2012-2013 RUSSAS PROJECT MONITORING REPORT

Document Prepared By
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Project Title	The Russas Project
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Russas Project seeks to help protect and conserve tropical forest by providing payments for ecosystem services. This type of project is known as a Reducing Emissions from Deforestation and forest Degradation project (REDD project). Project activities intended to reduce deforestation are implemented in and around a privately-owned property in the State of Acre, Brazil and are funded by payments related to emission reduction credits generated by the project.

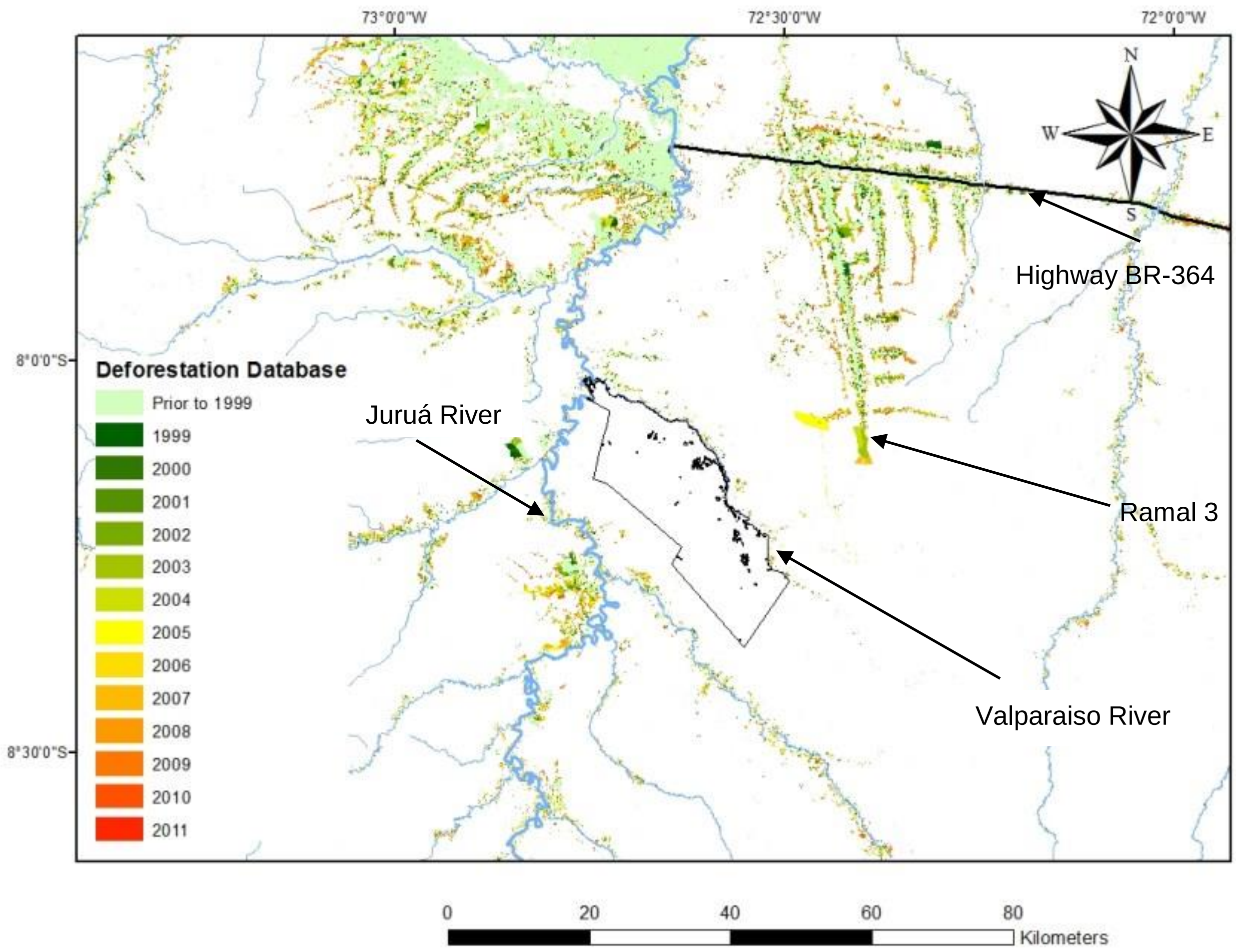
This project was developed and registered under the Verified Carbon Standard (VCS) and the Climate, Community and Biodiversity Standard (CCBS). Project development involved meeting with the local communities surrounding the project area, engaging Acre state officials working on similar strategies at a regional/state level, developing a plan which will result in lowering the pressure on land and forest resources in consultation with the local community, and putting into operation the REDD project implementation plan with the help of local partners and Russas Project staff. Activities implemented as part of the project to reduce deforestation include:

- Community outreach and education;
- Employment of local community members as forest guards or other project staff (to replace other sources of income associated with deforestation and land use);
- Providing agricultural extension training which will help baseline agents to increase productivity on current lands (thus reducing the pressure to expand their farms in the adjacent forest);
- Supporting local farmers association;
- Assist communities in obtaining land tenure; and
- Sharing a portion of carbon related revenue for communities living on the Russas property (replacing other sources of income associated with deforestation and land use).

The above activities directly address deforestation pressures in the region which are becoming more prevalent.

While the State of Acre historically has a low deforestation rate and a high level of forest governance, the paving of two primary roads BR-364 and BR-317 has greatly increased destruction of primary forests and conversion to cattle pastures. Deforestation pressures in the project region have increased significantly in the past several years as the paving of BR-364 is nearing completion. Upon being fully paved, BR-364 will allow for year-round transportation and will increase property values and market access and facilitate immigration. The Juruá River, a major tributary of the Amazon River, borders the project property and connects areas upstream and downstream of BR-364 to consumer markets. Further, secondary roads, such as “Ramal 3”, are fast approaching the project area (Figure 1.1) providing access to previously hard to reach areas for the agents of deforestation, small scale/subsistence farmers.

Figure 1.1. Deforestation in and around the project area (outlined in black) in the historical reference period.



There are 20 communities living on the project property, all of which live in close proximity to the Valparaiso River. These small scale and subsistence farming communities are the agents of deforestation and clear a portion of forest for land to engage in small scale farming and ranching for their livelihoods. Forest is generally cleared over a period of months. The process most often starts in May or June at the beginning of the dry season with the cutting of small trees and vines by machete. Next, the farmer or someone with a chainsaw cuts the larger trees down. The farmer then waits for the dead vegetation to dry for a period of time ranging from two weeks to several months. A portion of the farmers, then use fire to clear the land. Finally crops are planted or the land is converted to pasture.

The project baseline has been developed after meeting with local communities to understand their use of the land, and in light of the above mentioned increased accessibility of the project area in the near future. Further, the Russas Project is working closely with the State of Acre and is using a simple historic approach to setting the baseline to conform to Acre State's approach, which is still in development. Finally, data and information provided by the UCEGEO, the Climate Change Institute's GIS department of the state of Acre, was used in the development of the baseline.

There are three project proponents undertaking the Russas Project including CarbonCo, LLC ("CarbonCo"), Freitas International Group, LLC ("Carbon Securities"), and I.S.R.C. Investimentos e Acessória LTDA ("I.S.R.C."). CarbonCo, the wholly-owned subsidiary of Carbonfund.org, is responsible for project finance and managing project development. Carbon Securities acts as a liaison between CarbonCo and I.S.R.C. and provides logistical support during site visits. Ilderlei Souza Rodrigues Cordeiro is the landowner and sole proprietor of I.S.R.C., an Acre-based organization which is primarily responsible for implementation of project activities and day-to-day management of the Russas Project.

Implementation Status of the Project

The Russas Project was validated to the CCBS with Gold Distinction in March 2014 and was validated to the VCS in May 2014. This initial verification covers the monitoring and reporting period of March 17, 2011 to December 31, 2013. The following measures were implemented at the Russas Project during this time period. The Project Proponents successfully reduced deforestation in the Project Area, which led to the preservation of biologically diverse habitats. The Project Proponents, and particularly I.S.R.C., undertook numerous community engagement meetings and presented the Russas Project to diverse stakeholders such as the mayor of Cruzeiro do Sul and the Climate Change Institute. The Russas Project made some initial hires of local staff and contributed to the transfer of technical knowledge. For example, I.S.R.C. hired a local project manager and forest patrollers, while CarbonCo hired the local forestry firm TECMAN to undertake the forest carbon inventory. The Project Proponents established a baseline of community impacts through community surveys and designed a biodiversity monitoring plan that will utilize motion-sensitive, wildlife camera traps. I.S.R.C. offered the first five agricultural extension courses to local communities on the production of soursop (i.e., also known as graviola), passion fruit, banana, maize, and cassava. The Russas Project established a local headquarters to serve as a meeting place for local communities and to host visitors. Furthermore, the Russas Project became the second-ever, VCS-CCBS validated REDD+ project in the State of Acre, Brazil.

GHG Emission Reductions and Removals for the current Monitoring Period

The total emissions reduced by the Russas Project over the course of the 2012-2013 monitoring period is 140,450 tCO_2e.

Years	GHG emission reductions (tCO_2e)
2012	-19,644
2013	160,094
Total	140,450

1.2 Sectoral Scope and Project Type

Project Scope 14: Agriculture, Forest and other Land Use (AFOLU)

Project Category: Reduction Emission from Deforestation and Degradation (REDD)

Type of Activity: Avoided Unplanned Deforestation (AUDD)

This project is registered under the Verified Carbon Standard (VCS) as a Reducing Emissions from Deforestation and Degradation (REDD) project and has been developed in compliance with the Verified Carbon Standard[1], Version 3.3 and VCS AFOLU Requirements[2]. The project reduces emissions from unplanned frontier deforestation.

1.3 Project Proponents

The three main project proponents are CarbonCo, LLC ("CarbonCo"), Freitas International Group, LLC ("Carbon Securities"), and I.S.R.C. Investimentos e Acessória LTDA ("I.S.R.C.") which is a sole proprietorship managed by the Russas property landowner. CarbonCo, the wholly-owned subsidiary of Carbonfund.org, is responsible for getting the project certified and for project finance. Carbon Securities acts as a liaison between CarbonCo and I.S.R.C., acts as a translator, and assists with logistics for site visits. I.S.R.C. is an Acre, Brazil-based organization created by the Landowner and is primarily responsible for day-to-day management of the Project and the implementation of activities to stop deforestation. Table 1.1, below, details the role and responsibilities of each project proponent.

Table 1.1. List of Project Proponents.

Contact	Role	Responsibility
CarbonCo, LLC 3 Bethesda Metro Center, Suite 700 Bethesda, Maryland 20814 USA 001-240-247-0630	Project Developer	• Finance project development costs • Manage technical contractors helping with project development, the forest carbon inventory, and baseline modeling • Assist with drafting the VCS and CCBS Project Documents • Manage validation and verification process including contracting auditors and addressing Corrective Action Requests

[1] VCS. 2012 VCS Standard. Version 3.3, 04 October 2012. Verified Carbon Standard, Washington, D.C.
[2] VCS. 2012 Agriculture, Forestry and Other Land Use (AFOLU) Requirements. Version 3.3, 04 October 2012. Verified Carbon Standard, Washington, D.C.

I.S.R.C. Investimentos e Acessória LTDA Bairro: Zona Rural, Cidade: Cruzeiro do Sul - Acre - Brasil, Cep: 69.980-000	Project Manager	• Engage with local community to inform and explain the proposed project and gather feedback, and resolve any local issues • Develop and implement a plan to reduce deforestation
Freitas International Group, LLC (Carbon Securities) 201 S. Biscayne Boulevard, 28th Floor Miami, Florida 33131 – USA 55-61-3717-1008	Project Facilitator	• Serve as a liaison and translator for the landowners and CarbonCo, including establishing meetings with landowners and relevant stakeholders, arranging site visits, providing information and documentation such as previous studies, photographs, and satellite images related to the project

1.4 Other Entities Involved in the Project

Figure 1.2 provides an overview of the relationship of the various project proponents and entities involved in the project. Table 1.2 lists the role of the other entities.

Figure 1.2: Organizational Chart for the Russas Project

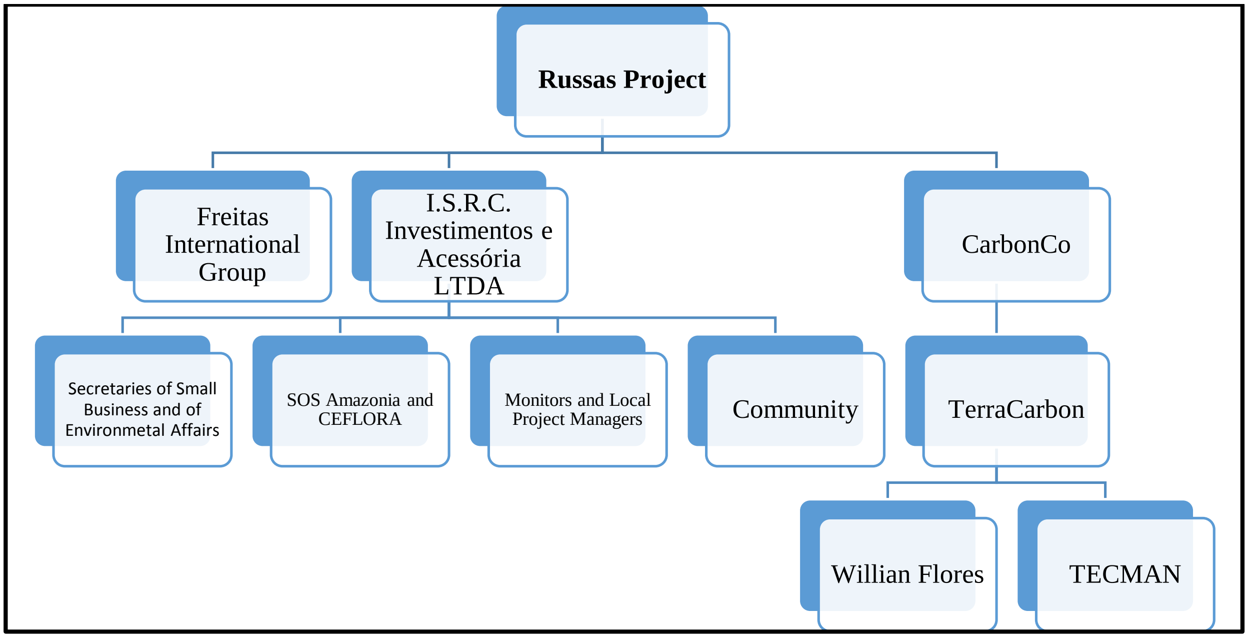


Table 1.2. List of Other Entities Involved in the Project.

Contact	Role	Responsibility
TerraCarbon LLC 5901 N. Sheridan Rd. Peoria, Illinois 61614, USA 001-434-326-1144	Independent Consultant	Co-lead project kickoff. Design and manage forest carbon inventory. Lead baseline development task. Develop project document and advise CarbonCo on all aspects of project development and monitoring.
TECMAN Rua Copacabana, nº 148, Sala 204, Conjunto Village Maciel, CEP 69.914-380 Rio Branco, Acre, Brasil 55-68-3227-5273	Independent Consultant	Lead and supervise collection of field data during the course of the forest carbon inventory.
Antonio Willian Flores de Melo Universidade Federal do Acre Centro de Ciências Biológicas e da Natureza, Distrito Industrial, CEP 69.915-900 Rio Branco, Acre, Brasil 55-68-3901-2611	Independent Consultant	Assist with review of the project baseline.
S.O.S. Amazônia Rio Branco - AC Rua Pará, 61 Cadeia velha CEP 69.900-440 Phone: 55 68 3223 1036	Independent Consultant	Provide technical assistance with regard to agricultural extension training for local communities

CEFLORA, Centro de Formação e Tecnologia da Floresta or the Center for Training and Forest Technology Rua Paraná , 865 Cruzeiro do Sul - Acre	Independent Consultant	Provide technical assistance with regard to agricultural extension training for local communities
Secretaries of Small Business and Environmental Affairs Environmental Affairs Rua Rui Barbosa n. 514 – Cruzeiro do Sul – Acre – CEP: 69.980-000 CNPJ n. 04-012-548/0001-02 – Phone: (0**68) 3322-4295 Email: prefeituraczs@bol.com.br Semmam.czs@gmail.com Small Business Secretaria de Estado de Pequenos Negócios Avenida Ceará, nº 1624 - Centro (em frente ao Colégio Aplicação)Phone: (68) 3224-2548 or 3224-7674 or 3224-3364 Email: josecarlos.reis@ac.gov.br	Independent Consultant	Provide technical assistance with regard to agricultural extension training for local communities

1.5 Project Start Date

The Russas Project has a project start date of March 17, 2011. The local project manager, Marmude Dene de Carvalho, was hired on this date and forest monitoring began. This is also the date Ilderlei Souza Rodrigues Cordeiro spoke with the community at length about REDD+, forest conservation, community benefits and the community signed an "ata" which is a public meeting MOU.

1.6 Project Crediting Period

The Russas Project has an initial project crediting period of 30 years, starting on March 17, 2011. The initial baseline period started on March 17, 2011 and is set to continue through March 16, 2021. The initial project crediting period is set to end on March 16, 2041.

1.7 Project Location

The Russas Project area is located in Acre, Brazil along the southern bank of the Valparaiso River. The Valparaiso River is a tributary to the Juruá River and joins about 40 km south of the town Cruzeiro do Sul. The total project area (i.e., forested area of the property as of the project start date, and 10 years prior) is 41,976 hectares.

Figure 1.3. Map of the Russas Property.

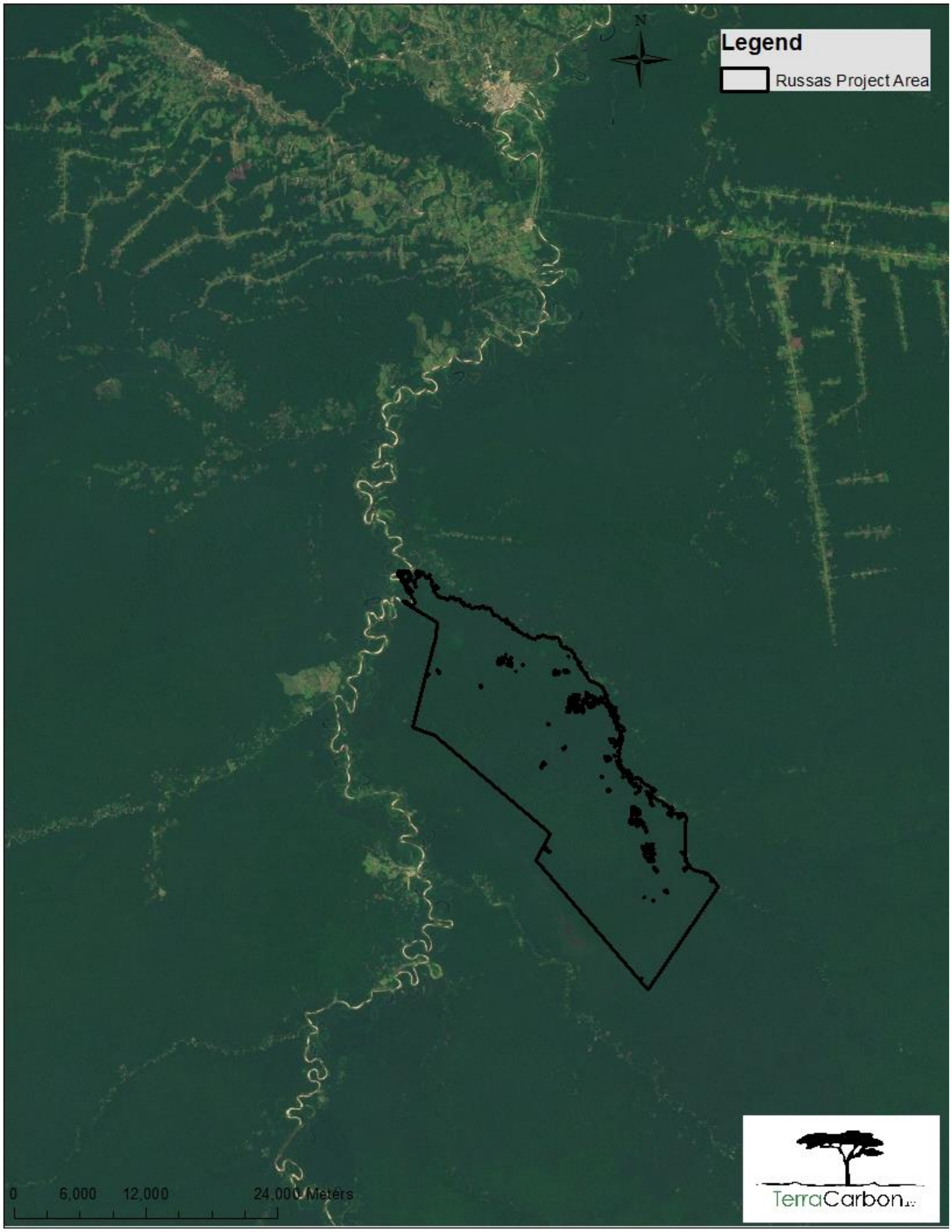


Figure 1.4 2001 Forest Cover Map (Green = Forest; Red = Nonforest).

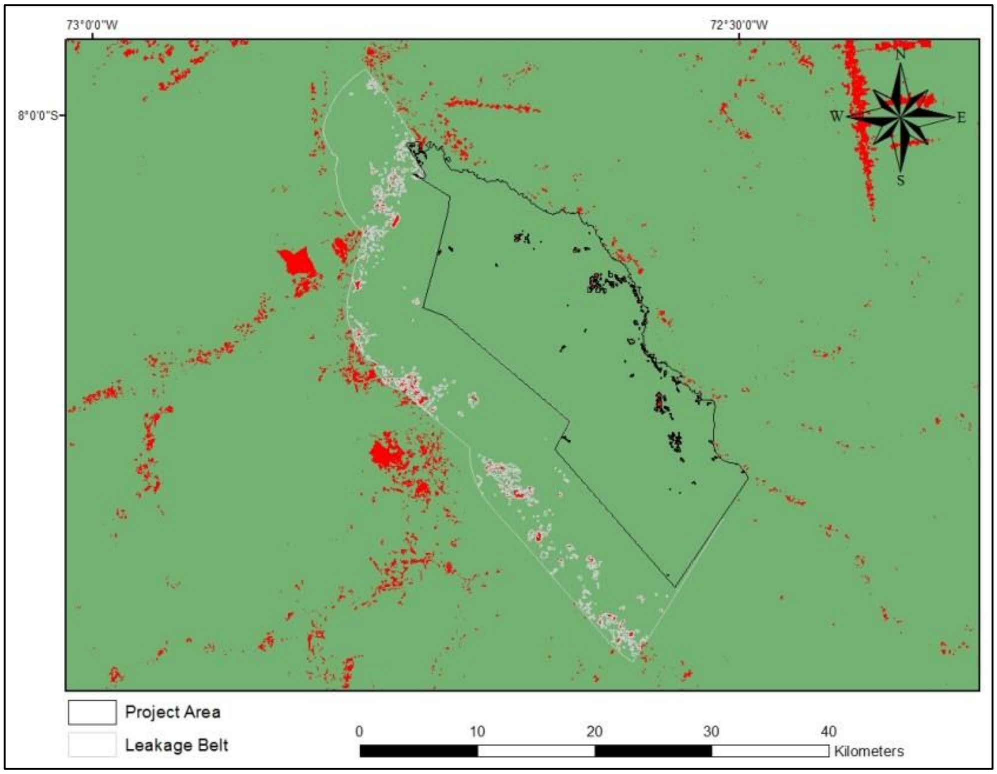


Figure 1.5. 2011 Forest Cover Map (Green = Forest; Red = Nonforest).

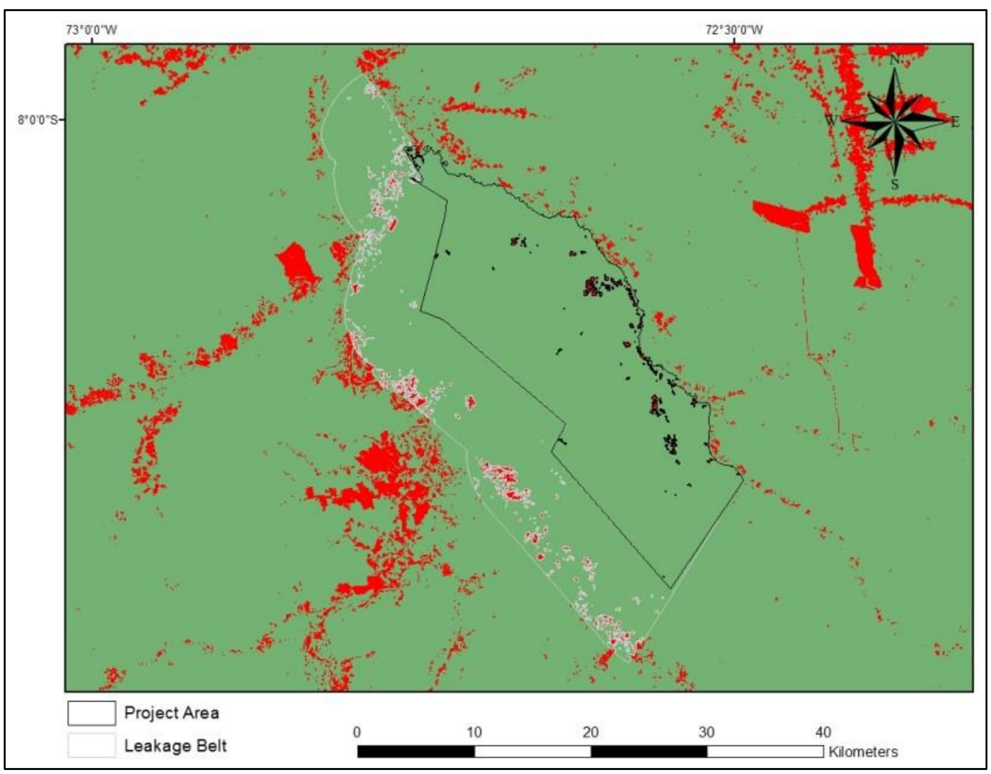
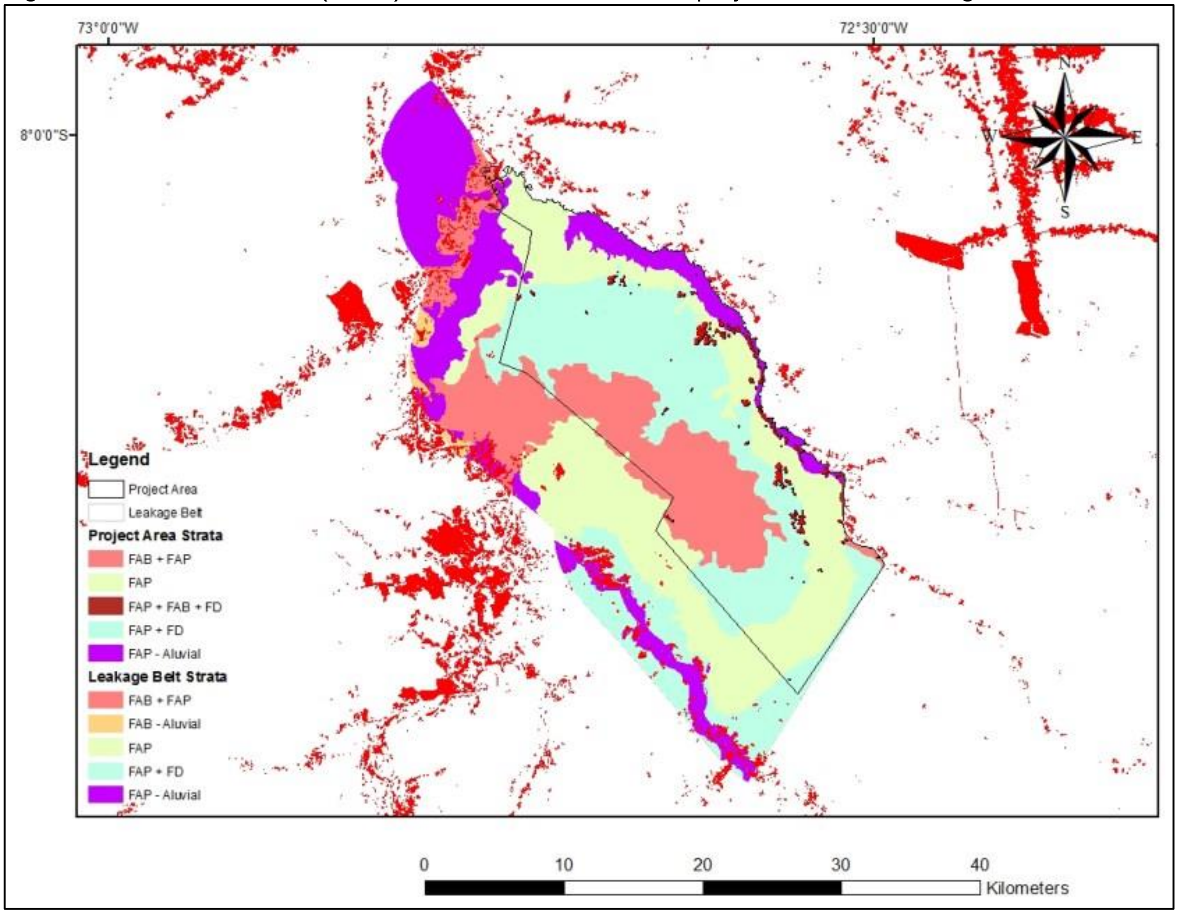


Figure 1.6 2011 Nonforest (in red) with forest strata for the project area and leakage belt.



1.8 Title and Reference of Methodology

The Russas Project is utilizing the Avoided Deforestation Partners' VCS REDD Methodology, entitled, "VM0007: REDD Methodology Modules (REDD-MF)." The only eligible activity as part of this project is avoiding unplanned deforestation, hence only modules related to unplanned deforestation are required. This project is eligible as an avoiding unplanned deforestation project because the forest land is expected to be converted to non-forest land in the baseline case and the land is not legally authorized and documented to be converted to non-forest or a managed tree plantation. The specific modules applied to the Russas Project are listed below.

REDD-MF, REDD Methodology Framework Version 1.4

Carbon Pool Modules:

CP-AB, "VMD0001 Estimation of carbon stocks in the above- and belowground biomass in live tree and non-tree pools," Version 1.0

CP-D, "VMD0002 Estimation of carbon stocks in the dead-wood pool," Version 1.0

Baseline Modules:

BL-UP, "VMD0007 Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation," Version 3.2

Leakage Modules:

LK-ASU, "VMD0010 Estimation of emissions from activity shifting for avoided unplanned deforestation," Version 1.0

Monitoring Module:

M-MON, "VMD0015 Methods for monitoring of greenhouse gas emissions and removals," Version 2.1,

Miscellaneous Modules:

X –STR, "VMD0016 Methods for stratification of the project area," Version 1.0

X-UNC, "VMD0017 Estimation of uncertainty for REDD project activities," Version 2.0

Tools:

T-SIG, CDM tool "Tool for testing significance of GHG emissions in A/R CDM project activities," Version 1.0

T-ADD, "VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities," Version 3.0

T-BAR, "Tool for AFOLU non-permanence risk analysis and buffer determination," Version 3.2

Use of modules, REDD-MF, M-MON, T-ADD, T-BAR, X-UNC, and X–STR, is always mandatory when using the VM0007 methodology. Further use of modules, BL-UP and LK-ASU, is mandatory in the case of projects focusing on unplanned deforestation. Use of the module T-SIG determines whether GHG emissions by sources and/or decreases in carbon pools are insignificant. Finally, CP-AB is mandatory in all cases and while CP-D is optional, as the dead wood pool is greater in the project scenario than the baseline scenario, it has been included.

1.9 Other Programs

Emission Trading Programs and Other Binding Limits

No emission reductions generated by the project are part of any other emissions trading program. The project has neither submitted to nor been rejected from any other greenhouse gas program. Further, Brazil does not currently have a national, legally binding limit on greenhouse gas (GHG) emissions nor is there currently a compliance emissions trading program which accepts REDD credits.

Other Forms of Environmental Credit

The project has not nor intends to create non-VCS GHG emission reductions or any another form of environmental credit. This includes, but is not limited to, biodiversity credits, species banking, water certificates, and nutrient certificates.

Participation under Other GHG Programs

The Russas Project has been registered under the Climate, Community and Biodiversity Alliance Standard (CCBS). The Russas Project has not been registered, nor is seeking registration, under any other GHG programs.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The Russas Project mitigates deforestation pressures using a combination of environmental programs and social programs which are intended to improve the livelihoods of community members living in the vicinity of the project area. Social projects and programs for the local communities, not only generate sustainable economic opportunities, but also result in a reduction in deforestation and the preservation of biodiversity.

Over the Project Lifetime, I.S.R.C. will implement the following project activities:

- Raise Project Awareness
- Hire Project Manager
- Patrol and Monitor Deforestation
- Provide Agricultural Extension Services
- Support Local Farmers Association
- Help Communities Obtain Land Tenure
- Profit-Sharing of Carbon Credits
- Establish a Project Headquarters

Raise Project Awareness

Between March 17, 2011 and December 31, 2013 the Project Proponents visited the Russas Project together and met with the local communities in June 2012, March-April 2013, June 2013 and August 2013.

The communities are an essential component of the Russas Project and likewise, it has been absolutely necessary to openly and frequently discuss the Project with the communities.

Through meeting with the communities, the Project Proponents have been able to gain the communities' insights about project design and to better incorporate the communities into the Project. As a result, the community objective of generating sustainable economic opportunities and implementing social projects and programs will be best achieved with active, on-going participation and input from the local communities.

Throughout 2011, 2012 and 2013, the Russas Project was discussed in greater detail with the communities to ensure the communities were fully aware of the Russas Project, were able to contribute to the Project design, able to openly express desired outcomes and concerns, understood the third-party grievance procedure, and were able to voluntarily give free, prior and informed consent.

Community members who wanted to join the Russas Project signed an "ata" on March 17, 2011. As of December 2013, the majority of community members residing within the Russas Project have either signed the "ata" or verbally agreed to join the project, with the first community members signing an initial "ata" on March 17, 2011, the Project Start Date.

In addition, community members joining the Project were given a sign of recognition.

Russas Project Sign (Photo Credit: Brian McFarland)

Hire Project Manager

Marmude Dene de Carvalho (“Marmude”) was hired by Ilderlei in March 2011 as the Russas Project’s local project manager and to patrol for deforestation.

As the local project manager, Marmude will work as a partner in the Project, facilitating communication and transparency in community decisions. Marmude lives onsite and is able to visit the neighboring communities with relative ease. Furthermore, Marmude will be responsible for ensuring social projects are implemented, assist with the community and biodiversity monitoring plans, collaborate on the deforestation monitoring, and will regularly communicate directly with I.S.R.C.

Local Project Manager and Patrollers (Photo Credit: Brian McFarland)

Project uniforms for both the Russas and Valparaiso Projects were purchased in July 2013. Also in July 2013, Marmude coordinated the placement of Russas and Valparaiso Project signs throughout the Project Zone.

Patrol and Monitor Deforestation

Marmude was hired by Ilderlei in March 2011 to also patrol for deforestation. Monitoring of deforestation via boat began in March 2011 and takes place on a monthly basis along the Valparaiso and Jurua Rivers.

If and when deforestation is identified, I.S.R.C. will immediately document and transfer this information to Carbon Securities and CarbonCo. Collectively, CarbonCo and I.S.R.C. will discuss the appropriate actions to undertake to counteract any reported deforestation.

The monitors will write down observations in a notebook, document the community meetings, input this data into the monitoring template, and upload the document onto a shared DropBox account among the Project Proponents. The monitoring template includes:

- Name of Monitor
- Date of Monitor
- Communities Visited
- Meeting Notes with Community
- Grievances and Concerns of Community
- Location and Date of Deforestation
- Responsible Actor for Deforestation

- Observations Pertaining to Deforestation
- Biodiversity Observed
- Other Notes Related to the Project

In the future, I.S.R.C. would like to hire another person to monitor deforestation on the opposite side of the Russas Project and would like to purchase a motorcycle or a four-wheeler to monitor areas of high deforestation risk including along property boundaries and existing paths in the forest, and nearby roads approaching the property.

Provide Agricultural Extension Services

The communities in and around the Russas Project were surveyed in March to May, 2013 to better understand which agricultural extension training courses would be of the most interest. A total of 33 courses, ranging from rotational pasture management to organic coconuts, were offered.

I.S.R.C. will facilitate the teaching of these top-ten courses. I.S.R.C. engaged the State of Acre's CEFLORA (Centro de Formação e Tecnologia da Floresta or the Center for Training and Forest Technology), the Secretary of Small Business, the Secretary of Environmental Affairs for the Municipality of Cruzeiro do Sul, and S.O.S. Amazônia to assist with onsite trainings to the communities in and near the Russas Project.

In July 2013, the first five courses were taught to the families living in the Russas Project and the Valparaiso Project along with families living in the leakage belt. A total of 27 people participated from the Russas Project, 34 people participated from the adjacent Valparaiso Project, and 40 people from the leakage belts participated. These five courses were the production of soursop (i.e., also known as graviola), passion fruit, banana, maize, and cassava. The courses also incorporate lessons on the control of pests and diseases through agro-ecological practices, the production of seedlings, and the use of traditional seeds. The courses were taught by the consultant Adair Pereira Duarte of S.O.S Amazonia, who is an environmental manager and specialist in agro-ecology.


ASSEMBLEIA
DE DEUS
NOVA ESPERANÇA
SEDE LAGOINHA
22/07/2013

Agricultural Extension Training Courses (Photo Credit: Ilderlei Cordeiro)

Agricultural extension trainings will assist the Project Proponents achieve both the climate and community objectives of the Russas Project. These activities will result in both net GHG emission reductions by reducing the communities' dependence on forest resources through intensifying agriculture and livestock, while also providing the communities with alternative incomes.

Support Local Farmers Association

I.S.R.C. will establish and financially support a community run local farmers association. Financial support will help to:

- modernize community manioc houses;
- build a local processing plant to industrialize açaí production;
- support purchase of new equipment;
- assist with improving production by mechanization of the land; and
- facilitate better market access.

From March 2011 to December 2013, several initial steps were taken to eventually create this association to assist with the processing of acai and manioc flour. In March 2011, during the very early stages of designing the Project, many communities spoke of the large amount of acai which can be found in the region and that income from selling manioc flour was very important but more support was needed. In 2012, I.S.R.C. agreed to make the necessary investments to create an association to assist with the processing of acai and manioc flour when there is eventually revenue from the sale of carbon offset credits. From 2012 to 2013, the Project Proponents looked into the approximate costs to help process acai and manioc flour and the Project Proponents also looked at a model of processing acai in Cruzeiro do Sul. Furthermore, the Basic Necessity Surveys (BNSs) and the Participatory Rural Assessment (PRAs), which were conducted in March and April 2013, further confirmed the importance of acai and manioc flour.

Help Communities Obtain Land Tenure

Community members that have been living on the land and who made the land productive (e.g., by growing agriculture or raising animals) for ten years have the right to be titled to land. I.S.R.C. will voluntarily recognize whatever area is currently deforested and under productive use by each family and up to the recommended size that a family in the State of Acre needs for a sustainable livelihood according to State and Federal laws. All communities, whether they join the Russas Project or not, will be titled the land they have put under productive use.

Between March 2011 and December 2013, Ilderlei spoke to the local families about the local families receiving land title. In addition, Ilderlei spoke with the director of ITERACRE, which is the State of Acre's Institute of Land, about land regulations of the residents. ITERACRE offered their services to be partners and the Project Proponents received a letter of support from ITERACRE for the Russas Project.

Profit-Sharing of Carbon Credits

Carbon revenue will be primarily used by I.S.R.C. to develop social projects and programs. However, within the first five years, communities will start to receive a small share of the payments from I.S.R.C. This revenue will be shared with the communities each time I.S.R.C. receives payment for its share of the verified emission reductions.

Although sharing carbon revenue with the local communities is a longer term activity, the Project Proponents – particularly I.S.R.C. – discussed with the communities that they would be eligible for a share of the carbon revenue in the future. In addition, the Project was designed and implemented throughout March 2011 to December 2013 which are necessary actions to eventually having a verified REDD+ project with issued carbon offset credits.

Carbon revenue will primarily enable I.S.R.C. to implement social projects and programs, while the small portion of revenue shared with the communities will contribute both to slightly increased and diversified income for communities.

Establish a Project Headquarters

The project has an initial headquarters in the project manager's house, and in the future I.S.R.C. will build a dedicated project headquarters near Marmude's house at the beginning of the Valparaiso River. This dedicated headquarters will provide: a place for visitors to sleep and eat; a small auditorium for presentations, community meetings and teaching courses; provide storage; a communication base with phone; and be located near the açaí processing plant.

At the beginning of the project design in early 2011, Ilderlei asked Marmude for permission to allow Marmude's house to serve as a provisional and unofficial headquarters. The role of this unofficial headquarters is to host visitors and to support residents such as hosting community meetings. From 2011 – 2013, Ilderlei spoke with Marmude about site identification for the eventual creation of a new, official headquarters and they also began to estimate the costs (i.e., approximately R$40,000) to establish the new headquarters. In addition in June 2013, an addition was added to Marmude's house to better support the residents of the projects as well as to better receive visitors.

Building an office contributes to the community objective because the office will serve as a centralized headquarters and will facilitate I.S.R.C.'s social projects and programs.

2.2 Deviations

2.2.1 Methodology Deviations

The following deviations to the methodology are applied.

Trees in the Cecropia genus will not be included as part of the forest inventory. This has been proposed as a deviation as it stands in conflict with the CP-AB requirement that "all the trees above some minimum DBH in the sample plots" be measured.

While sampling lying dead wood using the line intersect method:

- Two 92-meter transect lines were used rather than two 50-meter transect lines;
- The sampling lines did not bisect each sample plot, but rather ran from one plot center to the next; and
- The sampling lines were oriented to the north and east, and no randomization in the bearing of the first line was employed.

Rather than using a root to shoot ratio to estimate belowground biomass as per the CP-AB module, belowground biomass was estimated using an allometric equation developed by Cairns et al.[3]

The forest inventory has deviated from the criteria for selection (i.e., the equation is based on a datasets comprising at least 30 trees, with an r2 that is ≥ 0.8) and validation of the allometric equation related to palm biomass, however the equation used is likely to result in a conservative estimate of palm biomass for the following reasons:

-Volume is calculated as the volume a parabaloid rather than the volume of a cylinder;

-Only stem biomass is estimated, thus conservatively excluding other aboveground biomass; and

- A conservative measure of basal diameter (i.e., dbh) was used.

Dead wood collected for density determination was opportunistically sampled from within the project area. The forest inventory collected a total of 13, 17, 13 samples for the sound, intermediate, and rotten classes, respectively. While the minimum number of samples, twenty, as stated in the CP-D module of the methodology was not collected for each class, the sample was still sufficient for a robust estimate of the mean as indicated by the low coefficient of variations for each of the classes (i.e., less than 20% for each class).

[3] Cairns, M. A., S. Brown, E. H. Helmer, and G. A. Baumgardner. 1997. Root biomass allocation in the world's upland forests. Oecologia 111, 1-11.

The similarities of the project boundaries were assessed using population density rather than settlement density. This methodological deviation is warranted due to obvious inconsistencies in the available data on the location of settlements within the state. Use of population density data still meets the intent of the methodology as both population and settlement density reflect the relative density of resident populations (and level of pressures associated with those population).

The parameter TOTFOR has not been "limited to forest areas within 5km of roads and rivers suitable for conversion to agriculture / livestock" as mentioned in the methodology. As the resulting TOTFOR value is greater, the AVFOR value is also greater. The PROPLB parameter is therefore smaller thus resulting in more leakage outside the leakage belt and hence a conservative estimate. This deviation results in conservative accounting of leakage outside the leakage belt.

The parameter COLB has not been "limited to areas demonstrated to be suitable for agriculture or livestock ranching" as mentioned in the methodology. COLB has conservatively been set to the largest forest aboveground tree carbon stock rather than the area-weighted average aboveground tree carbon stock. This deviation results in conservative accounting of leakage outside the leakage belt.

The AVFOR parameter used in leakage estimation will be stratified using information and data derived from official (government) publications, peer-reviewed published sources, or other verifiable sources. Stratification is not limited to the delineation of different strata where contiguous areas of at least 100 ha differ in stocks by ≥20%.

Parameter $U_{P,SS,i,pool\#}$ will be monitored at least once every 10 years, on re-measurement of forest carbon stocks. While module X-UNC requires that monitoring of this parameter occur every $\leq$ 5 years, this requirement is inconsistent with the VM0007 pools modules, which specify that stock estimates (from which uncertainty is calculated) are assumed valid for 10 years. Therefore, a deviation to module X-UNC is applied to permit parameter $U_{P,SS,i,pool\#}$ to be monitored every $\leq$ 10 years, putting it into alignment with modules CP-AB and CP-D.

2.2.2 Project Description Deviations

Rather than initially assessing the significance of illegal logging using temporary sample plots covering 1% of the potential degradation area (*ADegW,i*) as proposed in the project document and monitoring module of the VM0007 methodology; information gathered during the course of the participatory appraisals including amounts of fuelwood, charcoal, and timber collected by communities members will be used along with conservative assumptions to assess whether emissions due to degradation are significant using the T-SIG tool, and plot level monitoring of degradation is warranted. This deviation may be used for the first and each subsequent monitoring period. This deviation was added during the course of the first verification event. This deviation was included as it was our understanding that we could use T-SIG to determine the significance of any with project emission. Further, this deviation was warranted due to the significant amount of work necessary to monitoring degradation using temporary plots and the likely insignificant amount of emissions resulting from degradation. The section on "Monitoring Illegal Degradation" in the monitoring plan has been updated to reflect this deviation.

Rather than monitoring Cpost using modules CP-AB and CP-D as described in the MON modules, C(post) can conservatively be assumed to be zero in the with project case, not only for natural disturbance (CP,Dist,q,i , as stated in Section 5.2.3 of the M-MON module) but also for deforestation (CP,post,u,i). This deviation is conservative because subtracting zero from the baseline stocks, leads to the conclusion that ΔCpools,Def,u,i,t is equal to C(BSL,i), which leads to the maximum emission in the with project case, which is conservative. This deviation may be used for the first and each subsequent monitoring period.

2.3 Grouped Project

The Russas Project is not a grouped project and therefore this section of the monitoring report is not applicable.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data and parameters calculated during the course of project development include those listed in this section.

Data Unit / Parameter:	$\Delta C_{BSL,PA,unplanned}$
Data unit:	t CO_2-e
Description:	Net CO_2 emissions in the baseline from unplanned deforestation in the project area
Source of data:	Derived in Section 3.1 of PD
Value applied:	see table below
Justification of choice of data or description of measurement methods and procedures applied:	Derived and justified in Section 3 of VCS Project Description (PD) in which baseline is set
Purpose of the data:	Calculation of baseline emissions
Comment:	None

Year	ΔCBSL,PA,unplanned
2012	34,205
2013	190,685
2014	243,544
2015	233,773
2016	248,221
2017	217,214
2018	246,296
2019	251,397
2020	233,279
2021	265,663

Data Unit / Parameter:	$\Delta C_{BSL,LK,unplanned}$
Data unit:	t CO_2-e
Description:	Net CO_2 emissions in the baseline from unplanned deforestation in the leakage belt
Source of data:	Derived in Section 3.1 and 3.2 of PD
Value applied:	see table below

Year	ΔCBSL,LK,unplanned
2012	35,152
2013	237,009
2014	380,426

	<table><tr><td>2015</td><td>344,023</td></tr><tr><td>2016</td><td>337,645</td></tr><tr><td>2017</td><td>317,929</td></tr><tr><td>2018</td><td>342,140</td></tr><tr><td>2019</td><td>344,183</td></tr><tr><td>2020</td><td>314,928</td></tr><tr><td>2021</td><td>366,684</td></tr></table>
Justification of choice of data or description of measurement methods and procedures applied:	Derived and justified in Section 3 of PD in which baseline is set
Purpose of the data	Calculation of baseline emissions Calculation of leakage
Comment	None

Data Unit / Parameter:	*CF*
Data unit:	$t\ C\ t^{-1}$ d.m.
Description:	Carbon fraction of biomass
Source of data:	IPCC 2006GL
Value applied:	0.47
Justification of choice of data or description of measurement methods and procedures applied:	Global default
Purpose of the data	Calculation of baseline emissions
Comment	None

Data Unit / Parameter:	C_{OLB}
Data unit:	$t\ CO_2\text{-e}\ ha^{-1}$
Description:	Area-weighted average aboveground tree carbon stock for forests available for unplanned deforestation outside the Leakage Belt
Source of data:	Derived from source data found in FAO. 2009. Global Forest Resources Assessment 2010, Brazil Country Report. Forestry Department, Food and Agriculture Organization of the United Nations, Rome.

Value applied:	458 t CO_2-e ha^{-1}
Justification of choice of data or description of measurement methods and procedures applied:	Derived above in Section 3.3 of the PD
Purpose of the data	Calculation of leakage
Comment	None

Data Unit / Parameter:	$C_{P,LB}$
Data unit:	t CO_2-e ha^{-1}
Description:	Area weighted average aboveground tree carbon stock for forests available for unplanned deforestation inside the Leakage Belt
Source of data:	Stock estimates of strata represented in the project area were derived from measurements from the forest carbon inventory of the project area, in addition to data from Salimon et al. for one unsampled forest strata. Salimon et al. 2011. Estimating state-wide biomass carbon stocks for a REDD plan in Acre, Brazil. Forest Ecology and Management 262: 555-560.
Value applied:	415 t CO_2e ha-1
Justification of choice of data or description of measurement methods and procedures applied:	Derived above in Section 3 of the Project Description
Purpose of the data	Calculation of leakage
Comment	None

Data Unit / Parameter:	ABSL,PA,unplanned,i,t
Data unit:	Ha
Description:	Projected area of unplanned baseline deforestation in the project area in stratum i at time t
Source of data:	Derived in Section 3.1 of PD
Value applied:	(see table below)
Justification of choice of data or description of measurement methods and procedures applied:	Derived and justified in Section 3 of PD in which baseline is set
Purpose of the data	Calculation of baseline emissions
Comment	None

Value applied:

Year	Aunplanned, i,t, FAB + FAP (ha)	AAunplanned,i,t, FAP (ha)	AAunplanned,i,t, FAP-alluvial (ha)	AAunplanned,i,t, FAP + FAB + FD or FAP + FD + FAB (ha)	AAunplanned,i,t, FAP + FD or FD + FAP (ha)
2012	2.2	16.3	4	0	94.3
2013	46.9	153.9	88.6	0.5	342.4
2014	48.1	245	158.8	1.4	330.3
2015	38.2	242.4	159.1	6.4	281.3
2016	35.3	248.5	161.5	3.7	309
2017	30.8	211.3	137.2	2.8	253
2018	27.7	241.9	127	2.7	313.7
2019	31.7	230.1	138.4	3.6	309.2
2020	35.9	212.7	97.3	3.4	281
2021	35.8	255.8	118.3	2.1	306.4

Data Unit / Parameter:	COMF i
Data unit:	dimensionless
Description:	Combustion factor for stratum i
Source of data:	Derived from Table 2.6 of IPCC, 2006.
Value applied:	0.45
Justification of choice of data or description of measurement methods and procedures applied:	Value is for primary open tropical forest.
Purpose of the data	Calculation of baseline emissions Calculation of project emissions
Comment	None

<table>
<tr><td>Data Unit / Parameter:</td><td colspan="2">Gg,i</td></tr>
<tr><td>Data unit:</td><td colspan="2">kg t-1 dry matter burnt</td></tr>
<tr><td>Description:</td><td colspan="2">Emission factor for stratum i for gas g</td></tr>
<tr><td>Source of data:</td><td colspan="2">Derived from Table 2.5 of IPCC, 2006.</td></tr>
<tr><td rowspan="2">Value applied:</td><td>G,N20 (kg/t d.m. burnt)</td><td>G,CH4 (kg/t d.m. burnt)</td></tr>
<tr><td>0.2</td><td>6.8</td></tr>
<tr><td>Justification of choice of data or description of measurement methods and procedures applied:</td><td colspan="2">Default parameter from IPCC</td></tr>
<tr><td>Purpose of the data</td><td colspan="2">Calculation of baseline emissions
Calculation of project emissions</td></tr>
<tr><td>Comment</td><td colspan="2">None</td></tr>
</table>

<table>
<tr><td>Data Unit / Parameter:</td><td colspan="2">GWPg</td></tr>
<tr><td>Data unit:</td><td colspan="2">t CO_2/t gas g</td></tr>
<tr><td>Description:</td><td colspan="2">Global warming potential for gas g</td></tr>
<tr><td>Source of data:</td><td colspan="2">Default values from IPCC SAR</td></tr>
<tr><td rowspan="2">Value applied:</td><td>GWP,N20 (t CO2/t gas g)</td><td>GWP,CH4 (t CO2/t gas g)</td></tr>
<tr><td>310</td><td>21</td></tr>
</table>

Justification of choice of data or description of measurement methods and procedures applied:	Default parameter from IPCC
Purpose of the data	Calculation of baseline emissions Calculation of project emissions
Comment	None

3.2 Data and Parameters Monitored

Details on data and parameters monitored are provided below. Note that:

Data Unit / Parameter:	$\Delta C_{P,Def,i,t}$
Data unit:	t CO_2-e
Description:	Net carbon stock change as a result of deforestation in the project case in the project area in stratum *i* at time *t*
Source of data:	Calculated
Description of measurement methods and procedures to be applied:	As this parameter was calculated rather than measured, no measurements methods are noted.
Frequency of monitoring/recording:	Every ≤ 5 years
Value applied:	<table><tr><th>Year</th><th>ΔCP,DefPA,i,t (t CO2-e)</th></tr><tr><td>2012</td><td>21,448</td></tr><tr><td>2013</td><td>12,265</td></tr></table>
Monitoring equipment:	None
QA/QC procedures to be applied:	Neither QA/QC procedures nor calibration are relevant for this calculated parameter.
Purpose of the data	Calculation of project emissions
Calculation method:	Equation 3, VMD0015
Comment	None

Data Unit / Parameter:	$\Delta C_{P,DefLB,i,t}$
Data unit:	t CO_2-e
Description:	Net carbon stock change as a result of deforestation in the project case in the leakage belt in stratum *i* at time *t*
Source of data:	Calculated
Description of measurement methods and procedures to be applied:	Net carbon stock change as a result of deforestation in the project case in the leakage

	belt in stratum *i* at time *t*
Frequency of monitoring/recording:	Every ≤ 5 years
Value applied:	Year / ΔCP,LB (t CO2-e): 2012 – 65,431; 2013 – 39,100
Monitoring equipment:	None.
QA/QC procedures to be applied:	Neither QA/QC procedures nor calibration are relevant for this calculated parameter.
Purpose of the data	Calculation of leakage
Calculation method:	Equation 4, VMD0015
Comment	None

Year	ΔCP,LB (t CO2-e)
2012	65,431
2013	39,100

Data Unit / Parameter:	$\Delta C_{P,DistPA,i,t}$
Data unit:	t CO_2-e
Description:	Net carbon stock change as a result of natural disturbance in the project case in the project area in stratum *i* at time *t*
Source of data:	Calculated
Description of measurement methods and procedures to be applied:	As this parameter was calculated rather than measured, no measurements methods are noted.
Frequency of monitoring/recording:	Every ≤ 5 years
Value applied:	Year / ΔCP,DistPA,i,t (t CO2-e): 2012 – 0; 2013 – 0
QA/QC procedures to be applied:	Neither QA/QC procedures nor calibration are relevant for this calculated parameter.
Purpose of the data	Calculation of project emissions
Calculation method:	Equation 20, VMD0015
Comment	None

Year	ΔCP,DistPA,i,t (t CO2-e)
2012	0
2013	0

<table>
<tr><td>Data Unit / Parameter:</td><td>$A_{DefPA,u,i,t}$</td></tr>
<tr><td>Data unit:</td><td>Ha</td></tr>
<tr><td>Description:</td><td>Area of recorded deforestation in the project area stratum *i* converted to land use *u* at time *t*</td></tr>
<tr><td>Source of data:</td><td>Monitored at each monitoring/verification event through the use of classified satellite imagery</td></tr>
<tr><td>Description of measurement methods and procedures to be applied:</td><td>Detailed procedures are provided below under monitoring plan description.</td></tr>
<tr><td>Frequency of monitoring/recording:</td><td>Every $\leq$ 5 years</td></tr>
<tr><td>Value applied:</td><td>
<table>
<tr><td>Year</td><td>FAB + FAP (ha)</td><td>FAP (ha)</td><td>FAP-alluvial (ha)</td><td>FAP + FAB + FD or FAP + FD + FAB (ha)</td><td>FAP + FD or FD + FAP (ha)</td></tr>
<tr><td>2012</td><td>0.7</td><td>28.1</td><td>11.7</td><td>0.4</td><td>9.7</td></tr>
<tr><td>2013</td><td>0.0</td><td>15.4</td><td>3.2</td><td>0.0</td><td>10.4</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment:</td><td>*ArcGIS*</td></tr>
<tr><td>QA/QC procedures to be applied:</td><td>Detailed procedures provided below under monitoring plan description</td></tr>
<tr><td>Purpose of the data</td><td>Calculation of project emissions</td></tr>
<tr><td>Calculation method:</td><td>Not relevant</td></tr>
<tr><td>Comment</td><td>None</td></tr>
</table>

Data Unit / Parameter:	$A_{DefLB,u,i,t}$
Data unit:	Ha
Description:	Area of recorded deforestation in the leakage belt stratum *i* converted to land use *u* at time *t*
Source of data:	Monitored at each monitoring/verification event through the use of classified satellite imagery

<table>
<tr><td>Description of measurement methods and procedures to be applied:</td><td>Detailed procedures provided below under monitoring plan description.</td></tr>
<tr><td>Frequency of monitoring/recording:</td><td>Every ≤ 5 years</td></tr>
<tr><td>Value applied:</td><td>
<table>
<tr><th>Year</th><th>FAB + FAP (ha)</th><th>FAP (ha)</th><th>FAP-alluvial (ha)</th><th>FAB - Aluvial (ha)</th><th>FAP + FD or FD + FAP (ha)</th></tr>
<tr><td>2012</td><td>7.5</td><td>4.0</td><td>53.9</td><td>22.4</td><td>72.0</td></tr>
<tr><td>2013</td><td>16.9</td><td>0.0</td><td>17.9</td><td>9.8</td><td>49.4</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment:</td><td>ArcGIS</td></tr>
<tr><td>QA/QC procedures to be applied:</td><td>Detailed procedures provided below under monitoring plan description</td></tr>
<tr><td>Purpose of the data</td><td>Calculation of leakage</td></tr>
<tr><td>Calculation method:</td><td>Not relevant</td></tr>
<tr><td>Comment</td><td>None</td></tr>
</table>

Data Unit / Parameter:	$A_{DistPA,q,i,t}$
Data unit:	ha
Description:	Area impacted by natural disturbance in post-natural disturbance stratum *q* in stratum *i,* at time *t*
Source of data:	Monitored at each monitoring/verification event through the use of classified satellite imagery and land managers observations
Description of measurement methods and procedures to be applied:	Detailed procedures provided below under monitoring plan description.
Frequency of monitoring/recording:	Every ≤ 5 years
Value applied:	Year / $A_{DistPA,q,i,t}$ (t CO2-e): 2012: 0 2013: 0
Monitoring equipment:	None
QA/QC procedures to be applied:	Detailed procedures provided below under monitoring plan description
Purpose of the data	Calculation of project emissions
Calculation method:	Not relevant
Comment	None

Year	$A_{DistPA,q,i,t}$ (t CO2-e)
2012	0
2013	0

Data Unit / Parameter:	$C_{BSL,i}$
Data unit:	t CO_2-e ha^{-1}
Description:	Carbon stock in all pools in the baseline case in stratum *i*
Source of data:	Estimated from forest carbon inventory.
Description of measurement methods and procedures to be applied:	Detailed procedures provided below under monitoring plan description
Frequency of monitoring/recording:	Every ≤ 10 years.
Value applied:	See table below

Strata	CBSL,i (t CO2-e ha-1)
FAB + FAP	441.9
FAP	458.1

	FAP - Aluvial	370.5
	FAP + FAB + FD or FAP + FD + FAB	482.1
	FAP + FD or FD + FAP	389.5
	FAB - Aluvial	424.4
Monitoring equipment:	*dbh tape, measuring tape, GPS, clinometer*	
QA/QC procedures to be applied:	Detailed procedures provided below under monitoring plan description	
Purpose of the data	Calculation of baseline emissions Calculation of project emissions Calculation of leakage	
Calculation method:	Use equations as stated in the forest inventory, including allometric equations as found in Brown (1997), a volumetric based palm equation, Cairns et al. (1997), Van Wagner (1968)	
Comment	None	

Data Unit / Parameter:	*ΔCpools,Def,u,i,t*
Data unit:	t CO2-e ha-1
Description:	Carbon stock in all pools in post-deforestation land use u in stratum i
Source of data:	Calculated.
Description of measurement methods and procedures to be applied:	None.
Frequency of monitoring/recording:	Every < 10 years.
Value applied:	Stratum specific values calculated as $C_{BSL,I}$-Cpost
Monitoring equipment:	None.
QA/QC procedures to be applied:	Detailed procedures provided below under monitoring plan description
Purpose of the data	Calculation of baseline emissions

	Calculation of project emissions Calculation of leakage
Calculation method:	Stratum specific values calculated as $C_{BSL,I}$-Cpost
Comment	None

Data Unit / Parameter:	$A_{DegW,i,t}$
Data unit:	ha
Description:	Area potentially impacted by degradation processes in stratum i
Source of data:	Delineated based on survey results indicating general area of project potentially accessed and typical depth of penetration of illegal harvest activities from points of access
Description of measurement methods and procedures to be applied:	Detailed procedures provided below under monitoring plan description.
Frequency of monitoring/recording:	Repeated each time the PRA indicates a potential for degradation. PRA conducted every < 2 years
Value applied:	0
Monitoring equipment:	None.
QA/QC procedures to be applied:	Detailed procedures provided below under monitoring plan description.
Purpose of the data	Calculation of project emissions
Calculation method:	Not relevant
Comment	None

Data Unit / Parameter:	$C_{DegW,i,t}$
Data unit:	t CO_2-e
Description:	Biomass carbon of trees cut and removed through degradation process from plots measured in stratum *i* at time *t*
Source of data:	Estimated from diameter measurements of cut stumps in sample plots
Description of measurement methods and procedures to be applied:	Detailed procedures provided below under monitoring plan description.
Frequency of monitoring/recording:	Every ≤ 5 years where surveys and limited sampling continue to indicate possibility of illegal

	logging in the project area
Value applied:	0
Monitoring equipment:	None.
QA/QC procedures to be applied:	Detailed procedures provided below under monitoring plan description.
Purpose of the data	Calculation of project emissions
Calculation method:	Equation 8, VMD0015
Comment	None

Data Unit / Parameter:	AP_i
Data unit:	ha
Description:	Total area of degradation sample plots in stratum *i*
Source of data:	Calculated as 3% of $A_{DegW,i,t}$
Description of measurement methods and procedures to be applied:	Detailed procedures provided below under monitoring plan description.
Frequency of monitoring/recording:	Every $\leq$ 5 years where surveys and limited sampling continue to indicate possibility of illegal logging in the project area
Value applied:	0
Monitoring equipment:	ArcGIS
QA/QC procedures to be applied:	Detailed procedures provided below under monitoring plan description.
Purpose of the data	Calculation of project emissions
Calculation method:	Not relevant
Comment	Not used in this monitoring period

Data Unit / Parameter:	$\Delta C_{P,DegW,i,t}$
Data unit:	t CO_2-e
Description:	Net carbon stock changes as a result of degradation in stratum *i* in the project area at time *t*
Source of data:	Calculated
Description of measurement methods and procedures to be applied:	As this parameter was calculated rather than measured, no measurements methods are note

Frequency of monitoring/recording:	Every ≤ 5 years where surveys and limited sampling continue to indicate possibility of illegal logging in the project area
Value applied:	Year / ΔCP,Deg,i,t (t CO2-e): 2012 – 0; 2013 – 0
Monitoring equipment:	None
QA/QC procedures to be applied:	Neither QA/QC procedures nor calibration are relevant for this calculated parameter.
Purpose of the data	Calculation of project emissions
Calculation method:	Equation 8, VMD0015
Comment	None

Data Unit / Parameter:	$PROP_{IMM}$
Data unit:	Proportion
Description:	Estimated proportion of baseline deforestation caused by immigrating population
Source of data:	Calculated based on results of survey of communities in the area around the project.
Description of measurement methods and procedures to be applied:	Detailed procedures provided below under monitoring plan description.
Frequency of monitoring/recording:	Every ≤ 5 years
Value applied:	0.000
Monitoring equipment:	None
QA/QC procedures to be applied:	Detailed procedures provided below under monitoring plan description
Purpose of the data	Calculation of leakage
Calculation method:	Not relevant
Comment	None

Data Unit / Parameter:	$PROP_{RES}$
Data unit:	Proportion
Description:	Estimated proportion of baseline deforestation caused by population that has been resident for ≥5 years
Source of data:	Calculated based on results of survey of

	communities in the area around the project.
Description of measurement methods and procedures to be applied:	Detailed procedures provided below under monitoring plan description.
Frequency of monitoring/recording:	Every ≤ 5 years
Value applied:	1.000
Monitoring equipment:	None
QA/QC procedures to be applied:	Detailed procedures provided below under monitoring plan description
Purpose of the data	Calculation of leakage
Calculation method:	Not relevant
Comment	None

Data Unit / Parameter:	*TOTFOR*
Data unit:	ha
Description:	Total available national forest area
Source of data:	Official data, peer reviewed publications, remotely sensed imagery (coarse scale imagery is appropriate) or cadastral maps and other verifiable sources
Description of measurement methods and procedures to be applied:	*Not applicable*
Frequency of monitoring/recording:	Prior to each verification event and at least every 5 years.
Value applied:	519,522,377
Monitoring equipment:	None
QA/QC procedures to be applied:	Detailed procedures provided below.
Purpose of the data	Calculation of leakage
Calculation method:	Not relevant
Comment	None

Data Unit / Parameter:	*PROTFOR*
Data unit:	ha
Description:	Total area of fully protected forests nationally
Source of data:	Official data, peer reviewed publications and

	other verifiable sources
Description of measurement methods and procedures to be applied:	Not applicable
Frequency of monitoring/recording:	Prior to each verification event and at least every 5 years.
Value applied:	0
Monitoring equipment:	None
QA/QC procedures to be applied:	Detailed procedures provided below.
Purpose of the data	Calculation of leakage
Calculation method:	Not relevant
Comment	None

Data Unit / Parameter:	*MANFOR*
Data unit:	ha
Description:	Total area of forests under active management nationally
Source of data:	Official data, peer reviewed publications and other verifiable sources
Description of measurement methods and procedures to be applied:	Not applicable
Frequency of monitoring/recording:	Prior to each verification event and at least every 5 years.
Value applied:	0
Monitoring equipment:	None
QA/QC procedures to be applied:	Detailed procedures provided below.
Purpose of the data	Calculation of leakage
Calculation method:	Not relevant
Comment	None

Data Unit / Parameter:	*ARRL,forest,2013*
Data unit:	ha
Description:	Remaining area of forest in RRL at time t
Source of data:	Calculated
Description of measurement methods and	As this parameter was calculated rather than

procedures to be applied:	measured, no measurements methods are noted.
Frequency of monitoring/recording:	Prior to each verification event and at least every 5 years.
Value applied:	4,292,671
Monitoring equipment:	ArcGIS
QA/QC procedures to be applied:	Neither QA/QC procedures nor calibration are relevant for this calculated parameter.
Purpose of the data	Calculation of project emissions
Calculation method:	Calculated as the total area of the RRL minus all nonforested areas.
Comment	None

Data Unit / Parameter:	*Aburn,q,i,t.*
Data unit:	ha
Description:	Area burnt in post-natural disturbance stratum *q* in stratum *i,* at time *t*;
Source of data:	*See parameter* $A_{DistPA,q,i,t}$
Description of measurement methods and procedures to be applied:	Monitored as part of $A_{DistPA,q,i,t}$
Frequency of monitoring/recording:	Every < 5 years
Value applied:	see table below
Monitoring equipment:	None
QA/QC procedures to be applied:	Detailed procedures provided below under monitoring plan description
Purpose of the data	Calculation of project emissions
Calculation method:	Aburn,q,i,t.= = $A_{DistPA,q,i,t}$ (area burnt in natural disturbance) + ADefPA,u,i,t (area burnt via deforestation in project ex post)
Comment:	None

Value applied:

Year	FAB + FAP Aburn,q,i,t. (ha)	FAP Aburn,q,i,t . (ha)	FAP-alluvial Aburn,q,i,t . (ha)	FAP + FAB + FD or FAP + FD + FAB Aburn,q,i,t. (ha)	FAP + FD or FD + FAP Aburn,q,i,t. (ha)
2012	0.7	28.1	11.7	0.4	9.7
2013	0.0	15.4	3.2	0.0	10.4

Data Unit / Parameter:	dbh
Data unit:	cm
Description:	diameter at breast height
Source of data:	Monitored during the course of each forest inventory
Description of measurement methods and procedures to be applied:	Detailed procedures provided in Appendix B of the project document
Frequency of monitoring/recording:	Every ≤ 10 years
Value applied:	See forest inventory excel sheet.
Monitoring equipment:	dbh tape, measuring tape,
QA/QC procedures to be applied:	Detailed procedures are provided below under monitoring plan description.
Purpose of the data	Calculation of baseline emissions Calculation of project emissions
Calculation method:	Not relevant
Comment	None

Data Unit / Parameter:	dbasal
Data unit:	cm
Description:	Basal diameter
Source of data:	Monitored during the course of each forest inventory
Description of measurement methods and procedures to be applied:	Detailed procedures provided in Appendix B of the project document
Frequency of monitoring/recording:	Every ≤ 10 years
Value applied:	Detailed in the Russas Project forest inventory
Monitoring equipment:	dbh tape, measuring tape,
QA/QC procedures to be applied:	Detailed procedures are provided below under monitoring plan description.
Purpose of the data	Calculation of baseline emissions Calculation of project emissions
Calculation method:	Not relevant
Comment	Dbh may be used as a conservative estimate of dbasal

Data Unit / Parameter:	H
Data unit:	m
Description:	Height of tree
Source of data:	Monitored during the course of each forest inventory
Description of measurement methods and procedures to be applied:	Detailed procedures provided in Appendix B of the project document
Frequency of monitoring/recording:	Every $\leq$ 10 years
Value applied:	Detailed in the Russas Project forest inventory
Monitoring equipment:	measuring tape, clinometer
QA/QC procedures to be applied:	Detailed procedures are provided below under monitoring plan description.
Purpose of the data	Calculation of baseline emissions Calculation of project emissions
Calculation method:	Not relevant
Comment	None

Data Unit / Parameter:	Dn
Data unit:	cm
Description:	Diameter of piece n of dead wood along the transect
Source of data:	Monitored during the course of each forest inventory
Description of measurement methods and procedures to be applied:	Detailed procedures provided in Appendix B of the project document
Value applied:	Detailed in the Russas Project forest inventory
Monitoring equipment:	dbh tape, measuring tape
QA/QC procedures to be applied:	Detailed procedures are provided below under monitoring plan description.
Purpose of the data	Calculation of baseline emissions Calculation of project emissions
Calculation method:	Not relevant
Comment	None

Data Unit / Parameter:	N
Data unit:	dimensionless
Description:	Total number of wood pieces intersecting the transect
Source of data:	Monitored during the course of each forest inventory
Description of measurement methods and procedures to be applied:	Detailed procedures provided in Appendix B of the project document
Frequency of monitoring/recording:	Every ≤ 10 years
Value applied:	See forest inventory excel sheet.
Value applied:	Detailed in the Russas Project forest inventory
Monitoring equipment:	None
QA/QC procedures to be applied:	Detailed procedures are provided below under monitoring plan description.
Purpose of the data	Calculation of baseline emissions Calculation of project emissions
Calculation method:	Not relevant
Comment	None

Data Unit / Parameter:	L
Data unit:	m
Description:	Length of the transect
Source of data:	Monitored during the course of each forest inventory
Description of measurement methods and procedures to be applied:	Detailed procedures provided in Appendix B of the project document
Frequency of monitoring/recording:	Every ≤ 10 years
Value applied:	184 m
Monitoring equipment:	measuring tape,
QA/QC procedures to be applied:	Detailed procedures are provided below under monitoring plan description.
Purpose of the data	Calculation of baseline emissions Calculation of project emissions
Calculation method:	Not relevant
Comment	None

Data Unit / Parameter:	Cpost
Data unit:	t CO_2-e ha^{-1}
Description:	Average carbon stocks remaining after deforestation.
Source of data:	Calculated
Description of measurement methods and procedures to be applied:	None
Frequency of monitoring/recording:	Every $\leq$ 10 years.
Value applied:	0
Monitoring equipment:	None
QA/QC procedures to be applied:	None
Purpose of the data	Calculation of project emissions Calculation of leakage
Calculation method:	None
Comment	None

<table>
<tr><td>Data Unit / Parameter:</td><td>Bi,t</td></tr>
<tr><td>Data unit:</td><td>tonnes d. m. ha-1</td></tr>
<tr><td>Description:</td><td>Average aboveground biomass stock before burning stratum i,time t</td></tr>
<tr><td>Source of data:</td><td>Calculated using forest inventory data</td></tr>
<tr><td>Description of measurement methods and procedures to be applied:</td><td>Detailed forest inventory procedures are provided in Appendix B of the project document</td></tr>
<tr><td>Frequency of monitoring/recording:</td><td>Every ≤ 10 years</td></tr>
<tr><td>Value applied:</td><td><table><tr><td>FAB + FAP Bi,t (t d.m./ha)</td><td>FAP Bi,t (t d.m./ha)</td><td>FAP-alluvial Bi,t (t d.m./ha)</td><td>FAP + FAB + FD or FAP + FD + FAB Bi,t (t d.m./ha)</td><td>FAP + FD or FD + FAP Bi,t (t d.m./ha)</td><td>FAB - Aluvial Bi,t (t d.m./ha)</td></tr><tr><td>211.0</td><td>217.7</td><td>176.3</td><td>229.7</td><td>185.6</td><td>202.3</td></tr></table></td></tr>
<tr><td>Monitoring equipment:</td><td>None</td></tr>
<tr><td>QA/QC procedures to be applied:</td><td>Detailed procedures are provided below under monitoring plan description.</td></tr>
<tr><td>Purpose of the data</td><td>Calculation of baseline emissions
Calculation of project emissions
Calculation of leakage</td></tr>
<tr><td>Calculation method:</td><td>Use equations as stated in the forest inventory, including allometric equations as found in Brown (1997) and a volumetric based palm equation, Van Wagner (1968)</td></tr>
<tr><td>Comment</td><td>None</td></tr>
</table>

Data Unit / Parameter:	*EBSL SS,i, pool#*
Data unit:	t CO2-e
Description:	Carbon stock or GHG sources (e.g. trees, dead wood, soil organic carbon, emission from fertilizer addition, emission from biomass burning etc.) in the baseline case
Source of data:	Calculated
Description of measurement methods and procedures to be applied:	As this parameter was calculated rather than measured, no measurements methods are noted.
Frequency of monitoring/recording:	Every ≤ 10 years.
Value applied:	(see table below)
Monitoring equipment:	None
QA/QC procedures to be applied:	Neither QA/QC procedures nor calibration are relevant for this calculated parameter.

Value applied:

Parameter	Live aboveground tree biomass	Belowground biomass	Standing dead wood	Lying dead wood
EBSL,SS,FAB+FAP,pool# (tCO2e)	4,063,545	922,537	19,465	199,338
EBSL,SS,FAP,pool# (tCO2e)	5,926,339	1,343,754	81,394	75,108
EBSL,SS,FAP-A,pool# (tCO2e)	1,954,348	449,895	32,948	60,536
EBSL,SS,FAB+FAP+FD or FAP + FD + FAB ,pool# (tCO2e)	6,921,606	1,563,641	45,383	210,652
EBSL,SS, FAP + FD or FD + FAP ,pool# (tCO2e)	5,812,094	1,335,873	152,414	167,009

Purpose of the data	Calculation of baseline emissions Calculation of project emissions
Calculation method:	See X-UNC module.

Data Unit / Parameter:	*UBSL,SS,i,pool#*
Data unit:	%
Description:	Percentage uncertainty (expressed as 95% confidence interval as a percentage of the mean where appropriate) for carbon stocks and greenhouse gas sources in the baseline case (1,2…n represent different carbon pools and/or GHG sources)
Source of data:	Calculated
Description of measurement methods and procedures to be applied:	As this parameter was calculated rather than measured, no measurements methods are noted.
Frequency of monitoring/recording:	Every ≤ 10 years.
Value applied:	(see table below)

Parameter	Live aboveground tree biomass	Belowground biomass	Standing dead wood	Lying dead wood
UBSL,SS,FAB+FAP,pool# (%)	42.5%	39.7%	60.9%	76.5%
UBSL,SS,FAP,pool# (%)	18.6%	17.2%	179.7%	54.6%
UBSL,SS, FAP-A,pool# (%)	79.4%	74.0%	283.2%	221.8%
UBSL,SS,FAB+FAP+FD or FAP + FD + FAB ,pool# (%)	17.7%	16.4%	62.9%	45.9%
UBSL,SS, FAP + FD or FD + FAP ,pool# (%)	14.2%	13.2%	138.4%	37.1%

Monitoring equipment:	None
QA/QC procedures to be applied:	Neither QA/QC procedures nor calibration are relevant for this calculated parameter.
Calculation of baseline emissions	Calculation of baseline emissions
Calculation method:	See X-UNC module.

Data Unit / Parameter:	E BiomassBurn,t
Data unit:	tCO2-e
Description:	Greenhouse emissions due to biomass burning as part of deforestation activities in stratum i in year t
Source of data:	Calculated
Description of measurement methods and procedures to be applied:	As this parameter was calculated rather than measured, no measurements methods are noted.
Frequency of monitoring/recording:	Every ≤ 10 years
Value applied:	E BiomassBurn2012,PA: 940.1 E BiomassBurn2013,PA: 537.7 E BiomassBurn2012,LB: 2751.3 E BiomassBurn2013,LB: 1645.0
Monitoring equipment:	None
QA/QC procedures to be applied:	Neither QA/QC procedures nor calibration are relevant for this calculated parameter.
Purpose of the data	Calculation of project emissions Calculation of leakage
Calculation method:	Use equation 1 as found in the E-BB module of VM0007
Comment	None

3.3 Monitoring Plan

This monitoring plan has been developed in close conjunction with module VMD0015 of the REDD Methodological Module, "Methods for monitoring of greenhouse gas emissions and removals (M-MON)." This section focuses on establishing procedures for monitoring deforestation, illegal degradation, natural disturbance, and project emissions ex-post in the project area and leakage belt. Further, procedures for updating the forest carbon stocks and revising the baseline are also provided below.

For accounting purposes, the project conservatively assumes stable stocks and no biomass monitoring is conducted in areas undergoing carbon stock enhancement, as permitted in the methodology monitoring module VMD0015, hence $\Delta C_{P,Enh,i,t}$ is set to 0.

Further as no commercial harvest of timber (including FSC selective logging) occurs in the baseline or with project case, the degradation due to harvest of timber will not be monitored, thus parameter $\Delta C_{P,SelLog,i,t}$ is set to 0. As such, parameters related to calculating emissions from commercial timber harvest, including ADECKS,I,t; AROAD,i,t; CAB_tree_dest, i; CBB_tree_dest, i; CS/U,lg; CB,lg; Lsk; VEXT,z,i,t; VEXT,j,z,i,t; and WSKID, are not included in the project.

None of the project area has been or will be registered under another carbon trading scheme during the VCS project lifetime, other than CCBA. Further, the property is under the private ownership of I.S.R.C., a project proponent, and registration under the CDM or under any other carbon trading scheme is not feasible without their consent. A separate section on quality assurance/quality control and data archiving procedures covers all monitoring tasks.

Organizations responsible for monitoring are listed below in Table 3.1. These organizations are responsible for implementing all aspects of a particular monitoring task, as described in the monitoring sub-sections below.

Monitoring Deforestation and Natural Disturbance

Forest cover change due to deforestation and natural disturbance is monitored through periodic assessment of classified satellite imagery, see below, covering the project area. Emissions ($\Delta C_{P,Def,i,t}$ and $\Delta C_{P,DistPA,i,t}$ for deforestation and natural disturbance, respectively) are estimated by the multiplying areas $A_{DefPA,u,i,t}$ and $A_{DistPA,q,i,t}$,, for deforestation and natural disturbance, respectively, by average forest carbon stock per unit area. Note that $A_{DistPA,q,i,t}$,, is limited to the area where credits have been issued and is identified as the overlap between the delineated area of the disturbance and the summed area of unplanned deforestation in the project area to the year in which the disturbance occurred. Stock estimates from the initial field inventory completed in 2013, are valid for 10 years (per VM0007). Table 3.1 shows the data and parameters monitored.

Table 3.1 Data and Parameters for Monitoring Deforestation and Natural Disturbance.

Parameter	Description	Units	Source/ Justification of Choice of Data or Description of Measurement Methods
$\Delta C_{P,Def,i,t}$	Net carbon stock change as a result of deforestation in the project case in the project area in stratum i at time t	t CO_2e	Calculated
$\Delta C_{P,DistPA,i,t}$	Net carbon stock change as a result of natural disturbance in the project case in the project area in stratum i at time t	t CO_2e	Calculated
$A_{DefPA,u,i,t}$	Area of recorded deforestation in the project area stratum i converted to land use u at time t	Ha	Monitored for each verification event
$A_{DistPA,q,i,t}$	Area impacted by natural disturbance in post-natural disturbance stratum q in stratum i, at	Ha	Monitored for each verification event

	time t		
$C_{BSL,i}$	Carbon stock in all pools in the baseline case in stratum i	t CO_2e ha^{-1}	Estimated from the forest carbon inventory
ARRL,forest,t	Remaining area of forest in RRL at time t	Ha	Updated prior to each verification event

Changes in forest cover ($A_{DefPA,u,i,t}$ and $A_{DistPA,q,i,t}$) will be monitored using data provided by the State of Acre. UCEGEO, the Central Unit of GIS and Remote Sensing within the Climate Change Institute (ICM) in Acre, produces an annual dataset on the extent and spatial location of all deforestation within the state using Landsat images. This dataset extends back to 1988. The definition of forest used in the classified dataset is in broad agreement with the Brazilian definition of a forest[4] as set by the Clean Development Mechanism Designated National Authority.

The UCGEO classification methodology includes atmospheric and geometric correction and uses a supervised classification approach. Landsat images with cloud cover covering less than 10% of a scene were downloaded and corrected for any atmospheric problems (using Carlotto HAZE algorithm) and geometric correction (using images Geocover 2000). Georeferencing was conducted with the nearest neighbor method, using a minimum of 20 points, and had an error (RMS) of less than 1 pixel. The image processing phase includes image segmentation (into statistically homogeneous areas) using the blue, green, and red Landsat bands. Then representative samples (training sites) of Forest, Non-Forest Water, Cloud and Cloud Shadow are selected using expert knowledge that are distributed throughout the image and represent the variability within each class. A supervised classification[5] approach was used with the Support Vector Machine (SVM) classification algorithm. All processing was implemented in ENVI + IDL 4.6 except georeferencing which was carried out using ERDAS IMAGINE 9.

Deforestation and natural disturbance may be distinguished using ancillary data which may include but is not limited to high resolution imagery, digital elevation models (to identify steep areas prone to landslides), information from local land managers, etc. For this monitoring period no ancillary data was required and all information on deforestation was acquired from the UCGEO classification. In the case, where this dataset ceases to be available, or if newer and/or higher quality data becomes available, ex-post deforestation will be determined by classification of remotely sensed imagery and land use change detection procedures.

The project area (and leakage belt boundary), as set in the PD, will serve as the initial “forest cover benchmark map” against which changes in forest cover will be assessed over the interval of the first

[4] The Clean Development Mechanism Designated National Authority in Brazil has set the forest definition as:
1. Minimum tree crown cover of 30 per cent;
2. Minimum land area of 1 hectare; and
3. Potential to reach a minimum tree height of 5 meters at maturity

See http://cdm.unfccc.int/DNA/ARDNA.html?CID=30, accessed March 5, 2012.

[5] There is no overlap between the accuracy assessment points and the data used for classification.

monitoring period; the entire project area has been demonstrated to meet the forest definition at the beginning of the crediting period. For subsequent monitoring periods, change in forest cover will be assessed against the preceding classified forest cover map marking the beginning of the monitoring interval. Thus, the forest benchmark map is updated at each monitoring event.

The area of remaining forest in the RRL (ARRL,forest,t) is derived by subtracting by the nonforested area within the RRL, as found in the forest benchmark map (updated at each monitoring event), from the total area of the RRL.

Monitoring Illegal Degradation

Emissions due to illegal logging will be tracked by conducting surveys in the surrounding areas every two years. Locations surveyed will include:

- Families residing on the Russas property adjacent to the project area; and
- Nearby ranches and rural properties, along the Jurua and Valparaiso Rivers and secondary roads approaching the project area.

Surveys will produce information on wood consumers (fuel wood and wood for construction and charcoal production) in the surroundings areas, as well as general indications on the areas where wood is sourced from and maximum depth of penetration of harvest activities from access points. In the event that any potential of illegal logging occurring in the project area is detected from the surveys (i.e. ≥ 10% of those interviewed/surveyed believe that degradation may be occurring within the project boundary), then an estimation of emissions associated with illegal logging will be produced from the survey data and the T-SIG tool applied. The information collected in the PRAs will be used to calculate logging emissions in conjunction with conservative assumptions/estimates including that all wood collected was live, use of a regional charcoal recovery rate, and use of a logging damage factor from the methodology.

In the event that the initial assessment indicated that illegal logging is occurring and significant in the area; the potential degradation area within the project area ($A_{DegW,i}$) will be delineated based on survey results, incorporating general area information and depth of penetration. Degradation monitoring plots will be allocated to achieve a 3% sample of this area. Rectangular plots 10 meters by 1 kilometer (1 ha area) will be randomly or systematically allocated in the area, sufficient to produce a 3% sample of the area, and any recently-cut stumps or other indications of illegal harvest will be noted and recorded. Diameter at breast height, or diameter at height of cut, whichever is lower, of cut stumps will be measured. Biomass will be estimated from measured diameters (conservatively assuming that diameters of stumps cut below breast height are equivalent to diameter at breast height) applying the allometric equations of Brown (1997) and otherwise maintain consistency with analytical procedures applied in the original forest inventory report. Emissions due to illegal logging ($\Delta C_{P,DegW,i,t}$) are estimated by multiplying area ($A_{DegW,i}$) by average biomass carbon of trees cut and removed per unit area ($C_{DegW,i,t}$ /AP_i).

The 3% sample will be carried out once every 5 years where initial surveys continue to indicate possibility of illegal logging in the project area to produce an estimate of emissions resulting from illegal logging ($\Delta C_{P,DegW,i}$). Estimates of emissions will be annualized (to produce estimates in t CO_2e per year) by dividing the emission for the monitoring interval by the number of years in the interval.

Table 3.2 Data and Parameters for Monitoring Illegal Degradation.

Parameter	Description	Units	Source/ Justification of Choice of Data or Description of Measurement Methods
$A_{DegW,i,t}$	Area potentially impacted by degradation processes in stratum i	Ha	Delineated based on survey results indicating general area of project potentially accessed and typical depth of penetration of illegal harvest activities from points of access
$C_{DegW,i,t}$	Biomass carbon of trees cut and removed through degradation process from plots measured in stratum i at time t	t CO_2e	Estimated from diameter measurements of cut stumps in sample plots
AP_i	Total area of degradation sample plots in stratum i	Ha	Calculated as 3% of $A_{DegW,i,t}$
$\Delta C_{P,DegW,i,t}$	Net carbon stock changes as a result of degradation in stratum i in the project area at time t	t CO_2e	Calculated

Monitoring Project Emissions

With project emissions are calculated as the sum of emission from fossil fuel combustion (EFC,i,t) + non-CO_2 emissions due to biomass burning (EBiomassBurn,i,t) + direct N_2O emissions as a result of nitrogen application (N2Odirect-N,i,t.). As stipulated in the methodology, fossil fuel combustion in all situations is an optional emission source. Further, no nitrogen is applied on alternative land uses in the with project case and hence project emissions therefore equal EBiomassBurn and are calculated using the VMD0013, “Estimation of greenhouse gas emissions from biomass burning (E-BB)” of the AD Partners modular REDD Methodology.

Non-CO_2 emissions from biomass burning in the project case include emissions from burning associated with deforestation and burning associate with natural disturbance, i.e. forest fire. It will be conservatively assumed that the total area burnt during the deforestation process is equal to the area deforested, ADefPA,u,i,t. Thus, the area used when calculating E-BB is equal to Aburn,i,t. (area burnt) = Aburn,q,i,t. (area burnt in natural disturbance) + ADefPA,u,i,t (area burnt via deforestation in project ex post).

Also, it is conservatively assumed that burning is a part of the forest conversion process in all incidents of deforestation taking place in the leakage belt. Thus, for deforested strata in the leakage belt, parameter $A_{burn,i,t}$ (Area burnt for stratum *i* at time *t*; ha) will be set equal to monitored parameter $A_{DefLB,i,t}$ (Area of recorded deforestation in the leakage belt at time t; ha). The T-SIG tool can then be applied, and if parameter $E_{BiomassBurn,t}$ (Greenhouse emissions due to biomass burning as part of deforestation activities in stratum *i* in year *t*) is determined to be insignificant, $E_{BiomassBurn,t}$, can be assumed equal to zero.

Table 3.3 Data and Parameters for Monitoring Emissions from Biomass Burning.

Parameter	**Description**	**Units**	**Source/ Justification of Choice of Data or Description of Measurement Methods**
E BiomassBurn,t	Greenhouse emissions due to biomass burning as part of deforestation activities in stratum i in year t	tCO_2e of each GHG (CH_4, N_2O)	Calculated
Aburn,i,t	Area burnt for stratum i at time t	Ha	Monitored for each verification event
Bi,t	Average aboveground biomass stock before burning stratum i, time t	tonnes d. m. ha-1	Conservatively assumed to be the carbon stock in all pools in the baseline case (CBSL,i).
COMF i	Combustion factor for stratum i; dimensionless	dimensionless	0.45 for primary open tropical forest. Derived from Table 2.6 of IPCC, 2006.
Gg,i	Emission factor for stratum i for gas g	kg t-1 dry matter burnt	GCH_4 = 6.8 g kg-1 and GN_2O = 0.2 g kg-1. Derived from Table 2.5 of IPCC, 2006.
GWPg	Global warming potential for gas g	t CO_2/t gas g	Default values from IPCC SAR: CH_4 = 21; N_2O = 310).

Monitoring Leakage

Leakage by local agents of deforestation is quantified in the leakage belt. The area deforested in the leakage belt (ADefLB,i,t) is estimated in the same manner as the area deforested in the with project case ($A_{DefPA,u,i,t}$) using the procedures outlined above in the monitoring deforestation section. Aburn,i,t is assumed to be equal to ADefLB,i,t unless monitoring and on the ground observations demonstrate otherwise. Activity shifting leakage within the leakage belt (ΔCLK-ASU-LB) is then calculated as the with project emissions in the leakage belt (ΔCP,LB) minus the baseline emissions in the leakage belt (ΔCBSL,LK,unplanned).

Table 3.4 Data and Parameters for Monitoring Activity Shifting Leakage.

Parameter	Description	Units	Source/ Justification of Choice of Data or Description of Measurement Methods
ΔCP,LB	Net greenhouse gas emissions within the leakage belt in the project case	t CO_2e	Calculated
ADefLB,i,t	Area of recorded deforestation in the leakage belt at time t	ha	Monitored for each verification event
$\Delta C_{P,Def,i,t}$	Net carbon stock change as a result of deforestation in the project case in the project area in stratum i at time t	t CO_2e	Calculated

Immigrant leakage is calculated using a series of equations found in the LK-ASU module. Most of the data for calculating immigrant leakage has been derived for the ex-ante estimates (including ΔCBSL,LK,unplanned; AVFOR; TOTFOR; PROTFOR; MANFOR; PROPLB; LBFOR; COLB; CLB; PROPCS; and ABSL,PA,unplanned,t) or gathered in the course of monitoring activity shifting leakage within the leakage belt and deforestation in the project area (including ADefPA; ADefLB,i,t; and ΔCP,LB).

The monitoring parameters MANFOR, PROTFOR, TOTFOR will be sourced from official data, peer reviewed publications or other verifiable sources, such as the Brazil Global Forest Resources Assessment Report published by the FAO and these monitoring parameters will be updated on review of current literature at least every 5 years. Demonstration that managed and protected forests will be protected against deforestation will further be demonstrated, as stipulated in the LK-ASU module.

Monitoring immigrant leakage will therefore consist of implementing surveys in communities living within 2 kilometers of the boundaries of the leakage belt and project area to determine what proportion of the agents of deforestation have been resident in and around the leakage belt and project area for ≥ 5 years (PROPRES) and the proportion of area deforested by population that has migrated into the area in the last 5 years (PROPIMM). As it is extremely sensitive to ask explicit questions regarding responsibility for deforestation, “the proportion of area deforested by population that has migrated into the area in the last 5 years” is assumed to be equal to the percentage of recent immigrants among local population with potential access to the project area (i.e. without directly asking if they are deforestation agents). Similarly, the “proportion of baseline deforestation caused by population that has been resident for ≥5 years” is assumed to be equal to the percentage of the local population residing in the area longer than 5 years with potential access to the project area.

Table 3.5 Data and Parameters for Monitoring Immigrant Leakage.

Parameter	Description	Units	Source/ Justification of Choice of Data or Description of Measurement Methods
PROPIMM	Proportion of area deforested by immigrant agents in the leakage belt and project area	proportion	Monitored prior to each verification event and at least every 5 years
PROPRES	Proportion of baseline deforestation caused by population that has been resident for ≥5 years	proportion	Monitored prior to each verification event and at least every 5 years
TOTFOR	Total available national forest area	ha	Monitored prior to each verification event and at least every 5 years
PROTFOR	Total area of fully protected forests nationally	ha	Monitored prior to each verification event and at least every 5 years
MANFOR	Total area of forests under active management nationally	ha	Monitored prior to each verification event and at least every 5 years

Updating Forest Carbon Stocks Estimates

Forest carbon stock estimates will be derived from field measurements less than or equal to 10 years old. Aboveground and belowground live tree and dead wood stocks will be re-assessed on or before 2023. For each stratum, where the re-measured estimate is within the 90% confidence interval of the t=0 estimate, the t=0 stock estimate takes precedence and is re-employed, and where the re-measured estimate is outside (i.e. greater than or less than) the 90% confidence interval of the t=0 estimate, the new stock estimate takes precedence and is used for the subsequent period.

Sample plots will be randomly located in areas within the Russas Project and measured following standard operating procedures located in Appendix B. Biomass will be estimated applying the following allometric equations and otherwise maintain consistency with analytical procedures applied in the original inventory (“Forest biomass carbon inventory for the Russas and Valparaiso Properties, Acre State, Brazil,” 2013). For live trees, biomass is calculated as a function of diameter at breast height (DBH; in cm) using the predictive model developed by Brown[6] for tropical moist forest stands. Application of the "moist" equation reflects the annual precipitation for the inventoried area, 2200mm.

aboveground biomass (kg) = ((42.69-12.8*(DBH)+1.242*(DBH)^2)) Equation 3.1

For palms, height and dbh (a conservative estimate of basal diameter) measurements are used to estimate the aboveground volume of a paraboloid and then mean (species level) Amazonian palm specific gravity of 0.31 g/cm3 estimated by Baker et al (2004) will be applied. The estimate of biomass for palms is therefore to be limited to the main trunk (bole) of the palm. Thus, for palms

aboveground biomass (Mg) = 0.5*Π*(basal diameter(cm)/200)^2*height(m)*0.31 Equation 3.2

Root biomass density is estimated at the cluster sample level applying the equation developed by Cairns et al.[7] , where

Root Biomass Density (t/ha) = EXP (-1.085 + 0.925 LN(aboveground biomass density)) Equation 3.3

The volume of lying dead wood per unit area is estimated using the equation (Warren and Olsen[8]) as modified by Van Wagner[9] separately for each dead wood density class:

$$V_{LDW} = \frac{\pi^2 * \left(\sum_{n=1}^{N} D_n^{\ 2} \right)}{8 * L}$$ Equation 3.4

where:

V_{LDW} Volume of lying dead wood per unit area; $m^3\ ha^{-1}$

D_n Diameter of piece n of dead wood along the transect; cm

N Total number of wood pieces intersecting the transect; dimensionless

L Length of the transect; m

Length of each transect was corrected for slope. The volumes per unit area of each dead wood density class are then multiplied by their respective densities to convert to a mass per unit area.

Biomass of standing dead wood is estimated using the allometric equation for live trees in the decomposition class 1. In decomposition class 2, the estimate of biomass was limited to the main trunk (bole) of the tree, in which case the biomass was calculated converting volume to biomass using dead wood density classes. Volume was estimated as the volume of a cone, as specified in the VM0007 module, "Estimation of carbon stocks in the dead wood pool".

[6]Brown, S., 1997. Estimating biomass and biomass change of tropical forests: A primer. FAO Forestry Paper: vii, 55 p.
[7] Cairns, M. A., S. Brown, E. H. Helmer, and G. A. Baumgardner. 1997. Root biomass allocation in the world's upland forests. Oecologia 111, 1-11.
[8] Warren, W.G. and Olsen, P.F. (1964) A line intersect technique for assessing logging waste. Forest Science 10: 267-276.
[9] Van Wagner, C.E. (1968). The line intersect method in forest fuel sampling. Forest Science 14: 20-26.

Density of dead wood is determined through sampling and laboratory analysis. Discs are collected in the field and decomposition class and green volume determined as per standard protocols (see Appendix B for more details). The resulting dry weight is recorded and used to calculate dead wood density as oven-dry weight (g) / green volume (cm^3) for each sample.

Dry mass is converted to carbon using the default carbon fraction of 0.47 t C/t d.m. (as recommended by IPCC[10] Guidelines for National Greenhouse Gas Inventories).

Revision of the Baseline

The baseline as outlined in the Project Description is valid for 10 years, through March 16, 2021. The baseline will be revised every 10 years from the project start date.

Data collection procedures in regards to revision of the baseline will include participatory rural appraisals, interviews and collaboration with the Acre State government, UCEGEO, the GIS department within the Climate Change Institute, and municipal officials. In the case, where the Acre State government no longer produces the annual dataset on the extent and spatial location of all deforestation within the state, deforestation maps will be prepared by classifying remotely sensed imagery. Other datasets used to substantiate aspects of the baseline with be from official government sources, peer reviewed publications, or other reputable sources.

Quality Assurance/Quality Control and Data Archiving Procedures

<u>Monitoring Deforestation, Natural Disturbance, and Leakage</u>

To ensure consistency and quality results, spatial analysts carrying out the imagery processing, interpretation, and change detection procedures will strictly adhere to best practices and good practice guidelines, when using the alternative method for quantifying deforestation. All data sources and analytical procedures will be documented and archived (detailed under data archiving below).

Accuracy of the classification, for both the baseline and monitoring, will be assessed by comparing the classification with ground-truth points or samples of high resolution imagery. Any data collected from ground-truth points will be recorded (including GPS coordinates, identified land-use class, and supporting photographic evidence) and archived. Any sample points of high resolution imagery used to assess classification accuracy will also be archived. Samples used to assess classification accuracy should be well-distributed throughout the project area (as far as is possible considering availability of high resolution imagery and/or logistics of acquiring ground-truth data), with a minimum sampling intensity of 50 points each for the forest and non-forest classes.

The classification will only be used in the forest cover change detection step if the overall classification accuracy, calculated as the total number of correct samples / the total number of samples, is equal to or exceeds 90%.

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[10] IPCC 2006 Guidelines for National Greenhouse Gas Inventories. Chapter 4 AFOLU (Agriculture, Forestry and Other Land-use).

All data sources and processing, classification and change detection procedures will be documented and stored in a dedicated long-term electronic archive.

Information related to monitoring deforestation maintained in the archive will include:

- Forest / non-forest maps;
- Documentation of software type and procedures applied (including all pre-processing steps and corrections, spectral bands used in final classifications (the blue, green, and red Landsat bands), and classification methodologies and algorithms applied), if applicable; and
- Data used in accuracy assessment - ground-truth points (including GPS coordinates, identified land-use class, and supporting photographic evidence) and/or sample points of high resolution imagery.

Forest Carbon Stocks and Degradation

The following steps will be taken to control for errors in field sampling and data analysis:

1. Trained field crews will carry out all field data collection and adhere to standard operating procedures. Pilot sample plots shall be measured before the initiation of formal measurements to appraise field crews and identify and correct any errors in field measurements. Field crew leaders will be responsible for ensuring that field protocols are followed to ensure accurate and consistent measurements. To ensure accurate measurements, the height of diameter at breast height (1.3 m) will be periodically re-assessed by personnel during the course of the inventory.
2. An opportunistic sample of plots will be re-measured to identify and correct any field measurement issues which arise during implementation of the monitoring plan and to assess measurement errors. Re-measurement for this purpose will be done by different field personnel.
3. Field measurement data will be recorded on standard field data sheets and entered into an excel database for data management and quality control. Potential errors in data entry (anomalous values) will be verified or corrected consulting the original data sheets or personnel involved in measurement. Original data sheets will be permanently archived in a dedicated long-term electronic archive. The electronic database will also archive GIS coverages detailing forest and strata boundaries and plot locations.

Quality control procedures for sampling degradation will include steps 1 and step 3, above.

Quality control procedures related to monitoring leakage include conducting a review of the current literature at least every 5 years to source information on the area of the monitoring parameters MANFOR, PROTFOR, and TOTFOR. Further, participatory rural appraisals used to assess the length of time people have been living in the project area and leakage belt will be implemented by personnel with experience conducting community surveys in rural Brazil.

Personnel involved in the revising of the baseline will have detailed knowledge in regards to spatial modeling and land use change and deep familiarity with REDD methodologies. Remote sensing data used will include officially published dataset, or classified imagery, which meets accuracy assessment requirements as laid out in the methodology.

All measurement and monitoring equipment requiring calibration will be calibrated according to the equipment's specifications and/or relevant national or international standards.

Data Archiving

Data archived will be maintained through at least two years beyond the end of the project crediting period. All project records are secure and retrievable. This includes project documents saved on the desktop of CarbonCo’s Project Director and stored in the Director’s file cabinets (based in Silver Spring, Maryland). An identical version of the project documents are remotely saved on an external hard drive and in the cloud via DropBox. Furthermore, many project documents (e.g., VCS Project Description, Monitoring Reports, CCBS Project Design Document, Project Implementation Reports, Validation and Verification Reports, etc.) are publicly available and stored on both the Standards’ website and on the Markit Environmental Registry. Given the extended time frame and the pace of production of updated versions of software and new hardware for storing data, electronic files will be updated periodically or converted to a format accessible to future software applications, as needed.

Organization, Responsibilities, and Monitoring Frequency

For all aspects of project monitoring, Russas Project staff will ensure that data collection, processing, analysis, management and archiving are conducted in accordance with the monitoring plan.

Table 3.6. Type of Monitoring and Party Responsible for Monitoring.

Variables to be monitored	**Responsible**	**Frequency**
Monitoring deforestation and natural disturbance	I.S.R.C.	Prior to each verification
Monitoring illegal degradation	I.S.R.C.	Every two years
Monitoring project emissions	CarbonCo	Prior to each verification
Activity shifting immigrant leakage assessment	I.S.R.C.	Prior to each verification event and at least every 5 years.
Updating forest carbon stocks estimates	CarbonCo	At least every 10 years.
Revision of the baseline	CarbonCo	At least every 10 years.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions for the project activities, for project years 2012 to 2013, are found in Table 4.1 below (derived from Section 3.1 of the VCS PD)

Table 4.1. Baseline emissions in the project area and leakage belt.

Year	ΔCBSL,PA,unplanned (tCO2-e)	ΔCBSL,LK,unplanned (tCO2-e)
2012	34,205	35,152
2013	190,685	237,009

4.2 Project Emissions

Project emissions are estimated by applying module M-MON (VMD0015, Version 2.0) of Methodology VM0007. Equation 4.1 is used to calculate ex-post project emissions, along with parameters listed in Table 4.2.

Equation 4.1. Equation for calculating the net GHG emissions within the project area under the project scenario.

$$\Delta C_P = \sum_{t=1}^{t*} \sum_{i=1}^{M} \left(\Delta C_{P,DefPA,i,t} + \Delta C_{P,Deg,i,t} + \Delta C_{P,DistPA,i,t} + GHG_{P-E,i,t} - \Delta C_{P,Enh,i,t} \right)$$

Table 4.2. Parameters used to calculate ex-post project emissions.

Parameter	Description
ΔC_P	Net greenhouse gas emissions within the project area under the project scenario; t CO_2e
$\Delta C_{P,DefPA,i,t}$	Net carbon stock change as a result of deforestation in the project area in the project case in stratum i at time t; t CO_2e
$\Delta C_{P,Deg,i,t}$	Net carbon stock change as a result of degradation in the project area in the project case in stratum i at time t; t CO_2e
$\Delta C_{P,DistPA,i,t}$	Net carbon stock change as a result of natural disturbance in the project area in the project case in stratum i at time t; t CO_2e
$GHG_{P-E,i,t}$	Greenhouse gas emissions as a result of deforestation and degradation activities within the project area in the project case in stratum i in year t; t CO_2e
$\Delta C_{P,Enh,i,t}$	Net carbon stock change as a result of forest growth and sequestration during the project in areas projected to be deforested in the baseline in stratum i at time t; t CO_2e

Deforestation

Emissions resulting from deforestation in the with-project case ($\Delta CP,DefPA,i,t$) are calculated as the area of deforestation (ADefPA,u,i,t) multiplied by the net change in carbon stocks. All parameters in Table 4.3 are sourced from Section 3.1 and 3.2 of this report. The area deforested was derived from the 2013 Acre deforestation dataset (see Section 5 Additional Information, below) combined with the original strata map. CBSL and Cpost values were those derived in the original forest inventory and the project document, respectively.

While deforestation decreased relative to the baseline case, a total of 79.4 ha were still deforested over this monitoring period. Upon discovering deforestation, the local project manager Marmude would talk to the communities about the importance of stopping deforestation in order for the implementation of social projects and programs.

Table 4.3 Net carbon stock change (t CO2-e) as a result of deforestation in the project area (ΔCP,DefPA,i,t).

Year	FAB + FAP ADefPA,u,i,t (ha)	FAB + FAP CBSL,i (t CO2-e/ha)	FAP ADef PA,u,i ,t (ha)	FAP CBSL, i (t CO2-e/ha)	FAP-alluvial ADefPA, u,i,t (ha)	FAP-alluvial CBSL,i (t CO2-e/ha)	FAP + FAB + FD or FAP + FD + FAB ADefPA,u, i,t (ha)	FAP + FAB + FD or FAP + FD + FAB CBSL,i (t CO2-e/ha)	FAP + FD or FD + FAP ADefPA,u, i,t (ha)	FAP + FD or FD + FAP CBSL,i (t CO2-e/ha)	Cpost (t CO2-e ha-1)	ΔCP,DefP A,i,t (t CO2-e)
2012	0.7	441.9	28.1	458.1	11.7	370.5	0.4	482.1	9.7	389.5	0.0	21,448
2013	0.0	441.9	15.4	458.1	3.2	370.5	0.0	482.1	10.4	389.5	0.0	12,265

Degradation

Net carbon stock change accounted as a result of degradation in the project area ($\Delta C_{P,Deg,i,t}$) are limited to emissions resulting from degradation due to illegal logging (ΔCP,DegW) as no commercial logging occurs in either the baseline or with-project case (i.e., ΔCP,SelLog,i,t is equal to zero).

While no acts of illegal logging were identified by forest monitors, degradation surveys were conducted in the project and surrounding area in April 2014 by CarbonCo and Carbon Securities. Fifteen households were surveyed included families residing in the project area and in nearby ranches and rural properties located in the leakage belt, representing a 43% sample of all households potentially reliant on the project area for wood use (total number of persons reliant = 190, average # persons per household = 5.3, estimated number of households = 35; data from March 2013 PRA).

Surveys produced information on wood consumers (fuel wood and wood for construction and charcoal production) in the surroundings areas, as well as general indications on practices and areas where wood is sourced from.

Surveys confirmed that no sampled households collected wood for charcoal production. Reliance on fuelwood collection from the project area is lessened by the fact that some respondents (3/15, 20%) reported that they use gas instead of wood as a fuel source, and that the majority of respondents (9/15, 60%) reported that they collected some amount of fuelwood consumed from pasture/grassland areas (not from the forest). It was estimated that 300 solid cubic meters of fuelwood were extracted annually from 2012-2013 in the project area (bulk volumes reported were converted to solid volumes using a 0.65 conversion rate of solid volume of fuelwood to bulk volume, per FAO[11], p24) – this conservatively assumes that all fuelwood consumption reported was sourced from within the project area forests; see supporting survey results and analysis in “2012_2013_RussasDegradation 2014.12.16.xls”.

Respondents reported that they also extracted timber from forests in the project area, although two out of 15 (13%) respondents reported that they only bought timber and did not cut it themselves. It was estimated that 280 solid cubic meters of timber were extracted annually from 2012-2013 in the project area – this conservatively assumes that all timber extraction reported was sourced from within the project area forests; see supporting survey results and analysis in “2012_2013_RussasDegradation 2014.12.16.xls”.

As the surveys reported above indicated that some level of logging is occurring in accessible areas within the project area, analysis proceeded to estimate emissions associated with illegal logging and apply the T-SIG tool.

Emissions from illegal logging were estimated from information collected in the survey, incorporating the following conservative assumptions:

- all wood used for fuelwood is live; and
- all reported volumes were collected from within project area.

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[11] FAO. 2004. UNIFIED BIOENERGY TERMINOLOGY - UBET. Food and Agricultural Organization of the United Nations. Rome, Italy.

Emissions were calculated referencing extracted solid wood volumes derived from the survey results (reported above), and applying mean live wood density of 0.62 g/cm^3 (= species level mean wood density for Amazonian forests calculated by Baker et al 2004 and subsequently validated for western Amazonia by Anderson et al 2009) and a logging damage factor (LDF) of 0.67 t C/m^3 stem volume harvested (for harvested timber), accounting for emissions associated with non-commercial portions of aboveground biomass and collateral damage, referenced VM7 module M-MON.

Estimated emissions from degradation were very small due to the low population pressures and insignificant amounts of fuelwood and timber collected. Degradation emissions over the two year monitoring period from 2012-2013 (2,619 t CO_2) are *de minimis*, representing less than 5% of net GHG benefits generated during the same monitoring period , and consequently are not accounted for.

Natural Disturbance

No areas of natural disturbance were reported in the project area during the 2012-2013 period by forest monitors or local land managers, nor was evident or could be distinguished (from anthropogenic deforestation, accounted for above) with remote sensing, and therefore $A_{DistPA,q,i,t}$ is assumed to be 0. As there is no ground based evidence of natural disturbance, net carbon stock changes resulting from natural disturbance in the project area in the project case are reported to be zero (i.e., $\Delta C_{P,DistPA,i,t} = 0$).

GHG Emissions

As forest monitors reported evidence of fire on recently cleared land, N_2O and CH_4 emissions from biomass burning have been accounted for. Using parameters found in Section 3.1 and 3.2 and Table 3.3, emissions from biomass burning (EBB) were calculated as the product of the area burned, the aboveground carbon stocks, a combustion factor, a GHG emission factor, and the global warming potential. It was conservatively assumed that Aburn,i,t = ADefPA,u,i,t (i.e., all areas deforested in the project area were burnt).

Table 4.4. Calculation of N2O emissions resulting from burning.

Year	FAB + FAP Aburn ,i,t (ha)	FAB + FAP B,i,t (t d.m./ha)	FAP Aburn,i ,t (ha)	FAP B,i,t (t d.m./ha)	FAP-alluvial Aburn,i ,t (ha)	FAP-alluvial B,i,t (t d.m./ha)	FAP + FAB + FD or FAP + FD + FAB Aburn,i ,t (ha)	FAP + FAB + FD or FAP + FD + FAB B,i,t (t d.m./ha)	FAP + FD or FD + FAP Aburn,i ,t (ha)	FAP + FD or FD + FAP B,i,t (t d.m./ha)	COMF	G,N20 (kg/t d.m. burnt)	GWP,N20 (t CO2/t gas g)	E-N2O BiomassBurn (tCO2e)
2012	0.7	211	28.1	217.7	11.7	176.3	0.4	229.7	9.7	185.6	0.45	0.2	310	284.6
2013	0	211	15.4	217.7	3.2	176.3	0	229.7	10.4	185.6	0.45	0.2	310	162.8

Table 4.5. Calculation of CH4 emissions resulting from burning.

Year	FAB + FAP Aburn ,i,t (ha)	FAB + FAP B,i,t (t d.m./ha)	FAP Aburn,i ,t (ha)	FAP B,i,t (t d.m./ha)	FAP-alluvial Aburn,i ,t (ha)	FAP-alluvial B,i,t (t d.m./ha)	FAP + FAB + FD or FAP + FD + FAB Aburn,i ,t (ha)	FAP + FAB + FD or FAP + FD + FAB B,i,t (t d.m./ha)	FAP + FD or FD + FAP Aburn,i ,t (ha)	FAP + FD or FD + FAP B,i,t (t d.m./ha)	COMF	G,CH4 (kg/t d.m. burnt)	GWP,CH4 (t CO2/t gas g)	E-CH4 BiomassBurn (tCO2e)
2012	0.7	211	28.1	217.7	11.7	176.3	0.4	229.7	9.7	185.6	0.45	6.8	21	655.5
2013	0	211	15.4	217.7	3.2	176.3	0	229.7	10.4	185.6	0.45	6.8	21	374.9

Table 4.6. Calculation of E BiomassBurning in the project area.

Year	E-N2O BiomassBurn (tCO2e)	E-CH4 BiomassBurn (tCO2e)	E-BiomassBurn (tCO2e)	GHGP-E,i,t (t CO2-e)
2012	285	656	940	940
2013	163	375	538	538

As justified in Section 3.3, total project GHG emissions (GHGP) equal emissions from biomass burning (EBB), as other potential sources are equal to zero.

Forest growth and sequestration

As stated in the project document, it is conservative to exclude forest growth and sequestration during the project, hence the parameter $\Delta C_{P,Enh,i,t}$ has been set to zero.

Net project emissions

Net emissions within the project area calculated in Table 4.7.

Table 4.7. Net project emission within the project area, ΔCP (t CO2-e).

Year	ΔCP,DefPA,i,t (t CO2-e)	ΔCP,Deg,i,t (t CO2-e)	ΔCP,DistPA,i,t (t CO2-e)	GHGP-E,i,t (t CO2-e)	ΔCP,Enh,i,t (t CO2-e)	ΔCP (t CO2-e)
2012	21,448	0	0	940	0	22,388
2013	12,265	0	0	538	0	12,802

4.3 Leakage

Leakage emissions from displacement of unplanned deforestation are estimated in conformance with the VCS modular REDD methodology VM0007, specifically the LK-ASU module. This module provides for accounting for activity shifting leakage resulting from both local and immigrant deforestation agents.

Activity shifting from local agents in the leakage belt was tracked by monitoring deforestation and stock changes in the leakage belt. Emissions were calculated as the difference between stocks before and after deforestation, as for project emissions. Emissions due to biomass burning were also calculated as per the procedures in the E-BB module. As justified in Section 3.3, total project GHG emissions (GHGP) equal emissions from biomass burning (EBB) as other sources are equal to zero. The area deforested was derived from the 2013 Acre deforestation dataset combined with the original strata map. CBSL and Cpost values were those derived in the original forest inventory and the project document, respectively.

The net greenhouse gas emission in the project case for the leakage belt, parameter *ΔCP,LB*, is equal to the sum of stock changes dues to deforestation through 2013, equal to 104,532 t CO2e. Estimated baseline annual emissions in the leakage belt from 2012 through 2013 were 272,161 t CO2e. Emissions from deforestation in the leakage belt were less than the projected emissions from deforestation in the leakage belt in 2013, but higher than projected emissions in 2012, and thus an estimate of 30,280 t CO2e were emitted in the leakage belt area.

Table 4.8a. Calculation of E BiomassBurning in the leakage belt.

Year	E-N2O BiomassBurn (tCO2e)	E-CH4 BiomassBurn (tCO2e)	E-BiomassBurn (tCO2e)	GHGP-E,i,t (t CO2-e)
2012	832.9	1,918.4	2,751.3	2,751.3
2013	498.0	1,147.0	1,645.0	1,645.0

Table 4.8b. Area (ha) deforested in the leakage belt (ADefLB,u,i,t) and resulting emissions ΔCP,DefLB,i,t (t CO2e).

Year	FAB + FAP ADefLB,u,i,t (ha)	FAB + FAP CBSL,i (t CO2-e/ha)	FAP ADefLB,u,i,t (ha)	FAP CBSL,i (t CO2-e/ha)	FAP-alluvial ADefLB,u,i,t (ha)	FAP-alluvial CBSL,i (t CO2-e/ha)	FAB -Aluvial (ha)	FAB - Aluvial CBSL,i (t CO2-e/ha)	FAP + FD or FD + FAP ADefLB,u,i,t (ha)	FAP + FD or FD + FAP CBSL,i (t CO2-e/ha)	Cpost (t CO2-e ha-1)	E-Biomass Burning LB (tCO2e)	ΔCP,LB (t CO2-e)	ΔCBSL,LK,unplanned (t CO2-e)	ΔCLK-ASU-LB (t CO2-e)
2012	7.5	441.9	4.0	458.1	53.9	370.5	22.4	424.4	72.0	389.5	0	2751.3	65,431	35,152	30,280
2013	16.9	441.9	0.0	458.1	17.9	370.5	9.8	424.4	49.4	389.5	0	1645.0	39,100	237,009	0

Activity shifting leakage outside the leakage belt was tracked by monitoring deforestation in the project area ($A_{DefPA,i,t}$) and leakage belt ($A_{DefLB,i,t}$). The area deforested by immigrants outside the Leakage Belt and project area under the project scenario (ALK-OLB) is then calculated as the difference between the total area deforested by immigrant agents in the baseline scenario in the project area (ALK-IMM,t) and the area deforested by immigrants in the project area and Leakage Belt under the project scenario (ALK-ACT-IMM,t). This area (ALK-OLB in Table 4.9) is then multiplied by the difference between stocks before and after deforestation outside the leakage belt to yield the estimate of emissions due to activity shifting immigrant leakage ΔCLK-ASU,OLB.

Table 4.9. Emissions calculations for activity shifting immigrant leakage outside the leakage belt

Year	PROPIMM	ABSL,PA,unplanned,t (ha)	ALK-IMM,t (ha)	ADefPA,i,t (ha)	ADefLB,i,t (ha)	ALK-ACT-IMM,t (ha)	ALK-OLB,t (ha)	COLB (t CO2-e ha-1)	Cpost (t CO2-e ha-1)	ΔCLK-ASU,OLB (t CO2-e)
2012	0.000	116.9	0.0	50.5	159.8	0.0	0.0	458.0	0	0
2013	0.000	632.3	0.0	28.9	93.9	0.0	0.0	458.0	0	0

Total leakage (30,280 t CO2-e) is then calculated as the sum of activity shifting leakage resulting from both local and immigrant (Table 4.10). GHG emissions from leakage mitigation activities (GHGLK) equal zero as none of the mitigation activities involve biomass burning or fertilizer usage.

Table 4.10. Estimation of total leakage due to the displacement of unplanned deforestation

Year	ΔCLK-ASU-OLB (t CO2-e)	ΔCLK-ASU-LB (t CO2-e)	GHGLK, E (t CO2-e)	ΔCLK-AS,unplanned (t CO2-e)
2012	0	30,280	0	30,280
2013	0	0	0	0

4.4 Net GHG Emission Reductions and Removals

Uncertainty in baseline carbon stock estimates, GHG emission estimates, and baseline deforestation projections were calculated applying the VM007 module X-UNC.

As stated in the methodology, “it is here assumed that there is zero uncertainty in baseline rate of deforestation or degradation where numbers are equal to a long-term average (BL-UP)”, hence uncertainty associated with the baseline deforestation projections are equal to zero.

As GHG emission sources in the baseline are conservatively assumed to be zero, uncertainty surrounding this estimate is also considered to be zero.

Uncertainty is therefore limited to the baseline carbon stock as determined by the Russas Project forest carbon inventory[12]. Overall, the inventory produced an estimate of biomass carbon stocks at the project level of 118.7 t C/ha (or 435.1 tCO2/ha) with a precision level of +/- 9.7% of the mean at the 95% confidence level.

As stated in the uncertainty module “where no ex post (re-)measurements of carbon pools or GHG sources have been made, i.e. uncertainty from these sources is already included in UncertaintyBSL,t*, cumulative project uncertainty through time t is therefore equal to uncertainty in baseline estimates.” As no ex post measurements of carbon pools or GHG sources have occurred, parameters related to calculating uncertainty in the with-project scenario, including EP,SS,i, Pool# and UP,SS,i,pool#, have not been included in the project.

As the precision surrounding estimates of forest carbon stocks, 9.7% of the mean (at the 95% confidence level) are less than precision requirements of the methodology, +/- 15% of the mean (at a 95% confidence level), no uncertainty deduction was warranted or applied.

Estimates of GHG credits eligible for issuance as VCUs were calculated in Table 4.11, below; where

Estimated GHG emission reduction credits =

Baseline emissions, fixed for 10 years at validation *minus*

Project emissions *minus*

Leakage *minus*

[12] Forest biomass carbon inventory for the Russas and Valparaiso Properties, Acre State, Brazil,” 2013.

Non-permanence Risk Buffer withholding (calculated as a percent of net change in carbon stocks prior to deduction of leakage)

Table 4.11. Estimate of Net Emission Reduction Credits. Values in this table have been rounded to the nearest whole number.

Years	Estimated baseline emissions or removals (tCO_{2e})	Estimated project emissions or removals (tCO_{2e})	Estimated leakage emissions (tCO_{2e})	Risk buffer (%)	Deductions for AFOLU pooled buffer account (tCO2e)	GHG credits eligible for issuance as VCUs (tCO_{2e})
2012	34,205	22,388	30,280	10%	1,182	-19,644
2013	190,685	12,802	0	10%	17,788	160,094
Total						140,450

5 ADDITIONAL INFORMATION

Deforestation Data

Monitoring results reported here used classified 2013 satellite imagery produced by UCEGEO[13], the GIS department within the Climate Change Institute, Acre State government, which produces an annual dataset on the extent and spatial location of all deforestation within the state. This dataset is based on classification of a series of Landsat imagery. Each image selected for classification contains less than 10% cloud cover. This is followed by processing of the images by applying the filter HAZE. This algorithm was developed by Carlotto[14] and aims to improve visibility by reducing the effect of atmospheric haze and smoke. This algorithm was applied using the software ENVI, version 4.6. This step was followed by geometric correction using base the NASA GeoCover 2000 product as the base data. ENVI + IDL, version 4.6 were used to group multispectral bands (the blue, green, and red Landsat bands), while ERDAS IMAGINE 9.1 software was used for georeferencing. The RMS error of the georeferenced product was < 1 pixel, meeting good practice standards in remote sensing. Additional details on pre-processing can be found in the UCEGEO methodology[15].

As mentioned in the monitoring plan, changes in forest cover were determined using the 2013 Acre deforestation database provided UCEGEO. Figure 5.1 shows the area of deforestation in the project area and leakage belt for this monitoring period. Figure 5.2 shows the 2013 forest benchmark map (covering both the project area and leakage belt) which was produced using the aforementioned deforestation dataset.

The deforestation in the project area and leakage belt is derived by subtracting the non-forested area at the time of the project start from the non-forested area at the end of 2013. The initial forest benchmark map at the time of the project start date referenced 2010 land cover data, which was the latest data available from UCEGEO at the time of the project start date.

[13] Note that the original dataset provided was corrected so the dataset included all 2012 data.
[14] CARLOTTO, M. J. Reducing the effects of space-varying wavelength-dependent scattering in multispectral imagery. International Journal of Remote Sensing, v. 20, n. 17, p. 3333-3344, 1999.
[15] ACRE - Governo do Estado do Acre (no prelo). REVISÃO DA DINÂMICA DO DESMATAMENTO NO ESTADO DO ACRE: ANÁLISE TEMPORAL DE 23 ANOS (PERÍODO DE 1988 A 2010). Rio Branco: (UCEGEO - FUNTAC/SEMA), 2011.

Figure 5.1. Map of the 2012 and 2013 deforestation in the project area and leakage belt.

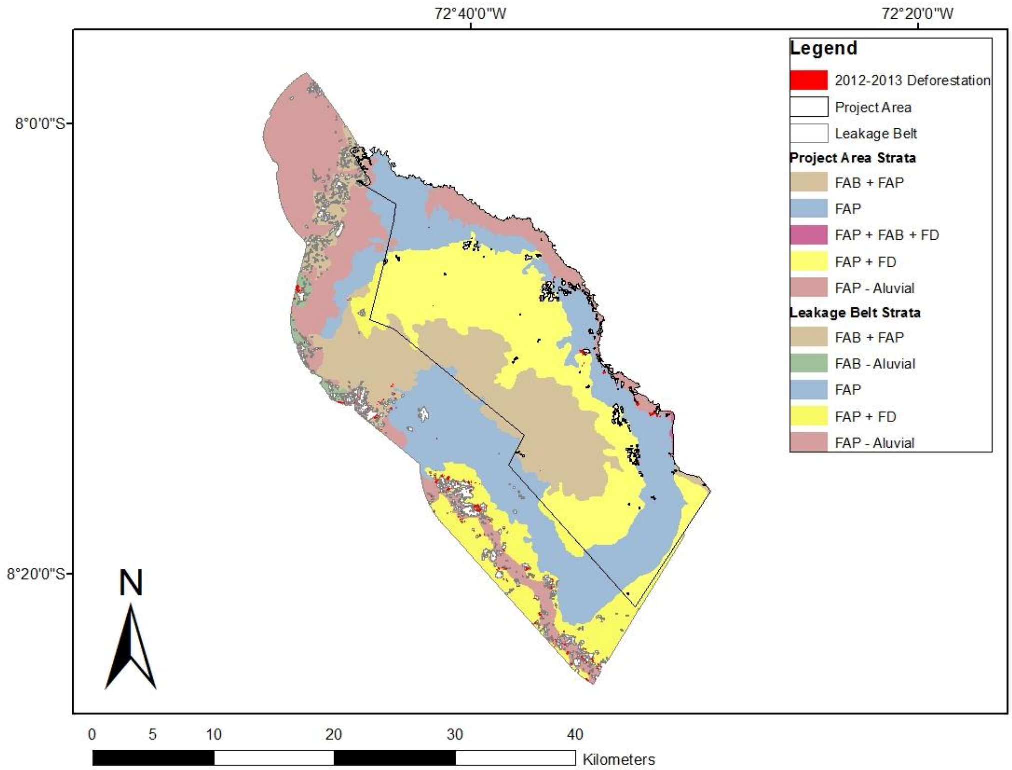
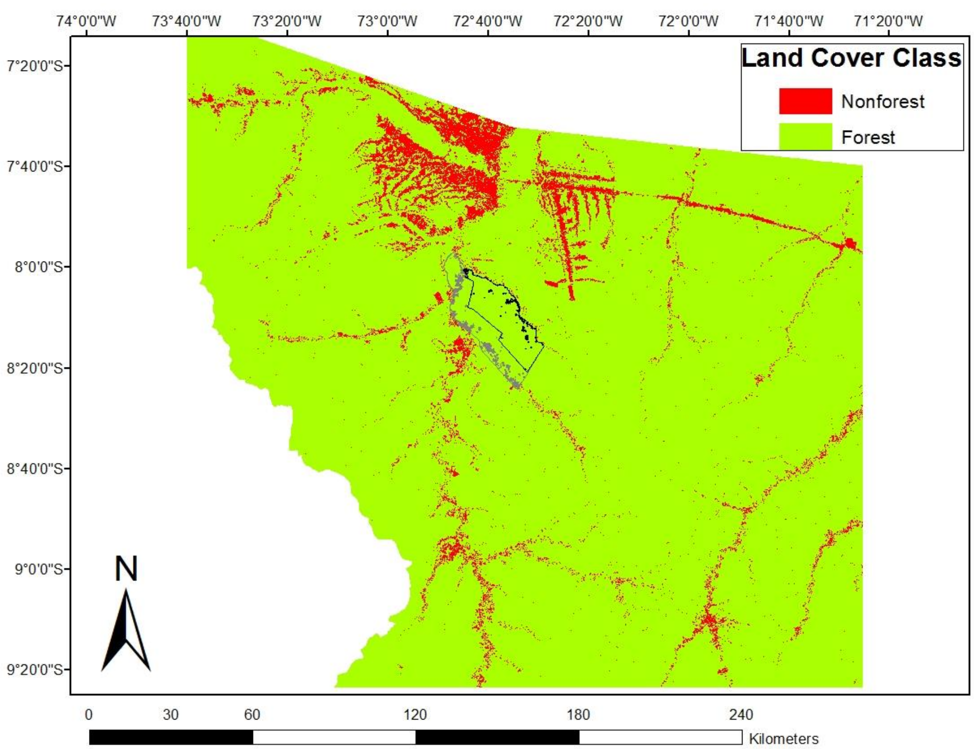


Figure 5.2. 2013 forest benchmark map for the project area and leakage belt.



Accuracy Assessment

Accuracy of the most recent UCGEO data set (including data on deforestation through 2013) was assessed by comparing the classification with ground truth points collected using high-resolution imagery (e.g. Digital Globe, Quickbird). The Quickbird satellite collects multispectral imagery at 2.4 and 2.8 meter resolutions. Sample points of high resolution imagery used to assess classification accuracy were recorded and archived (including sample and line points, and identified land-use class). Samples used to assess classification accuracy were well-distributed throughout the project area (as far as is possible considering availability of high resolution imagery and/or logistics of acquiring ground truth data). All samples were collected from imagery acquired between 2011-2013 and hence the accuracy assessment is relevant through 2013. This range was necessary to collect sufficient data points with good distribution. Figure 5.3 below shows the distribution of these points. All verification samples gathered from high-resolution imagery are from images as close as possible to classification date.

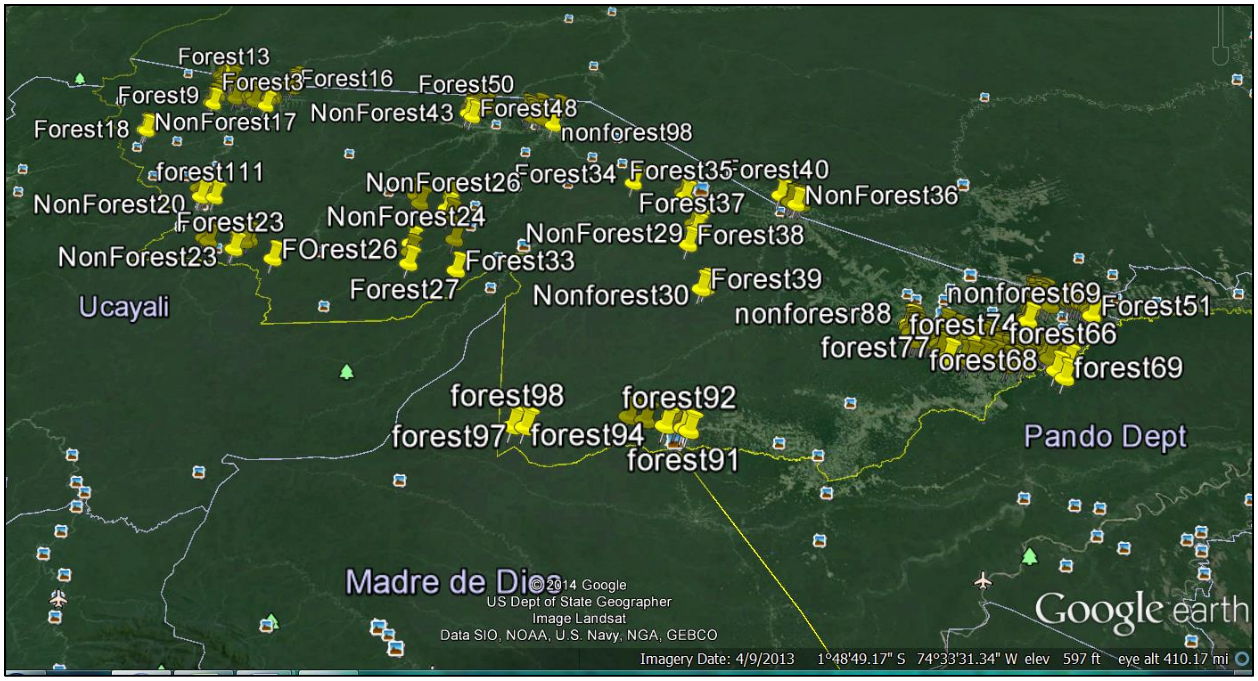
Results of the accuracy assessment are presented and analyzed in a matrix below, such that the following errors are presented:

- Classification accuracy
- Error of omission of each land-use category (forest and non-forest)
- Error of commission of each land-use category (forest and non-forest)

Land-use class as determined from ground-truth points	Classification		Total	Accuracy (%) *User's accuracy (# correct/ row total)*	Error of Commission (%)
	Forest	Non-forest			
Forest (100)	96	4	100	96	4
Non-forest (100)	0	100	100	100	0
Total	96	104	200		
Accuracy (%) ***Producer's accuracy (# correct/ column total)***	100	96			
Error of Omission (%)	4.0	4.0			

The classification will only be used in the forest cover change detection step if the overall classification accuracy, calculated as the total number of correct samples/ the total number of samples, is equal to or exceeds 90%. The accuracy of the 2013 classification meets this criteria with overall accuracy of 98% (196 correct out of 200 validation points).

Figure 5.3. Distribution of accuracy assessment points across Acre state



APPENDICES

APPENDIX A. VCS NON-PERMANENCE RISK REPORT

A1.0 INTRODUCTION

The risk analysis has been conducted in accordance with the VCS AFOLU Non-Permanence Risk Tool, dated 04 October 2012, version 3.2. This tool assesses a project's internal risk, external risk, natural risk and mitigation measures which help to reduce risk. The risk ratings and supporting evidence are detailed in Section A1.1, A1.2, and A1.3, below. Letters in the risk factor column correspond to the risk factor explained in the VCS AFOLU Non-Permanence Risk Tool.

A1.1 INTERNAL RISKS

Project Management		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Not applicable. Tree planting is not a project activity for which GHG credits will be issued.	0
b)	Ongoing enforcement is required to prevent encroachment by outside actors. The Russas Project employs forest patrols to prevent encroachment by outside actors into the project area.	2
c)	Management team does not include individuals with significant experience in all skills necessary to successfully undertake all project activities.	2
d)	Local management partners are based in Cruzeiro do Sul less than a day's travel from the project activity. There is a project manager living on the property and a project headquarters is being established on the property.	0
e)	Project proponents have developed other forest carbon projects and have been working in the forest carbon arena for over 5 years. Brian McFarland of CarbonCo has developed the "Tensas River National Wildlife Refuge Afforestation Project" and the "Purus Project" under the VCS and the CCBS including managing the project design, implementation, and financing. The project proponents work alongside and have access to experts in carbon accounting and reporting (i.e., TerraCarbon) who have significant experience in all aspects of AFOLU project design and implementation, carbon accounting and reporting under the VCS Program. TerraCarbon has successfully validated and verified numerous projects under the VCS, including validation and verification of the VCS ARR project "Reforestation Across the Lower Mississippi Valley"	-2
f)	There is no adaptive management plan in place.	0
Total Project Management (PM) [as applicable, (a + b + c + d + e + f)] Total may be less than zero.		**2**

Financial Viability		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a-d)	Project cash flow breakeven point is 4 years or less from the current risk assessment. Details are provided in a cash flow analysis which can be found in the project database.	0
e-h)	Project has secured 100% of funding needed to cover the total cash out before the project reaches breakeven. Details are provided in a cash flow analysis which can be found in the project database.	0
i)	Project has available at least 50% of the total cash out before project reaches breakeven. Project proponents are utilizing internal, non-restricted funds as evidenced in the project database.	-2
Total Financial Viability (FV) [as applicable, ((a, b, c or d) + (e, f, g or h) + i)] Total may not be less than zero.		0

Opportunity Cost		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a	As the majority of baseline activities over the length of the project crediting period are subsistence-driven, an NPV analysis is not required. This risk category will be revised downward, once net positive community impacts can be clearly demonstrated, such as through certification against the Climate, Community & Biodiversity Standards or results of a participatory assessment of the project activities on the local communities which demonstrates net positive community benefits.	8
b-d)	Not applicable.	0
e-f)	Not applicable.	0
g)	None of the project proponents are a non-profit organization.	0
h-i)	There is a legal contractual agreement to maintain the project area as forest for at least a 60 year period (i.e. greater than the length of the crediting period) from the project start date.	-2
Total Opportunity Cost (OC) [as applicable, (a, b, c, d, e or f) + (g or h)] Total may not be less than 0.		**6**

Project Longevity		
a)	Not applicable.	0
b)	There is a legal contractual agreement to maintain the project activities and maintain the project area as forest for at least a 60 year period from the project start date.	0

	The landowners of the property are under contractual obligations[16] which limit their development/use of the property, as stated below. “The landowner acknowledges and agrees to not execute any activity that otherwise might interfere with the [project] implementation…including but not limited to, i. Clearing forest for livestock / cattle ranches; ii. Clearing forest for agriculture; iii. Expanding old roads or constructing new roads; iv. Expanding into new forests for infrastructure (i.e., bridges, housing, electricity, etc.); v. Expanding logging operations; [and] vi. Deforestation for new mining or mineral extraction.”	
Total Project Longevity (PL) May not be less than zero		0

Total Internal Risks	
Total Internal Risks (PM + FV + OC + PL) Total may not be less than zero.	**8**

A1.2. EXTERNAL RISKS

Land Tenure and Resource Access/Impacts		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	The landowner, Ilderlei Souza Rodrigues Cordeiro, who is also a project proponent (I.S.R.C.), owns the project area outright (see Section 1.12) and has full resource access/use rights, who are not shared with anyone. The property was geo-referenced and officially registered in the cadaster (Cadastro Ambiental Rural), a process which involved on the ground assessment of all property boundaries and consultations with neighboring landowners and resolution of any existing boundary disputes.	0
b-d)	Not applicable.	0
e)	Not applicable.	0
f)	There is a legal contractual agreement to maintain the project area as forest for at least a 60 year period (i.e. greater than the length of the crediting period) from the project start date.	-2
g)	Not applicable.	0
Total Land Tenure (LT) [as applicable, ((a or b) + c + d + e+ f)] Total may not be less than zero.		0

[16] See addendum to the Tri-Party Agreement located in the project database.

Community Engagement		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	All households living on the Russas property directly adjacent to the project area have been consulted.	0
b)	To their knowledge, the project proponents have contacted all families reliant on the project area.	0
c)	Not applicable.	0
Total Community Engagement (CE) [where applicable, (a+b+c)] Total may be less than zero.		0

Political Risk		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a-e)	The average governance score for 2008 through 2012 is 0.05, or between the governance score of -0.32 to less than 0.19. Details of the calculation are provided below.	2
f)	Acre, Brazil is participating in the Governors' Climate and Forest Taskforce. Further, Brazil has an established Designated National Authority under the CDM and has at least one registered CDM Afforestation/Reforestation project.[17]	-2
Total Political (PC) [as applicable ((a, b, c, d or e) + f)] Total may not be less than zero.		0

Political risk was evaluated using the latest World Bank index data.

Table A1. Calculation of Brazil's average governance score.

Governance Indicator	**2008**	**2009**	**2010**	**2011**	**2012**
Control of Corruption	-0.02	-0.12	0.00	0.15	-0.07
Government Effectiveness	-0.09	-0.10	-0.04	-0.12	-0.12
Political Stability	-0.29	0.16	0.01	-0.13	0.07
Regulatory Quality	0.07	0.11	0.16	0.18	0.09
Rule of Law	-0.37	-0.22	0.00	-0.01	-0.11
Voice and Accountability	0.51	0.49	0.53	0.47	0.43
Overall Mean					0.05

[17] Project 2569: Reforestation as Renewable Source of Wood Supplies for Industrial Use in Brazil (http://cdm.unfccc.int/Projects/DB/TUEV-SUED1242052712.92/view).
Project 3887: AES Tietê Afforestation/Reforestation Project in the State of São Paulo, Brazil (http://cdm.unfccc.int/Projects/DB/SGS-UKL1280399804.71/view).

Total External Risks	
Total External Risks (LT + CE + PC) Total may not be less than zero.	0

A1.3. NATURAL RISKS

Fire	
Discussion/ Evidence	Most of the project area is un-fragmented forest, with few areas of bordering pasture/non-forest. Most forest fires that occur in the region are anthropogenic, and thus sources of fire outbreaks in the project area are limited. In a study[18] of fires in the Amazon, Cochrane and Laurance documented a relationship between fire incidence and distance from forest edge, with decreasing fire return intervals with increasing distance from edge. They also found that effects of forest fires depend on the extent and condition of fuel sources. In general, drought conditions need to be present prior to the initiation of rainforest fires. While initial fires can have a significant effect on the smaller diameter (<40 cm dbh) trees, it is only with subsequent burns, that significant losses (mortality of up to 40% of trees) of forest biomass can be expected[19]. Despite fire induced tree mortality, tree mortality itself is unlikely to result in the loss of substantial biomass due to incomplete combustion of live aboveground biomass. Biomass is merely transferred from the live biomass to dead biomass pool, which is also accounted for in this project. Further as fire is unlikely to affect the whole project area, the significance of any single fire event is likely to be minor and result in less than 25% loss in carbon stocks in the project area. The Cochrane and Laurance study[20] mentioned above, calculated a fire return intervals in another part of the Amazon as 10 to 15 years. While the agents of deforestation (and fire) are similar between region of the study (Para) and the project region (Acre), deforestation rates and likely incidences of fire are greater in Para. This fire return interval therefore is likely to represent a conservative estimate of the fire return interval in the project region with the actual interval likely being longer than 15 years.
Significance	Minor (5% to less than 25% loss of carbon stocks)
Likelihood	Every 10 to 25 years
Score (LS)	2
Mitigation	None

[18]Cochrane M.A.& Laurance W.F., 2002. Fire as a large-scale edge effect in Amazonian forests, Journal Of Tropical Ecology, 18:311-325.
[19]Cochrane M.A., Alencar A., Schulze M.D., Souza C.M., Nepstad D.C., Lefebvre P. & Davidson E.A., 1999. Positive feedbacks in the fire dynamic of closed canopy tropical forests, Science, 284(5421):1832-1835.
Cochrane M.A.& Schulze M.D., 1999. Fire as a recurrent event in tropical forests of the eastern Amazon: Effects on forest structure, biomass, and species composition, Biotropica, 31(1):2-16.
[20] Cochrane M.A.& Laurance W.F., 2002. Fire as a large-scale edge effect in Amazonian forests, Journal of Tropical Ecology, 18:311-325.

Pest and Disease	
Discussion/ evidence	The forests of the project area have a high diversity of tree species, with over 150 tree species >10 cm dbh[21], and like other diverse tropical forests, are not known to be subject to catastrophic disturbance by insect pests or forest diseases. Forest pests and diseases as a source of risk are more relevant in temperate forests or plantations, with low species diversity and consequently susceptible to extensive damage due to pest and disease outbreaks, which tend to be concentrated on single host species. Further, there is no history of catastrophic forest disturbance due to forest pests or diseases in the region.
Significance	Insignificant
Likelihood	Once every 100 years or more. Risk is not applicable to the project area
Score (LS)	0
Mitigation	None

Extreme Weather	
Discussion/ Evidence	While extreme weather events in the region include drought, flooding, and disturbance by wind, this analysis is limited to disturbance by wind as this is the only disturbance which has a direct effect on carbon stocks. As flooding within the project region is common, high water levels in the forest do not lead to a reduction in the forest carbon stocks. Drought does not have a direct effect on existing forest carbon stocks, but instead can increase the severity of forest fires and hence is covered above in the section on fire risk. In relation to disturbance by wind, the recurrence intervals for large blow down disturbances in the western Amazon have been estimated at 27,000 years.[22]
Significance	Insignificant <5% loss of carbon stocks
Likelihood	Once every 100 years or more.
Score (LS)	0
Mitigation	None

Geologic Risk	
Discussion/ Evidence	Neither volcanoes nor active tectonic fault lines are present within the project area. Landslides are not likely to occur within the project area because the project area is relatively level (less than 5% slope) terrain.

[21] For more information see the results of the "Forest biomass carbon inventory for the Russas and Valparaiso Properties, Acre State, Brazil" in the project database.
[22] Espírito-Santo, F.D.B.; Keller, M.; Braswell, B.; Nelson, B.W.; Frolking, S.; Vicente, G. 2010. Storm intensity and old-growth forest disturbances in the Amazon region. Geophysical Research Letters. 37, L11403, doi:10.1029/2010GL043146.

Significance	Minor
Likelihood	Once every 100 years or more
Score (LS)	0
Mitigation	None

Natural risk is quantified by assessing both the significance (i.e. the damage that the project would be sustained if the event occurred, expressed as an estimated percentage of average carbon stocks in the project area that would be lost in a single event) and likelihood (i.e., the historical average number of times the event has occurred in the project area over the last 100 years) of the four primary types of natural risk, including the risk of fire, pest and disease, extreme weather, and geologic hazards. The significance of the risk of all natural disturbances has been assessed as “Minor” or “Insignificant” as none of the risks should they occur would lead to a loss of greater than 25% of the carbon stocks in the project area in the case of fire or greater than 5% in the case of pest and disease, extreme weather and geologic risk. The occurrence of any natural risk is unlikely to affect 50% of the project area. Where a natural risk does occur, it is unlikely to remove >50% or the carbon stocks in the project area. While it is possible for trees to be killed due to natural risks such as fire or flooding, the majority of biomass within the live biomass carbon pool would simply be transferred to the dead biomass carbon pool, also accounted for in this project and therefore not a loss of carbon.

It is at times difficult to quantify the likelihood of natural risks when these risks occur infrequently. By definition likelihood is the historical average number of times an event has occurred over the last 100 years. Another term often used when referring to the likelihood of natural risk is the return interval. The return interval is common in literature pertaining to fire and flooding (e.g., the 100 year flood). While the likelihood or return interval would also be useful for assessing pest and disease as well as geologic risk, a key feature when calculating the likelihood or return interval is that an event has occurred enough times in enough places such that there is sufficient data to calculate the return interval. A review of the literature revealed little data to support a return interval for the project area for either pest and disease or geologic risk. For this reason, we have assigned each risk a return interval of “once every 100 years or more.”

Score for Each Natural Risk Applicable to the Project (Determined by (LS × M)	
Fire (F)	2
Pest and Disease Outbreaks (PD)	0
Extreme Weather (W)	0
Geological Risk (G)	0
Other natural risk (ON)	
Total Natural Risk (as applicable, F + PD + W + G + ON)	**2**

A2.0. OVERALL NON-PERMANENCE RISK RATING AND BUFFER DETERMINATION

A2.1. Overall Risk Rating

The overall risk rating calculated using the VCS AFOLU Non-Permanence Risk Tool is calculated below.

Risk Category	Rating
a) Internal Risk	8
b) External Risk	0
c) Natural Risk	2
Overall Risk Rating (a + b + c)	**10**

The Russas Project will employ a non-permanence risk deduction of 10%.

A2.2. Calculation of Total VCUs

Total VCUs including deductions to be deposited in the AFOLU pooled buffer account, are detailed in Section 4.4 of the 2012-2013 Russas Project Monitoring Report.