



Inter-American Development Bank

BRAZIL

DEVELOPMENT OF A MACAUBA-BASED SILVOPASTORAL SYSTEM AND VALUE CHAIN

FOMIN Private Sector
FIP PROPOSAL

CONTENT

PROPOSAL FOR SUBMISSION TO THE FIP SUB-COMMITTEE

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PROJECT SUMMARY

DEVELOPMENT OF A MACAUBA-BASED SILVOPASTORAL SYSTEM AND VALUE CHAIN

(BR-T1333 AND BR-Q0019)

In Brazil, a growing demand for palm oil has resulted in rising import costs and large tracts of forest land being cleared for palm plantations. The Macauba palm tree, native to Brazil, grows outside of typical rainforest zones and can be planted in agroforestry schemes (including on existing pastures), which represent an alternative to traditional monoculture palm plantations, whose expansion generally negatively impacts the environment by putting pressure on land degradation and deforestation. Macauba can produce palm oil to sustainably meet rising domestic and global demand without the need for land use change, and without reducing the yield of pastures for cattle grazing. The Macauba fruit is processed into plant oil, animal feed and a dense biomass granulate. Even though Macauba naturally flourishes on Brazilian lands (especially in the *cerrado*) it remains largely unexplored as it has lacked a structured commercial value chain: a third of the area of the project region of Alto Paranaíba, Minas Gerais would be sufficient to substitute the entire Brazilian palm oil imports. The long-term Macauba production potential in Brazil exceeds current global palm oil production volume by far¹ and represents a potential source of meeting a large part of global demand. If this market can be proven it could dramatically disrupt the global palm oil market and be scaled nationally and globally.

Leveraging resources from the Forest Investment Program (FIP, part of the Climate Investment Funds), this project seeks to develop the first sustainable Macauba oil value chain in the world by designing a model in which smallholder farmers harvest Macauba plants on their land and existing pastures, and receive payments for their labor during harvests and for the Macauba fruits grown on their land. The oil produced from the Macauba fruits will be sold to the growing palm oil market in Brazil and the other Macauba by-products will be sold to various other national industries.

This intervention will occur in an area with high seasonal unemployment and low incomes for smallholder farmers and agricultural laborers. It is expected to increase incomes of both laborers and farmers, create employment during the agricultural down season, and to create employment in the oil mill and the associated service sectors (transport, etc.). It is also expected to sequester 300,000 tons of CO₂, while avoiding emissions from deforestation and reducing pressure on a region suffering higher deforestation rates than the Amazon, which contributes to Brazil's INDC targets of reducing land use change and agriculture emissions, and supports the implementation of the Brazilian new Forestry Code.

A MIF reimbursable grant of \$1M will help provide farmer and agricultural laborer training, structure the smallholder farmer involvement, and develop the business model. A small MIF grant will cover costs associated with legal structuring and knowledge, coordination, and partnerships for scaling. The MIF will administer an equity investment of US\$3M (FIP resources) to finance capital costs of the farmers of the intervention and the investee INOCAS.

¹ Macauba Feasibility Study, page 8

http://www.leuphana.de/fileadmin/user_upload/portale/inkubator/download/Summary_Macauba_Feasibility_Study.pdf

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Draft Resolution

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ACRONYMS AND ABBREVIATIONS

ACF	Althelia Climate Fund
DNA	Diagnostic of Executing Agency Needs
IDB	Inter-American Development Bank
IIC	Inter-American Investment Corporation
FIP	Forest Investment Program
MIF	Multilateral Investment Fund
SCF	Strategic Climate Fund

PROJECT INFORMATION

**DEVELOPMENT OF A MACAUBA-BASED SILVOPASTORAL SYSTEM
AND VALUE CHAIN**

(BR-T1333 AND BR-Q0019)

Country and Geographic Location:	Brazil, Minas Gerais, Patos de Minas area		
Implementing Partner:	Reimbursable Grant: INOCAS - Soluções em Meio Ambiente S.A. Non-reimbursable Grant: INOCAS - Soluções em Meio Ambiente S.A. Equity Investment: INOCAS - Soluções em Meio Ambiente S.A.		
Focus Area:	Climate Smart Agriculture		
Coordination with Other Donors/Bank Operations:	Forest Investment Program (FIP), a program of the Climate Investment Funds (CIF) The project team has also closely coordinated with CSD/CCS in the analysis and design of these operations.		
Project Clients:	400 smallholder farmers and harvest workers, 2,000 hectares of degraded pasture land.		
Financing:	Equity (Forest Investment Program Resources under MIF management) ² :	US\$ 3,000,000	50%
	Reimbursable Technical Cooperation:	US\$ 1,000,000	17%
	Non-reimbursable Technical Cooperation	US\$ 106,000	2%
	Other (Legal and structuring) ³ :	US\$ 220,000	4%
	TOTAL MIF FUNDING:	US\$ 4,326,000	73%
	Counterpart (local investors):	US\$ 1,000,000	17%
	Co-financing:	US\$ 643,000	10%
	TOTAL PROJECT BUDGET:	US\$ 5,969,000	100%
Execution and Disbursement Period:	TC: 60 months of execution and 66 months of disbursement. Equity: 120 months of execution, with the possibility of a 24 month extension.		
Special Contractual Conditions:	Special conditions precedent to first TC disbursement will be: (i) Selection of a Project Coordinator and selection of a local agricultural extension services coordinator; (ii) Letter of agreement with local cooperative; (iii) signature of an advisory agreement between the IDB-MIF and Althelia Ecoshopere Group.		
Environmental and Social Impact Review:	This operation was screened and classified as required by the IDB's safeguard policy (OP-703) on 10/12/16. Given the limited impacts and risks, the proposed category for the project is C.		

² The Forest Investment Program has provided the MIF with resources for the equity investment in this project. The MIF will manage these resources for the FIP. Ultimate risk for the investment lies with the FIP.

³ \$170,000 of this will be reimbursed to the MIF at exit of the investment.

I. THE PROBLEM

Problem Description

- 1.1 A large scale research project at Leuphana University's Innovation Incubator (Germany), the "Platform for Sustainable Aviation Fuels", developed concepts for the environmentally, socially and economically sustainable production of vegetable oils, and the commercial implementation of these concepts. From 2011 to 2014, the European Union and the state of Lower-Saxony financed an applied research program with a total budget of EUR 2.7m to determine the feasibility of creating new vegetable oil value chains from the naturally occurring Macauba palm in Brazil. The project team comprised 16 researchers headed by INOCAS' founders Dr. Katharina Spethmann and Thilo Zelt. International research partners included Yale University's School of Forestry and Environmental Studies (USA) and Viçosa University (Brazil). INOCAS is the spin-off company with the task of implementing the concepts developed by the research team.
- 1.2 In the context of the Macauba research, the project team conducted an in-depth [market study](#) to analyze the economic and social sustainability of Macauba oil production. The feasibility study included the following elements: (i) Measuring fruit yields of selected, wild Macauba palm trees; (ii) harvesting 300t of fruits from native Macauba palm trees growing on pastures in Minas Gerais; (iii) processing the fruits to produce two types of oil (pulp oil and kernel oil), animal fodder (press cake) and granulate in a regional oil mill; (iv) analyzing of all cost factors in the process; (v) analyzing of all revenues of harvest workers; (vi) conducting qualitative interviews with 1/3 of the harvest workers focusing on working conditions and satisfaction levels; (vii) conducting a market analysis of the value of all products; and (viii) evaluating the economic viability of Macauba oil production in silvopastoral systems.
- 1.3 The feasibility study demonstrated the economic viability of Macauba, and its significant positive social and environmental impact such as the increase in incomes generated by harvest workers and farmers. The study also demonstrated that the production potential of Macauba palm trees planted in silvopastoral systems in Brazil exceeds the current global palm oil production. It constitutes the basis for the INOCAS Macauba model that will be supported in this project (see section II). This project will implement the Macauba model in a 2,000 ha agroforestry system with 300 Macauba trees per hectare, which will be planted only on existing pasture land.
- 1.4 Smallholder farmers in the project region of Patos de Minas, Minas Gerais, Brazil, are increasingly exposed to the negative impacts of climate change⁴ (heat, drought, worsening soil fertility and other socio-economic impacts) and they depend on monoculture cattle farming due to the topography, which impedes access with agricultural machines. The lack of diversification and other non-agricultural economic opportunities encourages deforestation to increase pasture sizes and makes these smallholder farmers even more vulnerable to pests, soil degradation and income volatility. Cattle farming also negatively impacts the environment as the land degradation and deforestation reduces CO₂ capture by forests and soil, increases runoff, and adds to erosion.

⁴ Sources: <http://climatenewsnetwork.net/brazil-faces-serious-power-and-crop-losses/>, http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-30982015000300461,

- 1.5 At the same time, local harvest workers face seasonal unemployment due to a lack of jobs during the low season for coffee production, reducing incomes and driving outmigration. There is a need to diversify agricultural activities, increase productivity, reduce the environmental impact of the cattle farming, rehabilitate degraded land and generate income for smallholders and harvest workers.
- 1.6 The primary beneficiary groups of the project are harvest workers, smallholder farmers, and the environment. Both the smallholder farmers and harvest workers participating in the project are in the poorest strata of the population. Farmers can expect new revenue sources from the cultivation of Macauba fruits, payments for land leases, and improved profitability and sustainability of their cattle production. Harvest workers usually face a period of unemployment after the coffee harvest in Minas Gerais. An estimated 200,000 people work in coffee in Minas Gerais during the harvest period. Afterwards, unemployment rates go up significantly. This seasonal effect can be reduced with Macauba, since the Macauba harvest takes place anticyclical to the coffee harvest. As the project's feasibility study demonstrated, harvest workers can earn more than twice the minimum wage harvesting Macauba, making Macauba an attractive, diversified source of income.
- 1.7 Results of this project will be monitored and evaluated, and a scaling-up strategy will be developed, as the project has a strong potential for being scaled. Pastures cover 50m hectares of the Brazilian Cerrado. Macauba is already native to most parts of the Cerrado and could be cultivated in the entire region. The business model is economically viable and can be scaled up working with additional cooperatives, as well as industrial cattle farmers. Approximately, 200,000 ha of silvopastoral Macauba plantation are required to cut Brazil's palm oil imports to zero. Achieving this plantation size within 20 years seems to be realistic given that partnering cooperatives manage pastures exceeding this area. With over 50m ha of Cerrado pastures potentially suitable for silvopastoral systems with Macauba, the long-term Macauba potential in Brazil exceeds the current global palm oil production volume by far. This potential can be realized by leveraging an innovative afforestation method – as opposed to deforestation for monocultures.

II. THE SOLUTION

A. Project Description

- 2.1 The objective of the project is to create the first sustainable Macauba value chain in the world, and ensure high social, environmental and economic impacts. Macauba is an oil producing palm tree native to Brazil, which can grow on pastures without reducing the pastures' yields. This allows for a large scale, sustainable palm oil production without land use change.
- 2.2 The intended main impact is to prove the commercial viability of the model so that it can scale nationally and internationally, generate employment, increase income, and diversify income sources for smallholder farmers and harvest workers during periods of high seasonal unemployment, while at the same time contributing to climate change mitigation.
- 2.3 The intended main result of this project is the creation of a replicable, scalable and profitable business model of a silvopastoral Macauba system allowing smallholders and harvest workers to incorporate Macauba plantation activities into their livelihoods, developing new business opportunities that can provide additional income. This model will also capture a significant amount of CO₂, and contribute to a reduction of land use change in an area of deforestation.

- 2.4 The project will initially harvest the fruits of wild Macauba trees and process them in a small-scale oil mill, before installing a commercial plantation during the first years of the project. The harvesting of fruits from existing Macauba trees is carried out by harvesters who typically work in coffee until September.⁵ For the harvest, Macauba fruit bunches are cut with knives fitted on long sticks and collected in bags, which are then transported by tractors and loaded on trucks. For processing, Macauba fruits are dried. After drying, the outer shell and pulp are separated from the harder, inner shell using an electric separator. The pulp is then pressed in the oil mill to gain pulp oil and pulp press cake. The endocarp is crushed to separate the soft inner kernel from its hard shell. The inner kernel is then further processed into kernel oil and kernel press cake. The hard shell is processed into a high-value granulate using a grinder.
- 2.5 A privately-owned pilot processing plant capable of processing the current, naturally occurring harvest, is available for use on a contract basis at the beginning of the project. A small-scale, yet industrial level processing plant will be set-up in the first two years of the project to process initial additional volumes produced in this project, while a large industrial processing facility will be set up with professional partners later and will be financed through different resources.
- 2.6 The model consists of five phases and begins with (i) the elaboration of land management plans, plantation guidelines, and farmer training materials based on the Macauba feasibility study. These materials will demonstrate the economics of the Macauba plantation, detail how to manage a silvopastoral system, and will include land-use planning.
- 2.7 As a next step, (ii) the smallholder farmers and harvest workers will be organized into groups and trained in the planting, cultivation, harvesting, and overall management of Macauba agroforestry-related activities.
- 2.8 The subsequent phase (iii) includes a commercial pilot. In the next phase, (iv) Macauba fruit will be processed in a local plant to be developed into 1) pulp and kernel oil, 2) animal feed (press cake), and 3) granulate.
- 2.9 **Agricultural productivity activities:**
- 2.10 As part of this project, INOCAS will also continue testing and improving various elements of the Macauba cultivation.
- 2.11 **Innovation**
- 2.12 This intervention is of a highly innovative nature given that it brings together smallholder farmers, providers of agricultural goods and services, and the demand side to develop the world's first commercial value chain for Macauba silvopastoral systems. The technical feasibility of this innovation has been demonstrated by the results of the feasibility study⁶ showing that it is possible to harvest and process the Macauba fruits in a socially, environmentally and economically sustainable way. The purpose of this MIF intervention is to demonstrate its commercial viability, as well as its potential for replication and scale.

⁵ In the project region of Alto Paranaíba, the Macauba harvest takes place between October and January, providing additional employment opportunities for coffee harvest workers.

⁶ The feasibility study was completed by the EA INOCAS in Minas Gerais in 2013 and was funded by a EUR 2.3 million European Union grant.

- 2.13 The Forest Investment Program (FIP) is a program under the Strategic Climate Fund (SCF), one of the International Climate Investment Funds (CIF) which supports developing countries in their efforts to reduce emissions from deforestation and degradation, promote sustainable forest management and enhance forest carbon stocks.⁷ Brazil is one of the pilot countries in the LAC region for the FIP. The MIF submitted this project for FIP financing following the approval of the first private sector FIP project in the world, designed by the MIF in Mexico. This project would be the first private sector FIP project in Brazil.
- 2.14 As part of a global call for proposals to access competitive funding for projects that engage the private sector in the FIP, an independent expert evaluation committee assessed projects for FIP financing. Only five projects were endorsed for funding as FIP interventions. Based on its transformative nature this project received the highest score of all project proposals reviewed by the experts. In the Brazilian Cerrado alone, there are 50 million hectares of pasture, most of which are suitable for Macauba. With Macauba-based silvopastoral systems, oil quantities exceeding the size of today's total global palm oil market can be produced without any impact on food security or natural ecosystems. There is strong recognition among relevant local actors regarding the potential of developing a Macauba value chain, as well as readiness to invest in its commercialization, but this potential has not materialized yet due to a lack of pilot projects. The MIF intervention is therefore crucial to bridging this pioneer gap.
- 2.15 **Component I: Equity Investment: (FIP funds: US\$3.000.000; other investors: US\$643.000)**
- 2.16 Description and amount: The equity funds invested in this project are funds entrusted to the MIF by the Forest Investment Program for use in this project. They are not MIF resources. This component will be managed in coordination with Althelia Ecosphere, with whom MIF will sign an investment advisory agreement (see paragraph 5.4). The objective of this component is to establish the first sustainable Macauba-based silvopastoral agroforestry value chain in the world, through the capitalization of INOCAS, together with local investors. To do this, MIF will channel up to US\$3 million in funds obtained from the FIP into share capital in INOCAS. Another US\$643,000 in share capital is expected from local investors. These amounts, together with the funds from Component 2, will provide the fledgling company with the investment amount necessary to begin and sustain operations until it begins to generate a profit, expected in year 7.
- 2.17 The MIF will invest the FIP resources directly into INOCAS. Given that MIF does not have prior experience directly investing in agricultural start-ups, especially in nascent product markets with a high level of technical and model innovation, MIF will partner with Althelia to provide hands-on support and advisory services for this investment.
- 2.18 The MIF has sought an investment advisor because of the specialized nature of this investment. Althelia was selected to be the investment advisor to the MIF for this operation because they have unique expertise and experience in investing in innovative agricultural start-ups in the region, a strong presence in Brazil, and significant investment management and advisory capacities. Althelia currently manages €100 million in land use investments via the Althelia Climate Fund, is near to closing two further funds, a Sustainable Oceans Fund and a Madagascar Climate and Conservation Fund, and has set up a new venture called Ecosphere+ to build a marketplace for environmental assets

⁷ The IDB is an Implementing Entity of the Strategic Climate Fund, as outlined in GN-2604. Paragraphs 3.13-3.16 of GN-2604 define the principles of use of SCF funds for NSG operations, Paragraph 3.20 of GN-2604 expressly indicates that all NSG windows of IDB Group will have access to SCF resources. Document GN-2674 and Resolution DE-9/11, as amended by Resolution DE-123/12, authorize the MIF Donors Committee to approve on behalf of the IDB the use of SCF resources administered by the IDB.

and REDD+. The MIF reviewed several other possible advisors but was unable to find another firm with the specialized knowledge required to undertake this investment. MIF will sign an investment advisory agreement with Althelia which is described in paragraph 5.4 below.

2.19 **Company valuation and MIF share: REDACTED**

2.20 **IDB/MIF Use of funds:** These resources will be used to cover capital investments and operational expenses that INOCAS will incur during its start-up and growth stage, including the establishment of a training center, oil processing mill and 2,000 hectares of Macauba palm trees in agroforestry systems. To ensure that MIF's financial interest in the company is adequately represented and protected, MIF will sign an advisory agreement with the specialized asset manager Althelia Ecosphere Group to provide on-the-ground, hands-on management advice and services. A description of this advisory agreement is provided in paragraph 5.4.

2.21 **Key Terms and Conditions of the investment:**

2.22 **REDACTED**

2.23 **Component II: Reimbursable Technical Assistance (MIF US\$1,000,000, Counterpart US\$1,000,000)**

2.24 **Use of Funds:** This component will be executed by INOCAS. Reimbursable TC funds are required to jump-start early-stage activities of the project, especially with regard to activities in organizing and training farmers. In this component, the smallholder farmers and harvest workers will be trained regarding the planting, management and harvesting of the Macauba palm trees and their fruits, including management of production systems and pastures. This component will be implemented in close collaboration with local milk cooperatives who will provide access to the 400 smallholder farmers and harvest workers that will participate in the pilot. Through this tree-to-harvest training, smallholder farmers will be able to participate in the Macauba value chain as growers and harvesters of Macauba fruits, and benefit from payments for the use of their land, their labor, and their production of fruits.

2.25 In addition to training through extension services, this component will also fund legal assistance to structure the land-use and management contracts with farmers, inputs for small farmer plantation activities (not to exceed 3% of the total cost of the component), nursery and seedling production and distribution (using counterpart funds), and Project Coordination activities related to the technical assistance component.

2.26 **Execution Period:** The Execution period of the reimbursable TC will be 60 months from the date of signature of the agreement. Disbursement will occur over 66 months.

2.27 **Disbursement Schedule:** The reimbursable TC will be disbursed in up to six tranches during the "Disbursement Period" upon request of INOCAS and upon completion of a series of prior conditions and milestones established in the Term Sheet for each of the disbursements of this reimbursable TC. These milestones will be based on specific deliverables related to new plantation installation (i.e. number of trees planted) and volumes of native Macauba fruits collected, because these reflect the main results of the activities included in this operation.

- 2.28 **Contingency Repayment Trigger:** INOCAS is obliged to begin to repay the IDB/MIF once INOCAS completes its first fiscal year with positive Earnings After Taxes (EAT). INOCAS is currently estimated to generate positive EAT in 2023, so the repayment would begin in 2024 if this goal is met. The reimbursable TC agreement will indicate the repayment would not start until the company reaches positive EAT within the first 10 years after the agreement is signed.
- 2.29 If the repayment of the Instrument coincides with the MIF's exit and sale of its shares in INOCAS, then the latter takes precedence in terms of repayment.
- 2.30 **Reimbursement Timeline: REDACTED**
- 2.31 **Component III: Non-reimbursable Technical Assistance (MIF: US\$16,000)**
- 2.32 This component will fund activities related to the capturing and dissemination of knowledge on the project model, results, and impact for public dissemination and reporting to the FIP. The project will fund a how-to guide to outline the structure and management of the Macauba system, an infographic demonstrating the financial model, and a promotional audiovisual to be used to provide the narrative of the project in a compelling way. These materials will be disseminated at a minimum of three fora, including FIP and CIF events.

1.1 Beneficiaries

- 2.33 The primary beneficiary groups of the project are harvest workers, smallholder farmers, and the environment.
- 2.34 The 2012/2013 Macauba feasibility study carried out by the executing agency collected detailed information about the low-income harvest workers. This study determined that harvest workers in the project area reported an average household income of R\$814/month during the year from non-Macauba activities, with the minimum wage being R\$678/person/month. During the Macauba harvesting season (typically October - January), the average monthly income from Macauba was R\$1606/person/month. In the project area, about 14,500 households (17%) are reported to have an income below the national minimum wage.⁸
- 2.35 Due to the type of the beneficiary businesses and the nature of the existing agricultural work in the project area (including cattle farming as well as growing and harvesting coffee), the beneficiary groups are used to working in mixed-gender teams. However, both beneficiary groups are predominantly male (72% of harvest workers⁹).
- 2.36 Smallholder farmers organized in the cattle/milk cooperatives are a very heterogeneous group, with some members possessing less than 10 hectares and others owning more than 100 hectares of land. Accordingly, the average income varies significantly as well. This being said, the project will focus on farmers holding the government's smallholder farmers certificate. There are four official conditions for the certificate: 1) the farmer does not have more than four "fiscal units" of land, 2) the farmer primarily uses his/her and his/her family's workforce (i.e. cannot have more than two employed external helpers), 3)

⁸ Equivalent to 17.3% of the total number of households in the project area. Link to study [here](#).

⁹ Determined as part of the 2012/2013 Macauba feasibility study carried out by the University partner of the executing agency in the project area.

the majority of the household's income must come from agricultural activities, 4) the farm must be run by the family (not e.g. by an external manager).

- 2.37 Smallholder farmers that expressed a written interest in the project reported an average income of around US \$100 per hectare per year. A specifically vulnerable group within the smallholder farmers are communities of formerly landless people (Assentados), settled by the government agency INCRA. INOCAS has already established contacts to associations representing this group – which have expressed a strong interest in the project – and plans to include them in the project.

B. Project Results, Impact, and Monitoring and Evaluation

- 2.38 This project contributes to the MIF's CSA aspirational indicator of reducing the gap between high and low productivity agricultural firms by half in 10 years while mitigating climate change. This project will improve the smallholder farmers' productivity with respect to the following aspects: i) the pilot will benefit around 400 smallholder farmers and harvest workers through increased income and productivity, with the expectation of scale upon proof of concept; ii) smallholder farmers will receive land lease payments and payments per ton of Macauba fruits harvested from their land and harvest workers' average incomes during the Macauba harvest season (which is after the coffee harvest season, thereby countering seasonal unemployment) will increase; iii) there will be a reduction in the amplitude of temperature swings on the pastures due to shade provided by the palm, which also reduces water consumption of cows, and therefore increases productivity; iv) there will be an increase in smallholder farmer total factor productivity growth, given that the increase in outputs (additional Macauba products) only requires comparatively minimal increase in inputs (labor, fertilizer, but no additional land).
- 2.39 With regard to environmental indicators: (i) degraded pasture land will be recovered, thereby improving soil quality and stopping soil erosion; (ii) approximately 300,000 tons of CO₂ will be sequestered; and (iii) additional emissions from deforestation will be avoided.
- 2.40 The project will undergo a mid-term and final evaluation. These evaluations will utilize data from INOCAS's monitoring and evaluation system, financial data, and Board reports to report on the project's financial performance, income generation results, environmental benefits, and market development. These evaluations will provide inputs for the knowledge detailed in 2.81, which will be disseminated through national and international networks such as the FIP, EMBRAPA, and local government.
- 2.41 The monitoring and evaluation system used by INOCAS will cover the project's social, economic and environmental impact. There are two main points and units by which data will be collected.
- 2.42 The first data collection method is the project's extension service that directly works with the smallholder farmers. Upon taking up a smallholder farmer into the planting scheme, several parameters will be checked. This includes making sure that Macauba trees are planted on existing pastures only. The size of the farm (in hectares) will be assessed and the farm's geo location will be stored. This is planned to happen on site via the GPS unit of an Android powered tablet or smartphone. Furthermore, on top of individual information, household data such as the household's income as well as the number of family members will be assessed. Upon plantation, the number of trees planted will be measured and the outer borders of the respective Macauba plantation mapped. During the regular visits to each farmer, on top of providing guidance the extension service will monitor the trees' state and survival rates. All this data will be collected in one central database.

- 2.43 The second main point of data collection measures the social and economic impact. INOCAS will monitor the payments to the smallholder farmers from Macauba cultivation as well as the payments to harvest workers. These payments are tracked through the company's accounting system.
- 2.44 Farmers' and harvesters' income from Macauba will be compared against both the national minimum wage – which is expected to be surpassed significantly – and potential income from other activities. Information on the latter will be gained through surveys.
- 2.45 Environmental indicators such as the improvement of soil quality as well as data for the calculation of the CO2 sequestration will be based on samples taken at different plantation sites over time.
- 2.46 All project results will be reported through the MIF's PSR system.

III. ALIGNMENT WITH IDB GROUP, SCALABILITY, AND PROJECT RISKS

A. Alignment with IDB Group

- 3.1 The project has team members from CSD/CCS, INE/ENE and the IIC. It aligns with the: (i) IDB Climate Change Sector Framework Document (countering climate change), (ii) IDB Integrated Strategy for Climate Change Adaptation and Mitigation and Sustainable and Renewable Energy (assistance in sustainable agriculture and maximizing the use of resources, particularly grant and concessional loans from the CIF), (iii) Renewed Vision for the IDB Group Private Sector Merge-Out (carbon reduction efforts, and the creation of new business opportunities that contribute to sustainable development), (iv) IDB Biodiversity and Ecosystem Services Program (promotion of private sector innovation for protection of ecosystems in key regional economic sectors, including agriculture and forestry), (v) OVE Thematic Evaluation of Climate Change at the IDB (increase in activities fostering climate resilience and climate change mitigation, and improvement of private sector leverage (concessional funds)), (vi) Country strategy Brazil (improvement of productivity and competitiveness; promotion of innovation and diversification of products and services; promotion of green growth, with a particular focus on climate resilience and agribusiness value chains).
- 3.2 The Project also responds to the goal endorsed in April 2016 by the Boards of Governors of the IDB and IIC to increase the volume of climate-related financing to 30 percent of operational approvals by the end of 2020 and, in particular, to access external sources of concessional financing.

B. Scalability

- 3.3 **REDACTED**
- 3.4 The IIC completed a first due diligence of the project and expressed interest in providing financing for scaling when the business is profitable. INE/ENE was one of the 18 founding members (including Gol, Boeing, GE) of a biofuel platform in Minas Gerais (where the project is located) with an interest in providing financing for a Macauba value chain and will continue to monitor the project and facilitate access to their local partners and biofuel purchasers.

- 3.5 There are opportunities for future scale internationally, as well. In addition to Brazil, the Macauba palm tree is native to several countries in the region, including Argentina, Bolivia, Colombia, Guyana, Mexico, Paraguay, Suriname, Uruguay and Central America, thereby offering significant additional scaling potential. Since no previous Macauba business model has been developed, information on the model, the plantation density, and silvopastoral systems will be particularly novel and useful. It will be particularly important to document the CO₂ benefits of the project and model, given that it is co-financed by the FIP and is expected to reduce land use change. In order to facilitate knowledge transfer and replication, the project will finance a how-to guide on how to develop a Macauba system, an audiovisual, and an infographic that explains the financial and environmental sustainability of the model. These items will be disseminated through local events such as the Macauba conference held in Minas Gerais, through FIP and Climate Investment Fund events, and in fora related to palm oil and associated businesses.
- 3.6 The main audiences interested in the project results will be i) Individual smallholder farmers and agricultural cooperatives with an interest in implementing silvopastoral systems and understanding the business model; ii) Forestry and agroforestry sectors worldwide, for-profit forestry and biofuel companies, agricultural cooperatives, especially in areas with native Macauba or similar trees; iii) Financing institutions and other investors with an interest in the technical and financial sustainability of the business model, the underlying risk profile, and markets; iv) Other FIP participants, including donor countries, and recipient countries; v) The Brazilian Government, other FIP country governments, forestry organizations and NGOs interested in CO₂ capture and land use.
- 3.7 The scalability of the project, either through organic growth of INOCAS or through replication of the use of Macauba in agroforestry schemes in other regions of the country can contribute directly to Brazil's climate and environment priorities. Brazil's INDC points to ambitious goals of reducing greenhouse gas emissions by 43% below 2005 levels in 2030, which will require finding alternative crops and agroforestry schemes that address land use change and agriculture emissions (the two largest sources of GHG emissions in Brazil; the latter's absolute emissions grew 50% in the last 20 years) while allowing for increasing levels of production and productivity gains. Brazil is also in the process of implementing the new Forest Legislation, which can benefit from experiences that foster the expansion of afforestation practices in degraded pastures, especially in cattle farming zones (main source of deforestation in vulnerable biomes such as the Amazon region).

C. Project Risks

- 3.8 This is a project that presents significant risks, as the company is a start-up involved in a new, novel business, with a little known product, that has not been attempted in the past. However, the expert due diligence report determined that the risks identified in this report are manageable and consistent with start-ups in the sustainable land-use space. Through the covenants listed above, and active participation in the shareholder's assembly and Board of Directors, risks can be mitigated, managed, and over time, reduced. The INOCAS team has demonstrated a high level of competence, optimism and professionalism and has demonstrated the potential to work with the investors to create a thriving business.
- 3.9 INOCAS as a business has the potential to be truly disruptive in the global vegetable oil market, developing a credible environmentally sustainable alternative to monoculture African palm oil plantations. This could have significant positive environmental impacts locally in Brazil, restoring degraded land and displacing production/imports of carbon

intensive African palm, and on a global scale by reducing the market share of oil derived from African palm oil plantations. On a micro-scale, INOCAS will deliver significant social impacts, as it is developing silvo-pastoral systems on smallholder land. This will deliver greater levels of income to smallholder farmers and seasonal workers, potentially throughout the Cerrado region, if scaled-up.

3.10 Specific risks and mitigation measures include:

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IV. COST AND FINANCING

- 4.1 The total project size will be US\$5,969,000. The MIF contribution to the project will consist of a reimbursable grant, non-reimbursable grant, and a FIP equity investment. The reimbursable grant of US\$1 million in MIF funds will be disbursed during years 1 through 5 years and repaid once cash flow permits (break-even estimated at around year 8), using the revenue-based mechanism described in paragraph 2.64.
- 4.2 The equity portion of US\$3 million, from FIP funds channeled through MIF, will be disbursed in equal tranches.
- 4.3 The project also includes US\$1,643,000 million counterpart contribution from local and regional organizations with an interest in the development of the Macauba value chain.
- 4.4 The project also benefits from a donation of the Patos de Minas municipality of 0.9 hectare of land used for the training center, processing, and storage facilities for the harvest from native Macauba trees. The municipality's decision to donate the land was based on the expected positive impact of the project's activities for the entire region. The municipality also supports further research in Macauba value chains which will help the project.

All figures in US\$	FIP	MIF	Counterpart	Co-financing	Total
Project Components					
Component 1: Equity Investment	3,000,000			643,000	3,643,000
Component 2: Reimbursable TC		1,000,000	1,000,000		2,000,000
Component 3: Non-reimbursable TC		16,000			16,000
Monitoring & Evaluation		40,000			40,000
Ex Post Reviews		50,000			50,000
Grand Total TC (Component II and III + M&E and reviews)		1,106,000	1,000,000		2,106,000
% of Grant Financing		50%	50%		100%
MIF Local Counsel Fees		50,000			50,000
Investment Management Fees*		170,000			170,000
TOTAL PROJECT	3,000,000	1,326,000	1,000,000	643,000	5,969,000

* These fees reimbursed to MIF at exit from investment proceeds. Other investment management fees paid from MDB fees received from the FIP at the IDB, and accounted in a separate agreement outside the envelope of this project.

V. PROJECT PARTNERS AND IMPLEMENTATION STRUCTURE

A. Project Partner(s) Description

- 5.1 The Forest Investment Program (FIP) will provide the MIF with the financing for the equity investment. FIP resources for this Project will be received from the World Bank, in its capacity as trustee of the Strategic Climate Fund (SCF). As explained above in paragraph 2.20, the IDB is an Implementing Entity of the SCF. Pursuant to Resolution DE-123/12, the Board of Directors of the IDB authorized the Donors Committee of MIF to approve the use of SCF resources when such resources are being used to co-finance a MIF operation. FIP resources will be administered by the IDB pursuant to the terms of a Financial Procedures Agreement (FPA) signed between the IDB and the WB, as authorized by the Board of Executive Directors in Resolution DE-9/11 (document GN-2604). The Office of the MIF will be responsible for actively collaborating with other IDB departments (such as CCS, ORP/GCM, FIN, and LEG) in complying with the fiduciary, reporting, administration and other legal requirements established in the FPA, to ensure that IDB can comply with such obligations on a timely fashion. Furthermore, as stipulated in the FPA, the use of FIP resources should be consistent with the approvals granted by SCF governing bodies for this project and the applicable policies and guidelines issued by the SCF. Pursuant to such policies and guidelines, FIP resources include implementation entity fees used for design, implementation, and supervision of this operation. These fees are received and managed outside of the budget envelope for this project. Availability of FIP resources for this project is subject to the WB transferring such resources to the IDB, pursuant to the terms of the FPA.
- 5.2 INOCAS S.A. will be the Implementing Partner of this project and will sign the agreement with the Bank for the reimbursable and non-reimbursable TCs. INOCAS will also operate the Macauba project.
- 5.3 [INOCAS](#) is a German-Brazilian company whose key personnel have been working as project developers in the field of alternative oil plants for over a decade. INOCAS and its shareholders carried out an EU-funded EUR2.7m Macauba applied research project to demonstrate the economic, social and environmental feasibility of a Macauba-based silvopastoral system in Minas Gerais (2012-2013). INOCAS S.A., the Brazilian subsidiary has been established in 2015 to prepare the plantation project and organize the harvest of wild Macauba.
- 5.4 Althelia Climate Fund GP s.a.r.l (a Luxembourg based General Partnership) will sign a contract to serve as advisors to the MIF in execution of the equity investment into INOCAS. Althelia Climate Fund GP is advised by Althelia Ecosphere, the advisory and operational counterpart in London. Althelia Ecosphere aligns the earth's economy with its ecology by financing the transition towards sustainable land use, creating new environmental assets that reflect the value of natural capital. Their investments reduce deforestation, mitigate climate change, protect biodiversity and provide a fair and sustainable living to rural communities through activities that also offer investors competitive returns. Althelia currently manages €100 million in land use investments via the Climate Fund, is near to closing two further funds, a Sustainable Oceans Fund and a Madagascar Climate and Conservation Fund, and has set up a new venture called Ecosphere + to build a marketplace for environmental assets and REDD+.
- 5.5 Other project partners include:

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B. Implementation Structure and Mechanism

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- 5.6 **Disbursement by Results and Fiduciary Arrangements.** The Implementing Partner will adhere to the standard MIF disbursement by results, procurement and financial management arrangements as specified in Annex V.

VI. INFORMATION DISCLOSURE

- 6.1 **Information Disclosure.** Details of the equity investment included in this project will remain confidential.