ADPML PORTEL-PARA REDD PROJECT MONITORING REPORT FOR 01/JAN/2009-01/JAN/2012 PERIOD

Document Prepared By Ecosystem Services LLC

Project Title	*ADPML Portel-Para REDD Project*
Version	*1.5*
Report ID	*MR 2009-2011*
Date of Issue	*09 Nov 2014*
Project ID	*981*
Monitoring Period	*01-January-2009 to 01-January-2012*
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1 PROJECT DETAILS

1.1 Summary Description of Project

A. Historical Deforestation Context and Dynamics

The Project is located in a fast-changing region characterized by forests rich in valuable timber species, illegal logging, unclear land tenure laws, widespread land speculation, overall weak law enforcement and severe poverty. With these variables combined the result cannot be other but the depredation of natural resources in the benefit of few.

Pioneer agents open the path for deforestation agents who cut clear the forest as a measure of proving land ownership and implementing low-cost and practically self-sustained productive activities.

The predominant final land-use in the area is deforestation by cattle ranchers to implement pastures, which occurs simultaneously in two deforestation fronts.

The first front is known as “consolidated frontier”, which is the area close to primary roads (federal and state highways) and already occupied mainly by cattle ranching. This frontier continues to expand due to the creation and expansion of secondary and tertiary roads that allow deforestation agents to deforest by using slash and burn.

The second front, known as a “pioneer frontier”, refers to forested areas with low deforestation but with high degradation located far from primary roads, but easily accessible through navigable rivers. These areas are considered to be of “free access” whenever the presence of the legal landowner is not made evident (i.e. through ongoing forest uses or/and monitoring and enforcement). In this front, landless people known as “riberinhos” slash and burn the forest to implement cassava plantations and pioneer agents such as loggers open penetration roads that allow squatters and ranchers to invade otherwise hard-to-access forest areas. Such penetration roads or “pioneer roads” not only allow access to natural resources but also connect the area to the network that leads to primary roads. This connection allows for a faster transportation of products and opens the area to pioneer agents that generate land speculation.

Brief Description of the Project Area

The Project Area comprises 36,727.8 Ha in 5 privately owned parcels or “Glebas” adding up to a total of 38,381 Ha in the Portel municipality, located in the Portel micro region.

The Marajo mesoregion constitutes 3 geographic micro regions (MRG): Araí, Furos de Breves and Portel. The first two regions comprise municipalities that are entirely included in the Marajó archipelago. The Portel MRG covers municipalities located in the continent, on the right margin of the Pará River. Even though Portel is geographically not a part of the Marajó archipelago, due to its location on continental lands, it belongs to the mesoregion Marajó. It can be assured, therefore, that from a geopolitical standpoint, Portel municipality belongs to Marajó (IBAMA, 2004). It is located in the whole region, south / southwest from the archipelago, 278 Km^2 from Belem, the state capital. The major access is by the Acuti-pereira River on the extreme east, Camarapi and Pacajá rivers on the central region and Anapu River on the north/northwest region.

The main transportation mean to arrive in Portel is by fluvial public transportation (20 hours from Belem) and then using a private boat to get into the Project Area. In the region of the Project transportation happens mostly by river although pioneer roads are already connected to the road network of the Transamazonica highway in the consolidated frontier thus providing increasing fast access to Project Area by road.

Forests in the area consist of large and productive trees connected to each other by lianas and parasites. The most important species according to size and value are: i) *Hevea brasiliensis* (seringueira); ii) *Castilla ulei* (caucho); iii) *Mauritia flexuosa* (Miritis); iv) *Euterpe oleracea* (Açaizeiros); v) *Ceiba pentandra* (Samaumeira); vi) *Cecropia sp*. (Embaubeiras) and vii) hardwoods.

Local population is comprised mainly of settlers known as *"Ribeirinhos",* who live along the rivers and along the *igarapés* (small streams). There are not indigenous communities located either in the Project Area, the Project's Leakage Management Area, Leakage Belt, the Project Zone or the Reference Region for Deforestation. Economic activities in the area are subsistence timber extraction and sale, fishing and subsistence agriculture.

B. ADPML Portel - Pará REDD Project

The Project's main objective is to avoid and prevent unplanned deforestation in native forests through a period of 41 years of Project's lifetime. Such objective will be achieved by managing the land in the form of a "private conservation reserve" by developing and implementing a management plan. Such plan will include a rigorous monitoring and enforcement plan built up on the existing experience of ongoing surveillance activities in the area since 2008. Such scaled-up monitoring activities will actively count with the participation of local villagers that will be trained in forest management and monitoring techniques. The medium term goal is to allow forest regeneration thus increasing the amount of carbon sequestered in the forest.

Since it started in 2008, the Project has been successful in identifying and removing illegal activities such as logging, squattering and attempts to implement pastures (as made evident by the patrolling reports made available to the validation team). A staff of guardians that continuously travel around the Project Boundary has performed monitoring and enforcement from 2008 to 2012, having just a few of them living in specific points of the Project Area. Although it was possible to cover and manage such a large area by using the aforementioned guardians, it will become more effective and resource-efficient to have monitoring staff actually living within the Project's Boundary. For this reason, from 2013 onwards the Project will scale-up its monitoring activities by employing and properly training local villagers as monitoring staff.

To improve the appropriate area coverage and an effective identification of illegal activities and invasion attempts, the Project will conduct a thorough census in the Project's Boundary and Leakage Belt to identify all affected villagers, to georeference active and resting agricultural plots and to continue with the identification and registration of illegal activities as it has been done since 2005. This census will take place within the first six months after validation and gathered information will be used to develop a detailed social monitoring plan as thoroughly explained in section G1.5 of this Project's CCB PDD. Ranchers identified during this initial census will be invited to participate in the project activities such as capacity building for pasture management, agroforestry practices and others.

Based on the census results the Project boundary will be divided in brigades[1] to facilitate monitoring such a large area. Initially, brigades will be constituted by a technician specialized in forestry topics that will function as a manager (it is expected that technicians will not belong to the villages) and a group of villagers as a patrol. With time and as experience is gained, it is expected that brigades managers will be chosen from local villages. The actual size of a brigade and the numbers of villagers to be hired depends on the results from the census that will be conducted after validation. The area of a brigade will need to be a reasonable one to allow for an effective surveillance given available staff. If not enough local villagers are willing to work as monitoring staff; Ecosystem Services LLC will hire technicians from Portel or Breves.

After the census and on a yearly basis, the social monitoring staff of each brigade will be in charge of updating the census in their area. Brigades will conduct regular visits made around the perimeter of the project area to neighboring invader origins to meet and invite participation in leakage preventive measure activities. Brigades will identify and report any illegal activities (invasions and timber extraction) to the brigade leader. If illegal activities are spotted, brigades should geo-reference the finding and make a short description of what was found. Brigades should approach squatters or ranchers to let them know –in good terms- that this is private land, they cannot undertake such activities in the area and that they are welcome to participate in the project's activities to receive capacity building to improve their activities thus reducing deforestation.

With the information supplied by each patrol, brigade leaders will fill –up a monitoring report that will include at least the coordinates where the illegal activities are taking place, the date and a brief report of what was identified. Finally, each brigade leader will submit this information to the local police in Portel and to IBAMA in Portel and in Belem. The efforts of on-site monitoring and reporting will be complemented by monthly flights over the Project Area and by the use of free satellite imagery as it becomes available. Additionally, once a year the Project will use adequate satellite or radar imagery to conduct an assessment of the forest cover in the Project Area and Leakage Belt.

The Project will not develop or implement extractive activities or activities that cause significant reduction in carbon stocks. Also, the Project will not implement reforestation activities or introduce invasive species to the area.

The Project, in agreement with the landowner, will provide land tenure rights versus conservation results to villagers living within the Project's Boundaries but outside the Project Area[2]. To those living outside the Project Boundary in neighbor villages, the Project will provide knowledge to legally claim and secure land titles on unused public land. Geo-referenced information will be gathered and provided for villagers to know which areas can be claimed without incurring in private land encroaching.

[1] We define as brigades the subdivisions of the Project Area.

[2] According to VCS's definitions these areas are known as Leakage Management Areas and are non-forest areas thus are not included in the Project Area.

Additionally, the Project will provide support to enhance community's organizational capabilities for a better management of local resources.

Finally, the Project will provide capacity building on agroforestry systems with native species[3] and on implementation of energy efficient cook stoves for cassava production to villagers within and nearby[4] the Project Boundary. At the same time, capacity building activities will be held with the main agents of deforestation to show them the benefits of pasture managements and intensified cattle ranching.

As for biodiversity, the Project will enhance ecosystem functionality by allowing regeneration of degraded forest thus eliminating ecosystem fragmentation.

Through its activities, the Project is expected to generate positive leakage[5] by addressing key underlying drivers of deforestation outside the Project Boundary. Negative leakage will be low as a result of the high levels of deforestation in the Project's Leakage Belt in the baseline scenario. The Project will not claim benefits from positive leakage (to be conservative).

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 (AUD)

1.3 Project Proponent

Organizations	Avoided Deforestation Project (Manaus) Limited ("ADPML")
Responsible	Andrew Fox
Title of main contact point	Authorized signatory

3 The Project's developer will only approve agroforestry activities that use native species commonly known to occur in the Para region and are not in the Global Invasive Species Database before approving the utilization of a particular specie.

4 To those willing to participate in such activities.

5 Positive Leakage is understood as an unintentional positive outcome on carbon stocks from conservation projects, for example when the activities of a project are adopted voluntarily outside project boundaries and more carbon sequestration and/or avoided GHG emissions are achieved Schwarze, R. N., J. and Olander, J. (2002). "Understanding and Managing Leakage in Forest-Based Greenhouse Gas Mitigation Projects." Nature conservancy.

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Address	18-20 Le Pollet, St Peter Port, Guernsey, GY1 1WH
E-mail	afox@oaktrust.co.uk
Short Descriptions	Avoided Deforestation Project (Manaus) Limited (“ADPML”) was incorporated in Guernsey on 30 July 2010 with company number 52223. ADPML is administered by Oak Trust (Guernsey) Limited who are professional fiduciaries licensed by the Guernsey Financial Services Commission. ADPML sole activity is that of carrying out a carbon credit generation scheme REDD+ in the state of Para, Brazil.

1.4 Other Entities Involved in the Project

Organization	Ecosystem Services LLC
General Manager	Gonzalo Castro de la Mata
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Technical Director	Giancarlo Raschio
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GIS / Modeling Expert	Christian Contreras
E-mail	ccontreras@ecosystemservicesllc.com
Address	1250 24th Street, NW Suite 300, Washington, DC, 20037, USA
Short Description	Ecosystem Services LLC is a forestry, renewable energy, and Natural Resources Company specialized in the generation of internationally marketable environmental services. ES LLC was founded by leaders in the environmental field that share the belief that long-term conservation of the environment and unprecedented profits for investors are possible through sustainable ecosystem management, renewable energy development, and carbon markets.

1.5 Project Start Date

The Project started on January 1st 2008, when on-the-ground activities to avoid and remove invasions were already taking place. The landowner conceptualized protecting his lands under a carbon project scheme since 2005.

It is in 2005 when the landowner hires the services of a lawyer to clarify any doubts on land titling and to execute corrective actions through legal means to remove invaders (squatters and illegal loggers). Although forest protection initiatives and activities were developed back in 2005, setting a 2008 Project start date was a conservative approach to make sure the Project had enough monitoring and enforcement experience to start producing conservation results.

1.6 Project Crediting Period

The crediting period for the Project is 40 years starting on January 1st, 2009.

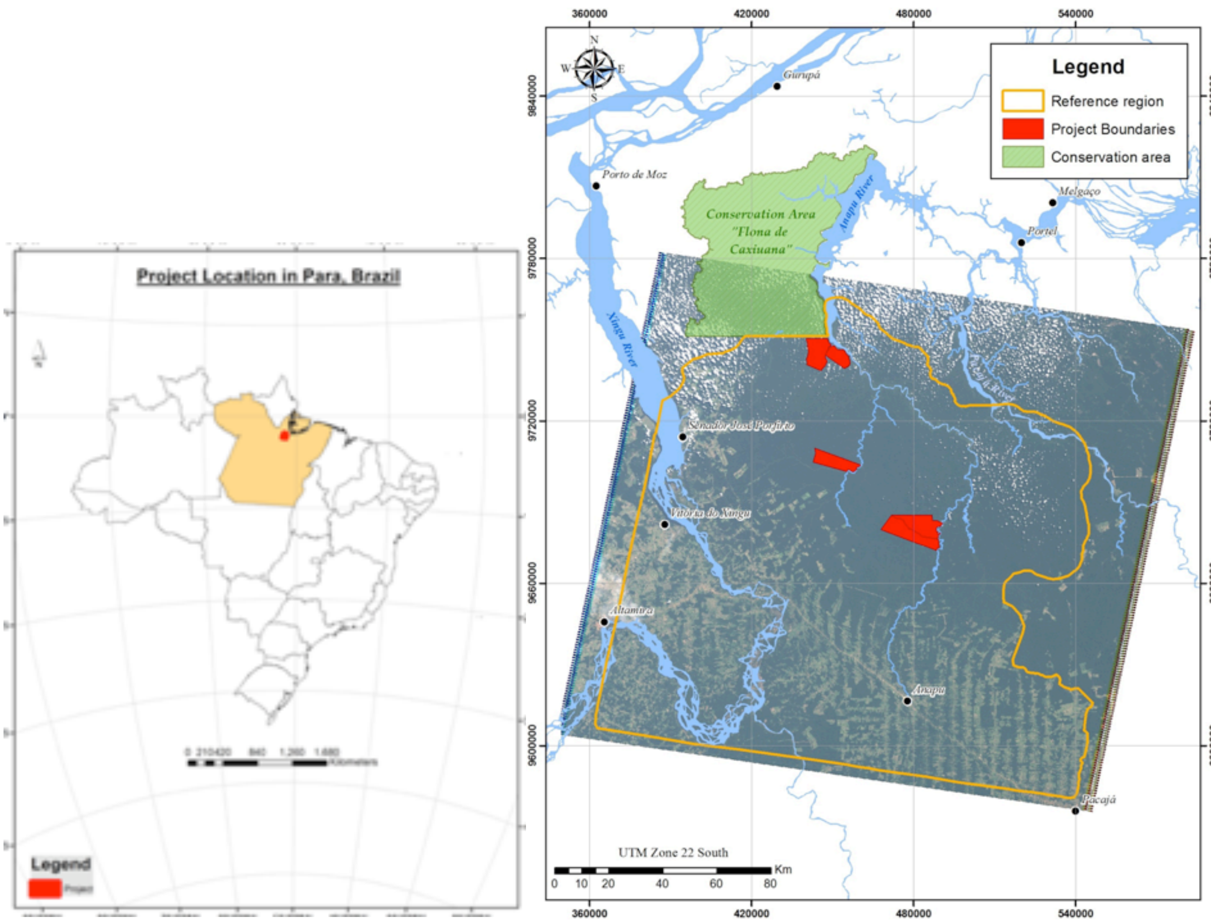
1.7 Project Location

The Project is located in northwest of Brazil, in the State of Para, micro region of Portel, municipality of Portel (Map 1). The regular main transport to arrive in Portel is by boat, the trip takes approximately, 20 hours from Belém. Some parts of the area are also accessible by car as the network of roads of the Transamazonica highway (BR-230) has already connected to logging (pioneer) roads that keep developing in the Project Area.

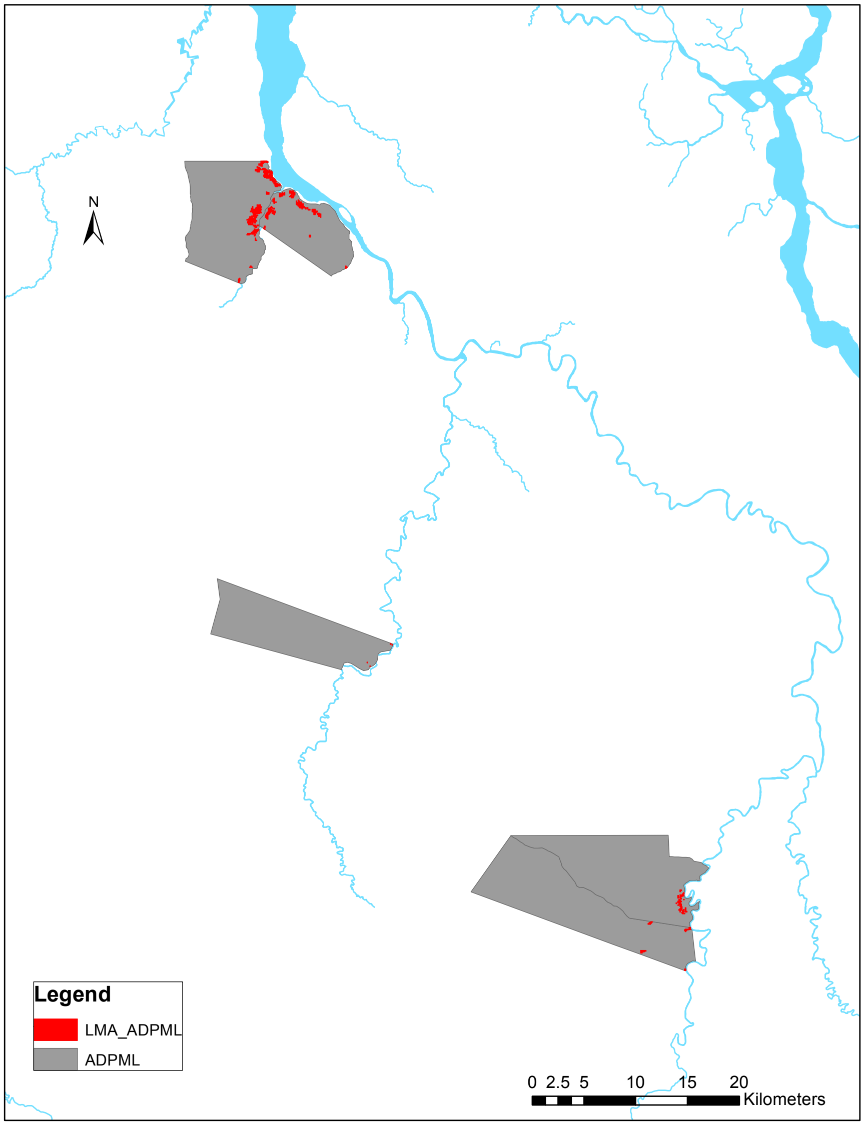
The Land of the Project (LP) has 38,381 ha[6] and the Project Area (PA) has 36,727.8 ha. In total, the Project Area is constituted by 5 individual Glebas (plots) that contain only forest at project start date. The Leakage Management Area is located within the Land of the Project and is entirely outside the Project Area (Map 2):

[6] The "Project Area" will be smaller than the Project Boundary as it has to contain only areas that have been forest for the past 10 years from the Project start date.

Map 1: Project location



Map 2: Leakage Management Area



1.8 Title and Reference of Methodology

The Project has been developed using the guidelines in the VCS VM0015 REDD Methodology: Methodology for Unplanned Deforestation V1.1

This Project follows and uses these documents and tools:

- VCS Program Guide 3.3
- VCS Program Standard 3.3
- VCS AFOLU Requirements Version 3.3

- VCS Tool VT0001 Version 3.0 – Tool for Demonstration and Assessment of Additionality in AFOLU Project Activities.
- VCS AFOLU Non-Permanence Risk Tool Version 3.1

The Project does not apply any deviations from the VM0015 methodology.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

Activities for the 01/Jan/2009-01/Jan/2012 crediting period:

Activity	Status
Patrolling activities	Implemented
Legal processes to make evident the presence of the landowner and to demonstrate clear land tenure	Implemented

Activities for the 2013-2048 crediting period

Activity	Status
Provide training on forest and biodiversity monitoring and management, as well as opportunities to work as a monitoring/enforcement staff	Under development
Enhancing community's organizational capabilities	Under development
Provide legal land-ownership rights versus results for conservation	Under development
Providing capacity building on steps to gain land use rights over Government owned	Under development

forests	
Providing capacity building in agroforestry techniques and implement agroforestry pilots	Under development
Providing capacity building on improved efficiency cook stoves and implement cook stove pilots	Under development
Providing capacity building to develop small sustainable business	Under development
Providing capacity building to cattle ranchers that encroach the Project Area	Under development

Summary:

The Project has been conducting on the ground monitoring and enforcement since 2008. The Project claims GHG benefits starting from 2009. Each year during the dry season the landowner would send teams of people to patrol all his lands. Patrols would generate hand-written monitoring reports during the field trip and once in Portel they would report illegal activities (i.e. loggers and/or squatters) through anonymous phone calls to IBAMA. Once back in the Belem, the lawyers of the landowner would transcribe the information and translate it to English. All reports (originals and translations) were kept in electronic format.

For this 01/Jan/2009-01/Jan/2012 period, leakage has been monitored using a 2011 Landsat TM image[7]. Leakage for the period was identified as the accumulated deforestation that exceeded baseline estimations within the leakage belt. As for the Leakage Belt Agreement, RDMLT will offset all leakage generate in the common Leakage Belt. Calculations of ex ante and ex post deforestation in the Leakage Belt were used to determine if leakage had to be accounted for, as showed in Section 4.3, Tables 21.d and 35 of this document. In conclusion, because ex post deforestation in the Leakage Belt is lower than its ex ante estimation, leakage for the project in the 01/Jan/2009-01/Jan/2012 period is zero.

The Non-permanence risk factor has not changed for this monitoring period.

[7] Satellite image Landsat 5 TM - Acquisition tima: July 4th, 2011 - Path 225/row 062 - Source: INPE web page (http://www.dgi.inpe.br/CDSR/)

Results of the Accuracy Assessment of the LULC-change analysis for the 01/Jan/2009-01/Jan/2012 period

1. 2011 CHANGE AREAS ACCURACY ASSESSMENT

This report presents a change detection accuracy assessment for the reference region from 2008 to 2011 using a two-step approach.

To accomplish this task, the accuracy assessment was completed in two steps. First, the 2011 change areas were assessed as a single-date land cover map. Validation samples were collected by interpreting Landsat 5 TM imagery of the 2011 Landsat imagery. Generating an error matrix with at least 30 samples per class, the overall map accuracy was computed as well as the omission and commission error rates for each individual thematic class within the map. Second, a change mask was assessed as a binary change/no change map. Samples were collected using a stratified random selection approach (Congalton-Green, 2009).

This mapping was conducted as part of the results of the accuracy assessment for the 2008-2011 LU/LC-change analysis. Therefore, we are performing the accuracy of classification from Landsat imagery of 90m of resolution at the most recent date (2011).

1.1 Description of Classes mapped

The map presents two general classes, which are: Forest and Non-Forest. This map was generated from supervised classification of Landsat TM images of year 2011. The classified map was developed following a standard classification scheme, and initial sub-classes needed to be regrouped into two general classes.

The class Forest meets the criterion of Brazil's definition for forest: 1 hectare with 30% crown cover and 5 meters tree height. The class Non-Forest includes subclasses: cattle ranching, small scale agriculture, towns, and roads.

1.2 Reference data Used for the Accuracy Assessment

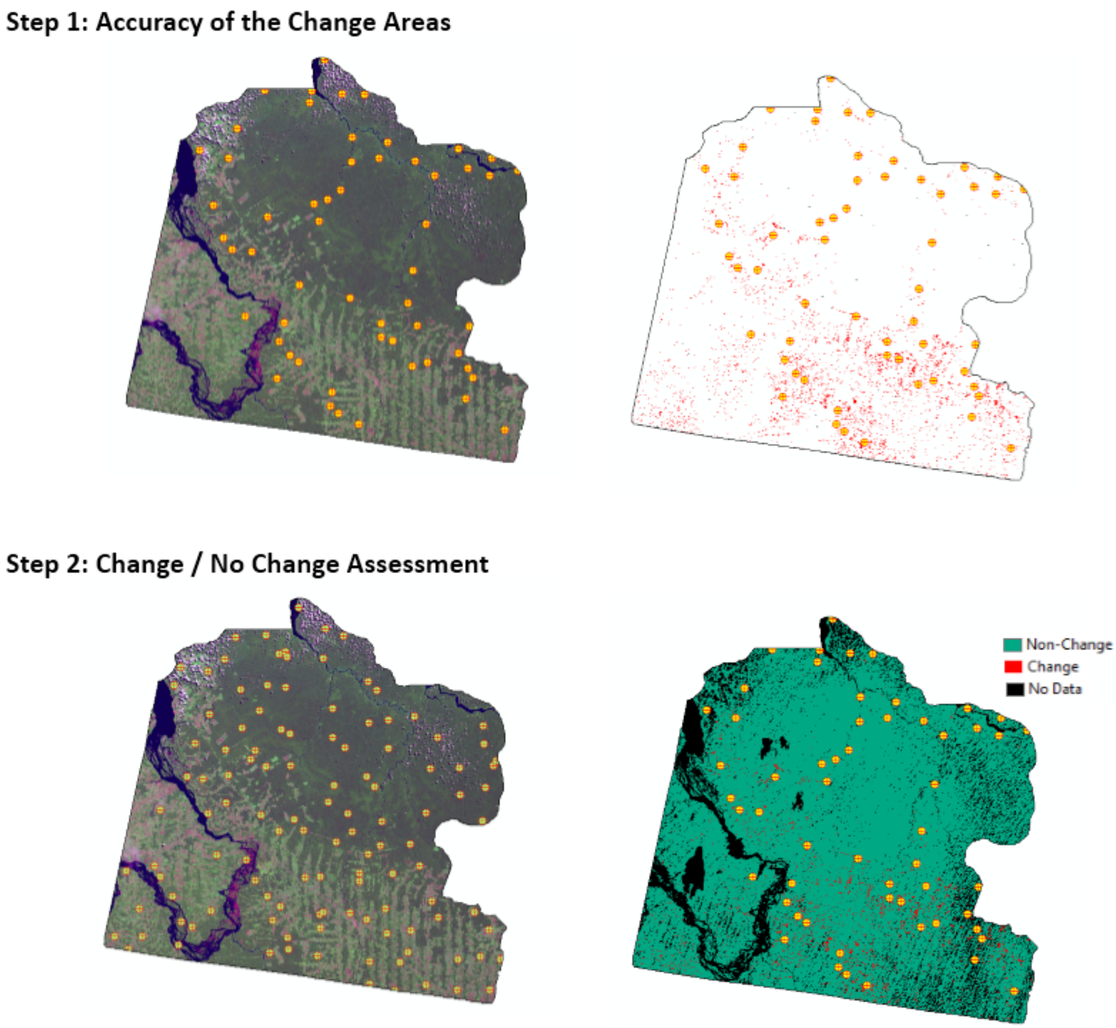
To perform accuracy assessment, it is required to cover all areas of the reference region with an image of 2011. Reference data used for the assessment of accuracy is the Landsat 5 TM image of 2011:

Satellite:	Landsat 5
Sensor:	Thematic mapper – TM
Source:	INPE web page (http://www.dgi.inpe.br/CDSR/)
Acquisition date:	July 4th, 2011
Path/row:	Path 225 Row 62

1.3 Two-step Approach to Change Detection Accuracy Assessment

The first step in this process is to assess the accuracy of just the areas that changed between the period 2008-2011. The second step in this process is simply a change/no change validation.

Figure 1: Two-step Approach to Accuracy Assessment of 2011 Change Areas



Step 1: Accuracy of the Change Areas

The first step in the change detection accuracy assessment was to assess the accuracy of the areas that changed as a separate, single-date map (Congalton-Green, 2009). The sampling procedure is similar to that of any traditional accuracy assessment. However, in this case, only areas classified as change between 2008 and 2011 were used to draw samples, specifically the transition Forest 2008 to Non-Forest 2011. This way, only non-forest area in 2011 classification (rows) was assessed. The reference data (columns) for this time period was Landsat 5 TM imagery 2011 from INPE website.

The total number of samples for the error matrix was calculated to be 56, corresponding all of them to the change Forest to Non Forest in 2008-2011. Locations of the evaluation points were selected using the “Sample” function in Idrisi software, with the option of stratified random.

The results of the accuracy assessment of the 2011 change areas are presented in error matrix form in the following table.

Table 1: Error Matrix for the Accuracy Assessment of the 2011 Change Areas

Reference data

Map	Class	Forest	Non-Forest	Total	
	Forest				
	Non-Forest	7	**49**	56	49/56
	Total	7	49	**56**	
		Accuracy:	***0.875***	***87.5%***	

The accuracy for the 2011 change areas is 87.5%.

Step 2: Change / No Change Assessment

In this step, the map is treated as a binary scheme (change/no change). This step is similar to collapsing the change detection error matrix to the change/no change (2 × 2). The difference here is that instead of having to sample to fill in the entire change detection error matrix, the sampling is performed to only assess the change/no change (Congalton-Green, 2009).

User's and producer's accuracy for each class and overall accuracy of the map were also calculated. According to guidance, the minimum acceptable classification accuracy is 80% for within class accuracy and 90% for overall accuracy.

The total number of samples for the error matrix was calculated to be 175, corresponding 119 for "Non-Change" and 56 for "Change" class. The number of samples was over 50 points for each class, which is the minimum according to general Guidelines. Locations of the evaluation points were selected using the "Sample" function in Idrisi software, with the option of stratified random.

Table 2: Final Change/No Change Matrix

Reference data

Map	Class	Non-Change	Change	Total	***Producer's accuracies***	
	Non-Change	**112**	7	119	112/119	0.9412
	Change	7	**49**	56	49/56	0.8750
	Total	119	56	**175**		
	User's accuracies	112/119	49/56			
		0.9412	0.8750			
	Overall Accuracy:	***0.92***	***92.0%***		161/175	

The overall accuracy of the 2008-2011 change/non-change map, which considered two map classes (Change and Non-Change), is 92.0%.

2.2 Project Description Deviations

The Proposed deviations comply with the requirements of the VCS Standard v3.3 sections 3.5 and 3.6:

a. The proposed Deviations from the PD are parameters that were available at validation and relate to measurement and monitoring. Such Deviations do not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario (baseline scenario is based on the same validated model with no changes). For the case of ADPML, which adopted the validated RRD of the neighbor project, the Deviation does not negatively impact the conservativeness of the quantification of GHG emission reductions or removals because the overall GHG reductions over the project's lifetime is lower than the original PD (VCS Standard 3.5.1).

b. Based on the previous point and because we remain in compliance with the methodology, we have described and justify the Deviations in the Monitoring Report (VCS Standard 3.6.1-item 2).

The ADPML Portel-Para REDD has undergone **eight** changes from its original Project Description. These changes are:

1. Correction of the Overman's allometric equation used at validation in order to account only for dry biomass.
2. Update of carbon stocks and carbon stock change factors calculations based on the biomass results from the corrected Overman equation
3. Update of calculations to determine significance of the pool "Wood Products" using the updated net carbon stock change factors and a logging intensity factor closer to the reality of selective illegal logging in the region of the project
4. Reduction of the total area by retaining only five (5) out of the eighteen (18) original validated areas.
5. Adoption of the validated Reference Region for Deforestation (RRD) of its neighbor REDD project (RMDLT Portel-Para REDD project)
6. Modification of the original Leakage Belt, which has finally been absorbed by the neighbor RDMLT Portel-Para REDD Project as stated in a Leakage Belt Agreement
7. Addition of all data and parameters monitored (both monitored or not)
8. Generation of a fixed degradation boundary at project start date, which will be monitored and assessed at every verification event

1. Correction of the Overman's allometric equation used at validation in order to account only for dry biomass

The original Overman's equation used in the validated PDD has been updated to yield results only in terms of dry biomass. To this end, the denominator "M" has been removed from the equation.

All calculations for carbon stocks and carbon stock change factors have been updated in the spreadsheet "Carbon results_Overmann 1994_CORRECTED without moisture" in Tabs "Trees_equations". Changes are reflected in the PDD Section 3.2.1 Figure 16.

2. Update of carbon stocks and carbon stock change factors calculations based on the biomass results from the corrected Overman equation

All calculations for carbon stocks and carbon stock change factors have been updated in the spreadsheet "Carbon results_Overmann 1994_CORRECTED without moisture" in Tabs "Above and Below-ground biomass" and "Uncertainty Assessment".

Table 3 shows the changes in the PDD's Section 2.4.3.1 Table 11 as well as in Section 3.2.1. Table 38 and Table 40.

Table 3: Updated carbon stocks and uncertainty assessment in the PDD (Tables 11, 38 and 40 of the PDD)

		All Above-ground Biomass														
		Liiter			DHB< 3cm			3cm<DBH<9.9cm			Trees ≥10cm (Overman 1994)			Total		
		Dense Forest	Degraded Forest	Under Regeneration	Dense Forest	Degraded Forest	Under Regeneration	Dense Forest	Degraded Forest	Under Regeneration	Dense Forest	Degraded Forest	Under Regeneration	Dense Forest	Degraded Forest	Under Regeneration
Biomass (tdm/ha)	N of cases	63	15	5	63	15	5	63	15	5	63	15	5	64	15	5
	Min	1.29	1.66	4.47	0.06	0.03	0.74	1.73	2.81	2.21	67.34	81.08	46.41	70.41	85.58	53.84
	Max	11.93	7.89	8.83	4.85	2.21	1.56	15.67	14.51	17.97	583.66	541.59	162.68	616.11	566.21	191.04
	Mean	4.73	4.89	6.50	1.14	0.90	1.06	7.46	7.22	7.48	247.55	243.44	104.29	260.89	256.45	119.33
	SD	2.22	1.75	1.60	0.85	0.55	0.36	3.23	3.24	6.09	118.90	118.81	47.80	125.19	124.35	55.85
	CI 90%	0.46	0.74	1.18	0.18	0.23	0.27	0.67	1.38	4.48	24.64	50.46	35.16	25.74	52.81	41.08

UNCERTAINTY ASSESSMENT 95% CONFIDENCE

	Litter		DHB< 3cm		3cm<DBH<9.9cm		Trees ≥10cm (Overman 1994)	
	Dense Forest	Degraded Forest	Dense Forest	Degraded Forest	Dense Forest	Degraded Forest	Dense Forest	Degraded Forest
CI 95%	0.54847344	0.548473436	0.209111236	0.276068641	0.797738585	1.64027681	29.35927328	60.12672819
((CI 95%)/ Mean)%	12%	12%	18%	31%	11%	23%	12%	25%
Mean	4.73388562	4.888202835	1.144291054	0.903595726	7.464591616	7.218896533	247.5482955	243.439203

		Dense Forest	Degraded Forest
$Uncertainty_{BSL,SS,i}$	$\sum_1^n (U_{BSL,SS,i,pool\#} * E_{BSL,SS,i,pool\#})^2$	862.9478649	3618.31092
	$\sqrt{\sum_1^n (U_{BSL,SS,i,pool\#} * E_{BSL,SS,i,pool\#})^2}$	29.37597428	60.15239746
	$\frac{\sqrt{\sum_1^n (U_{BSL,SS,i,pool\#} * E_{BSL,SS,i,pool\#})^2}}{\sum_1^n E_{BSL,SS,i,pool\#}}$	11%	23%
		Fails	**Fails**

Table 4: Updates in spreadsheet "Carbon results_Overmann 1994_CORRECTED without moisture": carbon stocks before and after uncertainty reductions (Tab "Above and Below-ground Biomass")

DENSE FOREST	
Total aboveground without litter (tCO2e)	469.62
Total corrected aboveground without litter (tCO2e)	422.90
Correction factor for lower CI boundary (tCO2e)	46.72
Total belowground without litter (tCO2e)	105.23
Total corrected belowground without litter (tCO2e)	94.76
Correction factor for lower CI boundary (tCO2e)	10.46
Total litter (tCO2e)	8.68
Total corrected litter (tCO2e)	7.83
Correction factor for lower CI boundary (tCO2e)	0.84

DEGRADED FOREST	
Total aboveground without litter (tCO2e)	461.20
Total corrected aboveground without litter (tCO2e)	365.74
Correction factor for lower CI boundary (tCO2e)	95.46
Total belowground without litter (tCO2e)	103.43
Total corrected belowground without litter (tCO2e)	82.13
Correction factor for lower CI boundary (tCO2e)	21.30
Total litter (tCO2e)	8.96
Total corrected litter (tCO2e)	7.60
Correction factor for lower CI boundary (tCO2e)	1.36

Table 5: Updates in spreadsheet "Carbon results_Overmann 1994_CORRECTED without moisture": net carbon stock change factors after uncertainty reductions (Tab "Stock Change Factors")

	Initial classes		Final Class
	Dense Forest	Degraded Forest	Grassland
Above ground	430.74	373.34	
Below Ground	94.76	82.13	
Total	525.50	455.47	51.65
Area-weighted stock change (tCO2e/ha)	**473.84**	**403.82**	

3. Update of calculations to determine significance of the pool "Wood Products" using the updated net carbon stock change factors and a logging intensity factor closer to the reality of selective illegal logging in the region of the project

Originally (at validation) logging intensity for calculations was assumed to be 30 m3/ha which is the maximum legal logging intensity allowed. Nevertheless, selective illegal loggers tend to move around an area quickly extracting some valuable species without being able to extract all valuable trees. Therefore, a logging intensity of 30 m3/ha is somehow on the highest end. Furthermore, according to an analysis based on date gathered during our biomass inventory the maximum volume of valuable timber species is 23.99 m3/ha in the project area so this would be the theoretical maximum extraction intensity. Even so, based on literature (see Long-lived Wood Products below) illegal selective logging will have an extraction intensity between 10-20 m3/ha.

Long-lived Wood Products

According to literature, selective logging operations in Brazil and the state of Para have a low logging intensity close to 10 m3/ha:

- According to Oliveira, L., 2005 who conducted a research in Para, logging intensity in low populated areas such as those of the projects ranges between 10-20 m3/ha.
- According to Verissimo, A., et al. 1992 who conducted a research in Para, logging yields vary greatly ranging from 20 to 50 m3/ha
- According to Silva, A., et al., 2004 (page 1) who conducted a research in Mato Grosso the logging intensity of a explored forest was 10 m3/ha whereas the logging intensity of a heavily explored and burned forest was 25 m3/ha. The type of forest of this study is the same as the

one in the project area (ombrofila), the same soil type (latossolo-vermelho) and texture (mostly clay) and similar annual precipitation (around 2,000 mm) (page 2).

- According to Asner, g., et al. 2009 (page 7) the Brazilian industrial logging extraction activity removes around 10 to 40 m3/ha of timber from the Amazon forest.

Based on the aforementioned arguments significance of wood products was tested using logging intensities of 10 and 20 m3/ha for each forest class[8]:

As a result from the analysis, carbon stored in long-live wood products is not accounted for because this pool did not pass the 5% significance test in any case tested (Table 6):

Table 6: Significance test for long-lived wood products (testing 10 and 20 m3/ha of logging intensity)

	Value	Unit
Net emission factor per Ha	455.58	tCO2e/Ha
Logging Intensity	10	m3/ha
Coefficient of Volumetric Efficiency	39%	
Wood Density	0.7153	t/m3
Carbon Density	0.5	
Conversion factor for CO2e	3.67	Dimensionless
Permanence factor of CO2e by the use of wood in durable products	5.15	tCO2e/Ha
Calculation of significance level	**1.1%**	

	Value	Unit
Net emission factor per Ha	455.58	tCO2e/Ha
Logging Intensity	20	m3/ha
Coefficient of Volumetric Efficiency	39%	
Wood Density	0.7153	t/m3
Carbon Density	0.5	
Conversion factor for CO2e	3.67	Dimensionless
Permanence factor of CO2e by the use of wood in durable products	10.30	tCO2e/Ha
Calculation of significance level	**2.3%**	

Data for the significance analysis came from:

- Logging intensity for illegal selective logging ranges between 10-20 m3/ha: Verissimo, A., et al. 1992; Silva, A., et al., 2004; Asner, g., et al. 2009; Oliveira, L., 2005.
- Coefficient of volumetric efficiency: (Pereira, Santos et al. 2010)
- Wood density: Weighted average of wood density of valuable timber species as per Table 8[9].
- Conversion factor: IPCC 2003

[8] Net emission factors are those to be used after updating Table 15b of the PDDs and MRs using the correct Overmann's equation

[9] Weighted average was calculated taking into account the number of individuals per tree species and their respective wood density

Medium-lived wood products

Literature indicates that the deforestation process (slash and burn) occurs once valuable timber species have been selectively removed. Timber extraction can be conducted by loggers or other agents acting as loggers (squatters or ranchers) (Margulis 2004). Once valuable timber resources are extracted, pastures for cattle are implemented (May, Millikan et al. 2011).

Regarding short lived and medium lived wood products the vm0015 methodology states in page 153 "If data on the proportion of carbon stocks in each fraction of the wood product carbon pool are unavailable, it is conservative to assume that 100% of the carbon is stored in the long-term fraction in the baseline case (in which case no carbon is released into the atmosphere in the baseline case), and that 100% of the carbon is stored in short-term fraction in the project case (in which case all carbon is emitted immediately in the project case)."

Based on the data from the social assessment and according to local literature (Pinto, Santos et al. 2007), the following are the most common timber species used by local habitants:

Table 7: Commonly used tree species timber by local habitants

Common name	Scientific name
Louro preto	ocotea sp.
Tachi preto	Tachigalia paniculata
Jacareuba	Calophyllum brasilense
Maçaranduba	Manilkara huberi
Cedro vermelho	Cedrela odorata L
Paricarana	Parkia
Acapu	Vouacapoua americana
Cupiuba	Goupia glabra
Itauba	Mezilaurus
Piquia	Caryocar villosum

(orange)	Specie with high economic value
(yellow)	Specie with medium economic value

As showed in Table 7 many of the trees used by local habitants have significant economic value (Pereira, Santos et al. 2010). Despite such trees could be assumed to be extracted as part of the volume considered in the calculations for long-lived wood products, to be conservative we also count such trees in the calculations for medium-lived wood products.

Detailed calculations of the significance of each tree can be found in Annex 9 and the results are presented below (Table 8):

Table 8: Significance level for medium-lived wood products

#	Common name	Scientific name	# of individuals in the sampling area	Wood Density (t.d.m/m3)	Volume (m3/ha)	Significance level (%)
1	Louro preto	ocotea sp.	13	0.51	0.05	0.003836%
2	Tachi preto	Tachigalia paniculata	358	0.56	3.95	0.349608%
3	Jacareuba	Calophyllum brasilense	5	0.65	0.04	0.003645%
4	Maçaranduba	Manilkara huberi	311	0.89	5.64	0.792817%
5	Cedro vermelho	Cedrela odorata L	1	0.43	0.03	0.002314%
6	Paricarana	Parkia	100	0.39	1.60	0.098690%
7	Acapu	Vouacapoua americana	552	0.79	7.06	0.880641%
8	Cupiuba	Goupia glabra	143	0.695	3.60	0.395266%
9	Itauba	Mezilaurus	61	0.39	0.78	0.083690%
10	Piquia	Caryocar villosum	14	0.79	1.25	0.137954%
				TOTAL	**23.99**	**2.75%**

(orange)	Specie with high economic value
(yellow)	Specie with medium economic value

We assume that the total volume of timber (m3/ha) extracted for building materials (i.e house building and posts for wire fences) should be equal to the volume extracted by selective logging operations. This assumption is conservative in the sense that selective logging operations use specialized equipment and heavy machinery to remove the timber whereas local habitants do all the work with hand-equipment.

Finally, the added significance of medium-lived and long-lived wood products is (Table 9):

Table 9: Total significance of medium-lived and long-lived wood products

Maximum Volume of valuable species (m3/ha) in the Project Area (*Tab Medium-lived Wood*)	**23.99**	**Significance**	
Maximum logging intensity according to literature(m3/ha)	20	5.0%	Not significant
Average logging intensity according to literature(m3/ha)	10	3.9%	Not significant

4. Reduction of the total area by retaining only five (5) out of the eighteen (18) original validated areas.

For the case of size reduction, the Proponent consulted with VCS to make sure such variation was allowed for which VCS replied (quoting): “Your interpretation of the AFOLU Requirements is correct. The project location can be smaller at verification than intended in the validated project description. As per section 3.4.2(c), the size of the project becomes fixed at verification and, as stated in section 3.4.2(d), areas not included within the verification but included in the project description must be considered in the leakage management, mitigation and accounting methods as per VM0015”.

5. Adoption of the validated Reference Region for Deforestation (RRD) of its neighbor REDD project (RMDLT Portel-Para REDD project)

For the case of a modification in the RRD, the original APDML’s RRD was overlapped in 87% by RMDLT’s RRD and the remaining 13% corresponded to the portion of the RRD that encompassed the removed areas (Figure 2). Because of this considerable similarity between RRDs, the ADPML project will adopt the RRD of the neighbor RDMLT project so both projects will use a unified RRD (Figure 3). By adopting the RRD of the RMDLT REDD Project, the ADPML Project also adopted the validated projection for future deforestation for that RRD. Procedures to estimate future deforestation are explained in the attached Annex: Methodology Procedures Used in the Projection of the Location of Future Deforestation (Modeling).

Figure 2: Initial overlap between ADPML's and RMDLT's RRDs.

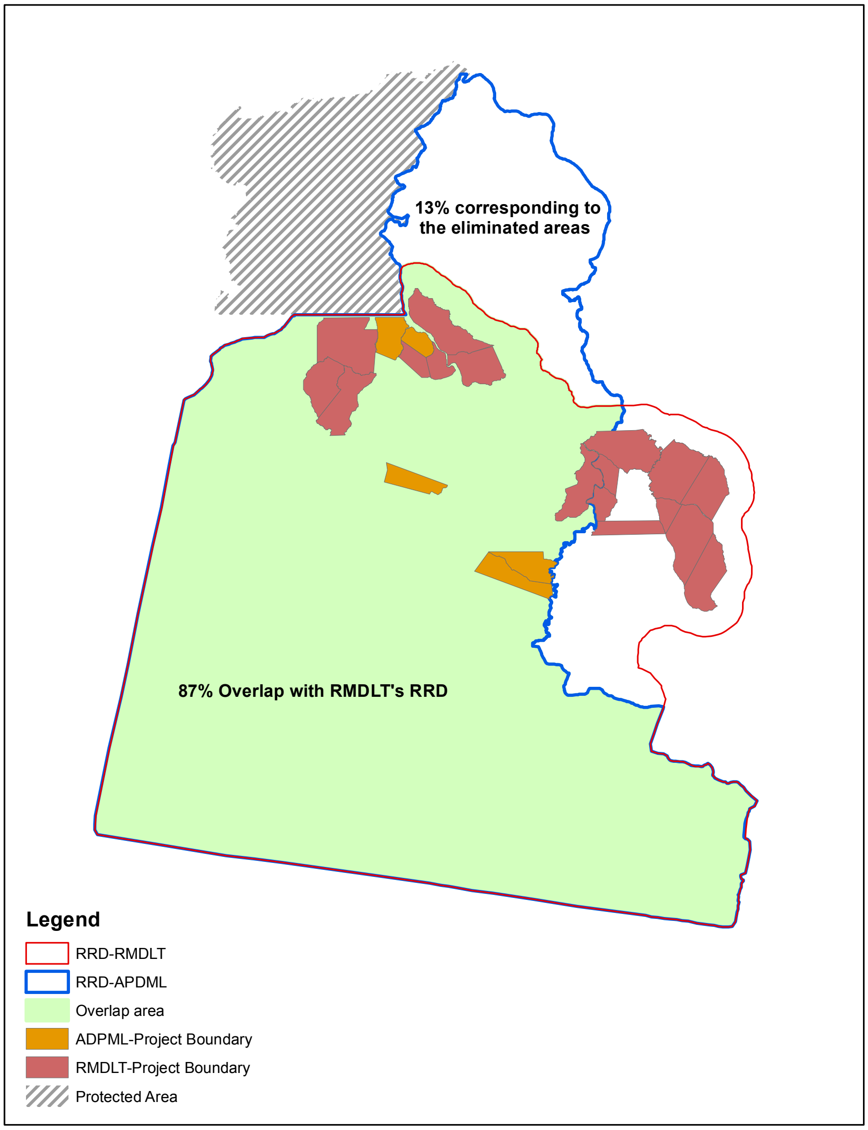
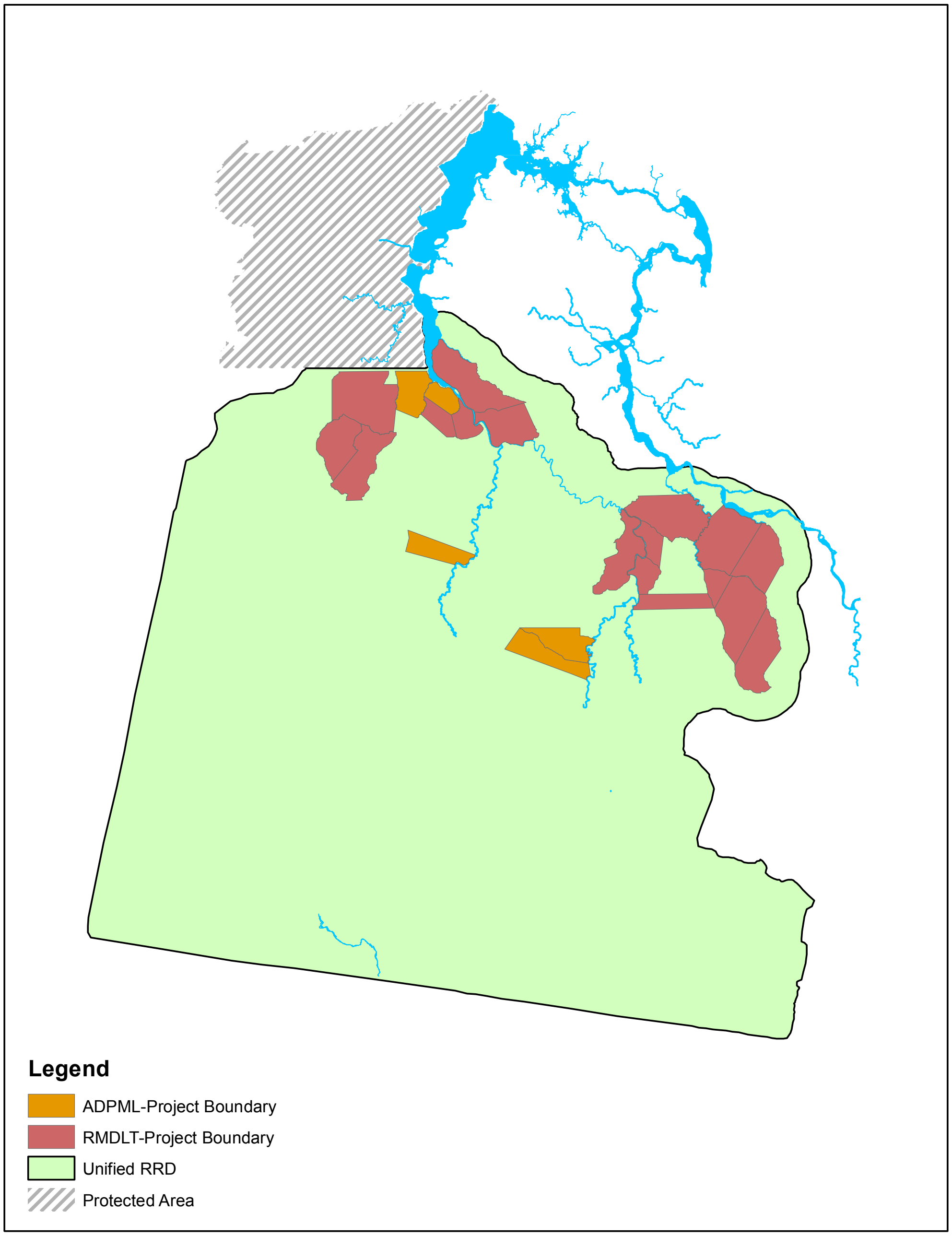


Figure 3: Unified RRD for both ADPML and RMDLT projects.



Evidence to support the change in Reference Region according to the VCS' methodology vm0015 v1.1:

The RRD encompasses the PB, PA, LMA and LK of the Project and it is just one single, continuous area. The RRD area is 65.3 times the PA thus it complies with the "rule of thumb" for size presented in the vm0015 methodology for projects smaller than 100,000 ha (that states the RRD should be between 20-40 times larger than the PA).

In terms of landscape configuration and ecological conditions, these are uniform throughout the RRD. Although some areas may present slights variations in slope, elevation and precipitation fall within the same range in all the areas of the RRD.

Vegetation is mostly Ombrophilous Forest with evidence of agricultural plots no further than 3Km from navigable rivers due to cassava crops implemented by riberinhos. The RRD complies with the requirements of the vm0015 methodology in terms of representativeness of the characteristics found in the PA by satisfying all four landscape configuration and ecological conditions (Table 10):

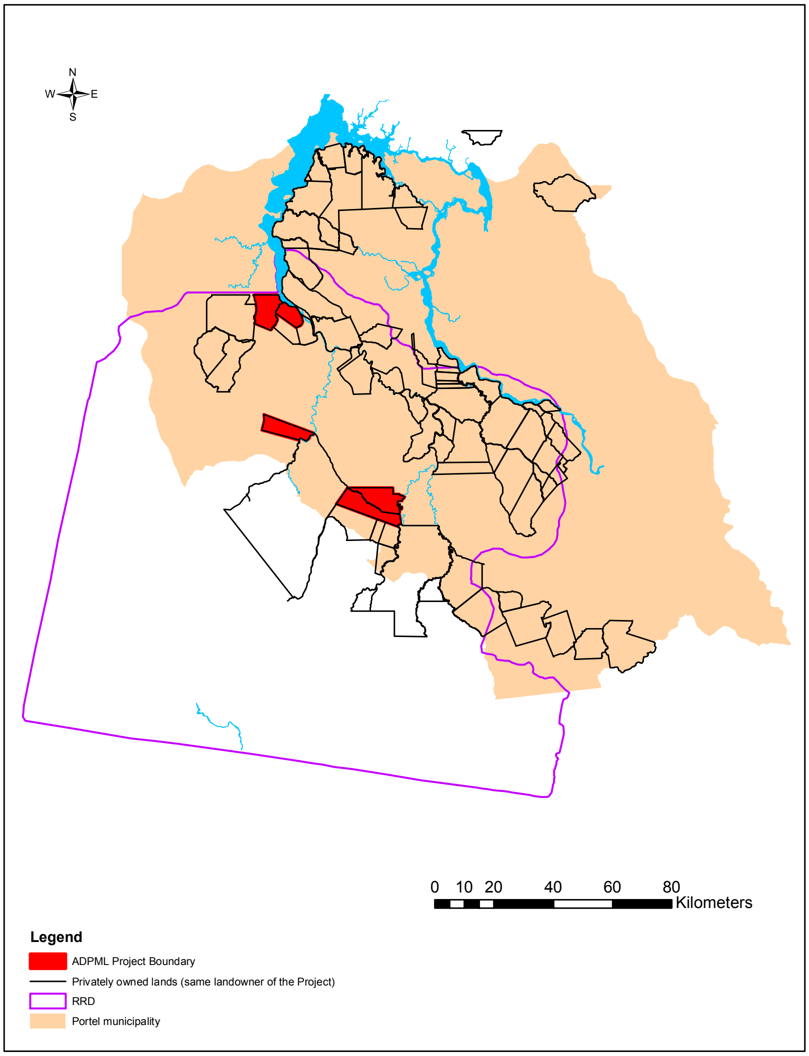
Table 10: Landscape configuration and ecological conditions for the validation of ADPML RRD

			Presence		Value or Range		RRD
		Description	RRD	PA	RRD	PA	Compliance
Landscape configuration and ecological conditions	Forest/vegetation classes	Ombrofile Forest	Present	Present	94.3%	98.0%	yes
	Elevation	Range			0-100	0-100	yes
	Slope	Average slope			5.5	5.6	yes
	Rainfall	Annual average (mm)			2,227.9	2,260.3	yes

In terms of socio-economic and cultural conditions, the RRD complies with all the requirements indicated in the vm0015 methodology. Firstly, the PB is privately owned land (legal tenure requirement) and will remain under the same legal status during the baseline case (legal status of the land requirement). In the RRD exist more privately owned lands (many of them belonging to the same landowner of the PB), which will also remain as private lands in the baseline case and because the PA belongs to the Portel municipality, which composes 40% of the RRD, municipal, regional and national regulations apply to both the PA and the RRD as well as the degree to which law is enforced. (Map 3). Secondly, the final land-use class expected to occur in in the PA is cattle ranching while small-scale agriculture is already existing in the LMA[10]. In the RRD cattle ranching is the dominant post-deforestation final land-use class but small-scale agriculture can also be found close to rivershores.

[10] Small-scale agriculture is not expected to occur in the PA or at least not as a final land-use in the baseline case because of three reasons: the historical contribution to small-scale agriculture in the land-use change has not been significant (2%); the PA is in most of the cases more than 3Km from river shores (and from the PRA it is known that riberinhos won't implement activities beyond this distance), and; cattle ranching is a more profitable activity that will eventually replace cassava sale thus replacing small-scale agriculture.

Map 3: Other privately owned lands in the RRD



As for agents and drivers of deforestation, the dynamics of deforestation in the RRD have been presented in sections 2.4.1 and 2.4.6.3 of the PD. As a brief summary, at the start of the historical reference period pioneer agents occupied the lands in the immediate vicinity of the BR-230 (Transamazonica highway) and PA-167 (Senador Jose Porfirio highway), where they extracted timber and implemented pastures. Over time, these original pioneer agents became consolidated agents and, together with new pioneer agents, they started to build secondary roads from the BR-230 and expanding into the forest in the north and south. As years went by, this secondary roads gave birth to tertiary roads in which became an intricate network of roads, all of them leading to the BR-230 or/and PA-167. By then end of the historical reference period (1996 to 2008), unofficial roads density in the RRD was 1,766 Km/104Km (an increase of 303% between 1996 to 2008) whereas site-specific literature indicates that average density of unofficial roads in 40% of the State of Para is 591Km/104Km (da Silva Viana, Fonseca et al. 2009).

A higher increase of unofficial roads in the RRD compared with the State of Para can be explained because around 40% of the RRD falls in the municipality of Portel, which has an increasing trend in deforestation rate while the State of Para has a decreasing rate. Also, the municipality of Portel still has vast areas of forest in comparison to the areas close to the BR-230 and PA-167 that are already deforested, so it is not possible for the deforestation rate to go any higher in such areas.

During the historical reference period timber resources in the areas surrounding the BR-230 and PA-167 were already depleted so illegal loggers (given their high mobility) started to explore forested areas far from primary roads (May, Millikan et al. 2011).

Nowadays these pioneer roads are connected to the road network of the BR-230 and the PA-167 thus became tertiary roads, just as it was verified during the on-site visit by the audit team based on the testimony of local riberinhos. The development of pioneer roads and their expansion is also made evident by a Map of digitalized roads based on Landsat TM imagery from 1996 and 2008 (map 16 of the PD). This road map shows how tertiary roads in the Project Area and its vicinity extend for kilometers, merging with secondary roads until reaching the BR-230 and PA-167. This finding is also supported in the literature, which states that timber operations can expand road networks for hundreds of kilometers (Uhl, Barreto et al. 1997).

Although the digitalized road network does not appear to be continuous up to the BR-230 and PA-167 (some sections seem to be “cut” by the forest canopy), the literature explains that logging and deforestation agents would leave some trees with large canopy to hide their activities from airborne surveillance until at some point, when all the remaining forest has been cleared and their activities are made evident but are irreversible (Margulis 2004).

This connection of road networks not only allows for products to be transported faster to major market selling points but also allows pioneer deforestation agents such as squatters to gain access to the Project Area, who try to claim large areas of forest looking to implement pastures. Nevertheless, monitoring and enforcement activities supported by the Project since 2008[11] have identified and avoided the invasion of large extensions of forest that otherwise would have been logged, cleared and converted to pastures. From our monitoring reports (see below) we have evidence that squatters have been trying to claim areas as far as 100Km from the BR-230 to convert them to pastures. Extracts from the official translation of the monitoring reports clearly indicate the extent of invaded areas and the intention of invaders in different opportunities from 2005 to 2011:

[11] In reality the landowner has been conducting monitoring activities since 2005, however the Project was implemented only in 2008 once the monitoring crew had gained enough monitoring experience

1. Miritizal and Gurupa - Told by ribeirinhos there was a big land claim on Miritizal, we went to the location and spoke to the invaders property keeper, he stated they owned 6,000 hectares and planned to start a project to cut and for cattle. The person's name is Soares and we have heard in the region he is very dangerous. We told the property this is private property and that it was being monitored by satellite so if any areas open up that everyone would get fines.
2. Miritizal and Gurupa - The same property keeper told us a family member of Soares is claiming 6,800 hectares next door. We told the property keeper this is private property and it is being monitored by satellite and that if any land is opened up they would get fines.

Engasgado - A land buyer came to us and asked if we knew of any land owner that was looking to sell some land or had land that he could convert into a 7,000 to 10,000 hectare cattle farm. He asked if Alvorado I, would work. We told him that this land and all the land around are private properties and told him to go north of Jaguarajó as it is all deforestested and uninhabited. Will follow up in 12 months.

Loggers: Alvorado II - Follow up to July 21, 2005 report: we went back and there is no activity on the land, however he stated they are planning on doing a cattle property on 20% of the land and 80% they plan on extraction. We again stated it was private property and that it can't be done. This involves about 4,800 hectares.

Porto do Fortuna - The Adami Family is each claiming 1,000 hectares, there are five family members for a total of 5900 hectares. We spoke to one of them and told them that IBAMA is monitoring the area. They stated they will not cut unless they get permits. However we think they are there to claim, regularize the land and to sell to a cattle buyer, or to have one of the logging companies to come in and log the wood. We will monitor this situation.

Aru and Porto do Fortuna - We went to Porto de Fortuna and came across a person by the name of Jordan Castro. He stated he has possession of 1,000 hectares in this area. He stated he was planning on setting up a cattle farm. We stated that it wouldn't be possible as this is private property.

Engasgado - Follow up: Spoke to the caseiro (property keeper) (property keeper) (property keeper) on Jaguarajó and he stated that a group has taken and claimed 7,025 hectares and is setting up a cattle farm. This appears to be the same cattle person from the May 17, 2006 report.

Miritzal and Gurupa - Follow up to April 16, 2007 - We went back to the location where Soares was and no one was there, there was no activity on the land either, potentially the property keeper left to go somewhere. There is 6,000 hectares involved here. Will follow up next time in the area. We can assume that if we deterred them for the last three years we have had success to deter them from starting to cut and do cattle.

Loggers: Miritizal, Gurupa and Alvorado I - We were approached by Agropecuária Colorado do Norte Ltda. which slightly west of Miritizal and is a big cattle operation. They asked if they could buy Miritizal, Alvorado and Gurupa to turn 20% of the land into cattle farms. We stated it is not for sale for that purpose, however we will be happy if they purchased it for preservation. They stated they would follow up with Jonas. This would cut down over 8,000 hectares of land to match the rest of their cattle farms.

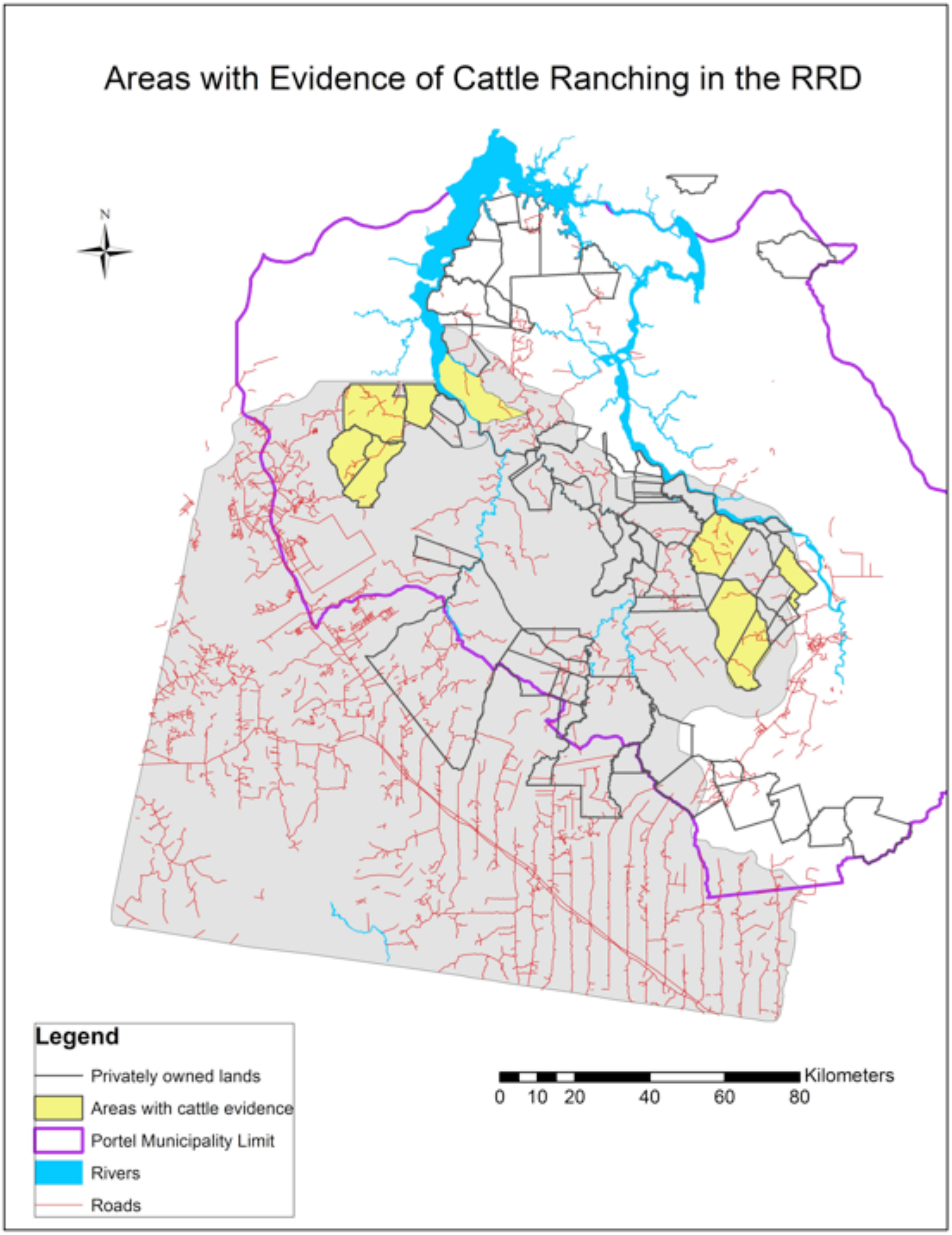
Loggers: Porto do Fortuna - Follow up to July 15, 2009 report on the Adami claim. We have gone back and there is still no activity on the land but the property keeper was present and he stated they were working to regularize the land to set up cattle farm and logging. We will follow up in Belem to see the progress. About 5,000 hectares here.

Loggers: Paraiso, Santa Maria III - We went to this property and he stated he Cleide Ferreira and was a relative of Manoel Ribeiro. We asked who is telling them they can settle in this location and he stated that no one is there to tell him to leave. We asked what his original plan was, and he stated to set up a cattle farm and extract wood. We stated that it is private property, however he can stay and live there, but is not allowed to cut. He stated he would only stay long enough to set up a homesite. We informed IBAMA that a new person was in the forest. There was about 1,700 hectares involved in this area.

Although degradation activities such as selective logging continuously try (and in some cases succeed) to gain entrance into the Project Area (because of the relative ease of getting in and out the area through use of the network of unofficial roads), it is not possible to observe deforestation and cattle ranching activities in the Project Area because of the continuous monitoring and enforcement activities held since 2005 and through the first four years of the Project lifetime. Monitoring reports from the field crews clearly indicate that many initiatives to implement pastures were stopped since 2005 (Map 4).

There is a clear correlation between the reach of the network of unofficial roads and the presence of initiatives to implement cattle ranching, even when such areas are located up to 100Km from primary roads. For this reason, the RRD constitutes a relevant geographical area that presents a credible proxy for possible future deforestation patterns in the Project Area, as required by the VM0015 methodology.

Map 4: Areas were cattle ranching initiatives were identified and stopped since 2005 to 2011

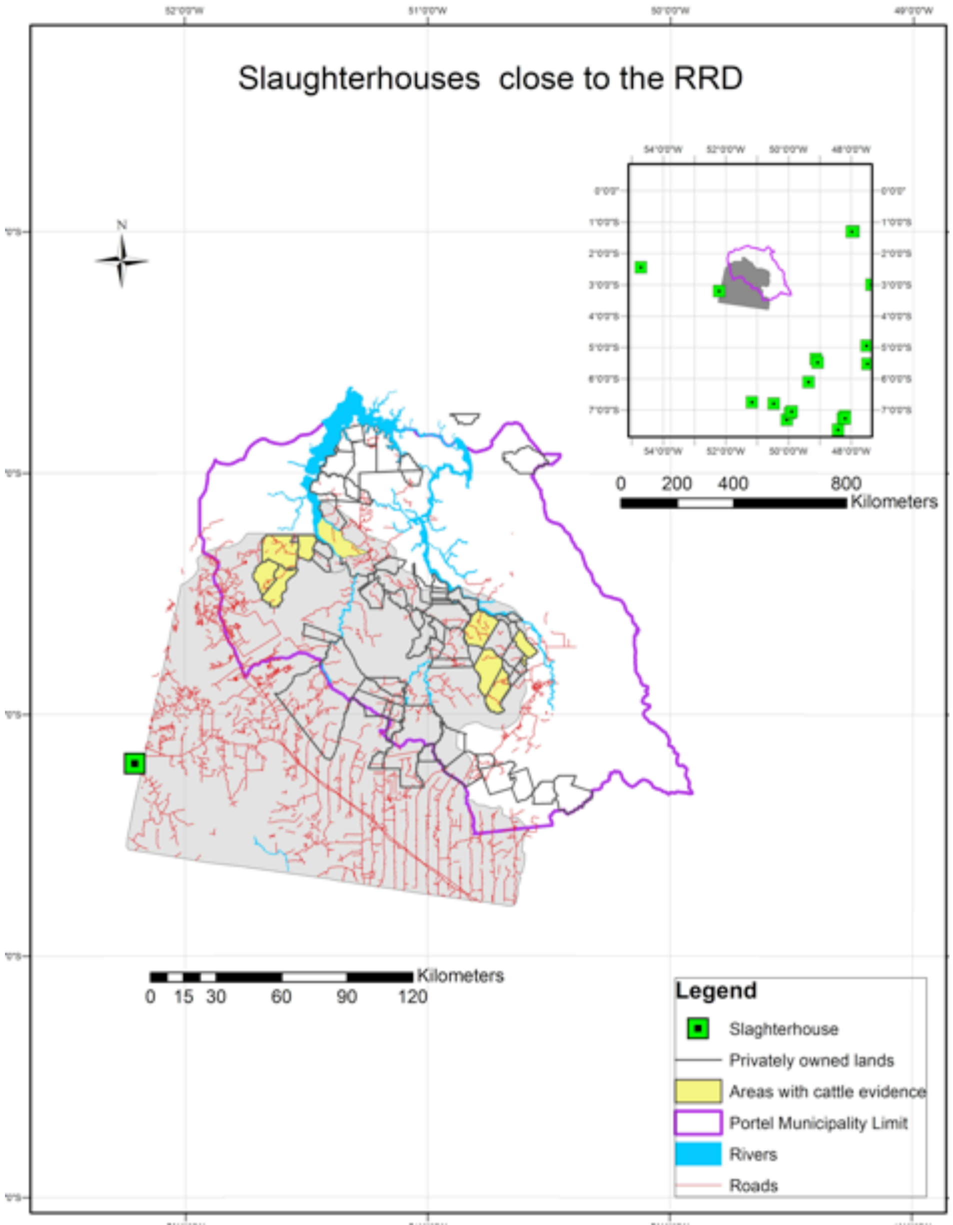


- Although being close to primary roads facilitated deforestation during the historical period, resource depletion and high mobility allowed loggers to encroach in new frontiers (May, Millikan et al. 2011). Such is made evident by the aggressive growth in the network of unofficial roads (Uhl, Barreto et al. 1997; Brandão Júnior, Souza Júnior et al. 2007) that expanded almost up to the junction of the Anapu and Pacaja rivers by merging with pioneer roads (map 16 of the PD). It is also contemplated by the literature that pioneer roads can expand for hundreds of kilometers (Uhl, Barreto et al. 1997).

- A study held in Brazil in 2007 shows that deforestation in the Legal Amazon is explained largely by the presence of unofficial roads. Such study indicates that 71% of all mapped roads are classified as unofficial and that 65% of all deforestation in 2003 and that 69% of the increment in 2004-2005 deforestation was located in the vicinity of unofficial roads (Brandão Júnior, Souza Júnior et al. 2007). These results are supported by literature that indicates that logged areas (which are defined by the presence of tertiary roads) have a high likelihood of being deforested (Asner, Broadbent et al. 2006).

- Monitoring reports back from 2005 indicate that that cattle ranching initiatives wanted to develop up to 100 Km from primary roads, which nowadays is very close to the edge of the road network of the BR-230 and PA-167 within the RRD. The fact that agents wanted to implement cattle up to 100Km indicates that there is access to markets. The closest slaughterhouse in the area is in Altamira, which can be reached by the BR-230 (Map 5). So, it can be implied that areas as far as 100Km upward the BR-230 had access to primary roads through the network of tertiary and secondary roads back in 2008 and before.

Map 5: Slaughterhouses close to the RRD



- More than half the monitoring reports that explicitly mentioned cattle ranching initiatives indicate that cattle is either preceded by logging or happens in parallel. This fact proves that the forests encroached by tertiary roads follow the deforestation dynamics presented in literature and verified in the RRD during the historical reference period. In this matter, there are many monitoring reports indicating plans to make large-scale invasions to conduct illegal logging and, although such reports do not explicitly indicate that the agent would have implemented pastures, all aforementioned evidence suggest that the deforestation dynamics presented in the literature and verified in the RRD will take place in the Project Area under the baseline scenario.

In conclusion, the selected RRD is geographic area that meets the size, landscape and socio-economic requirements of the VM0015 methodology for determining the baseline of the project area. It has been demonstrated that agents, drivers and overall deforestation patterns observed in it during the 10-15 year period preceding the start date of the proposed AUD project activity in the RRD represent a credible proxy for possible future deforestation patterns in the project area as required by the VM0015 methodology.

6. Modification of the original Leakage Belt, which has finally been absorbed by the neighbor RDMLT Portel-Para REDD Project as stated in a Leakage Belt Agreement

The Proponent requests a modification in the shape of the original leakage belt for the following reasons:

1. The Leakage Belt cannot be the same as the Reference Region. According to VCS vm0015 methodology: *"The methodology defines four spatial domains: a broad "reference region", the "project area", a "leakage belt", and a "leakage management area". The project area, leakage belt and leakage management areas are subsets of the reference region and are always spatially distinct (not overlapping) areas*" (VCS vm0015 methodology page 7 section Summary Description of the Methodology).

2. The validated Leakage Belt does not rely on an Opportunity Cost Analysis or a Mobility Analysis as required by the vm0015 methodology v1.1 (VCS vm0015 methodology v1.1 page 20 section 1.1.3).

3. The updated leakage belt has been generated based on the mobility of the main agents of deforestation: squatters, ranchers, loggers (agents of degradation acting as initiators of the deforestation dynamic), and ribeirinhos. This mobility analysis uses four variables: distance to the Project Boundary, Distance to the Boundary of the Consolidated Deforestation Frontier, Distance to Pioneer Roads, and Distance Covered by Ribeirinhos from River Shores. The updated leakage belt encompasses the Project and has as a limit the equidistance of these two variables (Figure 4).

4. Most of the deforestation in the Reference Region (thus in the original leakage belt) is not cause by the activities of the Project. According to the VCS vm0015 v1.1 methodology "*Where strong evidence can be collected that deforestation in the leakage belt is attributable to deforestation agents that are not linked to the project area, the detected deforestation may not be attributed to the project activity and considered leakage"* (VCS vm0015 methodology v1.1 page 115 section 1.2.2). Therefore, the Project must reconsider its leakage belt to transparently account for the right amount of leakage.

5. Agents located within the non-forest frontier existing at the Project start date belong to what the PD identifies as 'Consolidated Frontier' that is the area where wealthy deforestation agents are established (close to primary and secondary roads). According to literature, agents in the

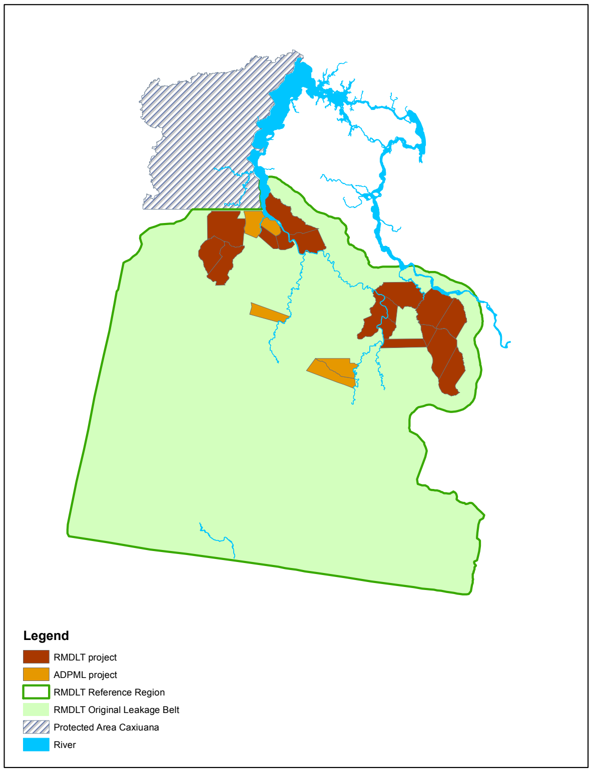
Consolidated Frontier keep expanding their existing logging and ranching activities, and are not prone to colonize new areas. On the other hand, agents that are expected to encroach into the Project Area are pioneer agents that are driven mostly by land speculation and also by timber prices and the revenues from extensive cattle ranching. For this reason, it makes no sense to assume that all deforestation within the RRD, specially the one developing in the Consolidated Frontier, is a result of agents displaced by the Project. It is far more logical to understand deforestation at the Consolidated Frontier as the result of the expansion of existing deforestation at the Project start date.

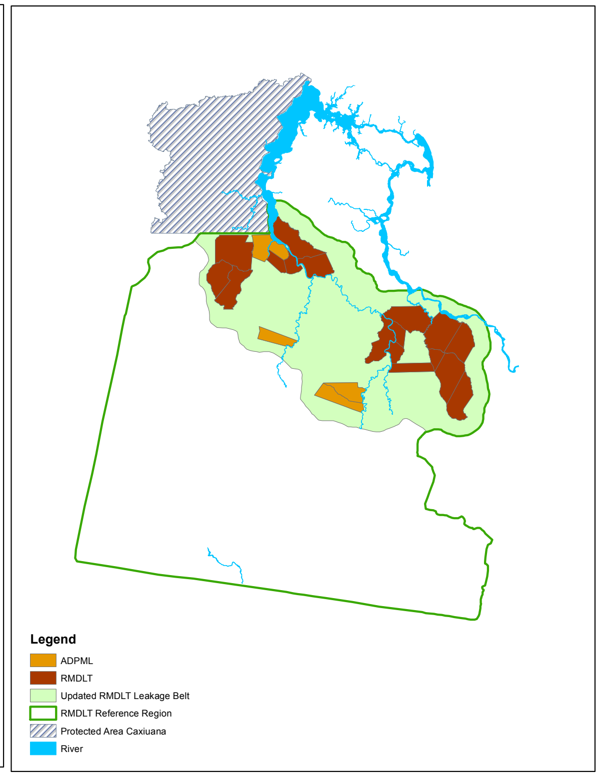
6. Agents driven by land speculation look for forested areas that appear to be ‘unused’. For this reason a pioneer agent that arrives to the Project Boundary and is displaced due to the activities of the Project will want to look for similar areas to encroach. Although agents are very mobile, it is more likely that a pioneer agent already in the vicinity of the Project Boundary would try to encroach a neighbor area and not travel tens of Kms to try luck on another area.

7. The Project cannot displace more deforestation (leakage) than the amount of forest at project start date. The fact that the leakage belt is 7.6 times the size of the Project Area implies that the leakage belt can accommodate much more deforestation than the one displaced by the Project.

8. Ribeirinhos are not significant agents of deforestation in the baseline scenario (based on the evidence from the historical period). According to the results of the PRA, ribeirinhos will not conduct their activities farther than 3Km from river shores.

Figure 4: Original validated (left) and updated (right) Leakage Belt





<u>Evidence to support the updated leakage belt according to the VCS' methodology vm0015 v1.1:</u>

The Mobility Analysis

A Mobility Analysis is required to identify the area where pioneer agents move in search of areas to encroach and claim.

It should be pointed out that the baseline scenario refers to the conversion of forest (initial class) to pasture (final class), a process that can be accomplished by agents that assume different roles. An agent is labeled (i.e. logger, squatter, rancher) depending on the activity he conducts at a specific moment, but that doesn't mean such agent cannot undertake additional activities. For example, a squatter can also be interested in extracting and selling timber to finance the clearing of the forest and the further implementation of pastures (May, Millikan et al. 2011); an illegal logger can be also motivated by land speculation (Margulis 2004) and the rights a landowner has over timber (Jose Antonio 2008), thus be interested in land claim.

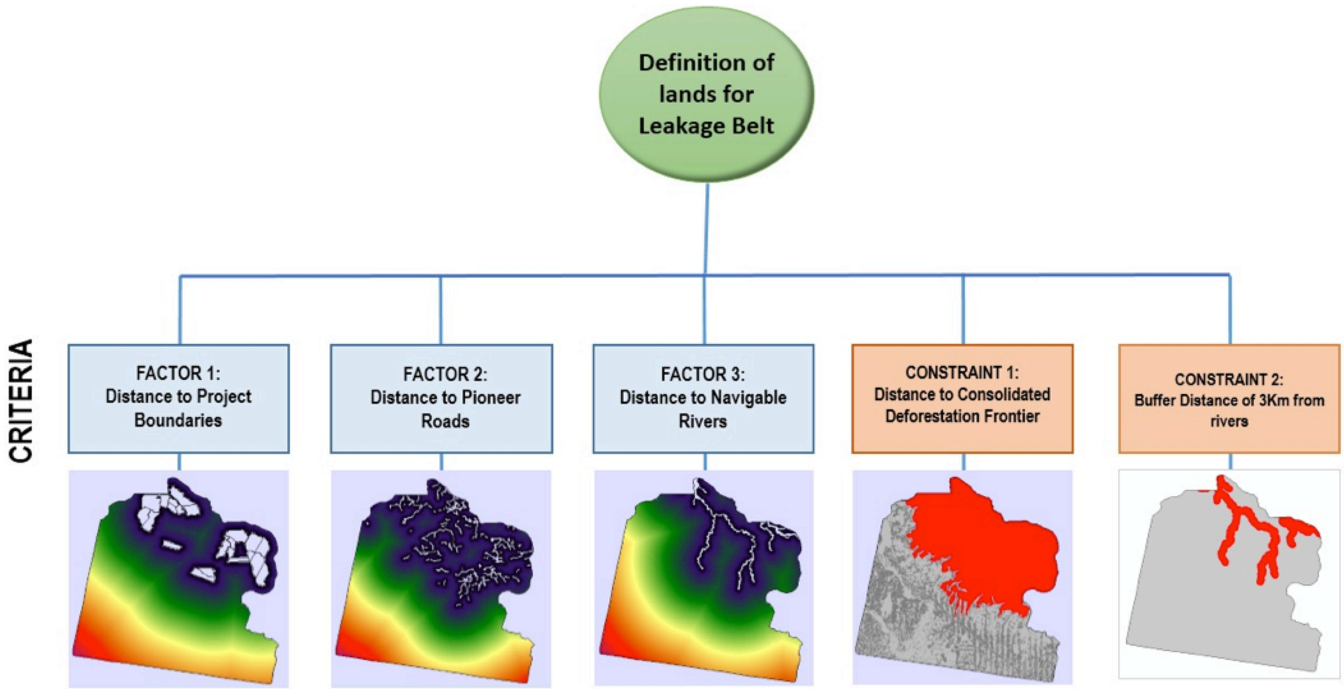
Pioneer agents look for areas of forest that apparently are under no use, clear them and then claim them. So, displaced pioneer agents will not look into the consolidated frontier for areas to encroach because large and well-capitalized deforestation agents already occupy those areas.

The potential mobility of these agents is assessed using multi-criteria analysis. Five criteria were used to determine the Leakage Belt through a mobility analysis (Table 11). Each of these criteria are represented by GIS raster images and are a set of guidelines or requirements used as basis to make a decision categorized as factors and constraints. Factors define some degree of suitability for all geographic regions, facilitating the movement of the agents. Constraints are those Boolean criteria that limit mobility of the agents to a particular region, identifying areas that are not considered suitable for agents' mobility. This analysis presents three factors and two constraints that apply to more than one agent (Figure 5):

Table 11: Deforestation agents and mobility criteria

#	Criteria	Apply to the following agents
	Factors	
1	Distance to Project Boundaries	Loggers/Squatters/Ranchers
2	Distance to Pioneer Roads	Loggers/Squatters/Ranchers
3	Distance to Navigable Rivers	Loggers/Squatters/Ranchers/Ribeirinhos
	Constrains	
1	Distance to Consolidated Deforestation Frontier	Loggers/Squatters/Ranchers
2	Buffer distance of 3Km from river shores	Ribeirinhos

Figure 5: Multi-Criteria Analysis Structure



The variables identified for the Mobility Analysis are:

1. Factors *(criteria that facilitate mobility)*

1.1 Distance to Projects Boundary standardized to 0-255 scale (Figure 6):

We know from our Participatory Rural Appraisal (PRA) and literature that loggers, squatters, and ranchers would try to get control over areas that appear to be "under no productive use" or forested areas (Araujo, Bonjean et al. 2009; ESLLC 2012). Despite the high mobility of deforestation agents in the Reference Region, a deforestation agent at the Project Boundary that cannot get access to the Project Area will move to nearby "unused" area. Once a deforestation agent is at the Project Boundary it becomes more cost/effective to encroach the next available area to start the claim process.

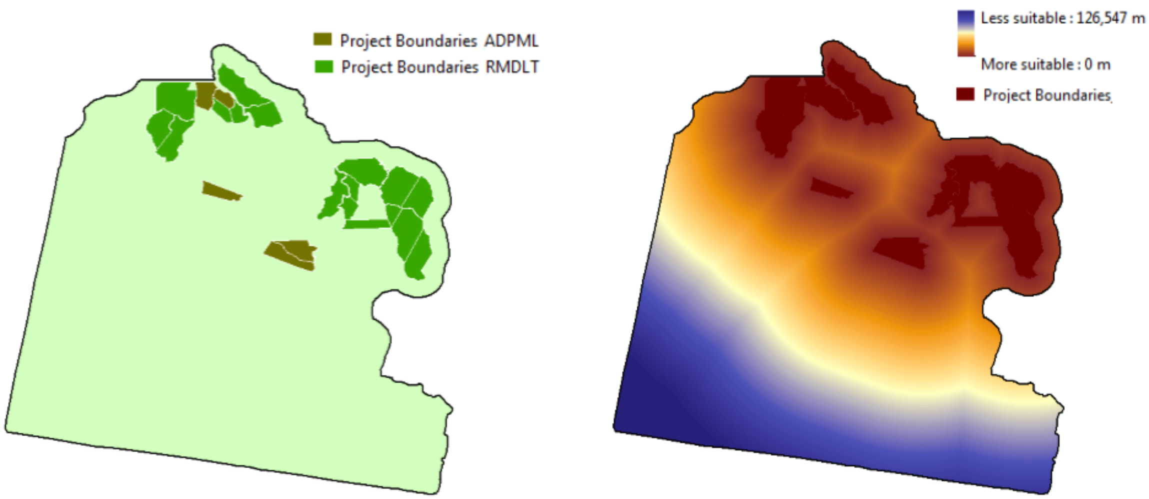
At the same time, the areas surrounding the Project Boundary constitute large extensions of forest without the presence of landowners, economic activities (understood as timber extraction activities) or consolidated deforestation agents. Thus, these areas are available to be encroached by pioneer agents according to the Constitution of 1988 (Araujo, Bonjean et al. 2009) . On the other hand, the south of the Reference Region or "Consolidated Frontier" (Margulis 2004), was occupied by well-capitalized agents already present at the start date of the Project[12]. Deforestation in this Consolidated Frontier is the result

[12] According to our historical analysis based on Landsat TM imagery for 2008.

of the expansion of the activities of the existing agents and due to proximity of existing non-forest (Kirby, Laurance et al. 2006).

In conclusion, the closest a new non-forest area[13] gets to the Project Boundary, the higher the likelihood it is a result of a displaced activity by the presence of the Project. For this reason, the variable vicinity to the Project Boundary properly describes a factor that facilitates mobility of the main deforestation agents expected to encroach into the Project Area.

Figure 6: Distance to the ADPML and RMDLT Project Boundaries



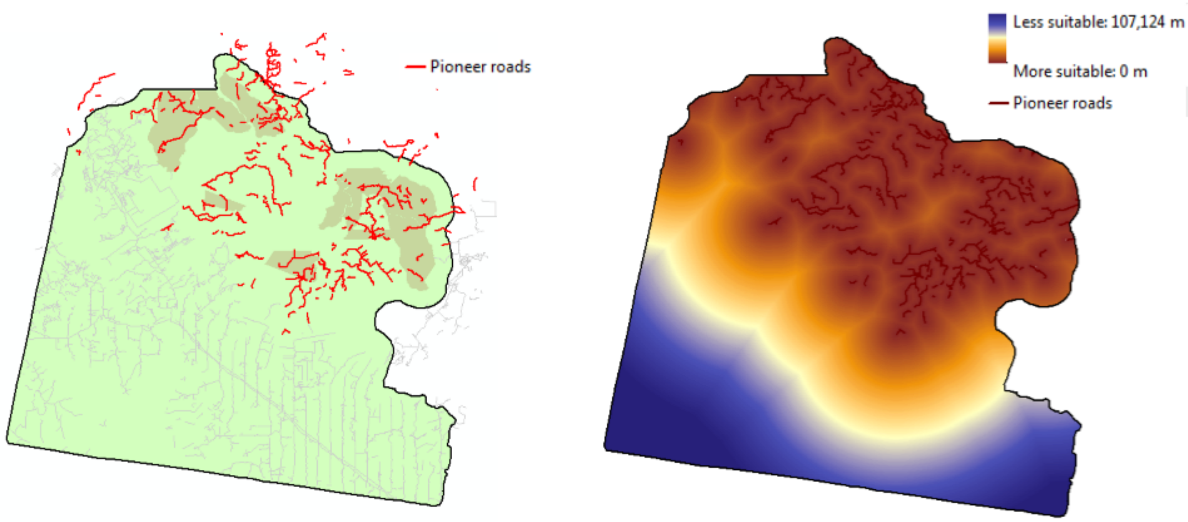
1.2. Distance to Pioneer (logging) Roads (Figure 7):

The widespread unclear land tenure and weak law enforcement (May, Millikan et al. 2011), allow loggers, squatters, and ranchers to gain access to the Project Area and its surroundings. Agents take advantage of the constantly evolving roads network developed by previous logging activities (pioneer roads) to reach previously inaccessible forested lands (May, Millikan et al. 2011).

This factor is represented with the image DISTANCEROADS, which is a simple linear distance image from all pioneer roads in the reference region. The closer an area is to the pioneer road, the most suitable it is for the mobility of the agents.

[13] Above baseline level.

Figure 7: Distance to Pioneer Roads



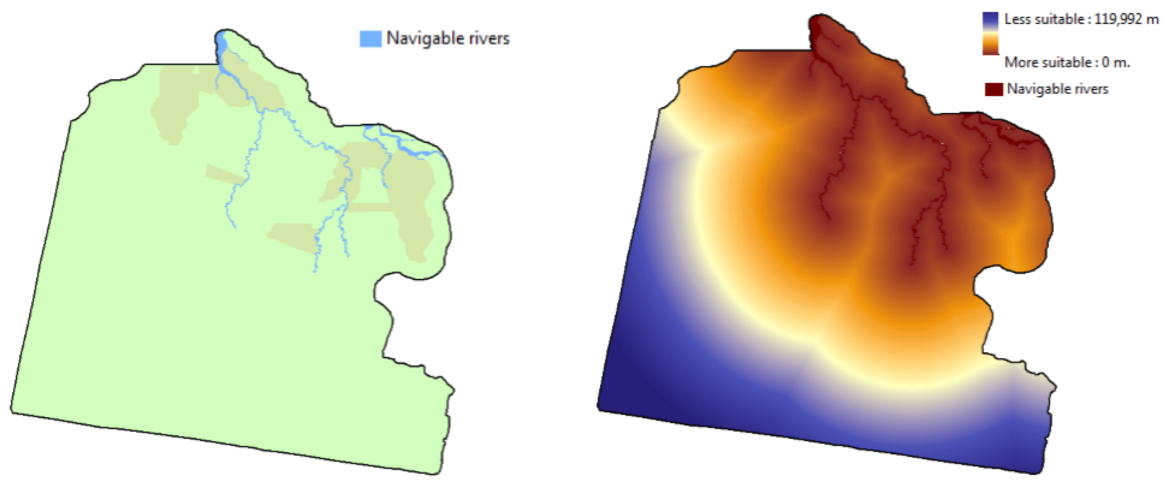
1.3. Distance to Rivers (Figure 8):

Pioneer agents can also use rivers to get access to some parts of the project area. However, based on data from the historical period analysis, this variable is not as strongly correlated to the baseline deforestation.

Rivers can be used by any agent trying to get access to the area but are mostly used by the agents ribeirinhos who, according to the PRA, conduct their activities no further than 3Km from river shores (ESLLC 2012).

This factor is represented with the image DISTANCERIVERS, which is a simple linear distance image from the navigable rivers in the reference region. The closer and area is to navigable rivers, the most suitable it is for the mobility of the agents.

Figure 8: Distance to Rivers



2. Constrains *(criteria that constrain mobility)*

2.1. Distance to the Boundary of the Consolidated Deforestation Frontier (Figure 9):

Non-forest areas at the south of the Reference Region and close to primary roads (BR-230 and PA-167) already existed at project start date according to our historical deforestation analysis[14]. Deforestation in this Consolidated Frontier is the result of the expansion of the activities of the existing agents and due to proximity of existing non-forest (Kirby, Laurance et al. 2006).

It can be assume that most of the areas nearby roads (i.e. official and unofficial) are already claimed (Hans P 1991). At the same time, a claimant who lives on the land gets preference to obtain a title for up to three times the area which he or she cleared forest (Hans P 1991).

Based on the above information, it can be assumed that there are no “free” forest resources in the Consolidated Frontier and that those who already claim possession of such areas will conduct any future clearing. Those agents who want to expand their activities and explore new forest areas must do so where forest resources are abundant and free to claim.

The area of the Consolidated Frontier represents a constrain for loggers, squatters, and ranchers as explained below.

[14] According to our historical analysis based on Landsat TM imagery for 2008.

2.1.1 Constrain to Loggers: cattle ranchers that also extract valuable timber species on their forests before clearing the land to implement pastures already occupy the area of the Consolidated Frontier. For this reason, selective logging operations cannot encroach areas where the presence of the landowners is made evident and where potential conflicts may arise.

The farther from the Consolidated Frontier, the most likely that illegal logging operations will take place which is made evident by the location of pioneer roads in the RRD (see Figure 5, left map).

2.1.2 Constrain to Ranchers at the Consolidated Frontier: The expansion of existing non-forest areas is highly correlated with previous clearings (Kirby, Laurance et al. 2006). This is also explained by the fact that non-forest existing in the south of the Reference Region at project start date belongs to what is known as a Consolidated Frontier. Deforestation caused by the larger landowners in these consolidated areas has less to do with the logic of "frontier occupation." It is more in keeping with a capitalist desire to invest in continuing the expansion of business activities, and also as a way of securing larger extensions of land. Also, logging operations play a limited role in financing the expansion of production and in opening new "penetration fronts" in this consolidated frontier (Margulis 2004).

The lands at the Consolidated Frontier are most likely already claimed or owed by those ranchers present during the historical reference period. There are no available lands to be encroached and claimed in the Consolidated Frontier, thus any new area expansion for pastures should occur distant from the primary and secondary roads where forest resources are abundant (Larson 2008).

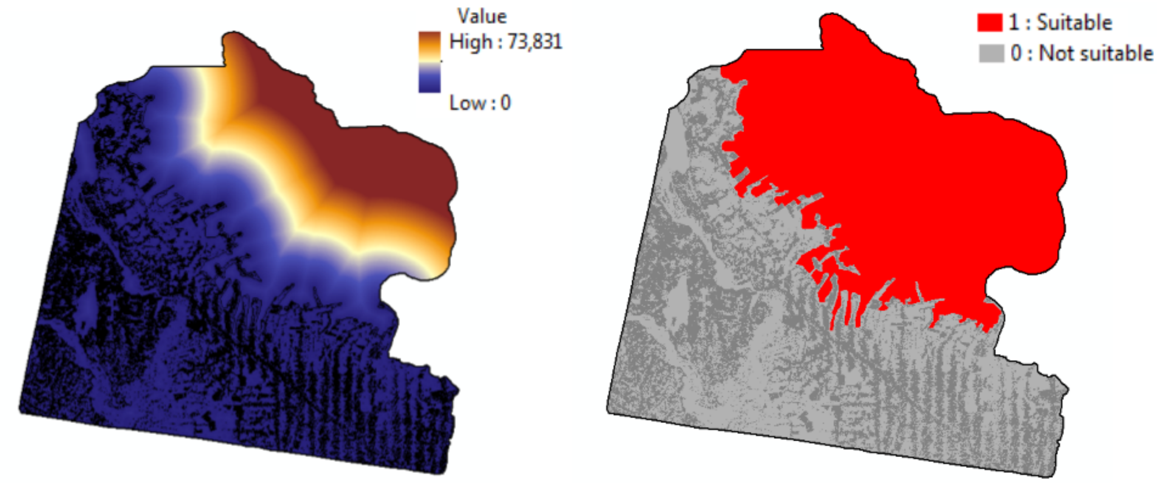
Therefore, deforestation in this Consolidated Frontier is a result of the activities of those agents already present there before the Project start date so it cannot be attributed to agents displaced by the Project.

2.1.3 Constrain to Ranchers arriving to the Project Area: Deforestation agents at the Project Boundaries and displaced by the Project will rather encroach forest areas in the vicinity rather than invading areas in the Consolidated Frontier. Actually, land invaders do not invade land already converted to pasture (Hans P 1991) where large cattle ranchers are already established Pioneer agents will actually arrive using primary roads and the network of unofficial roads (Mertens, Poccard-Chapuis et al. 2002; Brandão Júnior, Souza Júnior et al. 2007) to the Project Boundary looking for available "unused" areas (forested areas) with little or inexistent presence of landowners (Araujo, Bonjean et al. 2009).

2.1.4 Conclusion: In conclusion, the closer to the Consolidated Frontier, the harder it gets of a deforestation agents to invade and claim forest areas. For this reason, the variable Vicinity to the Consolidated Frontier properly describes a factor that constrain mobility of the main deforestation agents expected to encroach into the Project Area.

This constraint is represented with the image DISTANCEDEFOR, which is a Boolean image of the Consolidated Deforestation Frontier. Areas that are inside this frontier are given the value 0 while those outside are considered with the value 1. When the constraints are multiplied with the suitability map, areas that are constrained are masked out while those that are not constrained retain their suitability value.

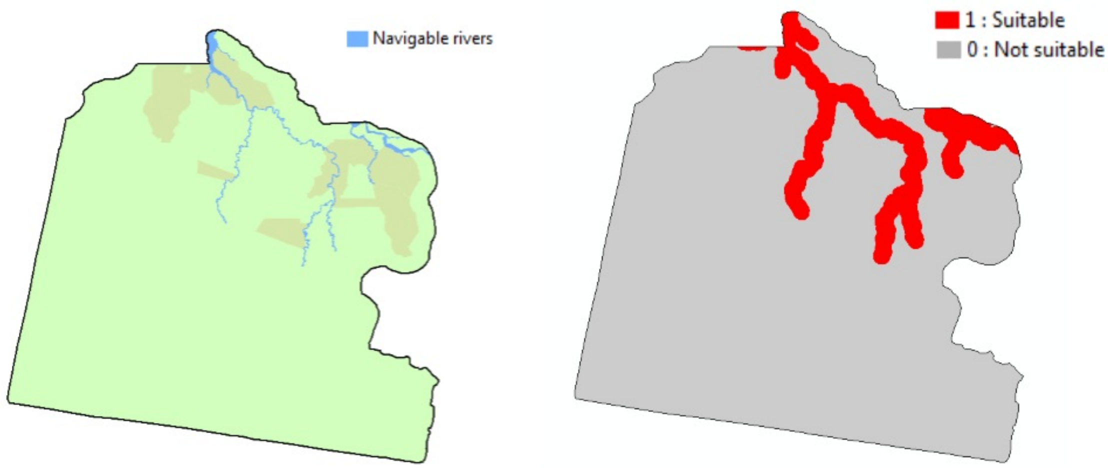
Figure 9: Distance to the Boundary of the Consolidated Deforestation Frontier



2.2. Buffer Distance of 3Km from rivers (Figure 10)

Rivers are mostly used by the agents ribeirinhos who, according to the PRA, conduct their activities no further than 3Km from river shores (ESLLC 2012). Agricultural, gathering, and economic activities (cassava production and sale) occur within this buffer. As mentioned in the PRA, ribeirinhos cover in-land distances by foot thus it is exhausting for them to cover distances greater than 3Km.

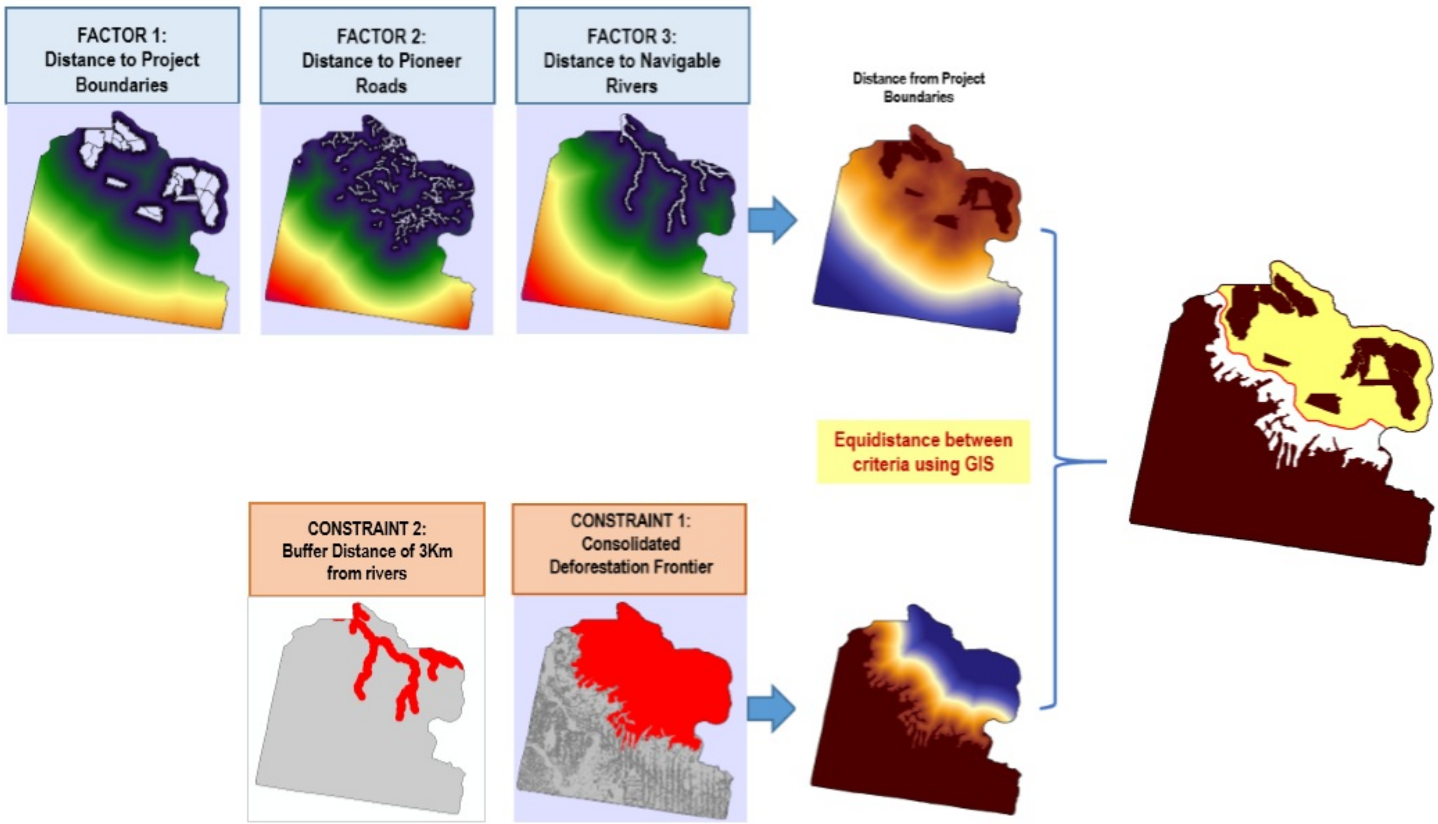
Figure 10: Buffer distance of 3Km from river shores



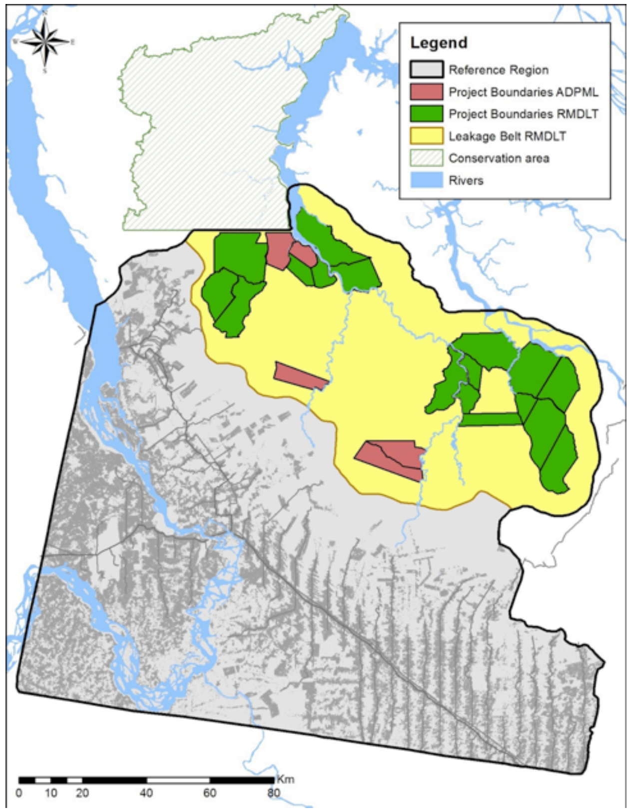
3. Results

We are giving each of the factors the same weight of relevance. The equidistance between the two criteria (factor and constraint) was calculated using GIS software10 to identify the overlap line that constitutes the limit of the Project's Leakage Belt (Figure 11). This consolidated leakage belt (Map 6) incorporates the leakage belts of both ADPML and RMDLT REDD Projects according to the terms of the Leakage Belt Agreement signed by the Proponents of both projects.

Figure 11: Overlap between criteria



Map 6: Unified Leakage Belt



7. Addition of all data and parameters monitored (both monitored or not)

All data and parameters indicated in the VM0015 methodology (monitored or not by the Project) are now included in the Project's PD.

8. Generation of a fixed degradation boundary at project start date, which will be monitored and assessed at every verification event

The Projects' baseline assumes that the final LU/LC is non-forest land. At the start date of the baseline period, the Project Area is composed by two forest classes (initial classes), Dense Forest (DF) and Degraded Forest (dF), which are projected to change into non-forest lands (NF) (final class). Because of this deforestation dynamic, the baseline doesn't consider the change from one forest class to another (DF to dF) as a final class. For this reason, the boundaries of the areas of each forest class at project start date are assumed to remain fixed.

According to VM0015 6.1.1.C "If the boundary of the forest classes undergoing degradation is fixed (i.e. does not change over time) it is sufficient to show the estimated changes in carbon stocks in a table". Therefore, it is not necessary to prepare a map sequence showing the spatial and temporal sequence of forest classes with successively lower carbon stocks must be prepared to account for the degradation occurring prior to deforestation.

Nevertheless, in order to be accurate and conservative, the Project will use remote sensing imagery to review this fixed degradation boundary at every verification event to account for GHG emissions from unavoided degradation.

2.3 Grouped Project

This is not a grouped project. It does not apply.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data Unit / Parameter	**RRD Forest / Non-forest Cover Benchmark Map**
Data Unit	ha
Description	Map showing LULC class forest and non-forest at Project start date
Source of data	Landsat Imagery from 1996, 2004 and 2008 obtained from INPES web site.
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Measurement Frequency	At the start of every fixed baseline period.
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**Project Area Forest Cover Benchmark Map**
Data Unit	ha
Description	Map that shows the stratification an location of LULC class forest in the Project Area at the Project start date (100% forest cover)
Source of data	Landsat Imagery from 1996, 2004 and 2008 obtained from INPES web site.
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Measurement Frequency	At the start of every fixed baseline period.
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**Leakage Belt Forest Cover Benchmark Map**
Data Unit	ha
Description	Map that shows the stratification an location of LULC class forest in the Leakage Belt at the Project start date (100% forest cover)
Source of data	Landsat Imagery from 1996, 2004 and 2008 obtained from INPES web site.
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Measurement Frequency	At the start of every

	fixed baseline period.
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**ABSLRR**$_t$
Data Unit	ha
Description	Annual area of baseline deforestation in the reference region at year t
Source of data	Calculated based on the results from future deforestation model using peer-reviewed software IDRISI Selva.
Justification of choice of data or description of measurement methods and procedures applied	Variables and procedures to calculate baseline deforestation are thoroughly explained in Annex 3.
Measurement Frequency	Each renewal of fixed baseline period
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**ABSLPA**$_t$
Data Unit	ha
Description	Annual area of baseline deforestation in the project area at year t
Source of data	Calculated based on the results from future deforestation model using peer-reviewed software IDRISI Selva.
Justification of choice of data or description of measurement methods and procedures applied	Variables and procedures to calculate baseline deforestation are thoroughly explained in Annex 3.
Measurement Frequency	Each renewal of fixed baseline period
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**ABSLLK**$_t$
Data Unit	ha
Description	Annual area of baseline deforestation in the leakage belt at year t
Source of data	Calculated based on the results from future deforestation model using peer-reviewed software IDRISI Selva.
Justification of choice of data or description of measurement methods and procedures applied	Variables and procedures to calculate baseline deforestation are thoroughly explained in Annex 3.
Measurement Frequency	Each renewal of fixed baseline period
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**Ctot**$_{icl}$
Data Unit	t CO_2-e ha^{-1}
Description	Average carbon stock of all accounted carbon pools in forest class *icl*
Source of data	Determined by using data from the carbon inventory developed by SETA Ambiental and supervised by Ecosystem Services LLC (November 2011 through January 2012).
Value Applied	Dense Forest: 468.01 Degraded Forest: 413.35
Justification of choice of data or description of measurement methods and procedures applied	The inventory was carried out in 79 plots of forest comprising two classes namely dense forest and degraded forest, within an area that encompasses the Project Area and Leakage Belt. A detailed report can be found in Annex 5 but as a summary the following are the highlights of the report: - Sampling plots were randomly located in forest stratum - DBH (Diameter at Breast Height) was measured for all the trees in a plot - Trees biomass was determined using Overman et.al. 1994 equation, which was successfully tested nearby the Project Area by a different study
Measurement Frequency	Only once at project start
QA/QC procedures to be applied	Sampling protocol can be found in Annex 5 and calculations in Annex 6..
Any Comment	na

Data Unit / Parameter	**Ctot** $_{f_{cl}}$
Data Unit	t CO_2-e ha^{-1}
Description	Average carbon stock of all accounted carbon pools in post-deforestation class f_{cl}
Source of data	IPCC 2003 Good Practice Guidance for Land Use – Table 3.3.8
Value Applied	51.65
Justification of choice of data or description of measurement methods and procedures applied	Data is a default value for land converted to grassland in Tropical-Moist & Wet Climate Zones.
Measurement Frequency	Only once at project start
QA/QC procedures to be applied	The highest value of the error range was utilized (original value reduced in 75%)
Any Comment	na

Data Unit / Parameter	**CF**
Data Unit	tCt-1d.m
Description	Carbon fraction of dry matter.
Source of data	IPCC 2003 Good Practice Guidance for Land Use, Chapter 3.2 Forest Land, page 3.25
Value Applied	0.5
Justification of choice of data or description of measurement methods and procedures applied	The value chosen is an IPCC default value as recommended by the vm0015 methodology.
Measurement Frequency	n/a
QA/QC procedures to be applied	n/a
Any Comment	n/a

Data Unit / Parameter	**CF*j***
Data Unit	tCt-1d.m
Description	Carbon fraction for tree specie j.
Source of data	IPCC 2003 Good Practice Guidance for Land Use, Chapter 3.2 Forest Land, page 3.25
Value Applied	0.5
Justification of choice of data or description of measurement methods and procedures applied	The value chosen is an IPCC default value as recommended by the vm0015 methodology.
Measurement Frequency	At Project start
QA/QC procedures to be applied	n/a
Any Comment	n/a

Data Unit / Parameter	$f_j(DBH)_{ab}$
Data Unit	t d.m. tree-1
Description	Allometric equation for species j linking DBH to aboveground biomass of living trees, expressed as t d.m. tree-1
Source of data	Overman's 1994 equation Overman, Witte et al. 1994) corrected for biomass moisture content (Araujo, Higuchi et al. 1999)
Justification of choice of data or description of measurement methods and procedures applied	Above-ground biomass for a DBH ≥ 10cm was calculated using Overman's equation (Overman, Witte et al. 1994) corrected for biomass moisture content (Araujo, Higuchi et al. 1999). Araujo tested Overman's equation in a location 250Km from Belem in Para (close to the Project Area under the same forest type), obtaining predicted results within ±0.6% of the weight determined in the field through destructive sampling.
Measurement Frequency	At project start.
QA/QC procedures to be applied	Overman 1994 equation has an R2 of 0.9 and was tested in the same region of the Project Area, in the same forest type with an error of ±0.6%
Any Comment	na

Data Unit / Parameter	**LULC-change**
Data Unit	%
Description	Percentage of forest that change to non-forest final classes during the historical reference period.
Source of data	Landsat Imagery from 1996, 2004 and 2008 obtained from INPES web site. SEMA (2010) Economic-ecologic Zonning information for the northen area of Para.
Justification of choice of data or description of measurement methods and procedures applied	Landsat imagery is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3. SEMA's data is available to the public and is the most up to date and scale adequate official data for the Project Area.
Measurement Frequency	At project start.
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**Fburnt$_{icl}$**
Data Unit	%
Description	Proportion of forest area burned during the historical reference period in the forest class *icl*
Source of data	Percentage of biomass that is left to burn after timber for wood products is extracted.
Value Applied	96%
Justification of choice of data or description of measurement methods and procedures applied	Data is derived from the assessment of durable wood products
Measurement Frequency	only once at project start
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	**ERCH4**
Data Unit	dimensionless
Description	Emission ratio for CH_4 (IPCC default value = 0.012)
Source of data	vm0015 methodology
Justification of choice of data or description of measurement methods and procedures applied	Default value indicated by the vm0015 methodology
Measurement Frequency	each renewal of fixed baseline period
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	**Pburnt**$_{p,icl}$
Data Unit	%
Description	Average proportion of mass burnt in the carbon pool p in the forest class icl;
Source of data	Percentage of biomass that is left to burn after timber for wood products is extracted.
Value Applied	96%
Justification of choice of data or description of measurement methods and procedures applied	Data is derived from the assessment of durable wood products
Measurement Frequency	only once at project start
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	$Cp_{,icl,t}$
Data Unit	t CO_2-e ha^{-1}
Description	Average carbon stock per hectare in the carbon pool *p* burnt at year *t* in the forest class *icl*;
Source of data	Determined by using data from the carbon inventory developed by SETA Ambiental and supervised by Ecosystem Services LLC (November 2011 through January 2012) Data from IPCC Good Practice Guidance for Land Use – Table 3.3.8
Justification of choice of data or description of measurement methods and procedures applied	The inventory was carried out in 79 plots of forest comprising two classes namely dense forest and degraded forest, within an area that encompasses the Project Area and Leakage Belt. A detailed report can be found in Annex 5 but as a summary the following are the highlights of the report: - Sampling plots were randomly located in forest stratum - DBH (Diameter at Breast Height) was measured for all the trees in a plot - Trees biomass was determined using Overman et.al. 1994 equation, which was successfully tested nearby the Project Area by a different study. Data is a default value for land converted to grassland in Tropical-Moist & Wet Climate Zones.
Measurement Frequency	only once at project start
QA/QC procedures to be applied	Sampling protocol can be found in Annex 5 and calculations in Annex 6. The highest value of the error range was utilized (original value reduced in 75%).
Any Comment	na
Used in Equations	na

Data Unit / Parameter	**$CE_{p,icl}$**
Data Unit	dimensionless
Description	Average combustion efficiency of the carbon pool p in the forest class
Source of data	vm0015 methodology
Value Applied	0.5
Justification of choice of data or description of measurement methods and procedures applied	Presented by the vm0015 methodology
Measurement Frequency	only once at project start
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	**GWP_{CH4}**
Data Unit	dimensionless
Description	Global Warming Potential for CH_4 (IPCC default value = 21 for the first commitment period)
Source of data	vm0015 methodology
Justification of choice of data or description of measurement methods and procedures applied	Presented by the vm0015 methodology
Measurement Frequency	each renewal of fixed baseline period
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	***DLF***
Data Unit	%
Description	Displacement Leakage Factor
Source of data	vm0015 methodology.
Value Applied	0
Justification of choice of data or description of measurement methods and procedures applied	Presented in the vm0015 methodology. The value is an ex-ante estimation.
Measurement Frequency	each renewal of fixed baseline period
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	***%LKB***
Data Unit	%
Description	Percentage of the overlapping leakage belts area to be assigned to project, A, B…..N
Source of data	Map of Distance to sellective logging from tertiary roads Map of distance to rivers Project Area Forest Cover Benchmark Map
Justification of choice of data or description of measurement methods and procedures applied	The data was generated using Landsat imagery that is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3. Relevance of the variable is recognized in the literature.
Measurement Frequency	At project start and at each verification
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	RF_t
Data Unit	%
Description	Risk factor used to calculate VCS buffer credits
Source of data	AFOLU Non-Permanence Risk Tool v3.1
Justification of choice of data or description of measurement methods and procedures applied	The value was calculated as a result of applying the guidelines in the aforementioned Tool
Measurement Frequency	each renewal of fixed baseline period
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	R_j
Data Unit	dimensionless
Description	Root-shoot ratio appropriate for species, group of species or forest type *j*
Source of data	IPCC 2003 Good Practice Guidance for Land Use – Table 3.3.8
Value Applied	0.22
Justification of choice of data or description of measurement methods and procedures applied	Is the lowest value presented in the document for Tropical Wet Forests in the IPCC's table.
Measurement Frequency	Only once at project start
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	***Cwp***
Data Unit	t CO_2-e
Description	Average carbon stock per hectare in the harvested wood products carbon pool
Source of data	Logging Intensity Coefficient of Volumetric Efficiency Carbon Stock Change Factor Carbon Fraction for Tree Specie j Basic Wood Density in specie j
Justification of choice of data or description of measurement methods and procedures applied	Logging Intensity was used as a default for Para as presented by Putz et. al. 2008 Coefficient of Volumetric Efficiency is an official default from CONAMA Wood Density is a default value from IPCC 2003 Carbon Stock Change Factor was caculated using the lowest boundary of the 90% CI
Measurement Frequency	only once at project start and when mandatory
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	***$\Delta Ctot_{ct,t}$***
Data Unit	t CO_2-e ha^{-1}
Description	Carbon stock change factor (also called emission factor) for all accounted carbon pools in category *ct* at time *t*
Source of data	Calculated
Value Applied	798.02
Justification of choice of data or description of measurement methods and procedures applied	Value calculated based on the corrected values of carbon density for each pool at the lowest boundary of the 90% CI
Measurement Frequency	only once at project start and when mandatory
QA/QC procedures to be applied	Lowest boundary of the 90% CI for carbon values in all pools
Any Comment	na

Data Unit / Parameter	**Map of Distance to sellective logging from tertiary roads**
Data Unit	Km
Description	Average distance from tertiary roads to areas presenting sellective logging
Source of data	Landsat Imagery from 1996, 2004 and 2008 obtained from INPES web site.
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3. Relevance of the variable is recognized in the literature.
Measurement Frequency	At the start of every fixed baseline period.
QA/QC procedures to be applied	Random sampling of several points in different areas
Any Comment	na

Data Unit / Parameter	**Map of distance to rivers**
Data Unit	Km
Description	Raster map of distances from navigable rivers in the RRD.
Source of data	Landsat Imagery from 1996, 2004 and 2008 obtained from INPES web site.
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Measurement Frequency	At the start of every fixed baseline period.
QA/QC procedures to be applied	
Any Comment	na

Data Unit / Parameter	**Map of distance to roads**
Data Unit	Km
Description	Raster map of distances from all roads in the RRD.
Source of data	Landsat Imagery from 1996, 2004 and 2008 obtained from INPES web site.
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Measurement Frequency	At the start of every fixed baseline period.
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	**Map of distance to non-forest**
Data Unit	Km
Description	Raster map of distances from non-forest areas in the RRD.
Source of data	Landsat Imagery from 1996, 2004 and 2008 obtained from INPES web site.
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Measurement Frequency	At the start of every fixed baseline period.
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	**Logging Intensity**
Data Unit	m3/ha
Description	Volume of commercial timber extracted per hectare in Para
Source of data	Putz et. al. 2008
Value Applied	30
Justification of choice of data or description of measurement methods and procedures applied	Data comes from a peer reviewed publication
Measurement Frequency	At project start
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	**Coefficient of Volumentric Efficiency**
Data Unit	NA
Description	Proportion of wood that actually makes it all the way to durable wood products
Source of data	CONAMA 2009
Value Applies	0.45
Justification of choice of data or description of measurement methods and procedures applied	Data comes from an official sources.
Measurement Frequency	At project start
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	**EI**
Data Unit	%
Description	Ex ante estimated Effectiveness Index
Source of data	calculated
Justification of choice of data or description of measurement methods and procedures applied	Based on results from ongoing on-site monitoring activities since 2008
Measurement Frequency	At project start and annually
QA/QC procedures to be applied	Based on accuracy assessment in Annex 3
Any Comment	na

Notation	Description	Unit	Equation	Observation
A	Area of error due to observed change predicted as persistence	ha	13	Was not used / Does not apply
$Aaverage_i$	Area of “average” forest land suitable for conversion to non-forest land within stratum	ha	5.b, 6.b, 10	Was not used / Does not apply

$Aaverage_{i,t1}$	Area with forest cover in stratum *i* on "average" areas at time *t1*	ha	6.b	Was not used / Does not apply
$Aaverage_{i,t2}$	Area with forest cover in stratum *i* on "average" areas at time *t2*	ha	6.b	Was not used / Does not apply
$ABSLL_{fcl,t}$	Area of final (post-deforestation) non-forest class *fcl* deforested at time *t* within the leakage belt in the baseline case	ha	14	Was not used / Does not apply
$ABSLLK_{ct,t}$	Area of category *ct* deforested at time *t* within the leakage belt in the baseline case	ha	15	Was not used / Does not apply
$ABSLLK_{icl,t}$	Area of initial (pre-deforestation) forest class *icl* deforested at time *t* within the leakage belt in the baseline case	ha	14	Was not used / Does not apply
$ABSLPA_{ct,t}$	Area of category *ct* deforested at time *t* within the project area in the baseline case	ha	15	Was not used / Does not apply
$ABSLPA_{fcl,t}$	Area of final (post-deforestation) non-forest class *fcl* deforested at time *t* within the project area in the baseline case	ha	14	Was not used / Does not apply
$ABSLP_{icl,t}$	Area of initial (pre-deforestation) forest class *icl* deforested at time *t* within the project area in the baseline case	ha	14	Was not used / Does not apply
$ABSLRRopt\_hrp_i$	Average area deforested in $Aaverage_i$ during the historical reference period	ha	5.a	Was not used / Does not apply
$ABSLRR_{fcl,t}$	Area of final (post-deforestation) non-forest class *fcl* deforested at time *t* within the reference region in the baseline case	ha	14	Was not used / Does not apply
$ABSLRR_{i,t}$	Annual area of baseline deforestation in stratum *i* within the reference region at year *t*	ha	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	Was not used / Does not apply

$ABSLRR_{i,taverage}$	Annual area of baseline deforestation in stratum *i* within the Reference region at a year $taverage_i$	ha	11	Was not used / Does not apply
$ABSLRR_{icl,t}$	Area of initial (pre-deforestation) forest class *icl* deforested at time *t* within the reference region in the baseline case	ha	14	Was not used / Does not apply
$ABSLRRopt\_hrp_i$	Average area deforested in $Aoptimal_i$ during the historical reference period	ha	5.b	Was not used / Does not apply
$ABSLRRsopt\_hrp_i$	Average area deforested in *Asub-optimal*$_i$ during the historical reference period	ha	5.c	Was not used / Does not apply
$ABSLRR_{i,taverage}$	Annual area of baseline deforestation in stratum *i* within the Reference Region at a year $taverage_i$	ha yr^{-1}	11	Was not used / Does not apply
$Aoptimal_i$	Area of "optimal" forest land suitable for conversion to non-forest land within stratum *i*	ha	3, 7	Was not used / Does not apply
$Aoptimal_{i,t1}$	Area with forest cover in stratum *i* on "optimal areas at time *t1*	ha	6.a	Was not used / Does not apply
$Aoptimal_{i,t2}$	Area with forest cover in stratum *i* on "optimal areas at time *t2*	ha	6.a	Was not used / Does not apply
AP	Plot area	m^2	A3-13	Was not used / Does not apply
$APDPA_{icl,t}$	Areas of planned deforestation in forest class *icl* at year *t* in the project area	ha		Was not used / Does not apply
$APF_{icl,t}$	Annual area of planned fuel-wood and charcoal activities in forest class *icl* at year *t* in the project area	ha		Was not used / Does not apply
$APLPA_{icl,t}$	Areas of planned logging activities in forest class *icl* at year *t* in the project area	ha		Was not used / Does not apply

$APNiPA_{icl,t}$	Annual area of forest class *icl* with increasing carbon stock without harvest at year *t* in the project area	ha		Was not used / Does not apply
$ARRaverage_{i,t1}$	Area with forest cover in stratum *i* on average and sub-optimal areas at time *t1*	ha	4.b	Was not used / Does not apply
$ARRaverage_{i,t2}$	Area with forest cover in stratum *i* on average and sub-optimal areas at time *t2*	ha	4.b	Was not used / Does not apply
ARR_i	Total forest area in stratum *i* within the reference region at the project start date	ha	6, 11	Was not used / Does not apply
$ARR_{i,t-1}$	Area with forest cover in stratum *i* within the reference region a year *t-1*	ha	3	Was not used / Does not apply
$ARRoptimal_{i,t1}$	Area with forest cover in stratum *i* on optimal areas at time *t1*	ha	4.a	Was not used / Does not apply
$ARRoptimal_{i,t2}$	Area with forest cover in stratum *i* on optimal areas at time *t2*	ha	4.a	Was not used / Does not apply
$ARRsub\_optimal_{i,t1}$	Area with forest cover in stratum *i* on sub-optimal areas at time *t1*	ha	4.c	Was not used / Does not apply
$ARRsub\_optimal_{i,t2}$	Area with forest cover in stratum *i* on sub-optimal areas at time *t2*	ha	4.c	Was not used / Does not apply
$Asub\text{-}optimal_{i,t1}$	Area with forest cover in stratum *i* on "sub-optimal" areas at time *t1*	ha	6.c	Was not used / Does not apply
$Asub\text{-}optimal_{i,t2}$	Area with forest cover in stratum *i* on "sub-optimal" areas at time *t2*	ha	6.c	Was not used / Does not apply
B	Area correct due to observed change predicted as change	ha	13	Was not used / Does not apply
BCEF	Biomass conversion and expansion factor for conversion of merchantable volume to total	dimensionless	A3-9, A3-36	Was not used / Does not apply

	aboveground tree biomass			
BEFpl	Biomass expansion factor for converting volumes of extracted round wood to total above-ground biomass (including bark), applicable to tree tr, in plot pl	dimensionless	A3-21	Was not used / Does not apply
Cab_{cl}	Average carbon stock per hectare in the above-ground biomass carbon pool of LU/LC class *cl*	t CO_2e ha^{-1}	A3-6, A3-14,A3-36	Was not used / Does not apply
$Cabnt_{cl}$	Average carbon stock per hectare in the above-ground non-tree biomass carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-7, A3-24	Was not used / Does not apply
$Cabt_{cl}$	Average carbon stock per hectare in the above-ground tree biomass carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-7	Was not used / Does not apply
Cbb_{cl}	Average carbon stock per hectare below-ground biomass carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-6, A3-17	Was not used / Does not apply
$Cbbnt_{cl}$	Average carbon stock per hectare below-ground non-tree biomass carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-8	Was not used / Does not apply
$Cbbt_{cl}$	Average carbon stock per hectare below-ground tree biomass carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-8	Was not used / Does not apply
Cdw_{cl}	Average carbon stock per hectare in the in the dead wood biomass carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-6, A3-25	Was not used / Does not apply
CF_{dc}	Carbon fraction of the density class *dc*	tonnes C (tonne d. m.)$^{-1}$	A3-30	Was not used / Does not apply
cl	1, 2, 3 … *Cl* LU/LC classes	dimensionless	A3-3	Was not used / Does not apply

Cl_{cl}	Average carbon stock per hectare in the litter carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-6	Was not used / Does not apply
$Cldw_{cl}$	Average carbon stock per hectare in the lying dead wood carbon pool of the LU/LC class *cl*	t CO_2-e	A3-25, A3-30	Was not used / Does not apply
$Csdw_{cl}$	Average carbon stock per hectare in the standing dead wood carbon pool of the LU/LC class *cl*	t CO_2-e ha^{-1}	A3-25	Was not used / Does not apply
$Csoc_{cl}$	Average carbon stock per hectare in the soil organic carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-6, A3-33	Was not used / Does not apply
$Csoc_pl$	Carbon stock per hectare in the soil organic carbon pool estimated for the plot *pl*;	t CO_2-e ha^{-1}	A3-33	Was not used / Does not apply
ct	1, 2, 3 … CT categories of LU/LC change	dimensionless	15	Was not used / Does not apply
$CXB_{w,icl,t}$	Mean carbon stock per hectare of extracted biomass carbon by class of wood product *w* from forest class *icl* at time *t*	t CO_2-e ha^{-1}	A3-35, A3-35, A3-37	Was not used / Does not apply
d1, d2, ..., dn	Diameters of intersecting pieces of dead wood	cm	A3-29	Was not used / Does not apply
DBI	Daily biomass intake	kg d.m. $head^{-1}$ day^{-1}	A4-2	Was not used / Does not apply
dc	1, 2, 3 dead wood density classes	dimensionless	A3-30	Was not used / Does not apply
DC	Total number of density classes (3)	dimensionless	A3-30	Was not used / Does not apply
$\Delta CBSLPA_t$	Total baseline carbon stock change within the project area at year *t*	t CO_2-e	14, 25	Was not used / Does not apply
ΔCdw_{ct}	Average carbon stock change factor in the dead wood biomass carbon pool of category *ct*	t CO_2-e ha^{-1}		Was not used / Does not apply

$\Delta CFCdPA_t$	Total decrease in carbon stock due to forest fires and catastrophic events at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CFCiPA_t$	Total increase in carbon stock due to forest fires and catastrophic events at year *t* in the project area	t CO_2-e		Was not used / Does not apply
ΔCLK_t	Total decrease in carbon stocks within the leakage belt at year *t*	t CO_2-e		Was not used / Does not apply
$\Delta CPAdPA_t$	Total decrease in carbon stock due to all planned activities at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPAiPA_t$	Total increase in carbon stock due to all planned activities at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPDdPA_t$	Total decrease in carbon stock due to planned deforestation at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPFdPA_t$	Total decrease in carbon stock due to planned fuel-wood and charcoal activities at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPFiPA_t$	Total increase in carbon stock due to planned fuel-wood and charcoal activities at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPLdPA_t$	Total decrease in carbon stock due to planned logging activities at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPLiPA_t$	Total increase in carbon stock due to planned logging activities at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPNiPA_t$	Total increase in carbon stock due to planned protection of growing forest classes in the project area at year *t*	t CO_2-e		Was not used / Does not apply
$\Delta CPSPA_t$	Total project carbon stock change within the project area at year *t*	t CO_2-e	25	Was not used / Does not apply

$\Delta Csoc_{ct}$	Average carbon stock change factor in the soil organic carbon pool of category *ct*	t CO_2-e ha^{-1}		Was not used / Does not apply
$\Delta CUCdPA_t$	Total decrease in carbon stock due to catastrophic events at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CUCiPA_t$	Total increase in carbon stock in areas affected by catastrophic events (after such events) at year **t** in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CUDdPA_t$	Total actual carbon stock change due to unavoided unplanned deforestation at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CUFdPA_t$	Total decrease in carbon stock due to unplanned (and planned – where applicable) forest fires at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CUFiPA_t$	Total increase in carbon stock in areas affected by forest fires (after such events) at year *t* in the project area	t CO_2-e		Was not used / Does not apply
ΔCwp_{ct}	Average carbon stock change factor in the harvested wood products carbon pool (stock remaining in wood products after 100 years) of category *ct*	t CO_2-e ha^{-1}		Was not used / Does not apply
D_{dc}	Dead wood density of class *dc*	tonnes d. m. m^{-3}	A3-30	Was not used / Does not apply
Dm	Deadwood density	g cm-3	A3-28	Was not used / Does not apply
DM_{pl}	Dry mass of sample $_{pl}$;	tonnes of d.m.	A3-24	Was not used / Does not apply
$EBBBSLPA_t$	Sum of (or total) baseline non-CO_2 emissions from forest fire at year *t* in the project area	t CO_2-e		Was not used / Does not apply

$EBBCO2_{icl}$	Per hectare CO_2 emission from biomass burning in slash and burn in forest class *icl*	t CO_2-e ha^{-1}	17, 18, 19	Was not used / Does not apply
$EBBN2O_{icl}$	N_2O emission from biomass burning in forest class *icl*	t CO_2-e	16, 17	Was not used / Does not apply
$EBBPSPA_t$	Sum of (or total) actual non-CO_2 emissions from forest fire at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$EBBtot_{icl}$	Total GHG emission from biomass burning in forest class *icl*	t CO_2-e	16	Was not used / Does not apply
$ECH4ferm_t$	CH_4 emissions from enteric fermentation at year *t*	t CO_2-e	A4-1	Was not used / Does not apply
$ECH4man_t$	CH_4 emissions from manure management at year *t*	t CO_2-e	A4-3	Was not used / Does not apply
$EdirN2Oman_t$	Direct N_2O emissions from manure management at year *t*	t CO_2-e	A4-4, A4-5	Was not used / Does not apply
EF1	Enteric CH_4 emission factor for the livestock group	kg CH_4 $head^{-1}$ yr^{-1}	A4-1	Was not used / Does not apply
EF1	Emission Factor for emissions from N inputs	tN_2O tN^{-1}		Was not used / Does not apply
EF2	Manure management CH_4 emission factor for the livestock group	kg CH_4 $head^{-1}$ yr^{-1}	A4-3	Was not used / Does not apply
EF3	Emission factor for N_2O emissions from manure management for the livestock group	kg N_2O-N (kg N^{-1}) $head^{-1}$ yr^{-1}	A4-5	Was not used / Does not apply
EF4	Emission factor for N_2O emissions from atmospheric deposition of forage-sourced nitrogen on soils and water surfaces	kg N_2O-N (kg NH_3-N and NO_x-N emitted)-1 $head^{-1}$ yr^{-1}	A4-6	Was not used / Does not apply
$EgLK_t$	Emissions from grazing animals in leakage management areas at year *t*	t CO_2-e	23	Was not used / Does not apply
$EindNOman_t$	Indirect N_2O emissions from manure management at year *t*	t CO_2-e	A4-4, A4-5	Was not used / Does not apply

ELK_t	Sum of *ex ante* estimated leakage emissions at year *t*	t CO_2-e	23	Was not used / Does not apply
$EN2Oman_t$	N_2O emissions from manure management at year *t*	t CO_2-e	A4-4	Was not used / Does not apply
$EN2Oman_t$	N_2O emissions from manure management at year *t*	t CO_2-e	A4-4	Was not used / Does not apply
ERN2O	Emission ratio for N2O (IPCC default value = 0.007)	dimensionless	17	Was not used / Does not apply
fcl	1, 2, 3 … *Fcl* final (post-deforestation) non-forest classes	dimensionless	14	Was not used / Does not apply
GWP_{N2O}	Global Warming Potential for N_2O (IPCC default value = 310 for the first commitment period)	dimensionless	17	Was not used / Does not apply
H	Height of the tree	meters	A3-27	Was not used / Does not apply
i	1, 2, 3 .. I_{RR} A stratum within the reference region	dimensionless	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	Was not used / Does not apply
icl	1, 2, 3 … *Icl* initial (pre-deforestation) forest classes	dimensionless	14	Was not used / Does not apply
j	number of organic fertilizer types	dimensionless		Was not used / Does not apply
L	Length of the line	m	A3-29	Was not used / Does not apply
NCR	Nitrogen/Carbon ratio (IPCC default value = 0.01)	dimensionless	17	Was not used / Does not apply
Nex	Annual average N excretion per livestock head	kg N $head^{-1}$ yr^{-1}	A4-6	Was not used / Does not apply
OFw	Fraction of wood products that will be emitted to the atmosphere between 5 and 100 years of timber harvest	dimensionless	A3-35, A3-37	Was not used / Does not apply

p	Carbon pool that could burn (above-ground biomass, dead wood, litter)	dimensionless	19	Was not used / Does not apply
$PCab_{pl}$	Carbon stock in above-ground biomass in plot *pl*	tC ha^{-1}	A3-13	Was not used / Does not apply
$PCbb_{pl}$	Carbon stock in below-ground biomass in plot *pl*	tC ha^{-1}	A3-16	Was not used / Does not apply
$Pcom_{icl}$	Commercial volume as a percent of total aboveground volume in initial forest class *icl*	dimensionless	A3-36	Was not used / Does not apply
PCx_{i}	Average in situ production costs for one ton of product *Px* in stratum *i*	\$/t	1	Was not used / Does not apply
$Pforage_{t}$	Production of forage at year *t*	kg d. m. yr^{-1}	A4-2	Was not used / Does not apply
pl	1, 2, 3, … *PLcl* plots in LU/LC class *cl*	dimensionless	A3-14, A3-17, A3-24, A3-33	Was not used / Does not apply
PL_{cl}	Total number of plots in LU/LC class *cl*	dimensionless	A3-14, A3-17, A3-24, A3-34	Was not used / Does not apply
Po	Anhydrous weight of sample	g	A3-28	Was not used / Does not apply
$Population_{t}$	Equivalent number of forage-fed livestock at year *t*	number of heads	A4-1	Was not used / Does not apply
$PP_{i,t}$	Proportion of stratum *i* that is within the project area at time *t*	%	12	Was not used / Does not apply
PPx_{l}	Potential profitability of product *Px* at the location *l* (pixel or polygon)	\$/t	1	Was not used / Does not apply
Ps	Saturated weight of sample	g	A3-28	Was not used / Does not apply

Px	Product x produced in the reference region	dimensionless	1	Was not used / Does not apply
$r1$	Radius at the base of the tree	meters	A3-27	Was not used / Does not apply
$r2$	Radius at the top of the tree	meters	A3-27	Was not used / Does not apply
$RBSLRR\_avg_{i,t}$	Deforestation rate applicable to stratum *i* within the reference region at year *t* after $Toptimal_i$ years and during $Taverage_i$ years	%	4.b	Was not used / Does not apply
$RBSLRR\_opt_{i,t}$	Deforestation rate applicable to stratum *i* within the reference region at year *t* during the first $Toptimal_i$ years	%	4.a	Was not used / Does not apply
$RBSLRR\_sopt_{i,t}$	Deforestation rate applicable to stratum *i* within the reference region at year *t* after $Toptimal_i$ + $Taverage_i$ and during $Tsub\text{-}optimal_i$ years	%	4.c	Was not used / Does not apply
$RBSLRR_{i,t}$	Percentage of remaining forest area at year t -1 in stratum *i* to be deforested at year *t*	%	11	Was not used / Does not apply
$R_{j,pl,tr}$	Root-shoot ratio, applicable to tree *tr* of species *j* in plot *pl*	dimensionless	A3-22	Was not used / Does not apply
$S\$_x$	Selling price of product *Px*	$/t	1	Was not used / Does not apply
SLF_w	Fraction of wood products that will be emitted to the atmosphere within 5 years of timber harvest	dimensionless	A3-35, A3-37	Was not used / Does not apply
SPx_l	Selling point *l* of product *Px*	map	1	Was not used / Does not apply
t	1, 2, 3 … *T* a year of the proposed	dimensionless	almost all	Was not used /

	crediting period		equations	Does not apply
*t**	the year at which the area $ABSLPA_{fcl,t}$ is deforested in the baseline case	dimensionless	A3-34	Was not used / Does not apply
$Taverage_i$	Number of years in which $Aaverage_i$ is deforested in the baseline case	yr	5	Was not used / Does not apply
$taverage_i$	Year at which $Taverage_i$ ends	yr	9, 11	Was not used / Does not apply
$TBab_j$	above-ground biomass of a tree of species, or species group, or forest type *j*	kg tree^{-1} or t tree^{-1}	A3-10	Was not used / Does not apply
$TBab_{tr}$	Above-ground biomass of tree *tr*	kg tree^{-1} or t tree^{-1}	A3-11, A3-13, A3-21	Was not used / Does not apply
$TCab_{tr}$	Carbon stock in above-ground biomass of tree $_{tr}$	kg C tree^{-1} or t C tree^{-1}	A3-11, A3-21	Was not used / Does not apply
$TCbb_{tr}$	Carbon stock in below-ground biomass of tree $_{tr}$	kg C tree^{-1}	A3-16, A3-22	Was not used / Does not apply
TC_v	Average Transport Cost per kilometer for one ton of product *Px* on land, river or road of type *v*	\$/t/km	1	Was not used / Does not apply
TD_v	Transport Distance on land, river or road of type *v*	\$/t/km	1	Was not used / Does not apply
Thrp	Duration of the historical reference period	yr	2	Was not used / Does not apply
$Toptimal_i$	Number of years since the start of the AUFD project activity in which *Aoptimal* in stratum *i* is deforested in the baseline case	yr	5	Was not used / Does not apply
$toptimal_i$	Year at which $Toptimal_i$ ends	yr	7, 8, 9	Was not used / Does not apply
tr	1, 2, 3, … *TRpl* number of trees in plot *pl*	dimensionless	A3-13	Was not used / Does not apply

$Tsub\text{-}optimal_i$	Number of years in which $Asub\text{-}optimal_i$ is deforested in the baseline case	yr	5	Was not used / Does not apply
v	1,2,3, …V type of surface on which transport occurs	dimensionless	1	Was not used / Does not apply
$V1_{i,t}$; $V2_{i,t}$; …;$Vn_{i,t}$	Variables included in a deforestation model		11	Was not used / Does not apply
VBC_t	Number of Voluntary Buffer Credits deposited in the VCS Buffer at time *t*;	t CO_2-e	24, 25	Was not used / Does not apply
VCU_t	Number of Voluntary Carbon Units (VCUs) to be made available for trade at time *t*	t CO_2-e	24	Was not used / Does not apply
VEF	Volume Expantion Factor	dimensionless	A3-9	Was not used / Does not apply
$VEX_{w,j,fcl,t}$	Volume of timber for product class *w*, of species *j*, extracted from within forest class *fcl* at time *t*	m^3	A3-34	Was not used / Does not apply
VOB10	Volume Over Bark above 10 cm *DBH*	m^3	A3-9	Was not used / Does not apply
VOB30	Volume Over Bark above 30 cm *DBH*	m3	A3-9	Was not used / Does not apply
$Volume_{dc}$	Volume of laying dead wood in the density class *dc*	m^3	A3-30	Was not used / Does not apply
V_{pl}	Commercial volume of plot *pl*	m^3 $plot^{-1}$	A3-19	Was not used / Does not apply
V_{tr}	Commercial volume of tree *tr*	m^3	A3-18, A3-21	Was not used / Does not apply

w	1, 2, 3 … W Wood product class (sawn-wood, wood-based panels, other industrial round-wood, paper and paper board, and other);	dimensionless	A3-34	Was not used / Does not apply
WW_w	Wood waste for wood product class w. The fraction immediately emitted through mill inefficiency	dimensionless	A3-35, A3-37	Was not used / Does not apply
XF	Plot expansion factor from per plot values to per hectare values	dimensionless	A3-12, A3-13, A3-16, A3-19, A3-20, A3-24	Was not used / Does not apply

3.2 Data and Parameters Monitored

Data Unit / Parameter	**RRD Forest / Non-forest Cover Benchmark Map**
Data Unit	ha
Description	Map showing LULC class forest and non-forest at Project start date
Source of data	Landsat Imagery from 1996, 2004 and 2008 obtained from INPES web site.
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Measurement Frequency	At the start of every fixed baseline period.
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**Project Area Forest Cover Benchmark Map**
Data Unit	ha
Description	Map that shows the stratification an location of LULC class forest in the Project Area at the Project start date (100% forest cover)
Source of data	Landsat Imagery from 1996, 2004 and 2008 obtained from INPES web site.
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Measurement Frequency	At the start of every fixed baseline period.
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**Leakage Belt Forest Cover Benchmark Map**
Data Unit	ha
Description	Map that shows the stratification an location of LULC class forest in the Leakage Belt at the Project start date (100% forest cover)
Source of data	Landsat Imagery from 1996, 2004 and 2008 obtained from INPES web site.
Justification of choice of data or description of measurement methods and procedures applied	The data is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3.
Measurement Frequency	At the start of every

	fixed baseline period.
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**$ABSLRR_t$**
Data Unit	ha
Description	Annual area of baseline deforestation in the reference region at year t
Source of data	Calculated based on the results from future deforestation model using peer-reviewed software IDRISI Selva.
Justification of choice of data or description of measurement methods and procedures applied	Variables and procedures to calculate baseline deforestation are thoroughly explained in Annex 3.
Measurement Frequency	Each renewal of fixed baseline period
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**ABSLPA**$_t$
Data Unit	ha
Description	Annual area of baseline deforestation in the project area at year t
Source of data	Calculated based on the results from future deforestation model using peer-reviewed software IDRISI Selva.
Justification of choice of data or description of measurement methods and procedures applied	Variables and procedures to calculate baseline deforestation are thoroughly explained in Annex 3.
Measurement Frequency	Each renewal of fixed baseline period
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**ABSLLK**$_t$
Data Unit	ha
Description	Annual area of baseline deforestation in the leakage belt at year t
Source of data	Calculated based on the results from future deforestation model using peer-reviewed software IDRISI Selva.
Justification of choice of data or description of measurement methods and procedures applied	Variables and procedures to calculate baseline deforestation are thoroughly explained in Annex 3.
Measurement Frequency	Each renewal of fixed baseline period
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	**LULC-change**
Data Unit	%
Description	Percentage of forest that change to non-forest final classes during the historical reference period.
Source of data	Landsat Imagery from 1996, 2004 and 2008 obtained from INPES web site. SEMA (2010) Economic-ecologic Zonning information for the northen area of Para.
Justification of choice of data or description of measurement methods and procedures applied	Landsat imagery is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3. SEMA's data is available to the public and is the most up to date and scale adequate official data for the Project Area.
Measurement Frequency	At project start.
QA/QC procedures to be applied	Through accuracy assessment in Annex 3
Any Comment	na

Data Unit / Parameter	***DLF***
Data Unit	%
Description	Displacement Leakage Factor
Source of data	vm0015 methodology.
Value Applied	0
Justification of choice of data or description of measurement methods and procedures applied	Presented in the vm0015 methodology. The value is an ex-ante estimation.
Measurement Frequency	each renewal of fixed baseline period
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	***%LKB***
Data Unit	%
Description	Percentage of the overlapping leakage belts area to be assigned to project, A, B…..N
Source of data	Map of Distance to sellective logging from tertiary roads Map of distance to rivers Project Area Forest Cover Benchmark Map
Justification of choice of data or description of measurement methods and procedures applied	The data was generated using Landsat imagery that is available to the public free of charge. Details about data pre and post-processing can be found in Annex 3. Relevance of the variable is recognized in the literature.
Measurement Frequency	At project start and at each verification
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	RF_t
Data Unit	%
Description	Risk factor used to calculate VCS buffer credits
Source of data	AFOLU Non-Permanence Risk Tool v3.1
Justification of choice of data or description of measurement methods and procedures applied	The value was calculated as a result of applying the guidelines in the aforementioned Tool
Measurement Frequency	each renewal of fixed baseline period
QA/QC procedures to be applied	na
Any Comment	na

Data Unit / Parameter	**EI**
Data Unit	%
Description	Ex ante estimated Effectiveness Index
Source of data	calculated
Justification of choice of data or description of measurement methods and procedures applied	Based on results from ongoing on-site monitoring activities since 2008
Measurement Frequency	At project start and annually
QA/QC procedures to be applied	Based on accuracy assessment in Annex 3
Any Comment	na

Notation	Description	Unit	Equation	Observation
A	Area of error due to observed change predicted as persistence	ha	13	Was not used / Does not apply
$Aaverage_i$	Area of "average" forest land suitable for conversion to non-forest land within stratum	ha	5.b, 6.b, 10	Was not used / Does not apply
$Aaverage_{i,t1}$	Area with forest cover in stratum *i* on "average" areas at time *t1*	ha	6.b	Was not used / Does not apply
$Aaverage_{i,t2}$	Area with forest cover in stratum *i* on "average" areas at time *t2*	ha	6.b	Was not used / Does not apply
$ABSLL_{fcl,t}$	Area of final (post-deforestation) non-forest class *fcl* deforested at time *t* within the leakage belt in the baseline case	ha	14	Was not used / Does not apply
$ABSLLK_{ct,t}$	Area of category *ct* deforested at time *t* within the leakage belt in the baseline case	ha	15	Was not used / Does not apply
$ABSLLK_{icl,t}$	Area of initial (pre-deforestation) forest class *icl* deforested at time *t* within the leakage belt in the baseline case	ha	14	Was not used / Does not apply
$ABSLPA_{ct,t}$	Area of category *ct* deforested at time *t* within the project area in the baseline case	ha	15	Was not used / Does not apply
$ABSLPA_{fcl,t}$	Area of final (post-deforestation) non-forest class *fcl* deforested at time *t* within the project area in the baseline case	ha	14	Was not used / Does not apply
$ABSLP_{icl,t}$	Area of initial (pre-deforestation) forest class *icl* deforested at time *t* within the project area in the baseline case	ha	14	Was not used / Does not apply
$ABSLRRopt\_hrp_i$	Average area deforested in $Aaverage_i$ during the historical reference period	ha	5.a	Was not used / Does not apply

$ABSLRR_{fcl,t}$	Area of final (post-deforestation) non-forest class *fcl* deforested at time *t* within the reference region in the baseline case	ha	14	Was not used / Does not apply
$ABSLRR_{i,t}$	Annual area of baseline deforestation in stratum *i* within the reference region at year *t*	ha	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	Was not used / Does not apply
$ABSLRR_{i,taverage}$	Annual area of baseline deforestation in stratum *i* within the Reference region at a year $taverage_i$	ha	11	Was not used / Does not apply
$ABSLRR_{icl,t}$	Area of initial (pre-deforestation) forest class *icl* deforested at time *t* within the reference region in the baseline case	ha	14	Was not used / Does not apply
$ABSLRRopt\_hrp_i$	Average area deforested in $Aoptimal_i$ during the historical reference period	ha	5.b	Was not used / Does not apply
$ABSLRRsopt\_hrp_i$	Average area deforested in *Asub-optimal*$_i$ during the historical reference period	ha	5.c	Was not used / Does not apply
$ABSLRR_{i,taverage}$	Annual area of baseline deforestation in stratum *i* within the Reference Region at a year $taverage_i$	ha yr^{-1}	11	Was not used / Does not apply
$Aoptimal_i$	Area of "optimal" forest land suitable for conversion to non-forest land within stratum *i*	ha	3, 7	Was not used / Does not apply
$Aoptimal_{i,t1}$	Area with forest cover in stratum *i* on "optimal areas at time *t1*	ha	6.a	Was not used / Does not apply
$Aoptimal_{i,t2}$	Area with forest cover in stratum *i* on "optimal areas at time *t2*	ha	6.a	Was not used / Does not apply
AP	Plot area	m^2	A3-13	Was not used / Does not apply
$APDPA_{icl,t}$	Areas of planned deforestation in forest class *icl* at year *t* in the project area	ha		Was not used / Does not apply

$APF_{icl,t}$	Annual area of planned fuel-wood and charcoal activities in forest class *icl* at year *t* in the project area	ha		Was not used / Does not apply
$APLPA_{icl,t}$	Areas of planned logging activities in forest class *icl* at year *t* in the project area	ha		Was not used / Does not apply
$APNiPA_{icl,t}$	Annual area of forest class *icl* with increasing carbon stock without harvest at year *t* in the project area	ha		Was not used / Does not apply
$ARRaverage_{i,t1}$	Area with forest cover in stratum *i* on average and sub-optimal areas at time *t1*	ha	4.b	Was not used / Does not apply
$ARRaverage_{i,t2}$	Area with forest cover in stratum *i* on average and sub-optimal areas at time *t2*	ha	4.b	Was not used / Does not apply
ARR_{i}	Total forest area in stratum *i* within the reference region at the project start date	ha	6, 11	Was not used / Does not apply
$ARR_{i,t-1}$	Area with forest cover in stratum *i* within the reference region a year *t-1*	ha	3	Was not used / Does not apply
$ARRoptimal_{i,t1}$	Area with forest cover in stratum *i* on optimal areas at time *t1*	ha	4.a	Was not used / Does not apply
$ARRoptimal_{i,t2}$	Area with forest cover in stratum *i* on optimal areas at time *t2*	ha	4.a	Was not used / Does not apply
$ARRsub\_optimal_{i,t1}$	Area with forest cover in stratum *i* on sub-optimal areas at time *t1*	ha	4.c	Was not used / Does not apply
$ARRsub\_optimal_{i,t2}$	Area with forest cover in stratum *i* on sub-optimal areas at time *t2*	ha	4.c	Was not used / Does not apply
$Asub\text{-}optimal_{i,t1}$	Area with forest cover in stratum *i* on “sub-optimal” areas at time *t1*	ha	6.c	Was not used / Does not apply
$Asub\text{-}optimal_{i,t2}$	Area with forest cover in stratum *i* on “sub-optimal” areas at time *t2*	ha	6.c	Was not used / Does not apply

B	Area correct due to observed change predicted as change	ha	13	Was not used / Does not apply
BCEF	Biomass conversion and expansion factor for conversion of merchantable volume to total aboveground tree biomass	dimensionless	A3-9, A3-36	Was not used / Does not apply
BEFpl	Biomass expansion factor for converting volumes of extracted round wood to total above-ground biomass (including bark), applicable to tree tr, in plot pl	dimensionless	A3-21	Was not used / Does not apply
Cab_{cl}	Average carbon stock per hectare in the above-ground biomass carbon pool of LU/LC class *cl*	t CO_2e ha^{-1}	A3-6, A3-14,A3-36	Was not used / Does not apply
$Cabnt_{cl}$	Average carbon stock per hectare in the above-ground non-tree biomass carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-7, A3-24	Was not used / Does not apply
$Cabt_{cl}$	Average carbon stock per hectare in the above-ground tree biomass carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-7	Was not used / Does not apply
Cbb_{cl}	Average carbon stock per hectare below-ground biomass carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-6, A3-17	Was not used / Does not apply
$Cbbnt_{cl}$	Average carbon stock per hectare below-ground non-tree biomass carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-8	Was not used / Does not apply
$Cbbt_{cl}$	Average carbon stock per hectare below-ground tree biomass carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-8	Was not used / Does not apply
Cdw_{cl}	Average carbon stock per hectare in the in the dead wood biomass carbon pool of LU/LC class *cl*	t CO_2-e ha^{-1}	A3-6, A3-25	Was not used / Does not apply
CF_{dc}	Carbon fraction of the density class *dc*	tonnes C (tonne d. m.)$^{-1}$	A3-30	Was not used / Does not apply

cl	1, 2, 3 … *Cl* LU/LC classes	dimensionless	A3-3	Was not used / Does not apply
Cl_{cl}	Average carbon stock per hectare in the litter carbon pool of LU/LC class *cl*	$t\ CO_2\text{-e}\ ha^{-1}$	A3-6	Was not used / Does not apply
$Cldw_{cl}$	Average carbon stock per hectare in the lying dead wood carbon pool of the LU/LC class *cl*	$t\ CO_2\text{-e}$	A3-25, A3-30	Was not used / Does not apply
$Csdw_{cl}$	Average carbon stock per hectare in the standing dead wood carbon pool of the LU/LC class *cl*	$t\ CO_2\text{-e}\ ha^{-1}$	A3-25	Was not used / Does not apply
$Csoc_{cl}$	Average carbon stock per hectare in the soil organic carbon pool of LU/LC class *cl*	$t\ CO_2\text{-e}\ ha^{-1}$	A3-6, A3-33	Was not used / Does not apply
$Csoc_{p}l$	Carbon stock per hectare in the soil organic carbon pool estimated for the plot *pl*;	$t\ CO_2\text{-e}\ ha^{-1}$	A3-33	Was not used / Does not apply
ct	1, 2, 3 … CT categories of LU/LC change	dimensionless	15	Was not used / Does not apply
$CXB_{w,icl,t}$	Mean carbon stock per hectare of extracted biomass carbon by class of wood product *w* from forest class *icl* at time *t*	$t\ CO_2\text{-e}\ ha^{-1}$	A3-35, A3-35, A3-37	Was not used / Does not apply
d1, d2, …, dn	Diameters of intersecting pieces of dead wood	cm	A3-29	Was not used / Does not apply
DBI	Daily biomass intake	$kg\ d.m.\ head^{-1}\ day^{-1}$	A4-2	Was not used / Does not apply
dc	1, 2, 3 dead wood density classes	dimensionless	A3-30	Was not used / Does not apply
DC	Total number of density classes (3)	dimensionless	A3-30	Was not used / Does not apply
$\Delta CBSLPA_t$	Total baseline carbon stock change within the project area at year *t*	$t\ CO_2\text{-e}$	14, 25	Was not used / Does not apply

ΔCdw_{ct}	Average carbon stock change factor in the dead wood biomass carbon pool of category *ct*	t CO_2-e ha^{-1}		Was not used / Does not apply
$\Delta CFCdPA_t$	Total decrease in carbon stock due to forest fires and catastrophic events at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CFCiPA_t$	Total increase in carbon stock due to forest fires and catastrophic events at year *t* in the project area	t CO_2-e		Was not used / Does not apply
ΔCLK_t	Total decrease in carbon stocks within the leakage belt at year *t*	t CO_2-e		Was not used / Does not apply
$\Delta CPAdPA_t$	Total decrease in carbon stock due to all planned activities at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPAiPA_t$	Total increase in carbon stock due to all planned activities at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPDdPA_t$	Total decrease in carbon stock due to planned deforestation at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPFdPA_t$	Total decrease in carbon stock due to planned fuel-wood and charcoal activities at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPFiPA_t$	Total increase in carbon stock due to planned fuel-wood and charcoal activities at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPLdPA_t$	Total decrease in carbon stock due to planned logging activities at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPLiPA_t$	Total increase in carbon stock due to planned logging activities at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CPNiPA_t$	Total increase in carbon stock due to planned protection of growing forest classes in the project area at year *t*	t CO_2-e		Was not used / Does not apply

$\Delta CPSPA_t$	Total project carbon stock change within the project area at year *t*	t CO_2-e	25	Was not used / Does not apply
$\Delta Csoc_{ct}$	Average carbon stock change factor in the soil organic carbon pool of category *ct*	t CO_2-e ha^{-1}		Was not used / Does not apply
$\Delta CUCdPA_t$	Total decrease in carbon stock due to catastrophic events at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CUCiPA_t$	Total increase in carbon stock in areas affected by catastrophic events (after such events) at year **t** in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CUDdPA_t$	Total actual carbon stock change due to unavoided unplanned deforestation at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CUFdPA_t$	Total decrease in carbon stock due to unplanned (and planned – where applicable) forest fires at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$\Delta CUFiPA_t$	Total increase in carbon stock in areas affected by forest fires (after such events) at year *t* in the project area	t CO_2-e		Was not used / Does not apply
ΔCwp_{ct}	Average carbon stock change factor in the harvested wood products carbon pool (stock remaining in wood products after 100 years) of category *ct*	t CO_2-e ha^{-1}		Was not used / Does not apply
D_{dc}	Dead wood density of class *dc*	tonnes d. m. m^{-3}	A3-30	Was not used / Does not apply
Dm	Deadwood density	g cm-3	A3-28	Was not used / Does not apply
DM_{pl}	Dry mass of sample $_{pl}$;	tonnes of d.m.	A3-24	Was not used / Does not apply

$EBBBSLPA_t$	Sum of (or total) baseline non-CO_2 emissions from forest fire at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$EBBCO2_{icl}$	Per hectare CO_2 emission from biomass burning in slash and burn in forest class *icl*	t CO_2-e ha^{-1}	17, 18, 19	Was not used / Does not apply
$EBBN2O_{icl}$	N_2O emission from biomass burning in forest class *icl*	t CO_2-e	16, 17	Was not used / Does not apply
$EBBPSPA_t$	Sum of (or total) actual non-CO_2 emissions from forest fire at year *t* in the project area	t CO_2-e		Was not used / Does not apply
$EBBtot_{icl}$	Total GHG emission from biomass burning in forest class *icl*	t CO_2-e	16	Was not used / Does not apply
$ECH4ferm_t$	CH_4 emissions from enteric fermentation at year *t*	t CO_2-e	A4-1	Was not used / Does not apply
$ECH4man_t$	CH_4 emissions from manure management at year *t*	t CO_2-e	A4-3	Was not used / Does not apply
$EdirN2Oman_t$	Direct N_2O emissions from manure management at year *t*	t CO_2-e	A4-4, A4-5	Was not used / Does not apply
EF1	Enteric CH_4 emission factor for the livestock group	kg CH_4 $head^{-1}$ yr^{-1}	A4-1	Was not used / Does not apply
EF1	Emission Factor for emissions from N inputs	tN_2O tN^{-1}		Was not used / Does not apply
EF2	Manure management CH_4 emission factor for the livestock group	kg CH_4 $head^{-1}$ yr^{-1}	A4-3	Was not used / Does not apply
EF3	Emission factor for N_2O emissions from manure management for the livestock group	kg N_2O-N (kg N^{-1}) $head^{-1}$ yr^{-1}	A4-5	Was not used / Does not apply
EF4	Emission factor for N_2O emissions from atmospheric deposition of forage-sourced nitrogen on soils and water surfaces	kg N_2O-N (kg NH_3-N and NO_x-N emitted)-1 $head^{-1}$ yr^{-1}	A4-6	Was not used / Does not apply
$EgLK_t$	Emissions from grazing animals in leakage management areas at year *t*	t CO_2-e	23	Was not used / Does not apply

$EindNOman_t$	Indirect N_2O emissions from manure management at year *t*	t CO_2-e	A4-4, A4-5	Was not used / Does not apply
ELK_t	Sum of *ex ante* estimated leakage emissions at year *t*	t CO_2-e	23	Was not used / Does not apply
$EN2Oman_t$	N_2O emissions from manure management at year *t*	t CO_2-e	A4-4	Was not used / Does not apply
$EN2Oman_t$	N_2O emissions from manure management at year *t*	t CO_2-e	A4-4	Was not used / Does not apply
ERN2O	Emission ratio for N2O (IPCC default value = 0.007)	dimensionless	17	Was not used / Does not apply
fcl	1, 2, 3 … *Fcl* final (post-deforestation) non-forest classes	dimensionless	14	Was not used / Does not apply
GWP_{N2O}	Global Warming Potential for N_2O (IPCC default value = 310 for the first commitment period)	dimensionless	17	Was not used / Does not apply
H	Height of the tree	meters	A3-27	Was not used / Does not apply
i	1, 2, 3 .. I_{RR} A stratum within the reference region	dimensionless	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	Was not used / Does not apply
icl	1, 2, 3 … *Icl* initial (pre-deforestation) forest classes	dimensionless	14	Was not used / Does not apply
j	number of organic fertilizer types	dimensionless		Was not used / Does not apply
L	Length of the line	m	A3-29	Was not used / Does not apply
NCR	Nitrogen/Carbon ratio (IPCC default value = 0.01)	dimensionless	17	Was not used / Does not apply
Nex	Annual average N excretion per livestock head	kg N $head^{-1}$ yr^{-1}	A4-6	Was not used / Does not apply

OFw	Fraction of wood products that will be emitted to the atmosphere between 5 and 100 years of timber harvest	dimensionless	A3-35, A3-37	Was not used / Does not apply
p	Carbon pool that could burn (above-ground biomass, dead wood, litter)	dimensionless	19	Was not used / Does not apply
$PCab_{pl}$	Carbon stock in above-ground biomass in plot *pl*	tC ha^{-1}	A3-13	Was not used / Does not apply
$PCbb_{pl}$	Carbon stock in below-ground biomass in plot *pl*	tC ha^{-1}	A3-16	Was not used / Does not apply
$Pcom_{icl}$	Commercial volume as a percent of total aboveground volume in initial forest class *icl*	dimensionless	A3-36	Was not used / Does not apply
PCx_i	Average in situ production costs for one ton of product *Px* in stratum *i*	\$/t	1	Was not used / Does not apply
$Pforage_t$	Production of forage at year *t*	kg d. m. yr^{-1}	A4-2	Was not used / Does not apply
pl	1, 2, 3, … *PLcl* plots in LU/LC class *cl*	dimensionless	A3-14, A3-17, A3-24, A3-33	Was not used / Does not apply
PL_{cl}	Total number of plots in LU/LC class *cl*	dimensionless	A3-14, A3-17, A3-24, A3-34	Was not used / Does not apply
Po	Anhydrous weight of sample	g	A3-28	Was not used / Does not apply
$Population_t$	Equivalent number of forage-fed livestock at year *t*	number of heads	A4-1	Was not used / Does not apply
$PP_{i,t}$	Proportion of stratum *i* that is within the project area at time *t*	%	12	Was not used / Does not apply
PPx_l	Potential profitability of product *Px* at the location *l* (pixel or polygon)	\$/t	1	Was not used / Does not apply

Ps	Saturated weight of sample	g	A3-28	Was not used / Does not apply
Px	Product x produced in the reference region	dimensionless	1	Was not used / Does not apply
r1	Radius at the base of the tree	meters	A3-27	Was not used / Does not apply
r2	Radius at the top of the tree	meters	A3-27	Was not used / Does not apply
$RBSLRR\_avg_{i,t}$	Deforestation rate applicable to stratum *i* within the reference region at year *t* after $Toptimal_i$ years and during $Taverage_i$ years	%	4.b	Was not used / Does not apply
$RBSLRR\_opt_{i,t}$	Deforestation rate applicable to stratum *i* within the reference region at year *t* during the first $Toptimal_i$ years	%	4.a	Was not used / Does not apply
$RBSLRR\_sopt_{i,t}$	Deforestation rate applicable to stratum *i* within the reference region at year *t* after $Toptimal_i$ + $Taverage_i$ and during $Tsub\text{-}optimal_i$ years	%	4.c	Was not used / Does not apply
$RBSLRR_{i,t}$	Percentage of remaining forest area at year t -1 in stratum *i* to be deforested at year *t*	%	11	Was not used / Does not apply
$R_{j,pl,tr}$	Root-shoot ratio, applicable to tree *tr* of species *j* in plot *pl*	dimensionless	A3-22	Was not used / Does not apply
$S\$_x$	Selling price of product *Px*	$/t	1	Was not used / Does not apply
SLF_w	Fraction of wood products that will be emitted to the atmosphere within 5 years of timber harvest	dimensionless	A3-35, A3-37	Was not used / Does not apply

SPx_l	Selling point *l* of product *Px*	map	1	Was not used / Does not apply
t	1, 2, 3 … *T* a year of the proposed crediting period	dimensionless	almost all equations	Was not used / Does not apply
*t**	the year at which the area $ABSLPA_{fcl,t}$ is deforested in the baseline case	dimensionless	A3-34	Was not used / Does not apply
$Taverage_i$	Number of years in which $Aaverage_i$ is deforested in the baseline case	yr	5	Was not used / Does not apply
$taverage_i$	Year at which $Taverage_i$ ends	yr	9, 11	Was not used / Does not apply
$TBab_j$	above-ground biomass of a tree of species, or species group, or forest type *j*	kg tree^{-1} or t tree^{-1}	A3-10	Was not used / Does not apply
$TBab_{tr}$	Above-ground biomass of tree *tr*	kg tree^{-1} or t tree^{-1}	A3-11, A3-13, A3-21	Was not used / Does not apply
$TCab_{tr}$	Carbon stock in above-ground biomass of tree $_{tr}$	kg C tree^{-1} or t C tree^{-1}	A3-11, A3-21	Was not used / Does not apply
$TCbb_{tr}$	Carbon stock in below-ground biomass of tree $_{tr}$	kg C tree^{-1}	A3-16, A3-22	Was not used / Does not apply
TC_v	Average Transport Cost per kilometer for one ton of product *Px* on land, river or road of type *v*	\$/t/km	1	Was not used / Does not apply
TD_v	Transport Distance on land, river or road of type *v*	\$/t/km	1	Was not used / Does not apply
Thrp	Duration of the historical reference period	yr	2	Was not used / Does not apply
$Toptimal_i$	Number of years since the start of the AUFD project activity in which *Aoptimal* in stratum *i* is deforested in the baseline case	yr	5	Was not used / Does not apply
$toptimal_i$	Year at which $Toptimal_i$ ends	yr	7, 8, 9	Was not used / Does not apply

tr	1, 2, 3, … *TRpl* number of trees in plot *pl*	dimensionless	A3-13	Was not used / Does not apply
$Tsub\text{-}optimal_i$	Number of years in which $Asub\text{-}optimal_i$ is deforested in the baseline case	yr	5	Was not used / Does not apply
v	1,2,3, …*V* type of surface on which transport occurs	dimensionless	1	Was not used / Does not apply
$V1_{i,t}; V2_{i,t}; ...; Vn_{i,t}$	Variables included in a deforestation model		11	Was not used / Does not apply
VBC_t	Number of Voluntary Buffer Credits deposited in the VCS Buffer at time *t*;	t CO_2-e	24, 25	Was not used / Does not apply
VCU_t	Number of Voluntary Carbon Units (VCUs) to be made available for trade at time *t*	t CO_2-e	24	Was not used / Does not apply
VEF	Volume Expantion Factor	dimensionless	A3-9	Was not used / Does not apply
$VEX_{w,j,fcl,t}$	Volume of timber for product class *w*, of species *j*, extracted from within forest class *fcl* at time *t*	m^3	A3-34	Was not used / Does not apply
VOB10	Volume Over Bark above 10 cm *DBH*	m^3	A3-9	Was not used / Does not apply
VOB30	Volume Over Bark above 30 cm *DBH*	m3	A3-9	Was not used / Does not apply
$Volume_{dc}$	Volume of laying dead wood in the density class *dc*	m^3	A3-30	Was not used / Does not apply
V_{pl}	Commercial volume of plot *pl*	m^3 $plot^{-1}$	A3-19	Was not used / Does not apply

V_{tr}	Commercial volume of tree *tr*	m^3	A3-18, A3-21	Was not used / Does not apply
w	1, 2, 3 … *W* Wood product class (sawn-wood, wood-based panels, other industrial round-wood, paper and paper board, and other);	dimensionless	A3-34	Was not used / Does not apply
WW_w	Wood waste for wood product class *w*. The fraction immediately emitted through mill inefficiency	dimensionless	A3-35, A3-37	Was not used / Does not apply
XF	Plot expansion factor from per plot values to per hectare values	dimensionless	A3-12, A3-13, A3-16, A3-19, A3-20, A3-24	Was not used / Does not apply

3.3 Description of the Monitoring Plan

Quality control and quality assurance procedures:

As monitoring will be conducted mainly by using remote sensing imagery in a GIS environment, quality management procedures are related with GIS data quality. When working with geographical information, positional accuracy is often synonymous with data quality. Data compilation from several different sources often requires very good data quality.

Quality procedures must be employed to ensure that data are properly collected, handled, processed, used and maintained throughout the data lifecycle while performing monitoring activities.

For Satellite Images, GIS and GPS data:

Quality Management Procedures before data collection:

- Monitoring will be done by trained project personnel, understanding the importance of accurate data collecting.
- Format: Satellite Images will be collected in TIFF raster digital format. Vector files will be collected in shapefile GIS format. GPS will also be collected in digital format.
- Spatial Reference: Data will always use the Projected UTM System, South 22 Zone, Datum WGS84.

- Imagery: Landsat LCDM (Landsat 8) is the type of image selected for permanent monitoring.
- Source: Imagery will be downloaded from the US Geologic Survey website (currently http://glovis.usgs.gov/).
- Responsibility for quality assurance will be assigned to a person with adequate background suitable to the task.
- References on GPS and satellite images calibration are described in this document in the section “Equipment calibration”.
- Metadata: Metadata will be created for the data to be collected.
- GPS accuracy: To obtain accuracies such as those reported, the GPS Receiver must be located in an area that is free from overhead obstructions and reflective surfaces and have a good field of view to the horizon (for example, they do not work very well under a heavy forest canopy). Data coordinates will be collected in meters using the spatial reference units noted above.
- The staff member for monitoring evaluates the data gathering team to identify errors in field techniques, verify measurements processes and correct any identified problems before measurements are carried out.

Quality Management Procedures during data entry:

- Protocols and Guides: Data in digital formats must be treated according to protocols on data management. Methodology to process and classify satellite images must be carried out according to the annexed section on “Classification and Accuracy Assessment”.
- Design an efficient storage system for the data: Data will be stored in a computerized database for use with specialized software (GPS, GIS, Remote sensing) for processing it. One person should be in charge of managing this dataset.
- All modifications to the dataset shall be documented.

Quality Management Procedures after data entry:

- Regular backup of data helps ensure consistent quality levels.
- Data integrity: Data should not be altered or destroyed in an unauthorized manner, or should not be accidentally or maliciously modified.
- Data integration: Geographical datasets are difficult to integrate when there are inconsistencies between them, which may involve both the spatial and attributes characteristics of the data.
- Given the time frame of the project, and the pace of production of updated versions of software and new hardware for storing data, electronic copies of data and reports will be

periodically updated or converted to a format that can be assessed by any future software applications.

All activities included in the Monitoring Plan are documented, as guides or protocols to be used permanently. It is required a data quality testing in each phase of data capture, including validation of GPS coordinates measured in the field (at a level community scale), choice of relevant data from a relevant source, positional accuracy of satellite images and GIS data, using automated GIS software tools and accuracy assessment of classified images.

Positional accuracy in satellite images.

It is very important to ensure that remote sensing images in a time series overlay properly to each other and to other GIS maps used in the analysis. To geometrically correct the acquired images, it is necessary to have at least one orthorectified image to use as a reference image, and to undertake a process called georeferencing.

Images will be geometrically corrected to the projection UTM Zone 22 South datum WGS 1984 using an orthorectified image by collecting manually selected control points in both images. Among the features to be identified as control point locations we have road or stream intersections, the mouth of a stream, the corner of an established plot, or roads corners. The second-order polynomial transformation and the nearest neighbor resampling technique could be used to correct images. RMS errors of less than one pixel obtained from the geometric correction process will be acceptable.

Accuracy of the baseline deforestation

Accuracy assessment will follow the guidelines of the document ‘Methodology Procedures Used in Prcessing, Classification, and Accuracy Assessment of Remotely Sensed Data’ included as Annex 3 in the VCS PD.

GHG emissions calculations

The tables to calculate GHG emission benefits from the project have been reviewed during the verification process and errors have been corrected. A cell by cell review was performed to follow the formulas and values to make sure all were correct.

TASK 1. Monitoring changes in carbon stocks and GHG emissions for periodic verification.

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

1.2 Monitoring leakage;

1.3 Ex-post calculation of GHG emission reductions.

1.4 Monitoring the impacts of natural disturbances and other catastrophic events.

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

1.1.1 Monitor the implementation of the project.

This task will be the responsibility of Ecosystem Services LLC starting in 2013. From 2008 to 2012 the landowner was in charge of sending patrol brigades to the project area to identify loggers and squatters.

Monitoring will be conducted mainly by using remote sensing imagery. Remotely sensed data have been widely used as a cost effective tool in the mapping and monitoring of large areas (e.g. Danaher et al. 1998; Gould 2000; Mayaux et al. 2000; Freeman et al. 2002). Satellite optical or radar images could be used depending on the availability of the scenes, cloud cover and related acquisition and processing costs. Satellite images need be calibrated (pre-processing procedures) before performing the principal analysis. These preprocessing operations could include (1) radiometric preprocessing to adjust digital values for effects of a hazy atmosphere and/or (2) geometric preprocessing to bring an image into registration with a map or another image (Campbell and Wynne, 2011).

At the same time, monitoring brigades composed by local people will patrol the Project Area to dissuade any invasion or illegal logging attempt. Fieldwork will be done using a ground-based GPS approach to register the geographical position of any activity that need to be reported.

The Project Area will be divided in brigades to better manage the extent of the Project Area and LMA and assure an effective on the ground monitoring. Brigade leaders will oversee the activities, compile, and analyze the results from monitoring patrols[15] (Figure 12). Brigade leaders will report to ESLLC's office in Portel, which in turn will report to the office in Belem. These two offices will be responsible of informing local authorities about illegal activities happening in the Project Area and to follow up the enforcement of the required measures to remove invaders (Figure 13).

EQUIPMENT CALIBRATION

GPS
Besides any operational considerations when using a GPS receiver in the field, this equipment need not be calibrated for this monitoring. Average positional accuracy of most GPS receivers (15 meters) is enough to register monitoring activities in the field (i.e. location of loggers or squatters in the Project Area). GPS coordinates will be used 'for information only' and its accuracy is considered appropriate to clearly show in maps where any feature or activity in the Project Area is located.

Satellite Images
Monitoring will be conducted mainly by using remote sensing imagery. Before processing the image data to produce land cover maps, satellite imagery need be calibrated, this is, some pre-processing procedures must be applied to the imagery. These procedures enhance the quality of the image data by reducing or eliminating various radiometric and geometric errors caused by internal and external conditions.

[15] Could be one leader overseen all the patrols or one for each type of patrol. This will be decided after validation based on the results from the census.

a. Geometric correction procedures address errors in the relative position of pixels due to factors such as variation in altitude, attitude and velocity of the sensor platform, Earth curvature, panoramic distortion, relief displacement and non-linearities in the sweep of a sensor (Lillesand and Kiefer 1994). It is very important to ensure that images in a time series overlay properly to each other and to other GIS maps used in the analysis. To geometrically correct the images, it is necessary to have a spread of Ground Control Points (GCPs) located either on a 1:100,000 official topography or an orthorectified image, to undertake a process called georeferencing. For all resampling operations, we will use the Nearest Neighbor algorithm to maintain radiometric integrity of the image.

b. Radiometric correction procedures account for errors that affect the brightness value of pixels due to both a sensor system detector error and an environmental attenuation error (e.g. changes in scene illumination, atmospheric conditions and viewing geometry [Lillesand and Kiefer 1994]). One of these procedures involved conversion of the measured multiespectral brightness values to top of atmosphere reflectance units. This normalisation procedure is crucial when creating multitemporal and/or multispatial mosaics as it largely removes variations between these images due to sensor differences, Earth-sun distance and solar zenith angle (caused by different scene dates, overpass time and latitude differences)(Bruce and Hilbert, 2004).

Figure 12: Activities management in the Project

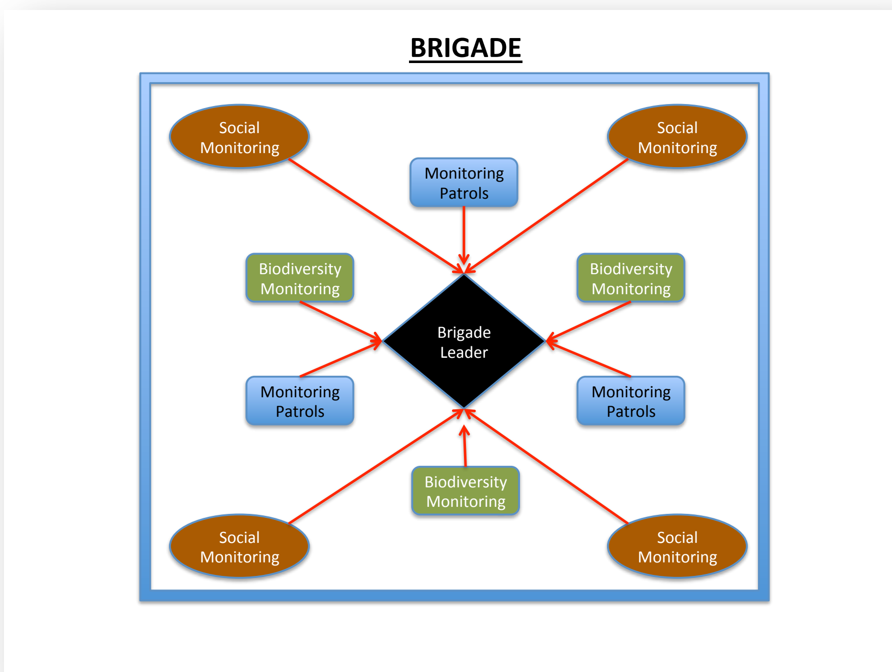
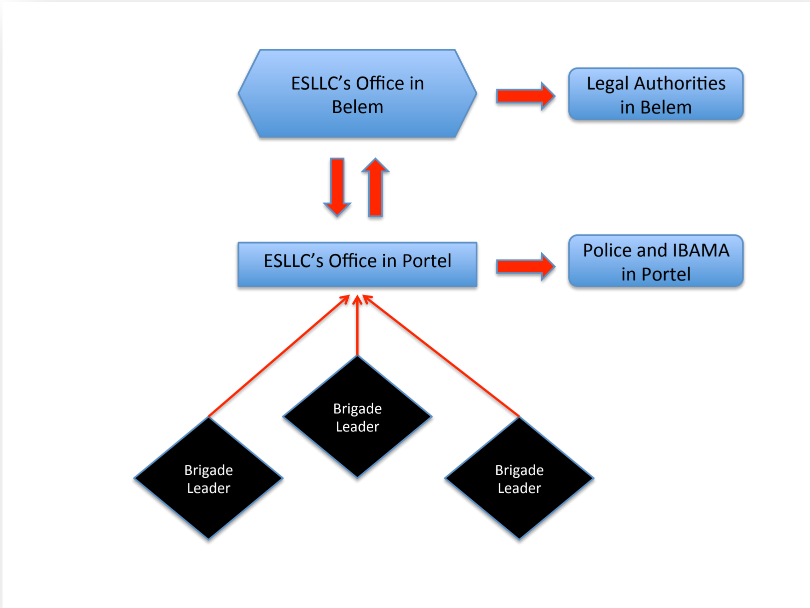


Figure 13: Activities to inform local authorities about illegal activities in the Project Area



The activities of the Project and their monitoring can be group as follows:

1. Forest monitoring:

Monitoring of forest cover will be done mainly by remote sensing imagery. The choice of imagery will depend on the availability of scenes, cloud cover, and related acquisition and processing costs. Remote sensing imagery could be either satellite (i.e Landsat) or radar (i.e Alos Palsar) or a combination of both.

LULC-change analysis using remote sensing imagery could be conducted annually of by periods depending on the availability of scenes. Therefore, verification event could occur annually of by periods.

The fixed degradation frontier map will be updated at each verification event to account for areas that may have changed their carbon stocks due to unavoided illegal logging activities. The fixed degradation frontier will be assessed based on the availability of scenes, cloud cover, and related acquisition and processing costs. Remote sensing imagery could be either satellite (i.e Landsat) or radar (i.e Alos Palsar) or a combination of both.

From 2008 to 2012 the landowner conducted monitoring by sending patrols to the Project Area. These patrols would generate a hand-written report in Portuguese and then a law firm hired by the landowner would clean the reports and translate these to English. During this period no GPS points were taken to identify the exact location of deforestation activities. All original hand-written repots and the official translations are available in digital formats.

Starting in 2013, patrolling activities will be scaled-up by hiring local people as forest monitoring patrols. There will be a responsible for each monitoring patrol who will generate monthly reports unless illegal activities are spotted, in which case a report should be submitted immediately as described in the next section.

Of particular importance is the implementation of the surveillance system that will allow continuous monitoring of the Project Area to prevent the entry of squatters and illegal loggers. The objective of forest patrolling is to make evident the presence of the landowner and dissuade pioneer agents (i.e loggers, squatters) from encroaching the Project Area. This activity will function as a complement of remote sensing-based monitoring but will not replace it. Furthermore, the generation of carbon credits for avoided emissions will not rely on the results of patrolling,

The Project Area will be divided in brigades[16] to facilitate monitoring such a large area. Each Brigade leader will compile the information from patrolling reports into adequate digital format[17] all the information from the reports to keep track of the areas that are being patrolled each week and what are the findings of each patrol. Digital reports will be sent to the office in Belem to be organized and stored.

The actual size of a brigade and the numbers of villagers to be hired depends on the results from the census that will be conducted after validation. The area of a brigade will need to be a reasonable one to allow for an effective surveillance given available staff. If not enough local villagers are willing to work as monitoring staff; Ecosystem Services LLC will hire technicians from Portel or Breves.

Brigades will identify any illegal activities (invasions and timber extraction) and report them the brigade leader. If illegal activities are spotted, brigades should geo-reference the finding and make a short description of what was found. Brigades should approach squatters or loggers to let them know –in good terms- that this is private land, they cannot undertake such activities there and they should leave immediately.

With the information supplied by each patrol, brigade leaders will fill-up a monitoring report that will include at least the coordinates where the illegal activities are taking place, the date and a brief report of what was identified. Finally, each brigade leader will submit this information to the local police in Portel and to IBAMA in Portel and in Belem.

Monitoring reports should be numbered, filed appropriately, and be scanned to have digital copies in an archive as backup.

Once every two months, brigade leaders will perform random site visits to verify that monitoring patrols are covering the assigned area and that each patrol is wearing the adequate field equipment. Brigade leaders should fill up a report that will be submitted to the ESLLC's office in Portel. A monitoring patrol that does not wear adequate field equipment or does not cover the designed monitoring route, will receive a warning. If a patrol is a reoffender, the patrol leader will be immediately replaced.

Maps, reports and records will be available to validators at each verification event.

[16] We define as brigades the subdivisions of the Project Area.

[17] Such as spreadsheets, tables or others. Also, georeferenced information should be available as shapefile or other adequate format whenever illegal activities are spotted.

2. Biodiversity monitoring: monitoring will follow the guidelines described in section "B3. Biodiversity Impact Monitoring" of the associate CCB PDD.

Biodiversity activities and their indicators will be:

1. Biodiversity protection is directly related with ecosystem health, which is in turn linked to forest cover. Positive impacts on biodiversity will be estimated indirectly through remote analysis of forest cover. Preserving forest cover through avoided deforestation and degradation will allow implying that net positive impacts on biodiversity are being generated.
2. Biodiversity spotting by local people. Local people participating in the biodiversity component of the project will be in charge of reporting animal spotting at the boundaries of the LMA and the PA. Spotting frequency and animal species identified will indirectly assess net positive impacts on ecosystem health.
3. Active biodiversity monitoring. Local people will be hired to monitor ants, bats and bryophytes. Results are a good indirect indicator of ecosystem health.

All information should be properly reported following the protocols developed by ESLLC after the fieldwork of mid 2013.Reports should provide geo-referenced information about biodiversity spotting and data as determined by the protocols. All data from the reports should be input into electronic format prior to the analysis.

Maps, reports and records will be available to validators at each verification event.

3. Social Monitoring: will be undertaken by social monitoring squads. There will be a responsible for each monitoring squad who will generate monthly activities reports. Each squad will be in charge of specific villages and will use approved questionnaires to gather socio-economic data about the impacts of the activities of the Project. Questionnaires will also include a section for comments to include information that is not contained in the template.

Monthly reports will be submitted to the brigade leader who will input the information into electronic format to analyze it. The results from this analysis will be used to assess the impact of each activity and to identify villages that require particular attention.

The Project management teams in Protel and Belem will held bimonthly meetings to assess the effectiveness of the activities in local villages. Based on the information supplied by the brigade leaders, the management teams will improve the proposed activities.

Maps, reports and records will be available to validators at each verification event.

1.1.2 Monitoring change and land use within the project area.

This task will be the responsibility of Ecosystem Services LLC. According to the categories presented in Table 35 of the VM0015 methodology (Table 12), the Project will implement MRV to identify and assess

LULC-changes within the Project Area.

Table 12: Categories that require MRV (refer to Table 35- VM0015 methodology)

ID	Type	Conditions under which monitoring is mandatory	Explanations	Applicability to the Project
I	Area of forest land converted to non-forest land.	Mandatory in all AUD project activities		**Applicable**
II	Area of forest land undergoing carbon stock decrease.	Mandatory only for AUD project activities having planned logging, fuel-wood collection and charcoal production activities above the baseline.	Change in carbon stock must be significant according to *ex ante* assessment, otherwise monitoring is not required.	Does not apply because none of the the Project's activities involve planned logging, fuel-wood collecion and charcoal production.
III	Area of forest land undergoing carbon stock increase.	Mandatory only for AUD project activities wishing to claim carbon credits for carbon stock increase.	Increase must be significant according to *ex ante* assessment and can only be accounted on areas that will be deforested in the baseline case.	Does not apply because the Project will not claim carbon credits from carbon stock increase.

Monitoring of forest cover will be done mainly by remote sensing imagery. The choice of imagery will depend on the availability of scenes, cloud cover, and related acquisition and processing costs. Remote sensing imagery could be either satellite (i.e Landsat) or radar (i.e Alos Palsar) or a combination of both.

LULC-change analysis using remote sensing imagery could be conducted annually of by periods depending on the availability of scenes. Therefore, verification event could occur annually of by periods.

LULC-change analysis will be done for the the Reference Region, Project Area and Leakage Belt using the protocol described in detail in Annex 3. This imagery classification analysis will result in forest and non-forest classes that should be compared with the results from the deforestation model for the date of a specific verification event. The results from such analysis will be reported using the appropriate VCS' tables and formats.

1.1.3 Monitoring of carbon stock changes and non-CO2 emissions from forest fires

None of the cases presented in Section 1.1.3 of the VM0015 methodology apply to the Project (Table 13). So, the Project is not required to set sampling plots to measure carbon stocks in either the Project Area or Leakage Belt.

Table 13: Applicability criteria for monitoring non-CO2 gasses

	ID	Type	Applicability to the Project
	Within the Project Area		
Mandatory monitoring of carbon stocks	I	Areas subject to significatn carbon stock decrease in the project scenario according to the *ex ante* assessment.	Does not apply.
	II	Areas subject to unplanned and significant carbon stock decrease e.g. due to uncontrolled forest fires and other catastrophic events.	Does not apply.
	III	Area of forest land undergoing carbon stock increase.	Does not apply.
	Within leakage management areas		
	IV	Areas subject to planned and significant carbon stock decrease in the project scenario according to the *ex ante* assessment.	Does not apply.
	Within the Project Area		
Optional monitoring of carbon stocks	V	Areas subject to carbon stock increase after planned harvest activities.	Does not apply.
	VI	Areas recovering after disturbances.	Does not apply.
	Within leakage management areas		
	VII	Aras subject to carbon stock increase due to leakage prevention measures.	Does not apply.
	Within the leakage belt		
	VIII	Aras undergoing significant changes in carbon stock.	Does not apply.

1.1.4 Monitoring of the impacts of natural disturbances and other catastrophic events.

Catastrophic events are not expected in the Project Area or Leakage Belt. Nevertheless, if by any chance a catastrophic event presents during the Project's lifetime, such events will be evaluated and reported if significant. Monitoring will follow VM0015 Tables 20.f, 20.g, 21.f and 21.g to report reductions by catastrophic events.

1.1.5 Total ex post estimated actual net carbon stock changes and GHG emissions in the project area

All ex post estimations in the Project Area will be summarized using the format of Table 24 of the VM0015 methodology.

1. 2 Monitoring of leakage

The Project is not expected to generate any type of leakage because the neighbor RDMTL Portel-Para REDD Project under a Leakage Belt Agreement has absorbed its leakage belt. Under this agreement leakage monitoring will be a sole responsibility of RMDLT.

1.2.1 Monitoring of carbon stock changes and GHG emissions associated to leakage prevention activities

The activities of the project won't generate GHG emissions.

1.2.2 Monitoring of carbon stock decreases and increases in GHG emissions due to activity shifting leakage.

The Project is not expected to generate any type of leakage because the neighbor RDMTL Portel-Para REDD Project under a Leakage Belt Agreement has absorbed its leakage belt. Under this agreement leakage monitoring will be a sole responsibility of RMDLT.

Monitoring of increases in GHG emissions

The parameter values used to estimate emissions will be the same used for estimating forest fires in the baseline (table 18 of VM0015 methodology), except for the initial carbon stocks (Cab, Cdw) which shall be those of the initial forest classes burned in the leakage belt area.

The results will be reported using the same table formats (Table 18 and 19 of the VM0015 methodology) used in the ex ante assessment of baseline GHG emissions from forest fires in the project area

TASK 2 - Revisiting the projected baseline at fixed periods.

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

Ecosystem Services LLC will be responsible for monitoring these variables.

The biophysical variables, agents, vectors, and the underlying causes of deforestation (Step 3). used to project future deforestation from the Reference Region will be reviewed at least every 10 years (fixed baseline period) but they can also be reviewed earlier depending on the requirements of the Project.

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

Ecosystem Services LLC will be responsible for carrying out this part of the monitoring.

Step 4 of Part 2 of the methodology VM0015 will be repeated to consider at least the following10-year period in the Reference Region (2018-2028). However, the baseline can be modified to consider earlier10-year periods. Such changes in the baseline must be approved by ESLLC and will require undergoing a verification process before they can be implemented.

Updating the baseline scenario will take place both in the modeling component of the system dynamics (which defines the amount of change) and the spatial component that defines the distribution of deforestation. Key variables that will be used to recalculate the baseline in the second 10-year period of the project are:

- Socio-economic information retrieved from the Project's monitoring activities
- Distance to new roads
- Average distance to selective logging activities from pioneer roads
- Distance to non-forest
- Planned infrastructure in the region

To collect this information, field visits, surveys and workshops will be held and forest cover dynamics will be assessed using available satellite and/or radar imagery.

2.3 Adjusting the carbon component of the baseline.

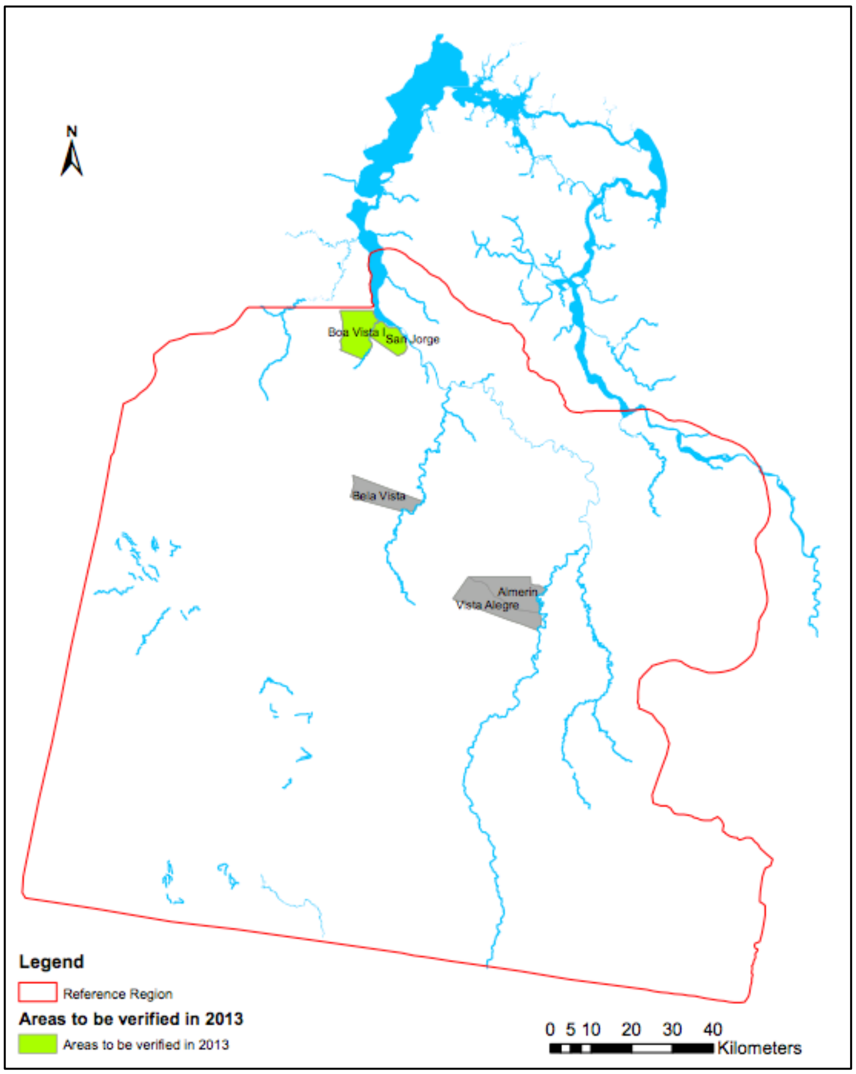
According to Section 1.1.3 of this monitoring plan, it will not be necessary to adjust the carbon component of the baseline.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

In this first verification event conducted in 2013 the ADPML project will verify only the emission reductions generated in two of its five areas (or Glebas as locally known). These two areas are Boa Vista I and San Jorge (Map 7).

Based on the ex post analysis, the Project avoided the emission of 550,391 tCO2-eq that after buffer reductions are equivalent to **477,611 Tradable VCUs** during the 01/Jan/2009-01/Jan/2012 period for the two verified areas.

Map 7: Areas to be verified for the 2009-2011 period



4.1 Baseline Emissions

Table 6. List of land use and land cover classes existing at the project start date within the reference region

Class Identifier		Broad class	Trend in Carbon stock[1]	Presence in[2]	Activities in the baseline case[3]			Description (including criteria for unambiguous boundary definition)
ID$_{cl}$	Name				LG	FW	CP	
001	Dense Ombrofile Forest	Forest Land	constant	RR	yes	no	no	
002	Degraded Ombrofile Forest	Forest Land	constant	RR	yes	no	no	
003	Grassland	Grassland	constant	RR	no	no	no	
004	Cropland	Crop Land	constant	RR	no	no	no	
005	Dense Ombrofile Forest	Forest Land	constant	PA	yes	no	no	
006	Degraded Ombrofile Forest	Forest Land	constant	PA	yes	no	no	
007	Grassland	Grassland	constant	PA	no	no	no	
008	Cropland	Crop Land	constant	PA	no	no	no	
009	Dense Ombrofile Forest	Forest Land	constant	LK	yes	no	no	
010	Degraded Ombrofile Forest	Forest Land	constant	LK	yes	no	no	
011	Grassland	Grassland	constant	LK	no	no	no	
012	Cropland	Crop Land	constant	LK	no	no	no	

Table 9.a Annual areas of baseline deforestation in the reference region

Project year *t*	Stratum *i* in the reference region	Total RR	
	1	annual	cumulative
	$ABSLRR_{i,t}$	$ABSLRR_t$	$ABSLRR$
	ha	ha	ha
1	18,788	18,788	18,788
2	18,788	18,788	37,576
3	18,788	18,788	56,364

Table 9.b Annual areas of baseline deforestation in the project area

Project year *t*	Stratum *i* of the reference region in the project area	Total PA	
	1	annual	cumulative
	$ABSLPA_{i,t}$	$ABSLPA_t$	$ABSLPA$
	ha	ha	ha
1		0	0
2		0	0
3	1,383	1,383	1,383

Table 9.c Annual areas of baseline deforestation in leakage belt

Project year *t*	Stratum *i* of the reference region in leakage belt	Total LM	
	1	annual	cumulative
	$ABSLK_{i,t}$	$ABSLK_t$	$ABSLK$
	ha	ha	ha
1	-	-	-
2	-	-	-
3	17,090	17,090.2	17,090.2

Table 11.a Annual areas deforested per forest class within the Reference Region in the baseline case (activity data per forest class)

Area deforested per forest class *icl* within the Reference Region			Total baseline deforestation in the reference region	
ID$_{icl}$>				
Name >	Ombrophile Dense	Ombrophile Degraded	annual	cumulative
Project year *t*	*ha*	*ABSLPA$_{icl,t}$* ha	*ABSLRR$_t$* ha	*ABSLRR* ha
1	18,788.0		18,788.0	18,788.0
2	18,788.0		18,788.0	37,576.0
3	18,788.0		18,788.0	56,364.0

Table 11.b Annual areas deforested per forest class within the Project Area in the baseline case (activity data per forest class)

Area deforested per forest class *icl* within the project area			Total baseline deforestation in the project area	
ID$_{icl}$>				
Name >	Ombrophile Dense	Ombrophile Degraded	annual	cumulative
Project year *t*	*ha*	*ABSLPA$_{icl,t}$* ha	*ABSLPA$_t$* ha	*ABSLPA* ha
1	-		-	-
2	-		-	-
3	513.5	869.1	1,382.6	1,382.6

Table 11.c Annual areas deforested per forest class within the leakage belt in the baseline case (activity data per forest class)

Area deforested per forest class *icl* within the leakage belt			Total baseline deforestation in the leakage belt	
ID$_{icl}$>				
Name >	Ombrophile Dense	Ombrophile Dense	annual	cumulative
Project year *t*	*ha*	*ABSLPA$_{icl,t}$* ha	*ABSLLK$_t$* ha	*ABSLLK* ha
1	0.0		-	-
2	0.0		-	-
3	17,090.2		17,090.2	17,090.2

Table 13.a. Annual areas deforested in each zone within the reference region in the baseline case

		Total baseline deforestation in the reference region	
IDz >	1		
Name >	Zone 1	*ABSLRR_t*	*ABSLRR*
Project year *t*	ha	ha	ha
0	-	-	-
1	18,788	18,788	18,788
2	18,788	18,788	37,576
3	18,788	18,788	56,364

Table 13.b. Annual areas deforested in each zone within the project area in the baseline case

Area established after deforestation per zone within the project area		Total baseline deforestation in the project area	
IDz >	1		
Name >	Zone 1	*ABSLPA_t*	*ABSLPA*
Project year *t*	ha	ha	ha
0	0	0	0
1	0	-	-
2	0	-	-
3	1,383	1,382.70	1,382.70

Table 13.c. Annual areas deforested in each zone within the leakage belt in the baseline case

		Total baseline deforestation in the leakage belt	
IDz >	1		
Name >	Zone 1	*ABSLLK_t*	*ABSLLK*
Project year *t*	ha	ha	ha
0		0	0
1	-	-	-
2	-	-	-
3	17,090.20	17,090.20	17,090.20

Table 15. Carbon stocks per hectare of initial forest classes *icl* existing in the project area and leakage belt

Table 15.a. Estimated values

Project year t	Initial forest class icl — Name: Ombrophile Dense — IDicl 1 — Average carbon stock per hectare ± 90% CI								Initial forest class icl — Name: Ombrophile Degraded — IDicl 2 — Average carbon stock per hectare ± 90% CI							
	Cab_{icl}		Cbb_{icl}		Cl_{icl}		$Ctot_{cl}$		Cab_{icl}		Cbb_{icl}		Cl_{icl}		$Ctot_{cl}$	
	C stock	± 90% CI	C stock	± 90% CI	C stock	± 90% CI	C stock	± 90% CI	C stock	± 90% CI	C stock	± 90% CI	C stock	± 90% CI	C stock	± 90% CI
	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$
1	469.6	46.7	105.2	10.5	8.68	0.8	583.5	58.0	461.2	95.5	103.43	21.3	8.96	1.36	573.6	118.1
2	469.6	46.7	105.2	10.5	8.68	0.8	583.5	58.0	461.2	95.5	103.43	21.3	8.96	1.36	573.6	118.1
3	469.6	46.7	105.2	10.5	8.68	0.8	583.5	58.0	461.2	95.5	103.43	21.3	8.96	1.36	573.6	118.1

Table 15.b Values to be used after discounts for uncertainties (Project Area)

Project year t	Initial forest class icl — Name: Ombrophile Dense — IDicl 1 — Average carbon stock per hectare ± 90% CI								Initial forest class icl — Name: Ombrophile Degraded — IDicl 2 — Average carbon stock per hectare ± 90% CI							
	Cab_{icl}		Cbb_{icl}		Cl_{icl}		$Ctot_{cl}$		Cab_{icl}		Cbb_{icl}		Cl_{icl}		$Ctot_{cl}$	
	C stock	C stock change	C stock	C stock change	C stock	C stock change	C stock	C stock change	C stock	C stock change	C stock	C stock change	C stock	C stock change	C stock	C stock change
	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$
1	422.90		94.8		7.8		525.5		365.7		82.1		7.6		455.5	
2	422.9		94.8		7.8		525.5		365.7		82.1		7.6		455.5	
3	422.9		94.8		7.8		525.5		365.7		82.1		7.6		455.5	

Table 16. Long-term (20-years) average carbon stocks per hectare of post-deforestation LU/LC classes present in the reference region

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	Post deforestation class fcl — Name: Grassland — ID fcl '003 — Average carbon stock per hectare ± 90% CI							
	Cab_{fcl}		Cbb_{fcl}		Cl_{fcl}		$Ctot_{fcl}$	
	C stock	± 90% CI	C stock	± 90% CI	C stock	± 90% CI	C stock	± 90% CI
Project year t	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$
Average to be used in calculations							51.65	

Table 17. Long-term (20-years) area weighted average carbon stock per zone (Project Area)

Zone		Post - deforestation LU/LC - classe fcl — Name: Cropland — ID fcl '004						Area weighted long-term (20 years average carbon stocks per zone z			
		Cab_{fcl}		Cbb_{fcl}		Cl_{fcl}		Cab_z	Cbb_z	Cl_z	$Ctot_z$
		C stock	± 90% CI	C stock	± 90% CI	C stock	± 90% CI	C stock	C stock	C stock	C stock
IDz	Name	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$	$tCO_2e\ ha^{-1}$
1	Zone 1										**51.65**

Table 20.a. Carbon stock change factors for initial forest classes *icl* (Project Area)

		Dense Forest			Degraded Forest		
Year after deforestation		$\Delta Cab_{icl,t}$	$\Delta Cbb_{icl,t}$	$\Delta Cl_{icl,t}$	$\Delta Cab_{icl,t}$	$\Delta Cbb_{icl,t}$	$\Delta Cl_{icl,t}$
1	t*	-422.9	-9.48	-7.84	-365.74	-8.21	-7.6
2	t*+1	0	-9.48	0	0	-8.21	0
3	t*+2	0	-9.48	0	0	-8.21	0

Table 20.b. Carbon stock change factors for final forest classes *icl* (Project Area)

		Zone 1			
Year after deforestation		$\Delta Cab_{z,t}$	$\Delta Cbb_{z,t}$	$\Delta Cl_{z,t}$	$\Delta Tot_{z,t}$
1	t*	1.72	1.72	1.72	5.17
2	t*+1	1.72	1.72	1.72	5.17
3	t*+2	1.72	1.72	1.72	5.17

Tables 21.b. Baseline carbon stock change in the project area

Tables 21.b.1 Baseline carbon stock change in above-ground biomass in the project area

Carbon stock changes in the above-ground biomass per initial forest class *icl*			Total carbon stock change in the above-ground biomass of the initial forest classes in the project area		Carbon stock changes in the above-ground biomass per post-deforestation zone *z*		Total carbon stock change in the above-ground biomass of post-deforestation zones in the project area		Total net carbon stock change in the above-ground biomass of the project area	
ID icl>	1	2	$\Delta Cab\ BSLPA_{icl,t}$	$\Delta Cab\ BSLPA_{icl}$	ID iz>	1	$\Delta Cab\ BSLPA_{z,t}$	$\Delta Cab\ BSLPA_{z}$	$\Delta Cab\ BSLPA_{t}$	$\Delta Cab\ BSLPA$
Name >	Dense Forest	Degraded Forest	annual	cumulative	Name >	Pasture	annual	cumulative	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0	0	0	0	0	0	0	0
1	-	-	-	-	1	-	-	-	-	-
2	-	-	-	-	2	-	-	-	-	-
3	(217,159)	(317,865)	(535,024)	(535,024)	3	1,587	1,587	1,587	(536,611)	(536,611)

Tables 21.b.2 Baseline carbon stock change in below-ground biomass in the project area

Carbon stock changes in the below-ground			Total carbon stock change in the below-		Carbon stock changes in the		Total carbon stock change in		Total net carbon stock change in	
ID icl>	1	2	$\Delta Cab\ BSLPA_{icl,t}$	$\Delta Cab\ BSLPA_{icl}$	ID iz>	1	$\Delta Cab\ BSLPA_{z,t}$	$\Delta Cab\ BSLPA_{z}$	$\Delta Cab\ BSLPA_{t}$	$\Delta Cab\ BSLPA$
Name >	Dense Forest	Degraded Forest	annual	cumulative	Name >	Pasture	annual	cumulative	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0	0	0	0	0	0	0	0
1	-	-	-	-	1	-	-	-	-	-
2	-	-	-	-	2	-	-	-	-	-
3	(4,866)	(7,138)	(12,004)	(12,004)	3	1,587	1,587	1,587	(10,417)	(10,417)

Tables 21.b.3 Baseline carbon stock change in litter in the project area

Carbon stock changes in litter per initial			Total carbon stock change in litter of		Carbon stock changes in		Total carbon stock change in		Total net carbon stock change in	
ID icl>	1	2	$\Delta Cab\ BSLPA_{icl,t}$	$\Delta Cab\ BSLPA_{icl}$	ID iz>	1	$\Delta Cab\ BSLPA_{z,t}$	$\Delta Cab\ BSLPA_{z}$	$\Delta Cab\ BSLPA_{t}$	$\Delta Cab\ BSLPA$
Name >	Dense Forest	Degraded Forest	annual	cumulative	Name >	Pasture	annual	cumulative	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0	0	0	0	0	0	0	0
1	-	-	-	-	1	-	-	-	-	-
2	-	-	-	-	2	-			-	-
3	(4,026)	(6,605)	(10,631)	(10,631)	3	1,587	1,587	1,587	(9,044)	(9,044)

Table 23. Parameters used to calculate non-CO2 emissions from forest fires

Initial Forest Class		Parameters																
IDcl	Name	*$Fburnt_{icl}$* %	*Cab* $tCO_2e\ ha^{-1}$	*Cdw* $tCO_2e\ ha^{-1}$	*Cl* $tCO_2e\ ha^{-1}$	*$Pburnt_{ab,icl}$* %	*$Pburnt_{dw,icl}$* %	*$Pburnt_{l,icl}$* %	*$CE_{ab,icl}$* %	*$CE_{dw,icl}$* %	*$CE_{l,icl}$* %	*ECO2-ab* $tCO_2e\ ha^{-1}$	*ECO2-dw* $tCO_2e\ ha^{-1}$	*ECO2-l* $tCO_2e\ ha^{-1}$	*EBBCO2-tot* $tCO_2e\ ha^{-1}$	*$EBBnN2O_{icl}$* $tCO_2e\ ha^{-1}$	*$EBBCH4_{icl}$* $tCO_2e\ ha^{-1}$	*$EBBtot_{icl}$* $tCO_2e\ ha^{-1}$
1	Dense Ombrofile Forest	96%	-422.9	0	-7.84	96%	0	100%	0.5	0	0.5	-202.99	0	-3.92	-199	0	-18	-18.2
2	Degraded Ombrofile Forest	96%	-365.74	0	-7.6	96%	0	100%	0.5	0	0.5	-175.56	1	-3.8	-172	1	-16	-14.8

Table 24. Baseline non-CO2 emissions from forest fires in the project area

Project year *t*	Emissions of non-CO_2 gasses from baseline forest fires				Total baseline non-CO2 emissions from forest fires in the project area	
	ID_{icl} = 1		*ID_{icl} = 2*			
	$ABSLPA_{icl,t}$ ha	*$EBBSLtot_{icl}$* tCO_2-e ha^{-1}	*$ABSLPA_{icl,t}$* ha	*$EBBSLtot_{icl}$* tCO_2-e ha^{-1}	annual *$EBBBSLPA_t$* tCO_2-e	cumulative *EBBBSLPA* tCO_2-e
1	-	(18)	-	(15)	-	-
2	-	(18)	-	(15)	-	-
3	514	(18)	869	(15)	(22,190)	(22,190)

4.2 Project Emissions

Table 9.b Ex post annual areas of unavoided deforestation in the project area

1

Project year *t*	Stratum *i* of the reference region in the project area	Total PA	
		annual	cumulative
	$ABSLPA_{i,t}$	$ABSLPA_t$	$ABSLPA$
	ha	ha	ha
1		0	0
2		0	0
3	61	61	61

Table 9.c Ex post annual areas of baseline deforestation in leakage belt

1

Project year *t*	Stratum *i* of the reference region in leakage belt	Total LM	
		annual	cumulative
	$ABSLK_{i,t}$	$ABSLK_t$	$ABSLK$
	ha	ha	ha
1	-	-	-
2	-	-	-
3	10,809	10,808.6	10,808.6

Table 11.b Ex post annual areas deforested per forest class within the Project Area (activity data per forest class)

Area deforested per forest class *icl* within the project area	1	12	Total baseline deforestation in the project area	
ID_{icl}>				
Name >	Ombrophile Dense	Ombrophile Degraded	annual	cumulative
Project year *t*	*ha*	$ABSLPA_{icl,t}$ ha	$ABSLPA_t$ ha	*ABSLPA* ha
1	-		-	-
2	-		-	-
3	60.8		60.8	60.8

Table 11.c Ex post annual areas deforested per forest class within the leakage belt (activity data per forest class)

Area deforested per forest class *icl* within the leakage belt	1	12	Total baseline deforestation in the leakage belt	
ID_{icl}>				
Name >	Ombrophile Dense	Ombrophile Degraded	annual	cumulative
Project year *t*	*ha*	$ABSLPA_{icl,t}$ ha	$ABSLLK_t$ ha	*ABSLLK* ha
1	-		-	-
2	-		-	-
3	10,808.6		10,808.6	10,808.6

Table 13.b. Ex post annual areas deforested in each zone within the project area

Area established after deforestation per zone within the project area		Total baseline deforestation in the project area	
IDz >	1		
Name >	Zone 1	*ABSLPA$_t$*	*ABSLPA*
Project year *t*	ha	ha	ha
0	0	0	0
1	0	-	-
2	0	-	-
3	61	60.80	60.80

Table 13.c. Ex post annual areas deforested in each zone within the leakage belt

		Total baseline deforestation in the leakage belt	
IDz >	1		
Name >	Zone 1	*ABSLLK$_t$*	*ABSLLK*
Project year *t*	ha	ha	ha
0		0	0
1	-	-	-
2	-	-	-
3	10,808.60	10,808.60	10,808.60

Tables 21.b. Baseline carbon stock change in the project area

Tables 21.b.1 Baseline carbon stock change in above-ground biomass in the project area

Carbon stock changes in the above-ground biomass per initial forest class *icl*			Total carbon stock change in the above-ground biomass of the initial forest classes in the project area		Carbon stock changes in the above-ground biomass per post-deforestation zone *z*		Total carbon stock change in the above-ground biomass of post-deforestation zones in the project area		Total net carbon stock change in the above-ground biomass of the project area	
ID icl>	1	2	$\Delta Cab\ BSLPA_{icl,t}$	$\Delta Cab\ BSLPA_{icl}$	ID iz>	1	$\Delta Cab\ BSLPA_{z,t}$	$\Delta Cab\ BSLPA_{z}$	$\Delta Cab\ BSLPA_{t}$	$\Delta Cab\ BSLPA$
Name>	Dense Forest	Degraded Forest	annual	cumulative	Name>	Pasture	annual	cumulative	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0	0	0	0	0	0	0	0
1	-	-	-	-	1	-	-	-	-	-
2	-	-	-	-	2	-	-	-	-	-
3	(25,712)	-	(25,712)	(25,712)	3	70	70	70	(25,782)	(25,782)

Tables 21.b.2 Baseline carbon stock change in below-ground biomass in the project area

Carbon stock changes in the below-ground			Total carbon stock change in the below-		Carbon stock changes in the		Total carbon stock change in		Total net carbon stock change in	
ID icl>	1	2	$\Delta Cab\ BSLPA_{icl,t}$	$\Delta Cab\ BSLPA_{icl}$	ID iz>	1	$\Delta Cab\ BSLPA_{z,t}$	$\Delta Cab\ BSLPA_{z}$	$\Delta Cab\ BSLPA_{t}$	$\Delta Cab\ BSLPA$
Name>	Dense Forest	Degraded Forest	annual	cumulative	Name>	Pasture	annual	cumulative	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0	0	0	0	0	0	0	0
1	-	-	-	-	1	-	-	-	-	-
2	-	-	-	-	2	-	-	-	-	-
3	(576)	-	(576)	(576)	3	70	70	70	(506)	(506)

Tables 21.b.3 Baseline carbon stock change in litter in the project area

Carbon stock changes in litter per initial forest class *icl*			Total carbon stock change in litter of the initial forest classes in the project area		Carbon stock changes in litter per post-deforestation zone *z*		Total carbon stock change in litter of post-deforestation zones in the project area		Total net carbon stock change in litter of the project area	
ID icl>	1	2	$\Delta Cab\ BSLPA_{icl,t}$	$\Delta Cab\ BSLPA_{icl}$	ID iz>	1	$\Delta Cab\ BSLPA_{z,t}$	$\Delta Cab\ BSLPA_{z}$	$\Delta Cab\ BSLPA_{t}$	$\Delta Cab\ BSLPA$
Name>	Dense Forest	Degraded Forest	annual	cumulative	Name>	Pasture	annual	cumulative	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0	0	0	0	0	0	0	0
1	-	-	-	-	1	-	-	-	-	-
2	-	-	-	-	2	-			-	-
3	(477)	-	(477)	(477)	3	70	70	70	(407)	(407)

Table 24. Ex post non-CO2 emissions from forest fires in the project area

Project year *t*	Emissions of non-CO_2 gasses from baseline forest fires: ID_{icl} = 1: $ABSLPA_{icl,t}$ (ha)	ID_{icl} = 1: $EBBBSLtot_{icl}$ (tCO_2-e ha^{-1})	ID_{icl} = 2: $ABSLPA_{icl,t}$ (ha)	ID_{icl} = 2: $EBBBSLtot_{icl}$ (tCO_2-e ha^{-1})	Total baseline non-CO2 emissions from forest fires in the project area: annual $EBBBSLPA_t$ (tCO_2-e)	cumulative $EBBBSLPA$ (tCO_2-e)
1	-	(18)	-	(15)	-	-
2	-	(18)	-	(15)	-	-
3	61	(18)	-	(15)	(1,107)	(1,107)

Table 27. Ex post estimated net carbon stock change in the project area under the project

Project year *t*	Total carbon stock decrease due to planned activities: annual $\Delta CPAdPA_t$ (tCO_2-e)	cumulative $\Delta CPAdPA$ (tCO_2-e)	Total carbon stock increase due to planned activities: annual $\Delta CPAiPA_t$ (tCO_2-e)	cumulative $\Delta CPAiPA$ (tCO_2-e)	Total carbon stock decrease due to unavoided unplanned deforestation: annual $\Delta CUDdPA_t$ (tCO_2-e)	cumulative $\Delta CUDdPA$ (tCO_2-e)	Total carbon stock change in the project case: annual $\Delta CPSPA_t$ (tCO_2-e)	cumulative $\Delta CPSPA$ (tCO_2-e)
0	0	0	0	0	0	0	0	0
1	0	0	0	0	-	-	-	-
2	0	0	0	0	-	-	-	-
3	0	0	0	0	(26,765)	(26,765)	(26,765)	(26,765)

Table 28. Total ex post estimated actual emissions of non-CO2 gasses due to forest fires in the project area

Project year *t*	Total *ex ante* estimated actual non-CO2 emissions from forest fires in the Project area	
	EBBPSPA$_t$ annual tCO_2-e	***EBBPSPA*** cumulative tCO_2-e
0	0	0
1	-	-
2	-	-
3	(1,107)	(1,107)

Table 29. Total ex post estimated actual net carbon stock changes and emissions of non-CO2 gasses in the project

Project year *t*	Total *ex ante* carbon stock decrease due to planned activities		Total *ex ante* carbon stock increase due to planned activities		Total *ex ante* carbon stock decrease due to unavoided unplanned deforestation		Total *ex ante* carbon stock change		Total ex ante estimated actual non-CO_2 emissions from forest fires in the project area	
	annual $\triangle CPAdPA_t$ tCO_2-e	cumulative $\triangle CPAdPA$ tCO_2-e	annual $\triangle CPAiPA_t$ tCO_2-e	cumulative $\triangle CPAiPA$ tCO_2-e	annual $\triangle CUDdPA_t$ tCO_2-e	cumulative $\triangle CUDdPA$ tCO_2-e	annual $\triangle CPSPA_t$ tCO_2-e	cumulative $\triangle CPSPA$ tCO_2-e	annual $EBBPSPA_t$ tCO_2-e	cumulative $EBBPSPA$ tCO_2-e
0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	-	-	-	-	-	-
2	0	0	0	0	-	-	-	-	-	-
3	0	0	0	0	(26,765)	(26,765)	(26,765)	(26,765)	(1,107)	(1,107)

4.3 Leakage

The Project has not leakage as the neighbor RMDLT Portel-Para REDD Project absorbed its entire leakage belt.

Table 15.b Values to be used after discounts for uncertainties (Leakage Belt)

Project year *t*	Initial forest class *icl* — Name: Ombrophile Dense; IDicl 1; Average carbon stock per hectare ± 90% CI								Initial forest class *icl* — Name: Ombrophile Degraded; IDicl 2; Average carbon stock per hectare ± 90% CI							
	Cab_{icl}		Cbb_{icl}		Cl_{icl}		$Ctot_{cl}$		Cab_{icl}		Cbb_{icl}		Cl_{icl}		$Ctot_{cl}$	
	C stock $tCO_2e\ ha^{-1}$	C stock change $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	C stock change $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	C stock change $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	C stock change $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	C stock change $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	C stock change $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	C stock change $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	C stock change $tCO_2e\ ha^{-1}$
1	516.3		115.7		9.5		641.6		556.7		124.7		10.3		691.7	
2	516.3		115.7		9.5		641.6		556.7		124.7		10.3		691.7	
3	516.3		115.7		9.5		641.6		556.7		124.7		10.3		691.7	

Long-term (20-years) average carbon stocks per hectare of post-deforestation LU/LC classes present in the leakage belt

Project year *t*	Post deforestation class *fcl* — Name: 0; ID*fcl* 0; Average carbon stock per hectare ± 90% CI							
	Cab_{fcl}		Cbb_{fcl}		Cl_{fcl}		$Ctot_{fcl}$	
	C stock $tCO_2e\ ha^{-1}$	+ 90% CI $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	+ 90% CI $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	+ 90% CI $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	+ 90% CI $tCO_2e\ ha^{-1}$
Average to be used in calculations							7.38	

Table 17. Long-term (20-years) area weighted average carbon stock per zone (Leakage Belt)

Zone		Post - deforestation LU/LC - classe *fcl* — Name: Grassland; ID *fcl* 0						Name: Cropland; ID *fcl* 0						Area weighted long-term (20 years average carbon stocks per zone *z*			
		Cab_{fcl}		Cbb_{fcl}		Cl_{fcl}		Cab_{fcl}		Cbb_{fcl}		Cl_{fcl}		Cab_z	Cbb_z	Cl_z	$Ctot_z$
IDz	Name	C stock $tCO_2e\ ha^{-1}$	+ 90% CI $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	+ 90% CI $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	+ 90% CI $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	+ 90% CI $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	+ 90% CI $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	+ 90% CI $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$	C stock $tCO_2e\ ha^{-1}$
1	Zone 1																7.37916667

Table 20.c Carbon stock change factors for initial forest classes *icl* (Leakage Belt)

Year after deforestation		Dense Forest $\Delta Cab_{icl,t}$	Dense Forest $\Delta Cbb_{icl,t}$	Dense Forest $\Delta Cl_{icl,t}$	Degraded Forest $\Delta Cab_{icl,t}$	Degraded Forest $\Delta Cbb_{icl,t}$	Degraded Forest $\Delta Cl_{icl,t}$
1	t*	-516.34	-11.57	-9.52	-556.66	-12.47	-10.32
2	t*+1	0	-11.57	0	0	-12.47	0
3	t*+2	0	-11.57	0	0	-12.47	0

Table 20.d Carbon stock change factors for final forest classes *icl* (Leakage Belt)

Year after deforestation		Zone 1 $\Delta Cab_{z,t}$	Zone 1 $\Delta Cbb_{z,t}$	Zone 1 $\Delta Cl_{z,t}$	Zone 1 $\Delta Tot_{z,t}$
1	t*	1.72	1.72	1.72	5.17
2	t*+1	1.72	1.72	1.72	5.17
3	t*+2	1.72	1.72	1.72	5.17

Tables 21.c. Baseline carbon stock change in the leakage belt area

Table 21.c.1. Baseline carbon stock change in the above-ground biomass in the leakage belt area

	Carbon stock changes in the above-ground biomass per initial forest class *icl*		Total carbon stock change in the above-ground biomass of the initial forest classes in the project area	
ID icl>	1	2	$\Delta Cab\ BSLLK_{icl,t}$	$\Delta Cab\ BSLLK_{icl}$
Name >	Dense Forest	Degraded Forest	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0	0
1	-	-	-	-
2	-	-	-	-
3	(8,824,354)	-	(8,824,354)	(8,824,354)

	Carbon stock changes in the above-ground biomass per post-deforestation zone *z*	Total carbon stock change in the above-ground biomass of post-deforestation zones in the project area	
ID iz>	1	$\Delta Cab\ BSLLK_{z,t}$	$\Delta Cab\ BSLLK_{z}$
Name >	Pasture	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0
1	-	-	-
2	-		
3	19,616	19,616	19,616

Total net carbon stock change in the above-ground biomass of the project area	
$\Delta Cab\ BSLLK_{t}$	$\Delta Cab\ BSLLK$
annual	cumulative
tCO_2-e	tCO_2-e
0	0
-	-
-	-
(8,804,738)	(8,804,738)

Table 21.c.2. Baseline carbon stock change in the below-ground biomass in the leakage belt area

	Carbon stock changes in the below-ground		Total carbon stock change in the below-	
ID icl>	1	2	$\Delta Cab\ BSLLK_{icl,t}$	$\Delta Cab\ BSLLK_{icl}$
Name >	Dense Forest	Degraded Forest	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0	0
1	-	-	-	-
2	-	-	-	-
3	(197,717)	-	(197,717)	(197,717)

	Carbon stock	Total carbon stock change in	
ID iz>	1	$\Delta Cab\ BSLLK_{z,t}$	$\Delta Cab\ BSLLK_{z}$
Name >	Pasture	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0
1	-	-	-
2	-	-	-
3	19,616	19,616	19,616

Total net carbon stock change in the	
$\Delta Cab\ BSLLK_{t}$	$\Delta Cab\ BSLLK$
annual	cumulative
tCO_2-e	tCO_2-e
0	0
-	-
-	-
(178,101)	(178,101)

Table 21.c.3. Baseline carbon stock change in litter in the leakage belt area

	Carbon stock changes in litter per initial forest		Total carbon stock change in litter of	
ID icl>	1	2	$\Delta Cab\ BSLLK_{icl,t}$	$\Delta Cab\ BSLLK_{icl}$
Name >	Dense Forest	Degraded Forest	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0	0
1	-	-	-	-
2	-	-	-	-
3	(162,699)	-	(162,699)	(162,699)

	Carbon stock	Total carbon stock change in	
ID iz>	1	$\Delta Cab\ BSLLK_{z,t}$	$\Delta Cab\ BSLLK_{z}$
Name >	Pasture	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0
1	-	-	-
2	-		
3	19,616	19,616	19,616

Total net carbon stock change in litter of	
$\Delta Cab\ BSLLK_{t}$	$\Delta Cab\ BSLLK$
annual	cumulative
tCO_2-e	tCO_2-e
0	0
-	-
-	-
(143,083)	(143,083)

Tables 21.c. Ex-post carbon stock change in the leakage belt area

Table 21.c.1. Baseline carbon stock change in the above-ground biomass in the leakage belt area

Carbon stock changes in the above-ground biomass per initial forest class *icl*			Total carbon stock change in the above-ground biomass of the initial forest classes in the project area		Carbon stock changes in the above-ground biomass per post-deforestation zone *z*		Total carbon stock change in the above-ground biomass of post-deforestation zones in the project area		Total net carbon stock change in the above-ground biomass of the project area	
ID icl>	*1*	*2*	$\triangle Cab\ BSLLK_{icl,t}$	$\triangle Cab\ BSLLK_{icl}$	*ID iz>*	*1*	$\triangle Cab\ BSLLK_{z,t}$	$\triangle Cab\ BSLLK_{z}$	$\triangle Cab\ BSLLK_{t}$	$\triangle Cab\ BSLLK$
Name >	Dense Forest	Degraded Forest	annual	cumulative	Name >	Pasture	annual	cumulative	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0	0	0	0	0	0	0	0
1	-	-	-	-	1	-	-	-	-	-
2	-	-	-	-	2	-			-	-
3	(5,580,913)	-	(5,580,913)	(5,580,913)	3	12,406	12,406	12,406	(5,568,507)	(5,568,507)

Table 21.c.2. Ex-post carbon stock change in the below-ground biomass in the leakage belt area

Carbon stock changes in the below-ground			Total carbon stock change in the below-		Carbon stock		Total carbon stock change in		Total net carbon stock change in the	
ID icl>	*1*	*2*	$\triangle Cab\ BSLLK_{icl,t}$	$\triangle Cab\ BSLLK_{icl}$	*ID iz>*	*1*	$\triangle Cab\ BSLLK_{z,t}$	$\triangle Cab\ BSLLK_{z}$	$\triangle Cab\ BSLLK_{t}$	$\triangle Cab\ BSLLK$
Name >	Dense Forest	Degraded Forest	annual	cumulative	Name >	Pasture	annual	cumulative	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0	0	0	0	0	0	0	0
1	-	-	-	-	1	-	-	-	-	-
2	-	-	-	-	2	-	-	-	-	-
3	(125,045)	-	(125,045)	(125,045)	3	12,406	12,406	12,406	(112,639)	(112,639)

Table 21.c.3. Ex-post carbon stock change in litter in the leakage belt area

Carbon stock changes in litter per initial forest			Total carbon stock change in litter of		Carbon stock		Total carbon stock change in		Total net carbon stock change in litter	
ID icl>	*1*	*2*	$\triangle Cab\ BSLLK_{icl,t}$	$\triangle Cab\ BSLLK_{icl}$	*ID iz>*	*1*	$\triangle Cab\ BSLLK_{z,t}$	$\triangle Cab\ BSLLK_{z}$	$\triangle Cab\ BSLLK_{t}$	$\triangle Cab\ BSLLK$
Name >	Dense Forest	Degraded Forest	annual	cumulative	Name >	Pasture	annual	cumulative	annual	cumulative
Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	Project year *t*	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
0	0	0	0	0	0	0	0	0	0	0
1	-	-	-	-	1	-	-	-	-	-
2	-	-	-	-	2	-			-	-
3	(102,898)	-	(102,898)	(102,898)	3	12,406	12,406	12,406	(90,492)	(90,492)

Table 21.d. Total net baseline carbon stock change in the leakage belt

Project year t	Total ex ante net baseline carbon stock change		Total ex post net actual carbon stock change		Total ex post leakage	
	Annual $\Delta CBSLLK_t$ tCO2-e	Cummulative $\Delta CBSLLK$ tCO2-e	Annual $\Delta CBSLLK_t$ tCO2-e	Cummulative $\Delta CBSLLK$ tCO2-e	Annual $\Delta CBSLLK_t$ tCO2-e	Cummulative $\Delta CBSLLK$ tCO2-e
1	-	0	-	0	-	0
2	-	0	-	0	-	0
3	(9,184,769.10)	(9,184,769.10)	(5,808,855.09)	(5,808,855.09)	-	-

Table 35 Ex post total leakage

Project year t	Total ex post GHG emissions from increased grazing activities		Total ex post increase in GHG emissions due to displaced forest fires		Total ex post decrease in carbon stocks due to displaced deforestation		Carbon stock decrease due to leakage prevention measures		Total net carbon stock change due to leakage		Total net increase in emissions due to leakage	
	annual $EgLK_t$ tCO2-e	cumulative $EgLK$ tCO2-e	annual $EADLK_t$ tCO2-e	cumulative $EADLK$ tCO2-e	annual $\Delta CADLK_t$ tCO2-e	cumulative $\Delta CADLK$ tCO2-e	annual $\Delta CLPMLK_t$ tCO2-e	cumulative $\Delta CLPMLK$ tCO2-e	annual ΔCLK_t tCO2-e	cumulative ΔCLK tCO2-e	annual ELK_t tCO2-e	cumulative ELK tCO2-e
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-

4.4 Summary of GHG Emission Reductions and Removals

The project has generated a total of **477,611** tradable VCUs in the period of 01/Jan/2009-01/Jan/2012.

Table 36. Ex post net anthropogenic GHG emission reductions (DREDDt) and Voluntary Carbon Units (VCUt)

Project year *t*	Baseline carbon stock changes		Baseline GHG emissions		*Ex post* project carbon stock changes		*Ex post* project GHG emissions		*Ex post* leakage carbon stock changes		*Ex post* leakage GHG emissions		*Ex post* net athropogenic GHG emission reductions		*Ex post* VCUs tradable		*Ex post* buffer credits	
	annual $\Delta CBSLPA_t$ tCO_2-e	cumulative $\Delta CBSLPA$ tCO_2-e	annual $EBBBSLPA_t$ tCO_2-e	cumulative $EBBBSLPA$ tCO_2-e	annual $\Delta CPSPA_t$ tCO_2-e	cumulative $\Delta CPSPA$ tCO_2-e	annual $EBBPSPA_t$ tCO_2-e	cumulative $EBBPSPA$ tCO_2-e	annual ΔCLK_t tCO_2-e	cumulative ΔCLK tCO_2-e	annual ELK_t tCO_2-e	cumulative ELK tCO_2-e	annual $\Delta REDD_t$ tCO_2-e	cumulative $\Delta REDD$ tCO_2-e	annual VCU_t tCO_2-e	cumulative VCU tCO_2-e	annual VBC_t tCO_2-e	cumulative VBC tCO_2-e
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	(556,072)	(556,072)	(22,190)	(1,107)	(26,765)	(26,765)	(1,107)	(1,107)	-	-	-	-	550,391	550,391	**477,611**	**477,611**	72,780	72,780

5 ADDITIONAL INFORMATION

There is no additional information.

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