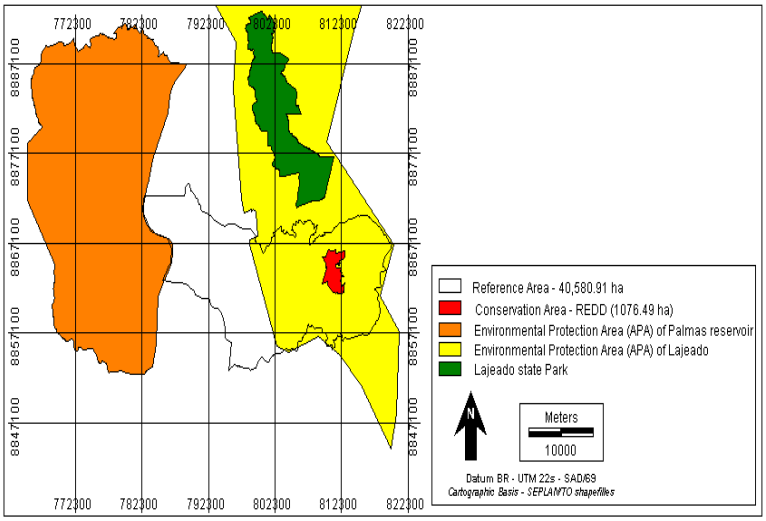
Genesis Forest Project: Reducing Greenhouse Gas Emissions from Deforestation and Degradation in the State of Tocantins, Brazil

Source(s): *Genesis Forest Project: Reducing Greenhouse Gas Emissions from Deforestation and Degradation in the State of Tocantins, Brazil*

Project location

The project area is located in the central region of the Brazilian state of Tocantins, between the longitude meridians 48°03'W and 48°21'W and latitude parallels 9°43' and 10°28' S.

The project area lies east-south-east of the state capital Palmas in the Taquarussu district, and inside the Environmental Protection Area (APA), Serra do Lajeado (p. 7), and to the South of the Serra do Lajeado State Park, which are protected areas that play an important role for the conservation of biodiversity (p. 3).



Location of the Protected Areas in the REDD project region (p.8)

Forest area and types

The Genesis Forest project is situated in the Brazilian Savannah region (Cerrado in Portuguese), Brazil's second largest biome after the Amazon Rainforest (p. 6). The cerrado is a biome considered one of the 25 global "hotspots" (p.131).

Climatic data from the Meteorological Observatory at Porto Nacional shows average monthly temperatures in excess of 25°C, reaching a maximum at the end of the winter, before the advent of the rains. Highest absolute temperatures at that time exceed 41°C (p. 9).

REDD Conservation Area = 1,076.49 ha; Leakage Belt = 3,171.42ha (p. 67); Reference Area = 40,580.91ha (p. 8).

In the reference area, 8 distinct categories are recognized: Riparian Forest (i-b), Closed Savannah (i-a), Stricto Sensu Savannah (i-c), Open Savannah (i-d), Other Lands (vi), Burnt Areas (vii), Wetlands (iv), and Settlements (v) (p.14,35).

Gallery Forests (riparian forests): 370.53 ha

These formations occur on the banks of watercourses, on the plateau, permeating the Savannah areas and in the watersheds associated with the Slope Forests. The structure of the gallery forest is characterized by 3 woody strata, and one herbaceous strata (pp.14-15).

Closed Savannah: 77.13 ha

This category is formed by xeromorphic and predominantly arboreal species with a profuse canopy furnished with large, coriaceous, evergreen leaves. The bushy stratum is little pronounced, and the herbaceous one is composed of grassy tussocks, mingled with stunted woody plants and dwarf palms (p.15).

Stricto Sensu Savannah: 531.90 ha

This is a land cover formation with sparse trees. It has 3 strata with predominantly herbaceous vegetation and woody species growing up to 7 m high (p. 16).

Open Savannah: 72.27 ha

This land cover type is characterized by what are essentially natural and anthropogenic (extensive pasture) vegetation formations. The height of the vegetation varies between 0.20 – 1.50 m, with grasses predominating and with a few low-growing woody plants (bushes) (p.16-17).

Other Lands (non-forest categories): 24.66 ha

Crop Land: This category is not representative of land-use and land-cover of the project and reference area. One of the most significant crops is soy, representing only 1.1% of the reference area, while the others crops can be described together as family subsistence agriculture (p. 24).

Grass Land: This category is very typical of Brazilian land use. It is the most significant economic activity in the state of Tocantins. In the Palmas region the activity represents around 34% of the land cover. It is common practice to graze cattle in areas of Open and Stricto Sensu Savannah, introducing Andropogon gayanus grass in order to increase productivity. Therefore, this class can be represented by: burnt areas, open savannah and other land (p. 24).

Wetlands: This category represents the hydrology and the Lajeado Reservoir present in the reference area (p. 25).

Settlements: This category represents all built-up areas in the reference area, such as urban areas, roads, and any kind of human infrastructure (p. 25).

Other Land: This category includes any kind of use not considered in the other categories, for example: bare soil, rocks and other kind of category that was not possible to identify in the satellite images. The category moreover includes areas that are continually subjected to the passage of fire and periodic deforestation events (p. 26).

Burnt Area: This category is well-represented in the land use of the reference area. Burning is a common practice to clear areas of vegetation as well as and remove native forest cover (p. 27).

Forest management and use context

The APA *Serra do Lajeado* was created May 20, 1997 and encompasses the municipalities of Palmas, Aparecida do Rio Negro, Tocantínia and Lajeado. It is 121,415 ha in area and acts as buffer zone for Lajeado State Park (roughly 5km from the project's border). The principle objective of the APA is to protect the river system that supplies the city of Palmas, as well to organize the urban expansion in this important socio-economic region. Meanwhile, the classification of APA, under Brazilian National System of Conservation Units (SNUC), does not express any restriction on normal use for the region, which may potentially affect the biodiversity, climate, water resources, and ecosystems of this area. For this reason the initiation of a REDD project in this area provides

additionality (pp. 7-8).

The project area is owned by the Ecologica Network and there is no land tenure disputes in the project area (p. 77). The Project Area pertaining to the Ecologica Group includes a total of four private properties situated around Ecológica Ranch (Fazenda Ecologica) in Taquarussu: São Francisco Ranch (main) and four parcels (06, 12B, 09A, and 07A) (p. 8).

In the state of Tocantins soy production is the leading crop, and the city of Palmas is responsible for 2,000 ha of plantations. The region of influence of the Lajeado Dam includes areas used for livestock production and agriculture. Large areas covered with different types of natural vegetation in the vicinity of the lake were replaced with cattle pasture. Agricultural activities are situated principally along the banks of the Tocantins River, in isolated areas where Gallery Forest existed. However they are now being used for subsistence agriculture, where watermelon, corn, sugar-cane, manioc, and other crops are cultivated. One common practice in the region is the reconditioning and clearing of pastures through the use of fire. According to the Brazilian Agricultural Research Agency (EMBRAPA), fire is employed in the preparation of pastures for planting and Harvest (pp. 33-34).

The communities in the vicinity of the project area are the urban areas of Palmas, the capital of the state of Tocantins and the district of Taquarussu located 32 km from the capital in the interior of the Lajeado APA.

Rates and drivers of deforestation and degradation

The processes of degradation of the cerrado, including the occurrence of fire, cattle ranching and agriculture, are due to direct anthropogenic interference on the biome through deforestation, utilization of herbicides and insecticides, road openings, urban construction and expansion, etc. (p. 34).

Because of its topographic conditions favorable to mechanized crop production, this region is considered an agricultural frontier in Brazil. Additionally, the Savannah Biome has one peculiarity that aids its own destruction, which is the facility to clear and deforested areas at lower costs (due to a lower tree density) compared with to humid forests, such as Amazonia and Mata Atlântica. As a result the Brazilian Savannah has been largely used for cattle production at relatively small cost. Moreover, business-as-usual economic activities in the reference area have historically defined the use of the natural resources without any environmental and social concern.

One of the major deforestation drivers is understory fires (p. 69). Once a forest is affected by an understory fire, the chance of having future burn events increases, perpetuating the feedbacks among deforestation, logging and fire (Nepstad *et al*., 2001). There are evidences that subsequent fires can favor species that are adapted to these events (see figure 61 below), perhaps leading to large scale forest impoverishment and even savanization (Nepstad *et al*., 2001; Cochrane *et al*., 1999) (pp. 133-134).

Project proponents

Ecológica Institute – IE (Instituto Ecológica): Implementing organization (p. 1)

Cantor CO2e Brazil: Institutional partner (p. 1)

Carbonfund.org: Institutional partner (p. 2)

Implementation timeframe

May 2009-May 2029 (p.68)

Project goals

The Genesis Forest Project was conceived to align conservation actions in private properties in the vicinity of the Ecológica Ranch (p. 52).

The goal of the project in a broader sense goes beyond simple conservation of Savannah forest fragments, aiming to disseminate new practices that promote a new paradigm of production and conservation for the region (p. 52).

It is hoped that, with the conservation activities, significant emissions reductions of greenhouse gases can be achieved (p. 52).

Implementation activities

The project hopes to transform part of the REDD area (57.4%) into Natural Heritage Private Reserve which will serve as a refuge for local fauna, increasing the size of the protected area mosaic, and lending to greater connectivity between forest fragments in the region (p.3,132).

Part of the REDD area will be designated as a protected area, according to the Brazilian Federal Law N. 9985, which describes the National System of Conservation Unities (*SNUC) and* which establishes the rules and concepts for protected areas (p. 53).

Conservation and the carbon permanence under the Genesis Forest Project for the Brazilian Savannah will be delivered through the mechanism of the Protected Area on Private Land (*RPPN*) in part of the project area and via Legal Reserve (*LR)*. Preliminary studies have shown that approximately 57.4% of the total area matches these criteria, allowing the establishment of legally recognized conservation areas on privately owned land and providing a means to directly redress the 'protection shortfall'. Additionally, the mechanism of RPPN and LR will legally guarantee the permanence of the carbon stock provided, once the remaining forest areas of the Genesis project (42.6%) are designated as Legal Reserve under the Brazilian Federal Forest Code. (p. 6, 54).

Ecologica Institute intends to develop at the Ecologica Ranch a program for the Center for Biodiversity Learning and Climate Change, or Ecotropical, whose mission is to develop interdisciplinary research on Tropical Biodiversity with a focus on Climate Change, Renewable Energy, Social Carbon, among others, promoting the exchange and interaction between communities, national and foreign researchers and society (p. 8).

The Strategic Management Plan (SMP) and regime is divided into three major programs (pp. 56-66).

1. **Program: Environmental Quality Monitoring**

As a function of the region dynamics and other activities, the REDD project and the buffer zone may undergo some modifications. These eventual changes should aim to create new programs that will assure the conservation maintenance along the evolutionary and ecologic period. Any environmental changes that occur in the REDD area due to activities outside the project boundary will also be considered.

Objectives: Monitor the REDD area activities as a function of the activities developed inside and outside of the project boundaries, decreasing the negatives and empowering the positives.

Activities:

a) Establish sample points in the various physiognomies, considering the location (inside or outside of the REDD area) and the zoning for the different activities to be developed;

b) Assess the possible impacts on the fauna and flora, as a result of the activities developed inside and outside the REDD area;

c) Georeference all information gathered;

d) Determine the changes to be made to the management plan.

Expected Results:

a) Creation of a database to monitor the effect of the REDD conservation activities above on the flora and fauna;

b) Refine the management plan.

--Subprogram: Biomass Monitoring

Objective: Monitor the accumulation of biomass to detect areas susceptible to burning.

Activities:

a) Assess dry biomass on the ground in various samples in the various physiognomies of the REDD project;

b) Assess living biomass in the different physiognomies;

c) Assess the location, the time period of the last burning occurrence, both inside and around the boundaries of the REDD project area;

d) Create a roads cartographic cover inside and outside the REDD area using GIS tools;

e) Create, using GIS tools, a property distribution cover in the neighborhood of the REDD area, distinguishing high risk residents who engage in destructive activities;

f) Create and maintain a georeferenced database, crossing all information's described above, detecting locals with high risk of burning and, as a result, the places which the vigilance will need to be more intensive.

--Subprogram: Invasive Species Monitoring

Objective: Identify and monitor area occupied by invasive species and identify areas of potential spread.

Activities:

a) Survey areas with a high incidence of invasive species, which will in turn feed a georeferenced database on the subject;

b) Identify invasive species and evaluate their propensity to spread and threaten biodiversity;

c) Monitor periodically areas showing the greatest impact or susceptibility to invasive species.

--Subprogram: Survey and Monitoring of Species Threatened with Extinction

Objective: Identify, monitor and update the list of species threatened with extinction in a way that enables the prioritization of conservation activities in areas of high environmental risk.

Activities:

a) Survey areas of high incidence of species threatened with extinction, which will in turn feed a georeferenced database on the subject;

b) Identify species threatened with extinction and evaluate their risk of disappearance and the consequences for biodiversity;

c) Monitor periodically areas of high occurrence of species threatened with extinction which will constitute priorities for the implementation of activities that conserve forest fragments.

2. Program: Protection of the REDD area

The protection program in the REDD area intends to protect the physical integrity of the area from

various perspectives, such as assisting in the natural regeneration process in degraded areas, the creation and maintenance of transition zones, amortization of impacts outside the REDD area and minimizing and supplying data on other kinds of threats such as erosions, burnings, hunting, among others.

--Subprogram: Hunting, plant specimen collection and logging inspections

Objective: Halt all hunting, logging and flora collection activities inside the REDD area.

Activities:

a) Systematic patrolling;

b) Register and georeference occurrences of hunting and logging through direct and indirect indication;

c) Notify competent authorities of environmental crimes committed so that perpetrators can be held responsible and pay appropriate penalties;

d) Inform the wider community of the importance of the program.

--Sub Program: Control of burning in the REDD area

Objective: Reduce the risks of burning from buffer zone and leakage belt activities.

Activities:

a) Open fire breaks on the REDD area boundary in the places where roads do not yet exist;

b) Celebrate an accord to support the *Taquarussu* Forest Fire Brigade that will help to monitor the REDD area and control fires that threaten the project area,

c) Celebrate an accord with the local fire brigade;

d) Install observation points in strategic places, each equipped with a radio.

--Subprogram: Control of invasive species, augmenting impacted areas' capacity for natural restoration, as well as strengthen the native ecosystem remaining after the processes of invasion.

Objective: Diminish in the long run the incidence of potential new invasions by exotic species.

Activities:

a) Implement a system of surveillance and monitoring of existing and potential exotic species.

b) Control exotic species in areas critical for biodiversity conservation using mechanical or manual grass cutters.

c) Environmental control to enable restoration processes, involving the replanting of native species, unpacking soils, seeding native species through soil cover and other techniques. These methods aim to return the environment to a condition more favorable to re-colonization by species native to the ecosystem thereby impeding the entrance of exotic invasive species.

3. Program: Environmental Education

Inform the local community about the importance of environmental conservation and sustainable development incorporating the tools for the activity into local communities.

Objective: Implement activities whose purpose is to respect the environment and sustainable development, as well sustainable approaches to income generation.

--Sub Program: Environmental education for the community in the leakage belt and buffer zone.

Activities:

a) Hold dialogues with students in the schools located on the buffer zone and leakage belt of the REDD area, to raise awareness about environmental conservation;

b) Support the school teachers located on the buffer zone and leakage belt of the REDD area, to maximize the students' understanding of the environment.

--Sub Program: **Environmental education for the artisans and plants collectors about medicinal and craft uses.**

Activities:

a) Support meetings in the associations and/or other places, with the intention of promoting the need for environmental conservation;

b) Support meetings in the associations and/or other places, to demonstrate sustainable development;

c) Hold dialogues with the associations, to encourage artisans to protect the natural resources supplying their activities and of the importance of collecting materials in a non-opportunistic way, observing natural resource limits;

d) Establish a link between the studies developed in the REDD area of the species used by the artisans and the artisans associations themselves.

--Sub Program: Community environmental education

Activities:

a) Develop conservation activities with the various associations, with the intention of alerting the population of the importance of conserving the environment inside and outside the REDD area;

b) Organize expositions that illustrate important aspects of the environmental conservation;

c) Create mechanisms such as the exchange of community ideas and for direct collaboration in project management.

--Sub Program: Burning prevention awareness

Activities:

a) Develop awareness of communities about the hazards of anthropogenic burning;

b) Visit properties neighboring the REDD area, explaining clearly the hazards of burnings and pertinent legislation;

c) Post signs near REDD area boundaries, emphasizing the hazards of burning, the prohibition of burning by law, and possible penalties.

Actors' roles and responsibilities

Ecológica Institute – IE (Instituto Ecológica)	The Ecológica Institute is responsible for the project coordination and project activities (p. 1). The Ecológica Institute, as an organization from the Civil Society of Public Interest (OSCIP), will be the focal point for information related to the project, distributing all of the data and documents generated by the project in a transparent manner (p.71). It will manage the activities of Social Carbon (pp. 80-81).
Cantor CO2e Brazil	Cantor CO2 Brazil is responsible for the Project Design Document (PDD) (p. 2) and the coordination of the REDD approach and baseline carbon estimate (p.

	75). It will be responsible for estimates of reductions of emissions from deforestation and for monitoring real reductions over the crediting period, as well as giving full support for themes relating to carbon and activities described in the PDD (p. 73).
Carbonfund.org	Carbonfund.org is responsible for project articulation between Hyundai (financial input), Ecológica Institute and Cantor CO2e Brazil (p. 2).
Hyundai Motors America	Hyundai Motors America (HMA) will sponsor the project and is interested in up-front payment for the carbon credits generated (p. 73).

Community participation

To guarantee the effective and long lasting participation of local communities, two workshops will be held to inform, train, and collect suggestions from those that will be directly and indirectly involved in activities. The workshops will include: Involvement of stakeholders (especially the local community) to discuss conservation strategies; Stakeholders' rights and obligations regarding each project activity; Definition of courses and training activities to teach those involved about making sustainable use of biodiversity and natural resources inside the project area and its surroundings (p. 70).

The Social Carbon Methodology (MCS) will be the biggest instrument of community participation and of other stakeholders in the project, promoting the direct monitoring and evaluation of the positive and negative impacts of the project (p. 83). A Strategic Conservation Activities Plan (SMP) will be implemented in addition to the MCS in the project area that will involve directly and indirectly the surrounding communities (p. 54). The SMP is a dynamic tool based on the Management Plan of the Lajeado State Park (5km distant) which has been implemented and is currently active in the park and its buffer zone (p. 81).

The process of capacity building in which the surrounding community will be involved encompasses some aspects important to the successful generation of income of the community which will guarantee its sustainability after the project. The invitation to participate in the activities will be extended to the entire community; however people with low income will have priority. The teachers will be craftsmen and confectioners of the community, participants in the projects of the Ecologica Institute (p.82).

Project financing

The Ecologica Institute develops projects with financial support from public and private companies, with the majority of support coming from private companies (p. 76).

Donors in 2007 and 2008 include *Petrobras, Natura*, HSBC, Bank of Brazil, FNMA, and Brazil Power (*Energias do Brasil*) (p. 76).

The starting date of the first crediting period will occur after the fifth year of the starting date. The crediting period will have 4 periods of 5 years each for a total of 20 years (p. 68).

In reality all of the credits generated by the Hyundai forest project (55,241.01 tCO2e (+/- 95% Confidence Interval)) will be withheld from regulatory market and sold as Verified Emissions Reductions for Hyundai Motors America in its voluntary offset commitment (p. 113).

Benefit sharing

Co-benefits

Among the direct and indirect gains foreseen for local communities are significant improvements in

the following areas (p. 116):

- Support for combating forest fires in the project area and region, both to the local fire brigade but also via trainings and information sessions;
- Capacity-building for community members in earning income through alternative and sustainable means;
- Environmental education, promoting a better relationship between man and environment to achieve a better quality of life;
- Direct and indirect job creation;
- Increase the strength and scope of activities of the Ecotropical Center considering its strong synergy and complementarily with both initiatives.

Emissions and removals with and without project

To estimate carbon stock due to project activities, the Methodology for Estimating Reductions of GHG Emissions from Mosaic Deforestation RED-NM-001 / Version 01 developed by BioCarbonfund.org was used. The carbon pools included are above ground, below ground, dead wood, litter and soil organic carbon (p. 22, 23).

The average carbon density was estimated for the forest and non-forest classes using existing data from scientific studies; most of the biomass data was based on Ottmar et al (2001) (p.28). Tree data was collected as follows: Trees greater than 2 cm in diameter were measured in twelve 0.002 ha plots or within the entire sample area (0.056 ha) depending on stem density. Trees were separated into the categories of stems *with* and stems *without leaves,* as it was not possible to determine whether trees without leaves were dead or merely dormant. Tree biomass was calculated on an individual plant basis by using the allometric equation for *cerrado* vegetation, i.e.

$$\log(y) = 0.9967 * \log(x) + 2.587$$

Where “y” is the total dry biomass of the individual (in g) and “x” is the cylindrical volume (in dm^3), calculated as the product of the basal area of the stem at 30 cm from the soil surface and the oblique height of the individual. Five percent of the total was subtracted from the biomass of trees without leaves to account for their biomass (p. 28, 29).

The data used to study the historical land-use and land-cover change was obtained through INPE (Brazilian National Institute of Space Research). Images from the TM Landsat 5 were acquired from three different periods, two of them (1987 and 2006) to create a Land Change Model of the Reference Area and the other to validate the model (2008) (p. 86).

To determine the reference area for the proposed project the principle of the watershed was used (a division based on the topography of the region) as well as the relevant human elements in the landscape. With these elements in mind the reference area was determined be an area of 40,580.91 hectares (p. 87).

Baseline deforestation activity data per forest class inside the project borders are as follows (p. 45).

Project Year	Forest Class *Stricto Sensu Savannah (i-a)*		Forest Class *Closed Savannah (i-b)*		Forest Class *Open Savannah (i-c)*		Forest Class *Riparian Forest (i-d)*		*Total*	
	Annual (hectares)	Cumulative (hectares)	Annual (hectares)	Cumulative (hectares)	Annual (hectares)	Cumulative (hectares)	Annual (hectares)	Cumulative (hectares)	Annual (hectares)	Cumulative (hectares)
2009*	-	178.11	-	16.65	-	49.05	-	77.22	-	-
2010	3.42	181.53	0.72	17.37	0.36	49.41	2.70	79.92	7.20	7.20
2011	3.15	184.68	0.27	17.64	-	49.41	3.24	83.16	6.66	13.86
2012	3.60	188.28	0.63	18.27	0.09	49.50	3.42	86.58	7.74	21.60
2013	3.42	191.70	0.63	18.90	0.09	49.59	2.70	89.28	6.84	28.44
2014[1]	3.24	194.94	1.17	20.07	0.27	49.86	2.52	91.80	7.20	35.64
2015	3.78	198.72	0.45	20.52	0.27	50.13	2.97	94.77	7.47	43.11
2016	3.69	202.41	1.17	21.69	0.18	50.31	2.52	97.29	7.56	50.67
2017	3.15	205.56	0.81	22.50	0.63	50.94	3.24	100.53	7.83	58.50
2018	4.86	210.42	0.45	22.95	0.18	51.12	2.52	103.05	8.01	66.51
2019[2]	4.05	214.47	0.63	23.58	0.27	51.39	2.25	105.30	7.20	73.71
2020	3.24	217.71	0.54	24.12	0.09	51.48	2.61	107.91	6.48	80.19
2021	3.15	220.86	0.72	24.84	0.09	51.57	2.79	110.70	6.75	86.94
2022	3.42	224.28	0.45	25.29	0.09	51.66	3.24	113.94	7.20	94.14
2023	3.69	227.97	0.72	26.01	0.18	51.84	2.97	116.91	7.56	101.70
2024[3]	3.42	231.39	0.72	26.73	0.36	52.20	3.15	120.06	7.65	109.35
2025	3.69	235.08	0.36	27.09	0.27	52.47	3.69	123.75	8.01	117.36
2026	3.78	238.86	0.54	27.63	0.45	52.92	2.97	126.72	7.74	125.10
2027	3.24	242.10	0.36	27.99	0.18	53.10	2.34	129.06	6.12	131.22
2028	2.52	244.62	0.54	28.53	0.18	53.28	2.43	131.49	5.67	136.89
2029	3.42	248.04	0.54	29.07	0.27	53.55	2.79	134.28	7.02	143.91
Total	**69.93**		**12.42**		**4.5**		**57.06**		**143.91**	

(2014: 1st monitoring period, 2019:2nd monitoring period, 2024:3rd monitoring period, 2029:4th monitoring period)

In the absence of the project, a future perspective of the use and occupation of the land suggests a tendency to maintain the common practices in the region. That is, subsistence agriculture, unsustainable collection and use of natural resources, as well as pasture creation using crude management techniques such as fire (p. 41). The baseline approach chosen for the Genesis Forest Project was GIS modeling, due the difficulty in using linear projection to explain the drivers and dynamics of deforestation in the state of Tocantins and especially near the Palmas district (p. 42).

To calculate the actual carbon stock changes several assumptions were made based on the expectation of a reduced deforestation tax for the conservation activities to be implemented during the project. For this purpose the goals for minimizing deforestation in the Brazilian Amazon, which includes the state of Tocantins, were referenced (p. 91, 92). The conversion of forest to non-forest involving fires is a source of emissions of non-CO2 gases. As these kinds of data are unavailable and with accuracy insufficient to give good estimates of gas emissions in the project and reference areas, the emissions from non-CO2 gases by biomass burning will not be considered (p. 95).

In the absence of the project (baseline) over a period of 20 years, deforestation in the project area would reach 143 hectares, or the equivalent of the emissions avoided from 57,389.55 tons of CO2 from the atmosphere (p. 52). With the implementation of the project emissions can be brought in the neighborhood of 2,148.53 tCO2e (p. 52). As a result, Reduced Net Emissions due to project activities were estimated conservatively at 55,241.01 (±2,762.06) tCO2e (p. 94).

The total results of baseline emissions, actual emissions and net reduced emissions from deforestation and degradation are as follows (p. 93);

For *Ex Ante* net anthropogenic GHG emission reduction:

$$C_{red} = C_{baseline} - C_{actual} - C_{leakage}$$

Where:

C_{RED} = Net anthropogenic greenhouse gas emission reductions attributable to REDD project activity; tons CO2e

$C_{BASELINE}$ = Baseline greenhouse gas emissions within the project area; tons CO2e

C_{ACTUAL} = Actual greenhouse gas emissions within the project area; tons CO2e

$C_{LEAKAGE}$ = Leakage greenhouse gas emissions; tons CO2e

Year	Baseline Emissions (tCO2e)	Actual Emissions (tCO2e)	Net Reduced Emissions (tCO2e)
2010	2,840.24	1,420.12	1,420.12
2011	2,746.78	412.02	2,334.77
2012	3,163.99	316.40	2,847.59
2013	2,755.01	0.00	2,755.01
2014	2,925.94	0.00	2,925.94
2015	2,929.56	0.00	2,929.56
2016	3,043.67	0.00	3,043.67
2017	3,124.26	0.00	3,124.26
2018	2,997.23	0.00	2,997.23
2019	2,736.81	0.00	2,736.81
2020	2,607.21	0.00	2,607.21
2021	2,768.47	0.00	2,768.47
2022	2,938.59	0.00	2,938.59
2023	3,033.58	0.00	3,033.58
2024	3,070.98	0.00	3,070.98
2025	3,225.22	0.00	3,225.22
2026	3,003.19	0.00	3,003.19
2027	2,384.53	0.00	2,384.53
2028	2,314.07	0.00	2,314.07
2029	2,780.21	0.00	2,780.21
Total	**57,389.55**	**2,148.53**	**55,241.01**

For calculation of *baseline* GHG emissions:

$$C_{baseline} = \sum_{j=1}^{n} C_{baseline,j}$$

Where:

$C_{BASELINE}$ = Baseline greenhouse gas emissions within the project area; tons CO2e

$C_{BASELINE,j}$ = Baseline greenhouse gas emissions within the project area of the category j; tons CO2e

n = Number of categories.

$$C_{baseline,j} = \sum_{i=1}^{n} EF_{cp,j} * (Activity\ Data_i)$$

Where:

$C_{BASELINE,j}$= Baseline greenhouse gas emissions within the project area of the category j; tons CO2e

j= Carbon Category (Land Use Carbon Class) Identifier;

$EF_{CP,j}$ = Emission factor in the all selected carbon pools for the category j; t CO2e ha-1

Activity Data$_i$= The estimates of deforestation and degradation for the year i of category j in hectares (see data in Tables 6 and 7, Baseline deforestation activity data per forest and non-forest classes presented in the section G2.1.2.3)

n = Number of years.

For Calculation of actual expected GHG emissions:

$$C_{actual} = \sum_{j=1}^{n} C_{actual,j}$$

Where:

C_{actual} = Actual greenhouse gas emissions within the project area; tons CO2e

$C_{actusl,j}$= Actual greenhouse gas emissions within the project area of the category j; tons CO2e

n = Number of categories.

$$C_{actual,j} = \sum_{i=1}^{4} EF_{cp,j} * (Activity\ Data_i) * DRR_i$$

Where:
$C_{actual,j}$ = Actual greenhouse gas emissions within the project area of the category j; tons CO2e
J = Carbon Category (Land Use Carbon Class) Identifier;
$EF_{CP,j}$ = Emission factor in the all selected carbon pools for the category j; t CO2e ha-1
Activity Data = The estimate of deforestation for the year i of the category j in hectares (see data in Tables 6 and 7 of main document, Baseline deforestation activity data per forest and non-forest classes presented in the section G2.1.2.3 in the main document)
DRR_i = Deforestation rate reduction expected

- Leakage

The agents of deforestation and activities impacting the natural resources are not expected to migrate to other regions as a result of the Genesis Forest Project. This is because one of the primary drivers of deforestation and degradation in the region, including the project area, is fire, which follows a logic different from cattle-raising and illegal logging, which when suspended in one location tends to shift to neighboring locations. In contrast to these activities, fires, if controlled within the project area, tend to also reduce the impacts in neighboring areas. In this way, it is believed that the project activities generate positive leakages around the project area (leakage belt) (pp. 101-102).

Monitoring

Climate Impact Monitoring

The monitoring methodology will be based and linked directly to the Methodology for Estimating Reductions of GHG Emissions from Mosaic Deforestation (RED-NM-001). Part 3 of the Methodology establishes the concepts and norms for each activity (p. 104).

Community Impact Monitoring

Besides monitoring using the MCS, periodic tracking of the effectiveness and applicability of activities with the community using the indicators develop from the SMP will occur (p. 122).

Biodiversity monitoring

The biodiversity resources will be monitored and constantly evaluated using the MCS, the SMP and indicators specific to the subject (p.132).

Reporting

The reports of the MCS, along with the results obtained by the SMP, will document the results of the diagnostic, the way in which the information was produced, as well as the participation processes and the actors involved (p. 80).

Verification

No data.

Risks and risk management

The Strategic Conservation Plan is dynamic. In other words, it will undergo changes during implementation and application, considering the environmental peculiarities that may arise, new agents of deforestation or other variables that may directly or indirectly influence conservation

activities. In this way the actions can be assured of their efficacy and applicability in attaining the goals and macro objectives of the REDD project (p. 68, 69).

20% of the credits will be discounted as “buffer” in order to guarantee that the climate benefits will not be underestimated, in case that some of the conservation areas is destroyed or the activities do not develop according to plans and model predictions (p. 69).

The following table summarizes an evaluation of the driving and restrictive forces to the conservation activities in the present project *(*p. 56).

Internal Environment	External Environment	Premises
Weak Points	Threats	Defense of Recuperative Action
Burning	Biodiversity reduction	Inspection
Hunting		Awareness
Logging		
Cattle Activities	Environmental degradation	Recovery of degraded areas
Existence of secondary roads		
Environmental degradation	Riparian Activities that influence the REDD area	Closing of Roads
Impacting Activities		

Progress and plans

CCBA Status: Undergoing Validation

Links:

Project-related documents:

Others:

Forest Carbon Portal

Hyundai Grants Pave Way for Emerging Forest Offset Projects Winners of Three Climate Grants Announced (April 28, 2009)

Casebook of REDD project in the Latin America(2009)