



# GHG MITIGATION IN BRAZIL’S LAND USE SECTOR: AN INTRODUCTION TO THE CURRENT NATIONAL POLICY LANDSCAPE

MARIA FERNANDA GEBARA AND ALICE THUAULT

## EXECUTIVE SUMMARY

Brazil has developed a suite of sector-specific greenhouse gas (GHG) mitigation actions that it estimates will result in a reduction of 36.1 percent to 38.9 percent below a projected hypothetical baseline in 2020.<sup>1</sup> Although framed as voluntary at the international level, this pledge is enshrined in Brazil’s National Policy for Climate Change (PNMC), which mandates the development of sectoral plans to implement specific mitigation actions.

Brazil’s sectoral mitigation plans are in different stages of development and implementation. This paper focuses on the plans to reduce deforestation in the Amazon and Cerrado regions, and the low-carbon agriculture plan. These plans are critical for near-term GHG mitigation because the agriculture, forestry, and other land use (AFOLU) sector is currently the largest source of GHG emissions in Brazil. Initial observations on these mitigation plans point to both successes and opportunities for improvement.

■ The Action Plan to Prevent and Control Deforestation in the Amazon (PPCDAm), although not yet fully implemented, has helped to slow deforestation. Nevertheless, emerging challenges could jeopardize the progress made to date. Challenges include the bureaucratic difficulties for landowners to harmonize their property and production with the law, the increasing demand for soy and beef in the market, and the lack of alternative and equivalent sustainable production options.<sup>2</sup> Also important have been steps to soften legislation and weak law enforcement and governance. A sustainable reduction in deforestation will require not only monitoring and control but also positive incentives and the resolution of governance problems.

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**Suggested Citation:** Gebara, Maria Fernanda and Alice Thuault. “GHG Mitigation in Brazil’s Land Use Sector: An Introduction to the Current National Policy Landscape.” Working Paper. World Resources Institute, Washington, DC. Available online at <http://wri.org/publication/ghg-mitigation-brazil-land-use-sector>

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## About the Series

This working paper is part of a series that provides an overview of the current policy landscape that key countries have pursued in the interest of GHG mitigation. For each country, the series:

- Describes the country's international mitigation pledge (e.g., GHG reduction commitment, Nationally Appropriate Mitigation Actions), including assumptions and conditions associated with the pledge, and in what respect – if any – it is codified domestically
- Outlines the country's key government institutions and legal authorities for mitigating climate change
- Outlines major policy instruments related to GHG mitigation, current, and under development
- Explains what is known about the country's GHG trajectory
- Identifies issues to watch in the coming years

- The Action Plan to Prevent and Control Deforestation and Fire in the Cerrado (PPCerrado) aims to reduce deforestation in the Cerrado biome by 40 percent by 2020 compared to historical deforestation rates. The PPCerrado's actions are organized into four pillars; the sustainable activities pillar is currently the most thoroughly implemented. A key challenge facing the PPCerrado is devising a system to monitor land use and land cover changes.
- In the agriculture sector, key actors lack the capacity to access resources for mitigation actions. In the first year of implementation of the Low-Carbon Agriculture Plan (ABC Plan) (2010–11), only five projects were approved for funding. However, more projects were financed in the next year (2011–12), totaling 5,038 projects, the majority in the southeast of Brazil. Actions are underway to enhance the effectiveness of the ABC Plan, including the provision of enhanced resources and capacity under the Forest Investment Program.

Whether Brazil can meet its AFOLU mitigation targets depends in part on its identification of and access to different types of financing to support actions. National and international institutions can support these targets through public investments, credits, taxes, carbon markets, and other financial mechanisms. Currently, the PNMC includes only a few national initiatives for financing mitigation in the forest sector, including the Amazon Fund and the National Fund on Climate Change. These

funds face challenges related to resources, program implementation, and effectiveness. Additionally, Brazil's National REDD+ Strategy and new Forest Law, enacted in May 2012, are likely to have a significant effect on the AFOLU sector (and are summarized below).

Our introductory review of Brazil's national AFOLU policy landscape indicates that the plans analyzed herein could be implemented more effectively through efforts focused on:

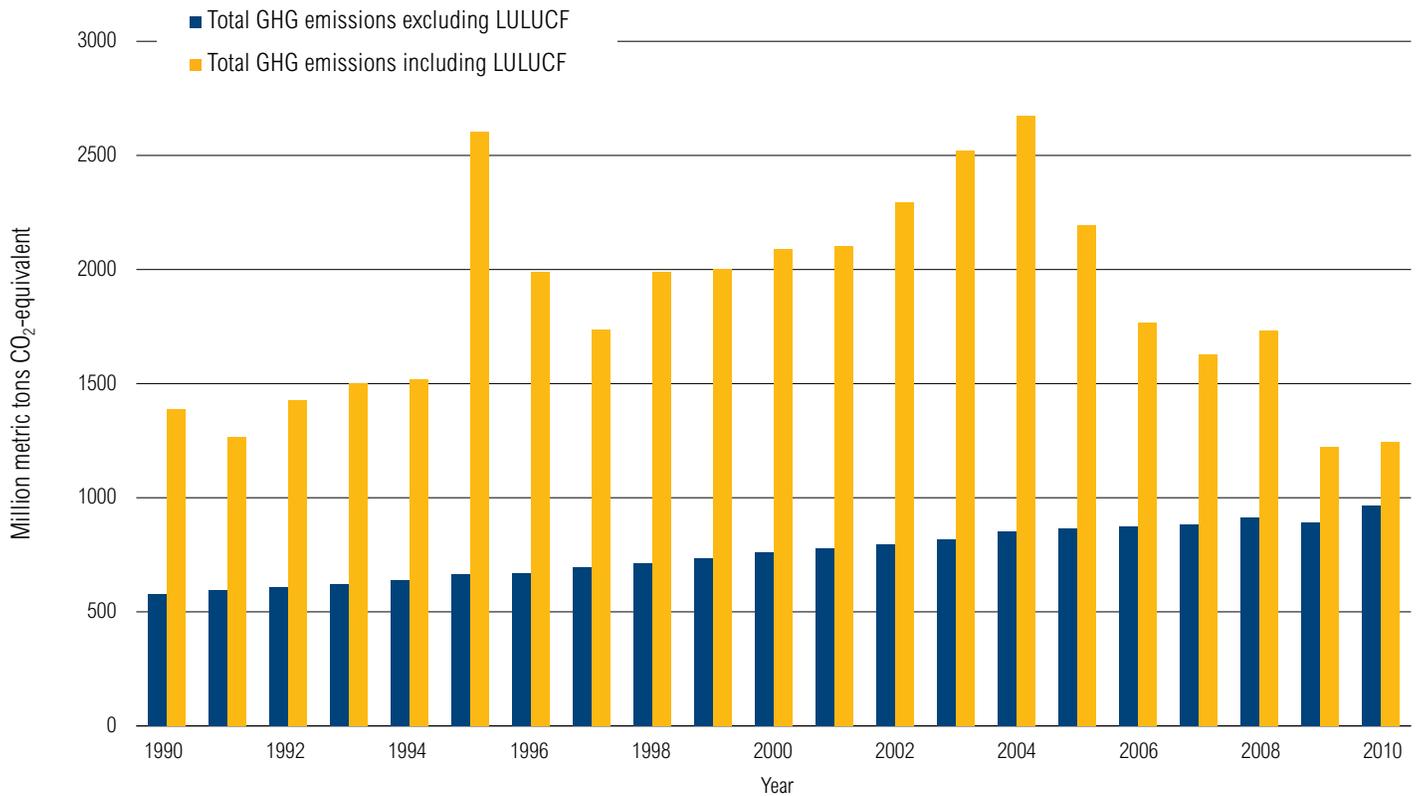
- engaging a broader range of civil society stakeholders in the climate debate, and promoting more transparency in policymaking;
- enhancing policy performance monitoring and evaluation of the short-, medium-, and long-term impacts of policy investments and mitigation actions for climate change;
- integrating different institutions, policies, and sectors in Brazil, including better coordination between ministries and different levels of government, as well as between climate policies and major development policies; and
- providing greater clarity regarding long-term funding.

In addition to a preliminary overview of the Government's strategies to reduce GHG emissions and actions in the AFOLU sector, this paper first provides critical background information, including key metrics and summaries of Brazil's international pledge and relevant government institutions. It also analyzes Brazil's estimated GHG emissions trajectory and highlights policy development issues that may be important in the months and years to come. An in-depth analysis of other sectors—including energy, transport, and industry—is beyond the scope of this paper, but will be prioritized in future research by the Open Climate Network to provide a more comprehensive view of Brazil's approach to climate change mitigation.

## KEY METRICS

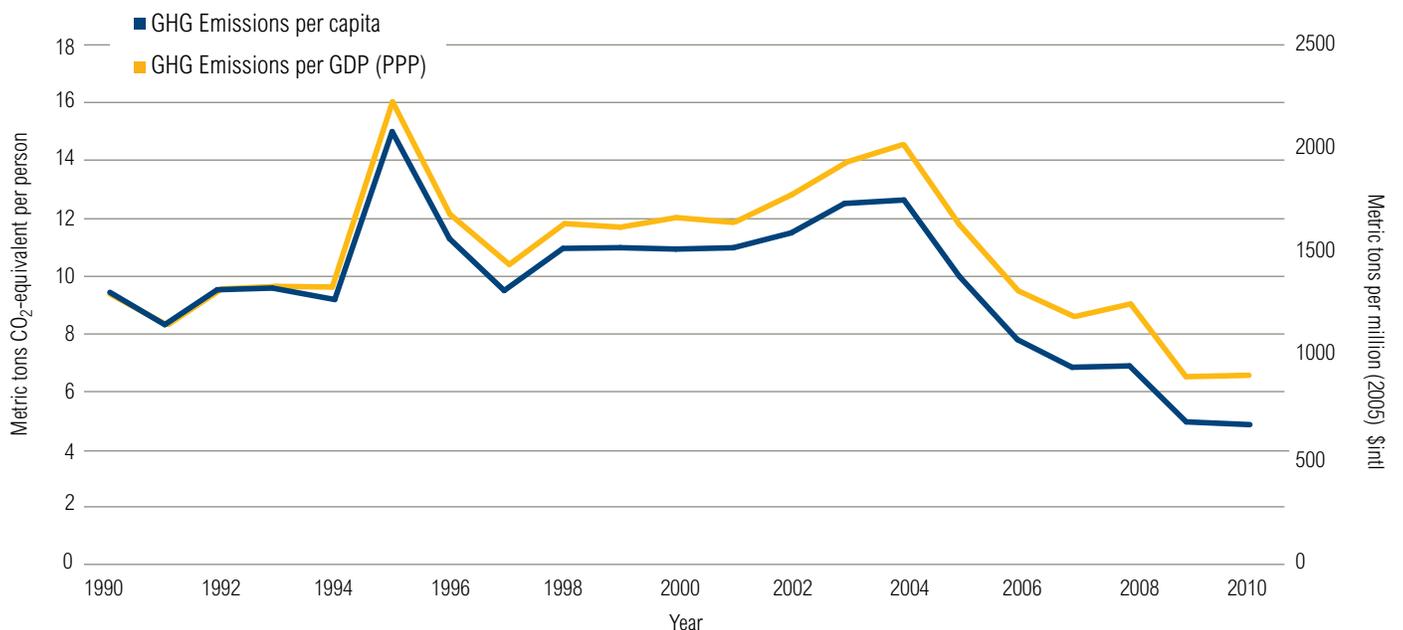
Brazil is one of the world's largest greenhouse gas (GHG) emitters. The majority of Brazil's GHG emissions come from deforestation in the Amazon (see Figure 1), driven by agriculture and livestock. With the world's fifth-largest population (now exceeding 190 million people), Brazil emitted 14.5 tonnes of carbon dioxide equivalent (CO<sub>2</sub>eq) per capita in 2004, but these emissions have generally declined since then as a result of reductions in emissions from deforestation (Figure 2).

Figure 1 | Total Brazil GHG Emissions



Data Source: 1990–2005 totals are from UNFCCC, 2012; 2006–10 totals are from MCTI, 2013.

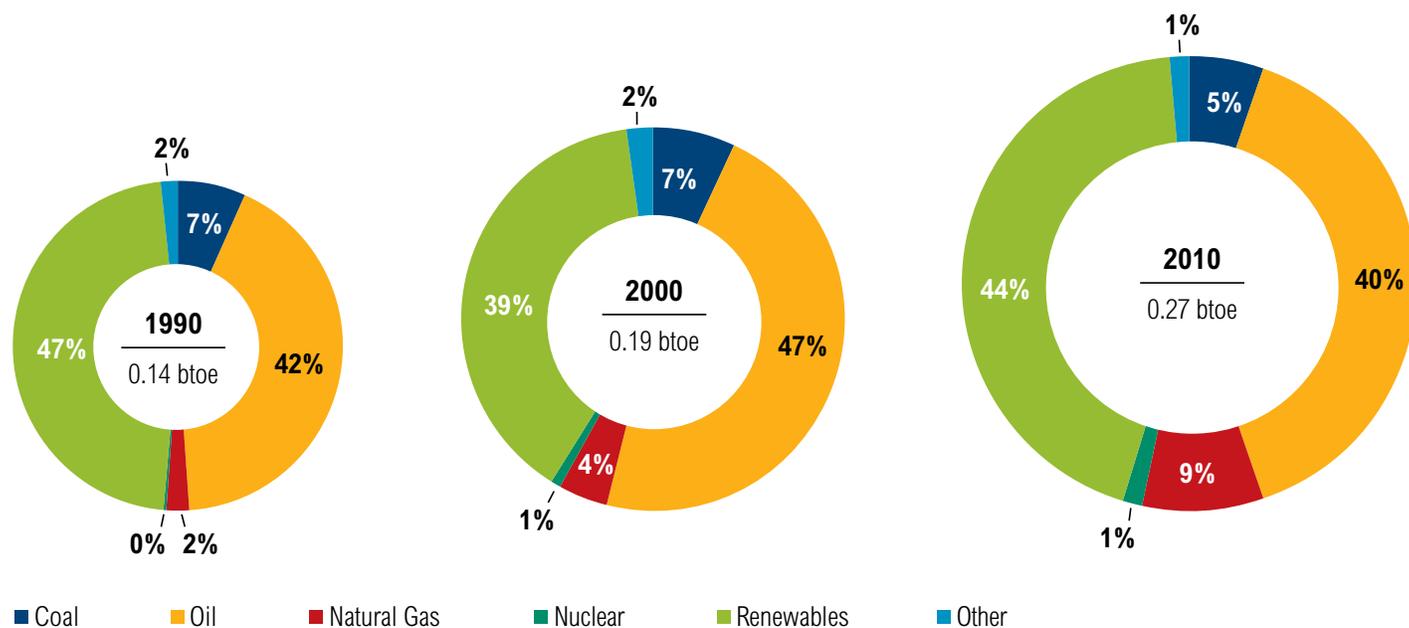
Figure 2 | Brazil GHG Emissions per Capita and GHG Emissions Intensity



Data Source: Calculated using UNFCCC, 2012; MCTI, 2013; and World Bank, 2012.

Note: GHG emissions totals include the land use, land-use change, and forestry (LULUCF) sector.

Figure 3 | **Brazil Fuel Mix: 1990, 2000, and 2010**



Data Source: International Energy Agency, 2012.

Notes: Size of circles indicates total consumption. Btoe = billion tonnes oil equivalent.

Table 1 | **Brazil's Voluntary International Mitigation Commitments**

MITIGATION ACTION	RANGE OF ESTIMATED ANNUAL REDUCTION IN 2020 RELATIVE TO BASELINE (MILLION TONNES OF CO <sub>2</sub> eq)
Reduction in Amazon deforestation	564
Reduction in Cerrado deforestation	104
Restoration of grazing land	83 to 104
Integrated crop-livestock system	18 to 22
No-till farming	16 to 20
Biological N <sub>2</sub> fixation	16 to 20
Energy efficiency	12 to 15
Increase the use of biofuels	48 to 60
Alternative energy sources	26 to 33
Increase in energy supply by hydroelectric power plants	79 to 99
Iron and steel (replace coal from deforestation with coal from planted forests)	8 to 10

Source: Brazil, 2010.

Table 2 | **Brazil's Sectoral Plans Published as of December 2013<sup>3</sup>**

SECTORAL PLANS
Action Plan to Prevent and Control Deforestation in the Amazon (PPCDAm)
Action Plan to Prevent and Control Deforestation and Fire in the Cerrado (PPCerrado)
Low-Carbon Agriculture Plan (ABC Plan)
Ten-Year Energy Plan (PDE)
Plan for Climate Change Mitigation for the Consolidation of a Low-Carbon Economy in the Manufacturing Industry
Low-Carbon Mining Plan (PMBC)
Plan on Transportation and Urban Mobility for Climate Change Mitigation
Health Mitigation and Adaptation Plan

Brazil is also characterized by a relatively “clean” energy mix (Figure 3), primarily as a result of its reliance on hydropower.

## I: INTERNATIONAL STATEMENTS OF FUTURE GHG MITIGATION

### International Mitigation Pledge under the United Nations Framework Convention on Climate Change

During the 2009 15th Conference of the Parties (COP) under the United Nations Framework Convention on Climate Change (UNFCCC) in Copenhagen, Brazil announced voluntary targets to reduce its greenhouse gas (GHG) emissions. The targets aligned with reduction targets that Brazil announced in domestic climate legislation in December of that year (see Domestic Codification of the International Pledge). Following the COP, in January 2010, Brazil communicated the status of its Nationally Appropriate Mitigation Actions (NAMAs) to Annex II of the Copenhagen Accord (Brazil, 2010). In this communication, Brazil identified a suite of sector-specific actions that it estimates will result in a reduction of 36.1 percent to 38.9 percent below a projected hypothetical baseline in 2020. Table 1 lists Brazil's voluntary mitigation commitments as submitted to the UNFCCC.

### Domestic Codification of the International Pledge

In December 2009, shortly after the COP announcement, the Brazilian Government launched the National Policy for Climate Change (PNMC) through Law no. 12.187/2009. In line with its submission to the UNFCCC, the PNMC committed Brazil to a 36.1 percent to 38.9 percent reduction in GHG emissions by 2020, in relation to a baseline scenario (Art. 12). In December 2010, the Brazilian Government approved Decree 7.390, which regulates the PNMC.

Decree 7.390 states that the 2020 projections will be achieved through sectoral plans and initiatives (see Table 2). For the agriculture, forestry, and other land use (AFOLU) sector, these include the Action Plan to Prevent and Control Deforestation in the Amazon (PPCDAm); the Action Plan to Prevent and Control Deforestation and Fire in the Cerrado (PPCerrado); and the Low-Carbon Agriculture Plan (ABC Plan). These plans are discussed further in part III of this paper.

Decree 7.390 also includes GHG projections based, in part, on Brazil's second national GHG inventory, which covers 1990 to 2005 and was published in October 2010 as part of Brazil's second official national communication to the UNFCCC.<sup>4</sup> The decree establishes 3,236 million tonnes of CO<sub>2</sub>eq as the GHG emissions baseline projection for 2020. The methodology used to develop the projections-with-actions scenarios was composed using the baseline

Table 3 | **Brazilian Baseline Projections for 2020 and Estimated GHG Reductions by Sector from Policy Actions (Decree 7.390/2010)**

SECTOR	2020 PROJECTIONS, WITHOUT IMPLEMENTATION OF ACTIONS	ACTIONS	ESTIMATED GHG REDUCTION FROM BASELINE (%) <sup>5</sup>
<b>Land Use, Land-Use Change, and Forestry</b>	1,404 million tonnes CO <sub>2</sub> eq	80% reduction in the annual rates of deforestation in the Amazon compared to the average between 1996 to 2005	20.9
		40% reduction in the annual rates of deforestation in the Cerrado biome compared to the average between 1999 to 2008	3.9
<b>Energy</b>	868 million tonnes CO <sub>2</sub> eq	Expansion of hydroelectric supply	2.9–3.7
		Expansion of alternative renewable energy sources, notably wind farms, small hydropower, and bioelectricity	1–1.2
		Increased supply of biofuels	1.8–2.2
		Improved energy efficiency	0.4–0.6
<b>Agriculture</b>	730 million tonnes CO <sub>2</sub> eq	Recovery of 15 million hectares of degraded pastures	3.1–3.8
		Greater use of integrated crop-livestock-forest practices on 4 million hectares	0.7–0.8
		Expansion of the practice of direct planting on 8 million hectares	0.6–0.7
		Adoption of biological nitrogen fixation on 5.5 million hectares of cultivated land, replacing the use of nitrogen fertilizers	0.6–0.7
		Growth of forest plantations on 3 million hectares	
		Development of technologies for treatment of 4.4 million m <sup>3</sup> of animal waste	
<b>Industrial Processes and Waste</b>	234 million tonnes CO <sub>2</sub> eq	Institutionalize carbon management in the industry sector	0.3–0.4
		Promote increased recycling and the use of coproducts	
		Promote energy efficiency and cogeneration in industry	
		Strengthen emissions reduction from voluntary associations and private sector companies	
		Facilitate the development and dissemination of sustainable technologies	
<b>TOTAL</b>	<b>3,236 million tonnes CO<sub>2</sub>eq</b>		<b>36.1–38.9</b>

projection and mitigation actions described by sector in Table 7 in part IV of this paper. However, the baseline scenario excludes the effects of some policies that predated the PNMC. Table 3 summarizes planned federal actions and their anticipated emissions reductions.

Additionally, the governments of several states are developing subnational policies and programs on climate change as highlighted in Box 1.

Not surprisingly, there are differences that reflect unique subnational circumstances, especially in the composition of emissions, accounting rules, and gas coverage. According to a 2012 Climate Forum study by the Ethos Institute

and the NESAs/USPs on climate change subnational policies in Brazil, the existence of different targets among states is not necessarily problematic (Forum Clima, 2012). However, failure to coordinate these diverse state targets could hamper efforts at the national level. For example, if subnational emissions reduction targets differ, businesses operating across state lines may be required to comply with conflicting rules. If state actions are not coordinated, measures to account for national targets to reduce emissions may be complicated. In response to these challenges, the federal government created a working group under the existing Interministerial Committee on Climate Change. This working group is charged with harmonizing national and subnational climate change policies and laws.

**Box 1 | Brazil State Climate Change Legislation<sup>6</sup>**

STATE	LAW OR BILL	FORUM
Acre (AC)*	Law no. 2.308, October 22, 2010	
Alagoas (AL)		
Amapá (AP)	Bill	
Amazonas (AM)	Law no. 3.135, June 5, 2007	Decree no.28.390, February 17, 2009
Bahia (BA)	Law no. 12.050, January 7, 2011	Decree no. 9.519, August 18, 2005
Ceará (CE)		Decree no. 29.272, April 25, 2008
Distrito Federal (DF)		
Espírito Santo (ES)	Law no. 9.531, September 16, 2010	Decree no. 1.833-R, April 19, 2007
Goiás (GO)	Law no. 16.497, February 10, 2009	
Maranhão (MA)		Decree no. 22.735, November 29, 2006
Mato Grosso (MT)	Bill	Law no. 9.111, April 15, 2009
Mato Grosso do Sul (MS)		
Minas Gerais (MG)	Bill	Decree no. 44.042, June 9, 2005
Pará (PA)	Bill	Decree no. 1.900, September 22, 2009
Paraíba (PB)	Law no. 9.336, January 31, 2011	
Paraná (PR)	Bill	Law no. 16.019, December 19, 2008
Pernambuco (PE)	Law no. 14.090, June 17, 2010	Decree no. 33.015, February 16, 2009
Piauí (PI)		Decree no. 12.613, June 4, 2007
Rio de Janeiro (RJ)	Law no. 5.690, April 14, 2010	Decree no. 40.780, May 23, 2007
Rio Grande do Norte (RN)		
Rio Grande do Sul (RS)	Law no. 13.594, December 30, 2010	Decree no. 45.098, June 15, 2007
Rondônia (RO)		
Roraima (RR)		
São Paulo (SP)	Law no. 13.798, November 9, 2009	Decree no. 49.369, February 11, 2005
Santa Catarina (SC)	Law no. 14.829, August 11, 2009	Decree no. 2.208, March 17, 2009
Sergipe (SE)		
Tocantins (TO)	Law no. 1.917, April 17, 2008	Decree no. 3.007, April 18, 2007

\* Acre does not have a specific law, but Law No. 2.2308/2010 created the State System of Incentives for Environmental Services (SISA), the Incentives for Environmental Services Program (ISA Carbono) and other environmental service programs and ecosystem products in the state.

Source: Adapted from *Forum Clima*, 2012, Table 1.

## II: RELEVANT GOVERNMENT INSTITUTIONS AND LEGAL AUTHORITIES

At the federal level, the Congress—composed of the House of Representatives and the Senate—is the legislative body responsible for creating directives, objectives, and instruments of any policy, including the PNMC. The president must approve legislation passed by the Congress before it becomes law. Some policies, however, are created by decrees and are not subject to this legislative process. Poli-

cies enacted by decrees are generally created to formalize existing policies. Decrees can only be issued by executive entities, such as federal, state, and municipal governments.

The PNMC allocates specific roles—including financing, public education and engagement, and intergovernmental coordination—to several federal regulatory authorities and relies on specific institutional arrangements to support regulations and policy implementation. A partial list of these entities is shown in Table 4.

Table 4 | **Brazilian Institutions with Specific Roles Dictated by the PNMC<sup>7</sup>**

PNMC INSTITUTIONAL AUTHORITIES	ROLE	FURTHER DETAILS
<b>Brazilian Chief of Staff Office (Casa Civil)</b>	<ul style="list-style-type: none"> <li>Overall coordinator of Interministerial Committee on Climate Change (CIM).</li> <li>Coordinate development of climate policies.</li> </ul>	
<b>Brazilian Forum on Climate Change (FBMC)<sup>8</sup></b>	<ul style="list-style-type: none"> <li>Mobilize society on climate change issues and the Clean Development Mechanism.</li> <li>Monitor the implementation of sectoral plans.</li> </ul>	<ul style="list-style-type: none"> <li>The president presides over the forum, which includes 12 ministers, the director-president of the National Water Agency, and civil society representatives.</li> <li>FBMC has a seat at the Interministerial Committee on Climate Change (CIM) and is part of the Executive Group for Climate Change (GEX).</li> </ul>
<b>National Fund on Climate Change</b>	<ul style="list-style-type: none"> <li>Finance climate change mitigation and adaptation actions.</li> <li>Sources of funds include the federal budget, additional credits, and national and international donations.</li> </ul>	The Brazilian Development Bank and the Ministry of the Environment are responsible for operationalizing credit lines. The fund is managed by a steering committee, which is chaired by the executive secretary of the Ministry of the Environment and includes representatives from different ministries and sectors, including civil society.
<b>Amazon Fund</b>	<ul style="list-style-type: none"> <li>The Amazon Fund is aimed at raising donations for nonreimbursable investments to prevent, monitor, and combat deforestation, as well as to foster conservation and the sustainable use of the Amazon biome.<sup>9</sup></li> </ul>	The Amazon Fund is managed by the Brazilian Development Bank.
<b>Interministerial Committee on Climate Change (CIM)</b>	<ul style="list-style-type: none"> <li>Align different government initiatives related to climate change.</li> <li>Guide and coordinate the National Policy on Climate Change.</li> </ul>	The overall coordinator of this committee—as established by Decree 6263/2007—is the Brazilian Chief of Staff Office (“Casa Civil”). Other government agencies involved include: Ministry of Environment; Ministry of Science, Technology, and Innovation; Ministry of Foreign Relations; Ministry of Mines and Energy; Ministry of Cities; Ministry of Agriculture; Ministry of Development Industry and Foreign Trade; Ministry of Transport; Ministry of Health; Ministry of Planning, Budget, and Management; Ministry of Finance; Ministry of Agrarian Development; Ministry of Defense; Ministry of Strategic Issues; and Brazilian Forum on Climate Change.
<b>Interministerial Commission on Global Climate Change (CIMGC)</b>	<ul style="list-style-type: none"> <li>Articulate government action with respect to the UN Framework Convention on Climate Change and subsidiary bodies of which Brazil is a member.</li> <li>Set criteria and make decisions on Clean Development Mechanism projects.</li> <li>Coordinate discussions on climate change and integrate the government’s policies between ministries.</li> </ul>	The Interministerial Commission on Climate Change is composed of 11 ministries and headed by the Ministry of Science, Technology and Innovation. The Ministries are Foreign Affairs; Transport; Agriculture; Mining/Energy; Planning; Environment; Science and Technology; Industry; Chief of Staff; Cities; and Finance.

Table 4 | **Brazilian Institutions with Specific Roles Dictated by the PNMC<sup>7</sup> (continued)**

PNMC INSTITUTIONAL AUTHORITIES	ROLE	FURTHER DETAILS
<b>Commission of Meteorology, Climatology, and Hydrology Activities</b>	<ul style="list-style-type: none"> <li>Generate and disseminate knowledge so Brazil can respond to challenges exacerbated by the causes and impacts of global climate change.</li> </ul>	Housed by the National Institute of Spatial Research.
<b>Ministry of Science, Technology, and Innovation</b>	<ul style="list-style-type: none"> <li>Responsible for the National Communications to the UNFCCC and for the National GHG Inventories.</li> <li>Responsible for forest cover monitoring through Brazil's National Institute for Space Research (INPE).</li> <li>Formulate national policy for scientific and technological research and innovation; policies for developing information technology and automation; the national policy on biosafety; Brazil's space policy; and Brazil's nuclear policy and the control of exports of sensitive goods and services.</li> <li>Hosts CEMADEN (National Centre for Monitoring and Warning of Natural Disasters).</li> </ul>	Secretariat for Research and Development of Policies and Programs, General Coordination for Management of Ecosystems and Biodiversity, General Coordination for Global Climate Change.
<b>Ministry of Environment</b>	<ul style="list-style-type: none"> <li>Formulate national policy on the environment and water resources; policies on preservation, conservation, and sustainable use of ecosystems, biodiversity, and forests; strategies, mechanisms, and economic/social instruments for improving environmental quality and the sustainable use of natural resources; policies for balancing the environment and production; environmental policies and programs for the Legal Amazon; and ecological and economic zoning.</li> </ul>	Secretariat of Climate Change and Environmental Quality, Secretariat for Extractivism and Sustainable Rural Development, Brazilian Forest Service, Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA), Chico Mendes Institute for Biodiversity Conservation (ICMbio), Secretary for Biodiversity and Forests, Secretary for Institutional Articulation and Environmental Citizenship.
<b>Ministry of Agriculture, Livestock, and Food Supply</b>	<ul style="list-style-type: none"> <li>Responsible for public policies aimed at boosting agriculture and agribusiness and promoting the regulation and standardization of services related to the agricultural sector.</li> <li>Seeks to integrate marketing, technological, scientific, environmental, and organizational aspects of the productive sector and supply sectors, storage and transport of crops; oversees agribusiness-related economic and financial policy.</li> </ul>	Secretariat for Agricultural and Cooperative Development, Brazilian Agricultural Research Corporation (Embrapa).
<b>Ministry of Agrarian Development</b>	<ul style="list-style-type: none"> <li>Responsible for public policies on familiar agriculture and agrarian reorganization.</li> <li>Coordinates implementation of policies related to territorial development and land regularization in the Amazon.</li> </ul>	Department of Familiar Agriculture, Territorial Development Secretariat, Department of Agrarian Reorganization, Special Secretariat for Land Regularization in the Amazon.
<b>Ministry of International Relations</b>	<ul style="list-style-type: none"> <li>Coordinate on international politics.</li> <li>Participate in trade negotiations, economic, technical and cultural relations with foreign governments and entities.</li> <li>Participate in programs of international cooperation and trade promotion.</li> <li>Support delegations in Brazilian agencies and international and multilateral agencies.</li> </ul>	Secretariat of Diplomatic Planning, General Secretariat of Foreign Affairs, Division for the Environment (DEMA), Ministry of Foreign Affairs.

Table 5 | **Implementation Steps of the Framework of Action Plans to Prevent and Control Deforestation in the Brazilian Amazon**

STEP	RESPONSIBLE INSTITUTION	CURRENT STATUS	OBSERVATIONS
<b>Design of the Action Plan</b>	Interministerial Permanent Working Group (GPTI)	Completed	In addition to the three existing activity pillars, a fourth pillar regarding mitigation of infrastructure impacts in the Amazon was considered by the drafters of the plan but does not appear in the final version adopted in 2004.
<b>Implementation of the First Phase</b>	Federal executive commission	Completed	The Action Plan to Prevent and Control Deforestation (PPCDAm) was launched in 2004 and finalized its first phase in 2007. <sup>13</sup>
<b>Assessment of the Results of First Phase of the PPCDAm and Revision of the Action Plan</b>	Federal executive commission	Completed	The assessment showed that activities from the “monitoring and control” pillar had been implemented with satisfactory results. The two other remaining pillars were not implemented to the same extent (Abdala and Reis Rosa 2008).
<b>Implementation of the Second Phase of PPCDAm</b>	Federal executive commission	In process	A new version of PPCDAm was published in 2012.
<b>Design of State Plans</b>	State agency	Completed	By October 2009, all states, except for Roraima, had designed and launched their plans.
<b>Integration of Federal and State Plans</b>	Federal and state executive commissions	In process	Since 2010, state and federal authorities have met annually to strengthen coordination. However, actual coordination of activities and targets remains weak. For instance, the state targets remain disconnected from the federal target, making the structure of a potentially nested system more challenging.
<b>Implementation of State Plans</b>	State executive commissions	In process	State plans include activities related to tenure and environmental regularization, monitoring and law enforcement, and economic incentives. Evidence shows a low level of implementation of the Amazon state plans in the deforestation frontier (see for instance Box 2).
<b>Integration into the National Climate Change Plan</b>	Federal executive commission	Completed	Integrated through Decree 7.390, enacted in December 2010.
<b>Assessment of the Results of the PPCDAm up to 2011</b>	Federal executive commission	Completed	The assessment concluded that PPCDAm has achieved relative success. Some independent analyses also conclude that PPCDAm contributed to a downward trend in deforestation (Assunção et al. 2013; Barreto and Ellinger, 2011). However, actions under the PPCDAm were not completely responsible for the declining rates of deforestation—contributing factors include the global economic crisis, which dampened demand, in turn lowering deforestation rates. PPCDAm’s effectiveness relies heavily on command and control actions. Initiatives that should foster a transition toward a sustainable development model in the Amazon, such as ones for sustainable production and technology transfer, have met with minimal success. Issues such as land use regularization and organization of sustainable production chains therefore remain the greatest challenges for PPCDAm (Maia et al. 2011).
<b>Revision of the PPCDAm</b>	Federal executive commission	In process	Three working groups have been reviewing the federal action plan since April 2012. The subsequent consultation process is unclear.

### III: OVERVIEW OF MAJOR LAND USE POLICIES

To date, the largest single source of GHG emissions in Brazil has been deforestation linked to the expansion of agricultural frontiers,<sup>10</sup> primarily in the Amazon region. In this section, we briefly assess the implementation status of the PPCDAm and PPCerrado, as well as the Low-Carbon Agriculture Plan (ABC Plan). According to official projections,<sup>11</sup> the PPCDAm is expected to produce between 53.7 percent and 57.8 percent of the total committed emission reduction in 2020. The PPCerrado is expected to produce between 10.2 percent and 10.8 percent, and the ABC Plan between 12.5 percent and 16.8 percent.

#### Action Plan to Prevent and Control Deforestation in the Amazon (PPCDAm)

During its first phase (2004 to 2007), the PPCDAm aimed to reduce deforestation by 20 percent (Grupo Permanente de Trabalho Interministerial, 2004). In its second phase (2008–11), it is targeting an 80 percent reduction in deforestation by 2020, relative to a 1996–2005 baseline (Grupo Permanente de Trabalho Interministerial, 2009). The third phase of PPCDAm (2012–15) will focus in areas with less than 25 ha by strengthening actions of planning and territorial development and agrarian sustainable productive activities.

The activities under PPCDAm are organized into three major pillars:

1. Tenure regularization and territorial management
2. Monitoring and control
3. Incentives for sustainable production

The first two pillars aim to strengthen control of deforestation and lands; clarify tenure through registers, cartographic data, and zoning plans; and strengthen monitoring and enforcement capacities. The third pillar seeks to incentivize sustainable practices, support sustainable forest management, support extractive activities, enhance agricultural productivity, and restore degraded areas.

The Brazilian Chief of Staff Office (Casa Civil) coordinates the executive commission of the PPCDAm, and the Ministry of the Environment monitors activities under the national action plans. All states in the Amazon are required to have state plans that reflect PPCDAm actions.

State action plans are coordinated by state agencies. In May 2008, the states of Acre, Mato Grosso, Tocantins, and Pará began formulating action plans under the auspices of the PPCDAm to reduce deforestation. By 2012, eight states in the Amazon had completed their state action plans. Roraima is now the only state within the Amazon that is still developing its plan.<sup>12</sup> Table 5 presents a summary of the implementation steps for PPCDAm.

The annual deforestation rate in the Brazilian Amazon decreased from an average of 19,508 km<sup>2</sup> between 1996 and 2005 to 6,238 km<sup>2</sup> in 2011 (MMA/SECEX/DPCD, 2012). According to the established baseline, Brazil is on track to meet its commitment—it has already achieved an accumulated reduction of 68.2 percent compared to the 1996–2005 average deforestation rate.

The rate of deforestation in the Brazilian Amazon fell until 2011, and experts largely agree that the PPCDAm, together with other conservation policies,<sup>14</sup> influenced this trajectory. A study conducted by the Climate Policy Initiative in Brazil suggests that command-and-control policies were responsible for the avoidance of 62,100 km<sup>2</sup> of deforestation from 2005 to 2009, representing 52 percent of the total deforestation that would have occurred in the absence of these policies. The remaining 48 percent of avoided deforestation can be attributed to crop and cattle price variation (Assunção et al. 2013).

Additional measures, such as the National Monetary Council's Resolution 3.545, also contributed to the decline in deforestation. The resolution conditioned credit for agriculture and livestock production in deforestation hotspots in the Amazon on proof of compliance with environmental regulations. Without such measures, deforestation rates would not have fallen as they did (Assunção et al. 2013).

Despite the decline in deforestation, much remains to be done. Deforestation of smaller areas (less than 25 ha) remains a challenge because of constraints on remote sensing identification and law enforcement (May et al. 2011).

According to data from the Amazon Institute of People and the Environment (Imazon), deforestation rates increased from August 2012 until July 2013 by 92 percent (which represents 2,007 km<sup>2</sup>) compared to the previous period, from August 2011 to July 2012 (Martins et al. 2013). Between August 2012 and July 2013, the state of Pará was the largest contributor to deforestation, responsible for 40 percent of the total deforestation area. Mato

Grosso was responsible for 31 percent of deforestation,<sup>15</sup> Amazonas 14 percent, and Rondônia 13 percent. The main drivers of deforestation in the region are the expansion of agribusiness, cattle, and timber industries; challenges associated with land tenure; and insufficient economic incentives to protect the standing forest. The development of adequate monitoring systems is a challenge under the PPCDAm, in part because of a lack of funding. This remains an issue despite government efforts to create incentives for sustainable activity.

PPCDAm's impact to date is largely attributable to command-and-control actions implemented under the "monitoring and control" pillar. Initiatives with a greater likelihood of promoting a long-term transition to sustainable development in the Amazon, such as technology transfer and incentives for sustainable production, have been implemented less effectively<sup>16</sup> (Abdala and Reis Rosa, 2008; Maia et al. 2011). It is possible that there would have been a greater reduction in deforestation had the other pillars been successfully implemented.

Furthermore, implementation of state action plans within the Amazon remains variable, which may mean that they are not meeting their full potential to reduce deforestation. Moreover, since 2004, decentralization has shifted some of the federal government's responsibilities to state governments. Many PPCDAm actions depend on state actors and actions taken under state plans to prevent and combat deforestation.

Finally, PPCDAm activities do not yet fully account for large infrastructure projects, such as hydroelectric plants and highways. Experts note that coordinating PPCDAm activities is thus likely to remain a challenge (Millikan, 2009; Marquesini, 2008). This point is clearly illustrated by increased rates of deforestation in the municipalities of Porto Velho and Altamira, where hydroelectric plants are under construction (MMA/SECEX/DPCD, 2012).

Although PPCDAm has shown promise in slowing deforestation, its implementation must be improved. A sustainable reduction in Amazon deforestation will require not only improved monitoring and control but also improved governance and positive incentives. Existing governance problems include uneven implementation and variations in effectiveness among the three PPCDAm pillars. The monitoring and control pillar has been the most successful, but it demands more state-level laws and actions, such as land tenure reform. At present,

states are unable to meet those demands. To develop an effective implementation strategy, the federal and state governments should prioritize PPCDAm actions. Positive incentives include tax compensation, financing lines for sustainable production, and forest management.<sup>17</sup>

## Action Plan to Prevent and Control Deforestation and Fire in the Brazilian Cerrado (PPCerrado)

The Brazilian savannah—the Cerrado—covers 24 percent of Brazil's territory. By 2009, agriculture expansion in this biome had led to the loss of 48.2 percent of its forest cover. Between 2002 and 2008, an average of 14,200 km<sup>2</sup> of the Cerrado's forests was lost to deforestation each year. Wildfires are also a major problem. The main reason for forest loss in the Cerrado is agriculture production (especially soybean), and currently it is the biome that is being destroyed most quickly.

In September 2010, the government of Brazil launched the Action Plan to Prevent and Control Deforestation and Fire in the Cerrado (PPCerrado). The PPCerrado was based on the National Program of Sustainable Use of the Cerrado<sup>18</sup> and was integrated into the PNMC.

Between 2002 and 2008, 20 municipalities accounted for 18 percent of deforestation in the Cerrado. The PPCerrado prioritizes these municipalities. Although deforestation in the Cerrado has decreased significantly, annual rates remain high: between 2008 and 2010, the Cerrado's original and secondary vegetation shrunk from 1,043,346 km<sup>2</sup> to 1,036,877 km<sup>2</sup>—a loss of approximately 0.32 percent of original Cerrado forest cover. In total, the Cerrado has lost 48.5 percent of its original forest area.<sup>19</sup>

The PPCerrado lists 151 actions that are managed by an executive commission comprising representatives from 17 ministries and coordinated by the Casa Civil.

The PPCerrado targets a 40 percent reduction in deforestation by 2020 (based on the 2002–08 baseline) and details activities for 2010 and 2011. Its actions are organized into four major pillars for 2011 and 2012:

1. Monitoring and control
2. Protected areas and territorial planning
3. Sustainable activities<sup>20</sup>
4. Environmental education

## Box 2 | Implementation in Mato Grosso of the Action Plan to Prevent and Control Deforestation in the Amazon and the Plan for Prevention and Control of Deforestation and Slash-and-Burn Agriculture for the State of Mato Grosso

Until recent years, the state of Mato Grosso was a major contributor to deforestation and agricultural expansion in Brazil's Amazon region. From 1996 to 2005, it deforested an average of 7,700 km<sup>2</sup> per year, which represented 39 percent of the total deforestation in the Brazilian Amazon. Since 2006, however, national deforestation rates have dropped. Sixty percent of the deforestation reduction in the Brazilian Amazon since 2005 was achieved in Mato Grosso, which makes it a key state for the prevention and control of deforestation in the Amazon.

The table below shows a synthesis of the main results of the Action Plan to Prevent and Control Deforestation in the Amazon (PPCDAm) and the Plan for Prevention and Control of Deforestation and Slash-and-Burn Agriculture for the

state of Mato Grosso. The data highlight the significant decrease in deforestation and increase in degradation. The level of activity implementation shows that tenure regularization is not being implemented effectively, monitoring and control is only occurring in some areas, and economic incentives for sustainable activities are not being implemented uniformly. This indicates that deforestation is not fully controlled. Updated deforestation data from Imazon show that deforestation increased 82 percent in Mato Grosso between August 2012 and May 2013 in relation to the same previous period (<http://www.imazon.org.br/publicacoes/transparencia-florestal/transparencia-florestal-amazonia-legal/boletim-do-desmatamento-sad-maio-de-2013>).

PILLAR	ACTIVITY	STATUS
Overall Plan	Deforestation	From 2004 to 2011, annual deforestation evolved from 11.814 km <sup>2</sup> to 1.126 km <sup>2</sup> (Prodes).
	Forest degradation	From 2009 to 2010, annual forest degradation evolved from 781 km <sup>2</sup> to 3.847 km <sup>2</sup> (Hayashi et al. 2011).
Tenure Regularization	Zoning plan	State zoning plan was approved by the state House of Representatives but was not accepted by the federal zoning council and has been suspended by a state court.
	Properties with land title	In April 2011, 60 land titles had been issued. The 2010 target was 606 (Brito and Barreto, 2011).
	Properties with environmental register	In 2010, 39 percent of the area of rural properties with a legal obligation to register had effectively registered.
	Settlement with environmental register	In 2012, 12.84 percent of the settlement area of Mato Grosso was registered.
	State Conservation Units	Between 2009 and 2010, the borders of six conservation units were identified by GPS, seven management plans were established, and nine were implemented.
	Indigenous territories in delimitation process	Approved: 40; declared: 7; identified: 4; in identification: 6 *
Monitoring and Control	Monitoring tools implemented	Federal monitoring tools implemented (Prodes, DETER, DEGrad). State monitoring tools in terms of forest exploration not implemented.
	Law enforcement	In 2009, state police operations covered 162 percent of the area of forest offenses in the same year. In 2011, state police operations only covered 47 percent. Between 2009 and 2010, the area of federal police operation reduced 35 percent (Conceição, Micol, and Andrade, in press).
	Fines paid	Between 2009 and 2011, the amount of state fines paid fell from BRL3.9 million to BRL2.2 million. It represents a very small portion of the amount of fines actually issued (Conceição, Micol, and Andrade, in press).
Sustainable Activities	Number of forest management plans authorized	In 2007, 330 forest management plans had been authorized (Micol et al. 2009), whereas in 2010, 2,103 forest management plans had been authorized (Conceição, Micol, and Andrade, in press).
	Access to credit for forest sustainable activities	In 2009/2010, access to specific credit lines for sustainable forest management and agroecology was very low (Cardoso, 2011).

\*Source: Instituto Socioambiental, <http://ti.socioambiental.org/#>, accessed April 7, 2012.

Table 6 | **Low-Carbon Agriculture Plan Strategies and Targets**

STRATEGY	ACTION	TARGET
<b>No-Till Systems</b>	Rather than till the soil, which contributes to erosion, farmers sow directly in the straw of the previous crop. This practice protects the soil, reduces water use, increases crop yields, and reduces machinery and fuel costs. The goal is to expand the current 25 million hectares under no-till systems to 33 million hectares.	To reduce the emission of 16 million to 20 million tonnes of CO <sub>2</sub> equivalent relative to projected 2020 levels
<b>Degraded Pastures Renovation</b>	To transform degraded land into productive areas for the production of food, fiber, meat, and forests. The government aims to recover 15 million acres.	To reduce between 83 million and 104 million tonnes of CO <sub>2</sub> equivalent relative to projected 2020 levels
<b>Integrated Crop-Livestock-Forestry Systems</b>	The system aims to integrate plant, animal, and forestry production in one system. This replenishes the soil, increases income, and creates jobs. The goal is to convert 4 million hectares, which are currently used for crops, to an integrated system.	To reduce between 18 and 22 million tonnes of CO <sub>2</sub> equivalent relative to projected 2020 levels
<b>Planted Forests</b>	Planted eucalyptus and pine trees provide future income to the producer and reduce carbon dioxide by releasing oxygen. The goal is to increase the area of 6 million hectares to 9 million hectares of planted forests.	To reduce between 8 and 10 million tonnes of CO <sub>2</sub> equivalent relative to projected 2020 levels
<b>Biological Nitrogen Fixation</b>	Biological nitrogen fixation processes develop microorganisms/bacteria to capture nitrogen in the air and turn it into organic matter for crops. This helps to reduce production costs and improve soil fertility. The government aims to improve the method in the production of 5.5 million hectares.	To reduce the emission of 10 million tonnes of CO <sub>2</sub> equivalent relative to projected 2020 levels
<b>Animal Waste Treatment</b>	Waste from pigs and other animals is collected and used to produce energy (gas) and organic compounds. The goal is to treat 4.4 million cubic meters of waste from pig farming and other activities.	To reduce 6.9 million tonnes of CO <sub>2</sub> equivalent relative to projected 2020 levels

According to the only available document on PPCerrado implementation, the third pillar—sustainable activities—has been most thoroughly implemented. Activities falling under the other pillars are limited by a lack of financing (Azevedo, 2012).

The PPCerrado’s greatest challenge is to structure a monitoring system for deforestation and degradation in the Cerrado biome. Unlike in the Amazon, attempts to monitor deforestation and degradation in the Cerrado are relatively new. To better analyze the dynamics of human disturbance of the biome, more effective methods for assessing and monitoring land use and land cover changes are required. The PPCerrado aims to provide adequate land cover classifications and to implement an operational monitoring system in the Cerrado, where historically there have been few attempts to control land degradation.

Currently, the Ministry of Environment’s Biodiversity and Forests Secretary is monitoring deforestation and degradation in the Cerrado, with financial support from the United Nations Development Programme and technical support from the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA). The initiative, however,

has limited resources and, in the Amazon, for example, does not measure deforestation and degradation in real time. In 2010, the Brazilian Government announced a partnership between the National Institute of Spatial Research and IBAMA to improve the monitoring system and provide annual deforestation rates. However, insufficient financing kept the partnership from becoming active until recently.

All actions approved under the Forest Investment Program indicate that the Cerrado is a priority and that investments should be made in monitoring systems (see Box 3 for more information). The involvement of civil society in monitoring actions that lead to GHG emissions and deforestation is crucial in this biome.

### Low-Carbon Agriculture Plan (ABC Plan)

In 2010, the Brazilian Government designed the Low-Carbon Agriculture Plan (ABC Plan) to provide resources and incentives for farmers to adopt sustainable agricultural techniques. The objective is to reduce emissions of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) from agriculture (Table 6). Specifically, the ABC Plan aims to reduce annual GHG emissions by 133 to 166 million tonnes of CO<sub>2</sub>eq relative to projected future levels by the year 2020 (see part

IV: GHG Projections). Other objectives include contributing to the achievement of international GHG reduction commitments; guaranteeing the continuous improvement of agricultural practices that reduce GHG emissions and increase carbon storage in vegetation and soil; incentivizing the adoption of strategies that increase environmental protection of plants and productive systems, while generating income for vulnerable rural communities; and enhancing efforts to reduce deforestation led by livestock and agriculture production in the Amazon and Cerrado biomes.

As of April 2013, the ABC Plan had not yet been enacted by decree and its governance structure was not yet fully implemented. Nevertheless, a government program—known as the ABC program—was already implementing the ABC Plan's activities.<sup>21</sup> State management groups are operating in 13 priority states, and the agriculture ministry has thus far focused on publicity and capacity-building activities.

The main problem of the ABC Plan is that it is being implemented slowly. A recent study organized by the ABC Observatory (ABC Observatory, 2013) identified a number of limitations, ranging from producers' ignorance of the ABC Plan to the low capacity of technology transfer and the chronic deficiencies of the agricultural extension system in Brazil. Overcoming such limitations, according to the study, is urgent in order to meet Brazilian mitigation targets.

One of the bottlenecks is the financial implementation of the ABC program, which aims to promote, among other things, the technologies recommended in the ABC Plan. Activities are limited by challenges in accessing available financial resources. In 2012, the ABC program received a budget allocation of 1.3 billion BRL (Conservation International, Instituto Socioambiental, and Instituto de Pesquisa Ambiental da Amazônia, 2012), but initial assessments showed very weak access to the plan's main credit lines (Cardoso, 2011). The ability of key actors to access credit is restricted by their lack of capacity and uncertainty about the risks of new technologies. Furthermore, until recently, Banco do Brasil managers had no incentive to offer credits from the ABC program because the provision of such credits was not factored into their performance review in the same way as the provision of other financial products, such as loans. The Forest Investment Program (see Box 3) aims to provide resources and capacity building to address these challenges.<sup>22</sup>

In the first year of implementation (2010–11), only five projects were approved under the ABC program. The government attributed this low number to poor marketing.<sup>23</sup> In the

second year (2011–12), the credit line for the agricultural ABC program grew to 3.15 billion BRL, with interest of 5.5 percent per year. Of this total, 48 percent was used (1.5 billion BRL), representing an increase of 262 percent over the previous year (2010–11). In its second year, part of the funding for the program was transferred by the Brazilian National Bank for Social and Economic Development (BNDES) to Banco do Brasil (1.2 billion BRL) and some public and private banks (300 million BRL), leveraging the use of resources. In 2012, 5,038 projects were approved, with 2,022 in the Southeast region, 870 in the Midwest, and 233 in the North. By January 2013 there were more than 4,500 contracts. Although growth appears to be quite positive, the number of contracts is still very small considering the many entities that can and need to take advantage of credits provided by the ABC program (ABC Observatory, 2013).

To qualify for a loan from the ABC program, farmers must register with the Rural Environmental Registry (CAR, in Portuguese). This registry is not yet available in all states, however, which creates a barrier to the expansion of the ABC program. The states that have accessed the ABC program the most are, in order: Minas Gerais, Paraná, Rio Grande do Sul, São Paulo, Goiás, and Mato Grosso do Sul.<sup>24</sup>

Another significant challenge for the ABC Plan is establishing a monitoring system and a baseline for its activities and impacts. The ABC Plan and the ABC program can help change traditional, unsustainable agricultural practices and play an important role in moving Brazil toward its voluntary emission reduction target, in accordance with the National Policy of Climate Change. The plan's implementation, however, depends on the federal and state governments' capacity to make the Rural Environmental Registry available for rural families. Moreover, rural families should be provided the training and information needed to support a shift toward more sustainable farming practices.

In 2011, only three states had established a management committee and developed an action plan. One of these states was Mato Grosso. The Mato Grosso action plan consists of 45 proposed activities, organized around seven expected results directly related to the national plan's targets. State action plans do not have a mechanism to absorb funding, however, which limits their capacity for implementation (Strassburg et al. 2012). In addition, there appears to be a lack of harmonization and integration with other action plans and policies that cover land use, including other deforestation plans and sectoral plans for energy and industry.

## Other Land Use Policies

Two other policies likely to affect Brazilian emissions and carbon stocks are the implementation of a legal or institutional framework for the Reduction of Emissions from Deforestation and Forest Degradation (REDD+) and revisions to the forest code (see Box 4).

## IV: GHG PROJECTIONS

Although this paper focuses on national policies in the AFOLU sector, to consider Brazil's GHG trajectory into the future, we must analyze all economic sectors. The projections presented here are based on an independent analysis of GHG emissions published by the Coimbra Institute and Graduate School of Research and Engineering at the Federal University of Rio de Janeiro in January 2013.<sup>28</sup>

### Box 3 | Three Examples of Financing Instruments in Implementing Brazil's Climate Policies: The Amazon Fund, the Climate Fund, and the Forest Investment Program

Whether Brazil can meet its climate mitigation targets will depend on different types of financing instruments—such as grants, public investments, and taxes—provided through national and international institutions. Currently, Brazil has three finance initiatives at the federal level established by law: the Amazon Fund, the National Fund for Climate Change, and the Forest Investment Program. However, not all climate funding sources are included in this assessment.

#### The Amazon Fund

Launched in 2008, Brazil's Amazon Fund aims to combat deforestation and promote sustainable development in the Amazon. Despite initial skepticism about its potential to secure funding, the Amazon Fund attracted interest from the government of Norway and later that of Germany. The Amazon Fund has so far received a pledge for up to US\$1 billion from the government of Norway, contingent on achieving reduced rates of deforestation. To date, US\$129 million has actually been disbursed to the Amazon Fund for a first round of projects. Thirty-six projects are contracted.

The Brazilian National Bank for Social and Economic Development (BNDES) manages the Amazon Fund, which is available to finance the sustainable use of forests, recovery of deforested areas, conservation, and sustainable use of biodiversity, as well as environmental control, monitoring, and enforcement. Grant awards follow guidelines established by a steering committee, which includes civil society representatives, but actual grant decisions are made by BNDES staff (see <http://www.amazonfund.gov.br/> for further details on fund management, including a listing of initial projects approved and in the pipeline).

In a 2011 report evaluating Norway's support for REDD+ readiness activities in developing countries, the Norwegian Agency for Development Cooperation stressed the importance of the US\$1 billion commitment for the initial thrust of forestry policies in Brazil. The report's authors consider the implementation of the Amazon Fund a "leading example of developing a national mechanism for the disbursement of payments based on results." However, the authors note that despite the Amazon Fund's success, interviews for the report revealed areas for improvement in future support from Norway's International Climate and Forest Initiative; activities thus far had had limited impact, and procedural constraints had restricted efficiency. The civil society organizations, community associations, private sector organizations, and state governments who see themselves as central actors and beneficiaries were frustrated with the limitations, complexities, tight specifications, and lack of transparency in these processes (May et al. 2011).

#### The National Fund on Climate Change

The PNMC established the National Fund on Climate Change (Climate Fund) in 2009 to finance projects, studies, and projects targeting climate change mitigation and adaptation. The Climate Fund is linked to the Ministry of Environment and provides refundable and nonrefundable resources. The refundable resources are managed by the National Bank for Economic and Social Development (BNDES). The nonrefundable funds are managed by the Ministry of Environment. Up to 60 percent of the Climate Fund's resources come from the Ministry of Environment from the proceeds of oil production. Other sources of funding include appropriations in the annual federal budget law, national and international public or private grants, and other arrangements made by law. However, the national climate change fund is currently under threat, which could have significant implications for future climate change activities.

#### The Forest Investment Program

In September 2010, the government of Brazil confirmed its interest in participating in the Forest Investment Program as a pilot country. The Forest Investment Program aims to support the efforts of developing and emerging economies to reduce emissions from deforestation and forest degradation through public and private investments. Forest Investment Program investments in Brazil will focus on the Cerrado biome. The Investment Plan for Brazil identifies three priorities. First, it supports structuring activities for sustainable forest management, aiming to enhance forest maintenance. Second, it supports the development and implementation of monitoring and planning tools for land-use planning, forest inventory, and the implementation of the rural environmental cadaster, (CAR, in Portuguese), aiming to strengthen the governance and management transparency of the forest resources. The rural environmental cadaster is a key instrument to assist in the process of environmental regularization of rural properties. Third, it targets the promotion of productive sustainable activities in already deforested areas, aiming to reduce the pressure of conversion of new areas.

The Amazon Fund and the Climate Fund are the main funds for climate mitigation in Brazil and are established by the PNMC as financing mechanisms for achieving Brazilian targets. To complement resources from these funds, Brazil is also a pilot country under the Forest Investment Program.

## Box 4 | National REDD+ Strategy & Forest Code Reform

### National REDD+ Strategy

The government of Brazil has been developing its National REDD+ Strategy since 2010, in consultation with civil society actors, including the private sector. With the aim of generating inputs for the National Strategy, the Ministry of Environment organized working groups to examine issues such as financing, benefit-sharing, and institutional arrangements. In addition, the Executive Group of the Interministerial Committee on Climate Change created a REDD+ temporary interministerial group to develop the National Strategy. State governments in the Amazon have been involved in this process through meetings with the Ministry of Environment to define strategies for nesting the subnational initiatives at the national level.

The draft strategy identifies the three sectoral plans analyzed here as the primary channels for implementing REDD+ in Brazil. It supplements these plans with cross-cutting measures, including a financial architecture for REDD+ and a set of “safeguards” designed to ensure that REDD+ actions do not inflict social or environmental harm. The safeguards cover a range of issues, including respect for the knowledge and rights of indigenous peoples and local communities, transparent national forest governance structures, effective participation of stakeholders, and conservation of natural forests and biodiversity.

Defining legal rules and constructing safeguards are important steps toward the regulation of REDD+ activities in Brazil. Rules and safeguards promote harmonization among federal, state, and municipal levels and establish the groundwork for further regulation of key aspects of the development and operation of REDD+ projects or programs. Currently, however, there is little coordination among existing REDD+ initiatives at the different levels of government.

Moreover, several important elements of REDD+ remain unaddressed in the draft strategy. The current draft does not include a mechanism to hold the government accountable for REDD+ emissions reductions at the national level or address the decentralization of REDD+ financing and benefit-sharing. Furthermore, the draft does not address how other biomes can benefit from the National Strategy, how REDD+ can be integrated into the mix of conservation instruments, and how local actors can be adequately engaged. According to some Ministry of the Environment representatives, other federal ministries are now reviewing the draft National REDD+ Strategy in preparation for public consultation.

### Forest Code Revision

First enacted in 1934, the Forest Code, now replaced by the Forest Law n. 12.651/2012, is a fundamental component of Brazil's environmental legal framework. Among other things, it established a “legal reserve”—a percentage of any rural property that must be kept forested—and a “permanent protected area” status that applies to riparian zones, hillsides, and mountaintops.

The extent of the legal reserve has long been a matter of debate. The original forest code set it at 50 percent for private properties within the country's northern (primarily Amazon) region. Following a major increase in deforestation in the mid-1990s, an executive order expanded the legal reserve for the legal Amazon to 80 percent. However, a significant share of Brazilian agricultural properties does not meet the 80 percent standard (Sparovek et al. 2010). Because compliance with the law would require radical changes in Brazilian agriculture, the country's agricultural interests have pushed for reform.

The proposed changes to the Forest Code provoked protests from environmentalists and scientists (Grupo de Trabalho do Código Florestal, SBPC, ABC, 2011; Metzger, 2010; Barreto and Ellinger, 2011). Indeed, studies suggest that the new Forest Law could threaten Brazil's efforts to reduce deforestation. According to an analysis of initial set of proposed reforms published by the Climate Observatory in 2010, the changes could lead to additional emissions and loss of carbon sequestration of 6 to 24 times the total of the mitigation goal in tonnes of CO<sub>2</sub> equivalent that was committed to in Copenhagen in 2009 (Martin, 2010).<sup>25</sup> Experts have speculated that changes in deforestation rates can be attributed to the expectation of amnesty (see Box 5).

Following intense national debate, the House of Representatives passed a bill in May 2012<sup>26</sup> weakening several Forest Code provisions. President Dilma Rousseff vetoed 12 of the more controversial revisions and issued a provisional measure for 32 modifications to the bill including:

- Diminished protection of riparian areas
- Amnesty for select cases of illegal clear-cutting
- Postponement of the requirement to use the Rural Environmental Registry as a prerequisite to access credit
- Complication of criteria for determining fines and restoration of degraded land

In September 2012, the Senate approved bill 571/2012, which regulates some of the issues that President Rousseff previously vetoed. The main change is the reduction of riparian areas for large farmers, which was later vetoed by the president.<sup>27</sup>

It is important to note that there are many synergies and contradictions between the National REDD+ Strategy, the new Forest Law, and the plans to reduce GHG emissions in the forestry sector. Examples of synergies include the implementation of the Rural Environmental Registry, the provision of payments for environmental services, and the improvement of monitoring strategies, all of which is set forth in the Forest Law. Examples of contradictions, which are changes to the Forest Code, include the reduction of Permanent Protected Areas, the inclusion of Permanent Protected Areas in the Legal Reserve, and the reduction of the re-composition area of the Amazonian Cerrado.

## Box 5 | Impact of the Zoning Plan Vote and Negotiation on Forest Code Reforms in Mato Grosso Deforestation

Legislative actions can have clear—and sometimes unintended—repercussions on deforestation rates. In Mato Grosso, they triggered illegal behavior and severely hampered mitigation.

Between August 2010 and March 2011, according to data from Imazon's Deforestation Alert System, deforestation in Mato Grosso increased 22 percent and forest degradation 225 percent, compared with the same period in 2009–10. In April 2011, field operations revealed the reappearance of cases of large deforestation (deforestation over 1,000 hectares), which had not occurred in Mato Grosso since 2006. From August 2010 to April 2011, 66 new deforestation areas were identified in Nova Ubiratã, totaling approximately 37,000 hectares (see illustration).

The resurgence of deforestation resulted from a race to clear large areas as quickly as possible in order to take advantage of the expected amnesty for illegal deforestation proposed in amendments to the Forest Code. These actions were carried out in defiance of the law, with the expectation of impunity.

The enactment of the state zoning plan on April 20, 2011 also fueled increased deforestation in Mato Grosso. The zoning plan provides a basis for regularizing any environmental liability in areas deforested by the date of its publication.



The study estimates GHG emissions are based in part on the figures provided in the Inventory of Emissions of the Second National Communication of Brazil to the UNFCCC. These projections represent the most recent review of Brazil's possible future GHG trajectory and are based on the emission figures provided in the federal decree that regulates the PNMC.

The analysis is based on three scenarios—A, B, and C—that together outline a range of possible GHG emissions through 2030 (Table 7 and Figure 4). Scenarios A and B extend the existing government assumptions from 2020 to 2030. Scenario C presents deeper mitigation potential. Scenario A, which serves as the baseline, assumes that average historic emission trends continue for land-use change, forests, and industry. For energy, this baseline scenario assumes that as of 2010, all new power generation is sourced from natural gas. (In fact, Brazil installed new renewable capacity prior to 2010 and has continued to do so.<sup>29</sup>) Scenario B takes into account mitigation policies and measures approved by the Brazilian Government to date, and assumes the Government's 2020 GHG reduction goals are met, and Scenario C assumes implementation of policies under consideration but not yet adopted.

The inputs to the projection model include, for all scenarios, a GDP growth rate of 5 percent per annum (pa) from 2011 to 2020 and 4 percent from 2021 to 2030. The six economic sectors are LULUCF, power generation, transport, industry, agriculture, and waste.

Table 7 summarizes the assumptions in each of the three scenarios, and Figure 4 presents the expected GHG trajectory under each scenario. The study finds that – assuming government GHG reduction goals for 2020 are met – the energy sector will become the largest source of GHG emissions by 2020. (As of 2012, energy emissions had already approached those of agriculture and those of land use change.<sup>30</sup>) Emissions would also continue to increase from 2020 to 2030 in the absence of additional mitigation actions.

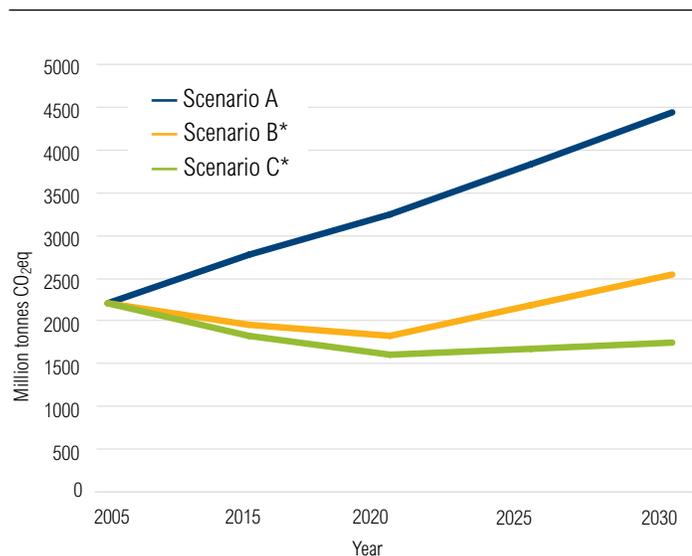
As outlined above, however, there are challenges to implementing the existing policies, including insufficient financing to support actions, inadequate monitoring and control, and too few positive incentives to sustain reduced deforestation.

Table 7 | Summary of Key Underlying Assumptions for Each Sector

	SCENARIO A (BASELINE)	SCENARIO B	SCENARIO C
<b>Overall assumptions</b>	Base values provided in Federal Decree 7.390, excluding any mitigation measures included in Scenario B and extended into the future based on trends observed before 2009	Includes mitigation measures that were outlined in Federal Decree No. 7.390 up to 2020, with no further mitigation actions after this date	Includes additional mitigation actions that are under consideration but not yet adopted
<b>Land-use change and forestry</b>	Average historic deforestation rates (from 1996 to 2005)	<ul style="list-style-type: none"> <li>■ Implementation of mitigation actions outlined in PNMC for 2010–20</li> <li>■ Amazon: Reduction of deforestation by 80% from baseline by 2020; maintained at this rate through 2030</li> <li>■ Cerrado: Reduction of deforestation by 40% from baseline by 2020; maintained at this rate until 2030</li> <li>■ Expansion of planted forests by 3 million hectares in 2020; increase to 11.2 million hectares in 2030</li> </ul>	<p>Deeper mitigation that occurs in 2 phases: by 2020 and post-2020</p> <ul style="list-style-type: none"> <li>■ Amazon: Reduction of deforestation by 85% from baseline by 2020; by 90% from baseline by 2030</li> <li>■ Cerrado: Reduction of deforestation by 45% from baseline by 2020; by 60% from baseline by 2030</li> <li>■ Expansion of planted forests by 3 million hectares in 2020, increase to 12.3 million hectares in 2030</li> <li>■ Reforestation of 7.5 million ha of forest cover by 2030</li> </ul>
<b>Energy</b> (demand assumed to be the same across scenarios)	No expansion of renewable energy sources as of 2010, all new power needs met through natural gas; only energy savings achieved through technology progress	<ul style="list-style-type: none"> <li>■ As stated in Ten-Year National Energy Plan (PDE) 2019 and the National Energy Plan (PNE) 2030 (for 2020 – 30)</li> <li>■ Mitigation measures include: <ul style="list-style-type: none"> <li>■ Expansion of hydro to 34 GW</li> <li>■ Expansion of renewable energy to 20 GW</li> <li>■ Energy efficiency actions to reduce projected power consumption by 4.4%</li> </ul> </li> </ul>	<p>Mitigation measures include:</p> <ul style="list-style-type: none"> <li>■ Wind power to replace coal power growth assumed in Scenario B</li> <li>■ Energy efficiency actions to save 2% more energy than in scenario B, reducing demand by 12% in 2030</li> <li>■ No nuclear expansion</li> <li>■ Energy efficiency shifts generation away from natural gas</li> </ul>
<b>Transport</b> (same increase in energy demand assumed across all three scenarios:  Lightweight vehicles: 6.8% pa up to 2020; 5.4% pa up to 2030  Heavyweight vehicles: 5% pa up to 2020; 4% pa up to 2030)	<p>Consumption of ethanol and biodiesel frozen at 2009 levels until 2030</p> <ul style="list-style-type: none"> <li>■ Consumption of gasoline C<sup>31</sup> and diesel calculated considering total demand and discounting biofuel values</li> <li>■ Proportion of anhydrous ethanol in gasoline C reduced progressively from 25% in 2009 to 20% by 2020</li> </ul>	<ul style="list-style-type: none"> <li>■ Increase in consumption of ethanol and biodiesel:</li> <li>■ Increase in consumption of ethanol: 13.9% pa up to 2020; 5.6% pa for 2021–30</li> <li>■ Consumption of gasoline C calculated as difference in lightweight vehicle energy demand and ethanol consumption</li> <li>■ Proportion of anhydrous ethanol in gasoline C maintained at 25%</li> <li>■ Heavyweight vehicles: Blending of biodiesel in diesel oil maintained at 5% throughout period</li> </ul>	<p>More ambitious increase in consumption of ethanol and biodiesel:</p> <ul style="list-style-type: none"> <li>■ Increase in consumption of ethanol: 13.9% pa up to 2020; 7% pa for 2021–30</li> <li>■ Consumption of gasoline C and proportion of anhydrous ethanol to gasoline assumed to be the same as in scenario B</li> <li>■ Heavyweight vehicles: Blending of biodiesel in diesel oil maintained at 5% up to 2020; increase to 6% in 2025 and 7% in 2030</li> </ul>
<b>Industry</b>	<p>Estimated based on Ten-Year National Energy Plan (PDE) 2019 and the National Energy Plan (PNE) 2030 (for 2020–30)</p> <ul style="list-style-type: none"> <li>■ No gains from energy efficiency</li> </ul>	<ul style="list-style-type: none"> <li>■ Mitigation measures include: <ul style="list-style-type: none"> <li>■ Increased energy efficiency</li> <li>■ Materials recycling (5% in cement manufacturing)</li> <li>■ Incremental use of charcoal reducing sector emissions by 10%</li> </ul> </li> </ul>	<p>Mitigation measures include:</p> <ul style="list-style-type: none"> <li>■ More rigorous energy efficiency measures, including implementation of measures with no economic returns for consumers</li> <li>■ Adoption of modified industrial processes—replacement of SF<sub>6</sub>, new-generation catalysts, etc.</li> </ul>

Source: Adapted from La Rovere et al. 2013

Figure 4 | **GHG Emissions Scenarios for Brazil**



\*Includes GHG impacts from reforestation. Source: La Rovere et al. 2012.

## V: LOOKING AHEAD

If Brazil continues to drive down deforestation and agriculture emissions, it could meet its targets for 2020. However, Brazil faces challenges in designing and implementing its mitigation plans. To meet its reduction targets, Brazil will need to address these challenges. It took an initial step in 2012 when the Executive Group of the Interministerial Committee on Climate Change launched a task force to review the National Plan for Climate Change. The Brazil National Plan predates the PNMC, and, while it includes Brazil's commitments to reduce GHG emissions across different sectors, it does not implement specific actions or regulations. If rigorous and comprehensive, the task force's review may provide an opportunity to harmonize the sectoral plans with the overall objective of the PNMC, update GHG projections, and better involve civil society.

Additional factors that could support Brazil in implementing its National Strategy include the following:

### Participation by civil society and transparency in the design of policies

Climate policymakers in Brazil have historically recognized the importance of including stakeholders in decisions about, and implementation of, GHG emissions reductions (May et al. 2011). The participation of these stakeholders (including representatives of local populations, forest managers, and members of the public sector, among others) is essential to ensure that the plans succeed in reducing GHG emissions.

In 2000, the government of Brazil created the Brazilian Climate Change Forum as a venue for communication with civil society on climate change issues. The Climate Change Forum, which is chaired by the president of Brazil, includes representatives from all sectors of Brazilian society focused on the climate agenda, including the private sector, social movements, academia, and think tank organizations. It coordinates and advises various climate change initiatives and is intended to bridge government and civil society. Although the forum has served its role as an avenue for civil society inputs, it has been less effective in accomplishing its intended goal of serving as a strategic advisory committee. A network of NGOs called the Climate Observatory has facilitated stakeholder participation in the development and implementation of sectoral plans. However, participation has been highly uneven and variable across the different functions of each plan. The Climate Observatory also engages in climate policymaking processes through the forum.

Improved transparency and inclusion are essential for creating a more open dialogue between civil society and policymakers—and ultimately enabling civil society to exert a positive influence on the climate debate. Relevant ministries will need to focus on the dissemination of information among different actors and actively promote capacity building on climate change. It is important to involve all sectors of Brazilian society in national planning in the short, medium, and long term. The establishment of a transparent governance structure is important to balance different powers and interests related to the regulatory and enforcement processes of mitigation targets. This could be achieved through increasing autonomy and improving the technical quality of institutions responsible for sharing information with different stakeholders, such as the Brazilian Forum on Climate Change, which would provide more regulatory stability.

## Monitoring implementation of the policies and reorientation of strategies

An underlying problem in Brazil has been the lack of performance monitoring and the difficulty of evaluating the impacts of policy investments and mitigation actions for climate change mitigation over longer timeframes. Decree 7390/2010 (Article 2, paragraph 1) establishes that sectoral plans will be reviewed and revised on a biannual basis, with the first review process expected in 2014–15.

The action plans that will drive achievement of the PNMC targets are spread across different ministries, so effective joint monitoring of the plans' progress must underlie any assessment of the progress of the plan as a whole. The current state of monitoring and assessment does not meet that need.<sup>32</sup> For example, Brazil has not disclosed any systematic assessments of the implementation of the PPCerrado or the ABC plans. Open policy assessments are necessary not only for accountability but also for informing the design and modification of new and existing policies and strategies. A lack of information can endanger participation processes. In order to participate effectively, civil society must have access to information on what has already been implemented and with what resources, and the level of success of those projects.

## Improving policy coordination and harmonization

In order to effectively mitigate GHG emissions, different instruments and policies across Brazil must be integrated. Policies and actions that may hinder mitigation should also be taken into account. Two examples are the possible increase in deforestation emissions due to infrastructure and energy projects such as the Belo Monte dam, and the project for extracting oil from the Pre-Salt Layer.

Successful coordination of these instruments and policies will require the following:

1. Thorough assessments and definition of indicators for measuring the impacts and effectiveness of policies in order to provide inputs to the reorientation of the strategies.
2. Technical and political coordination across a variety of complementary policy instruments. Although policy instruments are complementary in principle, they rely on institutional coordination at all levels—both horizontal (among the same level of governance) and vertical (among different levels of governance). To achieve better coordination, the capacities of public managers regarding policies and available instruments must be enhanced. Absence of legal clarity on governance structures may make it impossible to implement the mix of instruments for climate mitigation.
3. Alignment between the sectoral plans and climate policies, and those implemented across different levels of government (i.e., federal, state, and municipal). The geographical scale of Brazil, and the complexities of land use issues in key biomes like the Amazon and Cerrado, makes this type of coordination especially important. Ensuring the consistency of the various instruments employed by the PNMC, coordinating efforts in the regions, and sharing timely and relevant information are challenges that call for building synergies between various actors and activities with a view to securing cost-effective solutions.
4. Participation of civil society, governmental, and private sector actors is especially important when it comes to integrating environmental and business policies. Communication between these stakeholders can help identify overlapping and contradicting areas across policies. Participants can also help drive implementation, ensuring that it remains consistent with the original policy objectives.
5. Mainstreaming low-carbon and climate-resilient development into major Brazilian development policies, measures, and actions. On top of that, it is important to develop a long-term low-carbon and climate resilient development strategy.

## ABBREVIATIONS AND ACRONYMS

ABC Plan	Low-Carbon Agriculture Plan
AFOLU	agriculture, forestry, and other land use
BDNES	Brazilian National Bank for Social and Economic Development
COP	Conference of the Parties
CO <sub>2</sub> eq	carbon dioxide equivalent
GHG	greenhouse gas
Imazon	Amazon Institute of People and the Environment
INPE	National Institute for Space Research
LULUCF	land use, land-use change, and forestry
NAMA	Nationally Appropriate Mitigation Action
NESA	Center for Socioenvironmental Economy (Núcleo de Economia Socioambiental)
PDE	Ten-Year Energy Plan
PMBC	Low-Carbon Mining Plan
PNMC	Brazil's National Policy for Climate Change
PPCDAm	Action Plan to Prevent and Control Deforestation in the Amazon
PPCerrado	Action Plan to Prevent and Control Deforestation and Fire in the Cerrado
REDD+	Reduction of Emissions from Deforestation and Forest Degradation (REDD+)
UNFCCC	United Nations Framework Convention on Climate Change
USP	University of São Paulo

## ENDNOTES

- Equivalent to an estimated 1.17 to 1.26 billion tonnes CO<sub>2</sub> equivalent reduction relative to the 2020 projection.
- Avaliação do plano de ação para prevenção e controle do desmatamento na Amazônia legal, December 2011, 47–49. [http://www.cepal.org/dmaah/publicaciones/sinsigla/xml/7/45887/IPEA\\_GIZ\\_Cepal\\_2011\\_Avaliacao\\_PPCCDAm\\_2007-2011\\_web.pdf](http://www.cepal.org/dmaah/publicaciones/sinsigla/xml/7/45887/IPEA_GIZ_Cepal_2011_Avaliacao_PPCCDAm_2007-2011_web.pdf). Accessed May 17, 2013.
- See <http://www.mma.gov.br/clima/politica-nacional-sobre-mudanca-do-clima/planos-setoriais-de-mitigacao-e-adaptacao> for more information. The plan to reduce emissions from steel is still in preparation.
- See [http://www.mct.gov.br/upd\\_blob/0214/214078.pdf](http://www.mct.gov.br/upd_blob/0214/214078.pdf).
- Comitê Interministerial sobre Mudança do Clima, 2010.
- Further analysis of state policies is beyond the scope of this report. For more information, see the 2012 Climate Forum study by the Ethos Institute and NESA/USP: [http://www1.ethos.org.br/EthosWeb/arquivo/0-A-d2ePublica%C3%A7%C3%A3o\\_Forum%20Clima\\_2012\\_com%20anexo.pdf](http://www1.ethos.org.br/EthosWeb/arquivo/0-A-d2ePublica%C3%A7%C3%A3o_Forum%20Clima_2012_com%20anexo.pdf).
- The list of Brazilian institutions is not comprehensive.
- Created by Federal Decree No. 3515, June 20, 2000.
- [http://www.amazonfund.gov.br/FundoAmazonia/export/sites/default/site\\_en/Galerias/Arquivos/Relatorio\\_Atividades/RAFA\\_printed\\_ing\\_2012.pdf](http://www.amazonfund.gov.br/FundoAmazonia/export/sites/default/site_en/Galerias/Arquivos/Relatorio_Atividades/RAFA_printed_ing_2012.pdf)
- The most recent national inventory of GHG emissions showed that land use, land-use change, and forestry (LULUCF) was responsible for 77 percent of CO<sub>2</sub> emissions in Brazil in 2005.
- See part IV.
- <http://forumempresarialpeloclima.org.br/observatorio-de-politicas-publicas-de-mudancas-climaticas/>
- As previously noted, the PPCDAm predates the PNMC targets. The baseline from which Brazil will reduce its emissions, however, does not account for the measures outlined in the plan. The PNMC will benefit from the lessons learned from its performance and also act as an incentive for its effective implementation.
- As Barreto and Ellinger (2011) have stressed, several initiatives can claim partial credit for the decline in deforestation, including municipal environmental governance initiatives, enforced regulations in the meat production chain, and a soy moratorium.
- For a deeper assessment of policy implementation in Mato Grosso, please see Box 2.
- According to the Environment Ministry data quoted in the official assessment of the PPCDAm implementation, 13 of the 17 activities of the pillar “Monitoring and Control” were implemented from 75 to 100%, while only 1 of 5 of the activities under the “Tenure Regularization and Territorial Management” pillar and 4 of 19 activities under the “Sustainable Production Incentives” pillar were implemented (Maia et al., 2011, 29).
- [http://repositorio.ipea.gov.br/bitstream/11058/885/1/Resultados%20avaliacao%20PPCCDAm\\_seminario%20avaliacao\\_JH03x.pdf](http://repositorio.ipea.gov.br/bitstream/11058/885/1/Resultados%20avaliacao%20PPCCDAm_seminario%20avaliacao_JH03x.pdf)
- The National Program of Sustainable Use of the Cerrado, Federal Decree 5,577 from November 2005, aims to promote conservation, recovery, and sustainable management of natural ecosystems in the Cerrado biome, as well as to revert the present negative socioenvironmental impacts (<http://www.mma.gov.br/biomas/cerrado/conservacao-e-uso-sustentavel>).
- Folha de São Paulo*, <http://www1.folha.uol.com.br/ambiente/974578-desmate-no-cerrado-cai-e-ministerio-acena-com-revisao-de-meta.shtml>.
- Activities and approaches under this pillar consist mainly of credit lines for restoration, funds for forest plantations and agroforestry, and minimal pricing policies.
- Because a program is already implementing the ABC Plan’s activities, we consider the ABC Plan an existing policy.
- Not all climate funding sources are included in this assessment. The funds described are limited to those that were established by law.
- <http://www.nature.com/news/brazil-s-fund-for-low-carbon-agriculture-lies-fallow-1.11111>.
- [http://www.gcftaskforce.org/documents/o\\_programa\\_agricultura\\_de\\_baixo\\_carbono.pdf](http://www.gcftaskforce.org/documents/o_programa_agricultura_de_baixo_carbono.pdf).
- The quoted study is based on an earlier version of the forest code. Since the extent of amnesty considered is quite similar, however, the study’s results should be taken into consideration.
- Bill nº1876/1999.
- <http://congressoemfoco.uol.com.br/noticias/veja-os-nove-vetos-de-dilma-a-mp-do-codigo-florestal/>
- La Rovere et al. 2013.
- ANEEL 2013.
- Sistema de Estimativa de Emissões de Gases de Efeito Estufa 2013.
- Gasoline C is 75 percent pure gasoline and 25 percent anhydrous ethanol and is used to fuel lightweight vehicles. Gasoline contributes the second largest share of GHG emissions in the transport sector, after diesel.
- According to the Environment Ministry, a specific monitoring project is being developed and should be presented to the GEX in the second semester of 2013. This project will encompass an electronic platform where methodologies to monitor GHG emissions will be disclosed, as well as information on the result of this monitoring, data on implementation of actions, identification and interviews of the main stakeholders, and a list of activities to achieve the plan’s targets.

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## ACKNOWLEDGEMENTS

The authors would like to thank Priya Barua, Rachel Biderman, Jenna Blumenthal, Thomas Damassa, Taryn Fransen, Catarina Freitas, Jennifer Hatch, Emilio La Rovere, Carlos Rittl, Viviane Romeiro, and Natalie Unterstell for their valuable research and review contributions which greatly improved the quality of this paper. We would also like to acknowledge Thomas Faergeman, Hannah Foerster, and Matthew Horne for providing feedback on earlier versions of this paper. Thank you also to Hyacinth Billings, Alex Martin, Nick Price, Ashleigh Rich, Emily Schabacker, and Alston Taggart for their editing and publication design work.

Funding for this research was provided by the Oak Foundation.

## ABOUT THE AUTHORS

**Maria Fernanda Gebara, Fundação Getúlio Vargas**, has been working with climate change and forests since 2004. She is a PhD candidate at the Federal Rural University of Rio de Janeiro (UFRRJ) in institutions, markets, and regulation and a researcher at the Center for Law and Environment at the Fundação Getúlio Vargas in Rio de Janeiro. Her main topics of research are economic and political incentives for forest and biodiversity conservation, REDD+, benefit-sharing, institutions, and sustainable forestry management.

**Alice Thuault, Instituto Centro de Vida**, is a political scientist and holds a master's in the anthropology of development from Aix-Marseille University (France). After two years as a trainee in Brazil with CIRAD, she joined the Instituto Centro de Vida (ICV) in Cuiaba, Mato Grosso, in 2007 as a public policy analyst. She has since then carried out several studies and developed proposals focused on improving forest governance in Mato Grosso and in the Brazilian Amazon. She has participated in the Governance of Forests Initiative (GFI) since its creation in 2009. Her areas of expertise include transparency and participation in forest-related policies, socioenvironmental safeguards for REDD+, and indicator-based assessment of forest governance. She is currently coordinating the ICV's Forest Transparency initiative.

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