PROJECT PERFORMANCE ASSESSMENT REPORT

BRAZIL

National Biodiversity Mainstreaming and Institutional Consolidation Project and Sustainable Cerrado Initiative

Report No. 154858
DECEMBER 18, 2020

IEG
INDEPENDENT EVALUATION GROUP

WORLD BANK GROUP
World Bank • IFC • MIGA

WHAT WORKS

1818 H Street NW
Washington DC 20433
Telephone: 202-473-1000
Internet: www.worldbank.org

Attribution—Please cite the work as follows:
World Bank. 2021. Brazil—National Biodiversity Mainstreaming and Institutional Consolidation Project and Sustainable Cerrado Initiative. Independent Evaluation Group, Project Performance Assessment Report 154858. Washington, DC: World Bank.

IEG INDEPENDENT EVALUATION GROUP | WORLD BANK GROUP
World Bank • IFC • MIGA

Report No.: 154858

PROJECT PERFORMANCE ASSESSMENT REPORT

BRAZIL

NATIONAL BIODIVERSITY MAINSTREAMING AND INSTITUTIONAL CONSOLIDATION PROJECT (TF-91515)

SUSTAINABLE CERRADO INITIATIVE (TF-96766, TF-96767, TF-97156, TF-97157)

December 18, 2020

Financial, Private Sector, and Sustainable Development

Independent Evaluation Group

Abbreviations

ARPA	Amazon Region Protected Areas Program
CBD	Convention on Biological Diversity
FIOCRUZ	Oswaldo Cruz Foundation
FUNBIO	Brazilian Biodiversity Fund
GEF	Global Environment Facility
GEF Cerrado	Sustainable Cerrado Initiative (Phase 1)
ha	hectare
IBAMA	Brazilian Institute of Environment and Renewable Natural Resources
ICMBio	Chico Mendes Institute for Biodiversity Conservation
ICR	Implementation Completion and Results Report
IEG	Independent Evaluation Group
MAPA	Ministry of Agriculture, Livestock, and (Food) Supply
MCTI	Ministry of Science, Technology, and Innovation
MMA	Ministry of Environment
PAD	Project Appraisal Document
PPAR	Project Performance Assessment Report
PROBIO	National Biodiversity Project
PROBIO 2	National Biodiversity Mainstreaming and Institutional Consolidation Project
TTL	task team leader

All dollar amounts are US dollars unless otherwise indicated.

IEG Management and PPAR Team

Director-General, Independent Evaluation	Ms. Alison Evans
Director, Financial, Private Sector, and Sustainable Development	Mr. José C. Carbajo
Manager, Infrastructure and Sustainable Development (Acting)	Mr. Stephen Hutton
Task Managers	Mr. Christopher Nelson

This report was prepared by Christopher Nelson and John Redwood III, who assessed the project in November 2019. The report was peer reviewed by Christoph Diewald and panel reviewed by Ridley Nelson. Vibhuti Narang Khanna and Viktoriya Yevsyeyeva provided administrative support.

Contents

Figures

Appendixes

Project Data

This is a Project Performance Assessment Report (PPAR) by the Independent Evaluation Group (IEG) of the World Bank Group on the Brazil National Biodiversity Mainstreaming and Institutional Consolidation Project (P094715) and the Brazil Sustainable Cerrado Initiative (P091827 and P121671). This instrument and the methodology for this evaluation are discussed in appendix C. Following standard IEG procedure, copies of the draft PPAR were shared with relevant government officials for their review and comment; no comments were received.

National Biodiversity Mainstreaming and Institutional Consolidation Project (P094715)

Basic Data

Country	Brazil	World Bank financing commitment	$22.0 million
Global Practice	Environment and Natural Resources	Actual project cost	$118.05 million
Project name	National Biodiversity Mainstreaming and Institutional Consolidation Project	Expected project total cost	$96.0 million
Project ID	P094715	Actual amount disbursed	U$22.0 million
Financing instrument	Specific investment loan	Environmental assessment category	B
Financing source	Global Environment Facility (GEF) Trust Fund Grant		

Dates

Event	Original Date	Actual Date
Concept review	03/21/2005	03/21/2005
Negotiations	03/19/2007	03/19/2007
Board approval	01/31/2008	01/31/2008
Effectiveness	09/12/2008	09/11/2008
Closing date	12/31/2013	12/31/2014

Key Staff Responsible

Management	Appraisal	Completion
Project team leader	Adriana Gonçalves Moreira	Adriana Gonçalves Moreira
Practice manager	Laura E. Tlaiye	Emilia Battaglini
Sector director or senior Global Practice director	Laura Tuck	Paula Caballero
Country director	John Briscoe	Deborah L. Wetzel

Sustainable Cerrado Initiative (P091827 and P121671)

Basic Data

Country	Brazil	World Bank financing commitment	$13.0 million
Global Practice	Environment and Natural Resources	Actual project cost	$38.43 million
Project name	Sustainable Cerrado Initiative	Expected project total cost	$33.69 million
Project ID	P091827 and P121671	Actual amount disbursed	$11.93 million
Financing instrument	Horizontal adaptable program loan	Environmental assessment category	B
Financing source	Global Environment Facility Trust Fund Grant		

Dates

Event	Original	Actual
Concept review	09/02/2004	09/02/2004
Negotiations	06/10/2009	06/10/2009
Board approval	03/18/2010	3/18/2010
Effectiveness	09/13/2010	09/10/2010
Closing date	12/01/2013	06/31/2015

Key Staff Responsible

Management	Appraisal	Completion
Project team leader	Garo Batmanian	Bernadete Lange
Practice manager	Karin Erika Kemper	Raúl Alfaro-Pelico
Sector director or senior Global Practice director	Laura Tuck	Paula Caballero
Country director	Makhtar Diop	Martin Raiser

Summary

Project Background and Description

Brazil is the most biodiverse country in the world, holding an estimated one-fifth of all known flora and fauna species. It also contains a wide range of climate types in seven major biomes, including the vast Amazon and now largely depleted Atlantic rainforests, the Cerrado savanna (which covering 2 million square kilometers is second in size only to Amazônia), the semiarid Caatinga, the world's largest Pantanal wetlands, and an extensive coastline.

The National Biodiversity Mainstreaming and Institutional Consolidation Project (PROBIO 2) was funded by the Global Environment Facility (GEF). Its project development objectives were (i) to promote mainstreaming of biodiversity at the national level in key public and private sector planning strategies and practices, and (ii) to consolidate and strengthen institutional capacity to produce and disseminate relevant biodiversity information. The project sought to mainstream biodiversity in selected public and economic sectors and in the private sector, and to strengthen the information base for biodiversity policy making.

The project development objectives of the Sustainable Cerrado Initiative (GEF Cerrado) were to enhance biodiversity conservation in, and improve environmental and natural resource management of, the Cerrado in Brazil's territory through appropriate policies and practices. GEF Cerrado was designed as an umbrella program expected to be implemented in two phases, of which this project was the first. Its four subprojects were the Cerrado Policy and Biome Monitoring Project, managed by the Ministry of Environment (MMA); the Biodiversity Protection Project, managed by the Chico Mendes Institute for Biodiversity Conservation (ICMBio); and the Goiás and Tocantins Sustainable Cerrado projects, managed by the respective state environmental secretariats. It sought to enhance conservation of the Cerrado's biodiversity, sustainably manage the Cerrado's natural resources, and strengthen institutions and public policies.

Results

Mainstreaming of biodiversity conservation in the public sector under PROBIO 2 was significant**.** PROBIO 2 successfully mainstreamed biodiversity considerations in key economic and social sectors at the national level, especially agriculture and public health. It promoted significant policy and planning advances in the Ministry of Agriculture, Livestock, and (Food) Supply with respect to agroecology and organic agriculture, which refocused the ministry's priorities in this regard**.** Considerable progress was also made regarding the links among biodiversity, wildlife health, and

human health through PROBIO 2's support to the Ministry of Health and the Oswaldo Cruz Foundation. Positive mainstreaming outputs were likewise generated in the energy sector and science and technology sectors, and Brazil's ability to meet both its Convention on Biological Diversity and national biodiversity targets was strengthened.

Private sector adoption of biodiversity-friendly production practices likewise expanded under the two projects, especially PROBIO 2. Financed in part with project resources, eight subprojects in four states have incorporated biodiversity conservation measures in agricultural, livestock, and forestry activities, among others. These interventions cover nearly 5 million hectares in productive landscapes in three biomes. More than 8,500 hectares were also placed in private nature reserves in five states and the Federal District under the GEF Cerrado Project.

GEF Cerrado was only partly successful in terms of enhancing biodiversity conservation**.** according to the Management Effectiveness Tracking Tool, the project was able to improve the management of 24 existing federal protected areas, but it greatly underachieved its appraisal target for the creation of new or expansion of existing protected areas at the time the project closed, and this situation has improved only marginally since.

PROBIO 2 succeeded in advancing Brazil's generation, dissemination, and use of pertinent information on its rich biodiversity. In addition to generating and disseminating new knowledge on biodiversity and public health, the project financed biodiversity-related studies in the agricultural sector by the Brazilian Enterprise for Agricultural Research, and updated information on fauna and flora. The Ministry of Science, Technology, and Innovation used project resources to recover and digitize historical publications on Brazilian biodiversity and link its existing information system on this subject with the Oswaldo Cruz Foundation's real-time information system on wildlife health, which was also strengthened under the project.

PROBIO 2 created new institutional mechanisms to compile and share biodiversity information and other pertinent knowledge through various means**.** These included (i) the Brazilian Virtual Institute for Biodiversity (PainelBio), a virtual partnership of 15 institutions for producing and disseminating relevant information on biodiversity; (ii) a virtual Center for Biodiversity Monitoring and Forecasting; (iii) 10 specialized national Centers for Conservation of Flora and Fauna; and (iv) Participatory and Laboratory Networks on Wildlife Health. The Brazilian Biodiversity Fund (FUNBIO) developed and made publicly available a knowledge base facility containing biodiversity-related information of interest to the private sector. GEF Cerrado also contributed to this objective by improving information on rural land use and land use change in the biome.

Both projects strengthened the capacity of the Brazilian public sector to promote and support biodiversity conservation and contributed directly to its institutional consolidation. They boosted the role and ability of MMA to carry out its responsibilities for developing, implementing, monitoring, and reporting on policies, strategies, programs, and projects, including in relation to the Convention on Biological Diversity. Both projects likewise helped establish and strengthen ICMBio.

PROBIO 2 contributed directly to the consolidation of FUNBIO, which also managed GEF grant resources for the MMA subproject in GEF Cerrado. This involvement, combined with that in the parallel Amazon Region Protected Areas Program (also managed by the World Bank), has led FUNBIO to become the premier source of biodiversity-related finance for the private sector in Brazil.

Results in terms of promoting more sustainable environmental and natural resource management were disappointing, especially in the Cerrado. Some progress was achieved due to the agricultural mainstreaming activities and private sector component of PROBIO 2. But although GEF Cerrado may have indirectly contributed to this outcome by finalizing the Action Plan for the National Sustainable Cerrado Program, its results in the field were limited.

Design and Preparation

Strong national leadership, cross-sectoral collaboration, and effective coordination between the World Bank task team and federal government counterparts contributed to the smooth and relatively efficient preparation of PROBIO 2**.** Project design and preparation were coordinated by the Secretariat of Biodiversity and Forests in MMA. Key professional staff in the various involved federal ministries and agencies participated actively from the beginning in preparing PROBIO 2, which also helped generate their strong commitment to its objectives and activities. The design of PROBIO 2 built on the achievements of and incorporated lessons from the first PROBIO (the National Biodiversity Project), FUNBIO, and other World Bank–managed biodiversity-related operations in Brazil and elsewhere in Latin America.

Like PROBIO 2, GEF Cerrado was based on one of the outputs of the original PROBIO project. The Cerrado and Pantanal Biodiversity Assessment workshop in March 1998 was followed by the creation of a "Cerrado Nucleus" in MMA and convocation of a multistakeholder working group in 2003 for preparation of a national program for the Cerrado's conservation and sustainable development. The resulting program was formalized by presidential decree in 2005. GEF Cerrado was intended to finalize the program's action plan and support implementation of activities for biodiversity and for natural resource use.

The design and preparation of GEF Cerrado suffered from extensive delays and other misfortunes. Originally proposed in 2004, the project later had to be cut in half financially—and thus in scope—because resources available from GEF were limited. During the early stages of project preparation, there were tensions and misunderstandings between MMA and the World Bank regarding the project's nature and scope, while later delays were due to operational difficulties in the World Bank and the GEF.

Implementation and Supervision

PROBIO 2's successful implementation was due in part to the active and enthusiastic participation of the professional staff in the various ministries and agencies involved. They remained highly committed to its objectives and actions throughout the life of the project and, in many cases, were champions for it in their respective institutions. World Bank supervision also played a helpful role**.** This included providing agencies that were not familiar with World Bank requirements and procedures with training and assistance on procurement and financial requirements.

GEF Cerrado's implementation was considerably more problematic and contributed directly to its less impressive results. The initially proposed phase 2 of the project did not materialize because MMA chose not to go ahead with it. The ministry claimed that this decision was taken because the proposed additional GEF or other concessional resources involved were insufficient, and because phase 1 was not performing well. However, the more likely reason is that the World Bank had already helped MMA to secure additional trust fund support for environment-related activities in the Cerrado, while the ministry preferred to use its limited GEF allocation in Amazônia.

GEF Cerrado also suffered from other implementation difficulties. The ICMBio subproject started late because the federal government failed to allocate budget resources to it for the first year of project implementation, while a general economic crisis and resulting federal budget restrictions later limited the extent to which the project was able to use its GEF allocation. Political factors also played a role in the incomplete implementation and limited results of GEF Cerrado, especially in relation to the legal establishment of new Protected Areas, both in Goiás and Tocantins.

Lessons

A critical element for the success of projects that seek to promote the mainstreaming of biodiversity across sectors, both public and private, is strong ownership and active participation across the project's life by the institutions involved. This element was in place for PROBIO 2 but was largely lacking for GEF Cerrado, which was additionally complex because two levels of government were involved.

A firm up-front understanding of the underlying political, economic, and territorial contexts of the geographic area in which a project is seeking to establish new or expand existing protected areas is essential to properly gauge the possibilities of achieving such an objective. The most significant impediment to the creation of new protected areas in the Cerrado at the state level proved to be bureaucratic and political resistance to doing so. Neither of these constraints was identified as a risk at appraisal, even though it was well known that large parts of the Cerrado were already occupied by medium and large export-oriented commercial agriculture and ranching establishments. Project preparation, therefore, would have benefited from a comprehensive stakeholder analysis, if not a full consultation, which would have allowed both the Brazilian government and the World Bank to better anticipate potential support for and opposition to the actions proposed.

Experience in Brazil (and elsewhere) has shown that government commitment to project objectives and design can shift significantly over time due to changes in administrations, both at the federal and state government levels. For GEF Cerrado this risk was recognized at appraisal but assigned a "low" possibility of affecting project implementation; in retrospect, it should have been considered more seriously up front, especially given the project's unusually long gestation period.

Learning from environment projects that use concessional financing, both successful and unsuccessful, can have policy implications that extend beyond the original project's intentions. Despite its considerable design shortcomings, implementation difficulties, and a moderately unsatisfactory outcome, the GEF Cerrado Project directly contributed to evolving World Bank support for the biome. One of the main project outcomes was finalization of the Action Plan for the National Sustainable Cerrado Program, which aimed at preventing and controlling deforestation and fires in the biome and was largely implemented through nine later World Bank–managed projects financed by trust funds from sources other than GEF.

José C. Carbajo
Director, Financial, Private Sector, and Sustainable Development
Independent Evaluation Group

1. Background, Context, and Design

1.1 This Project Performance Assessment Report (PPAR) by the Independent Evaluation Group (IEG) covers two World Bank–administered biodiversity conservation projects in Brazil partly financed by the Global Environment Facility (GEF). The National Biodiversity Mainstreaming and Institutional Consolidation Project (PROBIO 2) entailed partnerships among the Ministry of Environment (MMA), the Brazilian Biodiversity Fund (FUNBIO), the Caixa Econômica Federal, and numerous other federal government institutions in different sectors. The Sustainable Cerrado Initiative (hereafter GEF Cerrado) was an umbrella operation consisting of four subprojects implemented by two federal agencies and two state governments. With its four separate GEF grant agreements, this project was processed by the World Bank as a horizontal adaptable program loan and was initially expected to be the first part of a two-phase program.

Context and Background

1.2 Brazil is the most biodiverse country in the world. It holds an estimated one-fifth of all known flora and fauna species and contains a wide range of climate types in seven major biomes: the vast Amazon basin and tropical forest in the North (Amazônia); the world's largest inland wetlands (the Pantanal) in the Center West; the semiarid thorn forests (the Caatinga) in the Northeast; the Atlantic Forest (the Mata Atlântica) in the East; the Pampas in the extreme South; the Cerrado (tree and scrub woodlands and savanna), mainly in the Center West but extending into parts of the North, Northeast, Southeast, and South; and coastal and marine ecosystems in the Southeast, Northeast, and North.

1.3 FUNBIO, the Brazilian Biodiversity Fund project, was capitalized by GEF resources of $20 million for establishment and operation of a long-term grants program for biodiversity conservation and sustainable use.[1] Overseen by a board of directors with members from MMA, the private sector, and civil society, the fund finances competitively selected subprojects for biodiversity conservation, sustainable biodiversity use, policy analysis, applied research, and technology development. Although the project closed in February 2004, FUNBIO has continued to operate and manage GEF resources and was certified as an independent GEF implementing agency in 2015.[2]

1.4 The parallel National Biodiversity Project (PROBIO) was partly financed with a GEF grant of $10 million and closed in December 2005. Its aim was to help the Brazilian government initiate the National Biodiversity Program and Wildlife Health (PRONABIO) by identifying priority actions, stimulating development of subprojects,

and disseminating biodiversity information. Its main elements were events including (i) biome assessments for Amazônia,[3] Cerrado and the Pantanal,[4] Caatinga, Mata Atlântica, and the Continental Shelf to consolidate information on their biodiversity and assess conservation and sustainable natural resource use options as inputs for the National Biodiversity Strategy; and (ii) establishment of a Biodiversity Information Network to store, update, and link information generated in these assessments and provide an efficient means for communicating about biodiversity.

1.5 The projects considered in this PPAR were follow-on operations to PROBIO and FUNBIO. They were intended to develop these institutions' ability to independently contribute to the sustainability of Brazil's biodiversity and to improve the viability of biodiversity in the Cerrado region. They were implemented along with other World Bank–managed GEF biodiversity projects, which were carried out at both the biome level (also including Amazônia and the Caatinga) and the state level, and which were approved both before and after PROBIO and FUNBIO were launched.[5]

Objective, Design, and Financing of PROBIO 2

1.6 The project development objectives of PROBIO 2 were (i) to promote mainstreaming of biodiversity at the national level in key public and private sector planning strategies and practices; and (ii) to consolidate and strengthen institutional capacity to produce and disseminate relevant biodiversity information. According to the Project Appraisal Document (PAD), "mainstreaming" seeks "to integrate conservation goals and sustainable use of biodiversity into sectors that impact biodiversity" and "requires participation of both the public and private sectors to influence the entire commodity supply chain (for example, soybeans, meat, biofuels, timber, charcoal, and mining)" (World Bank 2007, 11).[6]

1.7 The first component was mainstreaming biodiversity into selected public and economic sectors (appraisal cost: $33.4 million; actual cost: unknown).[7] This component was designed to support implementation of the National Biodiversity Policy by incorporating biodiversity conservation and sustainable use principles in select government sectors, initially expected to include agriculture, fisheries, forestry, water resources, health, and science and technology. The process in each sector would involve several actions: (i) consolidation of existing information; (ii) consensus building among stakeholders; and (iii) development of solutions. It would support preparation of sectoral plans incorporating biodiversity management practices and was to have two subcomponents--one for planning and refinement of public sector policies and policy instruments, and one for sectoral activities incorporating biodiversity at the national level.

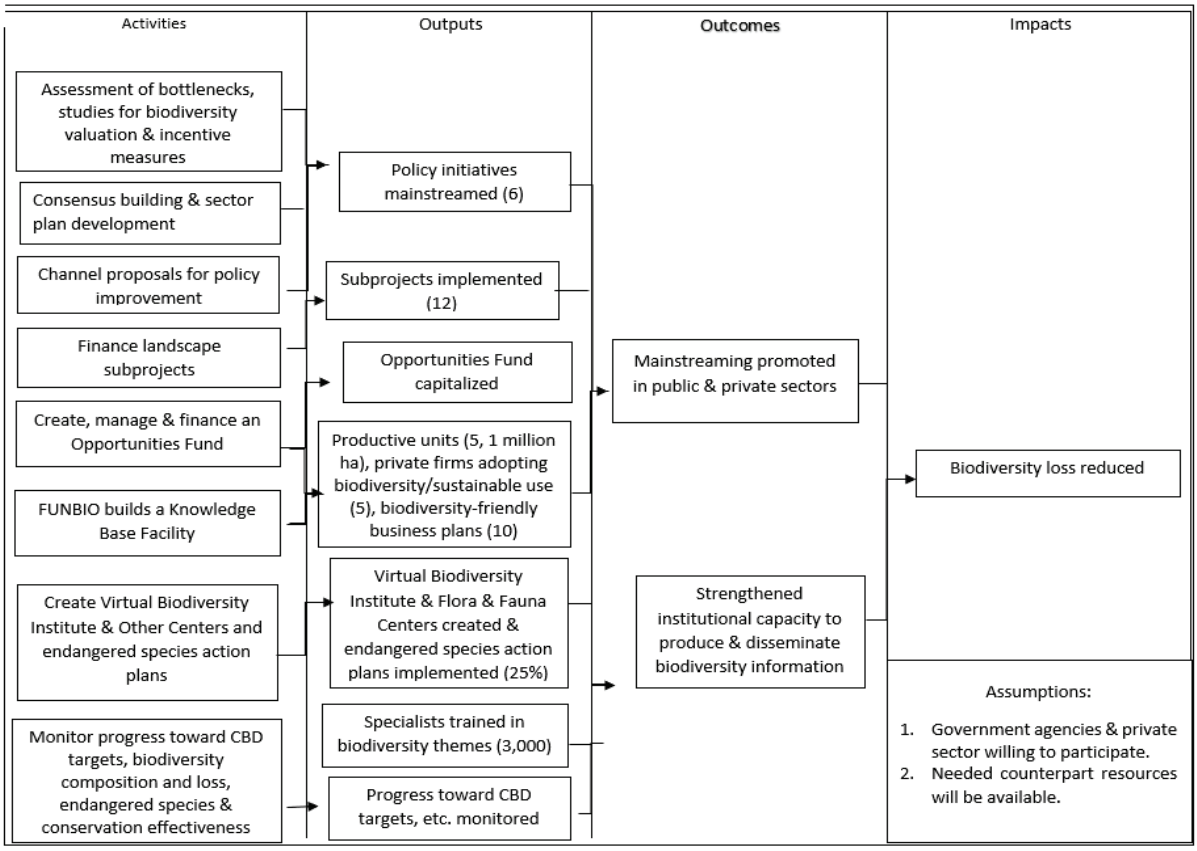
1.8 The second major component was mainstreaming biodiversity in the private sector (appraisal cost: $30.0 million; actual cost: unknown). It aimed at integrating biodiversity conservation and sustainable use into key private sector planning strategies and practices. The main mechanism for doing so was an Opportunities Fund, created and operated by FUNBIO, that would support mainstreaming biodiversity in large-scale productive landscapes. It also entailed establishment of a knowledge base facility with a database and website to facilitate the assessment and selection of subprojects and support future mainstreaming activities in the private sector.

1.9 The third component was institutional strengthening and generation of biodiversity information for policy making (appraisal cost: $31.1 million; actual cost: unknown). Its purpose was to enhance the capacity of the Brazilian federal institutions working on biodiversity to develop and disseminate information relevant to conservation mainstreaming. It would also monitor progress on key biodiversity indicators, including those linked to the Convention on Biological Diversity (CBD) targets for 2010.

1.10 The last component was project coordination and management (appraisal cost: $2.5 million; actual cost: unknown). The project was coordinated by MMA, through its Secretariat of Biodiversity and Forests, which had been established under the first PROBIO project. The National Biodiversity Commission (CONABIO) would provide consultative oversight on biodiversity priorities, policies, and guidelines.

1.11 A simplified theory of change for PROBIO 2 is presented in figure 1.1. It shows IEG's interpretation of the basic links among project activities, outputs, outcomes, and impacts, as PADs at that time did not contain theories of change per se.

Figure 1.1. Simplified Theory of Change: The National Biodiversity Mainstreaming and Institutional Consolidate Project (PROBIO 2)



Source: Independent Evaluation Group.
Note: FUNBIO = Brazilian Biodiversity Fund; CBD = Convention on Biological Diversity.

Objective, Design, and Financing of GEF Cerrado

1.12 The project development objectives of GEF Cerrado were to enhance biodiversity conservation in, and improve environmental and natural resource management of, the Cerrado in Brazil's territory through appropriate policies and practices. Its subprojects were (i) the Cerrado Policy and Biome Monitoring Project, managed by MMA; (ii) the Biodiversity Protection Project, managed by the newly established Chico Mendes Institute for Biodiversity Conservation (ICMBio); (iii) the Goiás Sustainable Cerrado Project, managed by the state Secretariat of Environment and Water Resources; and (iv) the Tocantins Sustainable Cerrado Development Project, managed by the state Secretariat of Water Resources and Environment.[8] The project was partly financed by a GEF grant of $13.0 million, of which $11.9 million had been disbursed at project closing. Estimated project costs at appraisal were $42.7 million, and actual project costs at completion were $49.3 million. The project also had four components, which were likewise not revised during implementation.

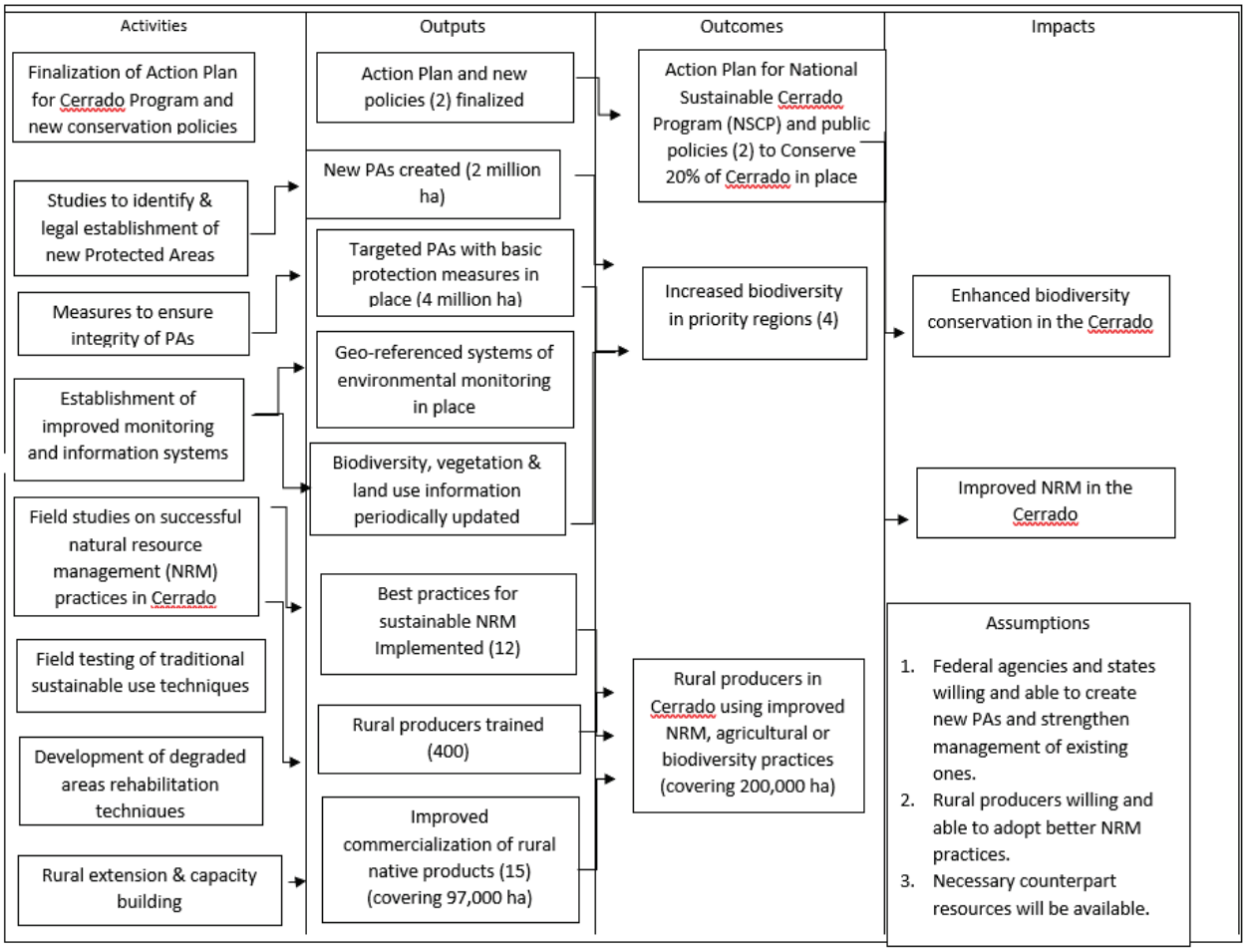
1.13 The first component was conservation of the Cerrado's biodiversity, which aimed at expanding and improving the management of its legally protected areas (appraisal cost: $12.0 million; actual cost: $12.0 million). This component was primarily the responsibility of ICMBio at the federal level and that of the environmental secretariats in the two participating states.

1.14 The second component was sustainable use of the Cerrado's natural resources (appraisal cost: $9.0 million; actual cost: $10.75 million). This component aimed at promoting improved management of the rural productive landscape, including adoption of sustainable agricultural practices by medium and large farmers and the sustainable use of native species by small farmers and local communities, while simultaneously reducing environmental impacts. It would achieve this objective through agricultural extension services intended to improve biodiversity practices. Activities included disseminating successful experiences, implementing agro-extractive systems, and building the capacity of rural producers to adopt best practices and alternatives to deforestation.

1.15 The third component was institutional strengthening and public policies (appraisal cost: $12.0 million; actual cost: $15.1 million). This component financed new public policies for conservation and sustainable use of the Cerrado and strengthened the capacity of government agencies to manage natural resources. It also engaged the private sector, civil society organizations, and local communities to participate in environmental management and formulation of new public policies for conservation and sustainable use of the biome's natural resources. This component was primarily the responsibility of MMA and the state environmental secretariats.

1.16 The final component was coordination and monitoring of the biome (appraisal cost: $9.69 million; actual cost: $11.43 million). In addition to seeking to ensure efficient project implementation, this component would support establishment of a publicly accessible database with updated georeferenced environmental and social information on the Cerrado. Overall project coordination was to be the responsibility of MMA. The simplified theory of change for GEF Cerrado is contained in figure 1.2, with the same caveat as stated for figure 1.1.

Figure 1.2. Simplified Theory of Change: The Sustainable Cerrado Initiative (GEF Cerrado)



Source: Independent Evaluation Group.
Note: ha = hectares; PAs = protected areas; NRM = natural resource management.

2. What Worked, What Didn't Work, and Why?

Results

2.1 The projects made substantial contributions to biodiversity conservation at the national level in Brazil, although there were also some significant shortcomings in the Cerrado. Although PROBIO 2 largely achieved its objectives in both the public and private sectors, GEF Cerrado was only partly successful. The main achievements and shortfalls are discussed in the following paragraphs.

2.2 The projects considerably enhanced biodiversity conservation and its mainstreaming in the public sector**.** As a result of advances achieved and monitored under PROBIO 2, Brazil's ability to meet CBD and national biodiversity targets made

noteworthy progress. This is described in detail in Brazil's *Fifth National Report to the Convention on Biological Diversity*, which was issued by MMA in January 2015 and which affirmed that "Brazil remains committed to develop and implement policies and solutions to integrate the conservation and sustainable use of biological resources into sustainable development strategies" (MMA 2015, 14). This report also highlighted the improved generation of knowledge on biodiversity achieved in recent years.[9]

2.3 PROBIO 2 was successful in mainstreaming biodiversity considerations in key economic and social sectors at the national level**.** This was especially true for the agriculture and public health sectors, as evidenced by the significant advances in agroecology and organic agriculture made in the Ministry of Agriculture, Livestock, and (Food) Supply (MAPA). The project forced a reconsideration of how agriculture policies could more effectively respond to biodiversity issues. For example, the rapid expansion of organic agricultural production in Brazil over the past decade is due in part to MAPA's official advocacy of this practice after its formal adoption of a new policy for agroecology and organic production (2012) and associated national plan (October 2013). According to MAPA, as of August 2018 there were 17,075 registered producers of organic food in the country (which is likely an undercount, given that not all such producers are registered); this in an increase from roughly 6,700 in 2013. At the end of 2017, the value of their output was on the order of $872 million, compared with $121 million in 2010. Over 70 percent of organic producers, moreover, are small farmers. PROBIO 2 instigated a culture of policy being informed by biodiversity considerations, and this approach had flow-on effects for MAPA.

2.4 The project's policy and planning outputs constituted a noteworthy transformation of MAPA's traditional approach. Under the project, MAPA rethought its emphasis on and assistance to large-scale—often export-oriented—commercial agriculture and livestock raising, which generally involved high levels of mechanization and use of chemical fertilizers and pesticides, particularly in the Cerrado**.** According to the former MAPA staff member primarily responsible for these outputs, PROBIO 2's support was essential for their development. These outputs played an important role in shifting the ministry toward promoting organic products, encouraging their adoption by a rapidly growing number of farmers, and supporting their sale to supermarkets and at street fairs throughout Brazil. More generally, MAPA is now giving much greater attention to the importance of ensuring the environmental soundness and sustainability of agricultural production, including biodiversity conservation, than was the case prior to PROBIO 2. This change is reflected in more recent World Bank–supported projects involving the sector in the Cerrado, including the Sustainable Production in Areas Previously Converted to Agricultural Use Project, which promoted low-carbon agriculture (including low tillage, planted pastures,

agroforestry, and mixed crop-livestock-forestry systems) and which was financed by the Strategic Climate Fund through the Forest Investment Initiative (2019),[10] as well as the ongoing Integrated Landscape Management in the Cerrado Biome Project (2018).[11]

2.5 As a result of project support to the Ministry of Health and the Oswaldo Cruz Foundation (FIOCRUZ), the health sector made considerable progress regarding the links among biodiversity, wildlife health, and human health**.** More specifically, the project made possible the real-time tracing of connections between wildlife and human illnesses and facilitated the development and implementation of measures to prevent and address these illnesses in remote rural communities and elsewhere. It also raised awareness about the importance of biodiversity and its conservation from a public health standpoint. At present, when there is substantial international awareness of the connection between wildlife and human diseases like Ebola and the coronavirus (COVID-19), this work is of obvious importance. In addition, there is strong evidence that habitat destruction is one of the main reasons why wildlife-human contact has increased rapidly in recent decades; see, for example, Gosalvez (2020). Positive mainstreaming results also occurred in the energy sector and the science and technology sector under the project.[12]

2.6 Private sector engagement and adoption of biodiversity-friendly production practices likewise increased under the project. FUNBIO successfully established and operated the Opportunities Fund under PROBIO 2 and through it was able to influence farmers to respond to environmental issues on some 4.8 million hectares (ha) in private rural landscapes in three major biomes (Amazônia, Atlantic Forest, and the Pampas). Altogether, eight subprojects in the states of Pará, Bahia, Espírito Santo, and Rio Grande do Sul have used PROBIO 2 funds from this source and their own resources to support biodiversity-friendly productive activities in the agricultural, forestry, and livestock sectors. These subprojects are briefly described in part 1 of appendix D. More generally, FUNBIO continued to increase awareness in the private sector concerning the role of biodiversity and the importance of its conservation for productive activities.[13] In addition, under the GEF Cerrado Project, 26 new private nature reserves totaling more than 8,500 ha were established in five states (Bahia, Goiás, Maranhão, Minas Gerais, and Tocantins) and the Federal District in 2010–14.

2.7 However, GEF Cerrado failed to achieve its targets for establishment of new protected areas and the share of the biome to be placed under greater protection. In retrospect, the appraisal target of 2 million ha in new and expanded conservation units was extremely optimistic; the project was able to place only an additional 390,486 ha under legal protection through the formal establishment of new federal and state protected areas, including two new national parks in Minas Gerais, expansion of an existing one in Piauí by ICMBio, and creation of a small (2,832 ha) state park in Goiás

under the respective subprojects. This result occurred even though the project had succeeded in carrying out the required preparatory biological, socio-economic, and land tenure studies and public consultations for PAs covering more than 2.1 million ha under the federal Subproject and nearly 402,000 ha under those for Goiás and Tocantins, for 5 other state PAs in the former and 4 in the latter. The reasons for these shortfalls involve both bureaucratic and political factors that will be discussed in the "Implementation and Supervision" section.

2.8 PROBIO 2 succeeded in advancing and consolidating Brazil's generation and dissemination of pertinent information on its rich biodiversity. The project financed biodiversity-related research in the agricultural sector by the Brazilian Agricultural Research Enterprise and on the links between wildlife and human health by FIOCRUZ.[14] This was done primarily through FIOCRUZ's Institutional Platform on Biodiversity and Wildlife Health (PIBSS) established under the project, and it resulted in the development of preventive measures and guidance publications, particularly for use in rural communities; see, for example, FIOCRUZ (2017). The project also updated and upgraded information on both Brazilian fauna (through ICMBio; this was used in part to identify endangered species and prepare and subsequently implement action plans for their protection) and flora (through the Botanical Gardens of Rio de Janeiro, which issued two landmark publications—"Red Books"—on threatened species). Finally, the Ministry of Science, Technology, and Innovation (MCTI) used project resources to recover and digitize historical publications on Brazilian biodiversity and to link its information system on this subject with FIOCRUZ's real-time information system on wildlife health, which was also strengthened under the project.

2.9 PROBIO 2 also created new institutional mechanisms to compile and share this and other pertinent knowledge through various means**.** These included (i) PainelBio, a virtual partnership of 15 institutions producing and disseminating relevant information on biodiversity;[15] (ii) a virtual Center for Biodiversity Monitoring and Forecasting, which provides information on 14 key biodiversity indicators based on the CBD 2010 targets; (iii) 10 specialized national Centers for Conservation of Flora and Fauna with capacity for generating products for biodiversity conservation and sustainable use; and (iv) the Participatory and Laboratory Networks on Wildlife Health. In addition, FUNBIO developed and made publicly available a knowledge base facility containing biodiversity-related information of interest to the private sector, as planned.

2.10 GEF Cerrado likewise played a positive role by improving information on rural land use and land use change in the biome**.** Under the MMA subproject of GEF Cerrado, knowledge of the vegetation and its cover was improved and deforestation estimates for the biome were updated. These activities were carried out specifically

through the TERRACLASS mechanism with support from Brazilian Agricultural Research Enterprise, IBAMA (the Brazilian Institute of Environment and Renewable Natural Resources), the National Space Research Institute), and other agencies, and it was expected that results would be made available through a newly developed Cerrado Socio-Biodiversity Portal.[16]

2.11 PROBIO 2 also contributed to Brazil's progress toward meeting its national targets and its commitments to the CBD. As part of its monitoring activities, the project successfully tracked progress toward meeting 51 CBD targets for 2010 organized under seven components;[17] it also tracked progress toward 20 national biodiversity targets for 2011–20 organized under five strategic objectives,[18] the results of which were presented in an Implementation Completion and Results Report (ICR) annex (World Bank 2015a, 53–62). This annex indicates that at the time of closing, the project had supported achievement of 41.2 percent of the CBD targets and contributed to 50 percent of the 2011–20 national ones.[19, 20] IEG was not able to independently verify or update this information (to 2020), given the enormity of the task involved. However, considerable relevant and detailed information regarding progress made by and in Brazil over the past decade in relation to many of these indicators is available in the country's two most recent National Reports to the CBD, issued respectively in January 2015 (that is, just after PROBIO 2 closed) and in 2019 (MMA 2015; MMA 2019).[21] In its Environmental Performance Review for Brazil, the Organisation for Economic Co-operation and Development stated that the country had succeeded in increasing the number of terrestrial protected areas from 919 in 2000 to 1,940 in 2015, or from 9 percent to 17 percent of the national territory (OECD 2015, 68), although in terms of area this was mainly in Amazônia. Much of this achievement, however, has occurred as the result of World Bank and GEF financial and technical support.

2.12 Relevant policy and planning gains also occurred under GEF Cerrado, and—as measured by the GEF Management Effectiveness Tracking Tool—management of existing protected areas improved as well. The project succeeded in formulating the Action Plan for the National Sustainable Cerrado Program, which was concluded by MMA in 2010 and updated in 2014.[22] This was one of the project's two Global Environmental Objective indicators. Much of this plan has been and is currently being implemented with financial support from two other World Bank–managed trust funds specifically focused on reducing deforestation and wildfires in the biome.[23] GEF Cerrado also reportedly promoted the improved management of 24 protected areas, covering 4,706,182 ha. These included nine national parks, one ecological reserve, one wilderness reserve, and five extractive reserves managed by ICMBio throughout the biome; three state parks and two environmental protected areas managed by the government of Goiás; and two state parks and one national monument managed by

the government of Tocantins. More than 70 percent of the area involved, however, was in the 16 federal protected areas.

2.13 Both projects strengthened capacity in the Brazilian public sector to promote and support biodiversity conservation, especially at the federal level, thereby directly contributing to its institutional consolidation more generally. In the public sector, the projects boosted the ability of MMA's Secretariat of Biodiversity and Forests, which had been created under the first PROBIO project, to carry out its responsibilities, including policy, strategy, program, and project development as well as monitoring and reporting to CBD on the country's progress toward national and global biodiversity protection targets. Through its MMA subproject, GEF Cerrado also provided support for management of this biome and finalization of the associated national program and action plan referred to above.

2.14 The projects also contributed to the establishment of a national fund for supporting private biodiversity conservation. This involvement, together with that in the parallel Amazon Region Protected Areas (ARPA) Program (also making use of World Bank–managed GEF and other concessional resources together with domestic funds),[24] has led FUNBIO to become the premier source of biodiversity-related finance for the private biodiversity conservation sector in Brazil. According its annual report for 2017, FUNBIO had supported 284 projects, 322 protected areas (with over 70 million ha under protection), 233 institutions, and 970 endangered species. More than half (55 percent) of its resources come from international cooperation, primarily GEF, and 14 percent come from other private national and international donations. The annual report also highlights the importance of the partnership established between FUNBIO and FIOCRUZ in the context of PROBIO 2 for efforts to use modern technology to carry out real-time monitoring of wildlife health and its links to human illness in rural areas in both Amazônia and the Northeast (FUNBIO 2018, 14–15, 53). A 20-year retrospective recently published by FUNBIO, moreover, highlights the critical role and importance of the GEF and the World Bank since the late 1990s in making these and other biodiversity-related achievements possible (FUNBIO, n.d., 84–85).

2.15 On the less positive side, however, results for promoting more sustainable environmental and natural resource management were disappointing, especially in the Cerrado. Some progress was achieved as a result of the agricultural mainstreaming activities (that is, the expansion of organic agricultural production and promotion of improved agroecological practices) and through the private sector component of PROBIO 2. Moreover, GEF Cerrado may have indirectly contributed to this desired outcome by finalizing the Action Plan for the National Sustainable Cerrado Program. But despite the fact that this objective was considered as important as biodiversity conservation, direct results in this regard were very limited and poorly monitored in

some instances. One evident reason for this imbalance was the comparatively much smaller project resources allocated for this purpose, $4.62 million versus $27.32 million for conservation, according to the PAD, and actual costs of $3.87 million as opposed to $24.08 million, according to the ICR. In this sense, there was a clear disconnect between the project's stated development objectives and its planned and actual resource allocation, which is also reflected in the much greater attention given to its biodiversity interventions by the project teams during implementation and by the World Bank in the ICR. However, this was only one of the deficiencies in project design.

Design and Preparation

2.16 The preparation and design experience of the two projects differed significantly and contributed directly to their differing outcomes. Although in the case of PROBIO 2 the preparation and design were comparatively harmonious and smooth, they were problematic in the case of GEF Cerrado. The principal differences are briefly discussed in the paragraphs that follow.

2.17 Strong national leadership, cross-sectoral collaboration, and effective coordination between the World Bank task team, especially the task team leader (TTL), and federal government counterparts contributed to the smooth and relatively efficient preparation process of PROBIO 2**.** Project design and preparation were coordinated by the Secretariat of Biodiversity and Forests in MMA, which had been established under, and coordinated the implementation of, the first PROBIO project. Key professional staff in the various federal ministries and agencies involved in the project participated actively in its preparation and design from the beginning, which also helped create their strong commitment to its objectives and activities. As a result, there was strong buy-in by the representatives of the nonenvironmental sectors (agriculture, health, and others) as well as from MMA, IBAMA, and later ICMBio for the mainstreaming of biodiversity conservation. This strong buy-in also characterized FUNBIO, which through the original FUNBIO project and ARPA had both prior and ongoing experience with the use of GEF resources and familiarity with GEF and World Bank requirements and procedures. This experience and familiarity facilitated preparation of the private sector component of PROBIO 2 as well as its subsequent ability to take on part of the financial management responsibilities for GEF Cerrado.

2.18 The World Bank and MMA (including IBAMA and later ICMBio, which were linked to it) had likewise developed a good and effective working relationship over the previous decade. This was due to ample past and ongoing experience with GEF, with another trust fund (for the Group of 7 ([G7] Program to Conserve the Brazilian Rainforests), and with World Bank loan–financed operations at the policy, technical,

and operational levels (especially the National Environment Program but also the Amazon Emergency Fire Prevention and Control Project, a project to combat fires associated with increasing deforestation in Amazônia).[25] Consequently, there was a shared vision regarding biodiversity conservation and other environmental priorities, including support for mainstreaming across sectors, awareness of the differing challenges in different biomes, and understanding of the persisting institutional consolidation needs at both the federal and subnational levels in Brazil.

2.19 The design of PROBIO 2 incorporated the lessons learned from the first PROBIO, FUNBIO, and other World Bank–managed biodiversity-related operations in Brazil and elsewhere in Latin America and was consciously designed to build on and expand their achievements.[26] As a result, project activities were for the most part carried out as planned, even though the initial intent was to involve even more sectoral ministries in cross-sectoral mainstreaming efforts. However, the then–Ministry of Agrarian Development did not get involved in this way;[27] this was because of insufficient interest on its part and perhaps the absence of an internal champion, such as were found in the ministries that did participate, especially MAPA and the Ministry of Health. The only noteworthy design issue in the private sector component was certain limitations in the initial operating rules and conditions in FUNBIO's Opportunities Fund, which would contribute to slow take-up by the private sector; but this issue was resolved during implementation through a World Bank–authorized partial restructuring, which in the end enhanced effectiveness.

2.20 Like PROBIO 2, GEF Cerrado was based on one of the outputs of the original PROBIO project, more specifically the findings and recommendations of its biome assessment workshop on priority areas and actions for biodiversity conservation in the Cerrado and Pantanal. This participatory workshop occurred in March 1998 and included representatives of federal, state, and municipal governments, as well as civil society organizations, academia, and the private sector. Even though the final biome assessment workshop publication was not issued by MMA until 2007, it was followed by establishment of a "Cerrado Nucleus" in the ministry and convocation of a Cerrado Working Group in 2003 with participants similar to those in the earlier workshop. The working group's purpose was to prepare a national program for the Cerrado's conservation and sustainable development and facilitate the coordination of federal and state government initiatives aimed at the protection and sustainable use of the biome's natural resources. In 2004, the working group delivered the first draft of the National Program for the Conservation and Sustainable Use of the Cerrado Biome to the minister of Environment (National Sustainable Cerrado Program). The National Sustainable Cerrado Program consisted of a sustainable development framework, including a set of principles and guidelines for improved environmental management,

greater biodiversity conservation, and social development in the biome. It was submitted to a public consultation process and formally created by a presidential decree in 2005. GEF Cerrado was intended to finalize the program's conversion into a comprehensive action plan (later known as the Action Plan for the National Sustainable Cerrado Program) and to partly implement its proposed activities, especially those related to biodiversity.

2.21 The design and preparation of GEF Cerrado, however, suffered from considerable delays and several unfortunate occurrences. The project as originally proposed in 2004 had to be cut in half financially—and thus in scope—because the availability of GEF resources was limited.[28] This was due in part to the extended length of the project's preparation period—nearly five years, compared with just two years for PROBIO 2[29]—and competing claims on Brazil's limited GEF allocation.[30] During the early stages of project preparation, moreover, there were tensions and misunderstandings between MMA and the World Bank regarding the project's nature and scope. This happened in part because the original local TTL was relatively new and did not adequately consult the ministry before submitting the Project Concept Note, with which MMA was not in agreement, to the GEF for review. One effect of this step was that the Project Concept Note had to be reformulated for submission to the GEF Secretariat and was only reviewed in June 2008, the first one having been issued in September 2004; appraisal did not take place until a year later (June 2009). More generally, delays in project preparation reportedly occurred due to World Bank and GEF processing issues, although the ICR refers only to an undefined "series of operational hurdles" to account for the excessively long project preparation period (World Bank 2015b, 4).

2.22 The final design of what was approved as the GEF Cerrado Project (phase 1)—which had to be presented in two different PADs to meet GEF requirements and deadlines for funding availability[31]—resulted in four complementary subprojects, grant agreements, and executing agencies (two federal and two state) in what was expected to be the first $13 million phase of a two-phase $27 million "Adaptable Program." Each of these subprojects, however, was allocated only a small amount of GEF resources ($3 million each to ICMBio, Goiás, and Tocantins, and $4 million to MMA, which was also expected to be the overall project coordinating agency). These resources were small in relation to the actual needs, considering that the Cerrado was the Brazilian biome most under pressure from increasing agro-ranching occupation and development but with only a small share of its territory and natural biodiversity under legal protection.[32]

2.23 Even considering that the planned Phase 2 of GEF Cerrado was expected to add another $14 million in grant resources, this total amount of concessional funding

was small in comparison with the biome's conservation challenges, such that the project's stated development objectives and associated output targets were overly ambitious. Furthermore, in addition to reflecting the project's institutional complexity, this situation contributed to weak ownership on the part of the two involved state governments (despite the strong commitment of the technical staff), which would deteriorate even further during implementation.

2.24 Later failures to legally establish new protected areas in Goiás and Tocantins under GEF Cerrado in part reflected the World Bank's insufficient understanding of the context-related implementation risks. These differences primarily took the form of contrasting levels of and dynamics of rural productive activities and associated local political economies in the two biomes, which were much less conservation friendly in the Cerrado than in Amazônia. More specifically, the Cerrado was undergoing rapid transformation into the locus of medium- and large-scale export-oriented agricultural (especially soybean) and livestock production, which meant that rural land in the biome was increasingly in demand and being occupied by farming and ranching activities, and that agro-industrial enterprises (sugar and ethanol production in parts of the region) were also rapidly expanding. Much of the land in the region, moreover, had already been occupied, especially in Goiás, while an active agro-ranching expansion process was taking place in Tocantins.[33] Had there been greater stakeholder consultation (with all potentially affected groups) or a comprehensive up-front stakeholder analysis as part of the project preparation process, the expectations and targets regarding the establishment of new protected areas in the Cerrado would likely have been more realistic.

2.25 Goiás and Tocantins were also at different developmental stages and therefore required different approaches. Reforms began in the 1960s with the inauguration of Brasília and construction of the Belém (Pará)-Brasília, Brasília-Cuiabá (Mato Grosso), and Brasília-Bahia highways.[34] Part 2 of appendix D presents empirical data from the past three Agricultural Censuses that show the principal characteristics of the agro-ranching economies of Goiás and Tocantins and their evolution over the past two decades. It also compares these characteristics and this evolution with that of selected other states and Brazil as a whole, thereby indicating the increasing importance of the Cerrado over this period as a source of medium- and large-scale commercial agricultural, agro-industrial, and livestock production, much of it for export. Based in part on the experience under this project, however, the World Bank is now much more aware of these characteristics and the constraints they represent to biodiversity conservation and environmental management more generally in the biome.[35]

Implementation and Supervision

2.26 Partly as a result of their differing design and preparation experiences, implementation and results of the two projects reviewed also differed. Both operations were hindered by the severe macroeconomic and fiscal crisis that affected Brazil, but its impact on GEF Cerrado was greater than on PROBIO 2, which started (and ended) earlier.[36] However, other factors also had a negative impact on implementation of GEF Cerrado, including its even greater institutional complexity involving both federal and state levels of government.

2.27 PROBIO 2's successful implementation was due in good measure to the active and enthusiastic participation of the professional staff in the various ministries and agencies involved throughout the life of the project. They remained highly committed to its objectives and actions and, in many cases, served as effective champions for the project within their respective institutions. In addition, both projects had an empowering effect on professionals in the ministries and agencies involved, including the state environmental secretariats in Goiás and Tocantins as well as those at the federal level: they allowed these professionals to pursue and their institutional objectives and responsibilities related to biodiversity conservation, and in some cases (at the MAPA, MMA, and MCTI, for example) they elevated them. For the most part, moreover, these professionals were engaged in the respective projects from start to finish, despite changes in administrations and institutional leadership at both the federal and state government levels.

2.28 World Bank supervision also played a helpful role, in part by providing training and assistance in procurement and financial requirements to agencies that were not familiar with World Bank requirements and procedures and whose lack of knowledge had contributed to some initial implementation delays in both projects. The relevant institutions were the Caixa Econômica Federal, MCTI, the Botanical Garden of Rio de Janeiro, and FIOCRUZ (for PROBIO 2), and ICMBio and the two state environmental secretariats (for GEF Cerrado); all expressed their appreciation for World Bank support in this regard during interviews carried out by IEG as part of the PPAR mission. In at least one case, moreover, the training and assistance apparently had an impact on agency procedures more generally.[37]

2.29 The positive contribution of the TTL in the case of PROBIO 2 was highlighted by those interviewed during the PPAR mission, especially her role in helping MMA coordinate project activities by a diverse set of institutions in a variety of sectors. As a local staff member, moreover, she was able to participate in PROBIO 2 from its initial concept stage through closing, thereby leading the project on the World Bank side for over a decade. The location of the TTL and other members of the World Bank project

team in Brasília, including the procurement and financial management specialists, likewise facilitated day-to-day interactions with the implementing agencies, which were also situated in the federal capital (this was partly the case for the GEF Cerrado). It also allowed the team to respond to occasional requests for "hand-holding" or meet the need for additional real-time training.

2.30 GEF Cerrado's implementation was considerably more problematic and contributed directly to its less impressive results. The initially proposed phase 2 of the project did not materialize as originally expected because MMA chose not to go ahead with it. MMA claimed during the PPAR mission that this decision was taken because the additional GEF or other concessional resources ($14 million) were considered too small and because phase 1 was not performing well. However, the TTL responsible for the appraisal and early supervision of phase 1 believes that this decision was most likely made for another reason: the World Bank had already helped the ministry to secure additional trust fund support for environment-related activities (specifically climate change mitigation) in the Cerrado (that is, from the government of the United Kingdom and the Forest Investment Program), and MMA preferred to use its limited GEF allocation for other biomes, especially Amazônia. The decision also reflected a more general shift in priorities within the ministry away from the Cerrado, together with a renewed concern about deforestation rates in the Amazon, which had started to rise again after a period during which they had been under greater control.[38]

2.31 In addition, even though resources had been specifically allocated for this purpose, MMA failed to effectively coordinate activities across the four GEF Cerrado subprojects, particularly those at the state government level. In this case, the experiences of PROBIO 2 and GEF Cerrado were quite different, both on the borrower's and on the World Bank's side, as well as in terms of the interaction between the two. In PROBIO 2 all implementing institutions were part of—or, in the case of FUNBIO, directly associated with—the federal government, while in GEF Cerrado, two federal agencies and two separate state governments were responsible for project implementation. Although MMA was able to coordinate PROBIO 2 with very strong assistance from the TTL, in GEF Cerrado MMA did not effectively use the resources allocated for coordination in project design for their intended purpose (except to collect and consolidate information provided by the other implementing agencies for the periodic reports to the World Bank).[39] In any event, in practice MMA had limited authority with respect to the two state governments involved. The fact that PROBIO 2 was managed on the World Bank side by the same very proactive TTL from early preparation through closing, and that she had developed very good personal relations with the representatives of each of the implementing agencies over time, was

also a positive factor. By contrast, GEF Cerrado had three different World Bank TTLs from start to finish, and the interpersonal relationships were not as lasting or strong.[40]

2.32 GEF Cerrado suffered from other serious implementation difficulties as well. The ICMBio subproject lost a full year, for example, because the federal government failed to allocate budget resources to it for the first year of project implementation, while the abovementioned economic crisis and the resulting federal budget restrictions subsequently also limited the extent to which the project was able to use its GEF allocation due to insufficient counterpart resources.[41] As a result, only 87 percent of these resources could be disbursed before project closing. Similarly, due to implementation constraints of a different nature, only 77 percent of the GEF allocation for the Goiás subproject was used. In this case, the principal impediment was the refusal of the incoming attorney general after a change in state government administrations to accept World Bank procurement rules and regulations over Brazilian national ones—despite efforts both by the local project team, which had remained unchanged, and World Bank supervision missions to convince him otherwise. This cut short the subproject's implementation and resulted in its inability to carry out some of the planned activities, making it the least successful part of the project.

2.33 Political factors also played a role in the incomplete implementation of GEF Cerrado, especially in relation to the legal establishment of new protected areas, both in Goiás and Tocantins. In the case of Tocantins, members of the former state project team informed IEG during the PPAR mission that even though all the preparatory work for creation of three new protected areas had been completed and the corresponding legal decrees drafted, they were not passed and the reforms became mired in political meddling. Support for conservation also declined in Goiás after the change in administrations mentioned above, and this likewise impeded the establishment of additional state protected areas. According to the local project team, in this case the same new attorney general pointed to a need to acquire land for and/or resettle people from the respective areas involved, and said that no state government resources were available for this purpose. As in Tocantins, there was most likely also underlying political resistance to the creation of additional protected areas and removal of land from potential productive use on the part of powerful vested rural landowners in the state.

2.34 World Bank supervision of GEF Cerrado was also helpful for many of the same reasons as described above for PROBIO 2, but there were also some differences. In contrast with the situation for the latter project, GEF Cerrado had two local TTLs during preparation and two during implementation, who were all environmental specialists. The procurement and financial management specialists were also local

staff. All were based in the World Bank's Brasília office and provided support to implementing agencies that the respective project teams appreciated. However, despite the best efforts of both TTLs during supervision, it was not possible to overcome the design shortcomings and constraints described in the "Design and Preparation" section, or the state-level implementation difficulties briefly discussed above in this section, during the latter stages of the project, particularly in Goiás.[42]

Lessons

2.35 **A critical element for the success of projects that seek to promote the mainstreaming of biodiversity across sectors, both public and private, is strong ownership and active participation by representatives of the various institutions involved throughout the project's life.** This element was present for PROBIO 2 but was largely lacking in the case of GEF Cerrado, which was additionally complex because two levels of government were involved.

2.36 **A firm up-front understanding of the underlying political, economic, and territorial contexts of the geographic area in which a project is seeking to establish new or expand existing protected areas is essential to properly gauge the possibilities of achieving such an objective**. The most significant impediment to the creation of new protected areas in the Cerrado at the state level proved to be bureaucratic and political resistance to doing so. Neither of these constraints was identified as a risk at appraisal, even though it was well known that large parts of the Cerrado were already occupied by medium and large export-oriented commercial agriculture and ranching establishments. Project preparation would have benefited from a comprehensive stakeholder analysis, if not a full consultation, which would have allowed both the Brazilian government and the World Bank to better anticipate potential support for and opposition to the actions proposed.

2.37 **Experience in Brazil (and elsewhere) has shown that government commitment to project objectives and design can shift significantly over time due to changes in administrations, both at the federal and state government levels.** For GEF Cerrado, this risk was recognized at appraisal but assigned a "low" possibility of affecting project implementation. In retrospect, it should have been considered more seriously up front, especially given the project's unusually long gestation period.

2.38 **Lessons from environment projects that use concessional financing, both successful and unsuccessful, can have policy implications that extend beyond the original project's intentions.** Despite its considerable design shortcomings, implementation difficulties, and moderately unsatisfactory outcome, the GEF Cerrado Project directly contributed to evolving World Bank support for the biome. One of the

main project outcomes was finalization of the Action Plan for the National Sustainable Cerrado Program, which aimed at preventing and controlling deforestation and fires in the biome and was largely implemented through nine later World Bank–managed projects financed by trust funds from sources other than GEF.

---

[1] Entities eligible for grant funding under FUNBIO are (i) state and municipal businesses and public agencies; (ii) private businesses, either for-profit or nonprofit; (iii) nongovernmental organizations; and (iv) research institutions.

[2] For an interesting history of FUNBIO (in both Portuguese and English), see FUNBIO (n.d.).

[3] The results of this workshop were later published in both Portuguese and English and provided the underlying analytical basis for the World Bank–managed Amazon Region Protected Areas (ARPA) Program initiated in 2002. See Verissimo et al. (2004).

[4] See MMA (2007). The workshop that resulted in this report took place in March 1998, but for various reasons, its report was not published until nearly 10 years later. The World Bank had previously also provided support for the Pantanal, Atlantic Forest, and coastal zone in Brazil under the Ecosystems component of the National Environment Program. In this regard, see, for example, Dolabella (2000, chapter 3); Redwood (2000).

[5] Prior to approval of GEF Cerrado, the World Bank and the GEF had approved two biome-specific projects for Amazônia, the Amazon Regional Protected Areas (ARPA) Project in August 2002 (see also endnote 25 below) and the Integrated Management of Aquatic Resources in the Amazon Region Project in June 2006, and the Caatinga Conservation and Management Project in June 2007. It had also approved state biodiversity-related projects for Paraná (May 2002), Rio de Janeiro (May 2005), São Paulo (June 2005), Espírito Santo (November 2008), and Rio Grande do Sul (December 2009). Following approval of GEF Cerrado, a second ARPA project was approved in February 2012 as was a Marine Protected Areas Project in September 2014, and most recently the Amazon Sustainable Landscapes Program in December2017. For a more detailed history of World Bank-administered GEF-financed biodiversity projects in Brazil, see John Redwood III, *The Evolution of World Bank Support for Biodiversity Conservation in Brazil: Project Design, Results, and Lessons Learned,* background paper for this PPARa for IEG, August 2019.

[6] The PAD states further: "Successful mainstreaming can result in lasting impacts within more far-reaching socio-economic processes than strict conservation alone, but these outcomes are often realized over the long-term" (World Bank 2007, 11).

[7] The Implementation Completion and Results Report (ICR) contains only the appraisal and actual amounts of the GEF funding and the total account of the actual costs ($118.05 million) compared with the appraisal estimate ($97.0 million), but it does not break down the actual amount by component.

[8] While Goiás and Tocantins were only 2 of the 10 states plus the Federal District that had parts of their territories in the Cerrado, they were the states that had the largest shares of their land areas—97 percent and 91 percent, respectively—in this biome.

[9] Part III of this report (MMA 2015, 174–208) specifically describes progress toward national and Aichi biodiversity targets. It indicates that, while the target of a 50 percent reduction in loss of native habitats compared with the 2009 rate had been surpassed in Amazônia, it had not been achieved in the Cerrado (MMA 2015, 182.) The 20 Aichi targets are a key element of the CBD's Strategic Plan for Biodiversity 2011–2020 and were adopted together with the plan at the 10th Conference of the Parties (CoP) in Aichi Prefecture, Nagoya, Japan, in October 2010. They are grouped under five goals: (i) address the underlying causes of biodiversity loss by maintaining biodiversity across government and society; (ii) reduce the direct pressures on biodiversity and promote sustainable use; (iii) improve the status of biodiversity by safeguarding ecosystems, species, and genetic diversity; (iv) enhance the benefits to all from biodiversity and ecosystem services; and (v) enhance implementation through participatory planning, knowledge management, and capacity. Each country, including Brazil, that is a party to the CBD was required to develop its own set of targets for each of the Aichi targets. The targets for Brazil, together with its National Biodiversity Strategy and Action Plan for 2016–20, were issued by MMA in 2017 and are available on the CBD's website.

[10] While undertaking the PPA mission in Brasília in November 2019, the main author of this report had an opportunity to attend a large public closing seminar for this project at which the current Minister of Agriculture, Livestock, and Supply, Tereza Cristina, who is from the Cerrado state of Mato Grosso do Sul, was the keynote speaker and at which she spoke very eloquently about the importance of environmentally sustainability and agriculture and livestock raising for Brazil. This reflected a level of awareness and public expression that would not have occurred on the part of most of her predecessors.

[11] Interestingly, while the first of these two projects had Bank agriculture staff, one based on Washington and the other in Brasília, as co-TTLs, the second one has agriculture and environmental co-TTLs, both based in Brasília.

[12] Specifically, the Energy Research Enterprise (EPE) under the Ministry of Mines and Energy (MME) carried out hydro-ecological studies on the Tapajós and Juruena basins in the Center West and Amazônia to guide decisions relating to hydropower projects and as an input to environmental licensing procedures. The studies identified critical areas for biodiversity conservation and linked the Ministry of Science and Technology's (MCTI's) Information System on Brazilian Biodiversity (SIBBr) with FIOCRUZ's online real-time information system on wildlife health, among other actions.

[13] FUNBIO performed diagnostic studies to select 12 priority geographic areas by mapping productive landscapes within priority biodiversity conservation zones for the implementation of such initiatives; to inform private sector activities, it also used project resources to finance studies by the Haas School of Business (University of California, Berkeley) on sustainable forests and an innovative financing mechanism.

[14] Through nine of its specialized research centers, widely scattered throughout Brazil, EMBRAPA implemented subprojects for (i) development and application of methodologies and techniques that were favorable to biodiversity in rural areas and that sought to minimize the adverse impacts of agriculture; (ii) public policies related to the use of native flora in regional economies; (iii) identification and analysis of soil quality indicators; (iv) provision of inputs to public policies related to direct planting; and (v) development of conservation and storage methods to permit farmers to use their own seeds.

[15] PainelBio is a multistakeholder panel whose declared purpose is to "contribute to the conservation and sustainable use of Brazilian biodiversity by promoting synergy between institutions and knowledge, making scientific information available to society, promoting capacity-building at various levels, and supporting decision making processes and public policies for achievement of the Aichi Targets in Brazil" (Natural Capital Coalition 2018). One external source states that it represents an example of "government dialogue best practice," noting that MMA presented a first version of the National Biodiversity Strategy and Action Plan to PainelBio in 2016. Through this mechanism, ways and means to strengthen the strategy were discussed "so that it could represent the different initiatives that work for biodiversity in Brazil." This source observes that "over 200 institutions and programs were invited to engage in the process to develop the National Biodiversity Strategy and Action Plan, contributing to their institutional actions…[and] each participant was requested to fill out a standard spreadsheet of the Action Plan, considering the 20 National Targets." See Natural Capital Coalition (2018).

[16] TERRACLASS Cerrado represents an application to the Cerrado biome of the same type of satellite-based geographical information on current rural land use and degradation, including deforestation, previously developed and used for the Brazilian Amazon region by the same institutions. It is expected to contribute to policy making and rehabilitation planning for degraded areas as well as to improve monitoring of land clearing. According to the ICR (World Bank 2015b, 43), the mapping activities and technical reports were concluded in June 2015, and MMA planned to make the results available in the coming months.

[17] The seven components (and the percentage to which the project contributed) are as follows: (i) knowledge on biodiversity (100 percent); (ii) biodiversity conservation (64.3 percent); (iii) sustainable use of biodiversity (38.5 percent); (iv) monitoring, assessment, prevention, and mitigation of impacts on biodiversity (71.4 percent); (v) access to genetic resources, associated traditional knowledge, and benefit sharing (0 percent); (vi) education, public awareness, information, and outreach on biodiversity (100 percent); and (vii) increased legal and institutional capacity for biodiversity (66.7 percent).

[18] The five strategic objectives (and the percentage to which the project contributed) are as follows: (i) address the underlying causes of biodiversity loss by mainstreaming biodiversity considerations across government and society (75 percent); (ii) reduce the direct pressures on biodiversity and promote sustainable use (40 percent); (iii) improve the status of biodiversity by safeguarding ecosystems, species, and genetic diversity (66.7 percent); (iv) enhance the benefits to all from biodiversity and ecosystem services (33.3 percent); and (v) enhance the

implementation through participatory planning, knowledge management, and capacity building (50 percent).

[19] Among the CBD targets to which PROBIO 2 made the strongest contributions were (i) an expanded and accessible list of formally described species of Brazilian plants, vertebrates, invertebrates, and microorganism (these possibly selectively developed in the form of potential databases); (ii) a preliminary national level assessment of the conservation status of all known plant and vertebrate species and a selective assessment of invertebrate species; (iii) maintained or increased capacity of ecosystems within priority areas for biodiversity to deliver goods and services; (iv) significant increase in actions to support on-farm conservation of the components of agro-biodiversity that ensure maintenance of sustainable livelihoods, local food security, and health care, especially for local communities and indigenous populations; (v) significant increase of investment in studies, projects, and research on sustainable use of biodiversity; (vi) creation and consolidation of a systematic and standardized nationwide biodiversity monitoring network; (vii) inclusion of the importance of biological diversity and the need for its conservation, sustainable use, and benefit sharing in communication, education, and public awareness programs; (ix) increased access to high-quality information on conservation, sustainable use, and sharing of benefits of biodiversity; and (x) establishment and strengthening of action networks for the conservation, sustainable use, and sharing of benefits of biodiversity. PROBIO 2 also reportedly contributed (though to a lesser extent) to progress with respect to 18 other indicators among the total of 51. See World Bank (2015a, annex 11).

[20] The national biodiversity targets (NTs) for 2011–20 to which the project directly contributed according to the ICR were (i) NT 1: by 2020, at the latest, Brazilian people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably; (ii) NT 2: by 2020, at the latest, biodiversity values, geodiversity values, and socio-diversity values have been integrated into national and local development and poverty reduction and inequality reduction strategies and are being incorporated into national accounting, as appropriate, and into planning procedures and reporting systems; (iii) NT 4: by 2020, at the latest, governments, private sector, and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption to mitigate or prevent negative impacts from the use of natural resources; (iv) NT 7: by 2020 the incorporation of sustainable management practices is disseminated and promoted in agriculture, livestock production, aquaculture, silviculture, extractive activities, and forest and fauna management, ensuring conservation of biodiversity; (v) NT 10: by 2015, the multiple anthropogenic pressures in coral reefs, and other marine and coastal ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and function; (vi) NT 12: by 2020, the risk of extinction of threatened species has been significantly reduced, tending to zero, and their conservation status, particularly that of species most in decline, has been improved; (vii) NT 13: by 2020, the genetic diversity of microorganisms, cultivated plants, farmed and domesticated animals, and wild relatives, including socioeconomically as well as culturally valuable species, is maintained and strategies have been developed and implemented for minimizing the loss of genetic diversity; (viii) NT 14: by 2020, ecosystems that provided essential services, including services related to water, and that contribute to health, livelihoods, and well-being, are restored and safeguarded, taking into account the needs of women,

traditional peoples and communities, indigenous peoples and local communities, and the poor and vulnerable; (ix) NT 17: by 2014, the national biodiversity strategy is updated and adopted as a policy instrument, with effective participatory and updated action plans, which foresee periodic monitoring and evaluation; and (x) NT 20: by 2020, the science base and technologies necessary for enhancing knowledge of biodiversity, its values, functioning, trends, and the consequences of its loss are improved and shared, and the sustainable use of biodiversity, as well as the generation of biodiversity-based technology and innovation, is supported, duly transferred, and applied; by 2017, the complete compilation of existing records on aquatic and terrestrial fauna, flora, and microbiota is finalized and made available through open access databases, with specificities safeguarded, with a view to identify knowledge gaps related to biomes and taxonomic groups.

[21] The latter report was based on information collected through December 2018. Both reports, together with their four predecessors (the third issued in September 2005 and the fourth in October 2010) can be found on the CBD website.

[22] Officially called the Action Plan for the Prevention and Control of Deforestation and Wildfires in the Cerrado, it was issued by presidential decree in September 2015 with 11 components divided into "thematic" and "mainstream" actions. The former were (i) biodiversity conservation; (ii) biodiversity sustainable use; (iii) water resources management; (iv) traditional and small communities; (v) agriculture, livestock, and forestry sustainability; (vi) information and promotion; (vii) monitoring and control; and (viii) regulatory aspects. The latter were (i) economic instruments; (ii) integrated planning; and (iii) institutional strengthening.

[23] This financial support involves nine projects approved between April 2014 and October 2018, four of which were financed by the United Kingdom's Brazil Cerrado Climate Change Mitigation Trust Fund and the other five by the Strategic Climate Fund for the Forest Investment Program. In chronological order by approval date, they are (i) Piauí Rural Cadastre and Fire Prevention, approved April 2014 and closed December 2017; (ii) Sustainable Production in Areas Previously Converted to Agriculture (also known as the Low-Carbon Agriculture Project in the Cerrado, or ABC Cerrado), approved July 2014 and closed November 2019; (iii) Bahia Rural Cadastre and Fire Prevention Project, approved September 2014 and closed December 2017; (iv) Platform of Monitoring and Warning of Forest Fires in the Cerrado Project, approved December 2014 and closed December 2017; (v) Dedicated Grant Mechanism for Indigenous Peoples, approved March 2015 and expected to close in December 2020; (vi) ProCerrado Project, approved April 2015 and closed May 2018; (vii) Environmental Regularization of Rural Lands in the Cerrado, approved July 2015 and expected to close February 2020; (viii) Development of System to Prevent Forest Fires and Monitor Vegetation Cover in the Cerrado, approved March 2016 and expected to close May 2020; and (ix) Integrated Landscape Management in the Cerrado Biome, approved October 2018 and expected to close in December 2023. Nos. (i), (iii), (iv), and (vi) were financed by Brazil Cerrado Climate Change Mitigation Trust Fund and are the subject of a joint Implementation Completion and Results Report (ICR) issued on November 28, 2018 (World Bank 2018a). These

projects and others receiving World Bank support in the Cerrado over the past decade are also briefly surveyed in Redwood (2019b), a background paper prepared for this PPAR.

[24] The ARPA project was approved in August 2002 for grants of $30.0 million from the GEF, $16.5 million from the World Wildlife Fund, and $14.4 million from the German international development bank KfW. Planned as the first phase of a 10-year program, its objective was to expand and consolidate the protected area system in the Amazon region, and it closed in December 2008. A follow-on ARPA II project was approved for grants of $15.89 million from GEF, $10 million from World Wildlife Fund, and $30 million from KfW in February 2012; it closed in July 2017. A third phase, the Amazon Sustainable Landscapes Project, is presently under implementation; a $60.33 million GEF grant was approved in December 2017, and the project is expected to close in April 2024.

[25] The Amazon Emergency Fire Prevention and Control Project was approved in September 1998 for a loan of $15.0 million and closed in December 2004. Its objectives were to prevent and control large-scale wildfires in the southern part of the Brazilian Amazon during the dry season of 1998 and to generate lessons regarding forest fire prevention and suppression techniques, through (i) risk assessment activities; (ii) fire prevention, primarily through community mobilization and training; (iii) strengthening of emergency coordination at federal, state, and municipal levels; (iv) building capacity for fire suppression; and (v) monitoring and evaluation. It was coordinated by IBAMA (the Brazilian Institute for Environment and Natural Resource Management) in collaboration with the state governments of what was known at the time as the "Deforestation Arc" (Maranhão, Tocantins, Mato Grosso, Pará, Amazonas, Rondônia, and Acre), after an earlier severe fire outbreak in the northernmost Amazonian state of Roraima.

[26] According to the PAD, "among the lessons learned from FUNBIO are elements necessary for the design of sustainable use programs; leveraging matching financial and material resources; development of private financial stimuli to engage the private sector in such initiatives; development of managerial, monitoring, and information infrastructure and systems; development of partner and beneficiary networks; and a pro-active Board of Directors to affirm decisions taken by a Fund. The selection of subprojects in Component 2 will be based on work carried out by FUNBIO and other projects. PROBIO provided numerous lessons on strategies and systems for consolidating information and building consensus. PROBIO's initial mainstreaming efforts also provided lessons on how to promote integration of biodiversity into other sectors and established a solid basis on which to build a network of biodiversity stakeholders. Other lessons on biodiversity monitoring and information have been drawn from projects in Brazil, including ARPA and PROBIO, and the Pilot Program to Conserve the Brazilian Rain Forests, and from projects implemented in other countries, such as the Inter-American Biodiversity Information Network (IABIN)" (World Bank 2007, 24–25). The PAD also pointed to other key lessons incorporated into the project strategy and design: (i) working on a large geographic scale to develop strategies relevant in a mega-diverse country; (ii) incorporating participation and consensus building throughout project implementation to increase the ownership and contributions of a wide range of stakeholders; (iii) designing projects from the early stages with the participation of all sectors; (iv) involving the private sector in biodiversity conservation, and creating synergies with public sector actions; (v) diversifying strategies to address different challenges and threats of each sector; (vi) organizing

and generating information in a manner relevant to decision makers; and (vii) affording acquisition of knowledge by many institutions.

[27] This ministry was responsible for carrying out federal agrarian reform and (internal) "colonization" activities—that is, the planning and management of rural land settlement projects—as distinct from the responsibilities of MAPA to promote large- and small-scale agricultural and livestock production. It was dissolved at the beginning of the current federal administration, which assumed office on January 1, 2019.

[28] The original Concept Note for the Cerrado project stated that it was to be financed with $30 million in GEF resources. This allocation was later reduced to $27 million, and then further cut to $13 million for the first phase.

[29] The Concept Note for PROBIO 2 was issued in March 2005; appraisal took place in March 2007; and the project was approved in January 2008. In contrast, the Concept Note for GEF Cerrado was issued in September 2004, but appraisal did not occur until June 2009, and project approval only occurred in March 2010.

[30] During the period when the original Concept Note for GEF Cerrado was issued and at the time it was approved, seven other projects that used GEF resources were approved: PROBIO 2; a project on conservation and management of the Caatinga (which like ARPA and PROBIO 2 was also an offshoot of the first PROBIO project); state-level projects for Rio de Janeiro, São Paulo, Espírito Santo, and Rio Grande do Sul; and a project on aquatic resources in Amazônia.

[31] The first PAD (World Bank 2010b) was issued on February 22, 2010, and the second on April 5, 2010 (World Bank 2010a). This highly unusual situation occurred to meet the GEF requirement that a PAD for the project be approved prior to the deadline for access to GEF resources, even though the project (that is, phase 1) had not yet been fully appraised. Hence the reason for the second PAD several months later.

[32] According to OECD (2015, 68), protected areas in Amazônia covered about 27 percent of its territory but they represented a much lower share of all the other major biomes, including the Cerrado, even though larger areas have been deforested both in the Cerrado and the Atlantic Forest. Targets were set in 2013 to put 30 percent of Amazônia, 17 percent of the other terrestrial biomes, and 10 percent of coastal and marine areas under legal protection by 2020, but this is likely to be impossible other than for Amazônia and the Pantanal.

[33] Goiás, located comparatively close to the major domestic consumer markets and ports in the Southeast and South, together with large parts of Mato Grosso do Sul and Mato Grosso and smaller parts of São Paulo and Paraná in the Cerrado biome, were the more established areas of soybean production in Brazil. More recent expansion of commercial agricultural and ranching activities occurred in more distant Cerrado states such as Maranhão, Tocantins, Piauí, and Bahia. Thus, even between Goiás to the south and Tocantins to the immediate north, there were significant differences in the dynamic if not the nature of the occupation of rural lands. In both states as in the rest of the Cerrado, however, the competition for land use for productive versus conservation purposes was significant, and much greater than in Amazônia. Recent deforestation rates and incidence of fires in the Cerrado have been even higher than in

Amazônia, although this fact has received much less attention in both the national and international media.

[34] The transfer of the federal capital from coastal Rio de Janeiro to the planned and newly built Brasília, located on the central plateau and officially inaugurated in 1960, was part of the government's strategy of opening up the vast interior of the country. Another part was the building and later paving of major highways connecting Brasília with Belém in the North, with Salvador, (Bahia) in the Northeast, and with Cuiabá farther to the west in Central Brazil. This construction initiated the process of frontier expansion through much of the Central West, and later to (and in) Amazônia. Those interested in this process can see Katzman (1977), especially chapters 2 and 3 (which refer to growth poles and developmental highways in Goiás) and chapter 5 (on planning for a demographic vacuum in Amazônia). The demographic and economic consequences of these developments over the past half century, however, is a story that needs to be both updated and told more fully.

[35] See, for example, World Bank (2019, 1–2), which states that "the Cerrado is a strategic biome both for economic and environmental reasons as well as for food security. It covers a large area [more than 2 million km^2, or 200 million ha] with significant carbon stocks, water resources, and substantial biodiversity.'' It adds: "Notwithstanding its ecological and socio-economic importance, the Cerrado is the Brazilian Biome that has suffered the most alteration due to human occupation after the Atlantic Forest. Over the past three decades there has been growing pressure to open new lands to increase meat and grain production for exports." It further observes that "despite the adoption of more sustainable agriculture practices [such as zero-tillage systems], studies have demonstrated that deforestation in the Cerrado Biome is more severe than in the Amazon Biome. Between 2013 and 2018, Amazon Biome deforestation represented 39,813 km^2. Over the same period, the Cerrado Biome lost 56,296 km^2, 2.7 percent of its cover, and only 48 percent of the area covered by natural vegetation remains," primarily in MATOPIBA.

[36] This crisis and the measures taken by the government to respond to it, especially budget restrictions, adversely affected the performance of the World Bank's portfolio with the federal government more generally during this period, as pointed out in the recent ICR for the Federal Integrated Water Sector Project (INTERAGUAS), implemented between July 2011 and October 2018. See World Bank (2019) for details.

[37] During the PPAR mission, the representative of the Caixa Econômica Federal who coordinated its activities for PROBIO 2 stated that, while he found it difficult and frustrating at first to have to apply World Bank financial management procedures, he later came to better understand their advantages and applied them to other activities not related to the World Bank or GEF.

[38] This shift is reflected in senior administrative changes within the ministry and the dissolution of the "Cerrado Nucleus" in MMA, which had been established in the mid-2000s to coordinate its (and the federal government's) activities in this biome. Amazon deforestation rates fell sharply between 2004 and 2006 but began to increase in 2007 and 2008 and stayed roughly flat

between 2009 and 2011, after which they fell again until 2016–18. They have risen even more sharply after the change in federal administrations in 2019.

[39] According to the staff member who coordinated the MMA subproject for GEF Cerrado, MMA never designated a specific individual or team or defined clear responsibilities for overall project coordination, despite having received resources for this purpose. The World Bank's TTL during appraisal and early supervision subsequently observed, however, that this most likely reflected the shortage of resources more generally in MMA even prior to the fiscal crisis–related budget restrictions. He described this shortage as a "chronic situation," and thus it is most likely that the available resources were used for other activities related to the subproject.

[40] Several of those interviewed by IEG stated that in the case of PROBIO 2, the World Bank TTL was the de facto project coordinator and was primarily responsible for providing the "glue" that kept the project together and its implementation largely on track. This coordination was not possible, at least not to the same extent, in the case of GEF Cerrado.

[41] As the peer reviewer pointed out, the budget constraints experienced by MMA and ICMBio at the time of fiscal crisis reflect the more general experience of World Bank projects that require resources to be passed through the federal budget in Brazil. As he put it, "Whenever the federal budget is involved, a project may not progress as fast as it otherwise could because of problems in budget management.. .. Bypassing government budgets facilitates project execution, at least in this case and in Brazil."

[42] Some GEF Cerrado activities in Tocantins were not fully completed by the time the project closed (even though it was able to fully use its GEF subproject allocation), particularly those involving local communities in buffer zones along a major state park in the eastern part of the state. But because there was another ongoing World Bank–supported operation, the Tocantins Second Integrated Sustainable Regional Development Project (approved in July 2012 for a loan of $300 million and expected to close in December 2020), it was possible to continue supporting these activities through its small agricultural and environmental components. As no similar World Bank project existed in Goiás, however, it was not possible to do the same in that state.

Bibliography

Arterberry, Tom, Jenn Kimbal, Michael Lebow, and Eliza Rosenbaum. 2008. *An Innovative Financial Mechanism: A Proposed Model to Improve the Financial Sustainability of FUNBIO's Territorial Projects*. Haas School of Business, University of California, Berkeley. https://funbio.org.br/wp-content/uploads/2014/11/An-Innovative-Financial-Mechanism.pdf

Dickie, Amy, Magno, Iran, Giampietro, James, and Alex Dolginow. 2016. "Challenges and Opportunities for Conservation, Agricultural Production, and Social Inclusion in the Cerrado Biome." San Francisco: CEA Consulting. http://www.climateandlandusealliance.org/wp-content/uploads/2016/09/Cerrado_Report_en.pdf

Campello, Silvana. 2015. Cantão: An Amazon Discovery. Palmas, Tocantins: Insituto Araguaia. https://www.magcloud.com/browse/issue/716081

Dean, Warren. 1997. *With broadax and firebrand: the destruction of the Brazilian Atlantic forest.* Berkeley: University of California Press. https://hdl.handle.net/2027/heb.02364

Dolabella, Ana Lúcia. 2000. "The Brazilian Pantanal: An Overview" in Frederick A. Swarts (ed.), *The Pantanal: Understanding and Preserving the World's Largest Wetland.* Paragon House, St. Paul, Minnesota. http://www.pantanal.org/papers.htm

Fabbri, Federico, Schricker, Hamid, Schahcheraghi, Reza, and Rui Bento. 2010. *Sustainable Forests: Vision, Challenges, and Risks for the Sustainable Forestry Sector and the Role of FUNBIO*. Haas School of Business, University of California: Berkeley. https://funbio.org.br/wp-content/uploads/2014/11/Funbio-Sustainable-Forestry-Management-.pdf

Fundação Oswaldo Cruz (FIOCRUZ). 2017. *Biodiversidade faz bem à saúde: guia prático*. Rio de Janeiro: Plataforma Institucional Biodiversidade e Saúde Silvestre. https://www.biodiversidade.ciss.fiocruz.br/sites/www.biodiversidade.ciss.fiocruz.br/files/Guia_Biodiversidade_Saude.pdf

Fundo Brasileiro para a Biodiversidade (FUNBIO). 2008. *Jurutí Sustentável: Uma Proposta de Modelo para O Desenvolvimento Local,* Rio de Janeiro. https://www.funbio.org.br/wp-content/uploads/2018/04/juruti_otimizado.pdf

Fundo Brasileiro para a Biodiversidade (FUNBIO). 2016. *Há 20 Anos Conservando o Futuro/20 Years Conserving the Future.* Coordenador Helio Hara: Rio de Janeiro. https://www.funbio.org.br/wp-content/uploads/2018/02/Livro-Funbio-20-anos-1.pdf

Fundo Brasileiro para a Biodiversidade (FUNBIO). 2018. *Annual Report 2017*, Rio de Janeiro. https://www.funbio.org.br/wp-content/uploads/2018/08/Funbio_AnnualReport_2017_ENG-1.pdf

Global Environment Facility. 2010. *GEF-5 Initial System for Transparent Allocation of Resources (STAR) Allocations.* GEF Council Meeting June 29-July 2, 2010, Washington D.C. https://www.thegef.org/sites/default/files/council-meeting-documents/C.38.9_Rev1_GEF-5_Operational_Procedures_for_STAR_0_1.pdf

Gosalvez, Emma. 2020. "How Habitat Destruction Enables the Spread of Diseases Like Covid 19." College of Natural Resources, North Carolina State University, Raleigh, North Carolina. https://cnr.ncsu.edu/news/2020/04/habitat-destruction-covid19/

Instituto Chico Mendes de Conservação da Biodiversidade. 2018. *Livro Vermelho da Fauna Brasileira Ameacada de Extinção*, Brasília. https://www.icmbio.gov.br/portal/images/stories/comunicacao/publicacoes/publicacoes-diversas/livro_vermelho_2018_vol1.pdf

Katzman, Martin T. 1977. "Cities and Frontiers in Brazil: Regional Dimensions of Economic Development." Harvard University Press: Cambridge, Massachusetts. https://www.hup.harvard.edu/catalog.php?isbn=9780674497047

Little, Paul. 2018. A *Case Study of the Brazil Forest Investment Program: An Innovation Approach to Forest Investments in the Cerrado Biome, 2012-2018.* World Bank, Washington D.C. https://www.climateinvestmentfunds.org/sites/cif_enc/files/knowledge-documents/fip_brazil_case_study.pdf

Margulis, Sergio. 2004. "Causes of Deforestation of the Brazilian Amazon." World Bank Working Paper 22, World Bank, Washington, DC. https://openknowledge.worldbank.org/bitstream/handle/10986/15060/277150PAPER0wbwp0no1022.pdf?sequence=1&isAllowed=y

Ministério de Meio Ambiente. 2007. *Cerrado e Pantanal: Áreas e Ações Prioritárias para Conservação da Biodiversidade*. Série Biodiversidade 17, Brasília. https://www.sema.rs.gov.br/upload/arquivos/201707/04142907-areas-proritarias-para-conservacao-da-biodiversidade-ministerio-do-meio-ambiente.pdf

Ministério de Meio Ambiente. 2010. *4th National Report to the Convention on Biological Diversity Brazil,* Brasília. https://www.cbd.int/doc/world/br/br-nr-04-en.pdf

Ministério de Meio Ambiente. 2015. *5th National Report to the Convention on Biological Diversity Brazil*, Brasília. https://www.cbd.int/doc/world/br/br-nr-05-en.pdf

Ministério de Meio Ambiente. 2019. *6th National Report to the Convention on Biological Diversity Brazil*, Biodiversity Series 55, Brasília. https://www.cbd.int/doc/nr/nr-06/br-nr-06-en.pdf

Natural Capital Coalition. 2018. *Government Dialogue Best Practice: Brazilian PainelBio Initiative & Its Role in National Strategy and Action Plan of Action for Biodiversity.* London, UK. https://naturalcapitalcoalition.org/government-dialogue-best-practice-brazilian-painelbio-initiative-its-role-in-national-strategy-plan-of-action-for-biodiversity/

Organization of Economic Cooperation and Development (OECD). 2015. Environmental Performance Reviews: Brazil. OECD Publishing, Paris. https://doi.org/10.1787/9789264240094-en

Redwood, John III. 2000. "The World Bank and the Pantanal." In *The Pantanal: Understanding and Preserving the World's Largest Wetland,* ed. Frederick A. Swarts (ed.), Paragon House, St. Paul, Minnesota

Redwood, John III. 2005. "World Bank Approaches to the Amazon in Brazil: The Bumpy Road to Sustainable Development." In *Global Impact, Local Action: New Environmental Policy in Latin America*, ed. Anthony L. Hall. London: Institute for Studies of the Americas.

Redwood, John III. 2019a. "The Evolution of World Bank Support for Biodiversity Conservation in Brazil: Project Design, Results and Lessons Learned." Background paper for this PPAR, McLean, Virginia.

Redwood, John III. 2019b. "World Bank Supported Projects in the Brazilian Cerrado (2009-2019)." Background paper for the PPAR and parallel Cerrado Case Study for IEG Evaluation on Natural Resource Degradation and Human Vulnerability, McLean, Virginia.

Sawyer, Donald. 2019a. PPAR Field Visit Reports (in Portuguese): 1. Sul de Goiás, November 9-10, 2019; 2. Meio Ambiente em Goiânia, November 10-11, 1999; 3. Palmas, November 12-14, 2019; and 4. Cantão, November 13, 2019, Brasilía, Distrito Federal.

Sawyer, Donald. 2019b. Summary Reports of Field Trips on IEG Missions in Goiás and Tocantins. Brasília, Distrito Federal.

Verissimo, Adalberto, Moreira, Adriana, Sawyer, Donald, dos Santos, Iza, and Luis Paulo Pinto. 2004. "Biodiversity in the Brazilian Amazon: Assessment and Priority Actions for Conservation, Sustainable Use, and Benefit Sharing." Instituto Socioambiental and Editora Estação Liberdade, São Paulo.

World Bank. 2004. "Brazil – Cerrado Integrated and Sustainable Management Project." Project Information Document. Concept Stage, Report No. AB1063, World Bank, Brasília.

World Bank. 2005a. "Brazil–National Biodiversity Mainstreaming and Institutional Consolidation Project." Project Information Document. Concept Stage Report AB1537, World Bank, Washington, DC.

World Bank. 2005b. "Brazil – Sustainable Cerrado Initiative." Integrated Safeguards Data Sheet. Concept Stage Report AC1014, World Bank, Washington, DC.

World Bank. 2007. "Brazil – National Biodiversity Mainstreaming and Institutional Consolidation Project." Project Appraisal Document Report 39011-BR, World Bank, Washington, DC.

World Bank. 2008. "Brazil – Sustainable Cerrado Initiative." Project Information Document. Appraisal Stage Report 29326, World Bank, Brasília.

World Bank. 2010a. "Brazil – MMA Cerrado Policy and Biome Monitoring Project and Tocantins Sustainable Cerrado Project in Support of the Sustainable Cerrado Initiative." Project Appraisal Document Report 32780-BR, World Bank, Washington, DC.

World Bank. 2010b. "Brazil – Goiás Sustainable Cerrado Project and ICMBio Biodiversity Protection Project in Support of the Second Phase of the Sustainable Cerrado Initiative." Project Appraisal Document Report 54062-BR, World Bank, Washington DC.

World Bank. 2015a. "Brazil – National Biodiversity Mainstreaming and Institutional Consolidation Project." Implementation Completion and Results Report ICR00003411, World Bank, Washington DC.

World Bank. 2015b. "Brazil – Sustainable Cerrado Initiative." Implementation Completion and Results Report ICR00003306, World Bank, Washington DC.

World Bank. 2016. "Brazil – National Biodiversity Mainstreaming and Institutional Consolidation Project." Independent Evaluation Group, Implementation Completion and Results Report Review, ICRR 14940, World Bank, Washington, DC.

World Bank. 2017. "Brazil — GEF Sustainable Cerrado Initiative." Independent Evaluation Group. Implementation Completion and Results Report Review 0020155, World Bank, Washington DC.

World Bank. 2018a. A Case Study of the Brazil Forest Investment Program: An Innovative Approach to Forest Investments in the Cerrado Biome, 2012-2018, Washington DC.

World Bank. 2018b. "Brazil – Brazil Cerrado Climate Change Mitigation Program. Implementation Completion and Results Report ICR00004686, ICR00004687, ICR00004688, and ICR00004689, Brasília.

World Bank. 2019a. Cerrado Biome Conservation in Brazil: World Bank's Approach, Program, and Projects Brasília.

World Bank. 2019b Brazil: Federal Integrated Water Sector Project – INTERAGUAS, Implementation Completion and Results Report, ICR00004613, Washington D.C.

Appendix A. Ratings

National Biodiversity Mainstreaming and Institutional Consolidation Project (P094715)

Table A.1. Principal Ratings

Indicator	ICR	ICR Review	PPAR
Outcome	Moderately satisfactory	Moderately satisfactory	Satisfactory
Overall efficacy	Satisfactory	Satisfactory	Satisfactory
Bank performance	Satisfactory	Moderately satisfactory	Moderately satisfactory
Quality of monitoring and evaluation	Not rated	Modest	Modest

Note: The Implementation Completion and Results Report (ICR) is a self-evaluation by the responsible Global Practice. The ICR Review is an intermediate Independent Evaluation Group product that seeks to independently validate the findings of the ICR. PPAR = Project Performance Assessment Report.

Table A.2. Project Performance Assessment Ratings Table

Outcome	Assessment and Justification
Relevance of objectives	The relevance of objectives was **substantial.** The project development objectives (PDOs) were to (i) promote mainstreaming of biodiversity at the national level in key public and private sector planning strategies and practices; and (ii) consolidate and strengthen institutional capacity to produce and disseminate relevant biodiversity information and concepts. The project's Global Environment Objective (GEO) was to contribute to the reduction of the current rate of biodiversity loss in Brazil, thereby contributing directly to the global target of the Convention on Biological Diversity (CBD) for 2010. **Background.** Brazil is the most biodiverse country in the world and the World Bank with Global Environment Facility (GEF) financing had successfully supported the government's conservation efforts through two previous parallel operations (PROBIO and FUNBIO) as well as through the earlier pioneering National Environment Program and the G7 Pilot Program to Conserve the Brazilian Rain Forests. At the time this operation was approved, it was also overseeing implementation of the GEF-financed Amazon Region Protected Areas (ARPA) project. **Alignment with the Country Strategy and CBD.** The PDOs were fully consistent with the World Bank's Country Partnership Strategy in effect for Brazil at the time the project closed (FY12–15), particularly its fourth main objective to "further improve the sustainable management of natural resources and enhance resilience to climate shocks while maximizing contributions to local economic development, and helping to meet rising global food demand" and, more specifically, to its subobjective of "improving environmental management, biodiversity conservation, and climate change mitigation." It was likewise fully consistent with the CBD and Brazil's commitments under this convention, which aimed to stem global biodiversity loss and whose implementation the project directly sought to advance at the national level. **Relevance of the PDO statement.** The PDOs appropriately focused on the "next steps" in the national biodiversity mainstreaming and institutional consolidation processes by promoting the integration of biodiversity considerations into strategic planning and practices in other economic sectors, especially agriculture, health, and science and

Outcome	Assessment and Justification
	technology, and on the part of the private sector, while at the same time strengthening government efforts to generate, share, and make publicly available relevant information with respect to Brazil's rich biodiversity. However, the objectives were very general and thus ambitious in nature and related more to processes (mainstreaming and institutional consolidation) rather than actual improved biodiversity conservation outcomes in the field, thereby leading to a substantial rating in terms of their relevance.
Efficacy	Efficacy is rated **substantial.** The key outcome indicators used to assess mainstreaming outcomes were (i) at least three key economic sectors apply biodiversity criteria and guidelines in their plans and policies by end of year 6 of the project, which was achieved in the agriculture, health, and science and technology sectors; (ii) tangible progress is made toward achieving the 50 quantitative targets established for Brazil as part of the CBD targets for 2010, tracked by a strategic set of monitoring indicators, which was exceeded as 21 of these targets were achieved; and (iii) at least 1 million hectares of affected landscapes under integrated conservation and sustainable use of biodiversity are established in Biodiversity Priority Areas with significant involvement of the private sector by the end of year 6 of the project, which was greatly exceeded for a reported total of nearly 5.4 million ha, mainly by the FUNBIO subprojects in Amazônia, the Mata Atlântica, and the Pampas, but on a much smaller scale through project-related activities by the Brazilian Agricultural Research Enterprise (EMBRAPA), and FIOCRUZ (in the Pantanal). Thus, the project successfully contributed to the mainstreaming of biodiversity in the Ministries of Agriculture, Livestock and (Food) Supply (MAPA); Health; and Science and Technology; and financed positive outputs in the energy sector. Through FUNBIO and the project-created Opportunities Fund, it enhanced financial and technical support for the integration of biodiversity concerns and activities by the private sector and other stakeholders in priority conservation areas primarily in three of Brazil's seven major biomes through investments that continued after the project closed (see part 1 of appendix D for a brief description). In addition, the project greatly improved the available information about biodiversity and its conservation status in Brazil by supporting the efforts of ICMBio (fauna), the Rio de Janeiro Botanical Gardens (flora), and other agencies to update and consolidate earlier efforts in this regard. It likewise contributed to the compilation and digitalization of relevant historical documents (by the Ministry of Science, Technology, and Innovation) and the undertaking of new and innovative studies in the areas of agriculture and biodiversity (EMBRAPA) and the relation between wildlife and human health (FIOCRUZ). In addition to producing a number of landmark publications (for example, the "Red Books" on flora and fauna) and meeting or surpassing most of the appraisal targets of both its key performance indicators (as noted above) and intermediate outcome indicators, PROBIO 2 created new mechanisms to bring together and disseminate this and other pertinent information through (i) PainelBio, a virtual partnership of 15 institutions producing and sharing relevant information on biodiversity; (ii) a virtual Center for Biodiversity Monitoring and Forecasting, which provides information on 14 key biodiversity indicators based on the CBD 2010 targets; (iii) 10 specialized national Centers for Conservation of Flora and Fauna with capacity for generating products for biodiversity conservation and sustainable use; (iv) the Participatory and Laboratory Networks on Wildlife Health; and (v) several other publicly accessible information systems, including the knowledge base facility established by FUNBIO and hosted on its website. These are significant and have thus far been lasting contributions that the implementing agencies have developed and expanded, especially in the agricultural and public health sectors.

Outcome	Assessment and Justification
Efficiency	Efficiency is rated **substantial** based on the considerations summarized below. **Value for money.** Considering the de facto hybrid nature of this project—that is, part policy and institutional development measures with implementation of some investment subprojects (especially with resources channeled through FUNBIO) in the field—it is difficult to assess efficiency. The outputs of the project are largely process-oriented and institutional and spread across many subactivities, with effects that are hard to quantify. Consequently, no economic analysis was undertaken either at appraisal or in the Implementation Completion and Results Report (ICR). From the perspective of five years after its closing, however, it is evident that the project has contributed to tangible results, even though the economic benefits of its wide-ranging actions are not possible to assess through either a cost-benefit or cost-effectiveness analysis. The project nonetheless helped stimulate a significant expansion of organic agricultural production and agroecological practices and generated a greatly improved national capacity to monitor and respond to the incidence of wildlife diseases that can be transferred to human populations. It likewise led to institutional advances in both the public and private sectors and establishment of several new mechanisms for updating and disseminating information on Brazil's biodiversity, which is of global importance. **Leveraging by and role of project resources.** At completion, the project cost was higher than expected at $118 million, compared with the $97 million estimated at appraisal. The additional $21 million came from the resources of the participating implementing agencies, especially MAPA, EMBRAPA, FIOCRUZ, and ICMBio, even during a period of considerable fiscal difficulty for the Brazilian federal government as a whole. Representatives of ICMBio, MAPA, Botanical Garden of Rio de Janeiro, and FIOCRUZ interviewed during the Project Performance Assessment Report (PPAR) mission affirmed that the GEF resources made available through the project had been essential to gain institutional buy-in and to permit the activities carried out under their respective subprojects to go forward. In the absence of GEF's concessional financial support accompanied by the World Bank's technical and operational assistance, these activities most likely would not have occurred, as otherwise they would most likely not have been given sufficient federal government priority or been reflected in its multiyear development plans and associated annual budgets. In short, the counterfactual is that, at best, without this external support they would have been implemented on a much more reduced scale and/or considerably less effectively, if at all. **Implementation efficiency.** Despite some initial delays due in part to the unfamiliarity of some project agencies with World Bank procurement and financial management procedures and requirements, which contributed to the need to extend the closing date by one year, the grant resources ($22 million) were fully disbursed. Considering its institutional complexity and the macroeconomic and fiscal crisis experienced by Brazil during the project period, on balance, its implementation was efficient.
Overall outcome	As per Independent Evaluation Group (IEG) guidelines, the overall outcome of the project is rated **satisfactory**, based on the partial ratings of substantial for relevance of objective, efficacy, and efficiency. As a follow-on project, PROBIO 2 succeeded in promoting biodiversity mainstreaming in several key sectors, thus strengthening key environmental institutions (MMA [Ministry of Environment], ICMBio, and FUNBIO), and it facilitated the ability of others to pursue biodiversity-related activities, programs, and research (especially MAPA, FIOCRUZ, and EMBRAPA), while at the same time expanding the production and dissemination of relevant information on Brazil's rich biodiversity (MMA, ICMBio, Botanical Garden of Rio de Janeiro, and the Ministry of Science, Technology, and Innovation). In doing so, it leveraged additional domestic financial resources from the participating federal

Outcome	Assessment and Justification
	government institutions and private enterprises in nonenvironmental sectors, especially agriculture (including livestock) and public health. It likewise empowered committed staff within the federal agencies involved to pursue pertinent biodiversity-related actions that, in the project's absence, most likely would not have occurred. Thus, it played a relevant role not only in policy development and institutional capacity building but also in the refocusing of sectoral priorities regarding biodiversity that have proven sustainable to date.
Risk to development outcome	Based on the strong continuity of project-related outcomes over the period since it closed (December 2014), but considering the explicit antienvironmental positions of the current federal administration, the risk to the development outcome of this project is considered **modest**. MAPA and EMBRAPA continue to support implementation of the Agroecology and Organic Production policy and plan; and the Ministry of Health, through FIOCRUZ, continues to carry out pertinent activities related to health and the environment and especially the links between wildlife and human health. It likewise continues to actively promote awareness, particularly in rural areas, of the importance of biodiversity conservation for public health through the Institutional Platform for Biodiversity and Wildlife Health established under the project. FUNBIO's financial and technical support to the private sector and civil society organizations for the integration of biodiversity conservation into productive activities also continues to expand with the use of GEF and other concessional resources together with increased counterpart funding from private and nonprofit organizations throughout Brazil. However, the main new risk to continued duration and immediate future expansion of PROBIO 2's positive outcomes in terms of biodiversity conservation is the reluctance of the current federal administration that assumed office in January 2019 to provide new financing for this purpose, which has particularly adversely affected the activities of (and staff morale in) MMA and ICMBio.
Bank performance	Bank performance is rated **satisfactory** for the reasons summarized below. **Quality at entry.** Building on the successful results of and lessons learned from its two parallel predecessor operations, including establishment of the Secretariat of Biodiversity and Forests within MMA and of FUNBIO, PROBIO 2 sought to promote biodiversity conservation activities in other key federal government ministries and agencies and in the private sector as well as to expand and consolidate institutional capacity development and the generation and dissemination of biodiversity-related information that had started during the previous phase of GEF and World Bank support. The project was designed in a very participatory fashion, with the World Bank's task team leader (TTL) and other Brasilia-based local staff serving as key partners in this process. While this may have required more time than if a less participatory approach had been used, the project ultimately benefited from the nearly universal commitment to its objectives and design on the part of those who represented the various institutions involved and who were also largely responsible for its subsequent implementation. While the earlier Implementation Completion and Results Report Review (ICRR) faulted the project's lack of a more detailed definition of project activities up front, the PPAR gives more weight to the strong interinstitutional collaboration and commitment of participating agency professional staff that the project was able to establish during the preparation phase. The World Bank TTL and other preparation team members, together with MMA, which successfully led this challenging interinstitutional process, also played an essential role in this regard. Thus, the PPAR rates quality at entry as satisfactory. **Quality of supervision.** The World Bank's positive contribution continued during implementation through its proactive supervision, which the participating government institutions credit for helping to maintain the discipline and providing the "glue" necessary to keep the project on track. The fact that the World Bank TTL was an

Outcome	Assessment and Justification
	experienced biodiversity specialist and remained the same throughout the life of the project was considered to have been a very positive element in this regard, as were the helpful training and hands-on support provided by World Bank local procurement and financial management specialists. This was of special importance for institutions such ICMBio, FIOCRUZ, Botanical Garden of Rio de Janeiro, and the Caixa Econômica Federal, which had not previously been familiar with World Bank procedures and requirements. Perhaps most importantly, the fact that virtually all of the World Bank team members, including the TTL, were based in the country office in Brasília, where many of the implementing agencies were also located, facilitated interaction among them and helped permit real-time World Bank response to implementation difficulties. World Bank–organized monthly meetings of all the participating agencies, in addition to periodic supervision missions and the Mid-Term Review, were viewed by many of those interviewed during the PPAR mission to have been essential for ensuring continued coordination and monitoring of implementation progress. The quality of supervision is thus likewise rated satisfactory.
Quality of monitoring and evaluation	The quality of monitoring and evaluation (M&E) is rated **modest** on account of the shortcomings and contributions indicated below. **Design.** Both the Implementation Completion and Results Report (ICR) and the ICRR pointed to shortcomings in the project's results framework indicators and M&E design. A positive contribution of the design, however, was the arrangement to track national progress toward meeting the 51 national 2010 CBD targets, and the 20 national biodiversity targets for 2011–20, with the results presented in an ICR annex. **Implementation.** MMA, as the overall project coordination agency, was also responsible for implementing its M&E activities. According to the ICR, M&E was carried out well, with data submitted by each of the implementing agencies and compiled by the project coordination unit on a regular basis. Several indicators and targets needed to be redefined during implementation and at the time of the Mid-Term Review. However, in addition to the specific activities for which they were individually responsible, the project also strengthened the implementing agencies' capacity to monitor progress toward the achievement of Brazil's 2010 CBD targets. **Use.** M&E results were used to help gauge project implementation progress over time, to provide important inputs for both the Mid-Term Review and the government and World Bank ICRs, and to assess the project's contribution to Brazil's national 2010 and 2011–20 biodiversity targets, thus also furnishing useful inputs for MMA's periodic reports to the CBD. Despite the initial design shortcomings, project M&E thus appears to have played a role not only in gauging performance and informing (fairly minor) needed adjustments during implementation but also in relation to Brazil's evolving progress in meeting its national commitments to the CBD.

Sustainable Cerrado Project (P091827 and P121671)

Table A.3. Principal Ratings

Indicator	ICR	ICR Review	PPAR
Outcome	Moderately unsatisfactory	Moderately unsatisfactory	Moderately unsatisfactory
Overall efficacy	Modest	Modest	Modest
Bank performance	Moderately satisfactory	Moderately unsatisfactory	Moderately unsatisfactory
Quality of monitoring and evaluation	Modest	Modest[a]	Modest

Note: The Implementation Completion and Results Report (ICR) is a self-evaluation by the responsible Global Practice. The ICR Review is an intermediate Independent Evaluation Group product that seeks to independently validate the findings of the ICR. PPAR = Project Performance Assessment Report.
a. This was not specifically rated by the ICR Review, but the comments imply a modest rating similar to that in the ICR.

Table A.4. Project Performance Assessment Ratings

Outcome	Assessment and Justification
Relevance of objectives	The relevance of objectives was and is **substantial.** **Background**. The Cerrado, while one of the most biodiverse, threatened, and neglected major biomes in Brazil, was and remains poorly covered by protected areas and other conservation measures, both at the federal and state government levels. In addition, as a region that had been undergoing rapid occupation by medium- and large-scale commercial agricultural and livestock establishments since the 1960s and featured active "frontier" areas in its poorer northern and northeastern portions (in the states of Maranhão, Tocantins, Piauí and Bahia), the biome also needed a more sustainable approach to natural resource management. This was recognized both in the earlier Global Environment Facility (GEF)-supported biome assessment carried out under the original PROBIO project and in the subsequent National Sustainable Cerrado Program developed by Ministry of Environment (MMA) in coordination with other key governmental and nongovernmental stakeholders, on which the present project was based. **Alignment with country strategy.** The project was likewise consistent with the priority given to environmental sustainability in the World Bank's Country Partnership Strategies for Brazil both for 2008–11 and 2012–15, with the former stressing, among other things, the need to increase support for federal and state policies and programs aimed at sustainable management of natural resources and conservation of biodiversity, and with the latter similarly highlighting the need for the World Bank to help the country to improve environmental management, biodiversity conservation, and climate change mitigation. **Relevance of the PDO statement**. This statement was and remains substantially relevant with its focus on both biodiversity conservation through the creation of new protected areas and expansion and improved management of existing ones in the Cerrado, as well as the need to simultaneously promote the adoption of more sustainable environmental and natural resource management practices by farmers and ranchers of all sizes in the biome. The project was also innovative by seeking to act at both the federal and selected state government levels, as well as to better coordinate conservation and rural sustainable development activities across the two levels of public administration. However, as the planned phase 2 of the project never materialized, in retrospect and given the special circumstances of the Cerrado (in terms of the status and dynamics of its

Outcome	Assessment and Justification
	rural occupation and economy), its objectives were clearly overly ambitious. In addition, while the PDO statement gave "equal billing" to both enhanced biodiversity conservation and improved environmental and natural resource management in the biome, there was a clear "disconnect" or inconsistency of these objectives with actual project design, which allocated the lion's share of the GEF and counterpart resources to the first of these two objectives.
Efficacy	Efficacy of the project is rated **modest** for the reasons described below. The Indicative Results Indicators (IRIs) for the biodiversity conservation objective for phase 1 were (i) an additional 2.0 million hectares of the Cerrado biome protected through the creation/expansion of PAs, which was considerably underachieved; and (ii) 30 percent of the Cerrado protected areas targeted by the Sustainable Cerrado Initiative with its basic protection measures in place, covering about 4 million ha, using the GEF Tracking Tool (Management Effectiveness Tracking Tool), which was reportedly achieved. Rating: **Modest.** For the sustainable use of the Cerrado's natural resources objective (which, according to the Implementation Completion and Results Report [ICR], would aim at "promoting the management of the rural productive landscape including the adoption of sustainable agricultural practices by medium and large farmers and the sustainable use of native species and local communities to improve the use of available resources and biodiversity conservation while reducing environmental impacts"), the IRIs were (i) 12 initiatives of traditional know-how and current best practices for the sustainable management of the Cerrado's natural resources with high replicability potential in protected area buffer zones and sustainable management protected area documented and disseminated, and 400 producers trained in the application of best practices, which was achieved; (ii) an additional 10 percent of rural properties in the project-supported areas regularly using some form of natural resource, land, or agricultural management or biodiversity conservation, covering at least 200,000 ha, which was not achieved; (iii) 15 initiatives for adding value and for improving the commercialization of native products originating from rural, sustainably managed production developed, totaling 97,000 hectares (ha) under specific sustainable management practices, partly achieved. Rating: **Modestly achieved**. Other project IRIs covering both objectives for institutional strengthening and public policies for the conservation and sustainable use of the Cerrado and strengthening government agencies to manage natural resources were these: (i) formulation of the Action Plan for the National Sustainable Cerrado Program publicly launched and under implementation, which was achieved; (ii) four new public policies related to the conservation and sustainable use of the Cerrado's natural resources developed, largely achieved by MMA through (i) illegal deforestation control in priority areas, (ii) ecological-economic zoning for land use planning, (iii) sustainable land use and forest management improvement in the Cerrado with concessional financial support from the World Bank–managed Forest Investment Program/Strategic Climate Fund, and (iv) federal agencies capacity strengthening related to the Cerrado, including training and other activities strengthening the ministry's activities related to the biome and supporting Action Plan for the National Sustainable Cerrado Program's coordination unit, ICMBio's capacity to prevent and combat forest fires in critical protected areas, and environmental monitoring and fire control in the Jalapão region of Tocantins with financial support from the German international development bank KfW; policy actions were also taken under the Tocantins and Goiás subprojects, but the one in the latter state referring to the creation of private nature reserves was never implemented; (iii) georeferenced systems for environmental monitoring, licensing of rural properties, and enforcement developed at

Outcome	Assessment and Justification
	the federal and state levels and under implementation in at least one state, achieved in both Goiás and Tocantins; (iv) six selected institutions working on matters related to the use of natural resources strengthened through staff training in specific environmental management processes and associated tools, achieved as MMA, ICMBio, and staff of six state institutions received such training; (v) three civil society networks and/or organizations strengthened to keep their affiliates informed about public policies and to communicate and represent civil society's opinions and aspirations in the national arena, achieved in Goiás and Tocantins; and (vi) information on the vegetation cover, biodiversity, and land use of the Cerrado biome periodically updated and made freely available, partially achieved at the time of project closing as the TERRACLASS system had been developed but its results were not yet publicly available, although it has subsequently gone online. Rating: **Substantially achieved**. On biodiversity conservation, the ambitious target of placing an additional 2 million ha of the Cerrado biome under protection was only approximately 20 percent achieved in practice, and this mainly by ICMBio in federal conservation units. While public consultations were carried out for five state protected areas in Goiás, only one such small protected area was added to an existing one. And despite the completion of all the required studies for four new protected areas in Tocantins, one was subsequently transferred to the ARPA project, and the governor failed to sign the decrees formally creating the others. In both cases, political resistance and opposition at the state level to removing additional areas from potential use for future productive activities was, or appears to have been, the underlying reason for the states' inability to legally establish these protected areas, a risk that had not been sufficiently appreciated by the World Bank at the time of project preparation and appraisal. The project did result in the improved management of 24 existing protected areas covering nearly 4.25 million ha (thus exceeding the 4 million ha appraisal target), according to the GEF Tracking Tool used to measure this result. Again, this occurred mainly through the ICMBio subproject but also to some extent in the subprojects for both Goiás and Tocantins. The project also succeeded in promoting the establishment of more than 8,500 ha in private reserves in six states and the Federal District. In addition, the Action Plan for the National Sustainable Cerrado Program was formally launched in 2010, was updated in 2014, and provided the basis for several subsequent World Bank–managed trust fund-financed operations for the prevention of deforestation and forest fires in the Cerrado that were approved between July 2014 and October 2018; government policies related to biodiversity conservation and sustainable use were approved in both Goiás and Tocantins. On balance however, achievements in relation to the project's biodiversity conservation objectives are rated **modest** due to the extreme shortfall in relation to its (in retrospect) clearly overly optimistic target for the creation of new or expansion of existing protected areas. Improvement of environmental and sustainable natural resource management **i**n the Cerrado, the project's second objective, was allocated a much smaller share of its GEF and counterpart resources. Results in the field were also disappointing despite the policy achievements mentioned above at the federal level and to some extent in Tocantins. While MMA supported the establishment of six Centers to Recover Degraded Areas in Minas Gerais and Bahia, the project failed to achieve a key appraisal target for 10 percent of rural properties in the areas in which it operated to regularly use some form of natural resource, land, or agricultural management or biodiversity conservation covering at least 200,000 ha. This had been expected to occur mainly through operation of a market-based mechanism to improve management of legal reserves in Goiás that was not implemented. Furthermore, the target of 15 initiatives to add value by improving the

Outcome	Assessment and Justification
	commercialization of native products originating from sustainably managed production in five extractive reserves under the ICMBio subproject and by the Tocantins subproject in state protected area buffer zones, involving a targeted total of 97,600 ha, was only party achieved, and the area covered was not recorded. Accordingly, project efficacy in relation to this objective is likewise rated **modestly achieved**. Several factors weigh against the more substantial achievements of the activities designed to support both objectives. There was considerable financial weight given to the component for biodiversity conservation, especially the creation and expansion of protected areas—it was allocated $27.3 million (actual costs at closing of $24.8 million), compared with the $4.62 million allocated to the sustainable environmental and natural resource management component (actual costs at closing of 3.89 million). Limited results were achieved in the field in relation to improved natural resource management in rural productive landscapes. Thus the overall project efficacy rating is **modest**.
Efficiency	Project efficiency is likewise rated **modest**. **Value for money**. The proposed phase 2, which would have more than doubled grant (and presumably also counterpart) resources for the Sustainable Cerrado Program, failed to materialize due to MMA's decision not to request additional GEF or other concessional finance to support implementation of its objectives and activities, even though considerable World Bank–managed trust fund resources subsequently were mobilized to help MMA and other federal agencies and a number of states to address climate change mitigation challenges (that is, to combat deforestation and fires) in the biome through a number of other projects. Partly as a result, the actual resources allocated for biodiversity conservation and sustainable natural resource use were perceived by many of the participants to have been insufficient to achieve what most of those interviewed during the PPAR mission, including in MMA and the state environmental agencies in Goiás and Tocantins, recognized to have been insufficient to achieve the proposed targets and ambitious objectives and targets. **Implementation efficiency**. The project closing date required one or more extensions for all four subprojects, totaling 18 months. Even so, two subprojects (ICMBio and Goiás) were unable to fully use their GEF grant resources prior to project closing. While this was partly due to budget constraints imposed by the federal government in response to the severe macroeconomic and fiscal crisis that adversely affected all of the World Bank's active portfolio at the time, it was also the result of various implementation delays and other difficulties.
Overall outcome	As per Independent Evaluation Group (IEG) guidelines, the overall project outcome rating is **moderately unsatisfactory** based on subratings of substantial for relevance of objectives and modest for both efficacy and efficiency. While the project did generate a positive outcome in terms of the improved management of existing protected areas in the Cerrado, it significantly underperformed in terms of the placement of additional land under legal protection for biodiversity conservation; and its results in terms of better environmental and natural resource management more generally were very limited. In fairness, these ambitious objectives were originally intended to be pursued with more than twice as much concessional funding from the GEF and/or other sources in an overlapping two-phase program. However, during implementation of phase 1, MMA decided not to go forward with the initially proposed second phase, which in and of itself severely reduced the project's potential impact.
Risk to development outcome	The risk to development outcome is **substantial**. Environmental agency and ex-subproject coordination staff interviewed during the PPAR mission in Tocantins stated that there was a good chance that the state protected areas, for which the necessary

Outcome	Assessment and Justification
	studies were carried out under the project, would finally be legally established in 2020, but five years after the project closed, and some of the sustainable natural resources activities initiated but not concluded under the project had been transferred (they are still under implementation with resources from the environmental and agricultural components of the World Bank–financed Tocantins Second Sustainable Regional Development Project), no further project-related follow-up activities have occurred or are presently expected in Goiás. More importantly, due to the antienvironment and anticonservation rhetoric and policies of the new federal administration that took office in January 2019, financial (as well as political) support to the Ministry of Environment and ICMBio, including for their biodiversity-related activities, has been severely cut. While the impact on the management of existing federal protected areas is uncertain but likely to be negative, no new federal resources are expected to be provided for creation of new or expansion of existing ones in the foreseeable future.
Bank performance	The quality of Bank performance is rated **moderately unsatisfactory.** **Quality at entry**. Although based on a previous World Bank–supported biome assessment to identify priority areas for enhanced conservation and sustainable natural resource management, the project took more than five years to prepare. In part as a result, it suffered from a substantial reduction in the GEF resources originally anticipated due to their increasing unavailability during its long gestation period. Furthermore, the project had to be divided into two, with possible funding from a different tranche of GEF resources for a proposed second phase that never materialized. Thus the project as eventually appraised consisted of four financially small subprojects implemented by four different government agencies with a poorly defined coordination mechanism that ultimately proved to be largely ineffective. Early on, there were also significant tensions between the World Bank and MMA staff and civil society stakeholders who had participated in preparation of the National Sustainable Cerrado Program (NCSP) regarding project contents and approach. These tensions, among other things, delayed preparation and led to a change in task team leaders (TTLs). In addition, before the fact, the World Bank had insufficient understanding of the underlying political economy of the Cerrado (compared with that of Amazônia, for example, where the World Bank and GEF had previously had significant prior experience), and thus of the likelihood that the project could achieve its conservation objectives. As a result, the associated risk of potential strong political resistance to the establishment of new and/or expansion of existing protected areas at the state level was underestimated by the World Bank at the time of appraisal. Finally, despite the "equal billing" given to the project's biodiversity conservation objectives and its sustainable rural natural resource use objectives, as noted above the resources allocated in its design were more than six times larger for the former than for the latter. Consequently, quality entry is rated **moderately unsatisfactory.** **Quality of supervision.** There were two different TTLs during the implementation stage of the project, who supported the project, as did other World Bank staff, with respect to its initial procurement and financial management issues and delays. However, this support was insufficient to overcome the design shortcomings summarized above and the political/institutional obstacles encountered over time, especially at the state level. Lack of familiarity with World Bank procurement and financial management procedures and requirements adversely affected early implementation of the ICMBio, Goiás, and Tocantins subprojects. However, those responsible for coordinating these subprojects who were interviewed during the PPAR mission acknowledged the helpful training and other assistance received from World Bank specialists in these areas as well as from the TTLs. As in the case of PROBIO 2, implementation support benefited from the fact that the TTLs were experienced local biodiversity specialists and, like the rest of the project

Outcome	Assessment and Justification
	team, were based in the World Bank's office in Brasília. This facilitated day-to-day operational and technical contact with the implementing agencies, especially MMA and ICMBio, and supplemented regularly scheduled supervision missions. However, this support could not make up for the lack of more effective coordination on the part of MMA, despite the fact that resources had been allocated for this function in project design. According to MMA staff interviewed, these resources were not actually used for this purpose. This was reportedly due to counterpart resource constraints, shifting internal priorities, and lackluster support for the project from top management, which declined during the implementation period. Changes in senior leadership in both the federal and state administrations over time also resulted in diminishing commitment to project and subproject objectives and activities and, thus, contributed to making World Bank supervision and implementation support less effective. Furthermore, the World Bank was unable to persuade an incoming state attorney general in Goiás to allow procurement of project-related activities to go ahead, thereby effectively shutting down subproject implementation. He was unwilling to accept the fact that World Bank–managed GEF projects followed World Bank rather than national procurement rules. On balance, the quality of supervision is rated **moderately satisfactory.**
Quality of monitoring and evaluation	The quality of monitoring and evaluation (M&E) is rated **modest** due to the design and implementation issues summarized below. **Design.** The project had complex M&E structures, with one results framework with one Global Environment Objective (GEO), two GEO indicators, and 12 common intermediate outcome indicators. Additionally, the four subprojects had specific results frameworks and some 21 intermediate outcome indicators and nine GEO indicators. Accordingly, the ICR (World Bank 2015, 6–7) argued that the results framework "could have been simpler with a GEO to focus on the two core outcomes that the project pursued, that is, (i) policies and plans and (ii) increasing area under protected areas and improved management of protected areas—as a first response to the threat of massive agricultural expansion to biodiversity in the Cerrado Biome." It also pointed out that "the two GEO indicators did not measure biodiversity directly but by proxy indicators related to the Management Effectiveness Tracking Tool, and that there was no direct measurement through indicators of management and practices at the GEO level." These shortcomings meant that the M&E design was inadequate for determining the extent to which the project was, in fact, able to enhance biodiversity conservation and improved rural environmental and natural resource management per se in the Cerrado. **Implementation.** The participating agencies at the subproject level were expected to establish baselines and collect data on project implementation, and this information was to be compiled and reported by the project coordination unit at the Secretariat of Biodiversity and Forests in MMA. While routine reporting did occur both prior to and after the Mid-Term Review, there were data deficiencies due to capacity constraints at the state level—for example, with respect to the area covered by project-induced improved natural resource management practices in Tocantins—but also, according to the earlier ICR Review (ICRR), due to "unclear definition of indicators," while "the large number of intermediate indicators necessitated additional data collection" (World Bank 2016). **Use.** Despite the shortcomings mentioned above, the TTL who led supervision during the latter part of the project period and was the main author of the ICR confirmed to IEG during the PPAR mission that the information gathered was sufficient to adequately gauge implementation progress and progress toward achievement of the PDOs as well as to identify needs to make adjustments both at the time of the Mid-Term Review and over the course of the project more generally. Over time, moreover, the M&E data confirmed that a political climate in the federal and state governments unfavorable for creation of new protected areas was one of the main reasons why this did not occur. As a result, the

Outcome	Assessment and Justification
	World Bank team decided not to propose a more substantial (that is, Level 1) restructuring but instead deployed an action plan to accelerate implementation in 2012, which was subsequently monitored on a monthly basis. The failure to collect some information (for example, the abovementioned data regarding the area under improved natural resource management due to subproject interventions in Tocantins) resulted in IEG's inability to confirm actual project performance in this regard.

References

World Bank. 2015. "Brazil—Sustainable Cerrado Initiative." Implementation Completion and Results Report ICR00003306, World Bank, Washington, DC.

World Bank. 2016. "Brazil—National Biodiversity Mainstreaming and Institutional Consolidation Project." Implementation Completion and Results Report Review ICRR14940, Independent Evaluation Group, World Bank, Washington, DC.

Appendix B. Fiduciary, Environmental, and Social Aspects

Financial Management

Financial management did not present any significant problems for either project considered in the present Project Performance Assessment Report (PPAR). However, the availability of federal government counterpart funds was constrained as a result of budgetary constraints enacted to help respond to the fiscal impacts of the general economic and financial crisis that affected Brazil—and other countries—during their overlapping implementation periods. In one case (ICMBio in the GEF Cerrado Project), this also affected an agency's ability to fully use Global Environment Facility (GEF) grant resources during the implementation period. This crisis and the government's response adversely affected the performance of all of the projects in the World Bank's active portfolio with the federal government at that time.

Financial management responsibilities for PROBIO 2 were split between the Caixa Econômica Federal for public sector institutions and activities (that is, components 1, 3, and 4), and FUNBIO for those directly involving the private sector (Component 2). According to the Implementation Completion and Results Report (ICR), however, "[financial management] was reviewed regularly and found generally satisfactory or moderately satisfactory throughout implementation, as arrangements including staffing/personnel, budgeting, accounting, internal control, funds flows, financial reporting, and auditing adhered to standards required by the World Bank" (World Bank 2015a, 12). It added that "overall FM [financial management] arrangements provided accurate and timely financial information and reasonable assurances that project funds were used for the purposes intended [while] independent auditors routinely audited project financial statements in accordance with international standards, and the World Bank received the unqualified audit opinions in a timely fashion." While the Caixa Econômica Federal did have some initial difficulties adapting to World Bank requirements, according to the person responsible for this activity who was interviewed during the PPAR mission, over time, with the World Bank's assistance, this experience contributed to lasting improvements in Caixa's internal approach to financial management more generally.

FUNBIO also played a role in financial management in the GEF Cerrado Project; grant resources for the Ministry of Environment (MMA) were channeled through and managed by it, as it possessed previous experience with World Bank procedures and requirements on account of the earlier GEF-financed FUNBIO and Amazon Region Protected Areas (ARPA) operations. As there were four separate grant agreements, the

counterpart resources for the ICMBio subproject went through—or were "internalized" in—the federal budget and the respective state government budgets for the subprojects in Goiás and Tocantins, and thus were managed separately in accordance with World Bank requirements. According to the ICR (World Bank 2015b, 9), "throughout and despite close supervision, audit reports, as well as the World Bank's Financial Management Supervision Reports, did point to some gaps in the project's financial management: (i) delays in submission of IFRs [Interim Financial Reports]; (ii) absence of detailed documentation of administrative costs; (iii) some process shortcomings within Internal Controls to approve payments; and (iv) gap on the control regarding counterparts' procedures." As a result, project financial management was rated **moderately satisfactory**.

Procurement

Procurement delays, due primarily to implementing agency unfamiliarity with World Bank requirements and procedures, occurred in both projects, but there were no recorded instances of misprocurement or misuse of funds in either one. However, the failure of the incoming attorney general (*procurador geral*) in Goiás, installed after a change in the state government administration, to accept that the World Bank's procurement requirements took precedence over national ones effectively curbed subproject implementation in the GEF Cerrado Project, thereby contributing to its inability to deliver some of its initially planned outputs and to fully use its GEF allocation.

For PROBIO 2, procurement was the responsibility of MMA and the various other implementing agencies for public sector subprojects and of FUNBIO for the private sector component. No major issues with project procurement were reported, although the ICR (World Bank 2015a, 11–12) noted that "all beneficiaries and executing agencies alike highlighted the difficulties in following the World Bank's guidelines, especially insofar as there were differences with Brazil's National Procurement Legislation, Law No. 8666." Because they were unfamiliar with World Bank guidelines and procedures, ministry and agency staff responsible for procurement were often reluctant to follow procedures other than those provided in national legislation, which resulted in implementation delays. This is a common problem with many World Bank–financed and/or –managed trust fund operations in Brazil.

For GEF Cerrado, MMA and FUNBIO were already familiar with World Bank procurement requirements because of their prior and ongoing involvement in other World Bank projects, World Bank–managed GEF projects, or other trust fund–supported projects (for example, the G7 Pilot Program to Conserve the Brazilian Rain Forest; ARPA), but as with PROBIO 2, the other implementing agencies (such as ICMBio and

the Goiás and Tocantins environment secretariats) were not. As a result, local World Bank procurement specialists needed to provide additional training and firsthand assistance to them during implementation, for which representatives of the various agencies involved expressed appreciation during the PPAR mission. The ICR (World Bank 2015b, 9), nevertheless reported that the implementing agencies performed well from a procurement perspective, "despite some operational issues" and that prior and post review of contracts raised no significant concerns, there was no misprocurement, and no significant mistake or wrongdoing was identified. It added only that "in general, procurement took longer than desired because of external factors such as the excessive time needed to prepare technical specifications and terms of reference or complex internal approval requirements inherent to each agency."

Environmental and Social Safeguards

Both projects were classified as category B for safeguards purposes. The safeguard policies initially triggered by both projects were (i) Environmental Assessment (OP 4.01); (ii) Natural Habitats (OP. 4.04); (iii) Pest Management (OP 4.09); (iv) Physical Cultural Resources (OP 4.11); and (v) Forests (OP 4.36). GEF Cerrado also triggered OP 4.10 (Indigenous Peoples) and OP 4.12 (Involuntary Resettlement). Both projects were considered very positive in the respective Project Appraisal Documents (PADs) from an environmental perspective. In the case of PROBIO, an Environmental Management Plan, including a brief Pest Management Plan (due to its activities in the agricultural sector), was prepared and included in the project's Operational Manual in order, according to the ICR (World Bank 2015a, 11) "to provide a framework for assessing potential impacts and presenting specific activities, responsibilities, and budgets to ensure the implementation of any needed mitigation measures." Similar provisions were made during preparation of GEF Cerrado and, in addition, according to its ICR (World Bank 2015b, 8) "each subproject also carried out a specific safeguard assessment that complied with the overall Project safeguard framework and with federal and state laws."

For PROBIO, safeguard compliance reviews were undertaken periodically as part of regular project supervision oversight and for the Mid-Term Review, when it was also verified that no social safeguards should be triggered. Supervision reviews reportedly confirmed multiple benefits for the conservation and sustainable use of biodiversity due to project activities. Even though the task team leader (TTL) was an experienced environmental specialist, both the preparation and supervision teams counted on the support of other environmental and/or social development and safeguard specialists. During project implementation, these specialists, together with the TTL, were based in the World Bank's office in Brasília. While the ICR did not specifically report on whether procedures were followed, its overall conclusion was that environment effects were positive, as confirmed in implementation support and field visits.

For GEF Cerrado, as concerns environmental safeguards, the ICR (World Bank 2015b, 8) affirmed that "ISRs [Implementation Status and Results Reports] throughout Project life consistently rated environmental safeguard compliance as Satisfactory." In relation to social safeguards, both an Indigenous Peoples Policy Framework and a Resettlement Policy Framework were elaborated during preparation, and the project reportedly complied with their requirements, according to supervision reports and Implementation Status and Results Reports. The Resettlement Policy Framework summarized in the PAD affirmed that creation of new protected areas and expansion of existing ones would be consistent with the pertinent Brazilian Legislation and ICMBio normative instructions for land regularization of any areas required for these purposes. These measures foresaw the need for compensation according to market values of affected land and assets for those possessing formal legal rights to land, and compensation by market value of assets for those who had no recognizable legal right or claim to the land they occupied.

At the time of project closing, no pending involuntary settlement issues were reported for any of the four protected areas created or expanded under the ICMBio and Goiás subprojects, and World Bank social safeguard requirements had been met. As in the case of PROBIO 2, a local senior social development specialist was a member of the World Bank's supervision team, and no indications were encountered either by the Implementation Completion and Results Report Review (ICRR) or the PPAR mission to contradict this conclusion. It is nonetheless important to recall that, according to the former subproject coordinator interviewed during the PPAR mission, the reason given by the new attorney general in Goiás for not authorizing creation of new state protected areas (even though all other requirements had been met) was that there were no financial resources available in the state government budget to compensate people who might need to be relocated or whose access to natural resources would be diminished as a result of—and prior to—their formal legal establishment. However, an ICR footnote points out that "Brazilian legislation ensures that: (i) local populations that have to be physically relocated by the creation of protected areas only can be removed after they receive fair compensation; and (ii) local populations that are affected by restricted access to natural resources due to the creation of protected areas may be consulted and provided livelihood alternatives under the protected areas' Management Plans" (World Bank 2015b, 8–9). This is an issue that the World Bank should have foreseen and taken into account in project design and appraisal, but it was not among the possible safeguards-related risks identified in the PADs and thus was apparently overlooked.

References

World Bank. 2015a. "Brazil—National Biodiversity Mainstreaming and Institutional Consolidation Project." Implementation Completion and Results Report ICR00003411, World Bank, Washington, DC.

World Bank. 2015b. "Brazil—Sustainable Cerrado Initiative." Implementation Completion and Results Report ICR00003306, World Bank, Washington, DC.

Appendix C. Methods and Evidence

This report is a Project Performance Assessment Report. This instrument and its methodology are described at https://ieg.worldbankgroup.org/methodology/PPAR.

This PPAR was based on a comprehensive review of project documents, including project Concept Notes, Project Appraisal Documents (PADs), project papers (for all level 2 restructurings), Implementation Status and Results Reports (ISRs), Implementation Completion and Results Reports (ICR), and Independent Evaluation Group (IEG) ICR Review (ICRR) reports. It also considered other pertinent non–World Bank documents obtained during the PPAR mission, which visited Brasília, Goiânia (Goiás), Palmas (Tocantins), and Rio de Janeiro between November 4 and November 22, 2019. To better understand the World Bank's involvement in biodiversity conservation and its activities in the Cerrado over the past decade, two background papers were drafted by the consultant in advance of the PPAR mission, together with a Concept Note for a before action review discussion in the IEG.

In addition to representing a freestanding output regarding part of the World Bank–managed Global Environment Facility (GEF) support for biodiversity conservation in Brazil over the past several decades, it was also intended to serve as a partial background input for the Brazil Cerrado Case Study for IEG's multicountry evaluation on Natural Resource Degradation and Human Resource Vulnerability, led by Lauren Kelly. The field missions for both the PPAR and the case study occurred at the same time, and the same Brasília-based international consultant (see below) participated in both. He was involved in all of the meetings with government officials and civil society stakeholders for the case study in Brasília as well as in a related field visit with one of the other members of its IEG evaluation team. The consultant primarily responsible for the PPAR also participated in some of these meetings with current or former government officials from the Ministry of Environment (MMA) and Ministry of Agriculture, Livestock, and (Food) Supply (MAPA) and civil society representatives in Brasília, but not in the field visit mentioned above. The consultant did, however, participate in the subsequent field visits in Goiás and Tocantins and some of the associated meetings with GEF project state coordination teams, while also pursuing additional contacts, especially in Tocantins, in relation to the case study. He did not, however, participate in the PPAR meetings in Rio de Janeiro or Washington DC, briefly described below.

During the PPAR mission, interviews were carried out with the task team leaders (TTLs) for both projects, who are based in the World Bank's country office in Brasília and, most importantly, are with their principal counterparts in the respective implementing agencies as indicated below. Following the mission, an interview was also conducted

with the TTL for GEF Cerrado during the latter stages of preparation and appraisal as well as during the initial phase of supervision. A more detailed list of individuals interviewed or met with during the PPAR mission in Brazil is included at the end of this appendix.

Both projects were a mixture of policy and institutional development measures. They also involved very widespread interventions in the field. This was the case in the public sector for GEF Cerrado (creation of new protected areas, expansion and improved management of existing protected areas in numerous states together with support for small natural resource–based livelihoods enhancement in remote locations). It was likewise true for the private sector conservation and production-related activities in three different biomes—Amazônia, Mata Atlântica, and Pampas—through FUNBIO in that of PROBIO 2. Thus, it was not feasible to carry out field visits to individual subprojects as part of the PPAR mission. However, a weekend field survey of both older (south-central Goiás) and more recent (Tocantins) areas of rural occupation in the Cerrado was undertaken, with the latter also involving a visit to and observation of a Park Management Council Meeting for a state protected area (specifically Cantão; see Campello, n.d.) in the transition zone between the Cerrado and Amazônia near the Araguaia River in central western Tocantins, together with a representative of the state environmental agency who had previously participated in the GEF Cerrado Project.

These visits were made in lieu of site visits to places where project activities had taken place in the field, for several reasons. In the first place, these activities were literally few and far between. The most significant on-the-ground investments directly supported by PROBIO 2 were the private sector–related ones supported by FUNBIO, which are briefly described in part 1 of appendix D. They were all located outside the Cerrado in four widely separated states (Bahia, Espírito Santo, Pará, and Rio Grande do Sul) in three other biomes (Mata Atlântica, Amazônia, and the Pampas, respectively). The investments, other than for improved management of existing federal and state PAs under GEF Cerrado, spread over at least four states. They mainly involved small community-level natural resource management and productive activities in Tocantins, located in extractive reserves in the far north of the state, known as the *Bico do Papaguaia* (Parrot's Beak) near Pará in the transition zone with Amazônia; and in the far east near a large state park (Jalapão) near the borders with Maranhão and Piauí, 300 kilometers distant from the state capital, Palmas. Other than by renting a small plane, access to these places would be difficult (as the rainy season had started, often making the dirt roads impassable) and time consuming. Such activities near Japapão, moreover, were still being assisted by the agricultural component of the Second Tocantins Sustainable Development Project, making attribution of results difficult.

These brief field visits were nevertheless useful for the PPAR team to obtain a firsthand idea of the contrasting ecological landscapes and rural development situations in which GEF Cerrado was being implemented. These landscapes, moreover, were quite different. South-central Goiás is densely occupied with and deforested due to the high incidence of medium- and large-scale commercial agricultural production (mainly soybeans but also sugar cane), livestock production, and associated agro-industrial and service activities. Most of the region visited was in the Corumbá River basin south of Brasília; this region was intensively occupied, mainly by commercial soybean production and cattle ranching. However, the southernmost part of the area visited has been largely given over to sugar cane to supply a major large-scale ethanol distillery in the municipality of Quirinópolis, which—like Brazil's largest soybean producer, who was formerly the governor of Mato Grosso (2003–10) and later minister of agriculture (2016–19)—was supported by the International Finance Corporation. Central western Tocantins, in contrast, is less intensively occupied, with much larger areas of forest still remaining. However, it is also part of an active agriculture/ranching frontier as well as a transition zone to Amazônia, in which occupation has increased significantly in recent decades. It is continuing to expand, in part through large-scale nonlocal landowners, such the abovementioned largest Brazilian soybean producer from neighboring Mato Grosso.

The main author of this PPAR was accompanied on the field visits to Goiás and Tocantins (and during some of the relevant interviews with key GEF Cerrado Project counterparts in Brasília) by a long-time resident of Brazil (Goiás and Brasília) who is a PhD sociologist from Harvard and former professor at the Center for Sustainable Development at the University of Brasília. More importantly, he is an experienced observer of environmental and socioeconomic change in the Cerrado over the past half century. His detailed reports on the meetings in Goiânia and Palmas and on the field visits in Goiás and Tocantins (see Sawyer 2019a, 2019b) were inputs for this PPAR.

The following persons were interviewed or met with during the PPAR mission in Brazil:

For PROBIO 2 – Brasilia:

World Bank, Adriana Moreira, TTL (appraisal and supervision)

Braulio Dias, former Director of the Department of Biodiversity Conservation and Secretary of Biodiversity and Forests, Ministry of Environment (MMA), later Executive Secretary of the United Nations Convention on Biological Diversity (CBD), and currently Professor at the Institute of Biology at the University of Brasília (UNB)

Rogério Dias, Ministry of Agriculture, Livestock, and (Food) Supply—former subproject coordinator (now retired)

Keila Juarez, Ministry of Science, Technology and Innovation—former subproject coordinator

Randys Azevedo, Caixa Econômica Federal—former coordinator of Financial Management team

Attempts were also made to contact the former project coordinators from both the Ministry of Health and EMBRAPA, but both had retired and could not be located.

PROBIO 2 – Rio de Janeiro:

Rosa Lemos Sá, Executive Director, National Biodiversity Foundation ((FUNBIO); subproject implementation and management of the Opportunities Fund; Fernanda F. C. Marques, Alexandre Camargo Ferrazoli, and Manoel Serrão Borges de Sampaio, project team members

Marcia Chame, Oswaldo Cruz Foundation – FIOCRUZ – former subproject leader

Gustavo Martinelli, Jardim Botânico de Rio de Janeiro – former subproject coordinator (by telephone from Brasília, as the person interviewed was not in Rio de Janeiro at the time of the mission's visit)

GEF Cerrado – Brasília

World Bank, Bernadete Lange, TTL (later supervision), Maria de Fátima Amazonas, senior agricultural specialist, Barbara Cristina Noronha Farinelli, agricultural specialist

MMA – In addition to Braulie Dias, former Secretary of Biodiversity and Forests (mentioned in connection with PROBIO 2 above), Mauro Pires, the former head of the Cerrado Nucleus, and Adriana Bayma and Julia Simões, former subproject coordinators within Secretariat of Biodiversity and Forests (one presently on leave from the secretariat/MMA and the other now working for an international environmental nongovernmental organization also based in Brasilia)

ICMBio – Paulo Costa, former subproject coordinator (now a senior official in the Brazilian Forest Service, also based in Brasília)

MAPA – Sidney Medeiros, coordinator of ABC Cerrado Project

GEF Cerrado – Goiânia, Goiás:

Andrea Vuklcanis, State Secretary of Environment and Sustainable Development, Jananaina Rocha, Adviser to the Secretary, Suzete Araujo Pequeno, former subproject

coordinator, and Elda Maria Cunha and Graziela Carvalho Fonseca, former team members

GEF Cerrado – Palmas, Tocantins:

Renato Jayme da Silva, State Secretary of Environment and Water Resources, Marli Terezinha dos Santos, former subproject coordination, and Cristiane Peres, former team member

GEF Cerrado – Rio de Janeiro:

Fábio Heuseler Ferreira Leite, FUNBIO staff member responsible for international financial management

GEF Cerrado – Washington, DC:

World Bank – Garo Batmanian, task team leader (appraisal and early supervision)

Appendix D. Additional Data

Part 1. Subprojects with Private Sector Involvement Financed with PROBIO 2 Resources through FUNBIO's Opportunities Fund.

The information in this section was summarized from part of a detailed PowerPoint presentation prepared by FUNBIO staff in relation to its participation in this project for the meeting with the Independent Evaluation Group (IEG) evaluation mission in Rio de Janeiro on November 18, 2019, in which the executive director of FUNBIO also briefly participated.

- **Sustainable Territorial Development of Jurutí Municipality and surroundings (Pará),** initiated in July 2014 and concluded in July 2016, with the objective of mainstreaming biodiversity in a mining region with a focus on its externalities on natural resources and development of alternative livelihoods, including sustainable timber and nontimber value chains and the strengthening of organic food production by family farmers and artisanal fisheries value chains.

- **Legado das Águas ("Water Legacy") (São Paulo)**, initiated in July 2014 and concluded in July 2016, with the objective of promoting socioeconomic and environmental sustainability of the area of influence of the "Water Legacy" (as Votorantim Industrial's nature reserve is known) though integrated conservation and productive value chain development based on local natural resources.

- **Forest Economy – Southern Coast of Bahia**, initiated in February 2014 and concluded in March 2017, with the objective of supporting sustainable territorial development based on the forest economy (cocoa and chocolate, ecotourism, tropical silviculture with native species, and payment for environmental services) in the project region.

- **Forest Economy – Demonstration Project in the Tapajós Aripiúns Extractive Reserve (Pará)**, initiated in November 2012 and concluded in May 2018, with the objective of establishing a new process of rural training to transform the existing dependence on slash and burn to integrated and sustainable agroecological and forestry practices to reduce environmental impacts, deforestation, and greenhouse gas emissions, and at the same time sequester carbon and contribute to food security and increased family incomes.

- **Wildlife Health and Digital Inclusion (Pará and Bahia)** in support of FIOCRUZ's activities under PROBIO 2, initiated in November 2014 and concluded in May 2018, to enable participation of local communities in

monitoring and application of best practices for the prevention and control of wildlife diseases in Santarém (in the Tapajós Arapiúns Extractive Reserve) and Uruçuca (Bahia) where other PROBIO 2 projects (briefly described immediately above) were already underway.

- **Incorporation of Environmental Sustainability in the Cellulose Productive Chain in Espírito Santo**, initiated in March 2016 and closed in February 2018, with the objective of maintaining environmental services and biodiversity in the area of influence of cellulose production in the central corridor of the Mata Atlântica through large-scale ecological restoration of degraded areas, monitoring, support for a program to increase forest cover, and payment for environmental services.

- **Biodiversity Conservation Linked to Agro-livestock Production in the Pampas** (Rio Grande do Sul), initiated in January 2018 and concluding in December 2019, with the objective of conserving native grasslands in the Pampa biome by increasing their productivity through more adequate management of pastures and utilizing as the biodiversity indicator the increased presence of migratory birds in the areas benefited.

- **Agroecological Strengthening Project (south of Bahia)**, initiated January 2018 and concluding in December 2019, with the objective of contributing to healthy nutrition and the protection of socio-biodiversity in rural areas and to the maintenance of forest cover in cocoa-producing areas in a biodiversity hotspot through the strengthening of agroecological family agriculture in production, processing, and marketing.

Part 2. Recent Evolution of the Agro-livestock Economies in the Cerrado States of Goiás and Tocantins in Relation to That of Brazil

Except for table D.1, the data presented in this section was prepared as part of the background information for the present Project Performance Assessment Report (PPAR), hence its focus on the states of Goiás and Tocantins. However, as the PPAR mission was carried out jointly and simultaneously with the field mission for the Cerrado case study for IEG's multicountry evaluation of Natural Resource Degradation and Human Vulnerability, which also features case studies for selected areas in Niger, Ethiopia, India, and Mongolia, this analysis was also developed as part of the background for this case study.

In the context of the present PPAR, one of the initial objectives of the assessment was to focus more specifically on the links between biodiversity and agriculture in the Cerrado

and, in the case of PROBIO 2, in other Brazilian biomes as well. Thus, evolution of agricultural and livestock-raising activities both in the biome and Brazil more generally during the project period is of direct relevance. In the case of the Cerrado, recent temporal and spatial dynamics are of particular importance. As both the Ministry of Environment and the World Bank are now fully aware, the principal threat to biodiversity and driver of the biome's increasing contribution to the country's land use change and associated deforestation and fires-related greenhouse gas emissions is the expansion of rural occupation and extension of the medium- and large-scale commercial and export-oriented agricultural ranching (soybean and beef) frontier in the northern and northeastern parts of the biome.

The Cerrado is of critical importance in terms of biodiversity, and, while receiving much less attention both in Brazil and internationally, is even more threatened than Amazônia. Only the biodiversity of the Atlantic Forest—which together with Amazônia was the focus of the earlier World Bank–managed G-7 Pilot Program to Conserve the Brazilian Rain Forests and, together with the Pantanal and Coastal Zone biomes, subject of a major component of the World Bank–financed National Environment Project—has suffered greater degradation and loss historically as the result of demographic settlement and agricultural occupation.[1] The Cerrado, moreover, is Brazil's second largest biome, after Amazônia, covering more than 2 million square kilometers, or nearly one-quarter of the national territory, and parts of 10 states and the Federal District (Brasília) situated in all five macro (or census) regions—North or Amazônia (N), Northeast (NE), Center West (CW), Southeast (SE), and South (S). Table D.1 provides more specific information in this regard, including the relative shares of each national subdivision that falls in the Cerrado. While Mato Grosso and Minas Gerais have the largest absolute areas in the Cerrado, Goiás (GO) and Tocantins (TO) have the largest relative shares of their territories in the Cerrado and were also the subject of specific subprojects in the GEF Cerrado Project.[2] In addition, Goiás is one of the older areas of rural settlement and productive occupation in the Cerrado, while Tocantins to the North and Bahia, Maranhão, and Piauí in the Northeast region (the territorial complex sometimes referred to as MATOPIBA) represent areas of more recent intensive productive occupation.

Table D.1. Location of the Cerrado Biome and the Area It Covers in Brazil

State	Macro Region	State Area (km^2)	Cerrado Biome Area (km^2)	Cerrado Biome as Share of the Total Area (%)
Mato Grosso (MT)	CW	903,358	358,837	39.7
Minas Gerais (MG)	SE	586,528	333,710	56.9
Goiás (GO)	CW	340,087	329,595	96.9
Tocantins (TO)	N	277,621	252,799	91.1
Mato Grosso do Sul (MS)	CW	357,125	216,015	60.5
Maranhão (MA)	NE	331,983	212,092	63.9
Bahia (BA)	NE	564,693	151,348	26.8
Piauí (PI)	NE	251,529	93,424	37.1
São Paulo (SP)	SE	248,209	81,137	32.7
Distrito Federal (DF)	CW	5,802	5,802	100.0
Paraná (PR)	S	199,315	3,742	1.9
Total		4,066,250	2,038,501	50.1

Source: World Bank, Cerrado Biome Conservation in Brazil, 2019.
Note: N = North; NE = Northeast; CW =Center West; SE = Southeast; S = South.

The 2017 Agricultural Census (based on the situation in 2016) provides considerable information regarding the characteristics of the agriculture and livestock sector in Goiás and Tocantins as well as for Brazil as a whole. Considered together, GO and TO, which cover 7.3 percent of Brazil's territory, accounted for 11.8 percent of its total area in rural (agricultural and ranching) establishments in 2016, but accounted for just 4.3 percent of these establishments, and 4.6 percent of the persons economically occupied in them, in that year. Thus, the average size of these establishments was roughly 2.8 times the average for Brazil as a whole.

While the distribution of rural establishments by size is not yet available for 2016, Agricultural Census data for 1995–96 indicate that these averages reflect a much larger share of establishments of large size (100 hectares [ha] to <1,000 ha) and very large size (1,000 ha or more) in GO and TO than in Brazil on average, where small and medium ones predominate (as shown in table D.2). Thus, the rural land size distribution structures for GO and TO are distinctly different from those for much of the rest of the country, particularly in the Northeast and Southeast, where much smaller establishments predominate. It is likely, moreover, that this pattern may have become even more pronounced over the past two decades.

Table D.2. Rural Establishments by Size in Goiás, Tocantins, and Brazil, 1995/96

	Goiás		Tocantins		Brazil		GO & TO	Go & TO	GO &TO/ BR
Size	Estabs.	%	Estabs.	%	Estabs.	%	Estabs.	%	%
<10 ha	12,526	11.2	2,614	6.1	2,402,374	49.7	15,140	9.8	0.6
10 - <100 ha	55,073	49.3	17,283	40.3	1,916,487	39.6	72,356	46.8	3.8
100 - <1,000 ha	38,728	34.7	19,565	46.0	469,964	9.7	58,293	37.7	12.4
1,000+ ha	5,437	4.9	3,475	8.1	49,358	1.0	8,912	5.7	18.1
Total	111,764	100.1	42,937	100.5	4,838,183	100.0	154,701	100.0	3.1

Source: IBGE, Agricultural Census, 1995–96; totals do not add to 100.0 due to rounding error.
Note: Totals do not add to 100.0 due to rounding error. GO = Goiás; ha = hectares; TO = Tocantins; BR = Brazil; Estabs. = Establishments.

In 1995–96, while GO and TO together accounted for just 3.1 percent of all rural establishments, they held 12.4 percent of those between 100 ha and 1,000 ha and nearly one-fifth of those with 1,000 ha or more; they held less than 10 percent of those having less than 10 ha, which, however, accounted for nearly half of all such establishments in Brazil as a whole. Thus in contrast, elsewhere in the country and particularly in the Northeast, small establishments clearly predominated. In addition, the share of large and very large establishments was even higher in Tocantins (54.1 percent of the total) than Goiás (39.6 percent).

The above data also provide an indication of the evolution of the agro-ranching sector in GO and TO in relation to Brazil over the past two decades in terms of the growth in the number of rural establishments. Table D.3 shows that, while the total number of rural establishments in Brazil increased by nearly 5 percent between 1996 and 2017, the growth over this period was much larger in Goiás (where it grew by more than a third) and even greater in Tocantins (where it grew by almost 50 percent). This reflects the relatively active agricultural/ranching "frontier" nature of these two states, particularly TO, compared with most of the rest of the country, especially the Northeast, Southeast, and South. As will be demonstrated below, much of this growth has been spurred by the expansion of medium and large commercial soybean and cattle ranching activities, which is also reflected in the significantly above-average size of rural establishments in GO and TO compared with elsewhere in Brazil.

Table D.2. Rural Establishments in Goiás, Tocantins, and Brazil, 1996–2016

	Goiás		Tocantins		Brazil	
Year	1996	2016	1996	2016	1996	2016
Rural establishments *(no.)*	111,764	152,174	42,937	63,808	4,838,183	5,073,324
Percentage of Brazil *(%)*	2.3	3.0	0.9	1.3	100.0	100.0
Increase 2017/1996 *(%)*	36.2		48.6		4.8	

Sources: IBGE, Agricultural Censuses, 1995/96 and 2017.

The above data likewise suggest that GO is more densely occupied than TO. This is also consistent with the fact that much of the growth in commercial agricultural and ranching activity in the former state occurred earlier than in the latter. In addition, Goiás has a much larger number of rural establishments of all sizes than Tocantins, although both states were still quite dynamic in this regard during the period considered. Another indicator of this relatively greater occupation of its territory to date is that 77.3 percent of the total area of Goiás was covered by rural establishments in 2016, compared with 54.7 percent of that of Tocantins, and 41.3 percent of that of Brazil as a whole.[3] Another important difference between GO and TO and Brazil on average refers to the share of their area occupied by rural establishments in pastures, as opposed to crop growing (agriculture), forests and other areas covered with other forms of vegetation ("*matas*"), and other uses. Table D.4 presents these figures and indicates the comparatively greater importance of livestock raising in GO and TO compared with Brazil as a whole, again taking into account the caveat stated in footnote 2.[4]

Table D.3. Area in Rural Establishments in Goiás, Tocantins, and Brazil, by Use, 2016

Area in Use	Goiás	Tocantins	GO & TO	Brazil	GO & TO/ Brazil
Area in Pastures	57.1	55.7	56.6	45.4	1.25
Area in agriculture (%)	18.7	8.0	14.8	18.1	0.82
Area in forests and *matas* (%)	20.1	28.5	23.1	28.9	0.80
Area in other uses (%)	4.2	7.3	5.3	7.7	0.69
Total (ha)	26,275,245	15,180,162	41,455,407	351,289,816	11.8

Source: IBGE, Agricultural Census, 2017.
Note: GO = Goiás; TO = Tocantins.

The contrast between GO and TO with respect to their relative areas in agriculture and forests and *matas* are also striking and reflect several differences. Goiás is a state of comparatively older settlement, but, more importantly, it is closer to both national and international consumer markets, the latter referring to the distance between it and the southeastern ports of Santos (São Paulo) and Paraná (Paranaguá) through which most of its agricultural exports, particularly soybeans, are dispatched.[5] In addition, as Tocantins is officially in the Legal Amazon region,[6] Brazil's Forest Code, which was revised in

2012, requires that 35 percent of the area in rural establishments in the Cerrado portion of this region be maintained as a Legal Reserve, compared with 80 percent in the forest portion; for the rest of Brazil, including GO, the Legal Reserve requirement is 20 percent. Again, however, there are significant differences in comparative land uses in rural establishments throughout Brazil both in the Cerrado and elsewhere, as table D.5 illustrates for selected states. In terms of their relative shares of pasture lands, for example, GO and TO are only exceeded in relative terms by Mato Grosso do Sul, while agriculture clearly predominates in terms of the area occupied in rural establishments in São Paulo (mainly for sugar cane but also coffee and oranges) and Paraná (primarily soybeans) and forest and *matas* in the state of Amazonas, followed by Pará, Mato Grosso, and Tocantins, all of which are totally or largely in the Legal Amazon region.

Table D.4. Relative Shares of Land Area in Rural Establishments in Different Uses in Selected States, 2016

State	Macro Region	Pastures (%)	Agriculture (%)	Forests & Matas (%)	Area in Rural Enterprises (ha)
Amazonas[a]	N	28	6	60	4,018,578
Pará[a]	N	51	6	38	28,419,453
Tocantins[a]	N	56	8	29	15,180,162
Ceará	NE	34	14	26	6,808,179
Pernambuco	NE	40	19	19	4,471,219
Bahia	NE	42	16	28	28,029,859
Minas Gerais	SE	51	15	27	38,168,688
São Paulo	SE	29	49	18	16,512,145
Paraná	S	27	43	25	14,741,967
Santa Catarina	S	28	23	40	6,448,785
Rio Grande do Sul	S	42	36	16	21,684,558
Goiás	CW	57	19	20	26,275,245
Mato Grosso [a]	CW	42	18	36	54,933,880
Mato Grosso do Sul	CW	60	12	24	30,549,179
Brazil		45	18	29	351,289,816

Source: IBGE, Agricultural Census, 2017.
Note: N = North; NE = Northeast; CW =Center West; SE = Southeast; S = South.
a. All or mostly in Legal Amazônia.

Another strong demonstration of the relative importance of ranching activities in GO and TO (and elsewhere in the Cerrado) is the presence of cattle. Table D.6 presents several indicators in this regard for these two states and Brazil for 2016, including not only the number cattle but also the number and relative shares of rural establishments

with cattle, and the average number cattle per establishment that have cattle. As table D.6 shows, there is both a much larger share of all rural establishments having at least some cattle in GO and TO than in the country as a whole, and the average herd size per such enterprise is double the national average.[7] It is also telling that, while GO and TO together had just 4.3 percent of all rural establishments in Brazil in 2016, they also had 14.7 percent of the all area in pastures in the country and 13.8 percent of the national cattle herd.

Table D.5. Comparative Presence of Cattle in Goiás, Tocantins, and Brazil, 2016

Indicator	Goiás	Tocantins	GO & TO	Brazil	GO & TO/ Brazil
Head of cattle	17,292,288	6,477,537	23,769,825	172,719,164	13.8%
Rural establishments with cattle	126,100	50,451	176,551	2,544,415	6.9%
Share of all rural establishments with cattle	82.7%	79.1%	81.7%	50.3%	1.62
Head of cattle per establishment	137.1	128.4	134.6	67.2	2.0

Source: IBGE, Agricultural Census, 2017.
Note: GO = Goiás; TO = Tocantins.

While the number of persons occupied in rural establishments in GO and TO in 2016 was only slightly larger than that for Brazil as a whole,[8] the average number of establishments with tractors—as an indicator of the degree of mechanization—was above the national average in the former state but slightly below it in the latter. These figures are presented in table D.7.

Table D.6. Persons Occupied and Tractors in Rural Establishments, 2016

Indicator	Goiás	Tocantins	GO & TO	Brazil	GO & TO/ Brazil
Persons occupied	490,612	204,430	695,042	15,105,125	4.6%
Persons occupied/establishment	3.2	3.2	3.2	3.0	1.07
Tractors	69,060	18,245	87,305	1,229,907	7.1%
Establishments with tractors	34,019	8,915	42,934	734,280	5.8%
Share of all establishments with tractors	45.4%	28.6%	19.9%	14.5%	1.37

Source: IBGE, Agricultural Census, 2017.
Note: GO = Goiás; TO = Tocantins.

Concerning mechanization, the difference between GO and TO is noteworthy and reflects the greater importance of ranching in the latter state. Table D.7 also reveals the much higher degree of mechanization in Goiás relative to the national average in 2016, but, here too, there are significant cross-regional differences (see table D.8). This is the greatest spatial disparity with respect to agricultural activity in Brazil, with the difference between states in the Northeast and North and the rest of the country being

particularly striking. The main soybean-producing Cerrado states (Mato Grosso do Sul, Mato Grosso, and Goiás) and São Paulo fall in the upper and middle parts of the distribution.

Table D.7. Tractors and Rural Establishments in Selected States, 2016

State	Macro Region	Tractors	Rural Establishments	Share of Establishments with Tractors (%)
Amazonas	N	2,430	80,959	3.0
Pará	N	21,222	281,699	7.5
Tocantins	N	18,245	63,808	28.6
Ceará	NE	6,043	394,330	1.5
Pernambuco	NE	7,774	281,688	2.8
Bahia	NE	38,615	762,848	5.0
Minas Gerais	SE	163,431	607,557	26.5
São Paulo	SE	175,459	188,620	93.0
Paraná	S	166,393	305,154	54.5
Santa Catarina	S	108,375	183,066	59.2
Rio Grande do Sul	S	242,274	365,094	66.4
Goiás	CW	69,060	152,174	45.4
Mato Grosso	CW	71,132	118,679	59.9
Mato Grosso do Sul	CW	53,439	71,164	78.1
Brazil		1,229,907	5,073,324	14.5

Source: IBGE, Agricultural Census, 2017.
Note: N = North; NE = Northeast; CW =Center West; SE = Southeast; S = South.

To better understand the nature of agriculture in the Cerrado, the importance of "temporary" (annual or field) crops in GO and TO (and in the biome more generally)—especially soybeans, corn, and, in some places, sugar cane—relative to "permanent" (or tree) crops, such as bananas, coffee, and coconuts, is also clearly evident. This is likewise the case for the relatively greater presence of permanent crops elsewhere in Brazil, particularly the Southeast and South (coffee, oranges, and bananas) but also the Northeast (cocoa, bananas, and coconut). The pertinent data are presented in table D.9.

Table D.8. Permanent and Temporary Crops in Goiás, Tocantins, and Brazil, 2017

Indicator	Goiás	Tocantins	GO & TO	Brazil	GO & TO/ Brazil
Harvested area in permanent crops (ha)	37,258	3,244	40,502	4,339,692	0.9 %
Harvested area in temporary crops (ha)	6,219,767	1,169,178	7,388,945	67,658,174	10.9%
Harvested area in permanent crops/harvested area in temporary crops	0.6%	0.2%	0.5%	6.4%	0.08
Establishments with permanent crops	5,768	2,318	8,086	1,080,387	0.7%
Establishments with temporary crops	65,765	52,675	118,449	6,552,951	1.8%
Establishments with permanent crops/establishments with temporary crops	8.8%	4.5%	7.0%	16.5%	0.42
Value of permanent crops (R$000)	318,220	32,537	350,775	38,764,9770	0.9%
Value of temporary crops (R$000)	22,584,068	3,417,858	26,001,926	236,984,983	11.0%
Value of permanent crops/value of temporary crops	1.4%	0.5%	1.3%	16.4%	0.73

Source: IBGE, Agricultural Census, 2017.
Note: GO = Goiás; TO = Tocantins.

The greatest contrast with GO and TO in this regard is São Paulo, where the ratio of harvested area in permanent versus temporary crops was 10.3 percent, the ratio of rural establishments producing permanent crops versus those producing temporary crops was 55.5 percent, and the ratio of the value of permanent crops harvested (primarily oranges, followed by coffee, and bananas)[9] versus temporary crops harvested (primarily sugar cane, followed at a considerable distance by soybeans and corn) was 27.3 percent,[10] thus in all cases significantly exceeding (and pulling up) the national average. The state of São Paulo alone contributed 23.9 percent to the national total value of harvested permanent crops in 2016, compared with less than 1 percent by Goiás and Tocantins combined, again highlighting the significant differences between these two distinct regional agricultural economies.

Finally, it is useful to consider the composition of temporary crops in Goiás and Tocantins compared with that of Brazil to further emphasize their importance in Cerrado agriculture relative to that in other parts of the country. The three main annual crops in these two states when considered together are depicted in table D.10 in terms of area harvested, number of establishments, and value of production in 2016. One interesting difference between GO and TO, however, is the much greater importance of sugar cane in the former, as table D.10 also shows.

Table D.9. Relative Importance of Soybeans, Sugar Cane, and Corn among Temporary Crops in Goiás, Tocantins, and Brazil, 2016

Indicator	Goiás	Tocantins	GO & TO	Brazil	GO & TO/ Brazil
Harvested area in soybeans (ha)	2,972,796	728,150	3,700,946	30,722,657	12.0%
Share of harvested area in soybeans	47.8%	62.3%	50.1%	45.4%	1.10
Establishments with soybeans	7,817	<7,060 [a]	<14,877 [a]	236,245	<6.4%[a]
Share of establishments with soybeans	11.9%	<14.2% [a]	<12.8% [a]	3.6%	<3.5[a]
Value of production in soybeans (R$000)	10,375,385	2,012,018	12,387,403	104,054,613	12.3%
Share of value of all temporary crop production for soybeans	45.9%	58.9%	47.6%	44.1%	1.08
Harvested area in sugar cane (ha)	942,289	33,459	975,748	9,127,645	11.9%
Share of harvested area in sugar cane	15.1%	2.9%	13.2%	13.5%	0.98
Establishments with sugar cane	3,394	—	—	—	—
Share of establishments with sugar cane	15.1%	—	—	—	—
Value of production for sugar cane (R$000)	5,735,284	207,156	5,942,440	48,827,496	12.1%
Share of value of all temporary crop production for sugar cane	25.4%	6.1%	20.4%	20.7%	1.01
Harvested area in corn (ha)	1,674,446	204,621	1,879,067	15,783,893	11.9%
Share of harvested area in corn	26.9%	17.5%	25.4%	23.3%	1.09
Establishments with corn	19,940	11,382	31,322	1,644,450	1.9%
Share of establishments with corn	30.3%	22.5%	26.9%	25.2%	1.07
Value of production from corn (R$000)	3,857,203	377,950	4,235,153	34,250,880	12.4%
Share of value of all temporary crop production from corn	17.1%	11.1%	14.6%	14.5%	1.01

Source: IBGE, Agricultural Census, 2017.
Note: GO = Goiás; TO = Tocantins; — = not available.
a. Sugar cane was included in the data for "other crops" and thus these values are clearly an overestimate.

In Goiás, the three crops in table D.10 together accounted for 89.9 percent of the area harvested in temporary crops, while in Tocantins they accounted for 82.6 percent, compared with 82.2 percent for Brazil as a whole in 2016. They also accounted for 88.4 percent of the total value of temporary crop production in Goiás, and 78.6 percent in Tocantins. This difference between the two states was mainly due to the fact that rice, with 9.4 percent of the area harvested, was the second most valuable annual crop in Tocantins that year, accounting for 12.7 percent of the total, compared with 11.1 percent for corn, and 6.1 percent for sugar cane.

Both in terms of area harvested and value, soybeans were clearly the most important crop in both states. They were comparatively more important in TO than in GO in relation to all other crops, both permanent and temporary, and in terms of both area and

value; but in absolute terms their production and value were considerably lower in the former state than the latter, again reflecting both the older and more dense rural occupation and the greater proximity of Goiás to Brazil's major export outlets in the Southeast and South. This situation notwithstanding, these two states accounted for 12 percent of the total area harvested in soybeans and an even slightly larger share (12.3 percent) of the total value generated by this crop in Brazil in 2016. It should also be kept in mind that soybeans and corn are often alternated annually on the same rural establishments (and the same land), as they are planted and harvested at different times of the year.

Data are also available for the area harvested in soybeans in Goiás and Brazil in 1995 and 2006 and for Tocantins in 2006, which also show how rapidly this crop has expanded over the past two decades. In Goiás, this area increased from 863,422 ha in 1995 to 2,037,568 ha in 2006, or by 136 percent, and then to 2,972,796 in 2016, or by another 45.9 percent. In Tocantins it rose from 224,487 ha in 2006 to 728,150 ha in 2016, or by 224.4 percent, while in Brazil as a whole it expanded from 9,479,893 ha in 1995 to 17,883,38 ha in 2006 and 30,722,657 ha in 2016, or by 88.6 percent in the first period and another 71.8 percent in the second.

As concerns sugar cane, the relative increase in the share of Goiás in the national total, particularly between 2006 and 2016, is also very impressive. From 92,216 ha harvested in this crop in 1995, it rose to 263,342 ha in 2006 and 942,289 ha in 2016, or by more than 10 times over this period, and by 257.8 percent in the decade beginning in 2009. The area harvested in corn likewise increased substantially in both states over the past two decades, from 768,096 ha in 1995 to 1,674,466 ha in 2016 in Goiás, while in Tocantins it expanded from 48,883 in the former year to 204,621 ha in the latter, or by 318.6 percent over the period as a whole.

Finally, in terms of the value of soybean production in Brazil in 2016, Goiás (which accounted for 10.0 percent of the national total) ranked fourth after Mato Grosso, which was by far the largest producer (accounting for 27.3 percent of the total), Rio Grande do Sul, and Paraná, while Tocantins came in 10th, also after Mato Grosso do Sul, Bahia, Minas Gerais, São Paulo, and Piauí in this order. Most of this production was in the Cerrado. Goiás also ranked second (11.7 percent) in terms of the value of sugar cane production after São Paulo, which alone accounted for 50.3 percent of the national total. And Goiás ranked third nationally in the value of production of corn (11.3 percent) after Mato Grosso and Paraná, which were responsible for 23.6 percent and 17.6 percent of the total respectively. When all temporary crops (also including wheat, rice, and beans, among others) are considered, Goiás ranked fifth in terms of total value produced in 2016 after Mato Grosso, Rio Grande do Sul, São Paulo, and Paraná, while Tocantins

ranked 12th also after Minas Gerais, Mato Grosso do Sul, Bahia, Santa Catarina, Maranhão, and Pará and was just ahead of Piauí.

In summary, Goiás is among the most important agricultural states in Brazil and is most significant from a national perspective in terms of its production of sugar cane and soybeans. Both these crops are largely concentrated in the southern and south-central parts of the state (that is, in the portion of the state to the south and southwest of Brasília), the same also being largely true in the case of corn, and of temporary crops more generally.[11] In terms of cattle, Goiás, with 10 percent of the national herd, was the fourth largest state after Mato Grosso (which held 14.1 percent), Minas Gerais (11.3 percent), and Mato Grosso do Sul (11.3 percent), while Tocantins (3.8 percent) was the 11th largest also after Pará, Rio Grande do Sul, Rondônia, Paraná, and São Paulo in this order.[12] Thus, Goiás is also an important state from a ranching perspective.

In Tocantins, the largest value-producing municipalities in terms of all temporary crops were situated in the southwestern part of the state near the Araguaia River, which flows northward and forms the border with Mato Grosso, with the largest soybean-producing *municípios* located generally to the south of the largest corn-producing ones. The municipalities containing the comparatively largest cattle herds were also generally located in the same part of the state, to the west of the capital Palmas, which was built after the state of Tocantins was created in 1988, and the Belém-Brasília highway first opened up this part of the state in the 1960s.[13]

References

Dean, Warren. 1995. *From Broadax and Firebrand: The Destruction of the Brazilian Atlantic Forest.* Berkeley, Los Angeles, and London: University of California Press.

World Bank. 2019. "Cerrado Biome Conservation in Brazil: World Bank's Approach, Program, and Projects." World Bank, Brasília.

---

[1] For a very interesting account of this historical process, see Dean 1995.

[2] Tocantins became a state in 1988, having formerly been the northern part of Goiás.

[3] Like many average figures for Brazil, however, this one conceals substantial differences across the national territory. Accordingly, the percentages of total land area occupied in states in the South, Southeast, and elsewhere in the Center West are well above the national average, while percentages for those in Amazônia are significantly below the national average. At the low end, for example, are Amazonas, Brazil's largest state that alone occupies more than 1.5 million km^2, with just 2.2 percent of its territory in rural establishments in 2017, followed by Pará, the second largest state with roughly 1.25 million km^2, also in Amazônia, with 22.8 percent. At the high end,

conversely, are Mato Grosso do Sul (like Goiás) in the Center West region, with 85.6 percent of its area in rural establishments, followed by Rio Grande do Sul (77 percent) and Paraná (74 percent) in the South, and São Paulo (66.5 percent) and Minas Gerais (65.1 percent) in the Southeast.

[4] The share of total area in agricultural establishments in pastures in other Cerrado states in the Center West, such as Mato Grosso do Sul and Mato Grosso, are also well above the national average, as are those in parts of Amazônia, especially Pará, while those in the states of the Northeast, Southeast, and South are generally below this average.

[5] Palmas, the capital of Tocantins, is 1,724 kilometers by road (which is how all soybeans are transported) from São Paulo, while Goiânia, the capital of Goiás, is 903 km. The latter city is also closer than both Campo Grande, capital of Mato Grosso do Sul (992 km), and Cuiabá, capital of Mato Grosso (1,527 km), both of which are likewise closer than Palmas.

[6] In fact, an estimated 37 percent of the Cerrado biome is in the Legal Amazon, which also includes most of Mato Grosso in the Center West and the western part of Maranhão in the census Northeast.

[7] Throughout Brazil, in addition to those rural landholders who are 100 percent or predominantly ranchers, many small and medium-size farmers also possess some cattle, but generally these are much smaller herds than those held in the larger rural establishments. The average number of cattle per establishment having cattle also varies widely from one state to another, with highs of 354.7 in Mato Grosso do Sul and 262.2 in Mato Grosso, which also had the largest absolute number of cattle among all states in Brazil (24,309,455, or 14.1 percent of the total) and are likewise (significantly) in the Cerrado biome, compared with just 28.1 in Santa Catarina, 43.8 in Rio Grande do Sul, and 49.3 in Paraná in the South.

[8] There was, in fact, relatively little variation across states in this regard: São Paulo is an outlier with an average of 4.4 occupied persons per rural establishment, compared with 3.0 in Minas Gerais, 2.8 in Bahia and Paraná, 2.7 in Santa Catarina and Rio Grande do Sul, 2.6 in Pernambuco, and 2.4 in Ceará, among the states considered. However, both Mato Grosso and Mato Grosso do Sul (likewise predominantly Cerrado states) also had above-average ratios with 3.6 persons per establishment each.

[9] Oranges accounted for 64.7 percent of the value of production of permanent crops in São Paulo in 2016, with coffee accounting for another 15.3 percent and bananas for 5.9 percent.

[10] Sugar cane was responsible for 79.4 percent of the value of production of temporary crops in São Paulo in 2016, followed by soybeans with 9.3 percent and corn with 5.1 percent.

[11] The leading producer of both soybeans and corn in terms of value in Goiás in 2016 was the municipality of Rio Verde, followed by Jataí, located to its immediate west, while the leading producer of sugar cane was Quirinópolis, which adjoins Rio Verde directly to the east and which was the second largest producer of this crop. Thus, these three neighboring and territorially relatively large municipalities in the south-central part of the state are responsible for a substantial share of the state's temporary crop production according to the most recent Agricultural Census.

[12] Unlike the temporary crops, however, much of the cattle population in the state is located to the northwest of Brasília, although Rio Verde and Jataí in the south ranked 9th and 10th in terms of total cattle population among all 264 municipalities in Goiás in 2016, while Quirinópolis was 12th.

[13] Prior to this time most access to what was then the northern part of Goiás had been through the Tocantins River, which flows from south to north, in the central part of the state.