MADRE DE DIOS AMAZON REDD PROJECT

MONITORING REPORT

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Madre de Dios Amazon REDD Project is a project whose proposed activity is to avoid unplanned deforestation of forests that are managed sustainably by the certified timber concessions “Maderera Rio Acre SAC “ and “Maderera Rio Yaverija SAC “, in the department of Madre de Dios, southeastern Peru, in the Peruvian Amazon.

Both companies have signed concession contracts with the Peruvian government, renewable for 40 years (for a total of 80 years of contract); in May 2002 for an area of 98,932.0 hectares (49,376.0 Maderacre and 49,556.0 Maderyja). These contracts explicitly give legal rights over both areas under concession, and all the environmental services included in them. There are no current or future land-use conflicts, nor are there people living within the concession boundaries. According to the Final Validation Report of the Project under CCBA performed by SCS, Maderyja and Maderacre have exclusive rights to environmental services within the project area, including forest carbon.

The project area is located within 30 km of the South Inter-Oceanic Highway (IOH), linking Brazil with the Peruvian ports, in the Amazon region that belongs to the Vilcabamba – Amboró Corridor, one of the world’s biodiversity hotspots. The presence of the IOH is a major risk. Until its paving, Madre de Dios was an isolated region, more integrated with Brazil than with the rest of the country. To get to the nearest city, Cuzco, they had to travel two to three days, which has been reduced to only about 14 hours. This facilitates the immigration of new settlers, mainly from rural Andean areas, and the establishment of economic activities not compatible with the forest that are consequently practiced, such as slash-and-burn agriculture, cattle ranching in poor pastures, etc. Deforestation and forest degradation are the result of these activities. Similar effects are already visible in Brazil, where the Trans-Amazon Highway was completed some time ago.

In this sense, it is necessary to consolidate the sustainable management of the area, as is the case of concessions for harvesting of timber and non-timber resources, private conservation areas and protected natural areas.

The project aims to reduce land pressure in the project area and its buffer zone, to ensure sustainable forest management of both timber concessions, and to improve the living conditions of local communities through implementation of an avoided deforestation project to help generate more resources for the management of the area.

The project started on January 1, 2009, when the validation process was completed under the Climate, Community and Biodiversity Project Design Standards (CCB), thus ensuring social and environmental sustainability of the proposal. This is reinforced by obtaining the Gold level of the standard. As a complement, the project was also validated under the Verified Carbon Standard (VCS) on September 20, 2012, subsequently making the verification of 2009-2012 on 21 May 2013, and then making the verification of 2013 on 30 July 2014.
The Total emissions avoided by the project during the verification period January- december 2014, according to calculations, was 823,951.82 t CO_2-e.

1.2 Sectoral Scope and Project Type

According to VCS categories, the Madre de Dios Amazon REDD Project falls under the sectoral scope 14 Agriculture, Forestry and Other Land Use, and according to the VCS AFOLU Requirements it falls under the definition of Reduced Emissions from Deforestation and Degradation (REDD), specifically under Avoiding Unplanned Deforestation and Degradation (AUDD). This is: the Project is proposing activities to reduce net GHG emissions by stopping deforestation and/or degradation of degraded to mature forests that would have occurred in any forest configuration, as a result of socio-economic forces that promote alternative uses of forest land and because the inability of institutions to control these activities, etc. In addition, the project occurs in a frontier configuration regarding as the deforestation/degradation is caused by the expansion of roads and other infrastructure into forest lands, which improves forest access and leads to an increase of encroachment by human populations, to do subsistence farming and fuel wood gathering on previously inaccessible forest lands.

In addition to this and as required by the REDD-MF Module of the applied REDD Methodology Modules, the following decision tree was used to identify the type of VCS-eligible REDD project activity:

Is the forest land expected to be converted to non-forest land in the baseline case?			
YES[8]		**NO**	
Is the land legally authorized and documented to be converted to non-forest?		Is the forest expected to degrade by fuelwood extraction or charcoal production, in the baseline case	
YES[9]	**NO**	**YES**	**NO**
Avoided planned deforestation	Avoided unplanned deforestation	Avoided forest degradation	Proposed project is not a VCS REDD[10] activity currently covered by the module framework

This project is not a grouped project.

1.3 Project Proponent

Organization name	Maderacre Río Acre S.A.C (MADERACRE)
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1.4 Other Entities Involved in the Project

N/A

1.5 Project Start Date

The project activities started to be implemented on 1st January 2009. By the end of March 2008, an agreement was signed between Greenoxx NGO and both concessions to implement the REDD Project. The project started to be effectively implemented in 2009, with the design of social plans, biodiversity studies, specific modeling and monitoring activities required for the achievement of validation according to the CCB Standard (Climate, Community and Biodiversity).

Said validation was obtained by the end of 2009, with Gold Level qualification. This date coincides also with the completion of the pavement of the Inter Oceanic Highway, a fact that completely changed the dynamic of deforestation in the area, In terms of impact, the Inter Oceanic Highway has greatly intensified the risk of deforestation and therefore the measures that project proponents have to implement to be able to combat said risk.

1.6 Project Crediting Period

Crediting period start date: 1 January 2009.

Crediting period end date: 31 December 2046.

Project crediting period: 38 years.

1.7 Project Location

The project is located in the hydrographic basin of the Acre River, Iñapari district, Tahuamanu province in the Madre de Dios department, South East of Peru, in the Peruvian Amazon, in the boundary with Bolivia and Brazil.

The area is located 28 km to the side of the new inter-oceanic road that joins Brazil with the Peruvian ports, in the region that belongs to the Vilcabamba-Amboró Conservation Corridor in the Peruvian Amazon, one of the world biodiversity hotspots.

The following figures show the location of the Madre de Dios Amazon REDD Project.

Fig. 1: General location of the Madre de Dios Amazon REDD Project

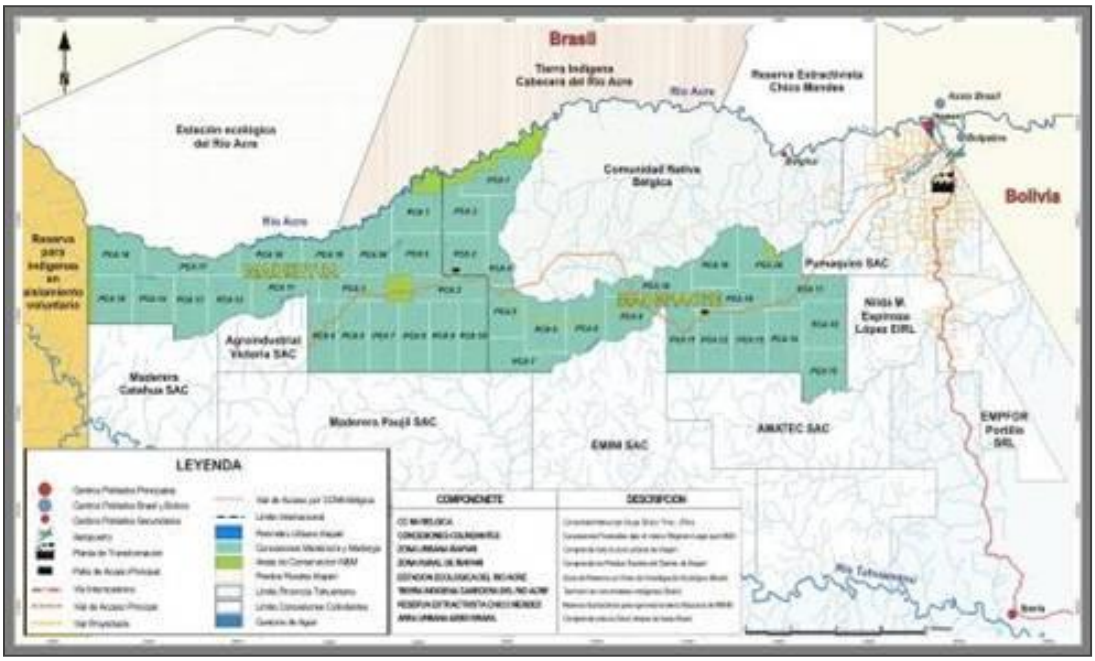


Fig. 2: Location of the Madre de Dios Amazon REDD Project and its limits

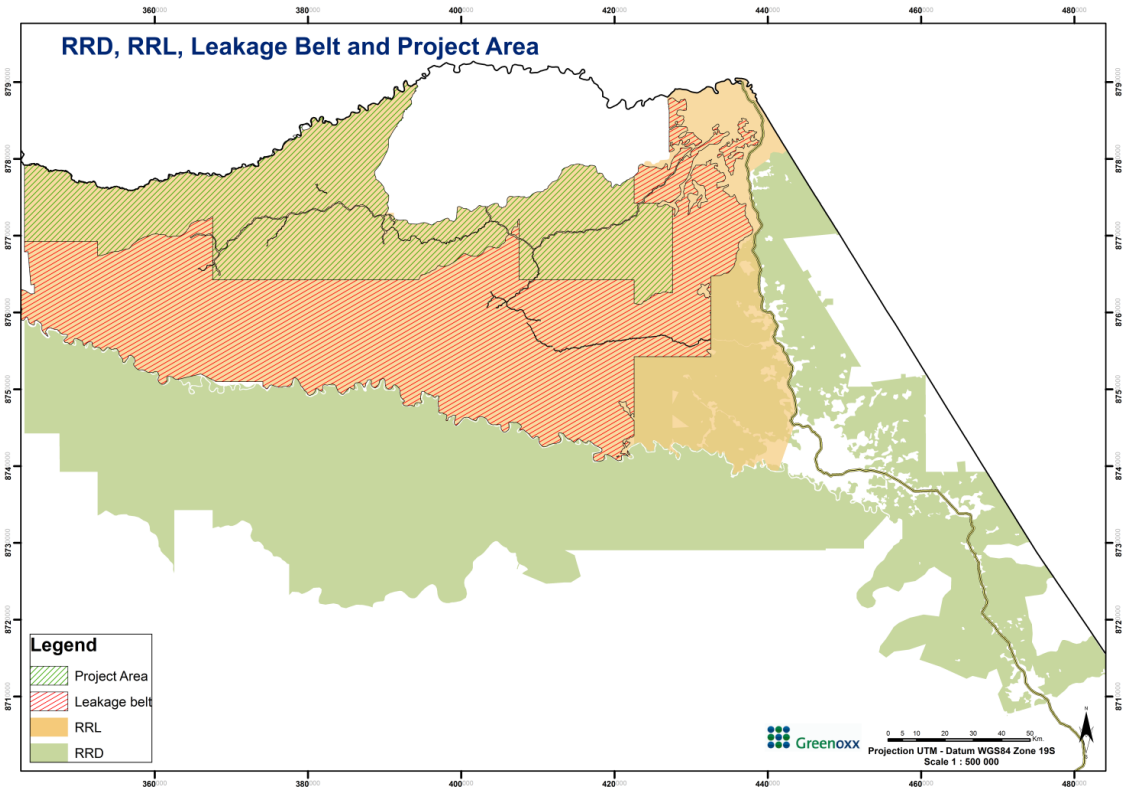


Fig. 3: Map of the Project Boundaries

In the following chart, the GPS coordinates of each polygon vertex is presented:

Chart 1: Polygon vertexes of the project area

Vertex	East	North
1	438521	8787582
2	446766	8774269
3	432562	8764691
4	432562	8754249
5	422557	8754249
6	422557	8746086
7	420910	8740962
8	322540	8777024
9	323813	8783623
10	333038	8790865

Total area of project, leakage belt and reference region:

Chart 2: Project Area, Leakage Belt and Reference Regions

Type	TOTAL
PA	97,817.41
LB	159,018.02

RRL	307,692.66
RRD	300,333.77

The determination of the regions detailed above was carried out taking into account the requirements of the BL-UP Module of the REDD Methodology Modules. See BL-UP module for a detailed description and explanation of the project area, leakage belt and project zone determination.

1.8 Title and Reference of Methodology

Methodology Information:

- Approved VCS Methodology VM0007
- REDD Methodology Modules (REDD-MF)
- Version 1.2
- Developed by Avoided Deforestation Partners

Modules Information:

- Estimation of carbon stocks in the above- and belowground biomass in live tree and non-tree pools (CP-AB), v1.0
- Estimation of carbon stocks in the long-term wood products pool (CP-W), v1.0
- Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation (BL-UP), v2.0
- Estimation of emissions from activity shifting for avoided unplanned deforestation (LK-ASU), v1.0
- Estimation of greenhouse gas emissions from biomass burning (E-BB), v1.0
- Estimation of emissions from fossil fuel combustion (E-FFC), v1.0
- Methods for monitoring of greenhouse gas emissions and removals (M-MON), v2.1
- Methods for stratification of the project area (X-STR), v1.0
- Estimation of uncertainty for REDD project activities (X-UNC), v2.0

Tools Information:

- Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities (Approved VCS Tool VT001), v1.0
- AFOLU non-permanence risk analysis and buffer determination, v3.1
- Tool for testing significance of GHG emissions in A/R CDM project activities (EB_31), v1.0

1.9 Other Programs

N/A

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The Project starting date corresponds to the 1sr of January, 2009. This is based on the fact that 2009 was the year of the CCB Validation (with a process which began in April 2008) and to the fact that was 2009 the year in which the interoceanic highway was finished.

Nevertheless, Maderacre and Maderyja were created in 2002. Since then, they have managed 100,000 hectares of Forest Concessions. Said forests have been certified under the FSC standards since January 2007. The concessions practice forest management for timber sustainable exploitation. This contributes to reduce the deforestation index in the area, through the custody of the area, executing low impact logging and involving local population.

The project was validated on October 2012. During the monitoring period 2009-2012 (verified on June 2013), monitoring period 2012-2013, and this monitoring period 2014, the REDD Project has kept the forest concessions' FSC Certification, already for 9 years now. The following activities were carried out in the concessions as part of the forest management system:

- Fauna monitoring, with the aim of evaluating the ecosystem's performance after the forest management implementation.
- Monitoring of sample trees growth.
- Monitoring of forest dynamic, structure and composition, using Permanent Monitoring Plots.
- Monitoring of forest natural regeneration capacity, with focus on exploited timber species.
- Identification and monitoring of High Value Conservation Forests Areas, in order to keep them free of timber exploitation.
- Forest management quality control, identifying impacts in terms of deforestation and degradation.
- Custody plan implementation in the concessions: installation of control posts, signalization, patrol routes
- Timber chain of custody, in order to assure correct (legal) lumber origin.

All of these activities are needed to assure a good forest management of the area, to renew the FSC certification every year, as well as to implement appropriately the Madre de Dios Amazon REDD Project.

The General Forest Management Plan for both forest concessions have been updated, including the REDD objectives.

The following activities have been carried out in the social area during this monitoring period:

- Implementation of the "environmentally friendly productive projects" Program
- Continues support to Belgica Native Community's Health and Education Program
- Continues support to Community in general
- Dissemination of the REDD Project (see table 2.1)

- Increment of job positions, giving preference to local workers

Talking about the Project itself, and what is defined in the PDD, Table 1 shows the level of implementation of the different activities planned.

Chart 3: Monitoring of REDD Project's Objectives

Objective	Activity	Monitoring
1) Contribute to the sustainable development of rural producers living in the buffer zone of the project	Socialization and dissemination of the project goals	The Project has done the following dissemination's activities: - REDD Presentation at Social Advisory Committee (march 2014, march 2015) - REDD Project at Public Meeting for the Start of the Year's Activities at the Forest Concessions (may 2014, april 2015) - REDD Project at Citizen participation workshop (august 2015) - REDD Project and Environmentally friendly Projects Contest Presentations in Belgica Native Community (december 2014, march 2015) - REDD Project and Environmentally friendly Projects Contest Presentations in Villa Primavera (January 2015) - REDD Project and Environmentally friendly Projects Contest Presentations for the Community in general (December 2014, January 2015) - Presentation at local school (august 2014)
	Identification and selection of proposals for the environmentally friendly productive projects	The Project carried out the following activities: a) Mapping of the properties (actors) of influence b) Identification of the most relevant area to work with c) Environmentally Friendly productive Projects' Contest Launch d) Dissemination of the Contest (Belgica Native Community, Villa Primavera and Iñapari) e) Reception of Candidate's Projects f) Environmentally Friendly productive Projects' winners selection g) Communication of results
	Development of the skills and capacities of the members of the associations linked to the selected projects	The skills will be developed while the Project's profile are in process of elaboration and, of course, during the execution.
	Design of the project profiles of the selected projects	Once the projects were selected, the following activities were carried out for the design of the Projects' profile: - Structured interviews and information collection with each Project proponent - Processing and information analysis - Identification of actors involved in the Projects - Synopsis for each Project

		Currently, the Projects are under elaboration (and some in first stage of implementation) More details of the selected Project in the next table
	Look for financing and/or co-financing for the approved profiles	The following actions were taken: - Identification and mapping of potential funds for the selected Projects - Fund raising Research - First approach to potential funds selected So far, the first results are as follows: PROJECT "LEARNING AND PROTECTING THE BIODIVERSITY" (Villa Primavera) An agreement is closed with ANIA NGO (specialized in carrying out the Children's Forest Program) for Technical assistant during the whole Project's life (logistics costs covered fully by ANIA). HANDCRAFT PROJECT (Bélgica Native Community) There is a strategic alliance with Planet Urgence to finance training and technical tools, including Italian professionals ECOLODGE Complete support to achieve Funds from the Government Program: Public Investment for the Environmental and Social Management due to the Interoceanic indirect impacts". Currently, this activity in process.
	Support on the implementation of the approved projects	At the report's closing date, 2 of the 4 selected projects are already in first stage of implementation: 1) Belgica Native Community Handcraft Project Strategic Partner: Planet Urgence Objective: Handcraft's Skills development and business capacity building 2) Villa Primavera Learning and Protecting Biodiversity Project Strategic Partner: ANIA NGO Objective: Establish and consolidate a "Children's Educational Forest" in the Villa Primavera Community, following ANIA's methodology, so that families can include in their live and customs the value of the nature biodiversity. The others 2 are in design stage, about to start first stage of implementation too.

	Monitoring of the projects	Projects are in the process of design and first stage of implementation. In 2016 we will have first monitoring report.
2) Reduce the vulnerability of the project area from external factors of deforestation and degradation	Review and update of the custody plan	The forest concessions' custody plan has been reviewed and updated for both concessions, completing the Project's total area
	Installation of control post PCA 5 Maderacre	Up to the report's date, additional to the existing control posts, we have installed a new control post in the Tahuamanu River, in the buffer zone. Up to today, there are 5 control posts operative.
	Delimitation of 100% of the concessions boundaries	Part of the project area has natural boundaries (permanent water courses). Apart from this, a 100% of the no natural limits have been marked with pedestrian trails. Annual maintenance is done in sectors of these pedestrian trails.
	Installation of "Hitos" in the concessions vertexes	The "Hitos" were installed in 100% of vertexes by now
	Improve the signaling within the concessions	We have installed signals that informs about the concessions perimeter, access, and that its prohibited to hunt and fish inside the area.
	Periodic and annual patrolling within vulnerable sectors	Patrolling actions to vulnerable sectors identified within the concessions were conducted: 1 river patrol over the River Acre Sector 1 land patrol over the limits with forest concessions Pumaquiro SAC, AMATEC SAC and Isabelita SAC Periodic Patrolling in the Tahuamanu River to avoid illegal logging and non-authorized deforestation in the zone. None of the patrolling actions reported the violation of boundaries and there was no evidence of invasion.
	Annual monitoring of possible invasions using satellite images	The report of the analysis of satellite imagery, for this period, does not report the occurrence of invasions within the Madre de Dios Amazon REDD project area. Meanwhile, the patrolling in the areas of highest risk showed no invasion or violation of the boundaries.
	In-field verification of sectors identified as potential points of invasion (due to deforestation)	The report of the analysis of satellite imagery, for this period, does not report the occurrence of invasions within the Madre de Dios Amazon REDD project area.
	Development and implementation of mechanisms for the dissemination of environmental education among children,	The Project has done the following dissemination's activities with the children and Community in general: - REDD Project at Public Meeting for the Start of the Year's Activities at the Forest Concessions (may 2014, April 2015) - REDD Project at Citizen participation workshop (august 2015)

	adolescents and communities involved in the project	- REDD Project and Environmentally friendly Projects Contest Presentations in Belgica Native Community (December 2014, march 2015) - REDD Project and Environmentally friendly Projects Contest Presentations in Villa Primavera (January 2015) - REDD Project and Environmentally friendly Projects Contest Presentations for the Community in general (December 2014, January 2015) - Environmental Education at local school (august 2014, July and September 2015) The concession has a cooperation agreement with the local school.

In the case of the first objective, "contribute to the sustainable development of rural producers living in the buffer zone of the project", we identified the influence area and actors involved in each one of the Environmentally Friendly Productive Projects selected, as follows

Environmentally Friendly Productive Project	Influence Area and Actors Involved
Moisés Mamani Fernández (peasant) "Preserving the environment with agroforestry crops" (Cacao, stevia) 5 Hectares	- Iñapari population - Mamani Fernández extended Family - Tahuamanu Cacao/stevia Producers - Madre de Dios Cacao/stevia market
Milton René Huanca Choque (Belgica Native Community) "Indigenous hand crafts as an alternative to improve the commoners' life standarts in Belgica Native Community" 53,000 Hectares	- Bélgica Native Community - Iñapari population - Handcraft regional market (Madre de Dios – Cuzco) - Handcraft Peru-Brasil market (Madre de Dios – Acre)
Hugo Lancha Tamaya (Villa Primavera) "Learning and Preserving Biodiversity" (Forest for conservation and Children environmental Education) 40 Hectares	- Villa Primavera Community - Madre de Dios National University - Iñapari population - Iñapari/Acre (Brasil) schools - Peruvian and Brazilian tourists

Verónica Cardozo Mouzully (landholder) “Touristic Iñapari Ecolodge” 40 hectares	- Iñapari Population - Cardozo Mouzully extended Family - MINCETUR - Iñapari Schools - Peruvian and Brazilian tourists

Whereas in the second objective ("Reduce the vulnerability of the project area from external factors of deforestation and degradation"), the Project has significant improvement. In total, 5 permanent control posts are working:

- 1 located in the access to the Project Area, in the Maderacre Concession
- 1 located in the access to the Project Area, in the Belgica Native Community Sector
- 1 located in the Amatec Concession (buffer zone)
- 2 located in the Tahuamanu River (buffer zone)

It is very important to highlight that there is a very good relationship with Bélgica Native Community. The following custody activities were carried out:

- Operation of permanent Guard Posts in the concessions' access.
- Acre River patrolling, in coordination with Belgica Native Community.
- Maintenance of pedestrian trails along the concessions non-natural borders.
- Periodic patrol in the non-natural perimeter (through the pedestrian trail).
- Maintenance of Signals in the access to the concessions and in the most relevant sectors

Some figures of the social impact measurement:

- Direct impact in Iñapari's population (1,500 habitants approximately), through direct and indirect employment.
- Local employment is prioritized. In the case of Maderacre concession 45% of the employees are from the Region.
- Direct impact in Belgica Native Community, through support in health and Education
- No conflicts have been registered with the Community

Regarding other potential risks apart from illegal presence in the area, the forest concessions have worked in industrial security capabilities, with annual training workshops, including all of its personnel. In the field operations, every camp has an extinguisher, fuel management guides, among other measures taken. Non-fire events have occurred in this monitoring period (neither in the forest concessions registry).

In addition, the Project gives a lot of importance to the continual training of its workers, such as: Industrial Safety, Basic First Aid, Identification and Protection of Forests with High Conservation Values, Wildlife Monitoring, Forestry Certification, Low-impact Harvest, among many other. A very relevant topic for the Project is the "initial approach to intercultural principles and respect to local communities", in which all employees were formed during the Forest Certification trainings and/or during the induction trainings when initially hired.

Finally, the Project has made important agreements with national and international universities to do forest research inside the Project area.

As a result of the monitoring work, we obtained the following results for deforestation action inside the Project area or Leakage Belt.

Table 2.3: Results on deforestation monitoring

RRL	Types of forest	Area (ha)	Interpretation of deforestation 2012(ha)	Interpretation of deforestation 2013(ha)	Interpretation of deforestation 2014 (ha)	Total
Types of forest in the leakage belt	Hilly forest	134515.75	1,079.99	-	-	133,435.76
	Terrace forest	17183.17	1,155.28	-	16.84	16,011.05
	Others	1622.92	3.23	-	-	3,100.22
	Bamboo	3103.45	437.12	-	-	1,185.80
	Tree Swamps	2592.74	17.89	-	-	2,574.85
	TOTAL AREA SIG	159,018.02	2,693.51	-	-	156,307.68
Types of forest in the project area	Hilly forest	79290.19	0.00	-	-	79290.19
	Terrace forest	9845.75	0.00	-	-	9845.75
	Others	130.59	0.00	-	-	130.59
	Bamboo	8550.87	0.00	-	-	8550.87
	TOTAL AREA SIG	97,817.40	0.00	-	-	97,817.40

2.2 Deviations

2.2.1. Methodology Deviations

The VCS Standard states that "The monitoring report describes all the data and information related to the monitoring of GHG emission reductions or removals. In the VCS Monitoring Report Template must to use this and adhere to all instructional text within the template."

This monitoring report template v3.3 requires that the user "Describe and justify any methodology deviations applied during this monitoring period. **During this monitoring period, and other didn't use deviation.**

When used " VM0007, REDD Methodology Modules (REDD-MF) version 1.3 , 20 November 2012, during the validation, to obtain the Madre de Dios Amazon Redd Project validation, the methodology showed that the buffer allocation should be calculated using equation 4 in which the final function of the formula was:

VM0007, Version 1.2
Sectoral Scope 14

$$Buffer_{UNPLANNED} = \left(\left(\Delta C_{BSL,unplanned} - \underset{Baseline\ Unplanned}{\sum_{t=1}^{t^*} \sum_{i=1}^{M} \left(E_{FC,i,t} + N_2O_{direct,i,t} \right)} \right) - \left(\Delta C_{P.(UnplannedDeforestationAreas)} - \underset{Project\ Unplanned}{\sum_{t=1}^{t^*} \sum_{i=1}^{M} \left(E_{FC,i,t} + N_2O_{direct,i,t} \right)} \right) \right) * \left(1 - Buffer\% \right) \quad (5)$$

and in this occasion the team observed that was incorrect. The Madre de Dios Amazon Redd Project, during the validation and during all verifications audits used the following equation:

VM0007, Version 1.4
Sectoral Scope 14

$$Buffer_{UNPLANNED} = \left(\left(\Delta C_{BSL,unplanned} - \underset{Baseline\ Unplanned}{\sum_{t=1}^{t^*} \sum_{i=1}^{M} \left(E_{FC,i,t} + N_2O_{direct,i,t} \right)} \right) - \left(\Delta C_{P.(UnplannedDeforestationAreas)} - \underset{Project\ Unplanned}{\sum_{t=1}^{t^*} \sum_{i=1}^{M} \left(E_{FC,i,t} + N_2O_{direct,i,t} \right)} \right) \right) * \left(Buffer\% \right) \quad (5)$$

This is the correct equation and this equation is showed in the recently version 1.4

The deviations relates only to the criteria and procedures for monitoring or measurement, and do not relate to any other part of the methodology。 This deviation does not negatively impact the conservativeness of the quantification of GHG emission reductions or removals, and relates only to the criteria and procedures for monitoring or measurement, and do not relate to any other part of the methodology

2.2.2. Project Description Deviations

During this monitoring period we use the same deviations, and use the same equation, to know the buffer unplanned, like in previous monitoring report and the validation of Madre de Dios Redd Project

2.3 Grouped Project

N/A

3 DATA AND PARAMETERS

3.1. Data and Parameters Available at Validation

Data Unit / Parameter:	Regional Forest / Non-forest Cover Benchmark Map
Data unit:	ha
Description:	Map that shows the stratification and location of forest and non-forest areas in the Reference Region RRD at the beginning of the accreditation.
Source of data:	Landsat satellite images.
Value applied:	n/a
Justification of choice of data or description of measurement methods and procedures applied:	The Landsat images have an adequate resolution and they are an available tool to all public
Purpose of the data	Determination of baseline scenario
Comments	The stratification was based on the Ecological and Economic Zoning of the Region of Madre de Dios. It was developed by the IIAP in 2009 and the regional government uses it as its official source. Non-forest has been determined as beach and water bodies areas. In addition, there are other areas that are access roads (rivers, bridges, alternate roads, the Interoceanic Highway)

Data Unit / Parameter:	Project Forest Cover Benchmark Map.
Data unit:	Ha
Description:	Map that shows the stratification and location of forest areas in the Project area at the beginning of the accreditation (100% forested).
Source of data:	Landsat-8 satellite image. Sensor OLI.
Value applied:	n/a
Justification of choice of data or description of measurement methods and procedures applied:	The Landsat images have the adequate resolution and they are an available tool to all public.
Purpose of the data	Determination of baseline scenario
Comments	The stratification was based on the Ecological and Economic Zoning of the Region of Madre de Dios. It was developed by the IIAP in 2009 and the regional government uses it as its official source. Non-forest has been determined as beach and water bodies areas. In addition, there are other areas that are access roads (rivers, bridges, alternate roads, the Interoceanic Highway). To date there is no other use but forest usage.

Data Unit / Parameter:	Leakage Belt Forest Cover Benchmark Map.
Data unit:	Ha
Description:	Map that shows the stratification and location of forest in the Leakage belt at the beginning of the accreditation (100% forested).
Source of data:	Landsat-8 satellite image. Sensor OLI.
Value applied:	n/a
Justification of choice of data or description of measurement methods and procedures applied:	The Landsat images have the adequate resolution and they are an available tool to all public
Purpose of the data	Calculation of leakage
Comments	The stratification was based on the Ecological and Economic Zoning of the Region of Madre de Dios. It was developed by the IIAP in 2009 and the regional government uses it as its official source. Non-forest has been determined as beach and water bodies areas. In addition, there are other non-forested areas that used as access roads

	(rivers, bridges, Interoceanic Highway, alternate roads).

Data Unit / Parameter:	A_i
Data unit:	Ha
Description:	Total area of each stratum *i*.
Source of data:	Landsat-8 satellite image. Sensor OLI.
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	Frequency at a minimum every 10 years prior to baseline renewal
Purpose of the data	Determination of baseline scenario (AFOLU projects only)
Comments	Ex-ante it is assumed that strata area will remain constant.

Data Unit / Parameter:	$A_{RRD,\ unplanned,\ hrp}$
Data unit:	Ha
Description:	Total deforested area during the term of reference (until 2008) in the RRD
Source of data:	Value taken from the Landsat-8 satellite image. Sensor OLI., used by the Deforestation Model of Madre de Dios.
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	The Landsat images have the adequate resolution and they are a free and available tool to all public
Purpose of the data	Determination of baseline scenario (AFOLU projects only)
Comments	Monitored for purpose of baseline revisions.

Data Unit / Parameter:	*CF*
Data unit:	t C t^{-1} d.m.
Description:	Carbon fraction of dry matter.
Source of data:	Value taken from IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.3
Value applied:	0.49 t C t-1 d.m

Justification of choice of data or description of measurement methods and procedures applied:	for Tropical Forests
Purpose of the data	Calculation of baseline emissions
Comments	n/a

Data Unit / Parameter:	C*Fj*
Data unit:	t C t^{-1} d.m.
Description:	Carbon fraction of biomass for tree species j.
Source of data:	Value taken from IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.3.
Value applied:	0.49 t C t-1 d.m.
Justification of choice of data or description of measurement methods and procedures applied:	for Tropical Forests
Purpose of the data	Calculation of baseline emissions
Comments	n/a

Data Unit / Parameter:	D*j*
Data unit:	t d.m. m^{-3}
Description:	Basic wood density in t d.m. m^{-3} for species *j*.
Source of data:	National species-specific densities. For species-specific wood densities not available, it is used the mean wood density value Regional average (0.60 t d.m.m-3- tropical America) from Reyes 1992 and Brown, S. 1997.
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	Species densities have been taken from different sources of national species-specific researches being the main ones: - Evaluation of mechanical and physical properties and probable uses of the wood of 20 species in Jenaro Herrera, Loreto – Perú (Aróstegui and Acevedo). - Summary of technical information of 32 tree species. Peruvian Confederation of Wood. 2008. CPM. CITE Madera. - Global wood density database. (Chavé et al., 2009).
Purpose of the data	Calculation of project emissions

Comments	n/a

Data Unit / Parameter:	D_{mn}
Data unit:	t d.m. m^{-3}
Description:	Mean wood density of commercially harvested species
Source of data:	National species-specific densities. For species-specific wood densities not available, it is used the mean wood density value Regional average (0.60 t d.m.m-3- tropical America) from Reyes 1992 and Brown, S. 1997.
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	Species densities have been taken from different sources of national species-specific researches being the main ones: - Evaluation of mechanical and physical properties and probable uses of the wood of 20 species in Jenaro Herrera, Loreto – Perú (Aróstegui and Acevedo). - Summary of technical information of 32 tree species. Peruvian Confederation of Wood. 2008. CPM. CITE Madera. - Global wood density database. (Chavé et al., 2009).
Purpose of the data	Calculation of project emissions
Comments	n/a

Data Unit / Parameter:	f_j (X,Y)
Data unit:	t d.m. $tree^{-1}$
Description:	Allometric equation for species j linking measured tree variable (s) to aboveground biomass of living trees, expressed as t d.m. $tree^{-1}$
Source of data:	The Chavé formula for trees and Winrock for palm trees.
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	Both formulas have been taken from: - Pearson, T., Walker, S. and Brown, S. 2005. Sourcebook for Land Use, Land-Use Change and Forestry Projects. Winrock International and the World Bank Biocarbon Fund. 57pp.

	- Chave, J, et. Al. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. Oecología 145: 87-99.
Purpose of the data	Calculation of baseline emissions
Comments	The validation of the equations will be performed with either of both methods presented in VMD0015 module: - Limited Measurements - Destructive sampling

Data Unit / Parameter:	Carbon stock in all pools in the forest stratum
Data unit:	T CO_2 e / ha
Description:	Carbon stock by stratum in baseline before deforestation.
Source of data:	Determined from carbon inventories carried out in the Project Area.
Value applied:	Hill Forest **505.10** Terrace Forest **547.81** Bamboos **604.48** Tree swamp **543.42** DP **18.63** DA **31.75** DI **-** DC **31.63**
Justification of choice of data or description of measurement methods and procedures applied:	- The inventory was made inside the Project Area. - Parcels were built in the different stratum. - DBH and HT were taken from each individual found. - It was determined the aerial biomass based in the Chavé formula for trees and Winrock for palm trees. - Factor 0.24 was used to determine the root biomass according to module CP-AB.
Purpose of the data	Calculation of baseline emissions
Comments	The exact data for each stratum is found in module CP-AB.

Data Unit / Parameter:	Change in the land use.

Data unit:	%
Description:	Percentages of the project area that will change the land use after deforestation.
Source of data:	Determined according to the studies of land use carried out in the region of Madre de Dios. - CDC, UNALM, SZF, INRENA 2007.
Value applied:	Clean cultivation 4% Grasslands 54% Agriculture and livestock 40% Infrastructure 2%
Justification of choice of data or description of measurement methods and procedures applied:	The study mentioned has been carried out in areas that include the Project Area, or next to them. Furthermore, this data is updated and actors that are also in our areas have been considered.
Purpose of the data	Calculation of baseline emissions
Comments	n/a

Data Unit / Parameter:	Emissions by biomass burning
Data unit:	T CO_2 e
Description:	Tons of CO_2 equivalents, coming from emissions of CH_4 and N_2O by forest and agriculture residues burning.
Source of data:	Factors of module E-BB were used (table 2.6 and 2.5) for tropical forest. Likewise, it was used the combustion factor of table 2.6 by agriculture biomass burning The deforested forest percentage that is burnt after deforestation has been taken from official sources[1]
Value applied:	Used values: - 55 % of the deforested forest is burnt. - Combustion factor. Tropical Humid Forest = 0.5 Agriculture Residues (Corn) = 0.8 - Emission Factor Tropical Forest = 6.8 (CH_4) and 0.2 (N_2O) Agriculture Residues = 2.7 (CH_4) and 0.07 (N_2O).

[1]Deforestation map of the Peruvian Amazon – 2000. MINAM (2009)

Justification of choice of data or description of measurement methods and procedures applied:	The percentage of 55% is moderate. Some experts consulted consider that 100% of hectares that are torn down are burnt
Purpose of the data	Calculation of baseline emissions
Comments	n/a

3.2. Data and Parameters Monitored

Data Unit / Parameter:	Project Forest Cover Monitoring Map
Data unit:	
Description:	Map evidencing the stratification and location of the forest in the Project area at the beginning of each verification period. It has to be evidenced if within the Project area there are deforested areas.
Source of data:	Satellite images and field verification of deforested areas if any (GPS).
Description of measurement methods and procedures to be applied:	Analysis and Classification of Satellite Images
Frequency of monitoring/recording:	Every 5 years with images. Verification of deforested areas will be permanent in field by the surveillance carried out by the monitoring equipment.
Value applied:	See Map
Monitoring equipment:	Software GIS, available satellite images, GPS, professional monitoring equipment in field.
QA/QC procedures to be applied:	Permanent verification of the area of the project surfaces.
Purpose of the data	Calculation of project emissions
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter
Comments	Stratification is the same as the one used at the beginning of the term

Data Unit / Parameter:	Leakage Belt Forest Cover Monitoring Map.
Data unit:	Ha
Description:	Map evidencing the stratification and location of the forest in the Leakage Belt at the beginning of each verification period. It has to be evidenced if there are deforested areas.
Source of data:	Satellite images and field verification of deforested areas if any (GPS).

Description of measurement methods and procedures to be applied:	Analysis and Classification of Satellite Images
Frequency of monitoring/recording:	Every 5 years with images.
Value applied	See Map
Monitoring equipment:	Software GIS, available satellite images, GPS, professional monitoring equipment in field.
QA/QC procedures to be applied:	Permanent verification of the area of the project surfaces. Also, through the accuracy assessment.
Purpose of the data	Calculation of leakage
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	Stratification is the same as the one used at the beginning of the term.

Data Unit / Parameter:	Degradation PRA Results
Data unit:	Surveys and/or interviews.
Description:	The PRA will be executed from interviews and/or surveys to local actors with the purpose of identifying the existence of degradation potential within the area of the project due to: • Extraction of firewood. • Illegal logging If ≥ 10% of the surveys indicate that there is a risk of degradation then the procedures to verify and estimate the degradation should be executed. An additional result of the PRA would be the penetration distance that should be applied to calculate the area with degradation potential (buffer area).
Source of data:	Current PRA
Description of measurement methods and procedures to be applied:	It would be developed according to the provisions set forth in the M-MON.
Frequency of monitoring/recording:	Every 2 years.
Value applied:	There is no degradation in this period
Monitoring equipment:	PRA sociologist in charge with focusing criteria.
QA/QC procedures to be applied:	There would be templates to carry out surveys and/or interviews.
Purpose of the data	Calculation of project emissions
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	n/a

Data Unit / Parameter:	Results of Limited Degradation Survey
Data unit:	Existence of stumps
Description:	Verification of degradation processes in the project area
Source of data:	Field measurements
Description of measurement methods and procedures to be applied:	If PRA indicates there is degradation potential, then the procedures to verify the degradation occurrence should take place. Sampling transects are distributed across the buffer area with the purpose of identifying if there are new tree-stumps. Transects should cover a surface of no less than 1% of the buffer area
Frequency of monitoring/recording:	Each time the PRA indicates there is degradation potential to the project area.
Value applied:	PRA indicate that evidence of degradation is non-existent
Monitoring equipment:	GPS, compass, tape line.
QA/QC procedures to be applied:	Trained staff for field measurement
Purpose of the data	Calculation of project emissions
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	n/a

Data Unit / Parameter:	$A_{burn,\ i,\ t}$
Data unit:	Ha
Used in equations:	Section 2.2.2
Description:	Area burnt in stratum i at time t. The monitoring will be carried out, if there is any record of any burnt area within the project area, on each stratum and year of the project
Source of data:	Field measurements
Description of measurement methods and procedures to be applied:	If there is a record of a burning, it will be indicated the type of forest and burnt area to determine the GHG emissions (CH_4 and N_2O). If possible, the new use of the land will also be indicated
Frequency of monitoring/recording:	Every time there is an occurrence.
Value applied	There are no burned areas in this period
Monitoring equipment:	GPS
QA/QC procedures to be applied:	n/a
Purpose of the data	Calculation of project emissions

	Calculation of leakage
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	Ex-ante burnt areas (baseline) have been determined by interviewing experts and by what it is known in the region of Madre de Dios. The obtained value will be used in the EBB module

Data Unit / Parameter:	$A_{DefPA, i, t}$
Data unit:	Ha
Description:	Deforested area in the Project area by type of forest
Source of data:	Satellite images
Description of measurement methods and procedures to be applied:	The images used will be compatible with the ones already used in the estimations ex-ante in order to be compared
Frequency of monitoring/recording:	For every verification event and no longer than every 5 years with satellite images. Constant monitoring in field
Value applied:	According with the results of satellite image analysis, there is no deforestation inside PA
Monitoring equipment:	Software GIS, available satellite images, verification in field with GPS and professional equipment
QA/QC procedures to be applied:	n/a
Purpose of the data	Calculation of project emissions
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	

Data Unit / Parameter:	$A_{DefLB, i, t}$
Data unit:	Ha.
Description:	Deforested area in the Leakage belt by type of forest
Source of data:	Landsat-8 satellite image. Sensor OLI.
Description of measurement methods and procedures to be applied:	The images used will be compatible with the ones already used in the estimations ex-ante in order to be compared
Frequency of monitoring/recording:	For every verification event and no longer than 5 years with satellite images. Constant monitoring in field
Value applied:	Results Table:

	Stratum / Post-defo LU	Agriculture	Farming	Secondary forest	Pastures	Infras-tructure
	Hilly forest	0	0	0	0	0
	Terrace forest	16.84	0	0	0	0
	Others	0	0	0	0	0
	Bamboo	0	0	0	0	0
	Tree Swaps	0	0	0	0	0
	TOTAL (ha)	**16.84**	**0**	**0**	**0**	**0**
Monitoring equipment:	Software GIS, available satellite images, verification in field with GPS and professional equipment					
QA/QC procedures to be applied:	n/a					
Purpose of the data	Calculation of leakage					
Calculation method	.					
Comments	it was confirmed that no deforestation for the period monitored					

Data Unit / Parameter:	$A_{DegW,i}$
Data unit:	Ha
Description:	Area under potential degradation process. Buffer area resulting from PRA, if it shows that there is potential degradation in the Project Area.
Source of data:	GIS delineation and ground validation data.
Description of measurement methods and procedures to be applied:	The buffer area shall be composed from all access points. The length is obtained from the PRA results, and the width shall be equal to the length.
Frequency of monitoring/recording:	Must be repeated each time the PRA indicates a potential for degradation
Value applied	PRA results indicates that evidence of degradation is non-existent
Monitoring equipment:	GIS software
QA/QC procedures to be applied:	n/a
Purpose of the data	Calculation of project emissions
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	There is no evidence of depredated areas or parcels ex-ante within the project area.

Data Unit / Parameter:	$A_{DECKS, i, t}$
Data unit:	Ha
Description:	Area of logging decks in stratum i at time t.
Source of data:	Field measurements.
Description of measurement methods and procedures to be applied	Field measurements of all logging decks (100%)
Frequency measurement:	At least every 5 years.
Value monitored:	Hilly forest: 12.99 ha Terrace forest: 0.59 ha
Monitoring equipment	Identify equipment used to monitor the data/parameter including type, accuracy class, and serial number of equipment, as appropriate.
QA/QC procedures to be applied	Describe the quality assurance and quality control (QA/QC) procedures to be applied, including the calibration procedures where applicable.
Purpose of the data	Calculation of project emissions
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	Ex-ante estimations of emissions are based on average size and number of decks produced due to logging in the region.

Data Unit / Parameter:	$A_{DistPA, q, l, t}$
Data unit:	Ha
Description:	Area impacted by natural disturbance in the project stratum i converted to natural disturbance stratum q at time t; ha.
Source of data:	Satellite images and GPS coordinates.
Description of measurement methods and procedures to be applied	Interpretation of Landsat-8 satellite image. Sensor OLI.
Frequency measurement:	At least every 5 years.
Value applied	Zero, there is no disturbance during this period
Monitoring equipment	
QA/QC procedures to be applied	
Purpose of the data	
Calculation method	
Comments	Ex ante estimations of emissions from natural disturbances will be based on historic incidence of such event in the Project region.

Data Unit / Parameter:	$A_{ROAD, I, t}$
Data unit:	Ha
Used in equations:	17
Description:	Area of roads in stratum i at time t.
Source of data:	Field measurements of all roads
Description of measurement methods and procedures to be applied	Length and width of roads known in field registries
Frequency measurement:	At least every 5 years
Value applied	There are two types of roads: 1) Primary Roads: Hilly forest: 13.41 ha Terrace forest: 0.61 ha 2) Secondary Roads: Hilly forest: 48.61 ha Terrace forest: 2.22 ha
Monitoring equipment	GPS
QA/QC procedures to be applied	Describe the quality assurance and quality control (QA/QC) procedures to be applied, including the calibration procedures where applicable.
Purpose of the data	Calculation of project emissions
Calculation method	Field data.
Comments	Ex-ante estimations are based on average length of roads produced per unit area due to logging in the region

Data Unit / Parameter:	$A_{RRL, forest, t}$
Data unit:	Ha
Description:	Remaining area of forest in RRL
Source of data:	Landsat-8 satellite image. Sensor OLI.
Description of measurement methods and procedures to be applied:	The images used will be compatible with the ones already used in the estimations ex-ante in order to be compared.
Frequency of monitoring/recording:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event.
Value applied	See Map
Monitoring equipment	Identify equipment used to monitor the data/parameter including type, accuracy class, and serial number of equipment, as appropriate.
QA/QC procedures to be applied:	n/a
Purpose of the data	Calculation of baseline emissions

Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	There is no evidence of degraded areas or plots ex-ante within the project area.

Data Unit / Parameter:	AP_i
Data unit:	Ha
Description:	Total degraded area verified by sampling plots.
Source of data:	Ground measurement.
Description of measurement methods and procedures to be applied:	The sampling plan must be designed using plots systematically placed over the buffer zone so that they sample at least 3% of the area of the buffer zone.
Frequency of monitoring/recording:	Every time the Limited Degradation Survey indicates degradation (existence of stumps), or at least every 5 years.
Value applied:	Zero, PRA showed no degradation pressure
Monitoring equipment:	GPS, field equipment: tape line, compass. And field staff.
QA/QC procedures to be applied:	Trained staff for field measurement.
Purpose of the data	Calculation of project emissions
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	

Data Unit / Parameter:	$C_{DegW,\,i,\,t}$
Data unit:	T CO_2 –e
Description:	Biomass carbon of removed trees through degradation process within the project area.
Source of data:	Field measurement.
Description of measurement methods and procedures to be applied:	With the tree-stumps identified during the evaluation of sampling parcels of the buffer area, the following procedures should be considered: - Take the diameter of the tree-stumps that will be assumed as DBH. In case they are too big (for example, due to buttress roots), then the specimen should be identified and place other individuals of the same species standing next to it. Then, measure their DBH and tree-stumps diameter. With this data, DBH should be estimated as from the

	tree-stumps diameter of the individuals deforested. - With DBH data, the carbon stock of individuals deforested is calculated using an allometric equation, yet to be defined. - It will be assumed that all stock will be send to the atmosphere.
Frequency of monitoring/recording:	Every time there is a degradation event or at least every 5 years.
Value applied:	Zero
Monitoring equipment:	GPS, field equipment: tape line, compass. And field staff.
QA/QC procedures to be applied:	n/a
Purpose of the data	Calculation of project emissions
Calculation method:	Through an allometric equation, using the DBH as one of its variables
Comments	n/a

Data Unit / Parameter:	$C_{AB_tree_dest,i}$
Data unit:	T CO_2-e ha^{-1}
Description:	Carbon stock in aboveground tree biomass assumed to be killed per unit area resulting from the creation of the skid trail per stratum.
Source of data:	CP-AB and documentation stating maximum size tree able to be killed during skid trail creation.
Description of measurement methods and procedures to be applied	It is assumed that $C_{AB_tree_dest,i} = C_{AB_tree,i}$ in the baseline.
Frequency of monitoring/recording	Specify measurement and recording frequency
Value applied	Hilly forest 407.34 t CO_2/ha Terrace forest 441.78 t CO_2/ha Bamboo 487.48 t CO_2/ha Otros 0 t CO_2/ha Tree Swamps 438.24 t CO_2/ha
Monitoring equipment	Identify equipment used to monitor the data/parameter including type, accuracy class, and serial number of equipment, as appropriate.
QA/QC procedures to be applied	Describe the quality assurance and quality control (QA/QC) procedures to be applied, including the calibration procedures where applicable.
Purpose of the data	Calculation of project emissions
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.

Comments	n/a

Data Unit / Parameter:	$C_{BB_tree_dest,i}$
Data unit:	T CO_2-e ha^{-1}
Description:	Carbon stock in belowground tree biomass assumed to be killed per unit area resulting from the creation of the d trail per stratum.
Source of data:	$C_{AB_tree_dest,i}$
Description of measurement methods and procedures to be applied	Estimation of belowground biomass will be performed following the procedures set in module CP-AB.
Frequency of monitoring/recording	Specify measurement and recording frequency
Value applied	Hilly forest: 97.76 TCO2/ha Terrace forest: 106.03 TCO2/ha Bamboo: 117.00 TCO2/ha Others: 0 TCO2/ha Tree Swamps: 105.18 TCO2/ha
Monitoring equipment	Identify equipment used to monitor the data/parameter including type, accuracy class, and serial number of equipment, as appropriate.
QA/QC procedures to be applied	Describe the quality assurance and quality control (QA/QC) procedures to be applied, including the calibration procedures where applicable.
Purpose of the data	Calculation of project emissions
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	The root-to-shoot ratio 0.24 is used (same as used in baseline carbon-stock calculations).

Data Unit / Parameter:	L_{sk}
Data unit:	M
Description:	Length of skid trail sk.
Source of data:	Field measurements
Description of measurement methods and procedures to be applied	A systematic sampling with random start within a sampled known logged area within the project boundary will produce an estimate of the length of skid trails created. The total length of skid trails in the project area equals the mean length of skid trails per unit area times the total area logged.
Frequency of monitoring/recording:	Al least every 5 years or prior to a verification

Value applied	Lsk was monitored in the field for PCA 12 (Maderacre), was estimated based on its total extraction volume Hilly forest: 242, 279.61 m Terrace forest: 11,076.07 m
Monitoring equipment	Identify equipment used to monitor the data/parameter including type, accuracy class, and serial number of equipment, as appropriate.
QA/QC procedures to be applied	Describe the quality assurance and quality control (QA/QC) procedures to be applied, including the calibration procedures where applicable.
Purpose of the data	Calculation of project emissions
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	n/a

Data Unit / Parameter:	$V_{EXT, z, i, t}$
Data unit:	m^3
Description:	Volume extracted from logging stratum z in stratum i at time t.
Source of data:	Records and reports (based on field measurements) documenting amount of wood extracted within project boundary.
Description of measurement methods and procedures to be applied	Documentation includes : • Delineation of the location. • Total area logged in the Project area. • Methods used to measure the amount of wood extracted. • Methods to estimate and catalog the volume of wood felled and extracted.
Frequency of monitoring/recording:	At least every 5 years or prior to a verification event
Value applied	Hilly forest and Terrace forest: 25,769.35 m3 See the excel "Cp Estimations in M&M" (spreadsheet GLG - Extracted timber)
Monitoring equipment	Identify equipment used to monitor the data/parameter including type, accuracy class, and serial number of equipment, as appropriate.
QA/QC procedures to be applied	Describe the quality assurance and quality control (QA/QC) procedures to be applied, including the calibration procedures where applicable.
Purpose of the data	Calculation of project emissions

Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	n/a

Data Unit / Parameter:	W_{SKID}
Data unit:	M
Description:	Mean width of skid trails.
Source of data:	Field measurements.
Description of measurement methods and procedures to be applied	Systematic sampling with a random start to produce an average width of skid trails, to PCA 12 (maderacre)
Frequency of monitoring/recording	Specify measurement and recording frequency
Value applied	The mean width is 4.28 m taken from field data of PCA 12
Monitoring equipment	Identify equipment used to monitor the data/parameter including type, accuracy class, and serial number of equipment, as appropriate.
QA/QC procedures to be applied	Describe the quality assurance and quality control (QA/QC) procedures to be applied, including the calibration procedures where applicable.
Purpose of the data	Calculation of project emissions
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	n/a

3.3. Monitoring Plan

The Madre de Dios Amazon REDD Project involves two adjacent timber concessions, included within the "Permanent Production Forest" of the Madre de Dios region. It has a total official area of 98,927.38[2] hectares covered by natural tropical forests with the presence of "Paca" (native bamboo). This type of forest is characterized by a great diversity of flora and fauna of Amazonian species. The physiographic type corresponds mainly to "Low Hills".

Although the management of the area for the production of forest products, mainly wood under an FSC scheme, is in charge of the two forest concessions, both constitute a single unit for the implementation of the Madre de Dios Amazon REDD Project. In this sense, the implementation of the activities related to the monitoring component of the project is performed by a single technical team.

[2] * Total number of hectares stratified by the IIAP for the Ecological Economic Zoning, which was based on the Forest Map of the National Geographic Institute (IGN) and which has available shapes. This data was employed in the development of all the maps required by the applied methodology. The area according to CIEF – Peru Digital (98,932 has), which was employed for the concession contracts and therefore in the FSC Certificates, the FMP and the PDD submitted to the CCBA does not have available shapes. If the images are compared, it can be appreciated that in the upper part there is no perfect overlap between the two profiles.

The main goal of this Monitoring Plan is the collection of the data that allow the verification of the deforestation and the degradation within the project area and its leakage belt throughout time, regularly updating the emissions estimations as well as the generation of sufficient and timely information to make the necessary adjustments to the strategies included in the VCS Madre de Dios Amazon REDD Project PD Template.

The Monitoring Plan is focused in the following two main components:

1. Monitoring of the Madre de Dios Amazon REDD Project objectives.

a) OUTCOME 1: Contribute to the sustainable development of rural producers living in the buffer zone of the project.
b) OUTCOME 2: Reduce the vulnerability of the project area from external factors of deforestation and degradation.

This component will be conducted through the assessment of compliance with the activities proposed for each objective.

2. Monitoring of the parameters described in the item 4.2. of this Monitoring Plan (Data and Parameters Monitored):

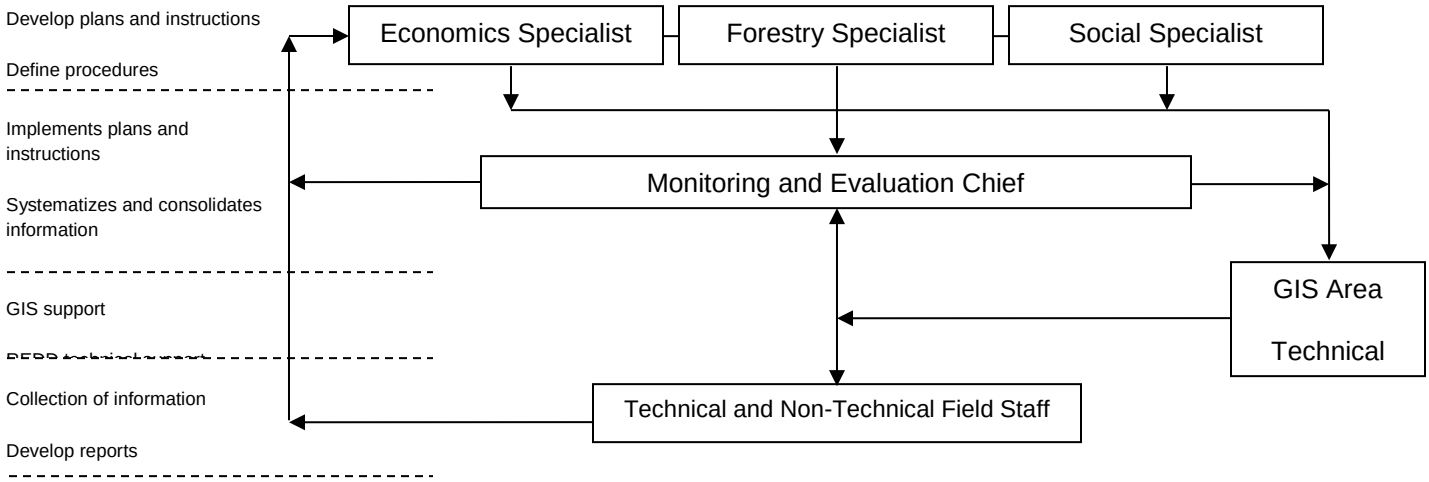
c) Forest cover map – Strata within the project area
d) Forest cover map – Strata within the project leakage belt
e) Results of the PRA
f) Degradation results
g) Burned area
h) Deforested area within the project area
i) Deforested area within the project leakage belt
j) Potentially degraded area within the project area
k) Degraded area within the project area
l) Carbon stock loss due to degradation
m) Emissions due to biomass burning (if deforestation within the project area occurs – land use change to agriculture and burning of the forest)
n) Emissions due to nitrogen incorporation (if deforestation and fertilizer are employed in the new land uses).
o) Carbon stock in wood products

ORGANIZATIONAL STRUCTURE

The Madre de Dios Amazon REDD Project counts with a skilled and experienced technical team for its implementation and its monitoring component. In addition to this, it also counts with the technical advice of Greenoxx NGO, AIDER NGO and Bosques Amazónicos SAC (BAM), all of them experienced institutions in the development of conservation and sustainable use of resources projects and projects involving the use of environmental services such as REDD Projects.

The development of the Monitoring Plan is in charge of a multidisciplinary team, led by an Economist, a Forestry Specialist and a Social Specialist, allowing the integral address of the different components of the plan. Its implementation is responsibility of the Monitoring and Evaluation Chief, who must articulate it with the technical and non-technical field staff, the same that carry out the in-field measurements and the corroboration of the laboratory information. There is also a GIS Area for mapping support. Additionally, BAM NGOs provide their support for the development of the modeling and specialized items that are required for the monitoring of the project.

Following, the information flow of the monitoring system is detailed:



INFORMATION MANAGEMENT: DATA COLLECTION, PROCESSING AND REPORT

The project is based in the premise of the "Adaptative Management", in this sense every intervention on the forest are sustained in previous information collected in field as a knowledge basis. Based on this knowledge is that Management Plans, Operative Plans and the rest of the necessary instructions for the implementation of the project, the interventions on the forest and the treatment of the social component are defined.

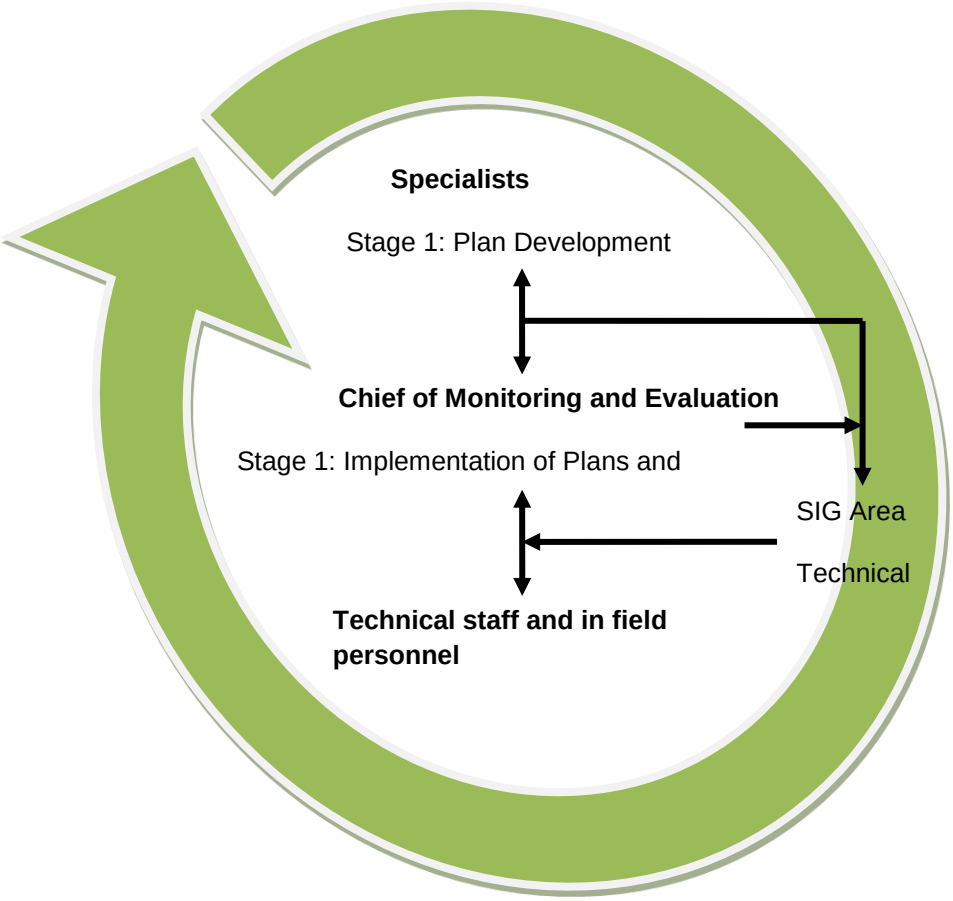
The permanent implementation of the Monitoring Plan allows the identification of the tendencies of the different parameters, including those that are useful to evaluate the compliance with the objectives of the Project. The knowledge that is generated allows the adaptation of the system (plans and the rest of the instructions).

The information collected in field by the technical staff is systematized by the Monitoring and Evaluation Chief, who at the end of the year (November-December) presents the Monitoring Report for the period to the specialists who together with other members of the project, will elaborate the Operative Plan of the following period, identifying additionally which manuals of instructions or protocols should be updated or adapted to the occurring changes. Since the following up in the

implementation of the project is permanent, if important changes occur, the system can be updated during the same period, without having to wait for the report at the end of said period.

Following, the information flow in the framework of the adaptative management of the project is presented:

ADAPTATIVE MANAGEMENT



PLANIFICATION AND MONITORING

Forms have been defined for the collection of the field data that is currently within the concessions processes and forms will be defined for those variables to be monitored. The collected data will be systematically digitalized in Excel type spreadsheets, also designed according to the information requirements. The calculations will be made in said spreadsheets using the correspondent formulas and afterwards the necessary reports are delivered as the basis for the elaboration of the consolidated Monitoring Report.

All the field monitoring processes should be documented, all the established sample units or plots should be georeferenced and systematized within the GIS.

The physical and digital files which store the data generated during the monitoring process will be accessible in the two modalities described before (physical files and digital files), being kept in the project offices in the locality of Iñapari and in Maderacre's central office in Lima, Perú throughout

the Madre de Dios Amazon REDD Project duration and for at least two years after the end of the project crediting period.

The information management comprises the following steps or processes:

Step 1: Selection and Analysis of the Source of Land Use Change

1.1 For the monitoring period of 5 years, the following actions will be carried out:

a) The collected and analyzed data should cover the entire project area and leakage belt. Available data for the year when verification occurs.
b) For the calculation of each category of land use change:
- The area of each category within the project area will be calculated and where required within the leakage belt.
- The forest cover maps of reference for the project area and leakage belt will be updated.
- The remaining forest area within the project zone will be updated.

1.2 For the monitoring period of 10 years. Baseline review:

a) Use of middle resolution images (30 m x 30 m or less, if available) at the end of the period where the baseline will be renewed.
b) The collected and analyzed data should cover:
- The entire reference region: available data for the year of baseline renewal or not less than a year earlier.
- For the processing of the data change for the Great Land Use Capacity (in Spanish Capacidad de Uso Mayor de las Tierras), will be georeferenced and geometrical corrections will be made as well as clouds and shadows detections.
- The area of each category within the reference region, project area and where required within the leakage belt will be calculated.
- The forest cover maps of reference for the reference area, project area and leakage belt will be updated.
- The total deforested areas during the first 10 years will be estimated in order to adjust the baseline and the deforestation rate if necessary.

Note: The indications of the correspondent Module of the REDD Methodology Modules will be taken into account with respect to clouds for the determination of maps. A classification accuracy of 90% or more will be sought.

Step 2: Interpretation and Analysis

2.1 Monitoring of Deforestation

a) Deforested area within the Project Area (PA) per stratum.
b) Deforested area within the Leakage Belt (LB) per stratum.
In both cases it must be specified to what type of Land Use (LU) the deforested areas have been changed. For the baseline re-calculation it should be established or indicated if the percentages of land use change are still the same as in the initial baseline.
c) Carbon stock in carbon pools:

- Carbon stock in each stratum defined in the baseline is maintained. It will be reassessed for the baseline review (in 10 years).
- Carbon stock of each land use is maintained. It will be reassessed for the baseline review (in 10 years).

d) Volume of timber harvested in each concession, per stratum and per year.
e) Deforested area within the Reference Region (for the baseline review).

2.2. Monitoring of Degradation

The Madre de Dios Amazon REDD Project counts with a Custody System in the process of implementation (control posts, defined boundaries, regular patrolling, etc.). In this sense, it is expected that there will be no degradation by wood extraction due to illegal logging or firewood or coal production. If this occurs within the concessions, this degradation will be discounted.

A Participatory Rural Appraisal (PRA) will be conducted in order to determine whether degradation occurs. In this sense, these steps will be followed:

a) Degradation due to illegal logging:
   - The PRA will be conducted every 2 years. The first PRA was done in 2011-2012, the last PRA was done in march, 20, 2015). If the results indicate that the project area has no pressure from this type of degradation, then it will be assumed that: $\Delta Cp,Deg,i,t = 0$.
   - If the results of the PRA indicate that there is potential for degradation, then it must:
     - Obtain a “penetration distance” in the PRA (distance that the degradation agents can enter from the nearest access points).
     - Identify the most important access points to the vulnerable area.
     - From said points, draw the distances and create a Buffer Area with a width equal to length.
     - Transects will be established to evaluate the buffer zone. The assessed area should not be lesser than 1% of the buffer area.
     - If stumps are not found (harvested trees), then it is assumed that $\Delta Cp,Deg,i,t = 0$ and the assessment is repeated every 2 years.
     - If stumps are found, then a systematic assessment is carried out. For this, plots are distributed systematically, being the area to assess ≥ 3% of the buffer area.
     - Take into account the diameter of the stumps, which will be assumed as their DBH. If they were very large (e.g. due to buttresses), then the species of the stump is identified and standing trees of the same species are located. Afterwards, their DBH and stump diameter are measured and a ratio between DBH/stump diameter is calculated. With this ratio, the DBH from the stump diameter of the cleared individuals that were found is estimated.
     - With the DBH data, the carbon stock of the harvested trees is calculated, using the allometric equation that was employed for the estimation of the tree carbon stocks in the baseline (Chavé Equation).
     - It will be assumed that all stock will be lost to the atmosphere.
     - This assessment must be repeated every 5 years.

b) Degradation due to fire:
   - Burned areas must be measured in the field using GPS.

- In order to calculate the emissions from this, the E-BB Module of the approved VCS REDD Methodology Modules shall be followed.

2.3 Monitoring of areas of increased carbon stocks

The increase in carbon stocks is assumed to be zero, thus it does not require monitoring.

2.4 Monitoring of project emissions

The Non-CO_2 GHG emissions will be calculated:

a) N_2O and CH_4 from the burning of agricultural and forest biomass. It is carried out in those areas of land where use change occurred. For the ex-ante calculations of the biomass burned within the forest, it was estimated (through expert consultation) that 50% of the deforested forest was burned. In the case that deforestation within the project area occurs, a new percentage will be established (based on real measurements that will be made or literature support). It will be indicated what was done for the baseline recalculation (every 10 years).
b) N_2O emissions due to the use of fertilizer within deforested areas. In the case that deforestation and N_2O use occur during the project lifetime, the amount of nitrogen fertilizer used per deforested hectare shall be determined.

SATELLITE IMAGES ANALYSIS AND INTERPRETATION

The deforestation and the source of land use change analysis should be conducted through the use of satellite images and in-field verifications. The procedures that will be considered are the following:

1. Selection of satellite images:

The image was obtained from the image server: Instituto Nacional de Pesquizas Espaciales – (INPE-Brasil) http://www.dgi.inpe.br/catalogo/

The satellite image used was Landsat- 8, path 003 and row 068. The dates correspond to october 13th 2014, the sensor was the OLI. The image has only 1% of cloud cover, in the evaluated area.

The monitoring reports must detail the relationship between the acquired images and the use of an “Images Acquisition Form” that includes the following information: Path, Row, Date, Year, Source and Code.

Images with a cloud cover surpassing 10% of the entire area of the image must not be used, this to ensure the proper analysis of them.

2. Satellite images processing:

For the processing of the selected satellite images, the software used are Erdas Imagine 2011 2® and ArcGis v10.1®. This activity should include the following steps:

a) Band composition
As the image is acquired in TIFF format (raw format), it has to be decompressed and exported to Erdas Imagine matrix (*img). Then, all bands are grouped in a 543-RGB combination, which is the most optimal combination for visual interpretation of deforestation and land use change.

b) Geometric Correction
This process is applied to transform images by eliminating geometrical distortions from the sensor, which means that they must be georeferenced. It is a very important step because it assures that the image is located in the same geographical space as the historic images.

c) Radiometric Improvement
This is done to get a better visual appearance of the image.

d) Visual classification
IIAP methodology was used to classify the satellite images. The working scale was 1:80 000. The classes identified were:
- Forest
- Non forest land, which was divided into sub categories:
- Pastures
- Agriculture
- Farming
- Infrastructure
- Secondary forest, included here to avoid accounting for positive changes in forest (natural regeneration).

For this period, any deforestation has occurred in the Project Area. The Leakage Belt has 16.84 ha the new accumulated deforestation as the one seen in last period, meaning that no new last period January-December 2014.

More details of the whole procedure can be seen in the technical report *"Mapeo de la Deforestación y Uso de la Tierra del Proyecto y Cinturón de Fuga de la Concesión de Maderacre y Maderyja en el Departamento Madre de Dios al año 2014 - Memoria Descriptiva del Procedimiento Metodológico"*

INTERNAL AUDITING

The main purpose of the management system of the project's information quality is to minimize the risks of error, obtaining reliable data on which to base the monitoring results. It includes the following steps:

1. Training
It includes the training of general staff in the different roles to play within the framework of the Madre de Dios Amazon REDD Project, however, aiming at always having quality information, the training on those critical points of the information management will be prioritized, which are field collection and its processing (Evaluation and Monitoring Chief, field staff and GIS

Specialist). All staff must go through an induction process before executing any activity related to the monitoring.

2. In-field verification
   It basically consists of monitoring in the field that the field staff is following the procedures set out in the methodological guidelines given in the previous process of induction. This work is in charge of the Evaluation and Monitoring Chief.
   An error in following the procedures should be corrected in the field during the execution of samplings or assessments.

3. Review of the collected data pre and post digitalization
   The collected data should be reviewed before (field forms) and after (electronic spreadsheet) its digitalization, so that a second eye can detect inconsistent information. This work is in charge of the Evaluation and Monitoring Chief.
   If any information inconsistency is identified at the level of field forms, this information must be verified in the field. If the inconsistency is found in the digitalized information, it must be corroborated in the field forms and whether the inconsistency persists, it must be corroborated in the field.
4. Review of the monitoring reports prior to publication
   The monitoring reports must be reviewed prior to publication, in order to confirm the calculations, analysis and the conclusions are accurate and measured. This work is in charge of the Project Chief or Coordinator.
   If non-conformities exist during the internal or external auditing processes, the data should be reviewed and the non-conformities addressed.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

If the reader wants to reproducer the calculation, please read the following files:

- Cp Estimations in MDD 2014
- Leakage Estimations in MDD 2014
- Uncertainty Analysis MDD 2014
- VCUs Estimations in MDD 2014
- VCS NonPermRisk May16

4.1. Baseline Emissions

As showed in the Project PD, the net GHG emissions under the baseline scenario in the 2012-3013 period amounts to (pg. 164 in PD):

T	Year	$\Delta C_{BSL,unplanned}$ (t CO_2-e)
1	2014	1,107,895.0

4.2. Project Emissions

The net change in carbon stock, inside the proyect area, by deforestation is **"0".** Las emisiones de gases de efecto invernadero netos con todas las variables indicadas en la ecuación N ° 01 son 192, 324. 36

We can see in the following chart the different change in carbon stock by:

Cp,SelLog,i,t (2013-2014)				
Stratum	**CLG**	**CLR**	**CWP**	**Total per stratum**
Hilly Forest	96,872.00	90,220.17	3,536.15	183,556.02
Terrace Forest	4,457.66	4,473.32	162.72	8,768.25
Bamboo	-	-	-	-
Others	-	-	-	-
Tree swamps	-	-	-	-
Total	101,329.66	94,693.49	3,698.87	192,324.27

CLG. Annual net project emissions arising in the logging gap
CLR Annual net project emissions arising from logging infraestructure
CWP Carbon stock in wood products pool

During the monitoring, all the steps in M-MON module were followed to obtain the Net greenhouse gas emissions under the project scenario:

$$\Delta Cp = \sum\sum(\Delta C_{p,defPA,i,t} + \Delta_{Cp,Deg,i,t} + GHG_{p\text{-}E,i,t} + \Delta C_{p,Enh,I,t})$$ … Equation n°1 M-MON

Stratum	*CpDef,PA,i,t*	*Cpdeg,PA,i,t*	*CpDist,PA,i,t*	*GHGp-e,i,t*	*Cp,Enh,i,t*	TOTAL
Hilly Forest	-	183,556.02	-	-	-	183,556.02
Terrace forest	-	8,768.25	-	-	-	8,768.25
Bamboo	-	-	-	-	-	-
Others	-	-	-	-	-	-
Tree Swamps	-	-	-	-	-	-
TOTAL	-	192,324.27	-	-	-	**192,324.27**

Read the Cp Estimations in MDD 2014 file

4.3. Leakage

During the monitoring of period 2014 and following the steps presented in LK-ASU module, the Net greenhouse gas emissions due to leakage are equal to:

$$\Delta C_{LK\text{-}AS,unplanned} = \Delta C_{LK\text{-}ASU\text{-}LB} + \Delta C_{LK\text{-}ASU\text{-}OLB} + GHG_{LK,E}$$

… Equation n°13 LK-ASU

$\Delta C_{LK\text{-}ASU\text{-}LB}$	$\Delta C_{LK\text{-}ASU,OLB}$	$GHG_{LK,E}$	$\Delta C_{LK\text{-}AS,unplanned}$
-	349.6358751	-	**349.64**

Given that the project was only validated for avoided unplanned deforestation activity, the total emissions due to leakage are the same presented in the above table, as stated in the following equation:

$$\Delta C_{LK} = \Delta_{CLK\text{-}AS,unplanned}$$ …. Equation n°3 REDD-MF

Read the Leakage Estimations in MDD 2014

4.4. Net GHG Emission Reductions and Removals

- The risk rating was 10%. You can see the risk report in the VCS NonPermRisk May16 file
-

The net change in carbon stocks is calculated by substracting the project stocks minus the baseline stocks, which is 915,570.80 (1,107,895.00 – 192,324.27 = 915,570.80). This deviation in buffer equation does not negatively impact the conservativeness of the quantification of GHG emission reductions or removals, and relates only to the criteria and procedures for monitoring or measurement, and do not relate to any other part of the methodology

The total net greenhouse gas emissions reductions of the REDD project activity were calculated as follows:

2014	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
Total	1,107,895.00	192,324.27	349.64	915,221.09

Then, this result was adjusted to account for the uncertainty analysis:

$Adjusted_C_{REDD} = C_{REDD} * (100\% - C_{REDD_ERROR}$[3] $+ 15\%)$ … *Equation in REDD-MF, page 19*

$Adjusted_C_{REDD}$ = 915,540.87 *(100%) =915,221.09 t CO_2-e

A final discount due to Permanence Risk Buffer was made, so the final result is:

$Buffer_{UNPLANNED}$ = ((1´107,895 – 0) – (192,324.27– 0)) * 10% = 91,557.07 t CO_2-e

In this way, the total emission reductions due to project activity for the 2014 period were obtain:

	$C_{REDD,t}$	Adjusted $C_{REDD,t}$	$Buffer_{UNPLANNED}$	VCU_t
Period 2014	915,221.09	915,221.09	91,557.07	**823,664.02**

Read the Uncertainty Analysis MDD 2014 and VCUs Estimations in MDD 2014 files

All calculations and SIG information, can be reviewed in the following worksheets, which will be available for the auditor:

[3] Uncertainty does not exceed the 15%, is 10.54%

- Cp Estimations in MDD 2014
- Leakage Estimations in MDD 2014
- Uncertainty Analysis MDD 2014
- VCUs Estimations in MDD 2014
- VCS NonPermRisk May16
- 01.memoria_M&M_jun_2016_v1

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