Public Disclosure Authorized

Project Information Document (PID)

Appraisal Stage | Date Prepared/Updated: 01-Aug-2022 | Report No: PIDA29356

Public Disclosure Authorized

BASIC INFORMATION

A. Basic Project Data

Country	Project ID	Project Name	Parent Project ID (if any)
Brazil	P172497	Sustainable Multiple Use Landscape Consortia in Brazil	
Region	**Estimated Appraisal Date**	**Estimated Board Date**	**Practice Area (Lead)**
LATIN AMERICA AND CARIBBEAN	25-Jul-2022	20-Oct-2022	Agriculture and Food
Financing Instrument	**Borrower(s)**	**Implementing Agency**	**GEF Focal Area**
Investment Project Financing	Serviço Nacional de Aprendizagem Rural	Ministério da Agricultura, Pecuária e Abastecimento (MAPA), Ministério do Meio Ambiente (MMA)	Multi-focal area

Proposed Development Objective(s)

To increase the area under sustainable land management in selected beef cattle and soybean landscapes in Brazil and promote the integration of food systems and sustainable landscapes, conservation of biodiversity and recovery of degraded areas.

Components

Component 1. Development and promotion of Sustainable Land Management (SLM) approach
Component 2. Promotion of sustainable food production practices and responsible value chains
Component 3. Conservation and restoration of natural habitats and mainstreaming biodiversity
Component 4. Knowledge Management

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	24.58
Total Financing	24.58
of which IBRD/IDA	0.00
Financing Gap	0.00

DETAILS

Non-World Bank Group Financing

Trust Funds	24.58
Global Environment Facility (GEF)	24.58

Environmental and Social Risk Classification

Moderate

Decision

The review did authorize the team to appraise and negotiate

ACRONYMS AND ABBREVIATIONS

APP	Permanent Preservation Area
ARPA	Amazon Region Protected Areas Program
BAU	business as usual
BIP	Brazil Investment Plan
CAR	Rural Environmental Cadaster
CBD	Convention on Biological Diversity
CGU	Office of the Comptroller General of Brazil
CIF/FIP	Climate Investment Funds/Forest Investment Program
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNA	Brazilian Confederation of Agriculture and Livestock
CPF	Country Partnership Framework
EMBRAPA	Brazilian Agricultural Research Corporation
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Analysis
ESMF	Environmental and Social Management Framework
ESS	Environmental and Social Standards
EX-ACT	Ex-Ante Carbon-balance Tool
FIP	Forest Investment Program
FM	financial management
FMA	Financial Management Assessment
FOLUR	Food Systems, Land Use and Restoration
GDP	gross domestic product
GEF	Global Environment Facility
GEMS	Geo-Enabling initiative for Monitoring & Supervision
GHG	greenhouse gas
GLEAM-i	Global Livestock Environmental Assessment Model interactive
GoB	Government of Brazil
GRM	grievance redress mechanism
GRS	Grievance Redress Service
IPF	Investment Project Financing
ISA	Sustainability Indicators in Agroecosystems
KM	knowledge management
LDN	Land Degradation Neutrality
LMP	Labor Management Procedures
M&E	monitoring and evaluation
MAPA	Ministry of Agriculture, Livestock and Food Supply
MFD	Maximizing Finance for Development
MMA	Ministry of the Environment
NDC	Nationally Determined Contribution
NGO	nongovernmental organization
NPCC	National Policy on Climate Change
OECD	Organisation for Economic Co-operation and Development
OPS	online procurement solutions
PAD	Project Appraisal Document

PIU	Project Implementation Unit
PL	productive landscape
POM	Project Operational Manual
PROBIO	Brazil's National Biodiversity Program
RPPN	Private Natural Heritage Reserve
SENAR	National Rural Learning Service
SEP	Stakeholder Engagement Plan
SICAR	Rural Environmental Cadaster System
SLM	Sustainable land management
SLM-AP	Sustainable Land Management Action Plans
STEP	Systematic Tracking of Exchanges in Procurement
tCO2eq	Tonnes of carbon dioxide equivalent
TFP	total factor productivity
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
URT	Technological Reference Unit
WHO	World Health Organization

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I. STRATEGIC CONTEXT

A. Introduction and Context

Country Context

Macroeconomic and Fiscal Situation

1. **The COVID-19 pandemic has exposed Brazil to unprecedented social and economic challenges.** By November 24, 2020 Brazil had the third largest number of confirmed COVID-19 cases in the world (over 6.1 million cases), and the second highest death toll (170,115 deaths). In addition, Brazil ranks 9th in the number of deaths per 100,000 people (81).[1] By the end of March 2020, most of the states and larger municipalities had implemented social distancing measures to contain the spread of the virus, but these were unevenly enforced and adhered to across the country. The pandemic and Brazil's multidimensional policy response resulted in substantial economic impacts in the second quarter of 2020. In order to protect the most vulnerable from the impacts of COVID-19, the Government of Brazil (GoB) has put forward a large, timely, targeted and time-bound fiscal package focused on social assistance. The cost of this package is estimated to reach R$789.5 billion in 2020 (US$145.9 billion), or 11.2 percent of GDP.[2]

2. **The ongoing COVID-19 pandemic is expected to cause an economic recession, with growth dropping by 5.4 percent in 2020, followed by a 3-percent GDP growth rebound in 2021.** The Brazilian economy is recovering from a steep plunge observed in the first two quarters of 2020, and is currently managing to reduce the depth of the recession for the year. This results from a relatively swift lifting of the economic lockdown and decisive monetary and fiscal policy measures, including a temporary cash-transfer program to benefit the most vulnerable. Mining and agriculture are expected to continue growing, supported by improving external prospects, and a weakened exchange rate. Industry is firmly recovering with rising domestic demand. The service sector rebound, however, is expected to be heterogeneous, as activities that are more dependent on face-to-face interactions—such as tourism, restaurants, and air travel—remain constrained. This positive momentum is expected to carry into next year, and result in a 3-percent growth in 2021. Brazil is expected to recover pre-crisis GDP levels in 2022 as economic activity normalizes, and GDP growth reaches 2.5 percent.

3. **Poverty rates could rise to about 21.5 percent in 2021 (compared to 20 percent in 2019) after the temporary income-support measures expire, and against the backdrop of a weak labor market recovery.** The crisis is expected to result in a steep drop in labor income and employment. As low-salary and informal workers were already in a more vulnerable position even before the COVID-19 pandemic, they are more likely to fall into poverty as a result of it. Unemployment reached 14.4 percent in August 2020, the highest rate in the past three years. In the first half of 2020, job losses mounted to 11.2 million, of which 7.9 million among informal workers; and 10 million people left the labor force. A sluggish recovery of the formal labor market is expected to continue during the second half of 2020 and in 2021. The workforce and the participation rate are expected to increase in the second half of 2020, and accelerate growth in 2021. Nonetheless, job creation will remain subdued, and the unemployment rate is likely to rise. The government's temporary emergency transfers are estimated to mitigate COVID-19 impacts on poverty in 2020. Yet, poverty could rise to about 21.5 percent in 2021 (using the US$5.50

[1] Recent reports point to potential underreporting: https://ciis.fmrp.usp.br/covid19/analise-subnotificacao/.
[2] R$37 billion (US$6.8 billion) in transfers to partially compensate states for tax-revenue losses due to the recession.

line, 2011 PPP), once the emergency measures expire, and if the labor market is not able to fully absorb the unemployed.

4. **Brazil needs to accelerate its productivity growth and infrastructure development to boost long-term growth.** As a result of Brazil's low total factor productivity (TFP) growth between 1996 and 2015, its per capita income has risen by just 0.7 percent per year since the mid-1990s. This corresponds to one tenth of the rate in China, and only half the average in OECD countries. In addition, Brazil has one of the lowest investment levels in infrastructure when compared to its peers (2.1 percent of GDP on average between 2000 and 2013). This has resulted in a deterioration of its infrastructure stock and severe production bottlenecks. With limited fiscal space, a dwindling demographic bonus, and the COVID-19 pandemic intensifying pressures on socio-economic outcomes, accelerating productivity growth in a sustainable manner remains key to unlocking long-term growth. Toward this end, reforms should focus on boosting market competition; opening the economy to external trade, which could reduce input and technology prices; and simplifying the tax system. Furthermore, higher levels of investment in infrastructure are needed to ensure an adequate stock of infrastructure capital; remove production bottlenecks; increase climate change resilience; and expand access to social services. This calls for enhancing the federal government's planning capacity, improving the regulatory environment, investing in sustainable productive sectors and leveraging private resources to finance investments.

Environment and Agriculture Context

5. **Brazil is one of the most biodiverse countries in the world, and managing its natural resources is critical for sustainable economic recovery.** Brazil is home to 15 percent to 20 percent of the world's biological diversity, including an estimated 120,000 species of invertebrates, 9,000 vertebrates, and more than 4,000 plant species.[3] The country has natural resources of continental and global significance, in ecosystems ranging from tropical rainforests to savannas, wetlands, grasslands, and shrublands. These natural resources ensure water cycling, pollination, and other critical ecosystem services throughout the continent, and serve as some of the largest carbon sinks on the planet, thus helping to combat climate change. Locally, Brazil's natural resources underpin its rural economy as a direct source of income and employment in the food and agriculture sector, and as basic sources of water and energy (62 percent of all electricity in Brazil is generated from hydropower).[4]

6. **Brazil's Cerrado biome, a vegetation mosaic covering almost one quarter of the country (approximately 204 million ha), is both a beef cattle land-conversion hotspot, and one of the most biodiverse regions in the world.** The Cerrado is an agricultural powerhouse and a globally important beef-exporting region, accounting for about 55 percent of Brazil's beef production (using over 26 million ha of pasture lands); 54 percent of the soybean produced for cattle feed (over 18 million ha of cropland); and 70 percent of Brazil's agricultural production overall.[5] This results from decades of agricultural expansion, primarily through cattle ranching beginning in the 1940s, and mechanized commercial production of soybean and maize (primarily for animal feed), as well as cotton, from the 1970s onwards.

7. **The Cerrado region is considered to be biologically megadiverse, with extreme abundance of endemic species** (including 11,627 native plant species), as well as 199 mammal, 837 bird, 1,200 fish, 180 reptile, and over 200

[3] United Nations Environment Programme.
[4] World Bank Group. 2016. *Brazil Systematic Country Diagnostic.*
[5] ABIOVE, A. & GTS, I. 2020. *Análise Geoespacial da Soja 2018/2019*. Bioma Cerrado.

amphibian species.[6] It is a critical source of water and energy: 8 of Brazil's 12 major hydrographic regions (that is, wide watersheds) receive water from the Cerrado, and half of all Brazilians are estimated to rely on electricity generated from water coming from that region.[7] The Cerrado's characteristic small trees and shrubs also have deep root systems, sequestering significant amounts of underground carbon (ranging up to 292 tons per ha).[8]

B. Sectoral and Institutional Context

8. **The agriculture sector (including livestock production) plays a significant role in the Brazilian economy.** Agriculture and agribusiness account for about 8.4 percent of the country's gross domestic product; 16.2 percent of total employment; and 40 percent of total exports (Brazil is the world's second largest food exporter).[9] Soybean accounted for nearly one third of the sector's gross production value and beef cattle about 15 percent in 2020.[10] Against the backdrop of COVID-19, agriculture has become an important factor for mitigating the negative economic effects of the pandemic, as the 2019–20 grain season reached a record-high harvest (approximately 251.9 million tons).[11] Agricultural exports are expected to rise in 2020–21 due to increased global demand for grains and a more competitive real effective exchange rate. These trends, together with growing food prices year on year, are expected to increase competition for agricultural land.[12]

9. **At the same time, historically the food and agriculture sector – in particular beef cattle production – has been a leading driver of land degradation, habitat loss, and other natural resource depletion in the Cerrado biome.** Brazil has seen rapid land-cover changes in recent decades, driven by agricultural expansion into natural areas for the purpose of beef cattle grazing and the production of soybean for cattle feed.[13] Land conversion for beef cattle and soybean production has reshaped Cerrado landscapes[14] at a significant cost, including natural resource degradation and biodiversity loss, as well as decreasing agriculture productivity. The Cerrado has lost half of its biome, including approximately 45 percent of its native vegetation cover, largely due to the expansion of agricultural activities that erode soils and deplete nutrients.[15,16] In particular, extensive beef cattle production systems have driven high rates of pastureland degradation, with nearly 40 percent of all pastures (over 18 million

[6] MMA 2020; Myers et al. 2000; Ratter et al. 2000. Also see Annex 6.
[7] EMBRAPA. The relevance of the Cerrado's water resources to Brazilian development.
[8] FAO. Protection of the upside-down forest: monitoring and sustainable use of the Cerrado.
[9] World Bank Group. 2016. *Brazil Systematic Country Diagnostic.*
[10] MAPA 2021. Gross production value – crops and livestock - Brazil.
[11] Companhia Nacional de Abastecimento—Conab. 2020. *Acompanhamento da safra brasileira de grãos*. Safra 2019/20.
[12] WB 2020. COVID-19 in Brazil—Impacts and policy responses.
[13] Trigueiro, W. R., J. C. Nabout, and G. Tessarolo. 2020. Uncovering the spatial variability of recent deforestation drivers in the Brazilian Cerrado. Journal of Environmental Management, 275, 111243.
[14] Landscapes are often seen as large-scale physical areas comprising overlapping ecological, social and economic activities and values. They generally have multiple functions, as they provide a variety of services to society, such as biodiversity, food, water, shelter, livelihood, economic growth, and human well-being. All these services are interlinked; therefore, if the agricultural area in a landscape expands, it will have repercussions for the area covered by forests. This makes landscapes an ideal unit for planning and decision making, as it allows for the integration of various sector plans and programs into one single spatial context, and for a better understanding of trade-offs, options and scenarios around proposed decisions and desired outcomes. https://www.forestlandscaperestoration.org/our-approach-landscape-approach.html.
[15] Alencar et al. 2020. *Mapping Three Decades of Changes in the Brazilian Savanna Native Vegetation*.
[16] Strassburg. B. B. N et al. Moment of truth for the Cerrado Hotspot. *Nature Ecology & Evolution 1,* 0099 (2017) | DOI: 10.1038/s41559-017-0099 | www.nature.com/natecolevol.

hectares) currently degraded.[17] Pasture degradation, generally a consequence of a mismatch between livestock density and pastures' capacity to recover from grazing and trampling, in turn contributes to further natural resource degradation through soil erosion, vegetation loss, carbon release from organic matter deposits, biodiversity loss, and impaired water cycles.[18] Recent studies[19] have shown that, in turn, these impacts adversely affect the productivity of livestock and crop systems, with severely eroded areas losing between 13 and 26 times more nutrients than areas with low and moderate soil-loss rates, for example. Additionally, agricultural productivity losses are increasing in some areas of the Cerrado, from about 3 million ha of crops and silviculture in 2000 to over 5.5 million ha in 2012.

10. **Brazil has historically committed to a strong policy framework to foster both sustainable agriculture and conservation measures.** Key Brazilian policies, plans, and programs introduced to conserve biodiversity and other natural resources include: the National Policy of Water Resources (Law No. 9,433/1997), which aims to improve the sustainable management of Brazilian's water resources; the National Plan for the Promotion for Socio-Biodiversity Value Chains (Resolution No. 239/2009); the National Policy to Combat Desertification (Law No. 13,153/2015); the National Policy for Environmental Services Payment (Law No.14119/2021); the National Soils program (PronaSolos), the first public policy for knowledge, use and conservation of soil as a national strategy; the National Program for Soil and Water Conservation in Micro-watersheds (Águas do Agro); Living Soils Brazil, an initiative in partnership with IICA which aims to promote good land management practices in Brazil and incentives to transform agricultural systems into ecosystems that accumulate more carbon in soils. In 2009, the Brazilian government also created the National Policy on Climate Change—NPCC (Law 12187/2009) to steer the country toward fulfilling its national voluntary commitment to reduce GHG emissions between 36.1 percent and 38.9 percent of projected emissions by 2020.

11. **In the context of the NPCC, the Ministry of Agriculture, Livestock and Food Supply (MAPA) developed its "Sector Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low Carbon Emission Agriculture Economy", also known as the ABC Plan** (Decree 7390/9/2010). The ABC Plan is expected to reduce pressure on forests by increasing agricultural productivity and promoting sustainable management practices. In order to achieve its objectives, the ABC Plan promotes six technologies that have a proven effect on the reduction of GHG emissions and the increase of carbon sequestration by the agriculture sector: no-till farming; degraded pasture restoration; crop-livestock-forest integration; commercial forest planting; biological nitrogen fixation; and animal waste treatment. The ABC Plan includes a credit initiative known as the ABC Program, which provides low-interest loans for the adoption of sustainable agricultural practices. Originally, the GoB estimated that nearly US$40 billion (via credit lines or producers' own resources) would be required between 2011 and 2020 to finance low-carbon investments aimed at meeting NDC targets. Since the ABC Program was launched in 2011, the GoB has provided US$5 billion to incentivize the adoption of low-carbon practices, having effectively disbursed a total of US$3.4 billion. Most of these resources were used for degraded pasture restoration and no-till farming. In April 2021, MAPA announced the second cycle of the ABC Program, "ABC+", to further consolidate Brazilian agriculture on the basis of sustainable, resilient, and productive systems. ABC+ and its Action Plan will continue to promote resilient and low-carbon agriculture and place an increased focus on integrated landscape approaches that

[17] Pereira, O. J. R., L. G. Ferreira, F. Pinto, and L. Baumgarten. 2018. Assessing pasture degradation in the Brazilian cerrado based on the analysis of MODIS NDVI time-series. Remote Sensing, 10(11), 1761.
[18] Raney, T. (2009). The state of food and agriculture: livestock in the balance. Food and Agriculture Organization of the United Nations, Rome, Italy.
[19] Gomes, L., Simões, S. J., Dalla Nora, E. L., de Sousa-Neto, E. R., Forti, M. C., & Ometto, J. P. H. (2019). Agricultural expansion in the Brazilian Cerrado: Increased soil and nutrient losses and decreased agricultural productivity. *Land*, 8(1), 12.

emphasize the multifunctionality of Brazil's landscapes, including for natural resource and biodiversity conservation and restoration.[20] Still, remaining hurdles for implementing the emerging ABC+ Action Plan will include farmers' limited knowledge and understanding of the technologies promoted, and the fact that some technologies require strong farm-management skills, as well as adequate training and technical assistance for farmers and ranchers.

12. **The Native Vegetation Protection Law (Law 12651/2012, also known as the Forest Code) provides a unique opportunity for Brazil to protect its remaining natural areas.** The Forest Code requires that all privately-owned rural landholdings maintain a certain percentage of native vegetation known as Legal Reserves (*Reservas Legais*—RLs).[21] In addition, the Forest Code mandates that landholders also maintain Permanent Preservation Areas (*Áreas de Preservação Permanente*—APPs), such as riparian forests, steep slopes, and mountaintops. Furthermore, the Forest Code obliges landholders to register their properties in the Rural Environmental Cadaster System (SICAR,[22] in the Portuguese acronym) which collects data on the size of individual farms, the areas earmarked for alternative land use, APPs, and RLs. Nevertheless, further efforts are required to analyze and validate the issuance of Rural Environmental Cadaster (CAR, in Portuguese) certificates, and to support the recovery of degraded areas within private landholdings.

13. **Brazil has also joined important international conventions on biodiversity protection and land degradation and desertification.** Brazil is a signatory to the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD), the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and is a country associated with the International Union for Conservation of Nature (IUCN). In 2017, Brazil signed a commitment to the Land Degradation Neutrality Strategy - LDN (UNCCD COP 13), for which it is currently conceptualizing, building and quantifying its self-determined goal. In addition, Brazil also signed a commitment to the implementation of the Aichi Goals (CDB;) and submitted its Nationally Determined Contribution (NDC) to the UNFCCC, committing itself to comply with the Paris Agreement. The country that was the cradle of the three "Rio Conventions", in addition to the CNUMAD Rio 92 Summit, also hosted CNUMAD Rio + 20, during which it played an important role in articulating synergies between the conventions, their bodies and partner institutions, as well as well as in the composition between different interests of development, nature conservation and maintenance of the world's economies. The country is also involved in several multilateral and regional sustainability initiatives, such as the Tropical Forest Alliance, the Consumer Goods Forum, the Roundtable on Responsible Soy and the Food and Land Use Coalition.

14. **Accordingly, while Brazil has made progress in reducing deforestation and land degradation in the Cerrado biome, it will require improved coordination to be able to comply with its international commitments and achieve its own national environmental goals – particularly in relation to the agriculture sector.** Brazil's

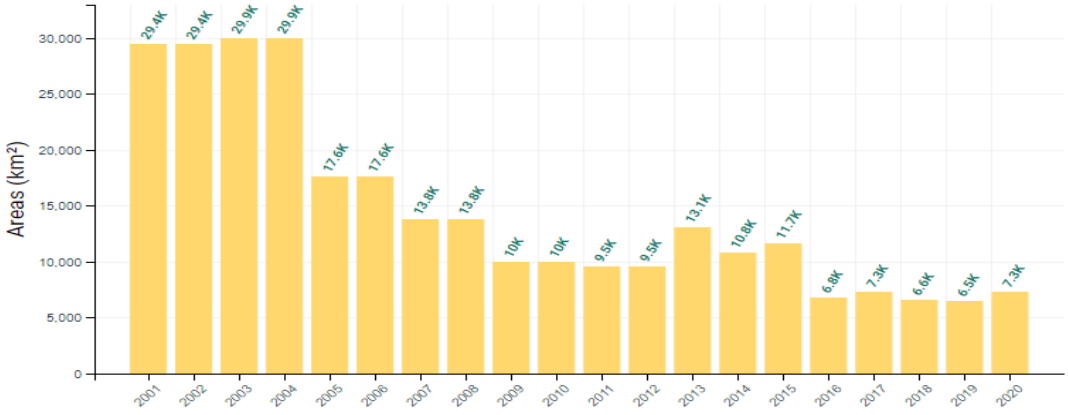
[20] MAPA (2021). *Plan for adaptation and low carbon emission in agriculture: Strategic vision for a new cycle*.

[21] The percentage to be held as Legal Reserves varies from 80 percent in the Amazon to 35 percent in the Cerrado within the Legal Amazon, to 20 percent in the rest of Brazil.

[22] CAR is the Rural Environmental Cadaster (*Cadastro Ambiental Rural*), a database containing information on compliance with the Forest Code based on self-declaration by landowners. The CAR consists of four parts which together are known as SICAR (*Sistema de Cadastro Ambiental Rural*): (i) a spatial referencing system (geodetic survey); (ii) a land parcel description system (including cadastral mapping); (iii) a land cover classification system that provides a basis for evaluation; and (iv) a system for marking ground-based boundaries (cadastral survey). SICAR is managed by the Brazilian Forest Service (*Serviço Florestal Brasileiro*) which operates under MAPA.

sustainable agricultural and environmental policies must be coordinated and expanded to work together, including by mobilizing private capital and engaging the agriculture sector in efforts to conserve productive natural landscapes. Currently, annual deforestation rates in the Cerrado are below 25% of 2001–04 levels in the biome as a whole (including areas bordering the Amazon biome, where the greatest losses occur), and have remained stable over the past 3- 4 years (figure 1). These gains have been enabled by national incentives, regulations, and environmental protection policies (such as the Forest Code, the National Biodiversity Conservation Policy – PNB, the National Policy to Combat Desertification and Mitigate the Effects of Droughts – PNCD, the Sectorial Plan for Mitigation and Adaptation to Climate Change - PNMC, and the recent National Policy for Payment for Environmental Services – PNPSA), which converge to structure and consolidate a national economy based on environmental sustainability and low-carbon emissions, as well as sectoral plans (such as the ABC Plan and emerging ABC+ Plan, the National Policy for the Recovery of Native Vegetation PLANAVEG/PROVEG, the CAR/SICAR Rural Environmental Registry System, and the Action Plan for the Prevention of Burnings and Control of Illegal Deforestation in the Cerrado Biome – *PPCerrado*).

Figure 1: Deforestation in the Cerrado Biome (2001–2020) [23]



15. **In order to further reduce incentives to expand production into forested areas as well as to address other critical threats to the Cerrado's biodiversity and productive areas, it is necessary to demonstrate how already-occupied and already-degraded areas can be transformed into sustainable agriculture landscapes**. Significant portions of the Cerrado are characterized by low productivity and unsustainable agricultural activities. Beef cattle in the Cerrado is mostly produced on extensive farming systems with limited adoption of sustainable production practices. Although soybean production has high adoption rates of some sustainable agricultural practices e.g. no-till farming, there is still much room for enhancing biodiversity and natural resource benefits. Sustainably increasing productivity on existing crop and livestock production areas is thus a key solution to reconciling competing demands on land systems for food production and conservation of natural ecosystems.

16. **However, the Brazilian government faces local knowledge and capacity challenges when it comes to prioritizing and coordinating actions along key value chains aimed at restoring highly degraded lands and sustaining environment benefits to yields synergies with agriculture productivity.** A number of considerable barriers remain to greater adoption of sustainable practices, such as integrated crop-livestock systems, in the Cerrado. These include lack of technical assistance,[24] low availability of economic instruments, lack of differentiated credit

[23] INPE/PRODES Cerrado 2020. http://terrabrasilis.dpi.inpe.br/app/dashboard/deforestation/biomes/cerrado/increments.
[24] Based on FIP-ABC Cerrado (Forest Investment Program—Low Carbon Agriculture) project results, the resources invested

for investment in sustainable productive practices, low availability of marketing options, and an unsupportive regulatory environment.[25]

17. **Sustainable Land Management (SLM)[26] presents a promising approach to agricultural intensification for soybean and beef cattle value chains in Brazil to reclaim vast areas of degraded pastures while mitigating greenhouse gas emissions**. To implement a systemic and synergistic SLM approach however, it will be critical to support improved local coordination to scale up sustainable agriculture, ecosystem restoration, soil and water conservation, and biodiversity practices, as well as to deliver technical assistance and training to producers both for implementing such practices and for complying with certification standards along the value chain to be able to access sustainable marketing opportunities. This will contribute to addressing a key development challenge for Brazil: how to sustainably manage its natural and productive landscapes, increasing food production on the one hand while restoring degraded land, water, vegetation, biodiversity, and ecosystems to fulfill its enormous potential for environmental service provision on the other.

18. **High-level global attention has been drawn to the need for integrated approaches such as SLM in key value chains to jointly address these environmental and agriculture challenges together, as reflected in the GEF-7 focal areas,[27] and the Food Systems, Land Use, and Restoration (FOLUR) Impact Program (IP) and Global Platform (GP).** FOLUR IP aims to promote sustainable integrated landscapes and efficient food value chains at scale, encouraging a transformation to more environmentally sustainable production practices and more resilient landscapes.[28] Such transformation will require integrated approaches emphasizing both horizontal (land and natural capital) and vertical (food value and supply chains) dimensions to manage production areas as integral components of the broader landscapes in which they are inserted, producing ecosystem services and maintaining natural capital. FOLUR GP, a child project of the wider FOLUR IP, has been designed to support the required transformational shifts in the adoption of environmentally sustainable practices and policies for priority global value chains through capacity strengthening, value chain engagement, and knowledge management.[29]

19. **The proposed Vertentes Project is strategically positioned to contribute to these needed transformational shifts in Brazil through engaging agriculture's private sector actors to implement an SLM approach in soybean and beef cattle value chains.** The Vertentes Project will leverage an integrated SLM approach to mobilize collective action among key public and private stakeholders. To this end, the project will establish

by the project were leveraged 8 times with contributions by producers (a ratio of 1:8), meaning that for every US$1 invested by the project, farmers invested US$8 to adopt improved agricultural and restoration practices. This represents a significant potential for beneficiary financial contribution to the Vertentes Project results (World Bank 2020; FIP-ABC Cerrado ICRR). See Annex 7 for more information on recent and ongoing relevant projects under the Forest Investment Plan in the Cerrado biome.

[25] Cortner et al. 2019. *Perceptions of integrated crop-livestock systems for sustainable intensification in the Brazilian Amazon*.

[26] Definition: "Sustainable land management (SLM) includes a range of complementary measures that are adapted to the biophysical and socio-economic context for the protection, conservation and sustainable use of resources (soil, water, biodiversity). Promising SLM options are available to sustain the productive utilization of different land use types within the landscape. The interaction between land components, within any given landscape, and the influence of climate and human activities determine the productivity and sustainability of the land use system." FAO. 2017. *Landscapes for Life: Approaches to Landscape Management for Sustainable Food and Agriculture.*

[27] GEF-7 Focal Area Objectives, April 2019.

[28] Project Document. Food Systems, Land Use and Restoration (FOLUR) Global Knowledge to Action Platform, July 8, 2020.

[29] Project Document. Food Systems, Land Use and Restoration (FOLUR) Global Knowledge to Action Platform, July 8, 2020.

multidisciplinary "consortia," catalyze complementary private sector investments in sustainable agriculture (soybean and beef cattle), and restore soils and biodiversity, in this way generating and sharing knowledge to support Brazil's transition toward more sustainable food systems. This innovative approach to promoting conservation in production landscapes is also considered more cost-effective than the traditional production approach and can be applied in other areas in Brazil with some adaptations if necessary. Moreover, the project will align with and build on existing public and private networks, activities, and initiatives in these thematic areas as well as complement and contribute to improvements in the implementation of existing relevant policies and programs. It will also complement other projects supported by the Bank (for example, Brazil's Forest Investment Program/Investment Plan in the state of Mato Grosso) and by other agencies (for example, GIZ and Amazon Fund) in and around the project area (see Annex 7).

C. Relevance to Higher Level Objectives

20. **The proposed project is fully aligned with the World Bank Group's Country Partnership Framework (CPF) for Brazil FY18–FY23** (Report no. 113259-BR, discussed by the Executive Directors on July 13, 2017). Under CPF Focus Area 2 (Private Sector Investment and Productivity Growth), the project aims to induce beef and soybean producers to adopt low-carbon and sustainable environmental practices, reduce land degradation, and engage with private actors who are committed to pursuing sustainability, reducing reputational risk, and creating the transformational market conditions toward environmental benefits beyond business as usual. Under CPF Focus Area 3 (Inclusive and Sustainable Development), the proposed project also supports the achievement of Brazil's NDC targets, with a particular focus on sustainable land use, environmental compliance, and promotion of socioeconomic development for rural producers offering opportunities to increase productivity and income generation.

21. **The proposed project is strongly aligned with GEF-7 focal areas[30] and the Food Systems, Land Use, and Restoration (FOLUR) Impact Program.[31]** The Vertentes Project will contribute significantly to the GEF-7 focal areas for Biodiversity (BD), Land Degradation (LD), and Climate Change Mitigation (CCM). The project will contribute to mainstreaming biodiversity across sectors and landscapes by mainstreaming biodiversity in priority sectors (BD 1-1), and by addressing direct drivers to protect habitats and species. It will also contribute to maintaining or improving the flow of agroecosystem services to sustain food production and livelihoods through sustainable land management (SLM) (LD-1-1) and reducing pressures on natural resources from competing land uses and increasing resilience in the wider landscape (LD-1-4). Finally, it will demonstrate mitigation options with systemic impacts for food systems, land use, and restoration impact programs (CCM-2-6). The Vertentes Project is also strongly aligned with the objectives of the FOLUR Impact Program through its SLM approach, including building the necessary institutional and governance capacity and land-use planning tools to enable the implementation of activities to (i) promote sustainable food systems for soybean and beef cattle value chains, and catalyzing investment opportunities to scale up production models with environmental and social benefits; (ii) promote low-carbon commodities by facilitating access to market protocols for the sustainable production of soybeans and beef cattle, as well as other food systems, and implementing a socioenvironmental business model recognized by the market; (iii) promote the legal conservation of natural ecosystems on private lands; and (iv)

[30] GEF-7 Focal Area Objectives, April 2019.

[31] The FOLUR Impact Program focuses on achieving three objectives: (1) promoting sustainable food systems to meet growing global demand; (2) promoting deforestation-free agricultural commodity supply chains to slow the loss of tropical forests; and (3) promoting restoration of degraded landscapes for sustainable production and to maintain ecosystem services. (GEF 7 Programming Directions document)

restore degraded lands by providing technical assistance, training and financial support to producers as a way to conserving and improving natural habitats. Multiple global environmental and agricultural benefits are expected to result from implementing this approach: including increased biodiversity conservation and sustainable use of globally relevant hotspots; protection of watersheds in areas of global importance; restoration of natural habitats; transition to longer-term, more sustainable livelihoods by supporting the sustainable use of the productive landscape and involvement of private sector; enhancing carbon sequestration; improving productivity on existing agricultural area; implementing sustainable agriculture practices; reducing GHG emissions and enhancing ecosystem services; contributing to the long-term reduction in deforestation and ecosystem destruction; and knowledge generation and dissemination on sustainable, biodiversity-based production practices.

22. **The Vertentes Project will also be part of a global platform managed by the World Bank, which integrates projects, partners, policies and practices into a program** that is greater than the sum of its parts, through strategic investments in capacity strengthening, engagement with value chains, policy and advocacy, and proactive knowledge management. This global platform will play a key role in ensuring that the whole of the program is greater than what might be delivered through individual country child projects (there are currently around 27 country child projects under FOLUR). As Brazil is an important player in the global environment, the Vertentes Project is committed to improving agricultural and environmental policy coordination; strengthening local landscape governance, planning and implementation asymmetries among local stakeholders; and promoting the scale-up of sustainable investments on the ground. Lessons from all these efforts will be actively captured and reported to enhance and benefit the global knowledge platform and its members.

23. **The Vertentes Project will also build on and complement ongoing investments in sustainability made by the public and private sectors at national and local levels** with the support of development partners, including the World Bank, the CIF/FIP, and the GEF. The key baseline programs are (i) the FIP/WB financed Sustainable Agriculture Production Project – FIP-ABC Cerrado (P143184) – closed in November 2019, where US$10.62 million enabled the adoption of sustainable practices in more than 700,000 hectares; and (ii) the FIP/WB financed Integrated Landscape Management in the Cerrado Project - FIP-Landscape (P164602), which reached 1,200,000 hectares of landscape under improved practices with a US$21.0 million grant. The project also complements other recent investments by development partners such as: (i) the GEF-supported Taking Deforestation out of the Soy Supply Chain (GEF ID 9617), which leveraged US$34.8 million to reduce deforestation in the agricultural frontier and to promote sustainable soy production in 6,000,000 ha of the Maranhão-Tocantins-Piauí-Bahia (MATOPIBA) region of Brazil; (ii) the Sustainable Rural Project – Cerrado, which aims to mitigate greenhouse gas emissions and increase the income of small and medium-sized producers in the Cerrado biome, promoting the adoption of low-carbon production technologies; and (iii) the *Aguas do Agro* program, which aims to promote sustainable economic development in rural areas through the promotion and adoption of soil and water conservation practices. Additionally, the project aligns with GoB policies including the ABC Plan, the Forest Code, and the National Policy to Combat Desertification with the objective of promoting sustainable land use and forest management improvements in the Cerrado. Building on these recent and ongoing investments, the project will support the incremental costs of interventions aimed at achieving large-scale transformational shifts and global environmental benefits. This, landscape approach, incentivized by the GEF-FOLUR will enhance interinstitutional coordination and mobilize synergies for the implementation of sustainable public policies and national action plans related to agriculture and the environment, promoting an effective and structured shift toward sustainable development in rural areas and reversing the land degradation currently resulting in low productivity and loss of biodiversity in the Cerrado biome. The project's interventions in this manner will be designed to align and respond in an aggregate and synergistic way to Brazil's multiple socioeconomic and environmental challenges.

24. **The Vertentes Project is aligned with the World Bank's corporate priorities on climate, gender, Maximizing Finance for Development (MFD), and post-COVID-19 recovery strategies**. The project ensures its alignment with environmental and agricultural global and regional strategies by strengthening, in a sustainable matter, key agricultural value chains and food systems through investments in climate-smart agriculture, natural resource management and conservation. The project has identified gender gaps and relevant actions to improve women's leadership at landscape (governance and management) and landholding (business and production decisions) levels. The project will help to create the preconditions for maximizing finance for development (MFD) by linking project-supported producers with buyers in beef cattle and soybean value chains; identifying constraints to private sector investment in sustainable value chains and providing incentives to overcome such constraints; sharing good practices; and building capacity. Additionally, the Vertentes Project will contribute to COVID-19 recovery in Brazil by strengthening the sustainability of beef cattle and soybean value chains and increasing the productivity and resilience of local farmers and livelihoods. Under FOLUR IP (see below), the Vertentes Project also has important features that can contribute to medium-term pandemic recovery, namely promoting investments at the landscape level to help retain and create jobs, increasing the resilience of rural communities, and creating critical awareness of healthy and sustainable food systems.

II. PROJECT DESCRIPTION

A. Proposed Development Objective(s)

PDO Statement

To increase the area under sustainable land management in selected beef cattle and soybean landscapes in Brazil and promote the integration of food systems and sustainable landscapes, conservation of biodiversity and recovery of degraded areas.

PDO Level Indicators Results

The achievement of the Project Development Objective will be measured through the following proposed indicators:

(i) Area of landscape under improved practices[32] (Hectares) (GEF Core Results Indicator - CRI)
(ii) Area of landscape under improved management (Hectares) (GEF CRI)
(iii) Greenhouse gas emission avoided and carbon sequestered (Metric tons of CO_2e) (GEF CRI)
(iv) Area of landscapes under improved management to benefit biodiversity (Hectare(Ha)) (GEF CRI)

B. Project Intervention Area and Beneficiaries

25. **Geographic focus.** The Vertentes Project will focus on nine Productive Landscapes (PLs), covering approximately 47.2 million ha in the states of Bahia, Goiás, Mato Grosso, Mato Grosso do Sul, and Minas Gerais, and in the Federal District (see map in Annex 8). These project areas were defined according to multicriteria analyses and a multisectoral process to maximize environmental and agricultural benefits, including high occurrence of land degradation; local importance for biodiversity conservation (for example, the presence of endemic, rare, or threatened species and the relevance to habitat connectivity); location relative to hydrographic basins and other territorial aspects; presence of local environmental characteristics that are important to regional environmental concerns; pasture degradation indices; and local importance of beef cattle and soybean production (for example,

[32] This excludes protected areas.

beef and soybean production levels, or post-farmgate processing capacity). During implementation, specific criteria will be developed to select specific sites for project intervention. See Annex 6 for detailed information on the biodiversity and agriculture criteria used to select the intervention areas.

26. The area identified as eligible for project intervention covers approximately 47.2 million ha of Cerrado biome in central Brazil. This area overlaps with parts of five central states and the Federal District,[33] categorized into nine productive landscapes (PLs), which have been historically used mainly for beef cattle and, to a lesser extent, for other agricultural commodities, including soybean. The adoption of conventional practices by rural producers in these areas has resulted in environmental degradation processes and productivity losses. Within the eligible 47.2 million ha, the project will target those areas assessed as the most critically degraded, aiming to implement sustainable land management (SLM) practices on **578,000 ha** of agricultural lands, and to restore an additional **49,800 ha** of degraded lands. The selected 578,000 ha will include both productive areas (500,000 ha) and areas identified as critical for biodiversity (78,000 ha) due, among other factors, to degradation levels, the occurrence of endemic species, and relevance for biodiversity.[34] The additional 49,800 ha of restoration will include degraded agricultural lands and natural forests and forested areas.

27. **Project beneficiaries**. The project aims to support a total of **10,500** direct beneficiaries (targeting a minimum of 2,100 women[35]) through training and technical assistance to strengthen SLM capacities and governance (Component 1), and to implement sustainable agriculture practices (Components 2 and 3). Under Component 1, direct beneficiaries will include producers and their representative organizations, state and municipal governments, local communities, local technical assistance agents, NGOs, buyers, and investors benefiting from training and technical assistance to strengthen SLM capacities and governance in the nine selected PLs. Under Components 2 and 3, beneficiaries are **2,500** soybean and beef cattle producers and farmworkers (targeting a minimum of 35% women beneficiaries) receiving technical assistance and training to implement sustainable agriculture, biodiversity, and restoration practices. In particular, the project will target medium and large landholdings (based on selection criteria to be defined in the Project Operational Manual), as they account for the bulk of agricultural land use in the project intervention areas. Indigenous peoples and other historically marginalized groups also live within the project's eligible intervention area (see Annex 6). They will be included in the project's stakeholder engagement strategy, and will be consulted as part of the PL diagnostic studies under Component 1.[36] Direct project beneficiaries also include participants in trainings, field events, educational activities, and other capacity-building and knowledge-sharing activities under Components 1 and 2. Indirect beneficiaries will include farmers and local communities in targeted PLs who benefit from the improved natural resource sustainability and increased environmental services; private agribusiness enterprises that may enter into partnership with producers or project-management institutions; stakeholders benefiting from knowledge generated by the project, such as academic researchers, civil society organizations that are active in the targeted areas, and private sector actors interested in sustainable agricultural value chains; Ministry of the Environment (MMA), National Rural Learning Service (SENAR), Ministry of Agriculture, Livestock and Food Supply (MAPA), and

[33] Bahia, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, and the Federal District.
[34] The areas targeted for practices to benefit biodiversity will not include those areas that are already under biodiversity protections.
[35] This estimation is based on the proportion of landholdings owned by women in the three selected areas (around 15 percent according to the latest data available from the 2017 Agricultural Census).
[36] A strategy for consultation with indigenous peoples and traditional communities has been defined and implemented, and the project´s grievance redress mechanism will be made available for indigenous and traditional communities in an accessible and culturally acceptable manner.

state environment agencies and staff; and FOLUR Global Platform participants.

Table 1: Vertentes Project Beneficiaries/Other Stakeholders by Project Component

Component	Beneficiaries/Other Stakeholders
Component 1. Development of integrated and sustainable landsmanagement approach	• Rural producers and local communities in targeted landscapes; • Private sector (companies interested in sustainable value chains, financial sector, and so on); • Civil society organizations with programs in selected productive landscapes; • MMA and MAPA secretariats and agencies at the federal, state, and local levels with relevant work in the project watersheds.
Component 2. Promotion of sustainable food production practices and responsible value chains	• Rural producers and local communities in targeted landscapes; • Private sector (companies interested in sustainable value chains, financial sector, and so on).
Component 3. Conservation and restoration of natural habitats and mainstreaming biodiversity	• Rural producers and local communities in targeted landscapes; • Academia and researchers; • Civil society organizations with programs in selected watersheds; • Private sector and companies interested in sustainable value chains; • MMA and state environment agencies.
Component 4. Knowledge management	• SENAR, MAPA, MMA staff; • FOLUR Global Platform participants.

C. Project Components

28. **The Vertentes project strategic approach is aligned with the FOLUR IP.** The Vertentes Project will promote a sustainable lands management[37] (SLM) approach to support shifts toward the use of environmentally sustainable practices and meet the growing global and domestic demand for soybean and beef cattle (both FOLUR IP-prioritized supply chains), while promoting sustainable integrated landscapes and conserving critical biodiversity, natural vegetation, and other ecosystem services. The project will engage key stakeholders (soybean and beef cattle producers and their representative organizations, state and municipal governments, local technical assistance agencies, NGOs, buyers, and investors) and build on existing public policies (CDB, UNCCD, Brazilian Forest Code, ABC Plan, and MAPA's Guidelines for the Sustainable Development of Brazilian Agriculture,[38] among others), currently being implemented at selected landscapes in an uncoordinated and fragmented way. The project will also inform the development of ABC+ and its Action Plan, announced in April 2021 as the second phase of the ABC Program. Through these activities, the project will establish and strengthen multidisciplinary coalitions—or "consortia"—to identify local on- and off-farm investment and business opportunities to collectively enable integrated and transformative, environmentally sustainable business.

29. **With a view to supporting the adoption of SLM practices within selected landscapes, the project will finance**

[37] Definition: "Sustainable land management (SLM) includes a range of complementary measures that are adapted to the biophysical and socio-economic context for the protection, conservation and sustainable use of resources (soil, water, biodiversity). Promising SLM options are available to sustain the productive utilization of different land use types within the landscape. The interaction between land components, within any given landscape, and the influence of climate and human activities determine the productivity and sustainability of the land use system." FAO. 2017. *Landscapes for Life: Approaches to Landscape Management for Sustainable Food and Agriculture*.

[38] MAPA. January 2020. *Guidelines for the Sustainable Development of Brazilian Agriculture*, January 2020.

the provision of knowledge, training, and technical assistance aimed at incentivizing on-farm practice change. The project will target selected private landholdings for sustainable low-carbon agricultural practices (including integrated crop, livestock and forest systems, recovery of degraded pastures, and no-till farming), as well as restoration and biodiversity conservation practices (including natural habitat restoration, environmental compliance, and soil and water management and conservation). This approach builds on experiences in the region demonstrating that producers are willing to adopt practices and technologies designed to achieve both productivity and environmental benefits, even contributing their own resources to do so, when provided with effective technical assistance and training. In the FIP-ABC Cerrado (Forest Investment Program—Low Carbon Agriculture) for example, the project investment in training and technical assistance were leveraged 8 times with contributions by producers (a ratio of 1:8), meaning that for every US$1 invested by the project, farmers invested US$8 to adopt improved agricultural and restoration practices.[39]

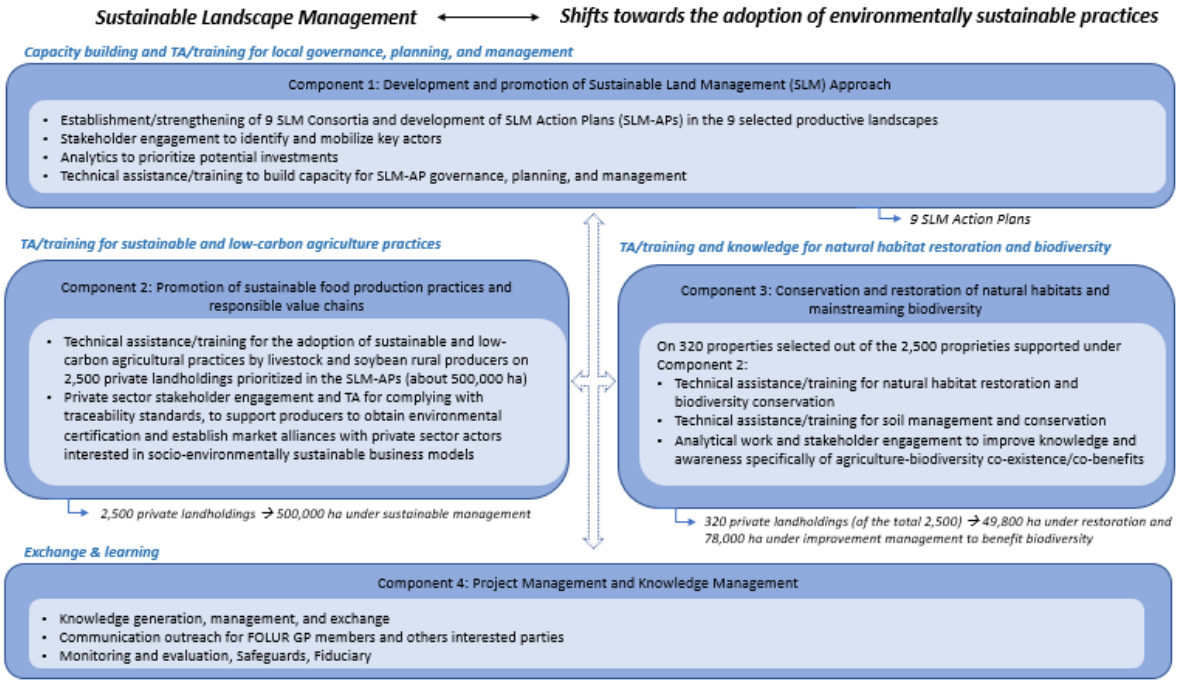
30. **The project will be implemented through four distinctive and complementary components, in alignment with the four FOLUR IP Program Components**: (i) Development and promotion of SLM approach, contributing to the FOLUR IP "Integrated landscapes" outcome through improving landscape planning and management practices and enhancing capacity of local landscape governance institutions); (ii) Promotion of sustainable food production practices and responsible value chains, contributing to the FOLUR IP "Commodity & food production systems" and "Commodity value chains" outcomes through providing support for producers to invest in sustainable practices, supporting them to comply with environmental sustainability standards, improving the responsible sourcing of priority value chains, and facilitating the uptake of lessons and innovations; (iii) Conservation and restoration of natural habitats and mainstreaming biodiversity, contributing to the FOLUR IP ("Integrated landscapes") outcome through restoration and enhanced ecosystem services; and (iv) Knowledge management, contributing knowledge generation and exchange as part of the FOLUR Global Platform (GP). Figure 2 shows the components and their working relationships and section C "Results Chain" demonstrates alignment with the FOLUR IP theory of change.

31. **Component 1: Development and promotion of Sustainable Land Management (SLM) approach (GEF US$2.10 million).** The objective of this component is to strengthen local governance, planning, and management capacity to implement SLM. It will contribute to achieving the FOLUR IP Program outcome related to integrated landscapes *inter alia* through improving landscape planning and management practices and enhancing capacity of local landscape governance institutions. To this end, this component will provide technical assistance and capacity building to support local, multidisciplinary coalitions—or consortia—and develop SLM action plans in the nine selected PLs. These consortia will assess the PLs' current status and remaining development needs; align and prioritize project activities in each PL; enable shared management of project activities by local private and public sector representatives; and promote synergies and partnerships for SLM. Activities under this component will include: (i) identifying relevant local stakeholders; (ii) mobilizing representative actors to participate in the consortia, including targeting of women; (iii) carrying out communication campaigns to inform and engage stakeholders on project objectives, scope, activities, and procedures; (iv) providing training and technical assistance to strengthen the SLM and governance capacities of key stakeholders participating in the consortia; (v) carrying out analysis of selected areas required for PL action plans; and (vi) identifying potential partnerships for cofinancing and for integrating SLM initiatives among different actors. Through these activities, this component expects to strengthen coordination among land-use policies and incentives relevant to SLM and

[39] This represents a significant potential for beneficiary financial contribution to the Vertentes Project results (World Bank 2020; FIP-ABC Cerrado ICRR). See Annex 7 for more information on recent and ongoing relevant projects under the Forest Investment Plan in the Cerrado biome.

improve stakeholder ownership and involvement in SLM governance, as well as guide project activities under Component 2 and Component 3.

Figure 2: Vertentes Project—Strategic Approach and Project Components



32. Activities under Component 1 are expected to generate critical knowledge and capacity that lead to a strategic vision for the agriculture and conservation pathways of the selected PLs beyond the end of the project. As a complex approach that seeks collaboration among diverse sectors and stakeholders, applying the SLM approach under this component will require a comprehensive understanding of each PL's challenges and needs. To this end, this component will undertake analytical work on the nine PLs, aiming to establish, among other things: agricultural production and productivity levels; land use mapping and land degradation degree; environmental (water and soil) and biodiversity conditions; local farmers' and communities' socioeconomic characteristics; existing local market actors and outlets; and relevant stakeholder mapping. These analyses, together with communication campaigns and meetings to explain the project's objectives, will guide the development of PL stakeholder engagement strategies. Once mobilized, relevant stakeholders will participate in capacity-building activities (training, seminars, discussions) organized by SENAR to enhance their governance, planning, and management capacities with a view to implementing SLM solutions. This component will engage specialized consultants for the development of training contents (both in-person and internet-based distance learning) to deliver such capacity-building activities and tailor them to local stakeholders, fostering local ownership. It will also support annual workshops to continue engaging with stakeholders over the project lifetime. These knowledge and capacity-building activities will help the consortia to align relevant land-use policies and incentives, and to prioritize critical areas for agriculture and conservation investment for each PL.

33. **Component 2: Promotion of sustainable food production practices and responsible value chains (GEF US$9.64 million).** This component aims to promote the on-farm adoption, by livestock and soybean producers, of low-

carbon and SLM practices,[40] and to engage the private sector in the adoption of such practices creating opportunities for increasing productivity and income generation. These activities are expected to sustainably increase agriculture and pasture productivity, reducing the pressure for further land-use change. It will contribute to the FOLUR IP Program outcomes related to commodity and food production systems and commodity value chains through providing incentives for producers to invest in sustainable practices, supporting them to comply with environmental sustainability standards, improving the responsible sourcing of priority value chains, and facilitating the uptake of lessons and innovations. In order to achieve this, the component will support the provision of training and technical assistance for technologies promoted under Brazil's ABC Plan, emerging ABC+ Plan, among others, including degraded pasture recovery, integrated crop-livestock-forestry systems (ILPF in Portuguese), and no-till farming, as well as other practices such as recovery of springs and soil and pest management. Training will be provided to producers and field technicians in both classroom and virtual environments to accommodate COVID-19 constraints; and technical assistance for the adoption of these practices will be provided to farmers and farm workers, with specific attention to women, engaged on the 2,500 private landholdings. With a view to encouraging the dissemination (to other relevant stakeholders) of the practical lessons learned from the adoption of project-promoted practices, this component will support the establishment of technological reference units (*Unidade Demonstrativa* in Portuguese) in selected farms. The project will also support continued dialogue between beneficiaries of this component and the wider stakeholder base engaged in the consortia.

34. ***Private Sector Engagement.*** The project will help to create the preconditions for sharing good practices, building capacities and facilitating producers for accessing sustainable market protocol and certifications. Specifically, this component will offer technical assistance and training to producers interested in complying with the traceability standards required by many certification programs and market protocols (for example, "carbon-neutral livestock farming");[41]. During project preparation, the project team identified key regional and local buyers, slaughterhouses, meatpacking facilities, and traders; and created a discussion forum to try to understand their market needs for sustainable products, the protocols and traceability processes they use, and the perceived risks related to committing to promoting productive alliances with local producers.[42] Based on that assessment, the project will produce training materials and technical assistance modules on promising certifications and market protocols.[43] The project will also facilitate the participation of beneficiaries in market platform events promoted

[40] Natural habitat restoration and conservation practices in private landholdings (Permanent Preservation Areas—APPs, and Private Natural Heritage Reserves—RPPNs), according to Brazilian Forest Code rules.

[41] These may include protocols to benefit food safety and prevent the spread of zoonotic diseases in the context of COVID-19.

[42] The following beef and soybean sector stakeholders were represented in the discussions. Beef: ABIEC—Brazilian Association of Meat Exporting Industries; Embrapa Beef Cattle—research entity responsible for the CCN and the Low-Carbon Protocol; ILPF Promotion Network—Crop-Livestock-Forest Integration; GTPS—Sustainable Livestock Working Group; IMAC—Instituto Mato-Grossense da Carne; ASSOCON—National Association of Intensive Livestock Farming; Brazilian Angus Association; ACRIMAT— Mato Grosso Breeders Association; Associação Brasileira de Produtores Orgânicos; and Meat Camp and BBq Secrets. Soybean: APROSOJA—Brazilian Soybean Producers Association; GAPES—Alternative Research Group of Southwest Goiás; GAAS—Sustainable Agriculture Associated Group, IRRIGANOR—Association of Rural and Irrigating Farmers in the Northwest of Minas; Women in Agribusiness; farmers unions in the states covered by the project; ABIOVE—Brazilian Association of Vegetable Oil Industries; COFCO; ANEC—National Association of Cereal Exporters; and AMAGGI/RTRS.

[43] The project will ensure that all promoted certifications and protocols have the relevant scientific and technical background information to guarantee they are in accordance with GEF's Environmental Certification premises and requirements.

by the Brazilian Confederation of Agriculture and Livestock (*Confederação da Agricultura e Pecuária do Brasil*—CNA) aimed to encourage relevant dialogue and business opportunities. This engagement with the private sector will play a key role in consolidating, mainstreaming, and sustaining the socioenvironmental business model for soybean and beef cattle producers promoted by the project.

35. **Component 3: Conservation and restoration of natural habitats and mainstreaming biodiversity (GEF US$8.09 million).** This component aims to support the adoption of biodiversity conservation and restoration practices on degraded agricultural lands, natural forests and forested lands located within a subset (320) of the private landholdings selected under Component 2. It will contribute to the FOLUR IP outcome related to integrated landscapes through restoration and enhanced ecosystem services. The targeted areas for this activity may include priority areas of Permanent Preservation Areas (APPs) and Private Natural Heritage Reserves (RPPNs).[44] The 320 landholdings will be selected based on criteria and procedures to be defined in the Project Operational Manual, including the level of soil degradation, the occurrence of endemic, rare or threatened species, ecological significance in the larger context of the landscape, connectivity and legal requirements, and opportunities for engaging committed actors.[45] To this end, this component will support technical assistance, training and financial support for: (i) restoration of natural habitats and conservation of biodiversity; (ii) restoration of critically degraded soils, including the LDN approach and studies on carbon fixation; and (iii) studies, mappings, and surveys to improve our knowledge and understanding of synergistic agriculture-biodiversity coexistence and co-benefits. By strengthening the links between conservation, restoration, and agricultural productivity, these activities are expected to contribute to reestablishing biotic and hydrological flows in the project and surrounding areas, reconnecting fragmented habitats, and restoring degraded ecological processes. The adoption of conservation and restoration practices supported under this component will be enhanced by the use of digital innovation technologies (for example, geospatial tools, remote technologies, digital satisfaction surveys, crowdsourcing, mobile data collection and compilation, and photographic and geographical records, among others) for the registration of participating beneficiaries (including women) and properties, budget management, and monitoring of practice implementation and restoration progress. As with Component 2, the project will support continued dialogue between beneficiaries and the wider stakeholder base engaged in the consortia. The role of the MMA in particular will be crucial for aligning the biodiversity conservation and deforestation reduction activities under this component with the strategies of the conventions to which Brazil is a signatory (specifically the CDB, UNCCD, and UNFCCC), the national public policies created for the implementation of these conventions, and other relevant socioenvironmental agreements and processes.

36. This component will rely on the implementation of the following key activities:

(i) ***Natural habitat restoration and biodiversity conservation.*** This activity will provide technical assistance, training and financial support for practices to restore natural habitats and benefit biodiversity in the 320 selected private landholdings (for example, APPs and RPPNs). Restoration support will be provided to landholders ("restoration units") who have volunteered to conduct restoration practices and are willing to

[44] The Forest Code requires that all privately owned rural landholdings maintain a certain percentage of native vegetation in areas known as Legal Reserves (*Reservas Legais*—RLs) and Permanent Preservation Areas (*Áreas de Preservação Permanente*—APPs), including riparian forests, steep slopes, and mountaintops, among others. Private Natural Heritage Reserves—RPPNs are designated areas within private landholdings, as per the Brazilian Conservation Unit System.

[45] Adhesion Agreements (*Termos de Adesão*) will be signed between landowners and SENAR establishing their roles and responsibilities. Individual farmers' "in-kind" support will partially cover restoration implementation costs, with matching funds provided by the proponent.

share their experiences with neighbors and other landowners, with the goal of restoring critical and sensitive areas and showcasing restoration practices on productive farms. Natural habitat restoration and biodiversity practices promoted under this activity will include, among others, natural vegetation enrichment, fencing, natural regeneration, assisted regeneration, planting or direct seeding of native tree species, erosion control, and invasive species control. By conserving biodiversity in productive areas, this activity will significantly contribute to the coexistence of productive activities with wildlife and native flora, as well as to GHG sequestration through enhanced carbon stocks. By restoring critically degraded areas in APPs, RPPNs, and others, it will significantly contribute to the sustainable economic use of landholdings' natural resources, supporting the conservation and rehabilitation of ecological processes; promoting biodiversity conservation; contributing to GHG sequestration through enhanced carbon stocks; and sheltering and protecting wildlife and native flora. The implementation of this activity will be aligned with Brazil's existing work under the Convention on Biological Diversity (CBD), the Tropical Forest Alliance, the Consumer Goods Forum, the Roundtable on Responsible Soy, and the Food and Land Use Coalition. The legal framework provided by the Rural Environmental Cadaster (CAR—*Cadastro Ambiental Rural*) will help to coordinate actions on different fronts.

(ii) ***Soil management and conservation.*** Additionally, this component will support the provision of technical assistance, training and financial support for sustainable soil-management practices within the 320 selected private landholdings. The activity will support producers to adopt soil-recovery and degradation-control practices, including contour lines, *barraginhas*,[46] green barriers, and stone constructions for moisture retention and flood control. The restoration of degraded productive pastures and soil offers vast potential to increase productivity and make more land available for soybeans and pastures without further deforestation and other land use change, in addition to mitigating conflicts among native vegetation, biodiversity, environmental services and agricultural production. The soil management and conservation practices adopted under this activity will also significantly contribute to carbon sequestration and contribute to the climate change resilience of the productive systems.

(iii) ***Agriculture-biodiversity coexistence.*** Studies suggest that market requirements and an adequate risk aversion incentivizes farmers to adopt sustainable practices, meaning that farmers do not necessarily need to have environmental preferences or to receive monetary benefits from ecosystem services to favor ecofriendly approaches.[47] This activity specifically aims to help scale up and improve knowledge and awareness of synergistic agriculture-biodiversity coexistence and co-benefits in the selected productive landscapes, contributing to the FOLUR IP and GP outcomes related to innovative knowledge products and uptake of lessons. To this end, this activity will support analytical work and stakeholder engagement including the following: (i) registration and mapping of key fauna; (ii) mapping of threats to key species as well as critical habitats; (iii) studies to assess the relationship between natural resource and habitat conditions, the provision of environmental services (for example, pollination, soil nutrient provision, water recharge, soil carbon and levels, carbon sequestration), and landscape productivity; and (iv) local stakeholder engagement events and dissemination materials to promote positive attitudes toward agriculture-biodiversity coexistence, and disseminate protocols for simple biodiversity conservation and connectivity-enhancing practices. The knowledge and awareness generated under this activity will inform and provide important links to SLM governance, planning, and management activities in the nine PLs.

[46] Small ditches to improve soil drainage excavated in the soil in the shape of a circle or a half moon (EMBRAPA).
[47] Mouysset, L. 2016. https://link.springer.com/article/10.1007/s10113-016-1023-2.

37. **Component 4: Knowledge Management (GEF US$4.75 million).** This component will support the overall planning, management, monitoring and evaluation (M&E) of the project, as well as the management of knowledge and dissemination of lessons learned at national and international levels as part of the FOLUR GP (see below). Specifically, this component will support: (i) interinstitutional coordination; (ii) M&E plan implementation, including environmental social standards implementation and risk management; fiduciary administration; internal controls and audits; citizens' engagement, gender strategy, and grievance redress mechanisms; (iii) Knowledge management (KM) strategy; and (vi) communication and outreach strategy.

38. ***M&E and reporting.*** In line with the requirements of the FOLUR Global Platform, the project has included two relevant KM indicator in the Results Framework, as well as adequate data collection, data treatment, and reporting schedules.

39. **Knowledge management (KM) strategy.** In close collaboration with the FOLUR GP, the project's KM strategy seeks to identify and test innovative approaches to environmentally sustainable production and governance issues, amongst others. The project will build national capacity and expand the knowledge base to: (a) support the adoption of low-carbon agricultural practices and sustainable value chains that favor standing natural systems and expand restoration efforts; and (b) strengthen and implement policies and strategies for promoting integrated landscape management, biodiversity conservation, and native vegetation recovery. Adequate staffing and budget planning and design will ensure participation in global and regional activities, contributions to reports and analyses, and sound and timely annual reporting and M&E. The project will contribute to generating lessons for the wider replication of FOLUR IP actions and results, thus enabling to scale up and incentivize improved practices for better landscape-level outcomes and greener beet cattle and soybean supply chains. The project team will also participate in an annual face-to-face Global Platform Meeting with all FOLUR implementing agencies, country projects and partners.

40. **Communication and outreach strategy.** Communication outreach activities will be based on the development of a project-related website and social media channels to keep a wider audience updated on project implementation progress, key documents, and knowledge products. In addition to quantitative reporting, the project will document success stories, and provide other inputs as contributions to annual overview progress reports on FOLUR GP. The communication strategy will also seek proactive coordination with FOLUR GP communication officers on any press coverage related to the project with a view to amplifying or mitigating its impacts.

41. The project will also contribute to the FOLUR Global Program knowledge platform, incorporating learning into the project, sharing knowledge with project stakeholders and private actors, and helping to inform government policy and program choices. In addition, it will leverage and disseminate FOLUR actions and results through individual country (and other) platforms and knowledge networks, with a view to scaling up, mainstreaming, and incentivizing improved practices aimed at better landscape-level outcomes and more sustainable soybean and livestock supply chains. In terms of policy dialogue, the project will work with MAPA and the MMA to identify and promote opportunities for policy reform and public sector engagement based on local context and specific engagement needs for global expertise available through FOLUR GP. The project is aligned with the components of the FOLUR Program so as to ensure coherence and promote an efficient achievement of common FOLUR objectives by all child projects through a joint effort.

Other Design Aspects

42. **Climate change.** A GHG appraisal of the Vertentes Project was carried out using the ex-ante carbon-balance tool (EX-ACT), which quantifies the net carbon balance with regard to tCO2e, resulting from GHGs emitted or sequestered during the project implementation and capitalization period (20 years) compared to the without-project scenario (see Annex 4). The GHG appraisal shows that the project will lead to estimated annual climate change mitigation benefits of 991,146 tCO2e, when compared to a business-as-usual baseline scenario. This is equivalent to annually reduced GHG emissions per hectare of 1.6 tCO2e. In total, an estimated incremental 19,822,929 tCO2eq will be avoided in the area intervened by the project (627,800 ha) over 20 years. A climate and disaster risk screening was also conducted, which rated the overall climate change risk to project outcomes as Moderate. This is due to the fact that, while the proposed project intervention areas face potential exposure to climate change hazards (for example, forest fires, rising temperatures and precipitation variability), the project is specifically designed to address them through both soft and hard components, significantly modulating climate change risks. Moreover, Brazil has a strong capacity to address these hazards, and—with sufficient knowledge awareness and technical assistance—beneficiaries' adaptive capacity is thought to be strong, based on previous projects. The full screening results are available in the project files.

43. **Gender approach.** The project is committed to identifying and reducing gender gaps among its beneficiaries, as well as acting to improve women's agency at landscape (governance and management) and landholding (business and production decisions) levels. It is focused on SLM planning, capacity building, extension service activities and events. In addition, by promoting the conservation and restoration of natural habitats, the project may contribute to addressing some of the key challenges that hamper gender equity. A detailed gender strategy is provided in Annex 5.

44. **Citizen Engagement and grievance redress mechanism (GRM).** The project in dealing with the development and promotion of SLM-APs at the landscape level is based on citizen's participation in consultation workshops. The Project will also put in place a grievance redress mechanism. The Project's Stakeholder Engagement Plan includes a full description of the grievance redressing mechanism (its channels, procedures, processes and timelines) that will be available for the Project. Complaints feedback mechanisms. Communities and individuals who believe that they are adversely affected by specific country policies supported as Prior Actions or tranche release conditions under a World Bank Development Policy Financing may submit complaints to the responsible country authorities, appropriate local/national grievance mechanisms, or the Bank's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address pertinent concerns. Project affected communities and individuals may submit their complaint to the Bank's independent Accountability Mechanism (AM). The AM houses the Inspection Panel, which determines whether harm occurred, or could occur, as a result of Bank non-compliance with its policies and procedures, and the Dispute Resolution Service, which provides communities and borrowers with the opportunity to address complaints through dispute resolution. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the Bank's Accountability Mechanism, please visit https://accountability.worldbank.org.
45. The Project's grievance mechanism will also utilize formal grievance mechanisms already in place in SENAR, MMA and MAPA. These mechanisms include different, broadly advertised and well-known ways in which users can submit their grievances: SENAR's communication channel with citizens (http://www.senar.org.br/fale-conosco),

MAPA's Citizen Attendance Service and an institutional ombudsman (dedicated telephone and fax line, mail, in person, the electronic platform available on the MAPA website on the Internet as well as the ombudsman electronic address (ouvidoria@agricultura.gov.br.) and electronic platform (http://www.agricultura.gov.br/ouvidoria/contatos-com-a-ouvidoria/por-formularioweb/formulario), MMA's Ombudsman phone and website (https://www.mma.gov.br/ouvidoria.html) and the information platform of the Federal Comptroller General (CGU) called Fala.BR, which replaces e -OUV, and the citizen information service (e-SIC), as provided for in the relevant Brazilian legislation. The project's progress report will periodically report on the operation of this multilevel GRM. Two indicators are proposed to monitor and evaluate citizen engagement – namely: (a) beneficiaries satisfied with project intervention and (b) complaints and inquiries received through the grievance redress mechanism that are registered and addressed.

46. **COVID-19 mitigation strategy.** Following World Bank, GEF and World Health Organization (WHO) guidelines and recommendations, as well as contingency plans produced by Brazil's federal and state governments, the following actions are proposed to address COVID-19 risks and impacts during the implementation of the proposed project: (i) carry out a risk assessment for project workers and beneficiaries covering all planned activities, to be periodically updated according to changes in the epidemiological situation; (ii) carry out an assessment of the conditions for virtual meetings and training activities, and give preference to such virtual channels while the pandemic lasts; (iii) based on this assessment and guidelines, develop and adopt a protocol to be followed by project workers, which will include, among other aspects, using personal protective equipment, adopting hygiene practices in the workplace, only sharing information issued by authorized sources, and restricting access to rural landholdings to strictly necessary personnel, and on a must/need basis (in addition, any project worker feeling the symptoms associated with COVID-19 will be tested, quarantined and receive orientation for proper medical treatment); (iv) use SENAR's well-designed and user-friendly communication materials to disseminate information on measures to prevent COVID-19 among project workers, local stakeholders and rural landowners and workers; and (v) during field activities and meetings, only disseminate information and guidelines issued by authorized sources on COVID-19, its symptoms, contagion, and what must be done if symptoms arise.

Results Chain

47. **The Vertentes project results chain aligns with the FOLUR theory of change**. The FOLUR IP theory of change rests on the links between problem analysis (key problems and impacts as well as their drivers and barriers), the identification of interventions to address those problems, the definition of outputs and outcomes from those interventions, and the generation of longer-term global environmental benefits.[48] Following this framework, the Vertentes project identified by component the main barriers, causes and impacts related to food and land use as detailed in Figure 3. In the project's intervention areas, land conversion for beef cattle and soybean production has reshaped Cerrado landscapes at a significant cost, including natural resource degradation and biodiversity loss, as well as decreasing agriculture productivity. Those problems were caused by decades of agricultural expansion and use of unsustainable and high-GHG intensity agriculture and livestock practices and uncoordinated policies and incentives related to land use. Farmers and local stakeholders' limited knowledge and understanding of the sustainable and low-carbon agriculture and environmental practices and landscape planning and management, as well as the indifference of some actors to the environmental impacts accumulated along the chain are the main barriers to revert the identified problems and causes. In this context, the project aims to address those barriers by engaging relevant stakeholders and providing knowledge provision and

[48] Project Document. Food Systems, Land Use and Restoration (FOLUR) Global Knowledge to Action Platform, July 8, 2020.

incentives on SLM, sustainable agriculture, biodiversity, conservation and restoration practices. The project also expects to generate and disseminate knowledge in sustainable agricultural production and environmental conservation practices.

48. **Global Environmental Benefits**. Through its results chain, the project is expected to contribute to the following Global Environmental Benefits: biodiversity conservation, through biodiversity conservation & habitat reconnection in targeted areas and landscapes under improved practices to benefit biodiversity and SLM; reduction of land degradation through improved land-use practices, land restoration activities in major production landscapes, and reestablishment of hydrological, biological and ecological processes; and climate change mitigation, through GHG emissions reduced/avoided and carbon fixation in soil and biomass. Figure 3 below presents the Results Chain with these elements, the specific outputs, outcomes, the longer-term global environmental benefits expected to follow from them, and the critical underlying assumptions.

Figure 3: Vertentes Project Results Chain

PROBLEMS, DRIVERS, BARRIERS	COMPONENTS/ACTIVITIES	OUTPUTS	OUTCOMES	LONG-TERM IMPACTS & GLOBAL ENVIRONMENTAL BENEFITS
• **Barriers**: Insufficient stakeholder engagement; • **Causes**: Uncoordinated policies & incentives related to land use; • **Impacts**: Weak landscape planning & management practices	**1. Development and promotion of SLM approach:** 1.1.Community & stakeholder engagement/mobilization; 1.2. Capacity building on landscape planning and governance; 1.3. Creating and strengthening of local landscape consortia. 1.4.Strengthening of public policies A1	1.1.1.Key stakeholders identified and engaged in project activities; 1.2.1.SLM capacity and governance knowledge provided to local communities and institutions; 1.3.1.Local landscape consortia strengthened. 1.4.1.Public policies strengthened.	1.1.1.1.Stakeholder ownership, stakeholders effectively participating in project activities; 1.2.1.1.SLM capacity and governance of local communities and institutions enhanced. 1.3.1.1.Local landscape consortia engaged to support sustainable land management interventions 1.4.1.Public policies and land use incentives linked and enhanced A4	• Targeted landscapes with improved planning & management practices, fostering sustainable food systems. • Leveraged action through consortia
• **Barriers**: Farmers' limited knowledge on sustainable practices; Commodity value chains indifferent to environmental impacts accumulated along the chain; • **Causes**: Use of unsustainable agriculture and livestock practices; Microclimate vulnerability; • **Impacts**: Natural resource degradation and biodiversity loss, as well as decreasing agriculture productivity	**2. Promotion of sustainable food production practices & responsible VCs:** 2.1. Provision of TA/training to rural producers on SLM, biodiversity conservation and restoration practices; 2.2. Implementation of Private sector engagement strategy 2.3. Survey and analysis of sustainable market protocols and certifications. A2	2.1.1.Training and technical assistance for producers on SLM and environmental restoration and protection practices provided; 2.2.1. Private sector engagement strategy implemented 2.3.1.Producers accessing sustainable market protocol and certifications A3	2.1.1.1. Rural producers and community members knowledgeable on SLM and environmental recovery and conservation practices; 2.1.1.2.Land areas under SLM in production systems expanded; 2.2.1.1. Rural producers and community members able to implement Project initiatives 2.3.1.1.Sustainable market linkages enhanced. A4	• Increased sustainability and resilience of agricultural value chains; • Improved land-use practices, and restoration activities in major production landscapes adopted and scaled up; • GHG emissions reduced/avoided; • Landscapes under improved practices to benefit biodiversity and SLM; • Land restored; • Increased productivity and income generation
• **Barriers:** Farmers and local community's limited knowledge on sustainable practices; •**Causes:** Use of unsustainable agriculture and livestock practices; Forest fires; •**Impacts:** Loss of environmental services & biodiversity (threatened species); Reduced water availability (quantity & quality); Soil loss & degradation	**3. Conservation and restoration of natural habitats and mainstreaming biodiversity:** 3.1.Provision of TA/training and financial support to rural producers on restoration practices; 3.2.Assessment and monitoring for biodiversity protection; 3.3.Assessments/studies of environmental services, landscape carbon stock and LDN	3.1.1.Support to restore/protect native vegetation, degraded soil and water resources provided; 3.2.1.Assessment and monitoring for biodiversity protection carried out; 3.3.1.Environmental service, landscape carbon stock and LDN assessments/studies carried out.	3.1.1.1.Native vegetation areas in recovery process expanded; 3.2.1.1.Landscape areas under improved management to benefit biodiversity expanded; 3.3.1.1Environmental service, landscape carbon stock and LDN measured.	• Biodiversity conservation & habitat reconnection in targeted areas • Restored degraded areas within rural properties; • Greater soil fertility and expansion of stock rates and carbon fixation in soil and biomass; • Reestablishment of hydrological, biological and ecological processes; • GHG emissions reduced/avoided; • Land restored; • Landscapes under improved practices to benefit biodiversity and SLM;
• **Barriers**: Gaps in application and communication of knowledge in sustainable agricultural production & environmental conservation practices; • **Causes**: Lack of effective information and dissemination of SLM practices to producer;	**4. Knowledge management** 4.1.Manage project implementation 4.2.Develop KM strategy 4.3. Develop comms strategy	4.1.1. M&E data collected reported; 4.2.1. KM strategy implemented; 4.3.1.Comms. strategy implemented	4.1.1.1.Project effectively implemented; 4.2.1.1.Knowledge generated and exchanged; 4.3.1.1.Project lessons, tools and innovations captured and shared with stakeholders.	• Contribution to the dissemination of knowledge generated under the FOLUR Global Platform.

• **Impacts**: Weak landscape planning & management practices

Main assumptions: **A1:** Local stakeholders understand the importance of SLM and are incentivized to engage in collective action; **A2:** Rural producers and community members are willing to undertake on- and off-farm investments; **A3:** Private agents are willing to partner with project beneficiaries; **A4**: Project activities are able to generation proposed impacts.

D. Rationale for Bank Involvement, Role of Partners, and Parallel Financing

49. The World Bank has longstanding knowledge and experience as the GEF Implementing Agency (IA) for a range of projects across the Latin America and Caribbean region and globally. Since GEF-5, these projects have shown a stronger focus on transforming business-as-usual productive practices into more environment-friendly, resource-efficient and climate-resilient practices. Under GEF-7, the World Bank serves as the IA for the Food Systems, Land Use and Restoration (FOLUR) Impact Program, which builds on the momentum and the growing commitment by the public and private sectors toward a transformational shift in food systems. FOLUR directly engages 27 countries,[49] selected on the basis of their strong alignment with the program vision and high potential to generate global environmental benefits through investments in promoting transformational change. Consequently, the World Bank can bring global knowledge and experience and transfer technical and strategic knowledge through the participation of specialists with ample experience in these areas, and thus allow other countries to learn and benefit from FOLUR work conducted in Brazil.

50. The GEF-7/WB financing will build on and complement ongoing investments in sustainability made by the public and private sectors at the national and landscape level with the support of development partners, including the World Bank and the CIF/FIP. It will specifically support the incremental costs of interventions aimed at achieving large-scale transformational shifts and global environmental benefits. The landscape approach incentivized by GEF-FOLUR will enhance interinstitutional coordination and integrate the implementation of international conventions (CBD, UNCCD, UNFCCC, CITES), environmental policies and laws (Forest Code, PNB, PNCD, PNMC, PNPSA), and sectoral programs related to agriculture such as the ABC and ABC+ Plans), promoting a shift toward sustainable development in rural areas, and reversing current land degradation, productivity and biodiversity-loss business as usual (BAU) in the Cerrado biome and ecotones. Project interventions will be designed to align with and respond to multiple socioeconomic and environmental challenges. The World Bank has been on the forefront of bringing attention to the social and environmental costs of climate change, which will have a major negative impact on the poor. A World Bank promoted program in the Cerrado will be seen by the private sector and national agencies as a significant step involving a highly credible international institution in one of the world's major food production areas.

51. **The project has leveraged parallel financing (cofinancing to the GEF) that will contribute further to the PDO**. Parallel financing has been leveraged to support further increases in the area under sustainable land management and restoration for beef cattle and soybean value chains in selected landscapes of Brazil. All parallel financing will be implemented under separate institutional and implementation arrangements, and their respective contributions to the PDO will be measured separately. The project, however, will provide interim reports on the results achieved through parallel financing, for which GEF funding will create an enabling environment. The projected parallel financing, presented in table 2, represents public sector investments and on-lending (to private producers), which is expected to have multiplier effects and generate a significant private sector investment response.

[49] Brazil, Burundi, China, Colombia, Cote d'Ivoire, Ethiopia, Ghana, Guatemala, Guinea, India, Indonesia, Kazakhstan, Kenya, Liberia, Malaysia, Mexico, Nicaragua, Nigeria, Papua New Guinea, Paraguay, Peru, Tanzania, Thailand, Uganda, Ukraine, Uzbekistan, and Vietnam.

Table 2: Sources of Parallel Financing for the Vertentes Project[50]

Source of parallel financing		Amount (US$) and Financing Type	Main purpose of parallel financing
GoB	MAPA's ABC Program	100,000,000 Loan investment mobilized	This subsidized credit line for sustainable agricultural investment is available for targeted municipalities and is an important financial instrument enabling rural producers to adopt low-carbon agricultural practices.
GoB	Ministry of Infrastructure	63,400,000 Investment mobilized	The Ministry of Infrastructure finances agrologistic investments in project-targeted areas.
Donor Agency	Integrated Landscape Management in the Cerrado Biome Project (P164602) under implementation	5,000,000 Grant investment mobilized	The FIP project supports livestock producers located in targeted watersheds in the Cerrado biome to strengthen the adoption of environmental conservation and restoration practices, and low-carbon emission agricultural practices.
GoB	Ministry of Agriculture, Livestock and Food Supply (MAPA)	800,000 Recurrent expenditures	MAPA's public investment contribution (2 specialists – part time (20%) and travel expenses)
GoB	Ministry of Environment (MMA)	1,000,000 Recurrent expenditures	MMA's public investment contribution (3 specialists – part time (20%) and travel expenses)
Civil Society Organization	National Rural Learning Services (SENAR)	800,000 Recurrent expenditures	SENAR Central and regional offices' private investment contribution (staffing, renting, information systems)
Total parallel financing:	**US$ 171,000,000**		

E. Lessons Learned and Reflected in Project Design

52. **The project design has benefited from the Bank's and the GoB's experience with similar projects in Brazil and**

[50] The ABC Program (Low Carbon Agriculture) is a GoB credit line available for producers based on the following programming directions: Recovery of Degraded Pastures; Crop-Livestock-Forest Integration (ILPF) and Agroforestry Systems (SAFs); No-Tillage System (SPD); Biological Nitrogen Fixation (BNF); and Planted Forests. Direct beneficiaries of the Vertentes Project are expected to have access to blended finance, including the ABC credit line, in order to achieve environmental compliance, as well as productivity gains. The project technical assistance will allow producers to better prepare financing proposals for the ABC Program.

globally. The Brazilian government has invested in several programs to support the implementation of the ABC Plan, the Forest Code, and the National Policy to Combat Desertification with the objective of promoting sustainable land use and forest management improvements in the Cerrado. The key baseline programs are under the Brazil Investment Plan (BIP), endorsed by the Forest Investment Program (FIP) and managed by the World Bank and the Brazil Cerrado Climate Change Mitigation Trust Fund. The main lessons to guide the design of the proposed project are:

53. **Leveraging of existing, relevant information and analytics, including both landscape mapping and stakeholder mapping, is key to advancing this complex agenda.** Previous experiences have shown that before initiating project interventions and investments, it is important to understand the specificities of selected landscapes in terms of local stakeholders and political configurations, socioeconomic and environmental conditions, policy performance, and agricultural production and commercialization interactions. The Vertentes Project will benefit from existing land-use planning and mapping baselines already established in the SICAR, which identifies the number and area of rural properties and legal reserve native vegetation deficits, so as to focus and scale up land recovery activities; and in the ABC Program, which indicates lending and investment levels in sustainable agricultural practices. The project will also invest in key complementary studies to develop a deeper understanding of selected value-chain interactions and environmental and biodiversity risks.

54. **Designing implementation arrangements to leverage experienced non-government agencies has proven beneficial.** Past projects that were developed through contracts signed with the state and other government agencies have demonstrated the advantages of directly implementing relevant activities through non-government agencies. This approach eliminates the need and cost of further layers of project implementation bureaucracy and implementation support. In addition, some proposed projects will collaborate with ongoing Bank projects, facilitating government and Bank monitoring and evaluation, and ensuring a more efficient use of GEF grants, as well as more effective investment in the generation of global benefits.

55. **Ensuring adequate levels and appropriate timing of stakeholder participation are key to gaining acceptance of program activities**. Landholders' initial reluctance can be overcome by clearly communicating the "whys", "hows" and "whats," explaining the benefits as well as potential negative consequences of not registering, and by dispelling clearly unfounded fears. It was important to clarify that the CAR does not interfere with property or land-use rights. The positive involvement of unions or associations representing the target populations in the CAR was essential to obtain acceptance by family landholders.

56. **Institutional strengthening is an integral part of building long-term capacity for climate change actions**. The experience gained in managing the Cerrado Program and in coordination actions across administrative levels can serve as building blocks for an expansion of these activities and a refinement of climate change actions in the Cerrado region. This also means that institutional strengthening should be readily supported by investment in human and material resources.

57. **Using adaptive management approaches is important for effective project implementation**. Past experiences have shown that adaptive management approaches are essential for a program both to overcome unexpected challenges and take advantage of unforeseen opportunities. When an original plan turns out not to be viable, flexibility in choosing and implementing an alternative approach rather than insisting on the original plan can yield positive results. Looking forward, applying this lesson will be critical in a scenario of project implementation during the COVID-19 pandemic.

F. Legal, Environment, Social

Legal Operational Policies	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

Summary of Assessment of Environmental and Social Risks and Impacts

The overall environmental and social risks of the project are considered Moderate. The proposed project intends to increase the environmental sustainability of cattle ranching and soybean production in the Cerrado, by promoting the recovery of degraded pastures, adoption of low-carbon agricultural practices, and the protection and reforestation of natural habitats within rural properties. The supported environmentally-friendly practices for soybean and beef cattle production still keep the use of significant amounts of agricultural chemicals, which inadequate or excessive use represents the most relevant environmental risk of the Project. Social risks are related to stakeholder participation, ensuring that female producers are not left behind and ensuring that the needs of disadvantaged and vulnerable social groups are not excluded from the benefits of the project.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

58. The Ministry of the Environment (*Ministério do Meio Ambiente*—MMA), and the Ministry of Agriculture, Livestock and Food Supply (*Ministério da Agricultura, Pecuária e Abastecimento*—MAPA) have the policy-level responsibility for carrying out the overall institutional coordination required to implement project activities. MAPA and the MMA have appointed *Serviço National de Aprendizagem Rural*—SENAR to manage grant resources. To this end, SENAR will sign a grant agreement with the World Bank to conduct project implementation activities. This agreement will set forth the specific terms and conditions for grant management and include the following responsibilities: procuring goods and contracting services needed for project execution with grant resources; conducting disbursements and the project's financial execution and accounting; and providing technical support to carry out project activities. The institutional arrangement will also be expanded and reinforced during the project implementation through partnerships and with other relevant projects and initiatives, depending on demands.

59. The implementation of the Vertentes Project will be carried out under the joint responsibility of SENAR,[51] the MMA, and MAPA through technical cooperation agreements to formalize individual responsibilities. SENAR will be the Grant

[51] SENAR has twenty-five years of experience in planning, carrying out and supervising projects and programs aimed at the training and education of rural professionals in Brazil, including both large and small producers, and extension and technical assistance staff. The agency has highly qualified staff in the fields of project planning, agronomy, training, technical assistance, financial administration and procurement. Its annual budget is currently about US$230 million. SENAR works under high standards of governance and under close scrutiny of auditors.

Recipient and Implementing Agency. The roles and responsibilities of SENAR, MAPA and the MMA will be detailed in the Project Operational Manual (POM) and aligned and coordinated by a Project Implementation Unit (PIU). A full description of institutional and implementation arrangements is provided in Annex 1.

60. **MMA and MAPA**. MAPA will provide general strategic project support, as well as supervision and coordination of stakeholders under Component 1. MAPA will also coordinate with the ABC Plan state management groups, which comprise state agriculture agencies and other relevant agriculture sector representatives. The MMA will provide technical leadership to supervise the field implementation of the project's socioenvironmental dimensions, in particular procurement and contracting for Component 3, and its links with other project components. In addition, the MMA will coordinate state and municipal environment bodies, hydrographic basin committees, and other relevant institutions and partners at all levels to compose and participate in the Regional Consortia.

61. **SENAR**. The National Rural Learning Service—SENAR, a private institution under the Brazilian Confederation of Agriculture and Livestock (*Confederação da Agricultura e Pecuária do Brasil*—CNA) will be responsible for overall rural extension activities and direct relationships with farmers and producers' organizations. The **SENAR Central Office** will be responsible for project financial management, procurement, implementation and monitoring of social and environmental safeguard instruments, disbursements, accounting, and dissemination of project results together with its regional offices. The **SENAR regional offices** are independent legal entities that will support the implementation of all project components.

62. **PIU**. The PIU will be established through a technical cooperation agreement, and will be composed of MMA, MAPA and SENAR representatives. The PIU will be responsible for: (i) determining the overall implementation strategy and changes thereof; (ii) reviewing and approving the POM; (iii) reviewing and agreeing annual project implementation plans and budgets; (iv) producing project progress reports, including for parallel project cofinancing; (v) coordinating different project actors; and (vi) carrying out project M&E. The PIU will be the Bank's main liaison during project implementation.

B. Results Monitoring and Evaluation

63. The PIU will have the overall responsibility for managing project data collection, monitoring and evaluation (M&E), including: (i) consolidating, coordinating and supervising project implementation; (ii) planning and monitoring activities to be financed by the project; (iii) monitoring, evaluating, and, as necessary, updating performance against the project objectives and targets set out Section VII (Results and Monitoring Framework—RF); and (iv) supervising overall project resources, as well as the execution of project activities.

64. This M&E responsibility also includes preparing and submitting progress reports at the end of each semester (biannually). A Results and Monitoring Framework has been fully developed to provide specificity in terms of indicators, data-collection methodology, reporting responsibilities, and frequency of M&E activities. For reporting consistency, the project has aligned the RF with GEF core indicators.

65. **M&E instruments and tools.** For M&E technical purposes, the project will employ a set of instruments, namely: (i) the Results and Monitoring Framework (RF) and other technical and fiduciary reports; (ii) the Annual Operational Plan; (iii) tools for monitoring GEF core indicators, including EX-ACT for carbon emissions (CO_2); (iv) the Technical and Management Support System (SISATeG —*Sistema de Assistência Técnica e Gerencial*), which will be used to develop relevant sustainability indicators; and (v) environmental and social risk management related systems. These instruments will generate specific reports and will be reviewed by the WB during implementation support missions and field visits, as well by annual external financial audits. The Bank and the PIU will carry out a mid-term review, due to

take place when grant disbursement levels reach 50 percent of total grant proceeds, or when half of the execution period has elapsed, whichever occurs first. This mid-term review will analyze progress toward the PDO and results indicators, and will allow for methodological adjustments, if warranted. The PIU will carry out a final evaluation under agreed terms of reference.

66. The project will adopt a multi-scale M&E approach at landscape and landholding levels. At landscape level, the project will map, through studies to be carried out under Component 1 and Component 3, key landscape characteristics and conditions, such as: socioeconomic data of potential beneficiaries, agricultural production and productivity conditions, environmental and biodiversity conditions, identification of degraded areas, and identification of relevant landscape stakeholders. At landholding level, SENAR technical supervisors, in collaboration with field technicians, will collect monthly data on overall performance and activities on social and environmental safeguard compliance, and will visit participants on field days. These data will provide up-to-date information on producers' adoption of practices, issues that may arise, and solutions that need to be identified.

67. During technical assistance activities, teams will collect data on economic indicators (farm income, profitability and productivity), environmental indicators (biodiversity, animal welfare, water use, and soil health) and social indicators (disaggregated by gender, where appropriate). Field technicians will assist with data collection. SENAR will have primary responsibility for tracking progress related to data collection and reporting.

68. The PIU will also systematically monitor the project's parallel financing, and report to the GEF during the project mid-term review and final evaluation. These activities will include an M&E expert, responsible for following all project M&E activities, and an environmental and social risk management specialist.

69. For the purposes of M&E, the World Bank is supporting SENAR with training on the use of novel platforms that enhance project monitoring and evaluation in multiple ways, including the Geo-Enabling Initiative for Monitoring & Supervision (GEMS), and online procurement solutions (OPS).

C. Sustainability

70. The Vertentes Project is central to the GoB´s efforts to promote sustainable land use and forest management improvements in the Cerrado. The project's approach and outcomes contribute to Brazil´s rural development while advancing on its social and environmental agendas and international commitments on desertification reduction, climate change, biodiversity conservation, and post-COVID-19 recovery. The project's design incorporates several elements of technical and financial sustainability:

    a. **Capacity building for relevant stakeholders.** Long-term sustainability will rely on human capital development (adequate capacity building and technical assistance). The project will generate evidence and inform state and national policies to support the scaling up of sustainable beef cattle and soybean production practices;
    b. **TA and training for sustainable production practices for local beef cattle and soybean producers** will support the incorporation of climate-smart agriculture-related technologies and practices, based on the assessment of on-farm agroclimatic vulnerabilities at the pre-investment stage;
    c. **Facilitating access to markets and sustainability certifications for rural producers** will enable the long-term sustainability of proposed project actions improving local farmer livelihoods;
    d. **Enhanced coordination on landscape interventions** will enable long-term sustainability by creating lasting partnerships among federal, state and local institutions;
    e. **Knowledge generation and management** will contribute to replication of project actions and results and

inform government policy and program activities in soybean and beef cattle value chains;

f. **Strong monitoring and evaluation systems** will help to verify results related to land-degradation restoration, biodiversity and GHG emissions. Strong monitoring and solid results can provide scaling-up opportunities at national level; support reporting on global commitments, such as the UNCDD; and potentially grant access to green finance and/or carbon markets, among others.

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis

71. **Technical analysis.** The technical quality of the interventions will be ensured through the following: (i) Component 1: the strengthening of local consortia will be based on a strong participatory process, finance-identification studies for each productive landscape, strong training and capacity building actions aimed at stakeholders, and constant validation of action plans. The implementation of Component 1 activities will require intensive support during the first two years to ensure the development and functioning of SLM action plans, as they are crucial starting points for landscape investment under Component 2 and Component 3; (ii) Component 2: there will be emphasis on the recruitment and adequate training of field supervisors and technicians to ensure the quality of knowledge provision (training and technical assistance), and on the mobilization strategy to encourage the participation of targeted beneficiaries; (iii) Component 3: activities will be focused on the selection process and on the quality and progress of native vegetation and degraded crop/pasture land recovery activities, as well as on mapping and monitoring key biodiversity species; and (iv) Component 4: project activities will ensure a functioning information system and M&E strategy, an active communication and knowledge management system, and the quality of bidding documents, terms of reference (ToR), evaluation reports, and products delivered by partners and consultants.

72. Moreover, the agricultural practices supported by the project have been widely studied, and have proven to deliver economic and environmental benefits. Integrated crop-livestock-forestry systems[52] (known as ILPF) consist in the diversification and integration of agriculture, livestock, and forestry systems within the same area through intercropping, succession, or rotation. ILPF systems can be adopted in four modes of integration: (i) crops and livestock (agropastoral); (ii) livestock and forestry (silvopastoral); (iii) crops and forestry (silvoagricultural, or agroforestry); and (iv) crops, livestock, and forestry (agrosilvopastoral). These combinations are proven by scientific data to increase farm productivity, reduce pressure for conversion of native forest areas, and reduce GHG emissions. The technology also improves soil and water quality, reduces diseases and weeds, and lowers methane emissions per kilogram of meat. In addition, ILPF systems provide income generation opportunities throughout the year on the same property. The technology has a low but growing application rate on approximately 2 million ha in Brazil. No-tillage (or no-till) is a complex farming system in which seeds are directly deposited into untilled soil, which has retained previous crop residues as mulch and permanent soil cover, while reducing time intervals between crops. Special no-till seeding equipment is needed. Adequate weed management is essential, in particular during the first years. Farmers control weed using herbicides and adopting crop rotations. Some environmental positive effects, such as erosion control, water quality improvement, increased water infiltration and increased soil carbon sequestration, occur only after several years of continuous, uninterrupted application. Adoption is limited, however, due to increased farm management complexity, the initial cost of seeding machinery, and the annual cost of herbicides. Degraded pasture recovery practices are able to reverse pasture degradation processes, which are evolutionary losses of forage yield that culminate in soil degradation.

[52] https://www.embrapa.br/en/tema-integracao-lavoura-pecuaria-floresta-ilpf.

Pastures degrade because of inadequate choices of forage species, lack of maintenance fertilization, and grazing intensity. When degraded, pastures must be recovered (with same forage) or renewed (replacing forage). Pasture recovery or renewal can reduce GHG emissions per animal by 15 percent, while more intensive livestock production techniques may reduce them by up to 85 percent.

73. **Incremental cost analysis and GEF role.** The global benefits of the project will be: (a) increased biodiversity conservation and sustainable use of globally relevant species and hotspots; (b) reducing pressure on biological resources; (c) transition to more long-term livelihoods by supporting the sustainable use of the productive landscape and the involvement of farmers; (d) contribution to long-term reductions in deforestation and ecosystem depletion; (e) contribution to global UNCCD and CBD targets; (f) land restored; (g) landscapes under improved practices to benefit biodiversity and SLM; (h) GHG emissions reduced/avoided; and (i) increased productivity and income generation. Knowledge sharing will facilitate future projects around the world, especially with critical biodiversity spots. Additionally, the dissemination of lessons learned from the design will encourage the use of similar approaches in other globally relevant hotspots.

74. Brazil is strategically positioned to contribute to the transformational change proposed by the FOLUR IP by: (a) promoting sustainable food systems for soybean and beef cattle value chains, and catalyzing investment opportunities to scale up production models with environmental and social benefits; (b) promoting low-carbon commodities by facilitating access to market mechanisms and protocols for the sustainable production of soybeans and beef cattle, as well as other food systems, and implementing a socioenvironmental business model recognized by the market; (c) promoting the legal conservation of natural ecosystems on private lands; and (d) restoring degraded lands by providing technical assistance, training and financial support to producers as a way to conserving and improving natural habitats. This will be framed within a sustainable land management (SLM) approach with the necessary institutional and governance capacities, and land-use planning tools to enable implementation. Multiple environmental benefits are expected to result from implementing this strategy in selected productive landscapes, such as: increased productivity on anthropized crop and pasture lands; reduced land degradation; increased carbon sequestration and lower GHG emissions; and improved habitat for key biodiversity species.

75. The without-GEF-project scenario would not adequately address the conservation challenges in the selected areas, and would likely fail to catalyze the necessary support from the private sector. With no GEF resources, the activities of this project would not be leveraged to support project coordination, stakeholders dialogue, or monitoring and evaluation. In this 'business-as usual' (BAU) scenario, there would thus be less mitigation of the limited protection and marked pressure from agricultural expansion that is currently projected to drive 31–34 percent of the remaining Cerrado to be cleared by 2050.[53] This projected deforestation is estimated to drive approximately 480 endemic plant species to extinction, or over three times all documented plant extinction since the year 1500.[54] Such global and local biodiversity losses may potentially change the functioning of ecosystems and their ability to provide services to local and regional communities; this will have profound consequences for both biodiversity and agribusiness in Brazil. The anticipated land conversion is estimated to emit up to 8.5 petagrams of CO_2 equivalent, or over 2.5 times all the emission reductions achieved in the Amazon between 2005 and 2013. In addition, under the BAU scenario, each producer and local stakeholder would be working separately, leading to uncoordinated and disperse results at the landscape level. This could translate into significantly higher global and regional costs in terms of biodiversity loss, land degradation, and disappearance of natural vegetation over the next 30–50 years.

76. The *with-GEF-project* alternative will ensure greater protection of endangered biodiversity of global importance in the

[53] Soares-Filho et al. 2016. Brazil's Market for Trading Forest Certificates. PLoS ONE.
[54] Strassburg et al. 2017. Moment of truth for the Cerrado hotspot. Nature Ecology & Evolution.

selected areas, and leverage financing linked to investment in sustainable agriculture practices and natural vegetation recovery. This will ensure that globally significant biodiversity is maintained through the promotion of sustainable use of natural resources, thereby greatly contributing to reducing biodiversity loss while improving the quality of life of the population living in the selected landscapes.

77. Regarding the potential of replication, this innovative approach to promoting conservation in production landscapes through SLM practices is considered more cost-effective than the traditional production approach and can be applied in other areas in Brazil with some adaptations if necessary. Indeed, the implementation of SLM practices through ABC's Program, increased from 245,000 hectares to 485,100 hectares (97.9%). Also, the credit operations increased 36.8% involving a total of R$1.068 billion and the number of contracts increased, from 796 to 1,202 (51%). These data show that after implementing SLM practices, rural producers become motivated to increase the area under those practices, corroborating the potential of replication[55]. Moreover, that potential can also be explained by the fact that innovative landscape management mechanism can enable rural landowners' compliance with the Brazilian Forest Code (by maintaining or recovering their mandatory permanent protected areas), improving biodiversity management through ecological corridors, creating larger landscape fragments, and promoting greater connectivity.

78. **Economic and financial analysis.** The project is expected to finance interventions aimed at improving productivity and spurring local economic growth, while increasing environmental awareness and contributing to the maintenance of local biodiversity through the productive transformation of degraded lands, and through the adoption of more environmentally sustainable practices and the restoration of areas that are environmentally significant to native vegetation. Key expected benefits include improved crop/livestock and land management practices, and the provision of environmental services and carbon sequestration. Benefits will accrue for farmers in the Cerrado through the adoption of selected low-carbon technologies, as well as sustainable land management practices. Benefits would also accrue for targeted catchments through improved ecosystem health and biodiversity, as well as enhanced sustainability of ranching and farming activities.

79. Under Component 1, the project will lay the groundwork for achieving benefits in targeted landscapes by (i) engaging key stakeholders; (ii) building on existing public policies at the landscape level that are currently being implemented in an uncoordinated and fragmented way; and (iii) establishing multidisciplinary coalitions (consortia) and developing Sustainable Land Management Action Plans. Component 2 benefits will focus on on-farm improvements, to be achieved through a training program and a rural technical and managerial assistance strategy focused on select low-carbon agricultural practices.

80. A cash-flow analysis presents *with-project* and *without-project* scenarios for Component 2. Key indicators include net present value (NPV), financial internal rate of return (FIRR), and payback period, and results are shown in table 3. In the *without-project* scenario, the financial internal rate of return (FIRR) is 10.26 percent with a payback period of eleven years; and in the *with-project* scenario, the FIRR stands at 17.35 percent with a payback period of eight years. The result of the incremental net benefits yields a 26.57-percent IRR with a payback period of six years. The incremental NPV/ha under improved management is equivalent to R$1,489 (US$298), with the same FIRR.

[55] https://www.gov.br/agricultura/pt-br/assuntos/noticias/areas-financiadas-pelo-programa-agricultura-baixo-carbono-crescem-quase-98-de-julho-a-setembro-deste-ano

Table 3: Financial Analysis Parameters

Indicator	Financial Without Project	Financial With Project	Financial Incremental Net Benefit	Financial Incremental Net Benefit / ha
Internal Rate of Return (IRR, %)	10.26%	17.35%	26.57%	26.57%
Net Present Value (NPV, R$)	11,777,423	602,543,672	563,599,898	1,489
Net Present Value (NPV, US$)	2,355,485	120,508,734	112,719,980	298
Payback (years)	11	8	6	6

81. Expected economic benefits from Component 3 are generated through the adoption of forest conservation and restoration practices (environmental compliance, soil and water conservation, and so on) in areas with highly intensified agriculture and pasture lands that are associated with erosion, negative environmental impacts on major freshwater-producing basins, and important endemic species. Economic benefits in terms of US$/ha/year were estimated based on a literature review, and assuming a *without-project* scenario where ecosystems are providing only 30 percent of their potential services, and a *with-project* scenario where ecosystems have recovered their capacity through project interventions, and could provide at least 80 percent of such benefits. Finally, the project's greenhouse gas (GHG) emission incremental analysis used the EX-ACT tool, applying higher and lower carbon prices (HCP/LCP)[56] to estimate the economic benefits of reduced GHG emissions. After 20 years, GHG mitigation benefits are estimated to reach a reduction of 19,822,929 tCO2e (see Annex 4).

82. The economic analysis shows that the project is an economically viable investment (table 4). The Economic Net Present Value (ENPV) of the net benefit stream, discounted at 9 percent, is R$854 million (US$171 million) producing an Economic Internal Rate of Return (EIRR) of 25.56 percent for the base scenario. When adding expected benefits from environmental services provided by the restoration of various productive landscapes, the resulting ENPV is R$1,124 million (US$225 million), with an EIRR of 31.47 percent.

Table 4: Economic Analysis Parameters

Indicator	Economic Incremental Net Benefit Vertentes ABC	Economic Incremental Net Benefit Vertentes ABC + ESS	Economic Incremental Net Benefit Vertentes ABC + ESS + LCP	Economic Incremental Net Benefit Vertentes ABC + ESS + HCP
Economic Internal Rate of Return (EIRR, %)	25.56%	31.47%	35.71%	67.27%
Economic Net Present Value (ENPV, R$ 1.000)	854,194	1,124,676	1,326,000	2,735,270
Economic Net Present Value (ENPV, US$ 1.000)	170,839	224,935	265,200	547,054

83. Under the HCP scenario, the economic rate of return (EIRR) for the entire project is 67.27 percent, and the economic net present value (ENPV) is approximately R$2,735 million (US$547 million). Under the LCP scenario, the EIRR is 35.71 percent and the ENPV is approximately R$1,326 million (US$265 million).

84. The robustness of these indicators was tested with a sensitivity analysis that resulted in a switching value for cost increments of 170 percent; 225 percent with ESS benefits; and 279 percent and 659 percent under LCP and HCP scenarios, respectively. The switching value for a reduction of benefits was estimated at −61 percent in the baseline

[56] In 2019, the Green Clime Fund (GCF) approved the FP100: REDD-PLUS results-based payments for results achieved by Brazil in the Amazon biome in 2014 and 2015. In this Results-based Payment Project, the GCF applies an economic carbon price of USD 5 per tCO2e. Reduced emissions from Vertentes could be actually included in a Results-based Payment Project; therefore, the GCF carbon price (CP) is considered to estimate the Low Carbon Price Scenario. The WB 2017 'Guidance note on shadow price of carbon in economic analysis' provides economic values for a low carbon price and a high carbon price. Given that the GCF CP is applied to estimate the LCP scenario, and that the highest range of economic value will hardly be applicable to a results-based payment initiative, the assessment takes into account the WB 2017 SPC 'LCP' as the Vertentes HCP scenario. If the actual WB SCP HCP values are applied to the analysis, the EIRR would be 102.61 and ENPV USD 867.95 million.

scenario (only farm-level benefits); −69 percent with ESS benefits; and −74 percent and −89 percent when including CO_2 benefits valued at LCP and HCP, respectively. This strongly suggest that the project represents an economically worthwhile investment.

B. Fiduciary

Financial Management

85. A Financial Management Assessment (FMA) was carried out for the project in accordance with Bank Policy: Investment Project Financing; Bank Directive: Investment Project Financing; and the Financial Management Manual for World-Bank-Financed Investment Operations (effective as of March 1, 2010, and revised on February 10, 2017). The goal was to determine whether SENAR has acceptable financial management (FM) arrangements in place to adequately control, manage, account for, and report on project resources and expenditures, and that these are subject to auditing arrangements acceptable to the Bank.

86. The scope of the FMA included: (i) an evaluation of existing FM systems to be used for project monitoring, accounting and reporting; (ii) a review of staffing arrangements; (iii) a review of fund-flow arrangements and disbursement methods to be used; (iv) a review of internal control mechanisms in place, including internal audits; (v) a discussion on reporting requirements, including the format and content of unaudited interim financial reports (IFRs); and (vi) a review of external audit arrangements.

87. The overall conclusion of the FMA is that: (i) existing FM arrangements are considered adequate for the project; (ii) fund-flow, disbursement, monitoring, auditing and implementation support arrangements have been designed in a way to respond to project implementation arrangements; and (iii) residual FM risks associated with the project are rated as **Low**. There are no FM-related conditions for negotiations, Board presentation and/or effectiveness.

88. The FMA identified the following risk to the achievement of the Project Development Objective: the close coordination that will be required between SENAR and other implementing partners to timely implement project activities, which will be mitigated by close Bank implementation support.

Procurement

89. Procurement will be carried out in accordance with the Bank's Procurement Regulations for IPF Borrowers dated July 2016, and revised in November 2020. The Bank has assessed Brazil's system for national open competitive procurement and confirmed it meets the requirement of para. 5.4 of the Procurement Regulations, under conditions specified in Annex 3.

90. The procurement policy framework, regulation, and procedures are well documented and publicly available and are designed to meet the core procurement principles of value for money, economy, efficiency, effectiveness, integrity, transparency, fairness, and accountability. SENAR's staff have experience in the implementation of Bank operations following Bank procedures. Training on the new procurement framework was arranged under other Bank-funded projects that SENAR is implementing, and no additional training is required.

91. The proposed project procurement risk is **Moderate**. The capacity assessment revealed that the procurement policy framework, regulation, procedures and documents in use at the agency are documented and publicly available, and are designed to meet the core procurement principles of value for money, economy, efficiency, effectiveness, integrity,

transparency, fairness, and accountability. SENAR produces and adequately maintains written records of all procurement and contract documents, and its complaint-handling system works well and effectively. SENAR is not impacted by fraud and corruption risks. The procurement methods chosen are appropriate and consistent with the legal framework. Clear procurement documents proportionate to the need are used to encourage broad participation. Procedures for bid submission, receipt and opening are clearly described in the procurement documents and are well complied with. Bid evaluation is based on contract-awarding and other criteria stated in the procurement documents. Procurement notices and contract awards are announced as prescribed. The agencies and the market have a good track record of managing environmental, social, and health & safety risks, including preventing sexual exploitation, rape and assault throughout the procurement process. There is a clearly identified target market for all procurements. The target market for the procurements is competitive and views the agencies as attractive. There are no restrictions to open competition in the market.

92. The Bank will carry out post procurement reviews on an annual basis with an initial sampling rate commensurate with the risk rating of the project. This rate will be adjusted periodically during project implementation based on the agencies' performance. The Bank will also carry out procurement support missions on a semiannual basis. SENAR shall upload all procurement and contract information in the Systematic Tracking of Exchanges in Procurement (STEP) system, which will be used to provide the World Bank with a consolidated list of all contracts for goods, works, and consultancy services awarded under the project. A sample post-review contract will be selected from STEP.

93. Detailed procurement documentation may be referenced as such and made available in the project files and the operations portal. The detailed 18-month procurement plan, once agreed with the Borrower, is published on the World Bank website. For more information, please refer to the World Bank Procurement Regulations for Borrowers.

94. Integrated fiduciary risk rating: the integrated fiduciary risk rating is **Moderate**.

C. Legal Operational Policies

	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

D. Environmental and Social

95. The screening of the environmental and social risks and impacts of the proposed list of activities agreed with the Client indicates that this is currently considered a moderate-risk project under the Bank's Environmental and Social Framework, where both environmental and social risks are **Moderate**. The following standards were found relevant during project preparation: ESS1—Assessment and Management of Environmental and Social Risks and Impacts; ESS2—Labor and Working Conditions; ESS3—Resource and Efficiency and Pollution Prevention and Management; ESS4—Community Health and Safety; ESS6—Biodiversity Conservation and Sustainable Management of Living Natural Resources; ESS7—Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities; ESS8—Cultural Heritage; and ESS10—Stakeholder Engagement and Information Disclosure. A detailed analysis of the

relevance of each applicable ESS is presented in the project's Environmental and Social Risk Summary. The Client carried out an environmental and social assessment and is currently finalizing the first version of an Environmental and Social Management Framework—ESMF, Stakeholder Engagement Plan—SEP and Labor Management Procedures—LMP. The ESMF, SEP and LMP will be consulted prior to the appraisal. An Environmental and Social Commitment Plan is being prepared in collaboration with the Client, and will be completed before appraisal.

96. **Environmental**. In the Cerrado, medium and large agriculture and cattle production are the main drivers of land-use change. By targeting these production chains and property sizes, the project intends to maximize the environmental benefits of promoting the protection and recovery of APPs and RPPNs; recovery of degraded soil and containment of land degradation processes, reforestation, degraded pasture recovery; and reduction in the environmental impacts of agricultural activities. If successful in engaging the active participation of these private-sector actors, the project should contribute to reducing land degradation, increasing landscape connectivity in the highly impacted Cerrado biome, and decreasing GHG emissions through the adoption of low-carbon production practices. Positive returns from vegetation recovery investments are expected only in the medium term (after 3–4 years), which makes it important for the project to initiate this type of activity early on during implementation, so as to be able to measure meaningful results. Although the environmental focus of the activities is on improving the coexistence of biodiversity and agriculture, restoring degraded lands and landscape connectivity, and promoting low-carbon production practices, the use of chemicals is a relevant issue to consider. Producers targeted by the project usually apply conventional production practices, which involve the use of substantial amounts of chemicals. Although most, or at least some, of the beneficiary producers are likely to continue using chemicals, technical assistance provided under the project will disseminate alternative pest-control methods that are appropriate for medium- and large-scale production, and that may reduce dependence on hazardous chemicals. In addition, the technical assistance will include best practices for the use of agricultural chemicals, as well as for the prevention, control and resolution of other common impacts associated with the targeted beef cattle and soybean chains (erosion, deforestation, land degradation, high water-use levels, and GHG emissions) with a view to increasing the project's environmental benefits. The project will also favor native species for the recovery and enrichment of forest and riparian vegetation in selected properties, and will seek to prevent further deforestation by providing technical assistance and support for obtaining environmentally-friendly-production certification. These measures have been included in the project's ESMF, and are already being incorporated into training events and materials produced during project preparation.

97. **Social**. The project will primarily act within the soy and beef cattle production chains. These chains are responsible for important economic results for the Cerrado region, which generate both positive and negative social impacts, depending on how they advance on the landscape. The greatest social risks that may compromise the achievement of the project's development outcomes include: (a) potential conflicts of interest and views on development among different stakeholders; (b) disregard for the views and concerns of different social groups, in particular the most disadvantaged and vulnerable ones (including indigenous peoples and traditional communities); (c) a potential initial reluctance among farmers to adopt low-carbon/climate-smart technologies, or commit to natural resource restoration practices, as such technologies and practices are not always commercially profitable; and (d) a potential low participation of women due to obstacles created by traditional cultural norms, and a consequent disregard for their views within the proposed consortia. Context-related risks associated with COVID-19 also have to be considered. The project can positively contribute to minimizing and mitigating these risks and adverse social impacts by supporting: (i) a socially inclusive approach for carrying out landscape studies, fostering meaningful consultation with all relevant stakeholders (including traditional communities), and ensuring that all parties that have an interest in environmental protection within the selected landscapes are heard, and that their views are taken into consideration; and (ii) a robust citizens' engagement, communication, outreach and awareness-raising campaign aimed at (a) mobilizing and engaging stakeholders, (b) supporting the SLM approach as part of the creation or strengthening of landscape consortia, (c) promoting innovative

and sustainable on-farm agricultural practices, (d) fostering the adoption of natural habitat recovery practices, and (e) ensuring that women are not left behind. For these outreach and engagement strategies, the project will initially rely on virtual channels and on the adoption of adequate protocols for preventing the spread of COVID-19 as an unwanted outcome of project activities. Farmers may volunteer to pilot on-farm low-carbon agriculture practices and environmental restoration practices, and their selection will take into account their understanding of gender gaps and barriers that might hamper women's participation in landscape consortia. Hence, citizens' engagement, gender action strategy, grievance redress mechanisms, and communication and outreach strategies have been embedded in project design as part of Component 1 and Component 4. Additionally, the Client carried out an Environmental and Social Impact Assessment and prepared an ESMF (including a COVID-19 Mitigation Strategy, and a Gender Action Plan), a Stakeholder Engagement Plan—SEP, and a Traditional Community Consultation Framework (including indigenous peoples).

V. GRIEVANCE REDRESS SERVICES

98. Communities and individuals who believe that they are adversely affected by a project supported by the World Bank may submit complaints to existing project-level grievance mechanisms or the Bank's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the Bank's independent Accountability Mechanism (AM). The AM houses the Inspection Panel, which determines whether harm occurred, or could occur, as a result of Bank non-compliance with its policies and procedures, and the Dispute Resolution Service, which provides communities and borrowers with the opportunity to address complaints through dispute resolution. Complaints may be submitted to the AM at any time after concerns have been brought directly to the attention of Bank Management and after Management has been given an opportunity to respond. For information on how to submit complaints to the Bank's Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the Bank's Accountability Mechanism, please visit https://accountability.worldbank.org.

VI. KEY RISKS

99. The project's overall risk related to the PDO has been defined as **Moderate**. Individual risks are described below:

100. **Political and governance risks are rated as Substantial.** Under the project, the federal government is committed to strengthening and scaling up a SLM approach together with sustainable investments in the Cerrado region. However, the uncertainty around the development of federal environmental policies may affect some federal government priorities, and consequently have an impact on project partnerships and activities. In order to mitigate this risk, the Bank has prioritized due diligence in its contacts with MMA and MAPA representatives during the preparation stage, so as to better understand such impacts. Another relevant risk is related to the November 2020 municipal elections. New municipal administrations (including mayor and municipal secretaries) were not involved in project preparation activities, and may not be supportive of project strategy. As local governments are important stakeholders for the development of comprehensive land-use plans, the PIU shall establish constant dialogue with municipal governments, and will propose meetings with the transition and new management teams with a view to increasing project ownership. In order to mitigate this risk, the key personnel involved in the project will be MMA and MAPA staff, consultants, and SENAR staff, and will most likely not change. Continuity of the proposed activities is foreseeable, even in the event of political changes, because the project seeks the implementation of national and international commitments, and has a strong focus on private landholdings and productivity.

101. **Macroeconomic risks are rated as Moderate.** Brazil is facing a macroeconomic crisis, aggravated by the COVID-19 pandemic. Federal, state and municipal governments have implemented health and social actions to mitigate the effects of the pandemic on vulnerable populational groups and key economic activities. However, the agriculture sector is expected to remain strong due to growing global demand for commodities and favorable exchange rates. Nonetheless, as the evolving COVID-19 scenario is still unclear, the Bank will continue to monitor closely economic trends for the agriculture sector during its implementation support missions and will take proactive measures with the PIU to minimize potential macroeconomic risks on project activities.

102. **Technical design risks are rated as Moderate.** The main technical issues are associated with the fact that SLM and value chain approaches involve the coordination of multiple institutional partners and policies, as well as a participatory process. Moreover, implementing agencies will require additional staff for several activities, such as restoring natural areas and mainstreaming biodiversity. In order to mitigate such risks, project design includes activities aiming to strengthen stakeholder capacities and enhance landscape monitoring capacity. The existing legal framework and government commitment are also mitigating factors. SENAR will recruit long-term consultants in 2021 and 2022.

103. **Institutional implementation capacity and sustainability risks are rated as Moderate.** Although this will be the first ESF project jointly implemented by SENAR, MAPA, and MMA, these entities are familiar with Bank policies and procedures. There is a risk that project implementation may be affected by management complexity, thus compromising the desired quality and compliance with agreed timelines. However, this kind of arrangement has been adopted and used effectively by other GEF projects including with the MMA (for example, Amazon Region Protected Areas Program—ARPA, Brazil's National Biodiversity Program—PROBIO, and the Cerrado Initiative). In these examples, the institutional capacity has been considered appropriate to implement project activities and assure fiduciary compliance. In order to mitigate institutional capacity risks, the project will support capacity building at both national and local levels specifically related to planning and implementing a landscape approach across different stakeholder groups to maximize the effectiveness of existing resource use and contribute to building synergies among implementing institutions, among other factors.

104. **Stakeholder participation risks are rated as Moderate.** Success in achieving lasting integrated and sustainable land management and investment relies on the convergence of interests and priorities of an array of stakeholders, including federal, state, and municipal governments; rural producers and their representative entities; private sector actors; and local communities in general. In order to mitigate stakeholder risks, the project design incorporated (during preparation and in the early stages of implementation) activities to identify, mobilize and engage relevant stakeholders for each selected landscape to jointly discuss and agree upon feasible and win-win nature investments. SENAR has developed protocols on COVID-19 prevention and control to guide project implementation during the pandemic, and protect the health of project teams, stakeholders and people with whom they interact. Such protocols will be incorporated into the POM. Nevertheless, an additional challenge to successful stakeholder engagement is presented by the fact that the pandemic significantly limits face-to-face stakeholder engagement. While it is difficult to predict the situation at the start of project implementation, social distancing measures are likely to remain in place throughout 2021.

105. **Integrated fiduciary risks are rated as Moderate.** Financial management risks are assessed as **Low**, as the proposed implementing agency has prior experience with World Bank projects, and has demonstrated satisfactory performance. Procurement risks are also considered **Moderate**. SENAR produces and adequately maintains written records of all procurement and contracting documents, and its complaint-handling system works well and effectively. The procurement methods chosen are appropriate and consistent with the legal

framework. The integrated fiduciary risk assesses the likelihood and impact of financial management and procurement risks, including governance and anticorruption-related risks. The risk level is considered **Moderate**, as funds are expected to be used for their intended purposes of achieving value for money with integrity, and delivering sustainable development.

106. **Environmental and social risks are rated as Moderate.** The proposed project intends to promote the recovery of environmental targeted areas (degraded APPs and others), the recovery of degraded crop and pasture lands, and a reduction in the environmental impacts of agriculture, mainly through rural extension activities. However, the transformative impacts will only concretize with strong coordination at local productive landscape level, and if private-sector agents (farmers and buyers) are willing to carry out sustainable agricultural and environmental investments. Positive returns from investment are expected only in the medium term (after 3–4 years). Environmental risks are associated with ongoing conventional agricultural practices that make substantial use of agrochemicals for highly technological production. Despite the expected reduction in the use of chemicals and enhanced practices, these are unlikely to be replaced by other pest-management techniques under the project. In order to mitigate this risk, as well as other common risks associated with the targeted beef cattle and soybean chains (erosion, deforestation, land degradation, high water-use levels, and GHG emissions), comprehensive training will be provided to rural technical staff hired by the project, as well as to beneficiary producers—who are expected to adopt more sustainable production practices promoted by the project with support from technical assistance. The main social risks are related to stakeholder participation, and the need to ensure that women are not left behind, and that landscape studies incorporate the views and concerns of all parties that have an interest in environmental protection in the Cerrado—particularly the most disadvantaged and vulnerable social groups (including indigenous peoples and traditional communities). In order to mitigate these risks, the project has developed a strong Stakeholder Engagement Strategy, a Gender Action Plan based on the initial screening of gender gaps and challenges posed to women's agency in rural settings, and a Traditional Community Consultation Framework. Additionally, with a view to mitigating the risk of low private-sector engagement, the project seeks to demonstrate that CSA practices can increase farmers' financial returns, and will provide on-demand technical assistance to rural producers—paying special attention to women farmers—to develop investment proposals to access available credit lines, such as the ABC Program.

107. **Other risks: climate change and severe weather risk are rated as Moderate.** The dynamics of natural Cerrado vegetation is often associated with fire. Fires as a natural phenomenon occur more frequently in the Cerrado, and play a key role in its ecological functioning. Nevertheless, human presence and land-use practices have altered natural fire regimes. Fires set by ranchers to induce pasture regrowth in the dry season often get out of control and spread over wide areas, affecting protected areas, indigenous lands, and remnants of natural vegetation. Anthropogenic climate change may further increase the frequency of fires, not only because of longer dry seasons in some regions, but also due to an increase in extreme drought events. In order to mitigate these risks, the Brazil Investment Plan (BIP) under the Forest Investment Program (FIP) is strengthening information systems that estimate forest-fire risks and GHG emissions; and mapping and monitoring land use to identify land-use changes in Cerrado habitats. In addition, the project design enhances climate resilience by incentivizing climate smart agricultural practices and technologies in financed interventions. This is consistent with the climate and disaster risk screening undertaken for the project.

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VII. RESULTS FRAMEWORK

Results Framework

COUNTRY: Brazil

Sustainable Multiple Use Landscape Consortia in Brazil

Project Development Objectives(s)

To increase the area under sustainable land management in selected beef cattle and soybean landscapes in Brazil and promote the integration of food systems and sustainable landscapes, conservation of biodiversity and recovery of degraded areas.

Project Development Objective Indicators

Indicator Name	PBC	Baseline	End Target
Promote sustainable land management and the adoption of sustainable practices			
Area of landscape under improved practices (Hectare(Ha))		0.00	578,000.00
Area of land restored (Hectare(Ha))		0.00	49,800.00
Greenhouse gas emissions avoided and carbon sequestered (Metric ton)		0.00	19,822,929.00
Conservation of biodiversity			
Area of landscapes under improved management to benefit biodiversity (Hectare(Ha))		0.00	78,000.00

Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	End Target
Component 1. Development and promotion of Sustainable Land Management (SLM) approach			
Consortia created or strengthened by the project (Number)		0.00	9.00
Actors trained and participating in project activities under the scope of the Regional Consortia (Number)		0.00	270.00
Component 2. Promotion of sustainable food production practices and responsible value chains			
Area of landscapes under sustainable land management in production systems (Hectare(Ha))		0.00	500,000.00
Farmers and rural workers who receive information on sustainable agriculture practices (Number)		0.00	2,500.00
Participants in distance education activities receiving information on sustainable agriculture practices (Number)		0.00	5,000.00
Participants attending project events, seminars, field days, and other meetings (Number)		0.00	2,730.00
Component 3. Conservation and restoration of natural habitats and mainstreaming biodiversity			
Area of forest and forest land restored (Hectare(Ha))		0.00	9,800.00
Area of degraded agricultural lands restored (Hectare(Ha))		0.00	40,000.00
Component 4. Project Management and Knowledge Management			

Indicator Name	PBC	Baseline	End Target
Number of direct beneficiaries of project activities (Number)		0.00	10,500.00
Number of direct beneficiaries of project activities - Women (Number)		0.00	3,675.00
Records of knowledge generated by the project on selected platforms (Number)		0.00	25.00
Project knowledge management annual events (Number)		0.00	5.00
Direct beneficiaries satisfied with technical assistance received under the project (Percentage)		0.00	80.00
Environmental and social risk management plan strengthened and adopted by the project (Yes/No)		No	Yes

Monitoring & Evaluation Plan: PDO Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Area of landscape under improved practices		Semi-annual	SENAR ATEG		SENAR
Area of landscapes under improved management to benefit biodiversity		Semi-annual	Field data collection		SENAR in collaboration with contracted technical field consultancy services
Area of land restored		Semi-annual	SENAR ATEG and		SENAR

			consultancy reports		
Greenhouse gas emissions avoided and carbon sequestered	This indicator measures the estimated emissions avoided and carbon sequestered associated with the project activities.	At project preparation, mid-term evaluation, and closing.	SENAR-ATEG		SENAR

Monitoring & Evaluation Plan: Intermediate Results Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Consortia created or strengthened by the project		Semi-annual	SENAR information system	Field monitoring visits	SENAR
Actors trained and participating in project activities under the scope of the Regional Consortia		Semi-annual	SENAR database on participants of Project activities		SENAR
Area of landscapes under sustainable land management in production systems		Semi-annual	SENAR-ATEG		SENAR
Farmers and rural workers who receive information on sustainable agriculture practices		Semi-annual	SENAR database on participants attending the		SENAR

			training sessions		
Participants in distance education activities receiving information on sustainable agriculture practices		Semi-annual	SENAR database on participants of distance education activities		SENAR
Participants attending project events, seminars, field days, and other meetings		Semi-annual	SENAR database on participants attending project events, seminars, field days, and other meetings		SENAR
Area of forest and forest land restored	Selected areas of interest and permanent protection areas recuperated or in the process of recuperation	Semi-annual	Field data collection		SENAR in collaboration with contracted technical field consulting services
Area of degraded agricultural lands restored	Area with soil recovery or in the process of soil recovery	Semi-annual	Field data collection		SENAR in collaboration with contracted technical field consulting services
Number of direct beneficiaries of project activities		Semi-annual	SENAR database on		SENAR

			individuals participating in project activities.		
Number of direct beneficiaries of project activities - Women					
Records of knowledge generated by the project on selected platforms		Semi-annual	SENAR database on consulting services products and training libraries		SENAR
Project knowledge management annual events		Semi-annual	SENAR database on project knowledge management annual events		SENAR
Direct beneficiaries satisfied with technical assistance received under the project	This indicator measures the level of satisfaction of beneficiaries with the agricultural technical assistance received under the project.	Midterm and final evaluation	Survey of a representative sample of beneficiaries, assessed by a third party.		SENAR in collaboration with MMA and MAPA

Environmental and social risk management plan strengthened and adopted by the project					

ANNEX 1. Implementation Arrangements and Support Plan

Implementation Arrangements

1. Implementation of the Vertentes Project will be carried out under the joint responsibility of the National Rural Learning Service (*Serviço National de Aprendizagem Rural*—SENAR),[57] the Ministry of the Environment (*Ministério do Meio Ambiente*—MMA), and the Ministry of Agriculture, Livestock and Food Supply (*Ministério da Agricultura, Pecuária e Abastecimento*—MAPA) through technical cooperation agreements yet to be signed. The roles and responsibilities of SENAR, MAPA, and the MMA will be detailed in the Project Operational Manual (POM). SENAR will be the GEF Grant Recipient and Implementing Agency. SENAR, MAPA, and MMA activities will be aligned and coordinated by the Project Implementation Unit (PIU).

2. The **PIU** will be established through a Technical Cooperation Agreement and composed of MMA, MAPA and SENAR representatives. The PIU will be responsible for: (i) determining the overall implementation strategy and changes thereof; (ii) reviewing and approving the POM; (iii) reviewing and agreeing annual project implementation plans and budgets; and (iv) producing project progress reports, including for parallel project cofinancing. The PIU will also convene annual multistakeholder meetings (consultative fora), including civil society, agribusiness organizations, academia, project beneficiaries, federal, state and municipal government institutions, and other concerned parties, to openly discuss and receive feedback and advice on project strategy and on progress on SLM action plans, as part of the citizens' engagement strategy. The proceedings of each annual meeting will be submitted to the Bank and the GEF Global Knowledge Platform. The PIU will also ensure a wide and permanent public information strategy for the project.

3. **MMA and MAPA**. The MMA and MAPA will have the overarching policy-level responsibility for carrying out the overall institutional coordination required to implement the proposed project activities. MAPA will provide general strategic project support, as well as supervision and coordination of stakeholders under Component 1. MAPA will also coordinate with the ABC Plan state management groups, which comprise state agriculture agencies and other relevant agriculture sector representatives. The MMA will provide technical leadership to supervise the field implementation of the project's socioenvironmental dimensions, in particular procurement and contracting for Component 3, and its links with other project components. In addition, the MMA will coordinate state and municipal environment bodies, hydrographic basin committees, and other relevant institutions and partners at all levels to compose and participate in the Regional Consortia.

4. **SENAR**, a private institution under the Brazilian Confederation of Agriculture and Livestock (*Confederação da Agricultura e Pecuária do Brasil*—CNA), will be the Grant Recipient. It will be responsible for overall rural extension activities and direct relationships with farmers and producers' organizations. Its project management team will include a general manager, a technical manager, an administrative manager and support staff, as well as ad hoc advisory, management and specialized services. It will implement the project through its central and regional offices in accordance with the POM and in a manner satisfactory to the World Bank. The **SENAR Central Office** will be responsible for project financial management, procurement, implementation and monitoring of social and environmental safeguard instruments, disbursements, accounting, and dissemination of project results together with its regional offices. SENAR regional offices

[57] SENAR has twenty-five years of experience in planning, carrying out and supervising projects and programs aimed at the training and education of rural professionals in Brazil, including both large and small producers, and extension and technical assistance staff. The agency has highly qualified staff in the fields of project planning, agronomy, training, technical assistance, financial administration and procurement. Its annual budget is currently about US$230 million. SENAR works under high standards of governance and under close scrutiny of auditors.

(in the states of Bahia, Goiás, Mato Grosso, Mato Grosso do Sul, and Minas Gerais, and in the Federal District) are independent legal entities that will support the implementation of all project components. To this end, SENAR will finance a project management and administration team using its own resources and part of the grant. The team will include a general project coordinator, a technical coordinator, an administrative coordinator, a procurement coordinator, a safeguards coordinator, a monitoring coordinator, a technical adviser, a legal adviser, and a communication adviser.

Table 1: Description of SENAR's Responsibilities and Support for the Project*

Occupation	Responsibility	Dedication to the project	Financing source
General coordinator	General project and coordination management.	30%	SENAR
Technical coordinator	Coordination of implementation with partner entities, SENAR regional offices, and field activities.	80%	Project
Administrative coordinator	Responsibility for the financial flow, including requests for disbursements, accountability, preparation of SOEs and IFRs.	50%	SENAR
Procurement coordinator	Responsibility for the preparation and implementation of the project procurement plan.	30%	SENAR
Safeguards coordinator	Responsibility for the execution and supervision of the project's social and environmental standards plan.	50%	SENAR
Monitoring and evaluation coordinator	Planning and supervision of monitoring and evaluation strategies throughout implementation.	50%	SENAR
Technical adviser	Support for technical coordination with partner entities during implementation and in the field.	20%	SENAR
Legal adviser	Support to general coordination with legal support in execution and processes.	50%	SENAR
Communication adviser	Responsibility for the proposal and execution of the communication plan throughout implementation.	100%	Project

* It should be noted that part of SENAR's designated team is also active in the implementation of Project P164602—FIP Rural Landscapes, thus ensuring greater qualification and experience, including lessons learned benefiting both implementations.

5. **SENAR regional offices** (in the states of Bahia, Goiás, Mato Grosso, Mato Grosso do Sul, and Minas Gerais, and in the Federal District) are independent legal entities that will support the implementation of all project components. Regional office activities, including delivering training, providing technical assistance, and engaging with beneficiaries, will be specified in action plans specifically designed for the project under "Declarations of Compliance" (containing targets and products) agreed with the SENAR Central Office. Operating expenses such as consumables, catering for events and daily expenditures will be made and justified by the SENAR regional offices and reimbursed by the SENAR Central Office. Each regional office will have a team composed of a regional technical manager, an administrative manager, and consultants hired to assist in the implementation of the project, such as project managers and local facilitators.

6. The project will rely on several groups of important stakeholders to support implementation:

   - ***Farmers unions***. SENAR will celebrate formal technical cooperation agreements with farmers unions, through which farmers will assist SENAR's regional offices in identifying relevant local actors and support the dissemination strategy to attract the interest of rural producers in participating in project activities at municipal level. These actions are designed to raise awareness and mobilize rural producers, as well as stimulate stakeholder

engagement in local events and interventions proposed throughout the project.

- ***Private sector professionals for training actions***. Relying on its existing private sector network, SENAR will recruit field professionals from each state to serve as technical supervisors, and support training and technical assistance activities. Technical supervisors' main task will be to act as mentors for field technicians, with each technical supervisor managing all field technicians working in their respective state. Field technicians will be agriculture professionals with technical or higher training in agricultural and environmental sciences. They will provide technical assistance services, regularly collect data for selected rural properties, and deliver training as requested by groups of farmers. These activities will be coordinated by SENAR in each state.

- ***Private sector professionals for individual consulting***. In addition, Master Consultants—or professionals with expertise in specific technical themes—will assist in the field and support technical training programs.

7. **Project Operational Manual (POM).** SENAR will implement the project in accordance with a Project Operational Manual, which will include standard rules, methods, guidelines, documents and procedures for the project, including: (i) detailed descriptions of project activities and institutional arrangements; (ii) administrative, accounting, auditing, financial reporting, acquisition and disbursement procedures; (iii) monitoring indicators; (iv) evaluation strategy; and (e) the Environmental and Social Management Framework, including guidelines for the adoption of an integrated pest management approach in all applicable activities to be developed within the scope of the project.

Implementation Support Plan

8. **The WB office in Brasilia** will be the main source of project support, as it has the technical and administrative expertise related to project scope, fiduciary and safeguard aspects required to follow up on project implementation. Implementation support will be provided through short follow-up technical meetings and semiannual implementation support missions focusing on the following areas:

(a) ***Strategic support.*** Implementation support missions will meet with the PIU and partner representatives to (i) review progress on project activities; (ii) discuss strategic alignment of different project activities with relevant stakeholders, especially at the planning level; and (iii) evaluate progress on crosscutting issues such as M&E (baseline, design and execution of evaluations), training, communication, knowledge exchange, innovation, dissemination of project results and experiences, and coordination among relevant stakeholders.

(b) ***Technical support.*** Implementation support will focus on ensuring the technical quality of interventions. The implementation of Component 1 activities will require intensive support during the first two years to ensure the development and functioning of SLM action plans, as they are crucial starting points for landscape investment under Component 2. Under Component 2, emphasis will be placed on recruiting farmers, providing technical assistance and engaging the private sector, as well as maintaining close coordination with on- and off-farm investments identified under Component 1. For Component 3, implementation support will focus on the selection process and on the quality and progress of native vegetation and degraded crop/pasture land recovery plans financed by the project, as well as on mapping key biodiversity species. Lastly, for all project activities, implementation support will ensure the quality of bidding documents, Terms of Reference (ToR), evaluation reports, construction plans, and products delivered by consultants. Regular site visits will be carried out during implementation, involving technical specialists as needed.

(c) ***Fiduciary support.*** Periodic procurement and FM support will be carried out by the World Bank semiannually or annually to (i) perform desk reviews of project IFRs and audit reports, following up on any issues raised by auditors,

as appropriate; (ii) assess the performance of control systems and arrangements; (iii) update the FM rating in the FM Implementation Support and Status Report, as needed; (iv) provide training and guidance on procurement processes in compliance with the Procurement and Anti-Corruption Guidelines and the POM; (v) review procurement documents and provide timely feedback to the PIU; (vi) carry out the post review of procurement actions; and (vii) help monitor project progress against the Procurement Plan.

(d) ***Safeguard support.*** The coordination work that began during preparation will continue throughout project implementation, especially to ensure that relevant concerns related to safeguards are included in any interventions financed under project components. Due diligence is to be applied, as well as the adoption of site-specific ESMPs, RPFs and IPPFs, and effective mitigation measures. Implementation support from World Bank safeguard specialists will take place at least twice a year.

Table 2: Implementation Support Resource Estimates

Time	Focus	Skills needed	Resource estimates
Year 1	-Refining and finalizing strategic studies and component activities, and ensuring quality of detailed designs; -Management and implementation support to initiate project activities, including technical and procurement review of ToRs and bidding documents; promoting innovation in the project; and baseline collection; -Social and environmental safeguards; -Fiduciary arrangements and FM systems.	-Project management; -Agricultural, environmental, climate change expertise; -Safeguard management; -Fiduciary management; -Monitoring and evaluation.	-2 yearly support missions, one with full Task Team; -Support from country office at the technical, safeguard, and fiduciary levels.
Year 2–4	-Project implementation and mid-term review; -Technical quality (technical review of ToR, technical reports, and bidding documents; technical assistance, capacity, and institutional strengthening efforts); -Safeguards; -Fiduciary (FM review and procurement review and feedback on bidding documents and consultant contracts); -Monitoring and evaluation.	-Project management; -Agricultural, environmental, climate change expertise; -Safeguard management; -Fiduciary management; -Monitoring and evaluation.	-2 yearly support missions, one with full Task Team; - Support from country office at the technical, safeguard, and fiduciary levels.
Year 5	-Completion of interventions and investments; -Monitoring and evaluation; -Final assessment reporting.	-Project management ; -Technical quality; -Monitoring and evaluation.	-2 support missions, one with full Task Team.

Table 3: Skill Mix Requirements

Skill needs for implementation support	Origin	Estimated staff weeks
Task team leaders (2)	HQ and Country-based	8 per year
Agricultural specialists	Country-based and consultancy	5 per year
Environmental specialists	Country-based and consultancy	4 per year

Climate change specialist	Consultancy	3 per year
FM specialist	Country-based	4 per year
Procurement specialist	Country-based	4 per year
Social specialist	Country-based	4 per year
M&E specialists	Consultancy	6 per year
Operations analysts	Country-based	6 per year
Lawyers	Country-based	4 for project lifecycle
Disbursement officers	Country-based	2 per year

ANNEX 2. Detailed Economic and Financial Analysis

Overview

1. This annex presents an incremental analysis of the financial and economic benefits generated by the proposed financing, including key benefit streams related to improved agricultural, livestock, and land management practices, the provision of environmental services, and carbon sequestration.

2. The Vertentes Project will operate in nine targeted productive landscapes in the states of Bahia, Goiás, Mato Grosso, Mato Grosso do Sul, and Minas Gerais, as well as in the Federal District. These were selected based on hydrographic, edaphological, agricultural, and land-use-related criteria. The selected PLs are important for soybean and beef cattle production, and are located in major freshwater-producing basins, featuring mainly the Cerrado biome, but also parts of the Pantanal, Caatinga and Atlantic Forest biomes. These areas are characterized by an arid climate spectrum, ecological transition hotspots, ecotones, and the occurrence of important endemic species, some of which are already threatened. There is minimal room for further legal land-use change, given that these are consolidated anthropized production areas.

3. Proposed project interventions aim to improve productivity and spur local economic growth while increasing environmental awareness and contributing to the maintenance of local biodiversity while applying the Soil Degradation Neutrality Strategy.[58] This can be achieved through the productive transformation of degraded lands, the adoption of more environmentally sustainable practices, and the restoration of environmentally significant areas to native vegetation. These PLs are further described in tables 1 and 2.

Table 1: Summary of Nine Selected Productive Landscapes (PL)

Productive landscapes	Watersheds	Biomes	States	Number of municipalities
PL 1: Emas—Alto Taquari	Tocantins, Araguaia, and Paraguai	Cerrado, combined with elements of Pantanal and Atlantic Forest.	Goiás	9
			Mato Grosso	1
			Mato Grosso do Sul	10
PL 2: Quedas do Araguaia—Couto Magalhães	Alto Araguaia, Alto Rio das Mortes, and Paraguay Basins	Cerrado combined with elements of Pantanal, Cocais Forest and Amazon Forest.	Goiás	7
			Mato Grosso	13
			Mato Grosso do Sul	1
PL 3: Goyáz Velho	Tocantins, and Paranaíba	Cerrado, and Caatinga.	Goiás	73
PL 4: Serra Geral de Goiás		Cerrado, combined with elements of Atlantic Forest and Cocais Forest.	Goiás	20
PL 5: Acaba-Vida	Paraguay Basins, São Francisco, and Paranaíba	Cerrado, combined with elements of Caatinga.	Bahia	4
PL 6: Geraes da Bahia		Cerrado, combined with elements of Caatinga.	Bahia	6

[58] Signed by Brazil during UNCCD COP 13 (United Nations Convention to Combat Desertification) held in Ordos, China, in 2017.

PL 7: Geraes do Grande Sertão Veredas		Cerrado, and Caatinga.	Minas Gerais	23
PL 8: Paracatu do Príncipe		Cerrado, combined with elements of Caatinga and Atlantic Forest.	Federal District (DF)	1
			Goiás	2
			Minas Gerais	13
PL 9: Lenda do Abaeté		Cerrado combined with elements of Atlantic Forest.	Minas Gerais	20

Source: Project preparation team.

Table 2: Summary of Economic Parameters

Productive landscape (PL)	Population	Total area (million hectares)	Number of farms	Number of livestock (million heads)	Pastures (million hectares)	Pasture degradation (percentage)	Soy production (million tons)	Soy exports value (US$, millions)
PL 1: Emas—Alto Taquari	610,000	8.500	13,660	3.800	3.800	36,3%	4.600	US$1,730.00
PL 2: Quedas do Araguaia—Couto Magalhães	229,882	6.400	9,591	2.335	3.100	45,7%	2.400 (0.592 Mha)	US$508.19
PL 3: Goyáz Velho	1,400,000	3.900	31,013	2.400	3.100	34,3%	1.400	US$184.43
PL 4: Serra Geral de Goiás	368,803	3.200	13,688	1.200	1.300	59,7%	0.319 (0.167 Mha)	US$57.30
PL 5: Acaba-Vida	265,297	1.800	4,249	0.140	0.186	89,5%	2.600 (0.435 Mha)	US$801.90
PL 6: Geraes da Bahia	202,712	5.600	18,080	0.416	0.392	73,4%	0.811 (2?) (0.656 Mha)	US$176.10
PL 7: Geraes do Grande Sertão Veredas	290,456	4.200	20,334	0.590	1.100	69,3%	0.362 (0.108 Mha)	US$1.02
PL 8: Paracatu do Príncipe	3,375,591	5.200	21,348	1.200	1.500	74,6%	1.700 (0.446 Mha)	US$722.00
PL 9: Lenda do Abaeté	131,344	1.1	6,722	0.433	1.000	49,1%	0.424	US$157.9

Source: PMU, IBGE 2019, Agricultural Census, Demographic Census and Municipal GDP.

4. As shown in table 2, pastures are characterized by extensive degradation processes (almost 50 percent of grassland area), as well as low productivity. Soy production has increased significantly over the past twenty years, spurred by growing demand from global markets, and is characterized by a high adoption of no-tillage techniques, combined with GM seeds and the use of herbicides (now approximately 95 percent of the area). From a landscape perspective, there is scope for better integrating natural areas—as required by the Brazilian legislation—between different farms, so that these can be relevant for biodiversity.

5. Experiences in the Cerrado area under previous projects (FIP-ABC Cerrado and FIP-Rural Landscape) show that degraded pasture areas, once recovered, may in part be used for agriculture, which enables existing soybean producers to expand their planted areas, converting pastures into agriculture land without the need for additional deforestation. Recovered pasture areas enable the adoption of practices promoted under Brazil's ABC Plan, including degraded pasture recovery, ILPF, and no-till farming, as well as other practices such as recovery of springs and soil and pest management. These areas may be partially converted for agricultural use through soybean/corn rotation, followed by off-season temporary pastures (sown before the grain harvest). In the following season, they may be used once again for grains (crop-livestock integration). When a recovered pasture area is fully used for beef production, pasture-forestry systems can be applied, and/or crop-pasture-forestry, with some pasture areas being regularly recovered with agriculture (2–3 seasons).

Project Additionality

6. In a business-as-usual (BAU) scenario, medium farmers in the Cerrado would continue to face barriers to adopt selected low-carbon technologies, given the technological knowledge gap, thereby limiting awareness and adoption of sustainable land management practices, such as the recovery of degraded pastures, and the promotion of agroforestry and silvopastoral production systems. Ecosystem health and biodiversity would continue to degrade in targeted catchments, as would the sustainability of ranching and farming activities. This would lead to further pressure on agricultural frontiers and limited capacity to absorb carbon.

7. The project creates additionality by: (i) engaging key stakeholders; (ii) building on existing public policies at the landscape level, which are currently being implemented in an uncoordinated and fragmented way; (iii) establishing multidisciplinary coalitions (consortia) and developing Sustainable Land Management Action Plans (SLM-AP) in targeted productive landscapes; and (iv) financing training and technical assistance on sustainable low-carbon practices. These will include agricultural practices (integrated crop, livestock and forestry systems; recovery of degraded pasture lands, no-tillage systems, and so on), and forest conservation and restoration practices (environmental compliance, soil and water conservation, and so on). These practices are to be adopted in areas with highly intensified crop and pasture lands, and where erosion has had negative impacts on environmental assets of national and global relevance, such as major freshwater-producing basins and important endemic species.

Methodology

8. This annex presents the economic and financial analysis (EFA) of the project's interventions. The financial analysis is based on a recent ex post financial and economic evaluation of ABC Cerrado,[59] which aimed "to promote the adoption of selected low-carbon technologies by medium-sized agricultural producers in the Cerrado through a pilot training and technical assistance program aimed at reducing the technological knowledge gap". It contributes to promoting sustainable land-use management practices and improving forest management in the Cerrado biome. In this context, the project has implemented a training program and a rural technical and managerial assistance strategy focused on

[59]Implementation Completion and Results Report: Sustainable Production in Areas Previously Converted to Agricultural Use. ABC-Cerrado Project (P143184), May 2020. http://documents1.worldbank.org/curated/en/352011590787555288/pdf/Brazil-Sustainable-Production-in-Areas-Previously-Converted-to-Agricultural-Use-Project.pdf.

four low-carbon technologies: (1) degraded pasture recovery; (2) crop-livestock-forest integration and agroforestry systems (SAFs); (3) no-tillage systems; and (4) planted forests, which are the same technologies that Vertentes will continue to promote. The incremental cash-flow analysis presents *with-project* and *without-project* scenarios. Key indicators used for the analysis include net present value (NPV), financial and economic internal rate of return (FIRR—EIRR), and payback period.

9. The project is expected to provide three economic benefit streams. The first is linked to the adoption of SLM and ABC practices at farm level, which is achieved by converting the financial analysis into social prices, using conversion factors and the opportunity cost of production, and removing taxes and transfers. This is mostly linked to Component 2. The second estimates the economic benefits provided by targeted productive landscape ecosystem services, mostly linked to interventions under Component 3. The third estimates the environmental benefits of reduced emissions (incremental analysis of *with-project* and *without-project* scenarios), using the EX-ACT carbon accounting tool,[60] under both Component 2 and Component 3. As Component 1 is geared toward creating the required enabling environment among relevant stakeholders, its contributions will be more indirect, and will depend on its impacts on related decision-making processes involving relevant stakeholders.

Main Data Sources and Assumptions

Item	Assumptions
Data source	The financial analysis is based on the ex post financial and economic evaluation of the ABC Cerrado project (US$10.62 million WB Strategic Climate Fund grant), implemented between 2014 and 2019. The ICRR was completed in May 2020.
Exchange rate	The exchange rate used in the analysis is fixed at US$1 = R$5, computed as an average of the exchange rate prevailing during the preparation, and used by the PMU to prepare the budget.
Prices	The adopted numeraire is the domestic price level expressed in local currency. Financial prices were taken from the existing business-plan model available from the ABC Cerrado's ICRR. The analysis is done using constant nominal prices.
Opportunity cost of capital	A discount rate of 10 percent was applied in the financial analysis to assess the viability and robustness of the investments.

Financial Analysis

10. The primary objective of the financial analysis is to determine the financial viability and incentives for the target group in relation to their participation in project activities. In this case, it means examining the project´s estimated effects on a model farm's cashflow and income. This model was subsequently used as a building block for the ABC Cerrado project by scaling it up to encompass the target area. Feasibility indicators include the net present value (NPV) of net benefit flows (for both *with-project* and the *without-project* scenarios), and the corresponding financial internal rate of return (FIRR) for the same net benefit flows, considering a payback period based on a 10-percent discount rate.

11. **Situation without the project**. For the construction of the *without-project* scenario, a simulation of a complete cycle of beef cattle production was developed considering a stocking rate of one (1) AU/ha, and a reference property with 127 ha of productive land, including pastures. This was then extrapolated to the ABC Cerrado project area of 378,513 hectares. The result for this model (table 3) shows an IRR of 10.26 percent, with payback in 11 years, and an NPV of R$11.7 million. This model considers an on-farm investment of 518 million. **Situation with the project**. In the *with-project* scenario, following the adoption of ABC technologies, the net present value is approximately R$602.5 million, with an IRR of 17.35 percent, and a payback over 8 years, with an on-farm investment of R$793 million. **Incremental**

[60] http://www.fao.org/tc/exact/ex-act-home/en/.

situation. The financial result of incremental net benefits yields an IRR of 26.57 percent, and an NPV of R$563 million with a payback of 6 years. The investment increment with the project was R$274.75 million. This same incremental net financial benefit analysis can be expressed in a per-hectare basis, with an NPV of R$1,489 per hectare under improved management.

Table 3: Financial Analysis Parameters

Indicator	Financial Without Project	Financial With Project	Financial Incremental Net Benefit	Financial Incremental Net Benefit / ha
Internal Rate of Return (IRR, %)	10.26%	17.35%	26.57%	26.57%
Net Present Value (NPV, R$)	11,777,423	602,543,672	563,599,898	1,489
Net Present Value (NPV, US$)	2,355,485	120,508,734	112,719,980	298
Payback (years)	11	8	6	6

Distribution of Benefits Over Time: Phasing

12. A summary of the Vertentes Project's main results per year is provided below in table 4.

Table 4: Increase Productive Landscape Area under Improved Management or Restored (in ha)

Project expected area results (ha) per year	Year 3 2023	Year 4 2024	Year 5 2025	Overall
1. Area of productive landscapes under SLM productive systems (pastures, soybean)	150,000	200,000	150,000	**500,000**
2. Area of productive landscapes under biodiversity systems	23,400	31,200	23,400	**78,000**
3. Area of productive landscapes under restored forest areas	1,960	5,880	1,960	**9,800**
4. Area of restored agricultural landscape (ranching and crops)	8,000	24,000	8,000	**40,000**
Total area	**800**	**2,400**	**4,800**	**627,800**

Source: PAD Results Framework.

Economic Analysis

13. The objectives of the economic analysis are: (i) to examine the overall project viability; (ii) to assess its overall economic rate of return; and (iii) to perform sensitivity analyses upon variables affecting project results. The analysis integrates three net benefit streams to assess the economic rate of return.

14. **Farm-level benefit stream**. The production model considered in the financial analysis was used as a building block for determining the viability of the whole project. The incremental benefit stream comprises the economic net values of the model developed in the financial analysis (*with-project* scenario minus *without-project* scenario). This includes using economic prices, rather than financial (or market) prices, and identifying and accounting for subsidies when present, as well as removing transfers and taxes. These economic benefits are then calculated on a *per-hectare* basis, and aggregated based on the phasing of major project area results. Economic cost benefit indicators are provided in table 5.

Table 5: Economic Analysis Parameters for the Farm-Level Benefit Stream

Indicator	Economic without project	Economic with project	Economic Incremental Net Benefit	Economic Incremental Net Benefit / ha
Internal Rate of Return (IRR, %)	14.17%	22.20%	31.07%	31.07%
Net Present Value (NPV, R$)	403,328,255	1,280,265,695	1,036,078,971	2,737
Net Present Value (NPV, US$)	80,665,651	256,053,139	207,215,794	547
Payback (years)	8	7	6	6

15. **Ecosystem service benefit stream**. Healthy productive landscapes provide many ecosystem services that are necessary for social and economic well-being. These services include water filtration and storage, air cleaning, habitat, and recreation, among others. Monetary values associated with ecosystem services are taken from recognized studies that assess the incremental economic benefits of such services. Two meta-analyses provide global estimates based on 127 and 665 analytical studies, respectively.

16. Table 6 shows an estimated valuation of ecosystem services, such as recreation (US$28.10–US$26.00/ha/year), habitat (US$3.00–US$53.00/ha/year), and water (US$60.00–US$86.40/ha/year), with a total of US$117.50–US$139.00/ha/year, and an average of US$128.00/ha/year. In order to estimate greenhouse gas emissions reduction benefits, the assessment applies FAO EX-ACT Tool and World Bank 2017 'Guidance note on shadow price of carbon in economic analysis.

Table 6: Overview of Study Estimates on Economic Values of Ecosystem Services (per hectare)

Ecosystem services (meta-analysis)	Value in US$/ha Siikamaki et al (2015) [61,62]	Value in US$/ha De Groot (2012) [63]	Average value in US$/ha
Recreation	28.10	26.00	
Habitat	3.00	53.00	
Water	86.40	60.00	
Total	**117.50**	**139.00**	**128.00**

17. In order to work out an incremental benefit stream, the analysis assumes a *without-project* situation where ecosystems are providing only 30 percent of their potential services because of overexploitation, weak regulation and poor landscape planning. In a *with-project* scenario, the analysis assumes that ecosystems have recovered their capacity, and are able to provide at least 80 percent of such benefits. By multiplying this incremental value (50 percent) by the number of hectares recovered per year, and extending the benefits over a twenty-year period, one can generate an incremental benefit stream which is then added to the net farm-level benefit stream.

18. **Carbon storage benefit stream**. Improved integrated land management practices, together with the adoption of low-carbon agricultural practices, leads to a reduction in carbon emissions through carbon storage and sequestration. Additional land-restoration interventions in water recharge areas, native forests and heavily degraded agricultural land were also taken into account. Total amounts sequestered were estimated using the Ex-Ante Carbon-balance Tool (EX-ACT). This value considers all carbon-emission reductions from avoided deforestation and protection of

[61] Siikamäki, J., et al. (2015), as quoted in World Bank (2020), Project Appraisal Document Connecting Watershed Health with Sustainable Livestock and Agroforestry Production in Mexico (P172079).
[62] Resende, F. M. et al. 2017. Economic Valuation of the Ecosystem Services Provided by a Protected Area in the Brazilian Cerrado: application of the contingent valuation method. *Brazilian Journal of Biology*, vol.77 no. 4.
[63] Global estimates of the value of ecosystems and their services in monetary units. Rudolf de Groot et al. 2012. *Ecosystem Services 1*, 50–61.

conservation areas (indirect contributions), as well as from sustainable grassland management associated with cattle ranching, agroforestry and silvopastoral systems. It also considers sustainable crop management in the case of soya (direct contributions), and compares it with a business-as-usual (BAU) scenario.

19. An estimated incremental 19,822,929 tCO2eq will be avoided in the area intervened by the project (627,800 ha) over 20 years (see Annex 4). This figure is divided evenly to estimate yearly-avoided emissions. Carbon social price was estimated ranging from the current price for carbon given to Brazil by the Green Climate Fund (US$5/tCO2),[64] to a higher social price of US$40/tCO2, as per the most recent World Bank guidelines.[65] The recommendation is to use a low and high estimate of the carbon price for the economic analysis with US$40 as an upper bound and US$5 as a lower bound. This generates an additional net benefit stream from reduced emissions, added to the previous two.

20. **Project economic costs**. The economic analysis includes recurrent investment and incremental costs of project components. Project financial costs have been converted into economic values by removing taxes, duties and subsidies. Specifically, the estimation of economic costs considered: (a) all investments and costs, without taxes or subsidies; (b) the recurrent costs of the program over the period of analysis; and (c) the use of a standard conversion factor to correct market costs to economic costs.

Assumptions Used for the Economic Analysis

Item	Assumption
Project life	Project life has been set at 20 years, considering investment lifecycles.
Discount rate	A 9-percent economic discount rate has been used. The opportunity cost of capital is currently slightly lower than that, with the Central Bank of Brazil deposit rate (SELIC) being around 2 percent per year.[66] The average SELIC rate for the past 10 years is just above 9 percent.
Conversion factor	Based on international trade data, the average standard conversion factor over the past ten years has been estimated to be 0.965. Producer support estimate was provided by Agrimonitor.[67]
Opportunity cost	The opportunity cost of unskilled labor was estimated considering the current long-term unemployment rate (13.1 percent)[68] resulting in a shadow wage rate factor (SWRF) of 0.901.

Results of the Economic Analysis

21. **Economic viability**. The economic NPV of the net benefit stream, discounted at 9 percent,[69] is R$854 million (US$171 million), producing an EIRR of 25.56 percent for the base scenario. This scenario only includes expected benefits at farm level from the adoption of SLM and ABC practices. Scenario 2 includes, in addition to these, the expected benefits from environmental services provided by the restoration of various productive landscapes, resulting in an ENPV of R$1,124 million (US$225 million), and an EIRR of 31.47 percent. Finally, scenarios 3 and 4 also include the environmental benefits of storing carbon, with reduced emissions being valued at low and high prices. A detailed

[64] https://www.greenclimate.fund/document/redd-results-based-payments-results-achieved-brazil-amazon-biome-2014-and-2015, p. 69 (C.2.4)

[65] Guidance note on shadow price of carbon in economic analysis. World Bank, September 2017

[66] https://www.bcb.gov.br/.

[67] https://publications.iadb.org/publications/english/document/PSE-Producer-Support-Estimate.pdf.

[68] https://www.ibge.gov.br/explica/desemprego.php.

[69] While the financial analysis uses a 10% discount rate, the economic analysis uses a 9% discount rate to reflect the opportunity cost of capital.

analysis is presented in tables 7, 7a, 7b, 7c, and 7d.

22. The project's economic analysis indicators were estimated using higher carbon price (HCP) and lower carbon price (LCP) assumptions to estimate the economic benefits of reducing GHG emissions.[70] Under the HCP scenario, the economic internal rate of return (EIRR) for the entire project is 67.27 percent, and the economic net present value (ENPV) is approximately R$2,735 million (US$547 million). Under the LCP scenario, the EIRR is 35.71 percent, and the ENPV is approximately R$1,326 million (US$265 million).

Table 7: Summary of Economic Analysis Results—Various Scenarios

Indicator	Economic Incremental Net Benefit Vertentes ABC	Economic Incremental Net Benefit Vertentes ABC + ESS	Economic Incremental Net Benefit Vertentes ABC + ESS + LCP	Economic Incremental Net Benefit Vertentes ABC + ESS + HCP
Economic Internal Rate of Return (EIRR, %)	25.56%	31.47%	35.71%	67.27%
Economic Net Present Value (ENPV, R$ 1.000)	854,194	1,124,676	1,326,000	2,735,270
Economic Net Present Value (ENPV, US$ 1.000)	170,839	224,935	265,200	547,054

23. **Sensitivity analysis**. The robustness of these indicators was tested and confirmed with a sensitivity analysis that resulted in a switching value for cost increments of 155 percent; 226 percent with ESS benefits; and 279 percent and 649 percent under LCP and HCP scenarios. The switching value for a reduction of benefits was estimated at −61 percent in the baseline scenario (only farm-level benefits), and −69 percent with ESS benefits, and −74 percent and −87 percent when including CO_2 benefits valued at LCP and HCP, respectively. These indicators strongly suggest that the project represents an economically worthwhile investment from the perspective of society (table 8).

Table 8: Summary of Sensitivity Analysis

	Scanario 1	Scenario 2	Scenario 3	Scenario 4
Indicator	ABC	ABC + ESS	ABC+ESS+LCP	ABC+ESS+HCP
EIRR	25.56%	31.47%	35.71%	67.27%
ENPV (m USD)	170.84	224.94	265.20	547.05
SVC	155%	226%	279%	649%
SVB	-61%	-69%	-74%	-87%

(ABC: Low Carbon Agriculture; ESS: Ecosystem Services; LCP: Low Carbon Price; and HCP: High Carbon Price)

Tables 7a, 7b, 7c and 7d: Net Benefit Stream, ENPV and EIRR under Various Scenarios

[70] In 2019, the Green Clime Fund (GCF) approved the FP100: REDD-PLUS results-based payments for results achieved by Brazil in the Amazon biome in 2014 and 2015. In this Results-based Payment Project, the GCF applies an economic carbon price of USD 5 per tCO2e. Reduced emissions from Vertentes could be actually included in a Results-based Payment Project; thefore, the GCF carbon price (CP) is considered to estimate the Low Carbon Price Scenario. The WB 2017 'Guidance note on shadow price of carbon in economic analysis' provides economic values for a low carbon price and a high carbon price. Given that the GCF CP is applied to estimate the LCP scenario, and that the highest range of economic value will hardly be applicable to a results-based payment initiative, the assessment takes into account the WB 2017 SPC 'LCP' as the Vertentes HCP scenario. If the actual WB SCP HCP values are applied to the analysis, the EIRR would be 102.61 and ENPV USD 867.95 million.

Year	Total Incremental benefits Vertentes ABC (with - without)	Total Economic costs - Investments	Economic costs - recurrent	Total Net benefit stream
2021	-	6,835,288		(6,835,288)
2022	- 105,069,572	21,181,798		(126,251,370)
2023	- 124,061,970	30,513,348		(154,575,318)
2024	- 77,591,308	28,978,998		(106,570,307)
2025	30,909,233	23,624,792		7,284,441
2026	40,072,940	-	6,080,513	33,992,427
2027	78,293,525	-	6,080,513	72,213,011
2028	127,494,253		6,080,513	121,413,740
2029	185,778,810		6,080,513	179,698,297
2030	256,740,753		6,080,513	250,660,240
2031	306,502,245		6,080,513	300,421,732
2032	321,957,872		6,080,513	315,877,359
2033	318,813,421		6,080,513	312,732,908
2034	320,881,872		6,080,513	314,801,359
2035	320,881,872		6,080,513	314,801,359
2036	320,881,872		6,080,513	314,801,359
2037	320,881,872		6,080,513	314,801,359
2038	320,881,872		6,080,513	314,801,359
2039	320,881,872		6,080,513	314,801,359
2040	320,881,872		6,080,513	314,801,359
	ENPV @ 9% (BRL)			854,193,846
Scenario	ENPV@ 9% (USD)			170,838,769
1	EIRR			25.56%

Year	Total Incremental benefits Vertentes ABC + ESS (with - without)	Total Economic costs - Investments	Economic costs - recurrent	Total Net benefit stream
2021	-	6,835,288		(6,835,288)
2022	- 105,069,572	21,181,798		(126,251,370)
2023	- 113,386,770	30,513,348		(143,900,118)
2024	- 47,370,508	28,978,998		(76,349,507)
2025	71,805,233	23,624,792		48,180,441
2026	80,968,940	-	6,080,513	74,888,427
2027	119,189,525	-	6,080,513	113,109,011
2028	168,390,253		6,080,513	162,309,740
2029	226,674,810		6,080,513	220,594,297
2030	297,636,753		6,080,513	291,556,240
2031	347,398,245		6,080,513	341,317,732
2032	362,853,872		6,080,513	356,773,359
2033	359,709,421		6,080,513	353,628,908
2034	361,777,872		6,080,513	355,697,359
2035	361,777,872		6,080,513	355,697,359
2036	361,777,872		6,080,513	355,697,359
2037	361,777,872		6,080,513	355,697,359
2038	361,777,872		6,080,513	355,697,359
2039	361,777,872		6,080,513	355,697,359
2040	361,777,872		6,080,513	355,697,359
	ENPV @ 9% (BRL)			1,124,675,655
Scenario	ENPV@ 9% (USD)			224,935,131
2	EIRR			31.47%

Year	Total Incremental benefits Vertentes ABC + ESS + LCP (with - without)	Total Economic costs - Investments	Economic costs - recurrent	Total Net benefit stream
2021	-	6,835,288		(6,835,288)
2022	- 88,434,957	21,181,798		(126,251,370)
2023	- 87,555,390	30,513,348		(143,900,118)
2024	- 6,921,402	28,978,998		(49,712,446)
2025	73,925,002	23,624,792		75,436,968
2026	76,155,127	-	6,080,513	102,764,420
2027	93,696,212	-	6,080,513	141,604,471
2028	113,624,317		6,080,513	191,424,667
2029	134,101,773		6,080,513	250,328,690
2030	156,078,841		6,080,513	321,910,100
2031	165,601,558		6,080,513	372,291,058
2032	160,599,944		6,080,513	388,366,152
2033	149,541,792		6,080,513	385,841,167
2034	141,092,475		6,080,513	388,529,085
2035	133,392,447		6,080,513	389,768,018
2036	125,811,032		6,080,513	390,387,485
2037	118,906,754		6,080,513	391,006,951
2038	112,623,703		6,080,513	391,626,418
2039	107,530,050		6,080,513	392,865,351
2040	102,339,806		6,080,513	393,484,817
	ENPV @ 9% (BRL)			1,325,999,975
Scenario	ENPV@ 9% (USD)			265,199,995
3	EIRR			35.71%

Year	Total Incremental benefits ABC + ESS + HCP (with - without)	Total Economic costs - Investments	Economic costs - recurrent	Total Net benefit stream
2021	-	6,835,288		(6,835,288)
2022	- 88,434,957	21,181,798		(126,251,370)
2023	- 87,555,390	30,513,348		(143,900,118)
2024	179,538,022	28,978,998		136,746,978
2025	264,720,692	23,624,792		266,232,658
2026	271,287,082	-	6,080,513	297,896,375
2027	293,164,433	-	6,080,513	341,072,692
2028	317,428,803		6,080,513	395,229,153
2029	342,242,525		6,080,513	458,469,442
2030	368,555,859		6,080,513	534,387,118
2031	382,414,842		6,080,513	589,104,342
2032	381,749,494		6,080,513	609,515,701
2033	375,027,607		6,080,513	611,326,982
2034	370,914,556		6,080,513	618,351,166
2035	371,887,059		6,080,513	628,262,630
2036	368,641,910		6,080,513	633,218,362
2037	366,073,898		6,080,513	638,174,094
2038	364,127,112		6,080,513	643,129,827
2039	367,705,991		6,080,513	653,041,291
2040	366,852,012		6,080,513	657,997,023
	NPV @ 9% (BRL)			2,735,270,211
Scenario	NPV@ 9% (USD)			547,054,042
4	EIRR			67.27%

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ANNEX 3. Detailed Fiduciary Assessments

Financial Management

9. **Financial management assessment of SENAR.** Brazil's National Rural Learning Service (SENAR—*Serviço Nacional de Aprendizagem Rural*) was created by Law 8315/1991 and regulated by Decree 566/1992. It is a government-controlled private entity maintained by rural employers, and linked to the Brazilian Confederation of Agriculture and Livestock (CNA—*Confederação da Agricultura e Pecuária do Brasil*). It is managed by a Deliberative Council composed of representatives of the federal government, rural workers, and rural employers. Its 27 regional offices deliver education and training to develop professional, technical assistance and social skills in approximately 300 rural trades.

10. In 2013, the Bank assessed SENAR for the implementation of the Low-Carbon Agriculture in the Brazilian Cerrado Project—ABC Cerrado (P143184). In 2017, the Bank reassessed it for the coexecution of the Integrated Land Management in the Cerrado Biome Project (P164602). The overall conclusion of both financial management assessments is that SENAR's financial management arrangements satisfy the Bank's minimum fiduciary requirements. SENAR's FM performance under the ABC Cerrado Project was consistently rated as satisfactory. Under the Landscape Project, SENAR has also been presenting a satisfactory performance to the date.

11. A Project Implementation Unit (PIU) will be established at SENAR, consisting of a general manager, a technical manager, a financial manager, a procurement manager, a safeguard manager, and support staff (to be drawn from SENAR's existing staff). If, in the future, the project so requires, SENAR will hire additional consultants to integrate the project's core staff. SENAR's Central Office will be responsible for contracting and procurement arrangements, and will provide funds to its regional offices, which will procure goods and services to deliver seminars, workshops, courses, and technical assistant.

12. ***Planning and Budgeting.*** SENAR's budget is prepared following the Ministry of Economy's requirements, as well as best management practices. Its budget is divided into subfunctions, programs and actions, and contemplates both physical and financial goals. SENAR has two budget systems: SEO (*Sistema de Elaboração Orçamentária*), to meet the Ministry of Economy's requirements; and its own budget system, called SGO (*Sistema de Gerenciamento Orçamentário*), which, since 2008, has allowed SENAR central and regional offices to detail and consolidate their annual budgets. SENAR has been working in the merging of SEO and SGO, and the resulting improved and standardized budget system is expected to go live in January 2021. The Bank will review this new improved budget system once it is finalized.

13. SENAR will prepare an Annual Operating Plan (POA), which will include, amongst other, the following details: (i) activities to be implemented and their detailed budget (financing needs, and expenditure categories with links to procurement plans); (ii) annual goals; and (iii) deliverables. The POA for the first year of implementation should be prepared and approved by the Bank (and thereafter, annually).

14. The procedures in place to plan project activities, prepare related budgets, and collect information from implementing partners are deemed adequate, but will require close monitoring due to the variety of implementing partners. Project plans and budgets (to be reflected in the POA) will be realistic, based on valid assumptions, and prepared for all significant activities in sufficient detail, so as to provide a meaningful tool to monitor subsequent performance (budget vs. actual variance analysis). Every quarter, actual expenditures will be compared with budget allocations, and presented to the Fiscal Council for monitoring. All discrepancies within 15 percent (up and down) must be justified. The Global Environment Facility (GEF) does not require counterpart funding, but rather cofinancing, as per GEF policy and guidelines on cofinancing,

both dated June 26, 2018. As per the child project document dated October 29, 2019, the cofinancing is detailed in table 2 of the PAD main text.

15. ***Accounting.*** Since 2017, SENAR has followed the Brazilian Accounting Standards Applied to the Public Sector (NBC TSP), which is aligned with international accounting standards, and has previous experience with World Bank projects. Brazil's fiscal year corresponds to the calendar year. SENAR applies the accrual accounting convention. A double bookkeeping system is used, and a chart of accounts is used for all postings.

16. SENAR's computerized accounting and financial system allows for the adequate recording of the projects' financial transactions, including the allocation of expenses according to their components, disbursement categories, and funding sources. SENAR's accounting and financial system is based on TOTVS RM, which has strict access controls and audit logs. Transactions flow between relevant departments for conference and approval. The corresponding supporting documents are electronically transmitted from an authority level to the other using the SenarDOCs system, which provides the audit trail of transactions and requires electronic signatures for approval. In order to ensure operating transparency, SENAR will open a separate bank account (see fund flow section), and will keep a separate journal/ledger exclusively for the project under a dedicated cost center created for the project. In the project journal, all receipts and expenditures related to measures and/or expenditure categories to be financed from the Grant will be recorded in chronological order, and according to the regulations established for the NBC TSP. The systems are able to produce the necessary financial reports for the project, and SENAR's accounting and financial staff are adequately trained to use and maintain the systems, ensuring the confidentiality, integrity and availability of data.

17. Subledgers or subsidiary records are electronically reconciled and verified against the general ledger control accounts, and all accounting and support documents are retained in SENAR's files for two years. At the end of this period, they are digitalized and transferred to a permanent archive, where they are kept for the period required by law (which varies depending on the type of document). SENAR's document management system is intended to enable company-wide access to all documents that contain relevant information, and ensures that documents can be properly processed, stored, filed and retrieved by authorized staff members.

18. Bank reconciliations are prepared daily and reconfirmed monthly by someone other than those processing or approving payments, and all unusual items in bank reconciliation are reviewed and approved by a responsible official.

19. ***Internal Controls:*** SENAR has an Internal Audit Unit created by Deliberative Council Resolution 039/01 of July 2001, as determined in article 9, section II of SENAR's bylaws. This Internal Audit Unit is an integral part of SENAR's internal control system. It is composed by a qualified multidisciplinary team with experience in the following areas: accounting, management, information technology, human resources, and economy.

20. The Internal Audit Unit provides the following core services:

- Auditing and assessing the adequacy and effectiveness of the internal control system;
- Auditing the clarity, comprehensibility, reliability and correctness of records kept by the financial and accounting divisions (financial audit);
- Auditing the organizational structure and organization of operations, as well as the effectiveness of steering and control mechanisms (operational audit); and
- Special investigations (audits and other activities) carried out at the request of the Executive Secretariat.

21. The Internal Audit Unit can carry out audits after prior notification, or unannounced. It documents any breach of the rules, and reports directly and continuously to the Executive Secretariat. It has unlimited right to all information within the scope of their audit mandates. As such, its members have access to all SENAR's premises and facilities, and are authorized to conduct talks with any member of the organizational unit being audited in order to clarify any issues. The Internal Audit Unit consists of six staff members, with adequate qualifications and experience. The Internal Audit Unit will include the project in its work program. Its recommendations are monitored through an IT system called SGA (Audit Management System—*Sistema de Gestão de Auditoria*). Once a unit has been audited, it has to report back to the Internal Audit Unit after an appropriate period of time, whether audit recommendations have been implemented or not.

22. SENAR has an ombudsman channel called *"Fale Conosco"* (Talk with Us), through which staff and project beneficiaries can report suspicions of fraud, waste or inappropriate use of project's assets and resources. All complaints are analyzed by the Administration and Financial Unit (*Diretoria de Administração e Finanças—DAF*), which is responsible for managing the channel. After this first screening, complaints are channeled to the responsible units within SENAR for investigation and/or action. There is no option for anonymous reporting, as complainants must provide personal details when submitting their grievances. SENAR strives to protect complainants' identity as much as possible.

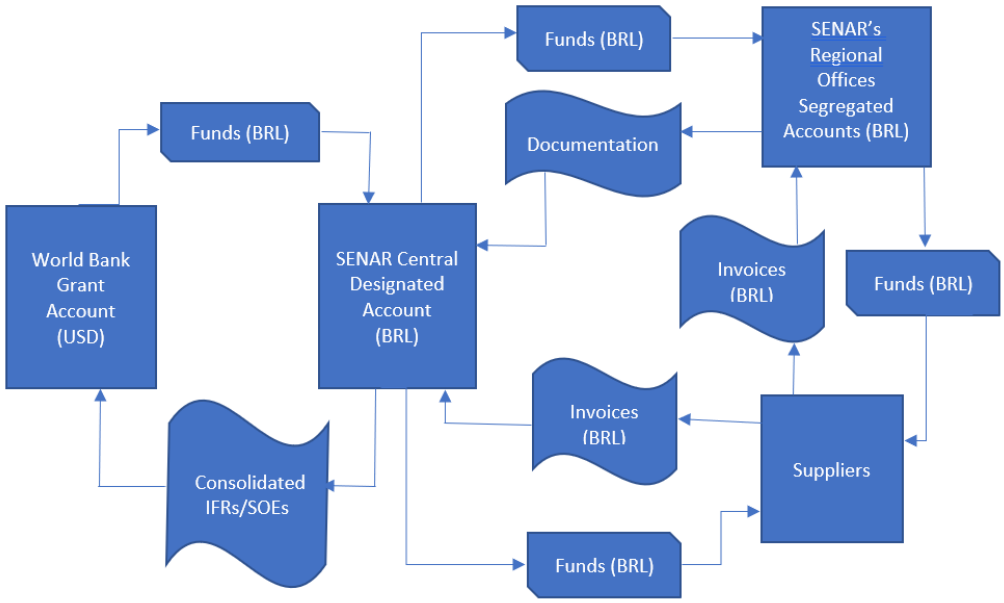
23. There is also an adequate system for protecting assets from fraud, waste and abuse. All equipment purchased is listed in an inventory record, where each item is given an individual record and number, that is, it is recorded as an individual asset, and depreciated according to its individual useful life. A physical inventory control is performed annually for these assets, and reconciled with their respective control accounts according to service instructions numbers 007 and 008 of August 2018. SENAR is protected by an insurance policy covering its premises and movables. If assets are no longer needed, they can be sold to a third party exclusively through a public tender, handed over to a project or regional office, or retired. Each eventuality has specific detailed disposal procedures. SENAR's annual statement of accounts contains a balance sheet, where all its fixed assets are reflected, with adequate insurance coverage for these assets.

24. The project's internal control system will be documented in a Project Operational Manual (POM) to be prepared by SENAR for the project. The POM will comprise descriptions, flow charts, policies, templates and forms, user-friendly tools, tips, and techniques to ensure that approval and authorization controls continue to be adequate and are properly documented and followed, with adequate safeguarding of the project's assets. The POM's FM and Disbursements section shall cover the following topics: flow of funds, chart of accounts, project organizational structure and responsibilities, internal and external auditing arrangements, accounting practices, disbursement procedures, and financial reporting arrangements. The POM should be produced by SENAR and approved by the Bank, and should be maintained/updated throughout the projects' life.

25. ***Flow of Funds***. The disbursement of project funds will be processed in accordance with Bank procedures, as stipulated in the Legal Agreement, and the Disbursement and Financial Information Letter. During project implementation, the following disbursement methods will be available for use: reimbursement, direct payment, and advance. The primary disbursement method will be Advances

26. The following diagram indicates the flow of funds for the Advance disbursement method from the Bank to SENAR:

Figure 1: Flow of Funds



(1) Funds will be transferred to a specific segregated bank account (Designated Account), to be specifically opened for the project and managed by SENAR. This account will be opened at a commercial bank (*Banco do Brasil*) acceptable to the Bank. The account will be denominated in *Reais* (BRL or R$). Funds will be advanced from the Designated Account to SENAR for the implementation of its activities (see below for more details including subsequent reporting).

(2) SENAR will transfer part of the resources to its regional offices, which will be responsible for implementing part of the activities. The regional offices will implement the activities, and register transactions in SENAR's FM systems under close supervision of the SENAR Central Office.

(3) Payments and invoices will be registered in the accounting system once incurred and subsequently paid, and records will be reconciled daily, and at the end of each month.

(4) Consolidated IFRs will be prepared in Excel; and statements of expenditures (SOEs) will be issued by the SISATeG (*Sistema de Assistência Técnica e Gerencial*) using information available on ERP TOTVS RM, and will be supported by accounting records. The General Conditions require the Borrower/Recipient to retain all records (contracts, orders, invoices, bills, receipts, and other documents) evidencing eligible expenditures, and to enable Bank representatives to examine such records. They also require the records to be retained for at least one year following receipt by the Bank of the final audited financial statement required under the Legal Agreement, or two years after the Closing Date, whichever is later. Borrowers/Recipients are responsible for ensuring that document retention beyond the period required by the Legal Agreement complies with their own and government's regulations.

27. The proposed fixed ceiling for the Designated Account will be BRL 5,000,000. The minimum application size for direct

payment and reimbursement withdrawal applications will be USD 250,000 equivalent. This minimum application size is not applicable for retroactive expenditure withdrawal applications.

28. The documentation of the use of advances and reimbursement withdrawal applications will be through SOEs. Direct payments will be documented by Records. SENAR will be responsible for preparing and sending withdrawal applications to the Bank. The project will also have a four-month grace period to document expenditures incurred prior to the Closing Date. SENAR will ensure that Grant proceeds are exclusively used for eligible expenditures. The frequency for the presentation of eligible expenditures paid from the Designated Account is at least quarterly.

29. No withdrawal shall be made for payments made prior to the date of the Legal Agreement. However, withdrawals up to an aggregate amount not exceeding 20 percent of the Legal Agreement amount are allowed for payments made prior to the Signing Date—but in no case more than one year prior to the Signing Date—for eligible expenditures as set out in the Legal Agreement.

30. ***Financial Reporting.*** SENAR already prepares regular financial reports, as required by current accounting norms, and these reports are used by management on a quarterly basis to compare actual expenditures with budgeted expenditures and programmed allocations. For this Grant, SENAR will prepare and submit to the Bank semiannual (consolidated) IFRs no later than 45 days after the end of each semester. The IFRs will be prepared by SENAR in Excel, using information registered on ERP TOTVS RM, and using the cash basis.

31. At the end of each fiscal year, SENAR will prepare annual financial statements for the project, and such statements will be audited. The final semiannual IFRs will serve as the projects' annual financial statements, with accompanying notes.

32. The following semiannual IFRs (format shared with SENAR; to be prepared in *Reais (*BRL), since this is the currency of the Designated Account and the functional currency of SENAR financial reporting) will be prepared for management purposes and submitted to the Bank:

(i) IFR 1A—Sources and uses of funds by Category (period-to-date, year-to-date, project-to-date) showing budgeted amounts versus actual expenditures (that is, documented expenditures), including a variance analysis;
(ii) IFR 1B—Uses of funds by project Component (period-to-date , year-to-date, project-to-date) showing budgeted amounts versus actual expenditures (that is, documented expenditures), including a variance analysis; and
(iii) IFR 1C—Designated Account bank reconciliation.

External Auditing. SENAR is subject to different external audits:

(i) quarterly audits of its financial reports are conducted by a private auditor. The last firm hired for auditing fiscal years 2018 and 2019 was *VR Group Auditores e Consultores S/S*. The results of the quarterly audits are used by SENAR's National Fiscal Council to support the approval of its quarterly accounts; and
(ii) as part of the S System,[71] SENAR is subject to audits conducted by the Office of the Comptroller General

[71] Created in the 1940s, the S system is formed by organizations and institutions related to the productive sector, such as industries, commerce, agriculture, transport and cooperatives, with the focus on vocational training, social assistance, consulting, research and technical assistance—that is, services considered to be in the public interest. Although they are privately-owned and managed by employers' federations and confederations, these entities are supported by statutory contributions and manage public resources. Revenues collected as contributions to the S System are passed on to its entities, which must use the resources as established in

(CGU—*Controladoria Genal da União*), and the Federal Court of Accounts (TCU—*Tribunal de Contas da União*).

33. No qualifications, disclaimers of opinion, or emphasis of matter were reported as a result of any of the audits conducted in the past three years (reports analyzed up to the end of 2018). SENAR's audits follow international auditing standards. SENAR's financial statements will not have to be submitted to the Bank.

34. For project purposes, the external audit will be performed by a private firm, following agreed Terms of Reference (TOR) acceptable to the Bank, and in accordance with International Standards on Auditing (ISAs) issued by The International Auditing and Assurance Standards Board (IAASB) of the International Federation of Accountants (IFAC) (or national auditing standards if, as determined by the Bank, these do not significantly depart from international standards). The audited financial statements will also be prepared in accordance with accounting standards acceptable to the Bank (that is, IPSAS issued by the International Public Sector Accounting Standards Board of the International Federation of Accountants (IFAC-IPSASB), or national accounting standards where, as determined by the Bank, they do not significantly depart from international standards). The TOR should be prepared by SENAR and approved by the Bank with a view to appointing the auditors within three months after the Signing Date.

35. The auditors hired to audit the project will have unrestricted access to SENAR's accounting records, supporting documentation, staff and premises, including its regional offices, insofar as they relate to the project. SENAR will endeavor to ensure that any requirements or demands arising from the financial statement audit are met or promptly addressed.

36. The audit report (and any accompanying management letter) should be submitted to the Bank no more than six months after the end of the fiscal year. The Bank will review the audit report and will periodically determine whether the audit recommendations are being satisfactorily implemented. The Bank also requires that the Borrower/Recipient disclose the audited financial statements in a manner acceptable to the Bank. Following the Bank's formal receipt of these statements from the Borrower/Recipient, the Bank will also make them available to the public in accordance with "The World Bank Policy on Access to Information."

37. An audit exception to combine the 2020 and 2021 audits may be necessary, depending on the Signing Date of the Grant. The financial statement audit will be financed from the Grant.

Procurement.

38. ***General.*** Procurement will be carried out in accordance with the "The World Bank Procurement Regulations for IPF Borrowers" dated July 1, 2016 and revised in November 2020. A PPSD for the initial 18 months of project implementation has been prepared and identified the procurement strategy and arrangements that are proportionate to the risk and value of all contracts to be executed during the implementation of the project. Those arrangements are reflected in the procurement plan.

39. ***Implementing agency.*** Procurement will be centralized within SENAR. Most of the procurement will not be complex, and the scope of contracts will be certain and easily quantifiable. Procurement arrangements do not include complex

their respective bylaws. According to Presidential Decree 9781/2019, S-System entities must disclosure their financial reports and relevant information following the regulations applied to public sector entities, as enforced by the Access to Information Law (Lei de Acesso à Informação—LAI), Law 12527/2011.

arrangements requiring specialized skills, such as, for example, dialogue-based arrangements that present probity risk. SENAR's regional offices will adopt the online bidding solution (SOL) application for smaller procurement. SENAR will adopt sustainable procurement and gender equality criteria in project's procurement transactions.

40. ***Capacity assessment.*** The capacity assessment revealed that the procurement policy framework, regulation, procedures and documents in use at the agency are documented and publicly available, and are designed to meet the core procurement principles of value for money, economy, efficiency, effectiveness, integrity, transparency, fairness, and accountability. SENAR produces and adequately maintains written records of all procurement and contract documents, and its complaint-handling system works well and effectively. SENAR is not impacted by fraud and corruption risks. The procurement methods chosen are appropriate and consistent with the legal framework. Clear procurement documents proportionate to the need are used to encourage broad participation. Procedures for bid submission, receipt and opening are clearly described in the procurement documents and are well complied with. Bid evaluation is based on contract-awarding and other criteria stated in the procurement documents. Procurement notices and contract awards are announced as prescribed. The agencies and the market have a good track record of managing environmental, social, and health & safety risks, including preventing sexual exploitation, rape and assault throughout the procurement process. There is a clearly identified target market for all procurements. The target market for the procurements is competitive and views the agencies as attractive. There are no restrictions to open competition in the market

41. ***Procurement documents.*** Standard procurement documents (SPDs) will apply to all international procurement. National procurement documents, as published by the federal government's Attorney-General's Office (*Advocacia Geral da União*—AGU, in Portuguese), may be used for domestic procurement, subject to the conditions indicated below, as established in paragraphs 5.3–5.6 of the Procurement Regulations. Procedures for *Concorrência* (open competition), *Tomada de Preços* (limited competition) and *Convite* (Request for Quotation and Shopping) may be used, provided that a *Letter* of *Acceptance* of the World Bank's *Anticorruption Guidelines* and *Sanctions* Framework is signed, and that the following points are discussed and included in the PPSD and/or the Procurement Plan:

a. The option prohibiting joint ventures shall not to be exercised;
b. A foreign firm certificate of operation shall only be required in the case of foreign firms that are already established in the country;
c. Price correction through clarification shall only apply with respect to misquoted taxes;
d. Disqualification due to the application of maximum prices shall not apply;
e. In admeasurement contracts, disqualification for exceeding maximum unit price shall only apply for items individually weighing more than 10 percent of the total price; and
f. For large and smaller works, the Bank's SPDs shall be used (as Conditions of Contract are not part of the government's standard procurement documents).

42. ***Training.*** Capacity building to be provided by SENAR following their existing technical assistance program will adopt SENAR's existing procedures, which have been reviewed and found acceptable to the Bank.

43. ***Operating costs.*** Operating costs will include those recurrent costs that SENAR would not have incurred if not for the project (for example, utilities, administrative and project implementation staff, office maintenance, and so on) and will be procured following SENAR's administrative procedures, which have been reviewed and found acceptable to the Bank.

44. ***Procurement Plan.*** SENAR must prepare a Procurement Plan in STEP for the first 18 months of project implementation, providing the basis for the procurement processes. This plan will be agreed upon by the SENAR and the Bank team before

negotiations. The Procurement Plan will be updated in agreement with the Bank on a biannual basis or as required to reflect actual project implementation needs and improvements in institutional capacity.

45. ***Summary of the Procurement Plan***: Based on the PPSD, the procurement plan has been prepared to set out the selection and procurement methods to be followed by the Borrower during project implementation in the procurement of goods, non-consulting and consulting services financed by the proposed operation.

Table 2: Indicative focal/non-focal area elements and financing

#	Description	Budget (Millions of US$)	Procurement/Selection Method	Preferential Market Approach
1	**Goods ; Non-consulting Services ; Information Technology**	**6.98**		
1.1	Implementation of recovery projects of degraded soils	2.66	Request for Bids (RFB)	Open National Approach
1.2	Execution of degraded APP recovery projects	3.57	Request for Bids (RFB)	Open National Approach
1.3	Development of GEO management and spatialization systems	0.39	e-Auction	Open National Approach
1.4	Communication and Advertising Services	0.25	e-Auction	Open National Approach
1.5	Non-complex Audit Services	0.09	e-Auction	Open National Approach
1.6	IT Equipment	0.02	Request for Quotations (RfQ)	Open National Approach
2	**Consulting Services (Firms)**	**2.28**		
2.1	Consultancy services for the popular mapping of species of higher fauna and training for the recording of occurrences	0.23	QCBS	Open National Approach
2.2	Preparation of studies of disaggregated environmental services and carbon stocks	0.79	QCBS	Open International Approach with participation of national qualified consulting firms.
2.3	Assessment processes and case studies, including data collection	0.36	QCBS	Open National Approach

2.4	Consulting services to carry our Project's Mid-Term Review	0.90	CQS	Open National Approach
3	**Individual Consulting Services**	**1.91**		
3.1	Hiring individual consultants to carry out master consultancy services at regional and national levels	1.56	Selection of Individual Consultants	Open National Approach
3.2	Consulting for analysis and interpretation of data and preparation of questionnaires	0.18	Selection of Individual Consultants	Open National Approach
3.3	Consulting for cost / effectiveness assessment of project actions	0.04	Selection of Individual Consultants	Open National Approach
3.4	Consulting for systematization of lessons learned	0.08	Selection of Individual Consultants	Open National Approach
3.5	Consultancy to prepare the final report of the project (Borrow request pre ICR).	0.05	Selection of Individual Consultants	Open National Approach
Total		**11.17**		

46. ***Procurement and Prior Review Thresholds:*** The Procurement Plan shall set forth contracts, which shall be subject to the World Bank's Prior Review based on the activity risks. All other contracts shall be subject to Post Review by the World Bank.

Table 3: Prior review thresholds based on the activity risks (USD million)

Activity Category	Activity Risks			
	High Risk	Substantial Risck	Moderate Risk	Low Risk
Works (Including turnkey, supply & installation of plant and equipment and PPP)	5.0	10.0	15.0	20.0
Good, Information Technology and non-consulting services.	1.5	2.0	4.0	6.0
Consulting Services (firms)	0.5	1.0	2.0	4.0
Individual Consultants	0.2	0.3	0.4	0.5

47. The above prior review thresholds apply to all procurement processes regardless of procurement or selection methods.

48. The determination of whether a contract reaches the threshold for prior review is based on the cost estimate of the respective contract or package of contracts, including all taxes and charges inherent in the contract or package of contracts to be procured or selected.

49. Particular procurement arrangements: On an exceptional basis, SENAR will apply its procurement procedures, commonly known "*Credenciamento",* to hire rural technicians and supervisors exclusively for activities related to i) Technical and Managerial Services for 2,500 rural farms counting with improved practices; ii) Training of field teams (technicians and supervisors: ATeG methodology and project themes); and iii) On-site training for rural producers (1 class per year per ATeG group. The operational manuals will describe how the procurement rules and procedures are acceptable to the Bank, i.e., up to the national procurement approach defined in the procurement plan. SENAR must accept the Bank's anti-fraud and corruption guidelines and the Bank's right to audit, passing them on to any contract it signs with proceeds from the agreement. Additionally, SENAR must issue a national advertisement every year during the project implementation to promote the SENAR's Register and bring new talents to the Register.

50. ***Sustainable Procurement and Gender Equality in Project's Procurement:*** SENAR must put in place measures to support sustainable procurement and gender equality in all project's procurement. To this end, SENAR will adopt criteria of sustainable procurement and gender equality in the project's procurement documents.

ANNEX 4. Greenhouse Gas Accounting Analysis

Background and Methodology

1. In its 2012 Environment Strategy, the World Bank adopted a corporate mandate to conduct greenhouse gas (GHG) emissions accounting for investment lending. The quantification of GHG emission is an important step in managing and ultimately reducing GHG emission, and is becoming a common practice for many international financial institutions. The World Bank adopted the Ex-Ante Carbon-balance Tool (EX-ACT) to assess the impact of agricultural and rural development investment lending in the Agriculture, forestry and Other Land Use (AFOLU) sector on GHG emissions from carbon stock changes and/or carbon changes rate, constituting the carbon-balance. EX-ACT was developed by the Food and Agriculture Organization of the United Nations (FAO) in 2010.

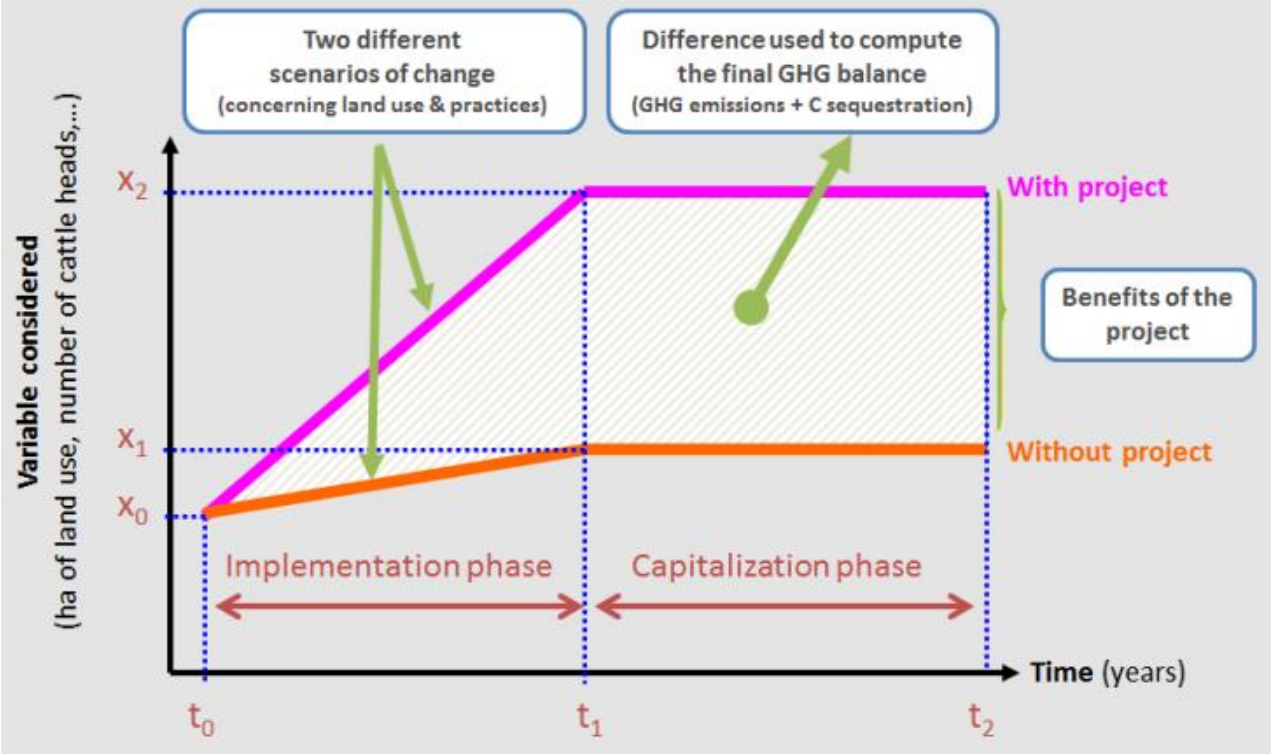
2. EX-ACT is a land-based accounting system, measuring GHG impacts per unit of land, expressed in tCO2-e per ha and year. It is based on the Intergovernmental Panel on Climate Change (IPCC) methodology for greenhouse gas (GHG) emissions inventories. Depending on information available, the tool would apply IPCC default values (Tier 1) and/or region specific coefficients (Tier 2). It takes into account baseline values to allow for comparisons between with-project and without project scenarios. EX-ACT provides its users a consistent way of estimating and tracking the impact of Agriculture, Forestry and Other Land Use (AFOLU) investments and policies on GHG emission levels. EX-ACT is the only GHG accounting tool to cover the entire AFOLU sector, including agricultural inputs, energy, infrastructure, management of mineral and organic soils, coastal wetlands, fisheries and aquaculture.

3. EX-ACT allows the ex-ante assessment of a project's net carbon-balance, defined as the net balance of CO_2 equivalent GHG that would be emitted or sequestered as a result of project implementation compared to a without project scenario, both with respect to the baseline situation.. EX-ACT estimates the carbon stock changes (emissions or sinks), expressed in equivalent tons of CO_2 per hectare and year. In other words, EX-ACT carbon balance compares the impacts of project intervention to the business-as-usual scenario. Thus, for each of the variables identified as relevant to the project, data is required for the following three situations: i) the baseline situation; ii) the With-Project scenario; iii) the Without-Project scenario (business-as-usual). Data requirements of EX-ACT are very similar to the usual data required for ex-ante, as well as ex-post, economic project analyses. The Figure 1 below illustrates the essential differentiation that is crucial for the correct understanding of EX-ACT and its application.

4. In Figure 1, X_0 denotes the initial situation of land use and management practices in the project area, (e.g. the amount of cropland managed under improved nutrient management). Intervention due to the project (With-Project scenario) will result in an increase in the area that benefits from improved management, to X_2. In the absence of project intervention (Without-Project scenario) this increase will likely be smaller – only X_1 hectares will benefit from improved management (see Baseline scenario building).

5. EX-ACT differentiates between two-time periods. The first is the implementation phase which defines the time period in which active project activities are carried out. This phase runs from t_0 until t_1. Thus the period covered by the analysis does not necessarily end with the termination of the active project intervention. Once an equilibrium in land use and agricultural practices is reached at t_1, further changes may occur due to the prior intervention, for instance in soil carbon content or in biomass. This period is defined as the capitalization phase and lasts from t_1 until t_2. The difference in activity data between the With- and Without-Project scenarios serves as the input data for calculating the carbon-balance of the project.

Figure 1: Visualizing the development scenarios used in EX-ACT



6. The Sustainable Multiple-Use Landscape Consortia in Brazil (Vertentes) is a World Bank funded project proposal that aims to increase the area under sustainable land management in selected beef cattle and soybean landscapes in Brazil and promote the integration of food systems and sustainable landscapes, conservation of biodiversity and recovery of degraded areas. The Project will be implemented in a five-year timeframe, starting in 2022. Project interventions are organized into three main components:

Component 1. Development and promotion of Sustainable Land Management (SLM) approach.
Component 2. Promotion of sustainable food production practices and responsible value chains.
Component 3. Conservation and restoration of natural habitats and mainstreaming biodiversity.
Component 4. Knowledge Management

7. To this extent, the analysis set forth will use the EX-ACT tool to assess the Greenhouse gas impacts associated with the activities contemplated in the proposed Project.

Application of EX-ACT

8. **Project boundaries.** A GHG appraisal of the Vertentes Project was carried out using EX-ACT, which quantifies the net carbon balance with regard to tCO2e resulting from GHGs emitted or sequestered during the project implementation and capitalization period (20 yeas) compared to the without-project scenario. The project, through Components 2 and 3,

will support, monitor and report on on-farm knowledge provision and investments on sustainable practices, committing to promote a Sustainable Land Management (SLM) approach - in line with Sustainable Land Management action plans (SLM-AP), supported through Component 1. The SLM models promoted by Vertentes Project are based on the experience and success of previous World Bank Projects, such as the sustainable Production in areas Previously Converted to Agriculture Land Use Project (ABC Cerrado Project). These models are applied to estimate the GHG Analysis and the Economic and Financial Analysis of the Project.

9. The following table (Table 1) summarizes the characteristics of the SLM investments under Component 1 and 2. For each SLM investment category, Table 1 indicates the projected land use, as well as the start/without project land use, and the corresponding area of intervention in hectares (ha).

Table 1: SLM investments supported by the Vertentes Project

Component	Model #	SLM Investments	Projected Land Use Type	Start/ Without project Land Use	With project (ha)	Start/ Without project (ha)
C2.1a	1	SLM in Soybean Production Systems	Annual crop (soybean)	Annual crop (soybean)	150,000	150,000
C2.1b	2	SLM in Livestock Production Systems	Grassland (non degraded)	Grassland (moderately degraded)	350,000	350,000
C3.1a	3	Restoration of degraded agriculture land (annual crops - soybean production)	Annual crop (soybean)	Degraded Land	12,000	12,000
C3.1b	4	Restoration of degraded agriculture land (grassland)	Grassland (non degraded)	Degraded Land	28,000	28,000
C3.2	5	Restoration of degraded forest and forest land	Afforestation (Forest Zone 2)	Degraded Land	9,800	9,800
C3.4a	6	Improved Land Management to benefit biodiversity - APPs	Afforestation (Forest Zone 4)	Set Aside	64,000	64,000
C3.4b	7	Improved Land Management to benefit biodiversity - RPPNs	Forest management (Forest Zone 2 non degraded)	Degraded forest land (Forest Zone 2 from low to large degradation)	14,000	14,000
		Total			**627,800**	**627,800**

10. Given the Project Development Objective, and past experience, SLM investments are based on the application of eligible technologies and practices contributing to mitigation of GHG, which at the same time increase the beneficiaries' resilience and the sustainability of landscapes and critical ecosystems.

11. The GHG accounting considers the following projected interventions with implications on GHG fluxes:
- Transition from business as usual to SLM production systems.
- Land use changes supporting an increase in forest cover and carbon sequestration – in ecosystems ranging from savanna (cerrado), thorny shrubs (caatinga) to tropical semideciduous forest. The approximate area and dynamics (initial, without project and with project) of diverse land uses is detailed in the following sections and summarized in the section on 'Land Use Changes'.

12. The technical capacities and enabling environment to attain the projected SLM investments is also considered in the institutional strengthening and TA activities under Component 1 and Component 4.

13. **Data source.** The main sources of data used to carry out the analysis include information generated by the ABC Cerrado Project, as well as government institutions involved in the preparation of the Vertentes Project. These inputs provide, amongst others, a detailed assessment on the technologies and practices supported by the project.

14. **Basic assumptions**. The geographic focal area of the Project has a sub-tropical climate and mostly dry regime. LAC soils are the dominant soil type. The timeframe of Project implementation is 4 years and the capitalization phase is 15 years, thus the analysis period is set for a total of 20 years. Dynamics of evolution are assumed to be linear for most of the variables. Default "Tier 1" coefficients for the EX ACT estimation were used. The construction of 'with-out project situation' and 'with project situation' trajectories is based on average technical references taken from the experience of previous and ongoing research and investment projects in Brasil.

15. **Annual crops.** The technical guidelines proposed for annual systems (soybeans production) incorporate "improved agricultural technologies and practices" that mitigate GHG emissions, while contributing to sustainable lands management. The EX-ACT-tool basic frame for accounting the improved agricultural technologies and practices for annual crops production include improved agronomic practices, nutrient management, no till & residue retention (table 2). It is estimated that at least 150,000 ha dedicated to annual crops will be subject to improved agricultural technologies and practices.

Table 2: Management options for annual crops

System	Management options				
	Improved agronomic practices	Nutrient management	No till & residue retention	Water management	Manure application
Climate resilient systems	Yes	Yes	Yes	No	No
Business as usual systems	No	Yes	No	No	No

16. **Livestock systems**. The project will implement sustainable land management in livestock systems, combining production intensification, good agricultural practices, improved grassland and pasture management, as well as upgraded breeding and feeding. As a conservative approach, feeding practices, additives and breeding are set to 0%. There is not sufficient information ex ante to define adequate baseline, with and with-out project values. Information on technical mitigation measures (particularly on feeding, dietary additives and breeding) can be assessed during the project implementation and included in further assessments of GHG balance. (See Table 3). It is estimated that 350,000 hectares

of grasslands, with low to moderate degradation level, will be subject to SLM practices leading to an increase in carrying capacity, while enhancing and maintaining its productivity.

Table 3: Livestock and manure management

Livestock categories	Head number (mean per year)			Technical mitigation option (%)								
	Start	Without project	With project	Feeding practices*			Specific Agents*			Breeding*		
				Start	With-out	With	Start	With-out	With	Start	With-out	With
Dairy				0	0	100	0	0	100	0	0	100
Cattle	434,774	434,774	524,568	0	0	100	0	0	100	0	0	100
Sheep				0	0	100	0	0	100	0	0	100
Swine (Market)				Feeding practices: e.g. more concentrates, adding certain oils or oilseeds to the diet, improving pasture quality,… Specific agents: specific agents and dietary additives to reduce CH4 emissions (Ionophores, vaccines, bST…) Breeding: increasing productivity through breeding and better management practices (reduction in the number of replacement heifers)								
Poultry												

17. **Restoration of degraded agriculture land**. Based on assessments from the FIP ABC Cerrado Project and studies from government and academic institutions (such as EMBRAPA), the Project identified the need to restore degraded lands to support soybeans production (12,000 hectares) and livestock systems (28,000 hectares), which would contribute to limit the conversion of forest to agriculture lands. A total of 40,000 hectares will be restored due to Project interventions.

18. **Reforestation of degraded forest and forest lands**. Besides the restoration of agriculture lands, the Project will also support the afforestation and reforestation of degraded forest and forest lands. For the purposes of this analysis, it is assumed that 9,800 hectares restored corresponds to tropical semi deciduous forest (Forest Zone 2 in EX-ACT Tool).

19. **Improved Land Management to benefit biodiversity.** This category of SLM investments include Afforestation and Reforestation of Permanent Preservation Areas (APPs) as well as Forest Management in Private Natural Heritage Reserves (RPPNs). In the case of APPs, it is assumed that the 64,000 hectares covered by the Project correspond mainly to degraded Cerrado ecosystem landscapes (tropical srhubland – Forest Zone 4 in EX-ACT Tool). For RPPNS, the assessment assumes that 14,000 hectares of tropical semi deciduous forest (Forest Zone 2 in EX-ACT Tool) will be subject to improved forest management that will avoid degradation and loss of biodiversity and other relevant forest ecosystem services.

20. **Land use change**. The evolution of land use per category is summarized in Table 4.

Table 4: Evolutions of land use /category (hectares)

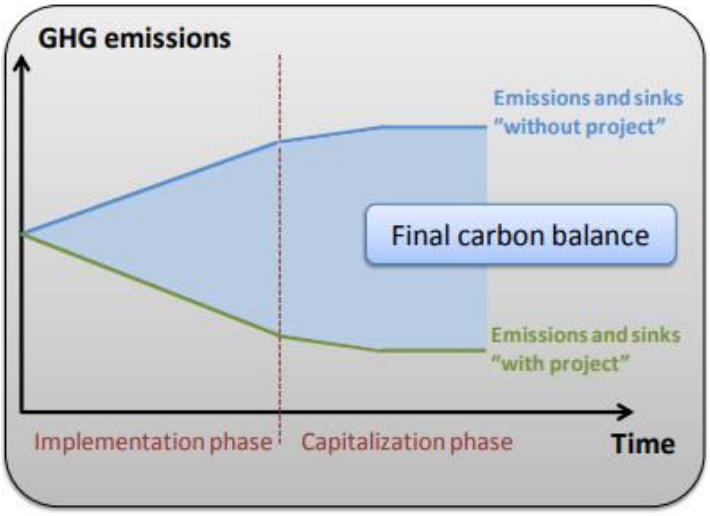
Evolutions of land use / category (hectares - ha)				
		Initial State	Without project	With project
Forest/Plantation		14,000	14,000	87,800
Agriculture	Annual	150,000	150,000	162,000
	Perennial	0	0	0
	Rice	0	0	0
Grassland		350,000	350,000	378,000
Other lands	Degraded	49,800	49,800	0
	Other	64,000	64,000	0
Wetlands		0	0	0
Total area (ha)		627,800	627,800	627,800

21. **Inputs**. The inputs considered in this GHG analysis are agricultural inputs (such as fertilizers and others). The available technical guidelines in annual crop production (soybeans production systems) include the use of improved seeds, fertilizers and pest control management. The amounts (tons per year) of fertilizers (nitrogen, phosphorus and potassium), herbicides, insecticides and fungicides were calculated based on data from SENAR. Data is available per hectare. The average amounts of inputs, in tons per year per hectare (at project start, without project and with-project) were multiplied by the projected area for annual crops (soybeans production systems).

Results

22. Interpretation of results from EX-ACT tool**. All agro-ecological conditions and activity data specified for each of the chosen EX-ACT modules are used in the calculation of GHG emissions and carbon stock changes. The comparison of net emissions reveals the difference between the With- and Without-Project scenarios. This difference is then used to determine the overall carbon-balance following project implementation (see Figure 2).**

Figure 2: Final carbon balance



23. **The main results EX-ACT results are shown in Table 5**. The EX-ACT results section includes: i) overall gross results, ii) overall carbon balance and iii) Gross results and carbon-balance by module. I. Overall gross results presents the gross

emission and sequestration results of the Without-project scenario (left column) and With-project scenario (right column). The values are given in tonnes of CO2 equivalents (tCO2-e) as totaled over the entire period of analysis, but also per hectare and per hectare and year. II. Overall carbon-balance compares the gross results of the With- and Without project scenarios to demonstrate the net difference that may be achieved through the project. This is referred to as the project's carbon-balance. III. Gross results and carbon-balance by module help identify those practices and activities that are the strongest sources of emissions or the most important carbon sinks.

24. **Net carbon balance**. The present GHG appraisal shows that the project leads to estimated annual climate change mitigation benefits of 991,146 of tCO2e, when compared to a business-as-usual baseline scenario. This is equivalent to annually reduced GHG emissions per hectare of 1.6 tCO2e. Thus, the project provides intermediate GHG emission reductions during project implementation. In total, an estimated incremental 19,822,929 tCO2eq will be avoided in the area intervened by the project (627,800 ha) over 20 years.

25. **Carbon sources and sinks**. The carbon sequestration benefits come principally from afforestation/restauration of degraded areas. SLM in Grasslands and soybean crops is also a significant contribution to GHG emissions reduction, while livestock and agrochemical inputs are sources of GHG emissions.

26. **Carbon sequestration from biomass and soil**. EX-ACT tool estimates the carbon balance in tons of CO2e from biomass and soil. Biomass contributes to the net reduction of 16.27 million tCO2e, which represents -25.8 tCO2e/year and -1.3 tCO2e/year/ha. Soil contributes to the net reduction of 5.75 million tCO2e, which represents -9.2 tCO2e/year and -0.5 tCO2e/year/ha.

27. **Sensitivity analysis**. The uncertainty, as calculated by EX-ACT-Tool, is 37.6%. This analysis was run using mostly tier 1 coefficients, which in some cases may provide over or underestimated values.

Table 5: Results of the ex-ante GHG analysis in tCO2-eq

Project Name	Brazil Vertentes	Climate	Tropical (Dry)				Duration of the Project (Years)		20
Continent	South America	Dominant Regional Soil Type	LAC Soils				Total area (ha)		627800
Components of the project	**Gross fluxes**			**Share per GHG of the Balance**				**Result per year**		
	Without	**With**	**Balance**	**All GHG in tCO2eq**				**Without**	**With**	**Balance**
	All GHG in tCO2eq			**CO_2**			**N_2O** / **CH_4**			
	Positive = source / negative = sink			**Biomass**	**Soil**	**Other**				
Land use changes										
Deforestation	0	0	0	0	0		0 / 0	0	0	0
Afforestation	0	-14,310,178	-14,310,178	-13,069,804	-1,240,374		0 / 0	0	-715,509	-715,509
Other LUC	0	-2,936,604	-2,936,604	-493,137	-2,443,467		0 / 0	0	-146,830	-146,830
Agriculture										
Annual	194,022	-729,082	-923,104	0	-183,750		-44,890 / -694,464	9,701	-36,454	-46,155
Perennial	0	0	0	0	0		0 / 0	0	0	0
Rice	0	0	0	0	0		0 / 0	0	0	0
Grassland & Livestocks										
Grassland	349,050	-1,572,083	-1,921,133	0	-1,572,083		-155,161 / -193,889	17,452	-78,604	-96,057
Livestocks	20,099,381	23,735,227	3,635,846				587,457 / 3,048,390	1,004,969	1,186,761	181,792
Degradation & Management										
Forest degradation	1,994,200	-1,511,033	-3,505,233	-2,707,649	-314,417		-99,026 / -384,141	99,710	-75,552	-175,262
Peat extraction	0	0	0		0		0 / 0	0	0	0
Drainage organic soil	0	0	0		0		0 / 0	0	0	0
Rewetting organic soil	0	0	0		0		0 / 0	0	0	0
Fire organic soil	0	0	0	0			0	0	0	0
Coastal wetlands	0	0	0	0	0		0 / 0	0	0	0
Inputs & Investments	2,397,107	2,534,584	137,477			47,496	89,981 / 0	119,855	126,729	6,874
Fishery & Aquaculture	0	0	0			0	0 / 0	0	0	0
Total	25,033,760	5,210,831	**-19,822,929**	**-16,270,590**	**-5,754,090**	47,496	378,361 / 1,775,895	1,251,688	260,542	**-991,146**
Per hectare	39.9	8.3	**-31.6**	**-25.8**	**-9.2**	0.1	0.6 / 2.8			
Per hectare per year	2.0	0.4	**-1.6**	**-1.3**	**-0.5**	0.0	0.0 / 0.1	2.0	0.4	**-1.6**

ANNEX 5. Summary of the Gender Analysis and Gender Action Plan

Preliminary Gender-Sensitive Diagnostic

51. Over the past few decades, Brazil has experienced significant improvements along several dimensions of gender equality. However, some challenges remain in terms of women's access to economic opportunities, particularly in rural settings. Compared to men, women face many disadvantages. In rural areas, gender inequalities in access to and control over resources are persistent. Women have more limited access to tangible assets than men. The 2017 IBGE Agricultural Census counted 5,056 rural landholdings covering an area of 351,289,816 hectares. Family farmers control 77.1 percent of these landholdings, but only 22.9 percent of the area. Women are a minority among landholders, as well as among rural workers. In total, only 18.7 percent of landholders are women: 19.7 percent among family farmers, and 15.2 percent among non-family farmers. In total they also represent only 29 percent of rural workers: 32.8 percent in family farms, and 21.3 percent of in non-family farms. Landholdings headed by women control just 19.5 percent of the total landholding area: 13.1 percent of the area of family farms, and 21.4 percent of the area of non-family farms. On average, landholdings headed by women are slightly larger than those headed by men: 72.40 hectares compared to 68.80 hectares (+5.2 percent). When comparing family and non-family farms, we find that the average size of family farms headed by women is equivalent to 61.1 percent of those headed by men, whereas the average size of non-family farms headed by women equals 151.8 percent of those headed by men.[72]

52. Women also have less access to information, technical assistance and extension services than men. According to the 2017 Agricultural Census, only 20.2 percent of all landholdings in the country had access to technical assistance, ranging from 27 percent in non-family farms to 18.2 percent in family farms. Relatively speaking, landholdings headed by women received less technical assistance than those headed by men: in the case of non-family farms, only 16.9 percent of landholdings headed by women received technical assistance, compared to 27.9 percent of those headed by men; whereas among family farmers, technical assistance benefited 11.2 percent of women-headed landholdings against 19.9 percent of those headed by men. In total, the rates were 12.3 percent and 21.8 percent, respectively. This gap hampers women's ability to learn about innovative and sustainable production practices. Traditional cultural norms and division of household labor are still prevalent among the rural population, and reduce women's mobility and available time to join learning events, meetings of producer organizations, and public planning consultation events.

53. Gender-related issues have a wide diversity and can be analyzed from different perspectives. In general, gender studies that analyze the rural context more frequently focus on the sexual division of labor, the traditional cultural norms of women's relationship with the land, work and family, often through qualitative methodolody[73]. Thus,

[72] *Source*: https://sidra.ibge.gov.br/pesquisa/censo-agropecuario/censo-agropecuario-2017.

[73] This contextual analysis gathered information from the following papers/articles/publications: Santos, N. A. A Sexual Division of Labor in Family Agriculture: between invisibility and devaluation of labor (re)production of rural women workers of the municipality of Brejo/MA against the expansion of soybean monoculture (2016); Solidaridad Brasil, Towards Gender Equality in the Cerrado and Amazonian productive chains; Santos, L. C. M. Women and Agroforests in the Cerrado (2017); Conservation International Brazil, PNUD and Good Growth Partnership. Responsible Expansion of Soy: Viable alternatives for the growth of agricultural production in consolidated areas (2021); Instituto Sociedade, População e Natureza. Who Are the Women of the Cerrado?; Nóbrega, S. C. The Work of Rural Women and the Conservation of the Cerrado in the APA do Rio Vermelho, Goiás(2021); Calado, C and Silva, V. Rural Women Ways of Life in Contexts of Expanding Agribusiness(2021).

dealing with gender relations in rural areas of the Brazilian Cerrado involves understanding the functioning of family farming in the biome.

54. Traditionally, the work of women in family farming in the Cerrado is linked to activities following the preparation of the land for the start of cultivation (such as some degree of deforestation and controlled fire), which, in theory, demands greater physical effort and is predominantly carried out by men. These are essential activities for the realization and maintenance of subsistence family production, without which production would not be successful, but which are made invisible and considered only support to the protagonist role of men in the property, an obligation imposed on women, to whom lies the commitment to care for the family.

55. In the Cerrado, women have been protagonists in the maintenance of agroforestry backyards, small integrated production systems that maintain continuous and diversified productivity, in addition to relying on forest and medicinal products, guaranteeing greater food sovereignty and access to traditional forms of herbal treatment and cure, in places with less access to public health services. It is also the space in which traditional knowledge is passed on between generations and collective tasks are carried out. In general, these are productions that do not use chemical inputs or pesticides. Activities related to extractivism also involve a large number of women, as well as its subsequent treatment and processing of the collected products. Extractive collection is sometimes also a collective activity and way of maintaining social and cultural norms among the rural population, especially among women. Agroforestry systems, commonly carried out in rural settlements that produce in their productive backyards, have a relationship that links small-scale agricultural production to the preservation of biodiversity, water sources and the Cerrado as a whole.

56. In areas of expansion of agribusiness, it has been common for men to leave their rural properties, which are less profitable, to work permanently or temporarily in the agricultural production of large soybean producers, leaving their original property in the care of family members, especially women, who accumulate work on the land with domestic and care tasks - unpaid and unvalued work. These larger (and more productive) properties do not absorb female labor in large quantities, as there is still a predominant idea that there are jobs that are more appropriate for each gender and, thus, jobs on a larger scale would be essentially male.

57. There is also an important issue related to family succession, since it is more common for small rural properties to be passed on to male children, while female daughters accompany husbands on their properties with marriage. However, in larger properties, whose family members have higher education level and family income, it has been increasingly common to observe women participating more actively in activities related to property, especially management, fostered by the female empowerment and gender equity movements, already better established in urban areas and in business and entrepreneurial contexts.

58. In summary, the main challenges faced by rural women include: (i) women's opportunities are constrained by insufficient information and knowledge about technological innovations and public policies; (ii) women's opportunities are constrained because most public institutions and implementing agencies do not involve men and women equally in the design, implementation, management, monitoring, and evaluation of policies or projects; (iii) time, transportation and safety constraints, as well as cultural norms, prevent women from participating in training, capacity-building, and extension activities; (iv) extension services for women remain rare, and, when such services are available, women often tend to benefit less than men; and (v) extension service agents tend to approach male farmers more often than female farmers because of the general misconception that women do not farm, and that extension advice will eventually "trickle down" from the male head of household to the other members of the family—therefore, the way in which extension services are delivered may also prevent women from receiving

information on innovations.

Objectives

59. The project is committed to identifying and reducing gender gaps among its beneficiaries, as well as acting to improve women's agency at landscape (governance and management) and landholding (business and production decisions) levels. The project also supports an SLM approach and the creation of landscape consortia with farmers involved in the soybean and beef cattle chains and aims to deliver capacity-building and extension activities for the promotion of better management and the adoption of sustainable agricultural practices, as well as the conservation and restoration of natural habitats. As such, it may contribute to addressing some of the key challenges that hamper gender equity.

60. It is understood that the project may support women in distinct different lines of action, such as:
- Further assessing gender gaps at the landscape level and fostering women's participation in the creation or strengthening of landscape consortia;
- Providing technical assistance, training and capacity building for productive activities associated with sustainable and innovative food production practices and responsible value chains, in which there is strong participation of women;
- Providing technical assistance, training and capacity building in conservation and restoration of natural habitats for women;
- Other themes related to the Project scope.

61. The creation of landscape consortia included in-depth studies of the landscape. These studies shall adopt a gender-sensitive approach that should be able to refine the identification of key gender gaps at the landscape level, and take them into consideration when organizing consultation meetings with key stakeholders. In preparation for these consultation meetings, the project will take into account women's time, spatial, and security constraints to participate in the consultation process itself, as well as in all training and capacity-building activities fostering sustainable and innovative food production practices and responsible value chains, and conservation and restoration of natural habitats.

Lessons Learned and Incorporated in Project Design

62. The implementation of the Gender Action Plan will rely on SENAR's recent implementation of *P143184 Sustainable Production in Areas Previously Converted to Agricultural Use*. In this project, no gender targets were established and there was no process aimed at including a certain number of women in training events. Nevertheless, the Gender Action Plan was implemented to increase opportunities for providing training and technical assistance to women, and women's participation was monitored in the results framework. Hence, after the January 2017 mid-term review reported low female participation, SENAR was ready to adopt an improved communication strategy to attract more women to training events—through advertisement specifically targeted at women; by hiring female instructors, field technicians, and supervisors; and by featuring more women in training videos.

63. The Borrower Completion Report relates that interviewed technicians, supervisors, instructors, and mobilizers recall a good level of female participation in project activities, even though many were accompanying their husbands, who were the formal owners of the land. Furthermore, the project's Results Framework reports that 2,300 women farmers received training and/or technical assistance (20.2 percent of the total); 1,781 female field technicians were trained

(22 percent of the total); and 475 women farmers have adopted improved agricultural technology promoted by the project (16.2 percent of the total). According to the instructors, during the training courses, women showed more interest and dedication than men in learning ABC technologies. A perception analysis with 313 producers included in the BCR also highlights, on average, a slightly higher willingness to adopt low-carbon agriculture technologies among women than among men.

64. A lesson on gender drawn from the implementation of P143184 is that, within the scope of establishing the target audience, the definition of indicators referring to the percentage of female participation must be assessed in a participatory way, with regional managers and technicians, and based on regional research and more detailed studies.

Approach

65. By incorporating this lesson when defining the approach of this Gender Action Plan, the project will establish specific eligibility criteria for women participation based on gender-sensitive social assessments to be carried at the landscape level (as part of the support to the creation of soybean and cattle farming landscape consortia), as well as on agreements with beneficiaries and/or their associations. Thus, the social assessments will analyze the differences between men and women in aspects related to access to and control over land, natural resources and economic assets; map the participation of women and their representative organizations in selected production chains; and examine constraints to female participation in decision-making and planning activities. The project will also seek to engage with existing women farmers' organizations—such as the Women's Agribusiness Center (*Núcleo Feminino do Agronegócio*—NFA); the Women's Livestock Center of Goiás (*Núcleo Feminino da Pecuária Goiana*—NFPGO); the Women's Forest Network (*Rede Mulher Florestal*); and the Network of Women farmers from the Cerrado and Pantanal (*Rede de Mulheres Produtoras do Cerrado e Pantanal*—CerraPan)—and promote their participation in landscape consortia. The project will also seek to disseminate its activities to other women's organizations and the National Congress of Women in Agribusiness (CNMA). Additionally, the key stakeholder engagement strategy will consider the use of tools such as apps and simple surveys to continuously collect feedback from women and representative leaderships at the landscape level, so as to guide and refine the implementation of the Gender Action Plan, together with data obtained from SISATeG—SENAR's Technical and Management Support System.

66. Finally, the Gender Action Plan will include a set of activities that the literature considers critical for overcoming gender inequalities and empowering women in the project's communication strategy, the organization of project-supported training and capacity-building activities, and project-supported technical assistance and extension services. Hence, the project communication strategy will take the appropriate steps to inform women in the selected productive landscapes about project activities. The project will target communication activities to include venues that women and/or female-headed landholdings usually attend or have access to. The organization of workshops and meetings will consider women farmers and/or female-headed landholdings' time, spatial, and security constraints. As such, they will be arranged and carried out at times and in places that are well aligned with women's needs, productive tasks, and domestic and family responsibilities so as to foster more active participation. Training and capacity-building events will reach out for the enrollment of both men and women. These events will be organized at times and in places that are well aligned with women's needs to ensure their enrollment and participation. The landscape consortia will not only include specific directives preventing gender discrimination in the composition of its boards, but will rather encourage female participation at board level. Finally, technical assistance and extension services will include targets related to the share of farms owned by women that receive visits from extension service agents, and the share of women and/or female-headed landholdings that receive guidance. All activities included in this Gender Action Plan will follow safety procedures in line with the COVID-19 prevention measures adopted by the

project.

Activities

67. The project's Gender Action Plan is organized according to the following main axes: (i) deepening the understanding of gender gaps at the landscape level; (ii) fostering female participation in landscape consortia; and (iii) providing training and capacity building for productive activities. These axes, activities, expected results and monitoring indicators are summarized in table 1 below.

Table 1: Axes and Activities Supported and Developed by the Vertentes Project Aimed at Reducing Gender Gaps

Themes	Activities	Expected results	Monitoring information
Axis 1: Deepening the understanding of gender gaps at the landscape level			
Better understanding of gender gaps and constraints to women's agency at the landscape level	• Carrying out a gender-sensitive social impact assessment that would identify: (a) the main gender gaps that may constrain women engagement in project activities; (b) the drivers to foster participation of women in landscape consortia; and (c) women participation in initiatives and business opportunities in sustainable production chains within the project's intervention PAs.	• Gender gaps and constraints on the engagement of women in project activities identified; • Representative organizations of women at the landscape level identified; • Sustainable and innovative production chains with strong participation of women identified; • Strategic actions to engage women in project activities developed.	• Gender-sensitive social impact assessments at the landscape level completed as part of the process of creating or supporting landscape consortia.
Axis 2. Fostering women's participation			
Women's participation	• Promoting women's participation in landscape consortia (through communication, mobilization and participation strategies).	• Individual women and women groups engaged in project activities.	• Women inserted in production chains supported by the project; • Women engaged and represented in priority actions of the Sustainable Land Management Action Plans.
Axes 3. Supporting capacity building and participation of women in sustainable production chains and restoration of natural habitats			
Project benefits shared with women and women groups	• Holding training events on various topics for women; • Holding training events on sustainable production technologies (exchanges, field days, knowledge exchanges) in production chains with strong female participation; • Holding training events; • Providing technical assistance to women.	• Women benefited by the Vertentes Project interventions.	• Women participating in training events; • Women receiving technical assistance; • Women engaged in sustainable and innovative production chains; • Women adopting sustainable and innovative practices within their landholdings; • Women adopting natural habitat conservation and restoration practices within their landholdings.

ANNEX 6. Selection and Key Characteristics of the Project Sites

Cerrado Biome

1. The Cerrado covers approximately 204 million hectares of the Brazilian Central Plateau (24 percent of the country´s total land area). As the second largest biome in South America, it is home to the headwaters of three major South American river basins, which include the Tocantins-Araguaia, the Paraná-Paraguai-Plata, and the São Francisco. The Cerrado's central position means that it overlaps with other biomes, such as the Atlantic and Amazon Forests, the Caatinga and the Pantanal. The Cerrado is highly seasonal, with marked wet and dry seasons, and rainfall between 800–1,800 mm. Approximately 90 percent of the annual rainfall occurs during the rainy season (between October and April).

2. One of the richest and most diverse regions in the world,[74] the Cerrado is regarded as one of 34 global biodiversity hotspots[75] due to its high level of endemism and rapid loss of habitat.

3. The Cerrado landscape is a vegetation mosaic ranging from open grasslands to forest formations, varying in structure, composition and levels of deciduousness.[76] Riparian forests exist throughout the region, occupying 5 percent of the Cerrado area and containing about 32 percent of its biodiversity. The Cerrado has the greatest diversity of plants among all tropical savannas, containing some 12,000 species (44 percent of which are endemic).[77] It is also home to 195 species of mammals, 605 species of birds, and 800 species of freshwater fish (25 percent of which are endemic). According to recent estimates, the Cerrado harbors 13 percent of the butterflies, 35 percent of the bees, and 23 percent of the termites found in the neotropics.

4. Three regional centers of biodiversity in the Cerrado (southeastern, northeastern and central Cerrado) have been identified, based on drought and frost polygons, and on different altitudes (around 400–

Box A6.1: Cerrado Biome: Facts and Figures

Area: 2.04 million km² (24 percent of Brazil)

Distribution: Bahia, Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Paraná, Piauí, São Paulo, Tocantins, and the Federal District.

Private landholdings:
1,059,181 units; 1,477,415 km²
Small landholdings:
826,058 units (78 percent); 218,693 km² (15 percent)
Medium & large landholdings:
233,123 units (22 percent); 1,258,722 km² (85 percent)

Agriculture:
135 million heads of cattle (64 percent of natural herd); and 61 percent of Brazil's soybean production in 2011

Protected areas: 167,381 km² (8.2 percent)

Strict protection: 59,522 (2.9 percent)

Sustainable use: 104,637 (5.1 percent)

Indigenous lands (TIs):
88,762 km² (4.3 percent); Number of TIs: 89
Quilombola lands (TQ):
5,519 km² (0.3 percent); Number of TQ: 41

Deforestation rate:
2018–19: 6,500 km²; 2017–18: 6,600 km²
Cumulative deforestation:
1,000,334 km² (49 percent of the biome)

Emissions:
2010 CO_2 emissions from **land use and forestry activities in the Cerrado**: 109 $TgCO_2e$ (39 percent of national land-use and forestry emissions)
Mitigation targets: Brazil committed to a GHG reduction target of 36–39 percent of projected emissions by 2020, implying a reduction in emissions of ~1 billion tCO_2e/year by 2020. Targets include a 40-percent reduction in deforestation in the Cerrado (104 $MtCO_2e$), and the recovery of 15 million ha of degraded pastures (104 $MtCO_2e$).

[74] Lewinsohn, and Prado. 2005. Quantas espécies há no Brasil. Megadiversidade, Belo Horizonte, v. 1, n. 1, p. 36–42, jul. *2005.*
[75] Mittermeier et al. 2005. https://www.jstor.org/stable/3591042.
[76] Ribeiro, and Walter. 1998.
[77] Mendonça et al. 2008.

500m, or 900–1,000m) (Castro, 1994).[78]

5. According to the findings of the TerraClass Cerrado report (2013), only 54.5 percent of the Cerrado has maintained its natural vegetation, and pastures now occupy 29.5 percent of the biome, while crop agriculture occupies 11.6 percent. Annual agriculture and perennial crops account for 8.5 percent and 3.1 percent of the Cerrado area, respectively.

6. Since the 1940s, the Cerrado biome has been the stage for an expansion of agricultural production, mainly through cattle ranching; and since the 1970s, for the commercial production of soybeans, corn and cotton. Agricultural activity is likely to continue increasing in the Cerrado because it still has very large areas with agricultural and forestry potential. These areas are likely to become more accessible and, therefore, more attractive to investors, who may also benefit from rising prices in agricultural commodities.

7. In this context, the project site areas were defined based on multicriteria analyses and a multistakeholder process aimed at maximizing environmental and agricultural benefits.

Selection of Productive Landscapes (PLs)

8. The Vertentes Project will focus on nine Productive Landscapes (PLs), covering approximately 47,159,091 ha in the states of Bahia, Goiás, Mato Grosso, Mato Grosso do Sul, and Minas Gerais, and in the Federal District (see map in Annex 8). The states, watersheds, and number of municipalities covered by each PL are shown in table 1.

Table 1. Watersheds, States and Municipalities of the Nine Productive Landscapes

Productive landscapes	Watersheds	States	Number of municipalities
PL 1: Emas—Alto Taquari	Watersheds: Tocantins, Araguaia, and Paraguai (Platina). Subwatersheds: Alto Araguaia, Alto Rio das Mortes, and Alto Taquari.	Goiás	9
		Mato Grosso	1
		Mato Grosso do Sul	10
PL 2: Quedas do Araguaia—Couto Magalhães		Goiás	7
		Mato Grosso	13
		Mato Grosso do Sul	1
PL 3: Goyáz Velho	Watersheds: Tocantins, and Paranaíba	Goiás	73
PL 4: Serra Geral de Goiás		Goiás	20
PL 5: Acaba-Vida	Watersheds: Tocantins, São Francisco, and Paranaíba	Bahia	4
PL 6: Geraes da Bahia		Bahia	6
PL 7: Geraes do Grande Sertão Veredas		Minas Gerais	23
PL 8: Paracatu do Príncipe		Federal District (DF)	1
		Goiás	2
		Minas Gerais	13
PL 9: Lenda do Abaeté		Minas Gerais	20

9. The nine PLs were selected based on hydrographic, agricultural, and other land-use-related criteria. Key environmental characteristics of these nine PLs are found in table 2, and agricultural and other socioeconomic characteristics of each PL are described in box 1.

[78] Brazil Investment Plan. 2012.

Table 2: Environmental and Biodiversity Features of the Nine Productive Landscapes

Productive landscape (PL)	Biome coverage	Environmental features	Endemic species	Biological importance
PL 1: Emas—Alto Taquari	Cerrado, combined with elements of Pantanal and Atlantic Forest.	Araguaia, Taquari and Peixe rivers; Paranaíba spring; Serranópolis thermal waters; archaeological sites; Salto do Sucuriú Falls.	*Alipiopsitta xanthops* (yellow-faced parrot, or papagaio do Cerrado); *Tolypeutes matacus* (southern three-banded armadillo, or tatu-bola ocidental); *Cattleya walkeriana* (Walker's cattleya); *Butia purpurascens* (purple yatay, or butiá vermelho); *Byrsonima cordifolia*; *Hippeastrum leucobasis*.	Of 17 identified priority areas, indications of biological importance are "extremely high" in 4 areas; "very high" in 12; and "high" in 1.
PL 2: Quedas do Araguaia—Couto Magalhães	Cerrado combined with elements of Pantanal, Cocais Forest and Amazon Forest.	Couto Magalhães Falls; Araguaia river beaches and islands; Marimbondo Falls; Sonora Canyon, Serra de Sonora range; Serra do Roncador range; Serra de Itiquira range; Barra do Garças thermal waters; ebb lakes and ponds.	*Inia araguaiensis* (Araguaia river dolphin, or boto do Araguaia); *Cattleya araguaiensis* (Araguaia cattleya); *Potamotrygon henlei (*Tocantins river ray, or arraia do Araguaia); *Hyphessobrycon amandae* (ember tetra, or tetra foguinho).	Of 18 identified priority areas, indications of biological importance are "extremely high" in 7 areas; and "very high" in 11.
PL 3: Serra Geral de Goiás	Cerrado, Caatinga, and ecotone.	Serra Geral de Goiás range; Paraná Canyon (hang-gliding free flight sites); Chapada dos Veadeiros plateau; Serra Geral range (rock cliffs); Buraco das Araras (sinkhole); Terra Ronca and other caves; Salto do Itiquira Falls and other waterfalls; Carste de Mambaí; areões da serra; Paraná meteor crater; Funil gorge and waterfall; thermal waters; lakes; scenic rivers.	*Mergus octosetaceus* (Brazilian merganser, or pato mergulhão); *Kerodon acrobata* (acrobatic cavy, or mocó da Chapada); *Tolypeutes tricinctus* (Brazilian three-banded armadillo, or tatu-bola oriental); *Pyrrhura pfrimeri* (Pfrimer's parakeet, or tiriba vermelha); *Bauhinia malacotrichoides*; *Cattleya walkeriana* (Walker's cattleya); *Podocarpus brasiliensis* (pinheiro de Brasília); *Cattleya nobilior* (nobler cattleya); *Podocarpus barretoi* (pinheiro da Chapada); *Vellozia albiflora* (canela-de-ema branca); *Cavanillesia umbellata* (Brazilian baobab, or barriguda); *Chorisia glaziovii* (white cotton-silk tree, or paineira branca).	Of 13 identified priority areas, indications of biological importance are "extremely high" in 2 areas; "very high" in 9; and "high" in 2.
PL 4: Goyáz Velho	Cerrado, combined with elements of Atlantic Forest and Cocais Forest.	Almas, Tocantinzinho; Corumbá, Bois, and Verde river watersheds; Serra Dourada range; Serra dos Pireneus range; Serra do Pouso Alegre range; historical towns; Chapada da Vendinha	*Cattleya walkeriana* (Walker's cattleya); *Podocarpus brasiliensis* (pinheiro de Brasília); *Cattleya bicolor* (bicolored cattleya);	Of 18 identified priority areas, indications of biological importance are "extremely high" in 6 areas; and "very high" in 12.

		plateau; Chapada de Brasília plateau; Ecos and other caves; Salto do Corumbá Falls; Morro do Cabeludo hill; Morro do Rodeador hill; Contagem Canyon; archaeological and paleontological sites; lakes; waterfalls; Serra Dourada rocky cliffs.	*Phragmipedium vittatum* (striped phragmipedium, or orquídea sapatinho de vênus); *Juscelinomys candango* (candango mouse, or rato candango); *Cynolebias boitonei* (Brasilia lyrefin, or pirá-brasília); *Rivulus brasiliensis (*rivulo do Planalto); *Mesosetum longiaristatum*; *Tibouchina papyrifera*; *Otachyrium piligerum;* *Vochysia haenkeana* (pau dourado); *Scytalopus novacapitalis* (Brasilia tapaculo, or tapaculo de Brasília); *Brycon orbignyanus* (piracanjuba); *Taoniscus nanus* (dwarf tinamou, or inhambú carapé).	
PL 5: Acaba-Vida	Cerrado, combined with elements of Caatinga.	Corrente, Grande and Santa Maria river watersheds; Cataratas do Acaba-Vida Falls; Redondo Waterfall; Ondas river; scenic rivers; Chapada das Barreiras plateau; Cuesta da Serra Geral.	*Cattleya nobilior* (noble cattleya)*;* *Mauritiella armata* (moretillo palm, or buritirana); *Claravis pretiosa* (blue ground dove, or pomba pararú); *Cavanillesia arborea* (Brazilian baobab, or barriguda).	Of 8 identified priority areas, indications of biological importance are “extremely high” in 3 areas; and “very high” in 5.
PL 6: Geraes da Bahia	Cerrado, combined with elements of Caatinga.	Scenic rivers; Geraes; historical towns; Cuesta da Serra Geral; *Cavanillesia umbellata* woods; waterfalls.	*Cattleya nobilior* (noble cattleya)*;* *Mauritiella armata* (moretillo palm, or buritirana); *Cavanillesia arborea* (Brazilian baobab, or barriguda); *Claravis pretiosa* (blue ground dove, or pomba pararú); *Chorisia glaziovii* (white cotton-silk tree, or paineira branca); *Cavanillesia arborea* (Brazilian baobab, or barriguda).	Of 10 identified priority areas, indications of biological importance are “extremely high” in 4 areas; “very high” in 5; and “high” in 1.
PL 7: Geraes do Grande Sertão Veredas	Cerrado, Caatinga, and ecotone.	Plateaus; Serra das Araras; Peruaçu and other caves; Geraes; scenic rivers; archaeological and paleontological sites; historical towns; rocky cliffs; river beaches.	*Charitospiza eucosma* (coal-crested finch, or mineirinho); *Cattleya nobilior* (noble cattleya)*;* *Mauritiella armata* (moretillo palm, or buritirana); *Cavanillesia arborea* (Brazilian baobab, or barriguda); *Claravis pretiosa* (blue ground dove, or pomba pararú); *Chorisia glaziovii* (white cotton-silk tree, or paineira branca); *Nothura minor* (lesser nothura, or codorna mineira); *Nothura boraquira* (white-bellied nothura, or codorna buraqueira).	Of 9 identified priority areas, indications of biological importance are “extremely high” in 4 areas; and “very high” in 5.
PL 8: Paracatu do Príncipe	Cerrado, combined with elements of Caatinga and Atlantic Forest.	Paracatu river watershed; Serra dos Cristais range; Serra dos Topázios range; caves; Geraes; river beaches; lakes;	*Cattleya walkeriana* (Walker’s cattleya); *Podocarpus brasiliensis* (pinheiro de Brasília);	Of 9 identified priority areas, indications of biological importance

		ebb ponds; plateaus (*chapadas*); historical towns; archaeological and paleontological sites.	*Cattleya bicolor* (bicolored cattleya); *Phragmipedium vittatum* (striped phragmipedium, or orquídea sapatinho de vênus); *Juscelinomys candango* (candango mouse, or rato candango); *Mesosetum longiaristatum; Otachyrium piligerum; Vochysia haenkeana* (pau dourado); *Scytalopus novacapitalis* (Brasilia tapaculo, or tapaculo de Brasília); *Taoniscus nanus* (dwarf tinamou, or inhambú carapé); *Nothura minor* (lesser nothura, or codorna mineira); *Nothura boraquira* (white-bellied nothura, or codorna buraqueira).	are "very high" in 2 areas; and "high" in 7.
PL 9: Lenda do Abaeté	Cerrado, combined with elements of Atlantic Forest.	Abaeté river watershed; Serra da Canastra range (northwest face); waterfalls; caves; archaeological and paleontological sites; medicinal waters; lakes.	*Mergus octosetaceus* (Brazilian merganser, or pato mergulhão); *Vochysia haenkeana* (pau dourado); *Scytalopus novacapitalis* (Brasilia tapaculo, or tapaculo de Brasília); *Taoniscus nanus* (dwarf tinamou, or inhambú carapé); *Nothura minor* (lesser nothura, or codorna mineira).	Of 5 identified priority areas, indications of biological importance are "very high" in 4 areas; and "high" in 1.

Box A6.2: Agricultural and Other Socioeconomic Characteristics of the Nine Productive Landscapes

PL 1: Emas—Alto Taquari is located in the Araguaia-Taquari watershed in the states of Goiás, Mato Grosso and Mato Grosso do Sul, covering 20 municipalities, with an area of 8.5 million hectares, 610,000 inhabitants, and 14,204 rural properties (13.5 percent of which are owned by women). In 2017, soybean production reached nearly 4.6 million metric tons in 1,3 million hectares of harvested area, 98.7 percent of which employing no-till farming techniques. In the same year, the total cattle herd comprised 3.8 million heads in 3.8 million hectares of grasslands, 36.3 percent of which present some degree of pasture degradation.

PL 2: Quedas do Araguaia—Couto Magalhães is located in the Alto Araguaia, Alto Rio das Mortes and Alto Taquari subwatersheds in the states of Goiás, Mato Grosso and Mato Grosso do Sul, covering 21 municipalities, with an area of 7.8 million hectares, 229,882 inhabitants, and 13,449 rural properties (17 percent of which are owned by women). In 2017, soybean production reached 2.4 million metric tons in 730.937 hectares of harvested area, 99.8 percent of which employing no-till farming techniques. In the same year, the total cattle herd comprised 2.9 million heads in 3.1 million hectares of grasslands, 45.7 percent of which present some degree of pasture degradation.

PL 3: Goyáz Velho is located in the Tocantins and Paranaíba watersheds in the state of Goias, covering 74 municipalities, with an area of 7.8 million hectares, 230,000 inhabitants, and 51,969 rural properties (14.6 percent of which are owned by women). In 2017, soybean production reached 1.4 million metric tons in 400,220 hectares of harvested area, 96.2 percent of which employing no-till farming techniques. In the same year, the total cattle herd comprised 3.9 million heads in 3.08 million hectares of grasslands, 34.3 percent of which present some degree of pasture degradation.

PL 4: Serra Geral de Goiás is located in the Tocantins and Paranaíba watersheds in the state of Goiás, covering 21 municipalities, with an area of 3.9 million hectares, 368,803 inhabitants, and 15,440 rural properties (20.6 percent of which are owned by women). In 2017, soybean production reached 319,000 metric tons in 94,242 hectares of harvested area, 98.4 percent of which employing no-till farming techniques. In the same year, the total cattle herd comprised 1.3 million heads in 1.3 million hectares

of grasslands, 59.7 percent of which present some degree of pasture degradation.

PL 5: Acaba-Vida is located in the Tocantins, São Francisco and Paranaíba watersheds in the state of Bahia, covering 4 municipalities, with an area of 3.3 million hectares, 299,000 inhabitants, and 6.554 rural properties (23.2 percent of which are owned by women). In 2007, soybean production reached 2.6 million metric tons in 809,452 hectares of harvested area, 96.9 percent of which employing no-till farming techniques. In the same year, the total cattle herd comprised 203,123 heads in 186,115 hectares of grasslands, 89.5 percent of which present some degree of pasture degradation.

PL 6: Geraes da Bahia is located in the Tocantins, São Francisco and Paranaíba watersheds in the state of Bahia, covering 6 municipalities with 3.7 million hectares, 119,000 inhabitants, and 12,122 rural properties (16.6 percent of which are owned by women). In 2017, soybean production reached 810,000 metric tons in 272,823 hectares of harvested area, 93,5 percent of which employing no-till farming techniques. In the same year, the total cattle herd comprised 219,000 heads in 392,000 hectares of grasslands, 73.4 percent of which present some degree of pasture degradation.

PL 7: Geraes do Grande Sertão Veredas is located in the Tocantins, São Francisco and Paranaíba watersheds in the state of Minas Gerais, covering 23 municipalities with 4.9 million hectares, 374,189 inhabitants, and 28,149 rural properties (16.8 percent of which are owned by women). In 2017, soybean production reached 361,000 metric tons in 113,201 hectares of harvested area, 96.8 percent of which employing no-till farming techniques. In the same year, the total cattle herd comprised 719,000 heads in 1.1 million hectares of grasslands, 69.3 percent of which present some degree of pasture degradation.

PL 8: Paracatu do Príncipe is located in the Tocantins, São Francisco and Paranaíba watersheds in the states of Goiás and Minas Gerais, and in the Federal District, covering 16 municipalities with 5.3 million hectares, 3.4 million inhabitants, and 19,168 rural properties (14.8 percent of which are owned by women). In 2017, soybean production reached 1.7 million metric tons in 519,186 hectares of harvested area, 95.7 percent of which employing no-till farming techniques. In the same year, the total cattle herd comprised 1.3 million heads in 1.5 million hectares of grasslands, 74.6 percent of which present some degree of pasture degradation.

PL 9: Lenda do Abaeté is located in the Tocantins, São Francisco and Paranaíba watersheds in the state of Minas Gerais, covering 20 municipalities with 2.5 million hectares, 82,359 inhabitants, and 21,073 rural properties (8.5 percent of which are owned by women). In 2017, soybean production reached 423,647 metric tons in 123,340 hectares of harvested area, 98.7 percent of which employing no-till farming techniques. In the same year, the total cattle herd comprised 1.2 million heads in 1.04 million hectares of grasslands, 49.1 percent of which present some degree of pasture degradation.

Selection of Project Intervention Areas Within the Nine Productive Landscapes

10. During implementation, specific criteria will be developed to select subsets for project intervention. Such criteria will include:

(i) High level of soil degradation;
(ii) Importance of local environmental characteristics;
(iii) High incidence of endemic species;
(iv) Importance for beef cattle and soybean production;
(v) Presence of farmers' organizations, enterprises and leaders with a vision toward more sustainable agriculture and livestock practices; and
(vi) Implementing agency's capacity to deliver capacity-building programs.

11. In the first year of implementation, the PIU will carry out comprehensive studies to update and improve the current characteristics of the nine selected PAs, including: agricultural production and productivity levels; location and degree of land degradation; environmental (water and soil) and biodiversity conditions; socioeconomic characteristics of rural producers and local communities; existing local market actors and outlets; and mapping of relevant stakeholders.

ANNEX 7. Major Related Projects Financed by the Bank and/or Other Agencies

1. The World Bank has been developing its approach to the Cerrado biome in Brazil by building partnerships at all government levels, as well as with the private sector and civil society. Its integrated approach includes analytical studies, lending, trust funds, and partnership activities. The deployment of Bank resources is based on the principles of flexibility, selectivity, innovation, and leveraging.

2. The biome approach combines conservation with the promotion of local and regional rural economic development. Currently, the World Bank is supporting initiatives led by the Government of Brazil (GoB) to foster inclusive development through several programs and projects.

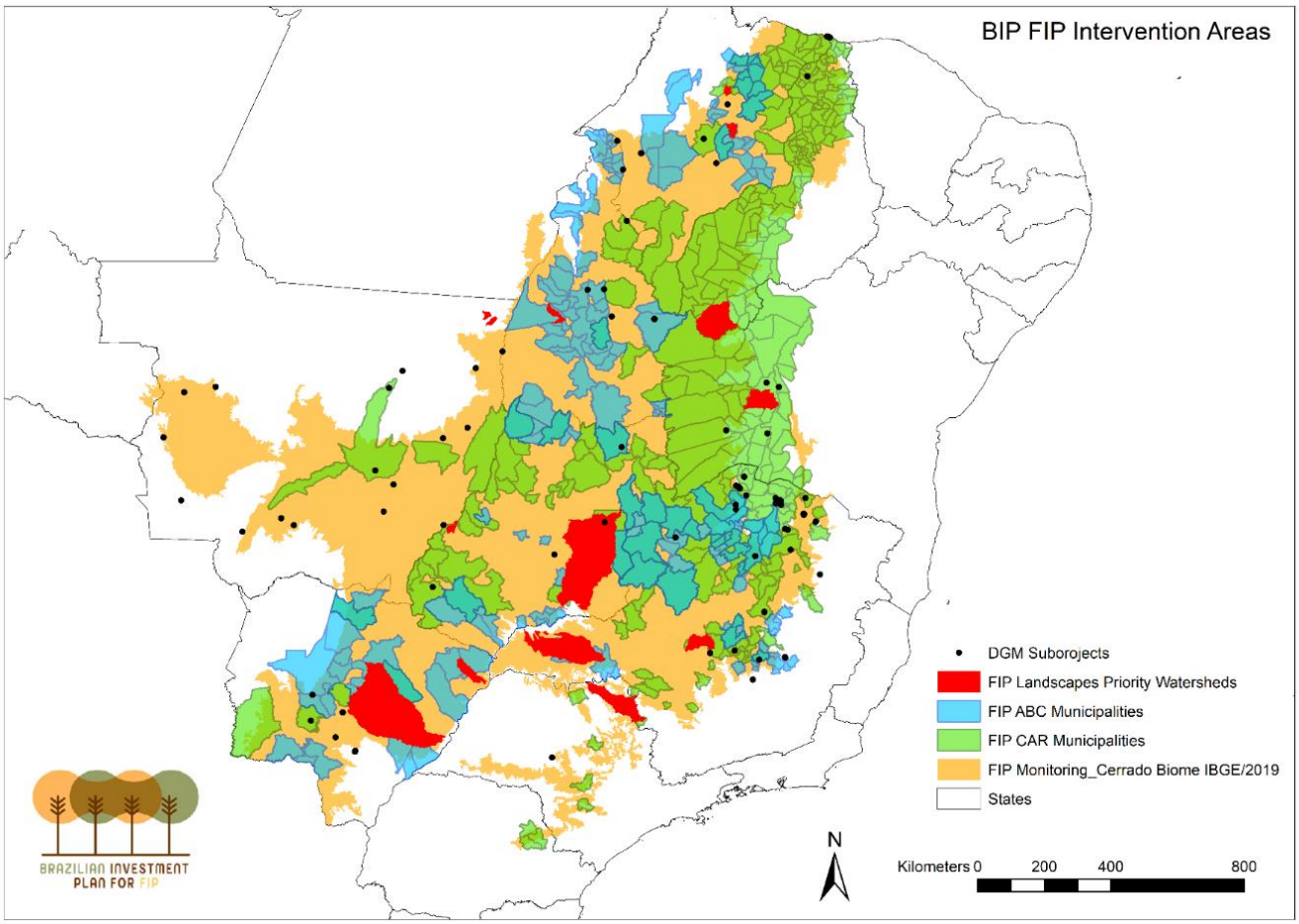
3. Moreover, the World Bank is supporting the GoB's efforts to improve efficiency in project planning and delivery. Thus, the Cerrado biome conservation approach also considers the best way to combine different programs and projects, promoting synergies and avoiding duplication.

4. Therefore, this project is included in wider policies and national plans which the GoB sees as priority. In parallel with GEF support, the GoB continues to foster initiatives related to its national policies and plans through annual budget allocations and other international funds. The project will operate in synergy with ongoing Cerrado government plans and policies already under implementation at federal, state and municipal levels. The table below presents the main related projects financed by the World Bank and/or other agencies.

Table 1. Main related projects financed by the World Bank and/or other agencies

Sector issue	Project name	Project number	Geographic area	Project period
Bank-financed				
Sustainable development	Tocantins Sustainable Regional Development Project	P121495	State of Tocantins	2013–22
	Bahia Sustainable Rural Development Project	P147157	State of Bahia	2014–22
Fiscal adjustment	Mato Grosso Fiscal Adjustment and Environmental Sustainability DPL	P164588	State of Mato Grosso	2019–21
Bank-managed				
Forest Investment Plan	Environmental Regularization of Rural Lands Project	P143334	Selected municipalities in the Cerrado	2017–21
	Development of Systems to Prevent Forest Fires and Monitor Vegetation Cover Project	P143185	Cerrado biome	2016–21
	Brazil Forest Investment Plan Management Project	P152285	Cerrado biome	
	Integrated Land Management in the Cerrado Biome Project	P164602	Selected watersheds in the Cerrado	2019–23
	Dedicated Grant Mechanism for Indigenous Peoples and Traditional Communities Project	P143492	Cerrado biome	2015–21
Other multilateral banks and development agencies				
	GEF Private Area International Institute for Sustainability (IIS)		Ongoing. Ends in April 2023	
	GIZ Cooperation with Brazilian Government Activities in the Cerrado Biome			
	Amazon Fund Projects Various, supporting the rural environmental cadaster and environmental regularization programs.			

Figure 1: Brazil FIP Intervention Areas



ANNEX 8. Map of Project Intervention Areas

Figure 1: Location of the Nine Productive Landscapes in Brazil

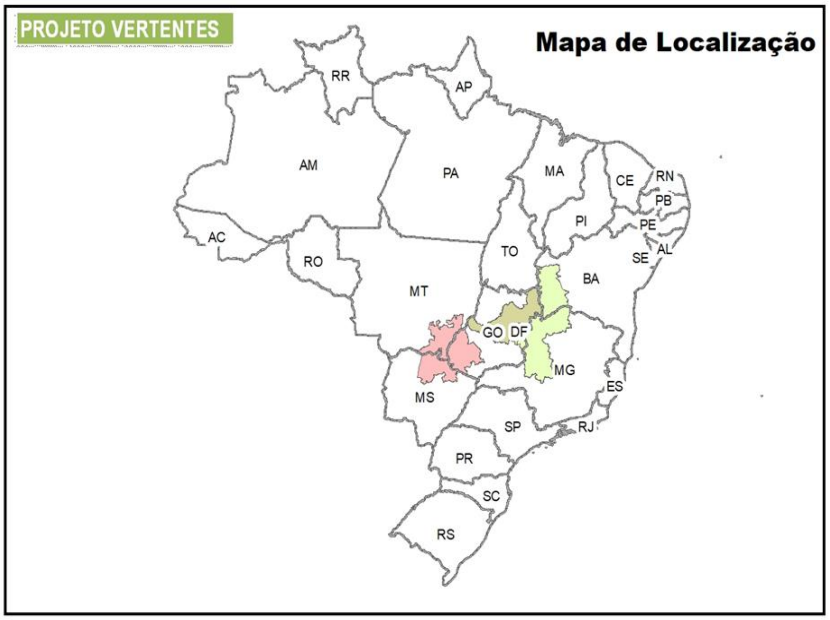


Figure 2: The Nine Productive Landscapes (PLs) Eligible for Project Intervention