EXECUTIVE SUMMARY

CHALLENGES AND OPPORTUNITIES

FOR CONSERVATION, AGRICULTURAL PRODUCTION, AND SOCIAL INCLUSION IN THE

CERRADO BIOME

An assessment developed for
the Climate and Land Use Alliance by CEA Consulting

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EXECUTIVE SUMMARY

The Cerrado biome is a dynamic, mosaic landscape that spans the center of Brazil. It is one of the largest and most biologically diverse tropical savannas in the world, has a rich social and cultural history, is home to a wide variety of indigenous peoples and traditional communities, and is an important region for the provisioning of freshwater across Brazil.

Since the 1970s, agribusiness has been steadily expanding across the Cerrado biome, contributing to Brazil's emergence as a global leader in agricultural commodity production. As a result, nearly half the biome has been deforested.[1] Continued agricultural productivity within the Cerrado that supports economic development and also works in harmony with thriving traditional livelihoods and conservation of native habitat is important for the long-term health and prosperity of the biome. Achievement of these multiple objectives will be challenging and will require a significant increase in resources, attention, and political will devoted to the region; however, the tools and frameworks exist to achieve this vision. The health and prosperity of the Cerrado biome is a matter of national importance. Given the central role that the Cerrado plays in food and water security and the region's rich social diversity and cultural heritage, the Cerrado agenda cannot be separated from the national agenda.

Today, Matopiba—the northern portion of the Cerrado where the majority of the biome's intact native habitat is found—is one of the primary agricultural frontiers in Brazil.[2] This landscape is the last great expanse of the Cerrado biome that has not been converted to large-scale mechanized agriculture. The Ministry of Agriculture (MAPA) is actively supporting the growth of the agriculture and livestock sectors in the region through the Agricultural Development Plan Matopiba (PDA-MATOPIBA) (Decree 8447, May 2015). Although the details of this plan have not yet been formalized, it clearly aims to spur growth in large-scale agriculture in the region, primarily through expansion of transportation infrastructure. It has been heavily criticized by civil society organizations for being formulated with limited consultation and transparency and for not including social and environmental representation on its governing body.[3] *(See callout box on next page.)*

Photo: CEA

1. Rene Beuchle et al., "Land Cover Changes in the Brazilian Cerrado and Caatinga Biomes from 1990 to 2010 Based on a Systemic Remote Sensing Sampling Approach," *Applied Geography* 58 (2015): 116–127.
2. Matopiba is named for the initial letters of the states that compose the region: Maranhão, Tocantins, Piauí, and Bahia.
3. Talise Rocha, "Plano para Desenvolvimento Agropecuário no Matopiba e Questionado," *Observatorio ABC*, October 2015.
4. Critical Ecosystem Partnership Fund (CEPF), "Ecosystem Profile: Cerrado Biodiversity Hotspot," April 2016.
5. Agroecology is the integrative study of the ecology of the entire food system, encompassing ecological, economic, and social dimensions. Charles Francis et al., "Agroecology: the Ecology of Food Systems," *Journal of Sustainable Agriculture* 22, no. 3 (2003): 99–118.

PDA-MATOPIBA aims to boost the trend seen over the last several years of large-scale agribusinesses advancing into the region to produce soy and other agricultural commodities for export. At the same time, another vision for this landscape is being championed by the traditional cultures and historical communities of the Matopiba region (e.g., indigenous people, quilombolas, extractivists, geraizeiros, ribeirinhos, and family farmers). This vision is for the continued development and economic flourishing of a wide diversity of agricultural systems across the landscape. Most of these systems are small in scale, have been practiced in the region for generations, operate in accordance with the principles of agroecological production,[5] and coexist well with natural habitat in complex mosaics. These communities, their lands, and their way of life are threatened by PDA-MATOPIBA and by the expansion of large-scale agriculture generally.

To build toward a future Cerrado that maintains ecological integrity, biodiversity, carbon stores, and a diversified set of agricultural systems, the expansion of large-scale agricultural needs to be both constrained and guided to areas where it will displace the least biologically and socially valuable resources. Careful planning for the region should allow for large-scale agriculture to grow and contribute to rural economic development in a way that harmonizes with other uses of the landscape and other economic development pathways.

This report outlines five high-level strategies that, if implemented together, can support multiple uses of the land. These strategies require:

- compliance with existing environmental and community rights laws;
- reconciliation of long-standing land claims and disputes;
- official recognition of traditional people's and rural communities' claims over lands and territories;
- secure land tenure for both private owners and communities;
- improved management of existing conservation units (including sustainable use and full protection);
- robust implementation of agribusiness commitments to zero- or zero-net-deforestation supply chains;
- support for traditional agriculture and agroecological practices and markets;
- expansion of low-carbon agricultural practices and sustainable intensification of pasturelands; and
- continuous improvements to monitoring and mapping of natural resources in the Cerrado (including forests, native vegetation, soils, biodiversity, and water).

Effective implementation of these strategies depends upon leadership, collaboration, and commitment—across a range of government, private sector, community, and civil society stakeholders. It will not be easy, especially given the current instability in Brazil's political and economic climate. Yet together, the strategies have the potential to create a resilient landscape that balances social and environmental needs with the economic potential of the region.

Geographic focus of these recommendations

Because of the current acute vulnerability of the Matopiba region, we recommend prioritizing conservation and social inclusion investments there and have focused much of this report on that region. However, all of the strategies included in this report can be applied to the entire Cerrado biome. Of the strategies highlighted in this report, the most relevant for the non-Matopiba portions of the Cerrado are 1) strong implementation of the Forest Code, 2) improved sustainability and productivity of existing agricultural lands and pasturelands, and 3) building the case for biodiversity and landscape conservation. Because the southern and western portions of the Cerrado have such significant legal reserve debts (see definition on page 18), compliance with the Forest Code will be a major driver for restoration. Restoration in these areas will produce very significant benefits for biodiversity, water protection, carbon sequestration, and agroextractivist communities. Restoration in the southern part of the biome is an important adaptation strategy since species' ranges are expected to shift to the south and east as a result of climate change.[4] Because the southern and western parts of the Cerrado also have so much land in agricultural production already, efforts to improve sustainable management of these lands (e.g., through pasture intensification and adoption of low-carbon or agroecological practices) will be more widely applicable than in Matopiba. Finally, because the Cerrado plays such an important role in the provisioning of water across the biome, the fifth strategy covered in this report must be undertaken at a biome scale, not just in Matopiba.

PRIORITY 1

Strong implementation of the Forest Code

Ensuring the legal protection of natural ecosystems on private lands

Brazil's new Forest Code (Law 12.651/2012) is the leading environmental policy in Brazil, governing management of native habitat and land use on all land holdings. Although the new Forest Code reduced the previous restoration requirement, providing amnesty to many producers, it also introduced new mechanisms for better compliance and for trading of legal reserves. Even with the reduced requirements, compliance with the law will restore 21 million hectares (Mha) of previously cleared land and provide greenhouse gas (GHG) mitigation of between 7 and 11 Gt of carbon dioxide equivalent (CO_2e).[6]

Complete, timely, and equitable implementation of the Rural Environmental Cadaster (CAR) is essential for successful enforcement of the Forest Code.

The CAR, a database that will hold information about the environmental characteristics of individual properties, is the first step in Forest Code implementation. It is the top priority for a number of federal, state, and local agencies, led by the Ministry of the Environment (MMA), as well as the main sources of international funding to the Cerrado (e.g., the World Bank's Forest Investment Program (FIP)). As of May 2016, roughly 91 percent of all rural areas were registered in the CAR.[7] Although this represents good progress, more time is needed to complete registrations, especially for smallholders. Many small-scale producers don't have the resources to complete their registration, and there are technical challenges with registering rural settlements and other types of communally owned land in the CAR. Two recent provisional measures have extended the deadline. In May 2016, a provisional measure (PM No. 724) extended the registration deadline for smallholders to May 5, 2017 and in June 2016, a provisional measure (PM No. 733) extended the deadline for all rural properties to December 2017.[8] Although these extensions are necessary to ensure that small landholders are included in the CAR, delays also pose a risk of paralysis.

Photo: CEA

Effective CAR validation and development of sound restoration and compensation platforms is necessary.

The validation of CAR registries and the resolution of conflicts within the CAR are critically important steps that need to be undertaken before further compliance actions are taken. Given that these responsibilities will fall to state-level agencies that often have limited capacity, the validation process could also stymie implementation of the Forest Code. Technical support to the relevant state agencies from the federal government and international donors is essential. At the same time, continued groundwork must be laid and momentum built to ensure effective compliance with the Forest Code once the roster of legal reserve debts and surpluses is documented and validated. To that end, the guidelines and regulations that will shape restoration and compensation activities require careful design to deliver conservation outcomes while being economically viable for producers.

Launch of the satellite monitoring systems for the Cerrado is essential.

The PRODES and DETER systems that provide satellite monitoring for the Amazon have been essential to the rapid reduction in deforestation in that biome over the last decade. Comparable satellite monitoring systems that provide both annual deforestation data and deforestation monitoring on a month-to-month timescale have been pledged for the Cerrado, with support coming from the FIP. This level of monitoring, along with CAR registrations, will provide the information needed to track Forest Code compliance in the Cerrado. However, the monitoring systems are now several years overdue; timely completion and launch is important to the success of the Forest Code.

6. Britaldo Soares-Filho et al., "Cracking Brazil's Forest Code," *Science* 344 (April 2014).
7. Serviço Florestal Brasileiro, "Cadastro Ambiental Rural: Boletim Informativo," May 2015.
8. Canal Rural, "CAR is extended to all producers," June 15, 2016 and Serviço Florestal Brasileiro, "Pequenos Poderão Fazer CAR Ate Maio de 2017," May 5, 2016.

PRIORITY 2

Protection and management of community and conservation lands

Recognition and titling of traditional peoples' lands and territories and improved stewardship of native habitat within all types of conservation areas

The Matopiba landscape is a mosaic of different types of peoples and land uses: family farmers, large-scale agriculture, indigenous lands, quilombola lands, agroextractivists, and other kinds of traditional communities. The Cerrado biome is often thought to be an open and empty land that is ripe for agricultural development, but in fact much of the land is in use, either inhabited or harvested and managed by one of the numerous traditional communities in the region. Many of these communities do not have secure tenure to their land. Family farmers may lack legal title to their parcels even if their families have ties to the land going back generations. Communally managed territory (e.g., rural settlement, quilombola territories, extractive reserves) may lack regularized or formal recognition from the government, even when their rights to their lands and territories are protected by the Brazilian constitution.

Helping communities and family farmers secure their claims and legal rights to the land is a key step in preventing unforeseen environmental and social risks from large-scale agricultural expansion in the region. It is in this context of tenuous protections for their lands that the traditional communities across Matopiba face new pressure from expanding agricultural crops and the PDA-MATOPIBA development plan. Support for CAR registrations for traditional communities and family farmers and renewed political will on the part of federal and state governments (including public prosecutors) to resolve land disputes and recognize community lands are important points of engagement.

Photo: Peter Caton/ISPN

Protected areas that are devoted to conservation and biodiversity need to be expanded and require better long-term funding and management. Currently, protected areas in the Cerrado cover roughly 8 percent of the landscape, less than half the target established by the UN Convention on Biodiversity (17 percent); 6.2 Mha (3.1 percent of the biome) lie in strict protected areas and 11.1 Mha (5.5 percent of the biome) are in Sustainable Use areas.[9] Expansion of this network is of key importance to the future of the Cerrado. The MMA and several conservation organizations have called for better support for existing protected areas and additions to the protected area network, in line with existing analyses of priority conservation areas published by the government and leading NGOs.[10] Additionally, expanded support for better management of protected areas should be a priority for the conservation and social agendas in the coming years. Currently, sustainable use protected areas are suffering from inadequate management, with deforestation persisting at rates comparable to areas not under protection.[11]

9. Renata D. Françoso et al., "Habitat Loss and the Effectiveness of Protected Areas in the Cerrado Biodiversity Hotspot," *Nature and Conservation* 13, no. 1 (2015): 35–40; MMA, "Unidas de Conservacao por Bioma," February 26, 2016.
10. MMA, "Priority Areas for the Conservation, Sustainable Use and Benefit Sharing of Brazilian Biological Diversity. Update: MMA Administrative Ruling No 9," (Brasília: January 2007); Mario Barroso et al., "Áreas Prioritárias para e Conservação do Cerrado e Pantanal," *WWF Brasil* (2013); CEPF, 2016.
11. Françoso et al., 2015.

PRIORITY 3

Incentives for conservation

Ensuring sufficient incentives from public and private sources for the conservation of surplus natural habitats on private and communally managed lands

The Cerrado landscape has great economic value as agricultural land. Prioritizing conservation requirements on both private and communally managed lands beyond the 20 percent legal reserve requirement of the Forest Code (35 percent for the sections of the Cerrado that fall within the Legal Amazon) will be costly and will require financial incentives.

Credit is one of the most important tools for creating incentives for producers. Credit could be used to strategically guide expansion of crops in the Matopiba area so that expansion avoids priority biodiversity areas and important areas for communities and is guided to areas that are best suited for crop productivity. This concept has been successfully employed in Brazil already with the sugarcane agroecological zoning (ZAE Cana) program, which was established by an inter-ministerial group.[12] Additionally or alternatively, public and private banks could offer preferential access to loans or lower interest rates for property holders that hold more land in conservation areas than required by the Forest Code or that adopt low-carbon agricultural practices. These incentives could be provided through broad integration of conservation priorities into the government's agricultural credit programs, such as the Agriculture and Livestock Plan, commonly called the Harvest Plan.

The private sector also has a role to play in providing incentives for farmers and ranchers across the Cerrado to both reduce deforestation and protect land rights for traditional communities. Successful implementation of sector-wide deforestation and rights commitments, which are proliferating among large, international agribusiness companies, could prove hugely important in reducing deforestation rates and protecting community rights in the Cerrado. Buyers of agricultural goods from the Cerrado should demand compliance with the Forest Code and other laws (e.g., regarding labor and safe use of agrochemicals). Buyers should also demand that producers avoid areas with high biological or social importance—if not fully commit to zero deforestation—and areas with social conflicts (e.g., areas with land tenure disputes or high levels of violence). Preferential or expanded market access for producers that comply with such commitments or policies is one incentive associated with this type of approach. Alternatively, corporate agribusiness leaders could engage with individual municipalities to help them develop robust instruments for reducing deforestation and/or embrace certifications as a way to provide incentives to producers for better practices.

Payment for Ecosystem Services (PES) programs merit further development. For example, the Forest Code's compensation mechanism, the Environmental Reserve Quota (CRA), could be expanded to help capture voluntary funding for intact habitat in the Cerrado (e.g., from corporate social responsibility campaigns or downstream municipalities). This concept, tentatively termed "X-CRA," has been suggested by Brazilian academics who have studied the CRA market extensively.[13] Additionally, the Water Producer Program managed by Brazil's National Water Agency (ANA), an existing PES scheme, should be expanded and targeted at those areas of greatest hydrological importance, and PES legislation that has been introduced to Congress should be considered.

Other means of building demand for intact Cerrado vegetation should also be explored and supported. For example, support for agroecological production and agroextractivists' products helps to promote sustainable use of the landscape; these topics are covered in Priority 4 *(See next page.)*. Finally, strengthening the Cerrado as a tourism/eco-tourism destination could help provide incentives for protection of native habitat and traditional cultures.

12. Government-subsidized credit lines were established through BNDES for entities wishing to expand sugarcane production, as long as they follow the ZAE Cana guidelines. "Sugarcane Agro-Ecological Zoning: Greening the Expansion of Ethanol," Evidence and Lessons from Latin America.

13. Raoni Rajão and Britaldo Soares-Filho, "Cotas de Reserva Ambiental (CRA): Potencial e Viabilidade Econômica do Mercado no Brasil" (Belo Horizonte: Ed. IGC/UFMG, 2015).

PRIORITY 4

Improved sustainability and productivity of existing agricultural lands and pasturelands

Encouraging sustainable intensification of pasturelands, mainstreaming low-carbon agricultural practices, expanding adoption of other sustainable practices, and supporting traditional agricultural products

Agriculture and livestock production are vital to Brazil's economy, accounting for over 35 percent of the country's export value and 21.5 percent of GDP.[14] The Cerrado has the largest area of farm and ranch land in Brazil, accounting for 88 Mha, or 44 percent, of the total agricultural area.[15] It produces about 40 percent of Brazil's beef, 84 percent of its cotton, 60 percent of its soybeans, and 44 percent of its corn.[16] Agriculture will likely continue to be an important driver of economic growth of the Cerrado in the coming years.

Photo: CEA

Making better use of already cleared land through sustainable intensification of pasturelands is one of the best ways to reconcile agricultural development with conservation. According to a recent study, Brazil could meet demands for increased crop acreage through 2040 without any further conversion of native habitat through intensification of pastureland and shifting crop cultivation onto the freed-up land.[17] This is an important strategy for the Cerrado, which has about 40 percent (almost 20 Mha) of the country's potential for pasture restoration.[18] Government, private sector, and civil society actors should collaborate to provide the necessary training and incentives to catalyze a shift from expansion to intensification in both the ranching and farming sectors. Mainstreaming and targeting credits from Brazil's Low Carbon Agriculture Plan (ABC Plan) or other credits for restoration of pasturelands, providing technical assistance and training, and studying and promoting successful pilots are all important elements of an intensification effort.

Any effort to support intensification would be most effective if done in a way that ensures social and ecological sustainability and is coupled with complementary instruments such as environmental compliance, land regularization, and supply chain governance as a way of mitigating the rebound effect. *(See definition on page 40.)*

The nearly 20 Mha of cropland in the Cerrado could also be managed more sustainably through broader adoption of low-carbon agricultural practices and other ecologically and socially sound production methods, including those typically employed in traditional agricultural systems.[19]

14. Aron Belinky, "Green Growth in Action – Overview of Innovative Country Strategies: Case Study from Brazil: Plano ABC," Centro de Estudos em Sustentabilidade da EAESP (London: October 28, 2014); The Center for Applied Economy, University of São Paulo.
15. CEPF, 2016.
16. Ibid.
17. Bernardo B.N. Strassburg et al., "When Enough Should Be Enough: Improving the Use of Current Agricultural Lands Could Meet Production Demands and Spare Natural Habitats in Brazil," *Global Environmental Change* 28 (2014): 84–97.
18. Another 10 percent (5.6 Mha) is found in the transitional areas between the Amazon and the Cerrado and between the Caatinga and the Cerrado. Ibid.
19. MMA, *PROBIO Land Cover Map* (Brazil, 2002).
20. MAPA, *Plano Setorial de Mitigação e de Adaptação às Mudanças Climáticas para a Consolidação de Uma Economia de Baixa Emissão de Carbono na Agricultura: Plano ABC (Agricultura de Baixa Emissão de Carbono)* (Brasília: MAPA/ACS, 2012).
21. Note that the area covered by the Cerrado states is larger than that of the Cerrado biome, so these statistics overstate the allocation of ABC credits to the Cerrado biome. "Analysis of Resources of the ABC Program: Investment Purposes," *ABC Plan Observatory* Report 3 – Year 2, December 2014.

Photo: CEA

Continued and expanded support for the full range of low-carbon agriculture practices promoted by the ABC Plan will be important for the long-term health and resilience of the agricultural sector and could help Brazil meet its greenhouse gas (GHG) reduction targets by contributing up to 166 million tonnes (Mt) of CO_2e by 2020.[20] The ABC Plan provides the most significant set of public incentives for the adoption of low-carbon agriculture practices, in the form of dedicated agricultural credits (R$4.5 billion). In the first quarter of the 2014/2015 crop year, roughly 80 percent of the nationally available ABC credits were issued in Cerrado states, roughly 20 percent of them in Matopiba states.[21] Support for the adoption of sustainable agriculture practices in line with the ABC Plan is a priority for international funding programs in the region, most notably the FIP. Still, a number of improvements to the ABC Plan could enhance its effectiveness, including expanded support for technical assistance, better training for the banks issuing the loans, and establishment of a monitoring program. It is also important to note that while low-carbon practices are generally positive, they are not always wholly environmentally sound.

Beyond its GHG emissions profile, Brazil's agricultural sector has much room for improvement in terms of the overall sustainability of its practices. There is much that government agencies, supply chain actors, and civil society can do to encourage more environmentally and socially sustainable practices across the agricultural sector, particularly with respect to the use of agrochemicals, farm labor, pollution of waterways, protection of water springs, crop diversity, and conflict with rural communities. Broad efforts should be made to reduce the negative environmental and social impacts of industrial-scale agriculture through better enforcement of laws governing pesticide use and labor standards, and through promotion of best practices for protecting water springs and waterways. Additionally, assistance for agroecological practices, small-scale production, and biodiversity and agro-extractive products is needed. Specifically, traditional and small-scale producers require expanded technical assistance, targeted credit lines, and support for market access. These forms of agriculture can help sustain native habitat and are consistent with conservation, social, and cultural priorities. Support for integrated crop-livestock-forest production, which is part of the ABC program, should also be expanded.

PRIORITY 5

Building the case for biodiversity and landscape conservation

Highlighting and enhancing scientific research on the importance of water and its relationship with native vegetation, and on the impacts of climate variability in the Cerrado

There is mounting evidence that preservation of native vegetation plays a beneficial role in maintaining the freshwater flows and water springs that agricultural producers, hydropower producers, and municipalities all depend upon.

Developing a more comprehensive body of research about the relationship between hydrological systems and land cover would be invaluable for planning efforts across the Cerrado. Such a research agenda should focus on questions of thresholds of native vegetation necessary for healthy ecosystem function, impacts on neighboring biomes, and the economic effects of changes in precipitation patterns. Specific questions include:

- Is there a point at which the relationship between land cover, weather patterns, and hydrological function will see a step-change?
- Could deforestation in the Cerrado dry out the Amazon?
- What would a ten-day delay to the rainy season mean for soy yields?
- What would a 40 percent drop in river flows mean for hydropower generation?

These questions have received some attention from scientists and government agencies, but a more coordinated approach to synthesize and build upon the current state of the science would help many actors across the Cerrado.

Adopting land use plans and agricultural practices that can help the region mitigate and adapt to the effects of global climate change should be an important component of agricultural development and expansion of protected areas in the biome. The Cerrado biome is expected

Photo: alarico/Shutterstock

to experience productivity disruptions due to global climate change. These global pressures will amplify those felt from local land use change. Both will have a warming and drying effect. A 2003 study that modeled the effects of climate change on Cerrado flora predicted that between 10 and 32 percent of the 162 analyzed tree species could end up without habitable areas in the Cerrado region or go extinct by 2055.[22] Additionally, over half of the species were projected to decline by more than 90 percent in the Cerrado, with major range shifts to the south and east.[23] Such range shifts should be considered in future plans for restoration and protected area management and expansion.[24]

Conclusion

The Cerrado is a vitally important region to Brazil's economy, traditional communities, biodiversity, hydrological resources, and climate mitigation and adaptation capacity. Agricultural expansion and related infrastructure development in the region, left largely unchecked, have the potential to threaten many human populations and ecosystem functions. Thus, it is essential to adopt a balanced approach to development in the Cerrado, one that recognizes the value of agricultural production, ecosystem function, and thriving agricultural systems and economies for traditional communities. The opportunities covered in this report are those that, based on our assessment, have the highest potential to support an integrated conservation, agricultural production, and social inclusion agenda.

22. CEPF, 2016.
23. Ibid.
24. Ibid.

Challenges and Opportunities for Conservation, Agricultural Production, and Social Inclusion in the Cerrado Biome

INTERVENTION	STRATEGY	SUBSTRATEGY
1. Strong implementation of the Forest Code	Timely, equitable, robust, and transparent implementation of the CAR	• Support smallholders and indigenous and traditional communities in the CAR registration process and in resolving conflicts • Capacity building for state-level agencies responsible for registrations and verification
	Development of a strong post-CAR agenda	• Develop restoration guidelines and policies that balance economic viability and ecological integrity • Design CRA markets that promote transparency, additionality, low transaction costs, and "smart compensation" (See definition on page 23.)
	Effective compliance and enforcement	• Launch satellite monitoring systems • Make CAR a precondition of agricultural credits (public and private) • Technical support for state-level agencies responsible for compliance
2. Protection and management of community and conservation lands	Land regularization	• Support smallholders and indigenous and traditional communities in the CAR registration process and in resolving conflicts • Capacity building and legal training to support family farmers in securing title to their land • Engagement of public prosecutors in resolving land conflicts
	Support for indigenous and quilombola lands and other communally managed lands	• Recognition and titling of indigenous lands • Recognition and titling of quilombola lands • Support laws that protect agroextractivists' access to land • Map community lands • Support sustainable land management planning and practices on indigenous, quilombola, and other traditional community lands
	Expanded and well-maintained protected area network	• Support better management of existing protected areas • Integrate Priority Conservation Areas and Key Biodiversity Areas mapping into CRA market design, corporate commitments, and agricultural credits to guide agricultural expansion away from these areas
3. Incentives for conservation	Use credits and other government programs to guide agricultural expansion in the Matopiba region	• Use existing agricultural credit lines (e.g., ABC Plan, Harvest Plan) or new credit lines to encourage development in areas that are already open or degraded, or that are highly productive, and to discourage expansion into areas of biological or social importance • Use this same kind of "zoning" approach in the development of the PDA-MATOPIBA plan and development of CRA markets
	Corporate commitments and supply chain incentives	• Determine an appropriate target for deforestation in the Cerrado that all parties can agree to (e.g., zero deforestation by a certain date, go/no-go zones based on social and biological criteria) • Increased use of certifications
	Payment for ecosystem services	• Expand ANA's Water Producer Program • Develop the "X-CRA" concept

INTERVENTION	STRATEGY	SUBSTRATEGY
3. Incentives for conservation *(continued)*	Strengthen the Cerrado's tourism industry	• Development grants and credits for eco-tourism

4. Improved sustainability and productivity of existing agricultural and pasturelands	Sustainable intensification of pasturelands	• Study the economics of expanding onto degraded pastures for producers of soy and other crops
		• Technical assistance and training for ranchers
		• Expand availability of credits for pasture intensification and target credits to areas best suited for restoration Expansion of low-carbon agriculture practices
		• Push for improvements in the ABC Plan, including:
		  • establishment of a monitoring system
		  • better training for banks that are issuing the loans
		  • increasing technical assistance allocation of credits
		  • better targeting of loans

	Support for sustainable agriculture and traditional agriculture	• Better enforcement of pesticide and labor laws • Support agroecological practices through better implementation of the national plans and policies on agroecology and organics (PNAPO, PLANAPO) • Promote markets and supply chains for sociobiodiversity products (e.g., pequi fruit, babaçu fruit, and native honey) (e.g., through better implementation of the National Plan for Promotion of Socio-Biodiversity Value Chains) • Support sustainable management of these products (e.g., through better implementation of the Food Acquisition Program and the National Program for School Meals) • Generally increase technical and financial assistance to smallholders
5. Building the case for biodiversity and landscape conservation	Consolidate existing science on the relationship between forest cover and water, and support new research	• Coordinate between government agencies, academics, and NGOs
	Harness existing incentive systems to help protect water resources and support adaptation to climate change (cross-referenced to other strategies)	• Increase support for PES programs (e.g., ANA's Water Producer Program) • Target CRA trading to places of hydrological importance • Tie agricultural credits to better water practices • Include water conservation practices in purchasing standards of agricultural commodity buyers