SURUÍ FOREST CARBON PROJECT

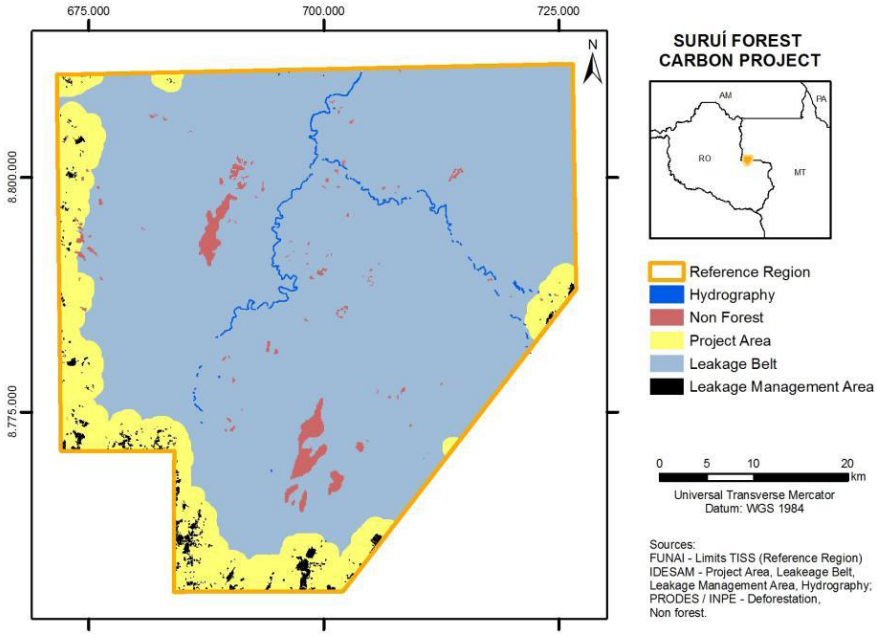
Source(s): Project Description: SURUÍ FOREST CARBON PROJECT

FUNBIO (2011) (*2)

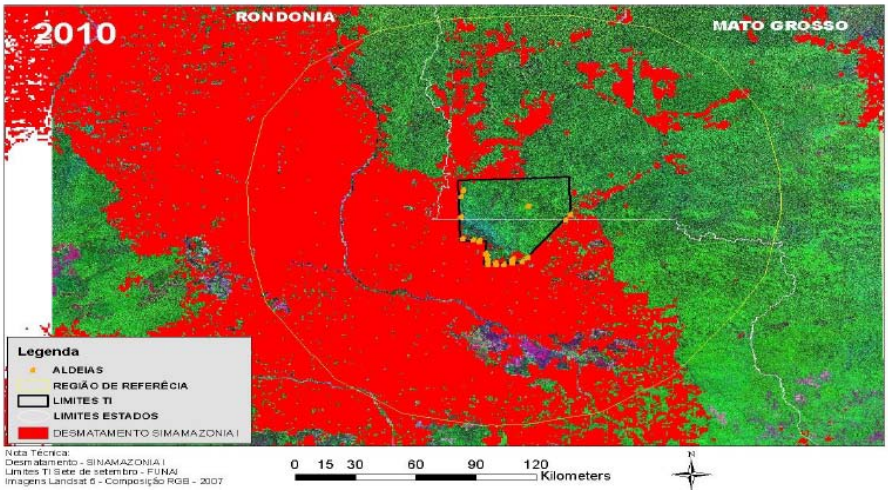
Project location

The TISS (Sete de Setembro Indigenous Territory) is located in the Brazilian Amazon at the border between the states of Rondônia and Mato Grosso, in a region of strong deforestation pressure known as the "deforestation arc". The Suruí territory is part of a broader ethno-environmental corridor that includes the Aripuanã Indigenous Lands, Aripuanã Park, Sierra Morena, Roosevelt, Zoro, Rio da Flor do Prado and Iquê Ecological Stations, and Igarapé Lourdes Indigenous Land. It is also complemented by the Jarú Biological Reserve (p.16).

The TISS covers approximately 247,845 hectares in three different municipalities - Cacoal, Espigão D‟Oeste and Rondolândia (p.16).



Location of project area, leakage belt, leakage management area and reference region for the Suruí Forest Carbon Project (PCFS) (p.7)



Location of the project area(*2, p.2)

Area of the Sete de Setembro Indigenous Land (TISS) corresponding to the Reference Region: 247,845 ha

REDD+ Project Area: 31,994.2 ha

Leakage Belt: 208,038.9 ha (p.7)

Forest area and types

The TISS is located in the Amazon River basin in an important interfluvial region in the sub basin of the Madeira River (p.18). The TISS is covered by tropical rain forest vegetation with small patches of non-forest vegetation (p.19). The vegetation classes are

(i) - Open sub-montane rain forest, characterized by spaced individual trees and frequent clusters of palm trees, lianas and / or bamboo. In the project area there are two types, with Palms *(Asp)* such as açaí *(Euterpe precatoria)* inajá *(Maximiliana* sp.) Paxiuba *(Iriartea* spp.) and Tucumã *(Astrocarium aculeatum),* and with Lianas *(Asc)* covered wholly or partly by woody lianas

(ii) - Dense sub-montane Ombrophyllous Forest, which is related to the topography, occurring in areas with higher slopes in mountains and hills. It has a uniform structure, with widely spaced trees with a maximum height of 40 meters, with or without palm trees and lianas. The dominant sub-class in the TISS is sub-montane Ombrophyllous Forest with palm trees, representing about 70% of the total area. The rest of the territory is almost equally occupied by the other two sub-classes.

Forest management and use context

With regard specifically to laws and regulations relating to REDD+, currently there is no established national or international law applicable to the PCFS (p.26, 29).The Ministry of Environment (MMA) was also consulted and, although encouraging the implementation of the Suruí Forest Carbon Project (PCFS), said it has no authority to endorse, or jurisdiction over, REDD projects in Brazil (p.26).

At the state level, the project has the support and approval from the State of Rondonia, where the majority of the Suruí population is located and represents almost the entire area of the project in the TISS. Informal dialogues were initiated with the Government of the State of Mato Grosso, indicating approval for the continuation of the project (p.26).

In the case of traditional authorities and indigenous communities, as a project led by their own Indigenous Association of the Paiter-Surui people (Metareilá Association), obtaining a formal approval through a process of consulting the people evolved in a natural way, which resulted in the adoption and signing of a commitment made by the four clans of the Paiter Suruí people, considered to mark the start date of the project (p.26).

Indigenous peoples have the exclusive right to use the natural resources of public goods with special use, legally defined as "Indigenous land", aiming at their physical and cultural reproduction, as is envisaged in the Constitution. The land ownership of 247,845 hectares of TISS is with the Union, and this makes the demarcation procedure formally recognizing this right (p.22). The Federal Constitution guarantees the right to indigenous lands traditionally occupied, embodied in the exclusive use of the riches of the soil, rivers and lakes in that area (paragraph 2, Article 231). The practice of leasing Indian lands is prohibited, as explicitly stated in the Indian Statute (p.28). When considering other legislation, such as the Forestry Code, Article 3 (g), areas to maintain the environment necessary for the life of the Indians are considered Permanent Protection Areas (APP). And yet, Article 3-A, amended by Provisional Measure 2.166/67 of 24/08/2001 states that the exploitation of forest resources on Indian lands can only be carried out by indigenous communities under a sustainable forest management regime to meet their livelihoods (p.28). The Surui People and consequently the Surui Project, as defined for the project documentation, bears the boundaries of the Project defined and recognized by the Decree number 88.867 dated of 18th October 1983 that was published by the competent legal Brazilian authority, which grants, the rights of use by the Surui People of such territory (p.28).

The history of land tenure conflicts includes disputes over the Surui land use and demarcation of their areas. In the 70s and 80s there were various conflicts with settlers who lived on the outskirts of their territory and invaded and exploited their natural resources. This was relieved with the precise definition of the limits of their land, which has become more respected by the colonists. With the final demarcation, there were no relevant land disputes internal or external to the indigenous territory (IT) (p.22).

The population of the TISS Paiter Suruí is arranged in 24 communities, with approximately 1,231 people (p.20). Traditionally, their way of life has always been based on the use of natural resources in the area, where hunting, fishing and gathering of forest products account for much of the livelihood and food security of the group (p.21).

The indigenous people call themselves Paiter Surui, whose Portuguese translation made by the Indians means "real people". Along with other indigenous peoples of the region, such as the Cinta-Larga, Zoro and Gavião, the Paiter Suruí people speak a language of the Tupi Monde family. They have an organization based on clans, which are the basis of the governance system of political organization and system of kinship and marriage of indigenous people. Clans are Gameb, Gamir, Makor and Kaban, and the transmission of the clan is patrilineal (p.19).

The Indigenous Land is located in the Madeira River basin which has only 17.1% of its area covered by protected areas and indigenous territories (with 1.2% overlap between them), a value lower than the average of the Amazon region (25%) (p.24).

The TISS has many attributes of High Conservation Value (HCV), and almost all of TISS is rated extremely important for biodiversity conservation, with the remainder classified as a small area of high importance for conservation. According to the ethnozoning, eight areas were identified in TISS that are sacred for cultural expression and/or spirituality. They can be divided into cemeteries, inhabited by local spirits, sites of local wars or areas for strict conservation. These sacred sites are extremely important to ensure the preservation of Suruí ethnic culture (p.24).

Rates and drivers of deforestation and degradation

The average rate of deforestation in this region between 2000 and 2009 was around 0.07% per year (157.3

ha/y) (pp.18,31)

Three drivers impacting the amount of deforestation in the reference region have been identified (pp.37-39).

1) Cash income from external actors: The main driver of deforestation is the dependence on externally-sourced, cash income in the Surui economy. This need for cash income justifies the Surui‟s agreements with loggers, settlers, and small farmers from outside the community.

2) Population growth: Although the birth rate appears to be decreasing, the population of the Surui is still growing. FUNASA data through 2009 was used to determine birth and death rates. Holding migration rates proportionally constant, population growth was extrapolated for 30 years. Whereas in 2009 the Suruí population consisted of 1,142 individuals, it is estimated to consist of 2,504 individuals in 2038.

3) Increased labor available: The Suruí population increased from about 250 people in mid-1970 to 1200 people in 2009. Currently, nearly half of the population is under 15 years of age. The current labor force available consists of about 534 individuals. It is estimated that in 2038, 949 individuals will be available to provide labor for land use activities and land use changes, representing a force capable of greater damage than today's.

Identification of underlying causes of deforestation

Generous subsidies for ranching companies from the Superintendency of Development for the Amazon (SUDAM) attracted capital to the Amazon region in the 1960s, greatly impacting forest cover. For example, Gleba Corumbiara (a huge block of land) in the south of Rondonia was auctioned at the end of the 1960s. The military government spent more demarcating the boundaries of the land than the land earned when it was sold, and buyers earned more by selling the timber on their lots than they paid for the land. This policy model prevailed throughout the Amazon and was responsible for the rapid advance of deforestation as well as the displacement and extinction of several indigenous groups. Subsidies for rural credit lines were higher in the Amazon than in other Brazilian regions, and these subsidies increased dramatically between 1974 and 1981. Even today, such subsidies play an important role in providing and attracting capital to deforestation activities (p.40). The future trend of these underlying causes of deforestation will tend to remain as before, as government policies still prioritize subsidies for large ranching companies (p.41).

Project proponents

Metareilá Association of the Suruí Indigenous People (p.2)

Implementation timeframe

2009-2038 (30 years) (p.10)

Project goals

The Suruí Forest Carbon Project (PCFS) aims to halt deforestation and its associated greenhouse gas (GHG) emissions in an area under intense deforestation pressure in the Sete de Setembro Indigenous Land (TISS) (p.6).

The PCFS seeks to consolidate forest conservation in the TISS through financial incentives from REDD+ and Payments for Ecosystem Services (p.12).

Implementation activities

Activities planned for the project and expected impacts to climate, biodiversity and community (p.14)

Project Activities	Objective	Specific Activities	Expected Impacts	Cost of Activities for the first 5 years in the PCFS (R$)
Forest Protection and Environment	Support the Paiter Suruí and non-indigenous people's monitoring and surveillance capacity to defend their territory	- Mapping risks, threats and vulnerability of Indigenous Lands; - Re-establish and rehabilitate demarcating lines; - Construction of bases for surveillance; - Training of environmental agents; - Provide enforcement with FUNAI and the Environmental Police. - Implement routine surveillance expeditions.	- Elimination of invasions in Indigenous Lands (IL); - End illegal logging in IL; - Forest stocks conservation in IL; - Ensuring the integrity of the territory; - Biodiversity conservation	R$ 1,870,279
Food Security and Sustainable Production	Organize the possibilities of sustainable economic use of natural resources within the Sete de Setembro Indigenous Land	- Diagnose the productive potential and the need for technical assistance; - Promote discussion about the Network of Farmers; - Identify sustainable alternative income generation; - Promote courses in agro-extractive production; - Identify technological problems and pinpoint improvement procedures; - Implement agro-ecological management of plantations; - Structure and improve supply chains; - Prepare communication materials; -Promote reforestation and agroforestry systems, and planting density; - Provide technical assistance for local production; - Analyze the possibility of certification	- Improvement of economic conditions; - Guarantee of alternative sources of income not linked to deforestation and forest degradation; - Ensure diversified sources of food for the Paiter Suruí. - Improving the diet of the Suruí.	R$ 1,060,875
Institutional Strengthening	Contribute to the autonomy of the Paiter-Suruí indigenous people through institutional strengthening of their organizations.	- Plan structure of Support Centers; - Present Plan for approval of the Paiter; - Equip Support Centers (computers, printers, telephones, etc.) and vehicles; - Technical Consultancy (management and administrative organization); - Hire staff	- Improved communication and working structure of associations; - Strengthening unity among associations; - Adequate training of associations to carry out its actions	R $ 1,341,585
Development and implementation of the Financial Mechanism (Suruí Fund)	Development and implementation of Suruí Fund for the financial management of the PCFS	- Create a financial management model for the Suruí Fund; - Diversify funding sources for implementation of project activities	- Ensuring long-term financial sustainability; - Suruí Fund operationalization	R $ 309,703

This set of activities is designed to end deforestation in the TISS by attacking its two main roots: the lack of economic alternatives to ensure the well-being of the Paiter Suruí, and the appearance of external actors to conduct illegal activities (p.6).

Actors' roles and responsibilities p.2

Metareilá Association of the Suruí Indigenous People	An institution representing the Paiter Suruí people (Act of Creation and Bylaws of the Metareilá Association
Institute for Conservation and Sustainable Development of Amazonas - IDESAM	Technical coordination in the elaboration of the baseline scenario and preparation of Project Design Document (PDD) as well as the validation and verification to VCS and CCB standards. Coordination of biomass and carbon inventories and forest monitoring in support of the PCFS (remote sensing). Also supports policy and technical coordination related to REDD for the PCFS (p.9).
Forest Trends	Provides support in the formulation and implementation of the project and strategy for raising funds and selling carbon credits generated by the PCFS (p.9).
Kanindé Association for Ethno-Environmental Defense	Responsible for the ethno-zoning of TISS. Coordination and organization of activities for Food Security and income generation, monitoring of biodiversity and socio-economic benefits. Communications Office and development of Territorial Protection Plan (p.8).
Amazon Conservation Team - ACT-Brazil	Support to activities for food security and income generation, monitoring of biodiversity and socio-economic benefits, legal advice and communication to the project. Development of the Land Protection Plan, environmental monitoring and carbon stocks (remote sensing) (p.8).
Brazilian Biodiversity Fund - FUNBIO	Responsible for the financial resources management mechanism generated by the Suruí forest carbon projects - Suruí Fund - and other income activities within the Management Plan (p.9).
Gãbgir Association of the Paiter Suruí Indigenous People	Provide support to improve the quality and performance of schools in the TISS (p.9).
Kabaney Association of the Forest People Garah Pameh Association of the Kabaney Paiter Suruí People	Supports the implementation of economic systems for the sustainable use of TISS‟ natural resources that meet the Paiter Suruí people's needs (p.10).
Pamaur Association for the Protection of the Paiter Suruí People's Makor Clan	Supporting the identification of more effective alternatives to address the health problems faced by the Paiter people (p.10).
Yabner Gãbgir Forestry Institute of the Paiter Suruí people	Encouraging the revitalization, strengthening and enhancement of traditional cultural property (p.10).

Community participation

The need for the development of the PCFS arose from the Paiter-Suruí themselves. The participation of local communities in preparing and designing the project took place through meetings, consultations and processes of prior informed consent, among others (p.99). The project includes an important process of free, prior and informed consent in the communities of the TISS, informing the Paiter-Suruí of planned activities and potential impacts and consulting with them about their concerns, suggestions and needs. The process was conducted in three steps during 2009. The first step consisted of meetings and discussions between the Suruí themselves to reach minimum consensus regarding the possibility of development and implementation of PCFS. The second stage consisted of meetings among indigenous leaders, representatives of local associations and other project partner institutions. This allowed traditional leaders and indigenous organizations and associations to learn about payments for environmental services, especially those from carbon, as well as the methods and activities that make up the construction of the Project Design Document (PDD). The third stage consisted of field activities with visits and community meetings in the villages, providing information about the project for the different groups in the TISS and

discussing the technical concepts related to the PCFS. At the end of this process, a memorandum of understanding was signed between the four clans that indicated the commitment of the Paiter-Suruí indigenous associations to implement the TISS Management Plan, especially regarding aspects of payments for environmental services from the expected sale of carbon credits (p.100).

The consent document attests that the Paiter Suruí had access to all necessary information on payments for environmental services, especially on carbon credits, allowing them to take an informed position on the conduct of this process, evaluating the risks and benefits that implementing sustainable development actions can pose to their way of life (p.27).

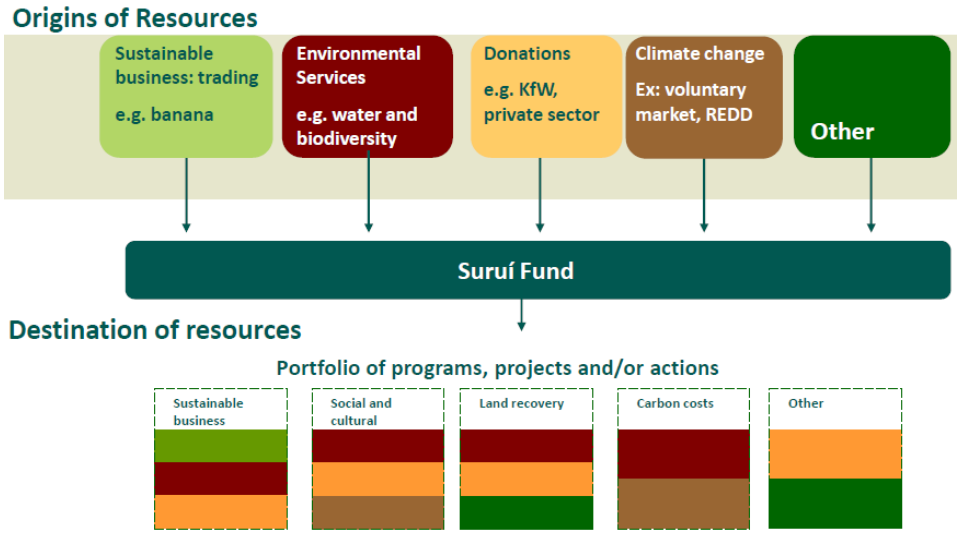
Local stakeholders will be informed of an open forum to receive and incorporate criticism, comments, questions and resolve conflicts related to the implementation and management of project activities. First, is a representative of the Paiter and a clan Council, composed of three representatives from each clan. Second, is the *Labiwayey* (leaders of the People) composed of two representatives from each zone (there are five zones within the TISS). Above the *Labiwayey* is the *Labiway esagah* (Primary Leader of the People) and the Council of Elders. There are also indigenous organizations and non-indigenous organizations that support and advise on project implementation. In cases where it is not possible to find a solution, information will be transmitted to Metareilá Association (the project manager). When actions successfully resolve conflicts that arise, the Project Manager should document how it was done. If conflicts are not resolved, the matter shall be referred to the Labiwayey (Leaders of the People), Labiway esagah (Primary Leader of the People), and finally, if necessary, to the Council of Elders (pp.101-102).

Currently in the process of political reorganization of the Surui, women have increased their participation, with a voice and active participation in some decisions, including getting to meetings and trainings, also facilitated by greater access to formal education. However, women are still shy to participate in political and commercial decisions (p.20).

Project financing

The management model adopted for the PCFS Financial Mechanism (Suruí Fund) will distribute assigned functions between different institutions and decision makers involved in implementing this project. The general structure of the fund is based on four pillars: the deliberating bodies, advisory bodies, an implementing institution and a local manager of the financial mechanism (p.15).

The PCFS aims to ensure the financial sustainability of project activities through a fundraising strategy mixed between public funds and market channels for carbon credit transactions in the voluntary market (p.15).



(*2, p.10)

Benefit sharing

N.D.

Emissions and removals with and without project

GHG sources, sinks and reservoirs in the baseline scenario

Carbon pools included or excluded within the boundary of the proposed AUD project activity are as follows (p.32):

Carbon pools	Included / TBD [1] / Excluded	Justification / Explanation of choice
Above-ground	Tree: Included	Carbon stock change in this pool is always significant
	Non-Tree: Included	Included within the definition of "vegetation in equilibrium" adopted by the project
Below Ground	Included	Equivalent to 26% of the emissions expected under the baseline scenario
Dead wood	Excluded	
Wood products	Included	Insignificatn. Significance test applied in 3.4
Litter	N	Not to be Measured According to VCS Program Update of May 24 th, 2010
Soil organic carbon	Excluded	Recommended When forests are converted to cropland. Not to be Measured in conversions to pasture grasses and perennial crop According to VCS Program Update of May 24 th, 2010.

Sources and GHGs included or excluded within the boundary of the proposed AUD project activity are as follows (p.33):

Sources	Gas	Included / TBD [1] [66] / Excluded	Justification / Explanation of choice
Biomass burning	CO_2	Excluded	Accounted for as changes in carbon stocks
	CH_4	Excluded	Not a significant source (<5%), according to the revised document LULUCF IPCC GL 1996.
	N_2O	Excluded	Considered insignificant under the VCS Program updates on May 24, 2010
Livestock Emissions	CO_2	Excluded	Not a significant source
	CH_4	Excluded	Not applicable to the project
	N_2O	Excluded	Not applicable to the project

Baseline Scenario

Data used for historical land use / land cover change analysis are as follows (p.33):

Vector (Satellite or airplane)	Sensor	Resolution		Coverage	Acquisition date	Scene or point identifier	
		Spatial	Spectral	(km^2)	(MM/DD/YY)	Orbit	Point
Landsat 5 - Land Remote Sensing Satellite 5	TM	30m	0.45 – 2.35 µm	34,225	8/12/2001	230	068
Landsat 5 - Land Remote Sensing Satellite 5	TM	30m	0.45 – 2.35 µm	34,225	8/18/2003	230	068
Landsat 5 - Land Remote Sensing Satellite 5	TM	30m	0.45 – 2.35 µm	34,225	9/5/2004	230	068
Landsat 5 - Land Remote Sensing Satellite 5	TM	30m	0.45 – 2.35 µm	34,225	5/8/2005	230	068
Landsat 5 - Land Remote Sensing Satellite 5	TM	30m	0.45 – 2.35 µm	34,225	6/26/2006	230	068
Landsat 5 - Land Remote Sensing Satellite 5	TM	30m	0.45 – 2.35 µm	34,225	6/26/2007	230	068
Landsat 5 - Land Remote Sensing Satellite 5	TM	30m	0.45 – 2.35 µm	34,225	7/30/2008	230	068
Landsat 5 - Land Remote Sensing Satellite 5	TM	30m	0.45 – 2.35 µm	34,225	9/3/2009	230	068

Land-use and land-cover

The classes of land-use and land-cover used for validation were: forest, secondary vegetation, bare soil or pasture, burned areas and water. After classification, the classified pixels were grouped into three classes (p.34):

1) Ombrophyllous Forest in Degradation (240,028 ha) includes vegetation types of tropical rain forest with logging. This class includes all areas classified as forest in 2009 and that did not change class between 2000 and 2008. It is known that since 1983 there is selective logging in the TISS. The field surveys, reports of the natives, satellite images and an overflight indicate that almost the entire area has been logged, although it was not possible to specify exactly what proportion of the area. All pixels classified as secondary vegetation in altitude range of 344-478 meters were considered to belong to this class. It is known that remote sensing (RS) results are biased on classification at hilltops and steep areas. Therefore, it was opted to consider such pixels to belong to this class based on the fact that PRODES deforestation data for the TISS on this altitude range was zero.

2) Anthropic Vegetation in Equilibrium (3,416.6 ha): This class combines classes of bare soil or pasture, secondary vegetation below 344 meters of altitude (originating from pasture and agriculture) and recent burned areas, which have been classified as a class distinct from non-forest. This vegetation also includes the productive areas.

3) **Non-forest (4,073 ha):** This class includes the non-forest vegetation (Savannah) of the IBGE map (scale 1:100,000). It also includes water.

For the purposes of accounting for carbon stocks, non-forest areas were excluded from the land-use classes used for calculation of changes in carbon stocks. They are also excluded in the projection of deforestation in the baseline.

The analysis of historical land use between 2001 and 2009 showed that 1,415.8 hectares were deforested in the Surui territory during that period, totaling 3,416.6 hectares of deforestation accumulated in Anthropic Vegetation (p.36).

Five drivers showed a positive correlation with the location of deforestation observed in the Surui territory in the period from 2001 to 2009. These variables were tested, in pairs, to verify the association or spatial dependence, using the Cramer indices (V) and the Joint Information Uncertainty (JIU).

The variables that best explain the spatial distribution of deforestation were determined to be (pp.39-40):

1) Distance to the village

2) Distance to prior deforestation

3) Distance to roads

4) Distance to urban areas

5) Types of vegetation: Vegetation is associated with the geography of the Surui territory, and vegetation types occurring in flat areas (i.e., the sub-class open lower montane ombrophyllous forest) were considered most susceptible to deforestation, given the ease of access.

Projection of the annual areas of baseline in the reference region

In order to establish the baseline of the project, a projection model of land use change in the TISS was developed. This model is called SimSuruí and is based on system dynamics to represent the existing system in TISS, its agents and their interactions with the surrounding vegetation (p.6).

For the projection of deforestation in the baseline scenario, approach "c" of the VM0015 methodology was chosen to build a (non-spatial) system dynamics model, Vensim (Ventana Systems, Inc.). Five sub-models were defined in order to build the model representing the dynamics of vegetation cover in the Surui territory in the 30 years (p.43).

(Sub-model1: Surui Demographics, Sub-model2: Groups of productive agents among the Surui, Sub-model3: Economic dynamics of the productive agent groups, Sub-model4: Subsistence farming, Sub-model5: Vegetation dynamics in the Surui territory) (pp.45-51)

As all deforestation in the region of reference occurs in the project area, a single summary table is presented below (p.58).

Annual areas of baseline deforestation in the reference region, project area and leakage belt

Project year *t*	Stratum *i* of the reference region in the project area 1 $ABSLPA_{i,t}$ ha	Total annual $ABSLPA_t$ ha	Total cumulative *ABSLPA* ha
2009	195.0	195.0	195.0
2010	191.2	191.2	386.2
2011	274.1	274.1	660.3
2012	258.0	258.0	918.3
2013	238.7	238.7	1,157.0
2014	255.5	255.5	1,412.5
2015	271.2	271.2	1,683.7
2016	243.3	243.3	1,927.0
2017	210.1	210.1	2,137.1
2018	211.5	211.5	2,348.6
2019	221.3	221.3	2,569.9
2020	225.0	225.0	2,794.9
2021	393.7	393.7	3,188.5
2022	480.8	480.8	3,669.3
2023	475.5	475.5	4,144.8
2024	751.5	751.5	4,896.3
2025	736.0	736.0	5,632.3
2026	584.7	584.7	6,216.9
2027	554.9	554.9	6,771.8
2028	696.8	696.8	7,468.6
2029	606.9	606.9	8,075.5
2030	483.6	483.6	8,559.1
2031	399.9	399.9	8,959.0
2032	477.4	477.4	9,436.3
2033	438.2	438.2	9,874.5
2034	560.8	560.8	10,435.3
2035	618.7	618.7	11,054.0
2036	605.5	605.5	11,659.5
2037	895.2	895.2	12,554.7
2038	1,020.6	1,020.6	13,575.3

Projection of the location of future deforestation

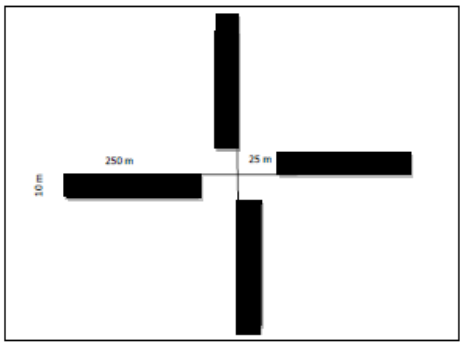
To estimate the location of future deforestation, the program Dinamica-EGO version 1.6.0 was used, accepted by the methodology VM0015 (p.59).

Estimation of baseline carbon stock changes

The stratified systematic sampling method was used, where each of the three vegetation types sampled corresponded to a stratum. Initially, a grid on the TISS map was created and nine quadrants where sampling units would be allocated for the pilot inventory were selected. Criteria for choosing the sampling sites included proximity to extraction roads, vegetation types and the level of difficulty of access to areas. As a first step nine clusters were sampled in order to determine the optimal number of sample plots to represent the total stock of TISS with a sampling error of less than 10% for a confidence interval (CI) of 95%. This determined the need to sample 13 more clusters in a second stage (pp.78-79).

Each cluster consists of four plots arranged in a cross distributed to the North, South, East and West, with dimensions of 10 x 250 meters, beginning 25 meters from the center of the cluster. Nine permanent clusters were installed for permanent monitoring of changes in carbon stocks, and 13 temporary clusters were measured. The clusters were installed at least 300 meters from the main logging road that gave access to the area (p.80).

Form of conglomerates installed(p.80)



In each plot all individuals of plants - trees, palms and lianas - with a diameter at breast height (DBH) ≥ 10 cm (or circumference at breast height - CBH ≥ 31.4 cm) were measured, and the height of palm trees estimated. The indigenous names of plants were noted for the permanent plots.

Allometric equations were used to obtain the dry weight of plants measured (p.80). Allometric equations for trees (Nogueira et. al. 2008) and palms (Saldarriaga et. al. 1988) were applied to obtain the total above-ground biomass (p.95). A tree species equation for open rain forest in southern Amazonia was used (pp.80-82):

$$PS_{abg} = EXP - 1{,}716 + 2{,}413 * Ln(DAP)$$

Where:

PS abg = estimated dry weight for each individual

DAP = diameter at breast height

To estimate the biomass of palms, the following equation was used:

$$PS_{abg} = EXP - 6{,}3789 - 0{,}877 * Ln\left(\frac{1}{DAP^2}\right) + 2{,}151 * Ln(H) \quad (8)$$

Where:

PS abg = estimated dry weight for each individual

DAP = diameter at breast height

H = Height

Carbon stock was estimated by multipling measured dry weight for each individual by 0.485.

Due to the low variation of carbon stocks identified between the three vegetation types of TISS, it was decided to use the weighted average. Thus, the stock of carbon above ground for calculations of emission reductions by the project will be 125.97 t C / ha.

For belowground biomass, a root / shoot ratio of 34.3% of dry biomass was used. This is a median value obtained from direct measurements, incorporating other references.

The stock change without the project involves the clearing of rainforest for the establishment of temporary pastures and agricultural crops, as well as the regeneration of secondary vegetation representing various stages of development. The forest carbon stock as measured in the carbon inventory and incorporating belowground biomass is 169.18 tC / ha (620.3 tCO 2 / ha).This value was reduced by the amount of carbon in vegetation in equilibrium that would replace the forest, composed of a mosaic of land uses in the Brazilian Amazon, equivalent to 12.82 tC per hectare (47.0 tCO 2 / ha).The use of this value for landscape carbon stocks in equilibrium is conservative in that it is based on a higher proportion of secondary forests in the

deforested area (45%) than the proportion projected for the simulated year 2038 (32%).

Thus, the project comprises a single class of original forest vegetation, divided into two *strata,* with carbon values for the initial class, Degraded Ombrophyllous Forest (Icl1 and Icl2), of 620.3 tCO 2 -e/ha converted to the final class Anthropic Vegetation at Equilibrium (Fcl1) (47.0 -e/ha tCO 2) resulting in an emission factor of 573.3 tCO 2 -e/ha (p.82).

As allowed by the methodology, the project proponents include a factor that represents the increase in carbon stocks in the project area, since the project area includes degraded forests that in the baseline case would be deforested and due to the project activity these areas will recover and sequester additional carbon. The lowest value found in the literature in the Amazon was adopted, giving the conservative estimate that a logged forest sequesters carbon at a rate of 0.27 tC / ha/year (or 0.99 tCO2/ha/year), resulting in increased carbon storage in the project area of 253,910.5 tCO 2 (p.86).

Significant GHG emissions within the project area are not expected under the "project scenario," nevertheless as a conservative approach to ex ante estimates, it is assumed only 90% of the total deforestation under the baseline scenario will be avoided. This factor takes into account any unexpected changes in carbon stocks, potentially generated by expansion of family farming areas, unavoidable unplanned logging or encroachment etc. This value makes a total of 524,360.8 tCO 2-e that could be emitted in the project scenario (p.88).

The step 'Ex ante estimation of actual non-CO2 emissions from forest fires' is not applicable to the PCFS, since forest fires have not been included in the baseline scenario (p.89).

Leakage

Two sources of leakage are considered and must be addressed (p.90):

i. Decrease in carbon stocks and increase in GHG emissions associated with leakage prevention measures;

The project believes that the Paiter-Suruí people, residents within the TISS, represent 100% of the actors directly involved in deforestation activities foreseen by the baseline scenario with PCFS. The leakage belt areas and leakage management PCFS are located within the TISS. To avoid leakage due to "activity displacement" of Surui outside of the project area, leakage prevention measures will be taken, primarily focused on income generation and improved quality of life of the Paiter-Surui people, that are described below:

Alternative and sustainable sources of income for the Suruí. The implementation of the project is largely based on the development of new alternative sources of sustainable income to replace those activities that cause deforestation in the baseline, the improvement of production chains of brazil nuts, coffee, bananas, handicrafts, and the creation of new sources of income, such as tourism and the actual jobs created with the implementation and monitoring of the project.

Reforestation activities. The project includes the reforestation of agricultural areas and pastures with native species, increasing the stock of carbon in the leak management areas.

ii. Decrease in carbon stocks and increase in GHG emissions associated with activity displacement leakage;

The Paiter-Surui PCFS believes that all of the actors involved in deforestation activities in the TISS are represented, and with the preventive measures outlined above, emissions leakage from activity shifting are not expected.

***Leakage Management Area:** Area cleared within the TISS by 2009, and classified as deforested since 2000/2001. This area covers 3,416.6 hectares and includes the production areas in pastures and agricultural areas, secondary and regenerating areas of the villages, where activities will be implemented to prevent the spread of deforestation for new areas of forest within the project scenario, according to the Ethnozoning and 50-Year Life Plan for territorial management by the Paiter Suruí people (p.32). The

PCFS is expected to generate a positive balance of emissions in the leakage management area through the promotion of reforestation and agroforestry systems based on principles of agroecology, low consumption of energy and chemical inputs, and increased use of organic fertilizers. Even so, as a conservative measure, these emissions are not accounted for in generating carbon credits for the PCFS (p.90).

Summary of GHG Emission Reductions and Removals (p.94)

Project year t	Baseline carbon stock changes annual $DCBSLPA_t$	Baseline carbon stock changes cum. $DCBSLPA$	Baseline GHG emissions annual $EBBSLPA_t$	Baseline GHG emissions cum. $EBBSLPA$	*Ex ante* project carbon stock changes annual $DCPSPA_t$	*Ex ante* project carbon stock changes cum. $DCPSPA$	*Ex ante* project GHG emissions annual $EBBPSPA_t$	*Ex ante* project GHG emissions cum. $EBBPSPA$	*Ex ante* leakage carbon stock changes annual $DCLK_t$	*Ex ante* leakage carbon stock changes cum. $DCLK$	*Ex ante* leakage GHG emissions annual ELK_t	*Ex ante* leakage GHG emissions cum. ELK	*Ex ante* net anthropogenic GHG emission reductions annual $DREDD_t$	*Ex ante* net anthropogenic GHG emission reductions cum. $DREDD$	*Ex ante* VCUs tradable annual VCU_t	*Ex ante* VCUs tradable cum. VCU	*Ex ante* buffer credits annual VBC_t	*Ex ante* buffer credits cum. VBC
	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
2009	111,789.9	111,789.9	-	-	10,985.9	10,985.9	-	-	0.00	0.00	0.00	0.00	100,804.0	100,804.0	**94,755.7**	**94,755.7**	5,048.2	5,048.2
2010	109,600.2	221,390.1	-	-	10,581.5	21,567.4	-	-	0.00	0.00	0.00	0.00	99,018.7	199,822.7	**93,077.6**	**187,833.3**	5,941.1	11,989.4
2011	157,152.8	378,542.9	-	-	14,901.1	36,468.6	-	-	0.00	0.00	0.00	0.00	142,251.7	342,074.4	**133,716.6**	**321,549.9**	8,535.1	20,524.5
2012	147,911.8	526,454.8	-	-	13,769.5	50,238.1	-	-	0.00	0.00	0.00	0.00	134,142.3	476,216.7	**126,093.8**	**447,643.7**	8,048.5	28,573.0
2013	136,832.8	663,287.6	-	-	12,501.8	62,739.9	-	-	0.00	0.00	0.00	0.00	124,331.0	600,547.7	**116,871.1**	**564,514.8**	7,459.9	36,032.9
2014	146,502.4	809,789.9	-	-	13,132.3	75,872.2	-	-	0.00	0.00	0.00	0.00	133,370.1	733,917.8	**125,367.9**	**689,882.7**	8,002.2	44,035.1
2015	155,477.9	965,267.9	-	-	13,668.4	89,540.5	-	-	0.00	0.00	0.00	0.00	141,809.6	875,727.3	**133,301.0**	**823,183.7**	8,508.6	52,543.6
2016	139,483.9	1,104,751.8	-	-	12,021.4	101,562.0	-	-	0.00	0.00	0.00	0.00	127,462.5	1,003,189.8	**119,814.7**	**942,998.4**	7,647.7	60,191.4
2017	120,439.4	1,225,191.1	-	-	10,172.1	111,734.1	-	-	0.00	0.00	0.00	0.00	110,267.3	1,113,457.1	**103,651.2**	**1,046,649.6**	6,616.0	66,807.4
2018	121,249.5	1,346,440.6	-	-	10,031.1	121,765.2	-	-	0.00	0.00	0.00	0.00	111,218.4	1,224,675.4	**104,545.3**	**1,151,194.9**	6,673.1	73,480.5
2019	126,851.9	1,473,292.5	-	-	10,275.6	132,040.8	-	-	0.00	0.00	0.00	0.00	116,576.3	1,341,251.7	**109,581.7**	**1,260,776.6**	6,994.6	80,475.1
2020	128,994.2	1,602,286.7	-	-	10,226.4	142,267.1	-	-	0.00	0.00	0.00	0.00	118,767.8	1,460,019.6	**111,641.8**	**1,372,418.4**	7,126.1	87,601.2
2021	225,685.2	1,827,971.9	-	-	17,502.1	159,769.2	-	-	0.00	0.00	0.00	0.00	208,183.2	1,668,202.7	**195,692.2**	**1,568,110.6**	12,491.0	100,092.2
2022	275,624.8	2,103,596.7	-	-	20,898.9	180,668.1	-	-	0.00	0.00	0.00	0.00	254,725.9	1,922,928.6	**239,442.3**	**1,807,552.9**	15,283.6	115,375.7
2023	272,595.2	2,376,191.9	-	-	20,198.5	200,866.6	-	-	0.00	0.00	0.00	0.00	252,396.7	2,175,325.2	**237,252.9**	**2,044,805.7**	15,143.8	130,519.5
2024	430,848.8	2,807,040.7	-	-	31,180.6	232,047.2	-	-	0.00	0.00	0.00	0.00	399,668.2	2,574,993.4	**375,688.1**	**2,420,493.8**	23,980.1	154,499.6
2025	421,931.0	3,228,971.7	-	-	29,806.6	261,853.8	-	-	0.00	0.00	0.00	0.00	392,124.4	2,967,117.9	**368,597.0**	**2,789,090.8**	23,527.5	178,027.1
2026	335,183.5	3,564,155.1	-	-	23,099.6	284,953.5	-	-	0.00	0.00	0.00	0.00	312,083.8	3,279,201.7	**293,358.8**	**3,082,449.6**	18,725.0	196,752.1
2027	318,125.1	3,882,280.3	-	-	21,374.7	306,328.2	-	-	0.00	0.00	0.00	0.00	296,750.4	3,575,952.1	**278,945.4**	**3,361,395.0**	17,805.0	214,557.1
2028	399,455.8	4,281,736.0	-	-	26,149.5	332,477.6	-	-	0.00	0.00	0.00	0.00	373,306.3	3,949,258.4	**350,907.9**	**3,712,302.9**	22,398.4	236,955.5
2029	347,934.1	4,629,670.1	-	-	22,175.9	354,653.5	-	-	0.00	0.00	0.00	0.00	325,758.3	4,275,016.7	**306,212.8**	**4,018,515.7**	19,545.5	256,501.0
2030	277,230.8	4,906,900.9	-	-	17,190.8	371,844.3	-	-	0.00	0.00	0.00	0.00	260,040.0	4,535,056.6	**244,437.6**	**4,262,953.2**	15,602.4	272,103.4
2031	229,265.0	5,136,165.9	-	-	13,820.6	385,664.9	-	-	0.00	0.00	0.00	0.00	215,444.4	4,750,501.0	**202,517.8**	**4,465,471.0**	12,926.7	285,030.1
2032	273,665.5	5,409,831.4	-	-	16,024.6	401,689.4	-	-	0.00	0.00	0.00	0.00	257,641.0	5,008,142.0	**242,182.5**	**4,707,653.5**	15,458.5	300,488.5
2033	251,195.6	5,661,027.0	-	-	14,275.0	415,964.4	-	-	0.00	0.00	0.00	0.00	236,920.6	5,245,062.6	**222,705.3**	**4,930,358.8**	14,215.2	314,703.8
2034	321,532.6	5,982,559.6	-	-	17,716.9	433,681.4	-	-	0.00	0.00	0.00	0.00	303,815.7	5,548,878.3	**285,586.7**	**5,215,945.6**	18,228.9	332,932.7
2035	354,701.9	6,337,261.5	-	-	18,932.1	452,613.5	-	-	0.00	0.00	0.00	0.00	335,769.8	5,884,648.1	**315,623.6**	**5,531,569.2**	20,146.2	353,078.9
2036	347,124.6	6,684,386.2	-	-	17,928.2	470,541.7	-	-	0.00	0.00	0.00	0.00	329,196.4	6,213,844.5	**309,444.6**	**5,841,013.8**	19,751.8	372,830.7
2037	513,213.1	7,197,599.2	-	-	25,620.1	496,161.8	-	-	0.00	0.00	0.00	0.00	487,593.0	6,701,437.5	**458,337.4**	**6,299,351.2**	29,255.6	402,086.2
2038	585,113.8	7,782,713.1	-	-	28,199.0	524,360.8	-	-	0.00	0.00	0.00	0.00	556,914.8	7,258,352.3	**523,499.9**	**6,822,851.2**	33,414.9	435,501.1

Monitoring

TASK 1. Monitoring changes in carbon stocks and GHG emissions for periodic verification (pp.97-98).

1. Monitoring actual changes in carbon stocks and GHG emissions in the project area;

1.1.Monitor the implementation of the project.

Financial and technical reports will be submitted for project activities. Of particular importance is the implementation of the surveillance system that will allow continuous monitoring of the territory to halt entry of potential squatters. It involves the construction of three checkpoints in the TISS to control the flow of transport and with the objective of involving the Paiter-Surui in identifying threats of deforestation and forest degradation, mapping areas susceptible to fire, and controlling illegal logging, illegal hunting and fishing, among other activities. Information from the checkpoints will be sent to the executing agency/administrator that is monitoring the site to take appropriate measures for the supervision and control of the TISS, with support from the States of Rondonia and Mato Grosso.

1.2. Monitoring change and land use within the project area.

The project will use LANDSAT 5 TM to generate annual deforestation data throughout the Reference Region of the project, using the supervised classification of images with the maximum likelihood method described in the supplementary material 03. This analysis will generate classes of deforestation and forested areas, updated every year, and will be compared with previous years. Deforestation estimates

obtained from this analysis will be compared with the deforestation model designed by "SIMSURUI" that was used to establish the baseline scenario in the region of interest, and differences between projected and observed values will be presented for every year.

1.3. Forested areas where the carbon stock is increasing.

Monitoring will follow the re-measurement of the 36 permanent plots established (arranged in 9 clusters of 1 ha) within the project area.

2. Monitoring leakage;

This project is not expected to cause any kind of leakage. In any case, deforestation will be monitored annually throughout the Reference Region, including the leakage belt. If some deforestation occurs in the leakage belt during the project period, the loss of carbon stocks will be accounted for using the current values of carbon stock per hectare of the forest class in question, and will be deducted from the non-permanence buffer.

TASK 2 - Revisiting the projected baseline at fixed periods.

1. Update information on agents, drivers and underlying causes of deforestation.

2. Adjust the component of use and land-use change of the baseline.

3. Adjusting the carbon component of the baseline.

Community Impact Monitoring

The methodology used to define the expected impacts of the Project on the Surui communities, as well as the selection of indicators and building a plan to monitor these indicators is based on the "Manual for Social Impact Assessment of Land-based Carbon Projects." This methodology aims to use participatory analysis tools for with and without project scenarios, definition of impacts and preparation of a comprehensive plan for monitoring, including indicators, frequency analysis and monitoring, among others. These themes do not characterize the indicators to be monitored, but they indicate the subjects to which indicators should be linked (p.108).

The monitoring of these variables in order to verify that the project is actually generating positive benefits to communities and allow an assessment regarding possible negative impacts will be done every four years, through workshops with direct participation of the Surui and analysis of indicators from socioeconomic surveys, made directly in the field (p.108).

Biodiversity Impact Monitoring

To ensure net positive impacts on biodiversity in the project, and monitor the biological diversity that can still be threatened by the project, the following items are included in the proposed plan (p.110):

1 - To sensitize community members about the importance of monitoring the use of natural resources and establish rules for sustainable use.

2 - Train community members to operate as biodiversity monitors.

3 - Monitor the species used by the local communities, including the synergetic fauna (mammals, birds and fish) and use of timber and non-timber forest products.

4 - Monitor species of "special interest", those endangered or critically endangered, endemic species and species that cause economic losses to communities (generate conflict).

Reporting

N.D.

Verification

N.D.

Risks and risk management

Historically, the TISS has suffered invasion of external actors to exploit their natural resources, hunters and loggers, and causing other impacts such as fire. Moreover, the indigenous people were enticed to join outside actors to develop schemes such as sharecropping and leasing of land for pastures, and cutting and selling of timber in partnership with loggers in the region.

The cooperation agreement signed between the Surui clans is a crucial milestone which ensures that these illegal activities will no longer be developed in the territory. The PCFS will reverse this scenario by installing surveillance bases in border areas of TISS, the use of new monitoring technologies, the adoption of a surveillance system with Surui environmental agents, a fire brigade, and construction of firebreaks, among others (p.28).

Progress and plans

CCB status: Gold Level (Mar 30, 2012)

VCS status: Under validation

Links:

Project-related documents

IDESAM website

Associação Metareilá do Povo Indigena Surui (2010) Free, Prior and Informed Consent Surui Carbon Project

Thiel, A. (2012) The Surui Become the First Indigenous Tribe to Earn Carbon Credits under Internationally Recognized Standards ,Forest Trends- Recent News

Surui: Carbon Finance and the Protection of Indigenous Peoples' Forests in the Amazon

Gebara, M.F., et al., REDD+ risks and opportunities for Indigenous People in Brazil: A case study from the Surui Forest Carbon Project

Others

Latin American and Caribbean Network of Environmental Funds (2011) Case Studies 'Funbio,Brazil- the Surui Carbon Fund, The roles of Environmental Funds in REDD+