REDD PROJECT IN BRAZIL NUT CONCESSIONS IN MADRE DE DIOS

Bam
Bosques Amazónicos

Document Prepared by BOSQUES AMAZONICOS SAC

Project Title	**REDD Project in Brazil Nut Concessions in Madre de Dios**
Version	04
Report ID	BAM-MR
Date of Issue	27-February-2022
Project ID	**868**
Monitoring Period	01-January-2017 to 31-December-2017
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project, proposed by Bosques Amazónicos SAC (BAM), is located in the Peruvian region of Madre de Dios, an area of great biological diversity which is in risk due to deforestation mainly caused by livestock ranchers and farmers. Since 2009, BAM and its implementation partner, FEPROCAMD[1], are committed to reducing the emissions from deforestation and to implementing a socio environmental plan for the sustainable development of the community.

Using the Deforestation Model approved in validation stage by the correspondent VVB (SCS Global Services) and VERRA, built with DINAMICA EGO software[2], the expected deforestation in the project zone (RRL) was geographically allocated. This model was based on the analysis of 3 Landsat satellite images from years 2000, 2005 and 2008, which revealed different deforestation rates in the region. According to the model, approximately 34% of the forest within the Project Area would be lost by the end of 2041 in a without-project scenario. The design and monitoring was based on the modular methodology developed by Avoided Deforestation Partners, approved by VCS on December 3, 2010.

Date	Milestone(s) in the project's development and implementation
24/09/2009	BAM and FEPROCAMD sign a Strategic Agreement to implement a REDD project
13/06/2012	Brazil Nut REDD Project is validated under VCS and CCB Standards
14/11/2013	First VCS Verification
14/01/2014	CCB Validation
13/10/2020	Second VCS Verification

The main activities implemented by the project throughout the verification period (2017), supported by documentary evidence[3] and that will be later explained in detail can be summarized in the following matters:

- FEPROCAMD's strengthening and operations funding
- Concessionaires meetings for strengthening the organization's capacities
- Representation of concessionaires in front of authorities
- Training workshops in sustainable forestry management and other topics of interest
- Technical and legal assistance for concessionaires
- Promotion of the Brazil nut sector: fair and festival

Net tradable emissions reduction as a result of the project activity in the period: **2.366.747,68 tCO2e.**

[1] Departmental Federation of Brazil nut Producers of Madre de Dios.

[2] DINAMICA EGO software developed by Universidad Federal de Minas Gerais from Brazil, 2002.

[3] Activities 2017 file: *Activities 2017; Document: e.g. Officious N32-2017-GOREMAD-GRRNYGMA, e.g. Letter N098-2017-FEPROCAMD-MDD-DCHP. Video: GOREMAD – FEPROCAMD Participation in the dialogue table 2017.*

405 concessions comprise the project area (PA). The total PA covers 329,564,04 hectares. Only 387 of the 405 partners of the project were included for calculating climate contribution during this verification period (2017). The 387 concessions accountable represent an area of 314,403.13 hectares. Due to a methodological restriction, those concessions where selective, minimal and permitted timber extraction was carried out by concessionaire rural families in accordance with their legal concession contract granted by the Peruvian state, could not be accounted for in the climate contribution (net emissions reductions) generated by the project during the period under evaluation. It is important to mention that these concessions do not cease to be part of the project, they are just excluded from the accounting of climate contribution, even though they present net emissions reductions in their area. Not considering concessions where legal/artisanal/selective logging was performed in the accounting of net emission reductions occurred within the period is a conservative approach due to the following: considering only the non-accounted concessions for calculations (emission reductions) in 2017, and according to the baseline scenario, 174,328 tCO2e would have been emitted due to land use change in the mentioned area. In the with-project-scenario, the actual deforestation in those 18 concessions was zero.

During this period, the emissions caused by the deforestation in baseline within the excluded area (15,161 hectares) would have been 174,328 tCO2 (ΔCBSL,unplanned), however, the actual reported deforestation in the area was zero (ΔCP = 0). Hence, as the real avoided emissions (CREDD,t) is the result of discounting the emissions in baseline minus the reported emissions from deforestation and emissions from leakage, for this period the real avoided emissions were: 174,328 – 0 – 5,060 = 169,268 tCO2e.

Furthermore, to calculate adjusted avoided emissions uncertainty was assessed at 19.63% (Excel file: uncertainty analysis). According to methodology, real avoided emissions were discounted, multiplying its value by the result of 100%-19.63%+15%, resulting in 161,438 tCO2e (Adjusted CREDD,t),

For calculating the buffer, the difference between emissions from deforestation in the baseline scenario and emissions from real deforestation was first calculated (174,328 – 0 = 174,328) and then discounted by multiplying the value by the non-permanence risk (Document: non-permanence risk tool), resulting in 174,328 * 10% = 17,433 tCO2e.

According to methodology, the value of VCUs is the adjusted emissions reductions minus the buffer, hence the number of VCUs calculated for the period is: 161,438 – 17,433 = 144,005 tCO2e.

On the other hand, to consider emissions caused by degradation, the total volume of timber extracted (in cubic meters) by the concessionaires temporarily excluded for the emission reduction calculations in this period (Excel file: BAM Castañeros excluidos por periodo), was multiplied by the factor 0.49 (carbon fraction, IPCC 2006) (12,027*0.49 = 5,893) to convert

it to carbon, and finally multiplied by 44/12 to convert it to tCO2e, resulting in: 5,893 * 44/12 = 21,609 tCO2e.

Additionally, after subtracting the emissions from legal logging (harvested m3) during the period from the calculated VCUs for 2017, the value of net emission reductions was 122,369 tCO2e (144,005 – 21,609 = 122,369 tCO2e).

Due to the methodological restriction, these 122,369 tCO2e net emission reductions occurring in the aforementioned area have not been accounted for in the final calculations of the project. In other words, the **122,369 tCO2e ER has not been generated in favor of the project despite having occurred as a result of the project's management, following the principle of conservatism required by the methodology.**

1.2 Sectoral Scope and Project Type

According to the decision tree presented in the Methodology Framework, the project qualifies under the VCS category Avoided Unplanned Deforestation.

Table 1: Methodology framework

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

Source: REDD Methodology Framework (REDD-MF)

The REDD Project in Brazil Nut Concessions in Madre de Dios is classified as a grouped project as it includes many forest units (Brazil nut concessions) managed individually but with similar conditions. For this verification period, no additional areas have been incorporated to the project from the previous verification process. The concession partners of the project are: 405 concessions.

1.3 Project Proponent

Organization name	Bosques Amazónicos SAC – BAM
Contact person	Jorge Cantuarias Falconí
Title	General Manager
Address	Av. Víctor Andrés Belaúnde 147 Vía Principal 123, Oficina 201 Edificio Real Uno, Lima 27, Perú
Telephone	Phone: +(51 1)4801192
Email	jcantuarias@bosques-amazonicos.com

1.4 Other Entities Involved in the Project

Organization name	Federación de Productores de Castaña de Madre de Dios - FEPROCAMD
Role in the Project	Representing most of the concessionaires of forestry products other than wood (i.e. Brazil nuts) in Madre de Dios, and it gathers the associations formed by people and families working on collecting, transforming and commercializing Brazil nuts.
Contact person	David Asturima Huamantica
Title	President
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1.5 Project Start Date

The Project start date is 24/09/2009, the date when the Association Contract between BAM and FEPROCAMD was executed for the joint development of the REDD Project in Brazil nut concessions.

1.6 Project Crediting Period

The Project Crediting Period goes from 01/01/2010 up to 31/12/2040 and makes up a total of 31 years of crediting time. The start date coincides with the beginning of the first monitoring period.

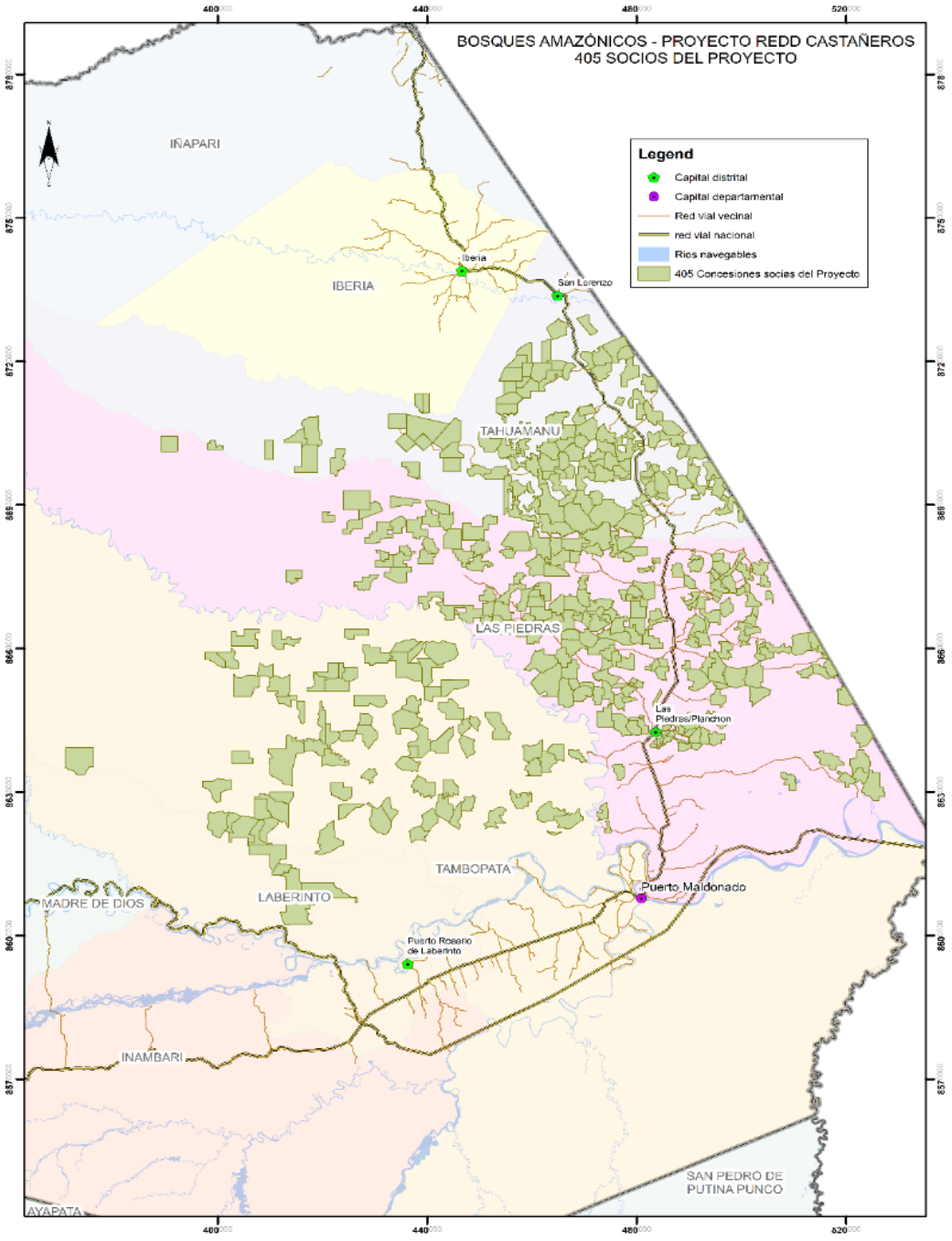
1.7 Project Location

The Project is located in the eastern side of Madre de Dios, which is a Region in southeastern Peru, bordering Brazil, Bolivia and the Peruvian Regions of Puno, Cuzco and Ucayali. Within Madre de Dios, the Project is located in the Provinces of Tahuamanu (Iberia and Tahuamanu districts) and Tambopata (Las Piedras, Laberinto, Inambari and Tambopata districts).

The Project Area is formed by a set of non-timber concessions, specifically Brazil nut (BN) concessions that were granted by the Peruvian Government from 2002, after this activity was recognized and regulated through the new Forestry and Wildlife Law of 2001. These concessions are spread in a well-defined zone, where the majority of BN concessions (nearly 1000) are located in the region (both margins of Stretch 3 of the Inter-Oceanic Highway, most of them at the left side).

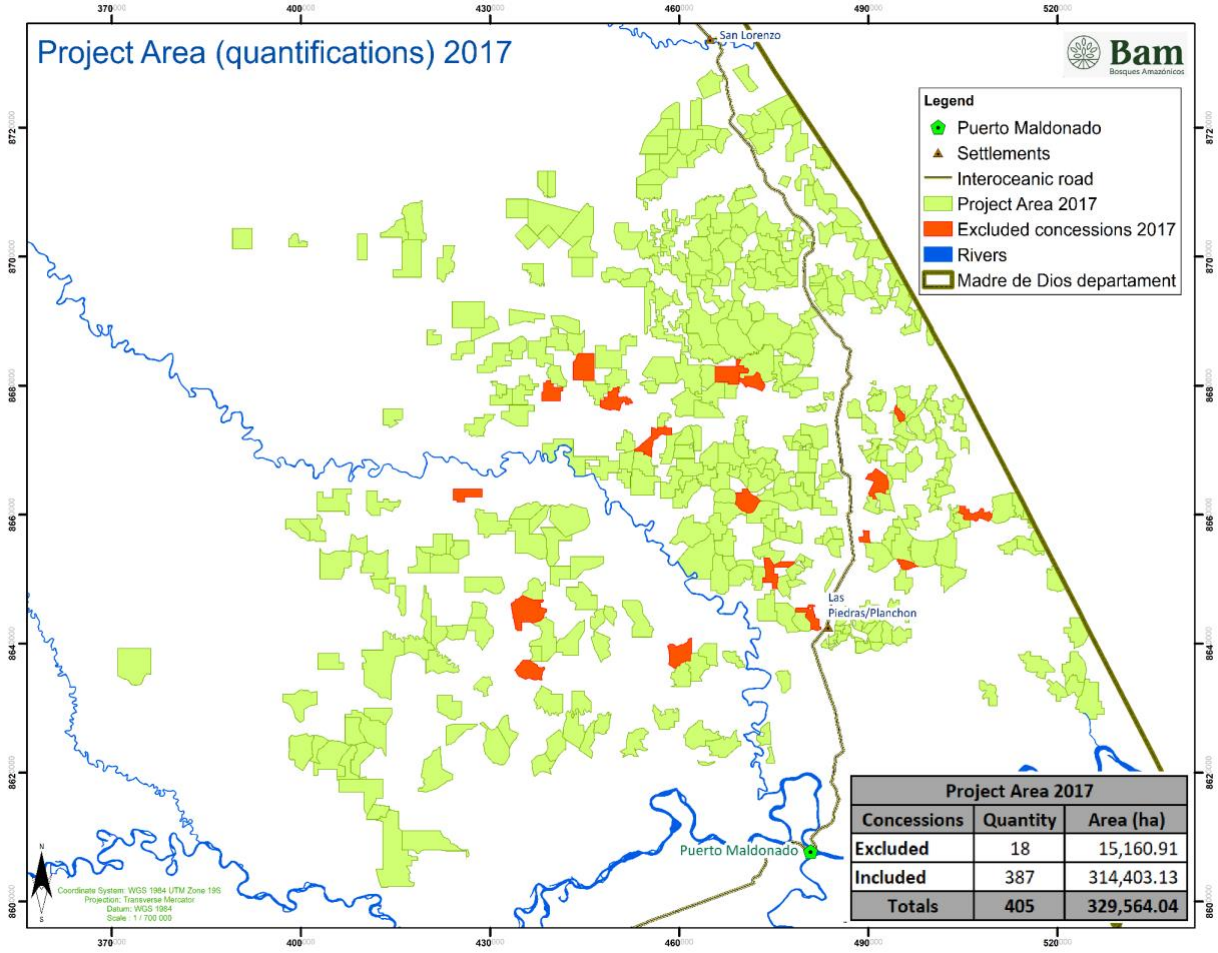
405 concessions comprise the project area. The total project area covers 329,564,04 hectares. The boundaries of the PA were defined based on the legal boundaries of each concession contract, excluding, as requested by the methodology, areas within these concessions that were deforested before the project start date. The centroid coordinates of each concession are shown in Annex 1.

Map 1: location of REDD Brazil nut concessions project



Source: Self–made

Only 387 of the 405 partners of the project were included for calculating climate contribution during this verification period (2017). The 387 concessions accountable represent an area of 314,403.13 hectares. See map below:



1.8 Title and Reference of Methodology

The methodology used for validating the project is named REDD Methodology Modules (VM0007), version 1.1. It belongs to the AFOLU Sectorial Scope, was developed by Avoided Deforestation Partners and was approved by VCS in December 2010.

It is formed by several modules, but as this is an Unplanned Deforestation project, we have only used the ones most appropriate, listed in table 2.

Table 2: Information of the Modules used

	Module	Code	Version
Always Mandatory	REDD Methodology Framework (REDD-MF)	VM0007	1.1
	Methods for monitoring of greenhouse gas emissions and removals (M-MON)	VMD0015	2.0
	Estimation of uncertainty for REDD project activities (X-UNC)	VMD0017	1.0
	Methods for stratification of the project area (X-STR)	VMD0016	1.0
Baseline	Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation (BL-UP)	VMD0007	2.0
Leakage	Estimation of emissions from activity shifting for avoided unplanned deforestation (LK-ASU)	VMD0010	1.0
Pools	Estimation of carbon stocks in the above- and belowground biomass in live tree and non-tree pools (CP-AB)	VMD001	1.0
Emissions	Estimation of greenhouse gas emissions from biomass burning (E-BB)	VMD0013	1.0
	Estimation of emissions from fossil fuel combustion (E-FFC)[1]	VMD0014	1.0

Source: REDD Methodology Framework (REDD–MF)

Table 3: Information of the Tools used

	Tools	Code	Version
Risk	Tool for AFOLU non- permanence risk analysis and buffer determination (T-BAR)		3.2
Additionality	Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities (T-ADD)	VT001	1.0
Significance	Tool for testing significance of GHG emissions in A/R CDM project activities (T-SIG)	EB_31	1.0

Source: REDD Methodology Framework (REDD–MF)

1.9 Participation under other GHG Programs

The project does not participate in any Emission Trading Programs and Other Binding Limits, nor other forms of environmental credit or other GHG program.

1.10 Other Forms of Credit

Not applicable.

1.11 Sustainable Development

Sustainable forestry management for non-timber forest products is one of the main targets of the sustainable development in the national and regional plans. In the Forest and Climate Change National Strategy[4], the REDD+ strategy/action plan of Peru under the UNFCCC, the Brazil nut is highlighted as the second highest export value NTFP and it is mentioned in the Strategic Activity 2.5 "Develop specialized programs to promote the sustainable forestry management associated with timber, non-timber, wildlife, ecotourism and eco-business" as one of the prioritized actions to reduce deforestation. Again, Activity 7.5 is also included because of its high social impacts for benefiting the local population.

Regionally, the Brazil nut is also one of the pillars of sustainable development as can be seen in the Regional Agreed Development Plan (PDRC), where, in part thanks to the support received by this project, the strengthened Federation FEPROCAMD was chosen as one of the two representatives of civil society to the Promoting Committee to update this important document. It must be mentioned that the PDRC is the official tool to guide all the different actions to bring sustainable development in the region.

The project monitors these achievements by a continuous registration process of all the activities developed by FEPROCAMD and other grassroots organizations. In addition, the project applies surveys to monitor the progress of the community, specifically the progress of concessionaire families part of the project, in terms of the Sustainable Development goals, evaluating indicators such as: Gender equity; Income improvement; Capacity building (economic activities)[5].

The REDD Brazil Nut concessions project was registered in the REDD+ National Registry of the Ministry of Environment (MINAM) but, as this registry is no longer publicly available, the project is open to re-register when it is open and active. In the meantime, BAM actively participates in the meetings convened by MINAM for the nesting process.

[4] http://www.bosques.gob.pe/archivo/ff3f54_ESTRATEGIACAMBIOCLIMATICO2016_ok.pdf

[5] Documentary evidence: *Línea Base_Componente Comunidad*

2 SAFEGUARDS

2.1 No Net Harm

The project does not generate negative environmental impacts; on the contrary, the Project seeks for ecosystem preservation and sustainable forestry management with respect to the traditional activities of the partners: Brazil nut -a non-timber forest product (NTFP) that grows wild in this primary forest- and timber.

The Brazil nut collection is considered a low-impact activity that promotes forest conservation, since the activity is profitable only in undisturbed forests. Attempts to establish Brazil nut plantations have been made without success; for this reason, it is essential to safeguard Brazil nut productive forests, by strengthening techniques for forest management and providing resources to increase Brazil nut production, sub products with added value and others. Brazil nut activity is regulated by the Peruvian State and requires a General Management Plan for Brazil nuts collection prior to beginning of the activity, which must be approved by the Regional Directorate of Forestry and Wildlife (DRFFS) and the POAs (Plan Operativo Anual) or DEMAs (Declaración de Manejo) to be authorized annually.

Logging is a complementary activity to Brazil nut collection, permitted only when it is carried out under the extraction levels and methods established in the concession contract with the Peruvian government. To perform this activity, concessionaires must elaborate a Complementary Management Plan and submit it for approval by the Forestry Authority. This management plan must describe in detail the trees to be harvested (species, volume, quantity, location, etc.). After obtaining approval, the concessionaire is evaluated by the supervisory Forestry Authority, which carries out permanent and random unannounced field inspections of the concessionaires to ensure that management is occurring or has occurred in accordance with the permitted levels established in the management plan. These regulations and inspections ensure that logging is carried out on an artisanal scale and in accordance with the legal framework. According to the extraction balances, the volumes harvested are even lower than the maximum allowed.

Within this period of evaluation (2017), 18 Brazil nut producers (4.4% of total partners of the project) conducted legal logging activity within their concessions. Even though this activity was performed according to the Concession contract with the Peruvian State, the net reductions occurring in these areas could not be accounted for in calculating climate contribution in this verification period. Due to the methodological restriction, emission reductions that do occur in the areas as a consequence of the project management cannot be accounted for their climate contribution in the period. That is, they cannot be translated into verified ER generated as a result of the project activities. It is important to mention that these concessions do not cease to be part of the project, they are just excluded from the

accounting of climate contribution, even though they present net emissions reductions in their area during the period.

According to the applicability conditions of M-MON tool (Modular Methodology: Module VMD0015 v2 "M-MON" developed by Avoided Deforestation Partners, approved by VCS on December 2010), when selective logging is taking place in the project case, emissions from logging may be omitted if it can be demonstrated the emissions are de minimis using Tool T-SIG. If emissions from logging are not omitted as de minimis, logging may only take place within forest management areas that possess and maintain a Forest Stewardship Council (FSC) certificate for the years when the selective logging occurs. According to T-SIG tool, the sum of decreases in carbon pools and increases in emissions that may be neglected shall be less than 5% of the total decreases in carbon pools and increases in emissions, or less than 5% of net anthropogenic removals by sinks, whichever is lower.

For this reason, as the concessionaries are not FSC certified and their GHG emissions by selective logging do not fall in minimis, the concessionaries must be excluded for accounting purposes only for the years when they do logging, which is very seldom. It must be highlighted that the main forest resource harvested from this type of concessions is the Brazil nut, a non-timber forest product (NTFP), that grows wild in this primary forest. These concessions has a size of 800 hectares as an average, too small for doing logging at an intensive scale.

Hence, this approach does not imply any change on non-permanence risk valuation as the "exclusion" is only for VCU calculations and there isn't any difference in the benefits that the non-accounted concessionaries receive from the project compared with the accounted concessionaries. For this reason, the level of protection and the behavior and land use pattern is similar and does not have a change that may vary the risk of non-permanence.

In order to account for the emission reductions occurring in these areas, the project proponent consulted on the feasibility of achieving FSC certification for this specific project. After a conversation with the FSC team, it was considered hard and even unviable to achieve this certification due to the difficulty to use this type of monitoring in such a large non-contiguous area (+320K ha) of smallholder concessions (in average have less than 800 ha. each). Therefore, a methodological addendum will be presented to VERRA for the consideration of other type of controls within the area (e.g. National Controls, Reporting and Monitoring according to the Peruvian Forest Laws) so that the project can account for emissions avoided in properly managed concessions in the next verification periods.

The 18 concessionaires that presented legal extraction levels were only excluded from the calculation of the contribution to the net reductions generated by the project during the verification period.

The project seeks to generate a positive impact on the social and economic welfare of the community, ensuring that benefits are fairly shared among all members and groups over the

life of the project. REDD Brazil nut concessions is focused in promoting forest conservation by enabling local communities to benefit from sustainable revenue streams generated through the protection and responsible management of forests. For doing so, the project is focused achieving 3 main goals:

A. **Improve community livelihood by generating revenue streams through sustainable forestry management:** REDD Brazil nut concessions is focused on generating wealth for the community through the sale of carbon credits and the implementation of other sustainable activities that center around conservation and sustainable forest management.

B. **Strengthen the Federation of Brazil nut producers FEPROCAMD's organizational and operational capacities, allowing them to play an active role in Madre de Dios sustainable development:** REDD Brazil nut concessions not only helped to consolidate FEPROCAMD as an organization, but, over the years, has also helped to finance its operations and strengthen it to the point where it is now an important representation for the Brazil nut families of Madre de Dios in relation to the authorities and interest groups in the sector. This strategy is essential to strengthen the negotiation power of partners in the market and to make their voice heard in the sector.

   In addition, REDD Brazil nut concessions seeks to increase the capacities of the partners as individuals and as an organization through training workshops that aims to give them the necessary tools (knowledge) to successfully protect their forests and to develop sustainable activities that generate greater economic opportunities as well as micro entrepreneurial development for them and their families. Training workshops on topics such as: how to promote and denounce threats of deforestation, sustainable forestry activities, etc.

C. Implement activities to avoid deforestation, preserving the value of ecosystems and its biodiversity: in addition to the aforementioned activities aimed at removing pressure on the forest, REDD Brazil nut concessions seeks to control and monitor the area to prevent any deforestation threat, implementing activities such as the permanent legal and technical support for concessionaires.

The implemented activities in the current period of evaluation will be later explained in the document.

The implementation of the project activities seek to limit and prevent the expansion of environmental threats and violations from deforestation agents within the project area. To prevent and mitigate any threats or conflicts, the project combines control activities and encourages productive activities. By implementing the activities that break down from the pursuit of the objectives previously mentioned, the project seeks to generate employment opportunities for the community (particularly for the partners and their descendants) and wealth for their sustainable development and betterment of livelihood.

In this sense, potential negative environmental and socio-economic impacts will be minimal in the project area.

2.2 Local Stakeholder Consultation

Official communications between BAM and all project partners are carried out in coordination with the FEPROCAMD leadership, respecting the structure of the organization as stipulated in its bylaws (president, board members, association presidents). Communication between the BAM-FEPROCAMD-CONCESSIONAIRES project takes place mainly through general and decentralized meetings called assemblies, which are called by the Federation to all its bases through popular media in the area such as radio communication among others. In these assemblies, the progress of the REDD Project and discussion of future activities for the benefit of the project are communicated openly. The main communications and meetings attended by BN organizations during 2017, are listed below:

FROM	TO	ISSUES	MONTH
FEPROCAMD	Alerta	Approval of REDD credit sales	October
FEPROCAMD	Alto Mercedes	Approval of REDD credit sales	October
		Forest Management Committee	
		Future carbon credits sale	
		Carbon measurements	
FEPROCAMD	Carmen Rosa	Approval of REDD credit sales	October
DGEFA-MINAM	FEPROCAMD	BN samples for cadmium analysis	March
FEPROCAMD	Planchón	Approval of REDD credit sales	October
FEPROCAMD	Planchón	Adequacy of LFFS	March
		CONAFOR	
		BN Processing Plant	
		BN Technical Roundtable	
FEPROCAMD	La Novia	REDD benefit sharing	September
		Approval of REDD credit sales	
		Carbon measurements	
		Equipment	
FEPROCAMD	Laberinto	REDD benefit sharing	June
		Changes in OSINFOR penalties	
FEPROCAMD	Alto Malecón	AGROBANCO loan for logging	July
		Carbon measurements	
		BN Regional Forum	
GRRNNYMA-GOREMAD	FEPROCAMD	PIP MINAM-CAF	December

During 2017, as detailed, different meetings were held to discuss issues related to the project. The main topics were related to carbon credit sales approval, benefit sharing, and

future sales. Other topics focused on Brazil nut activity (sanctions from OSINFOR field inspections, promotion of the BN technical roundtable, processing plant and regional forum, risk of cadmium presence that may affect exports), access to funds (AGROBANCO loan, PIP project), among others.

Through FEPROCAMD's organizational structure, its leaders communicate directly with BAM's management, holding periodic working meetings, in order to raise the points of the meetings, align processes and make decisions that respond to the needs of the concessionaires and the projects. Based on the feedback from concessionaires, decisions and updates in the implementation of project activities are made.

In these communications and meetings, project progress as well as delays in the execution of certain activities are discussed. As will be seen later in the deviations section, one of the main delays, which was raised in the meetings by the concessionaires, was the construction of the Brazil nut plant stipulated in the Project Design. The main reason for this and that have been communicated is the change in the dynamism of Brazil nut industrial activity in the region (the entry into the market of new actors, processing plants and traders of Brazil nuts, which has led to a high level of competitiveness in the sector) and the limited resources generated by the project from the sale of carbon credits. The project, through FEPROCAMD, suggests that the concession partners organize themselves to jointly sell their product in order to achieve a better position in the market. Furthermore, the project and FEPROCAMD seeks to promote the product (Brazil nuts) of the concessionaires by participating in fairs such as the Participation of the Federation and its bases of the Agro-industrial Craft Fair of Madre de Dios (JUL 2017).

Another of the consultations made during this verification period was about the problem that some concessionaires have regarding the exact definition of the limits of their concessions. The Project has contributed to address this issue by providing technical and legal advice to concessionaires. Furthermore, the Project aims to carry out a complete and end-to-end process of boundary service for all members of REDD Brazil nut concessions, addressing and covering this requirement of the partners in its entirety.

To maintain open and fluent communication the Project office is always available to any Brazil nut partner requiring support e.g. technical/legal support. If an on-site visit is required, it is scheduled and accompanied throughout the process.

Currently other channels for communicating progress and status on the Project are social networks as Facebook pages and WhatsApp chat groups: https://www.facebook.com/Proyecto-REDD-Casta%C3%B1eros-MDD-104395071611763 Furthermore, bulletins are periodically published to communicate key improvements and activities of the project among the partners and other stakeholders.

Regarding the communication to the concessionaires non-accounted in the period: It must be highlighted that the 18 concessions non-accounted from in this period is only for carbon accounting purposes, meaning that the net reductions which have happened within these areas are not being accounted for as climate contribution occurred in the period. As it will be demonstrated in Section 5.1, this calculation has followed the conservative approach as requested by VERRA and VCS methodology.

Important to highlight that all concessionaires (the total of 405 including the 18 previously mentioned) receive project benefits (technical assistance, legal advisory, etc.) equally. In other words, the concessionaires non-accounted in the emissions reduction (net emissions reductions) occurred in this specific period (2017) for presenting legal/selective/artisanal levels of timber extraction permitted under their concession contracts with the Peruvian state, are still part of the Project and have not ceased to receive the same treatment and benefits from the project as the other project partners (accounted in the emissions reduction occurred). The Project assumes the reduction of VCUs and consequent incomes from this exclusion. Even though there is no difference between the partners (non-accounted/accounted) as mentioned, among the different interviews and testimonies collected for the present verification, the testimony of Mrs. Dionizia Ccorahua (concessionaire excluded from the accountability of emission reductions in the period), was taken in consideration.

Furthermore, in order to be able to account for such reductions in the future, the project proponent plans to submit an addendum to the methodology proposed by VERRA (FSC) to one that fits the characteristics of the project (small family management areas, non-contiguous lands covering more than 300,000 hectares).

As mentioned above, communication regarding progress, as well as project delays and deviations, has been permanently communicated to project partners through the FEPROCAMD's organizational structure.

2.3 AFOLU-Specific Safeguards

The project is a partnership between 405 Brazil nut collectors organized in the Federation FEPROCAMD and Bosques Amazónicos (BAM). As previously mentioned, only 387 of the 405 partners were included for calculating climate contribution during this verification period. The 387 represents an area of 314,403.13 hectares.

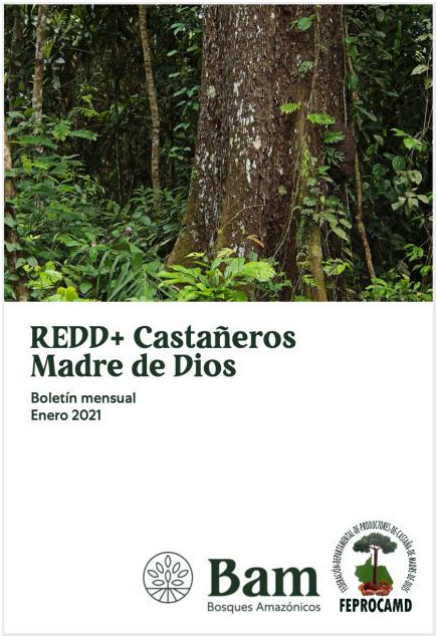
The project is carried out in state forests, permanently granted to rural families as non-timber forest concessions. In many cases, the areas of these families have been transferred over generations. In this sense, there are no land conflicts or claims over the project area.

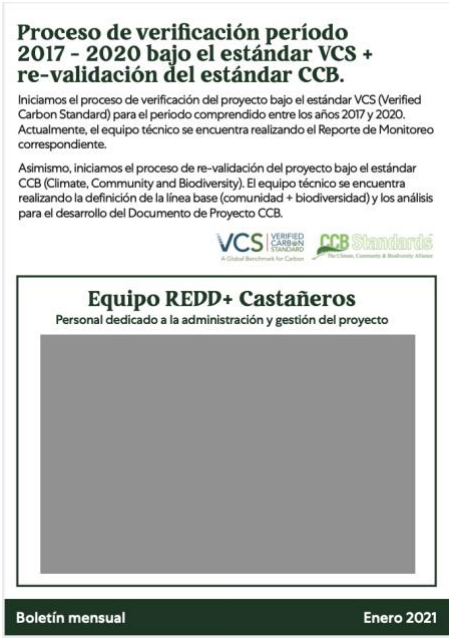
The main activity in these forests is Brazil nut harvesting, a very traditional activity, carried out since the 1940s, and which to this day maintains a very traditional way of harvesting, generating a balance of sustainability with the environment.

During the design stage, decentralized consultation meetings were carried out (documented in the annexes of PD). During the implementation stage, permanent and periodical meetings are carried out (documented in the different monitoring reports) for the information and consultation of Project activities and performance.

For this verification period (2017), different general assemblies were held through FEPROCAMD, convening project partner concessionaires to share the development (status) of project activities. In addition, training sessions were held for members and forums to strengthen FEPROCAMD as the organization that promotes the welfare of Brazil nut concessionaires. Each of these meetings and training sessions were communicated from the FEPROCAMD's board, prior collaboration and communication with BAM, directly to the concessionaires.

Progress and status of project activities are also communicated through other channels/products. For example, in the case of how the start of the verification of the current period was communicated, the project used the newsletter (sent to all project partners periodically) as a means of communication.





"Verification process period 2017-2020. under the VCS standard + re-validation of the CCB standard: we started the project verification process under the VCS standard (Verified Carbon Standard) for the period from 2017 to 2020. Currently, the technical team is preparing the corresponding Monitoring Report. Likewise, we started the process of re-validation of the project under the CCB standard. The technical team

is currently defining the baseline (community + biodiversity) and conducting the analysis for the development of the CCB Project Document".

In addition, for the present remote verification, the VVB randomly interviewed a number of concessionaires who were previously informed of the reason for the interview in coordination with the Project team. To summon the interviewed concessionaires, representatives of the Project team called the concessionaires individually, explaining the reason for the interview and proposing their participation in it. The concessionaires accepted to participate and were invited to the interviews, which were held at the Project offices (for computer use) and virtually with the verifier (VVB).

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The REDD Brazil nut concessions project implemented by BAM in partnership with the Federation of Brazil nut producers of Madre de Dios (FEPROCAMD) has been working actively since the establishment of the agreement between both partners in 2009.

Throughout the verification period (2017) the Project continued to strengthen the FEPROCAMD (organization of Brazil nut producers) through financing of the organization's operations for it to support concessionaires in protecting their forests. FEPROCAMD's financing of operations allows: improving BN concessionaires capacities in sustainable forestry management, giving concessionaires permanent technical and legal support for identifying and controlling threats of deforestation, having an organization representing concessionaires (their needs and requirements) in front of different regional and national authorities, among other activities for improving the livelihood of the community.

About the importance of FEPROCAMD's operation funding: the Project comprises more than 300,000 hectares of noncontiguous land of responsibility of small landowners (concessionaire families). Before the Project, concessionaires were isolated and acted independently, which meant they lacked power to interact among themselves and to reach competent authorities, the markets and all relevant stakeholders. The REDD Brazil nut concessions project helped concessionaires to group in 11 associations and to consolidate the Federation of Brazil nut producers of Madre de Dios, FEPROCAMD. The organization of concessionaires as a formal entity, allowed these families to join forces and work together to achieve collective goals for the protection of forests and the well-being of their community.

Since then and up to the present verification, the Project has financed FEPROCAMD's operations as a key activity for strengthening concessionaires capacity to: respond to any threat of deforestation happening within the project area; improve their ability for sustainable forestry management; improve their position in the market related to brazil nut

activity; improve their possibility to have a voice in front of competent authorities for presenting their needs and expectations as key players within the agro and environmental sector.

Strengthening the regional grassroots organization is key to deal with deforestation drivers as they act as a hinge channeling the threats and demands of BN collectors toward policy makers, including regional government, forest authority, police and attorney among others. As a key Project strategy to prevent deforestation in the area, during this verification period, the funding for FEPROCAMD's operations permitted the Project to achieve:

Meetings for strengthening organization capacities

Thanks to Project funding, Brazil nut concessionaires were able to organize and gather during the verification period in order to work on different points of interest to the community. Throughout the year, FEPROCAMD held several meetings (general assemblies and decentralized meetings in small towns with a high presence of BN producers) with the concessionaires to gather their needs, share information of interest and work together to carry out community development projects. This allows a higher level of participation of project partners. These meetings served to identify areas for improvement and assistance for the concessionaires. For example, one of the meetings held during the year identified a lack of knowledge regarding the forestry regulatory framework on the part of some of the concessionaires, and the need to hold workshops with the forestry authorities to train them in these aspects. As a result of this understanding, FEPROCAMD organized training workshops in collaboration with regional forestry authorities such as OSINFOR and SERFOR for concession holders.

These events also allowed for back and forth communication with concessionaires, gathering the partners' requirements in terms of: concession demarcation, project activities, carbon credit sales, processing plant, etc. In addition, ecological and conservation plans have been taken forward in different meetings between the federation and the project partners, thus providing sustainable development alternatives and addressing the drivers of deforestation.

Documents: Activities2017 file: Activities 2017.doc (summary); Document file: e.g. Letter N098-2017-FEPROCAMD-MDD-DCHP; Letter N097-2017-FEPROCAMD-MDD-LMRA; Carta N035-2017-FEPROCAMD-MDD-DCHP

Representation before authorities

In addition, FEPROCAMD's funding and consequent strengthening helped the organization to represent concessionaires before different working groups so that they can make their voices, requirements and concerns heard before the competent authorities. This representation also helps to position concessionaires as agents of sustainable development in the region. During the verification period (2017), FEPROCAMD represented the Brazil nut

concessionaires in roundtables as the Representation in the Forestry Development Technical Roundtable, created by the Ministry of Agrarian Development and Irrigation MINAGRI in January 2017 and the representation at the table of Madre de Dios authorities such as representatives of the Natural Resources Management and Environmental Management, as well as the Forestry Directorate, and the management of the IIAP (Research Institute of the Peruvian Amazon) to address the problem of superposition of Brazil nut areas.

Documents: Activities2017 file: Activities 2017.doc (summary); Document file: e.g. Officious N32-2017-GOREMAD-GRRNYGMA; Video: GOREMAD - FEPROCAMD_ Participation in the dialogue table 2017.

Training workshops for concessionaires

Thanks to the Project, various training sessions were held for concession partners on sustainable forest management and other topics of interest during the verification period. These trainings were sometimes carried out in cooperation with forestry authorities such as OSINFOR and SERFOR in order to strengthen the concession holders' knowledge and capacities in:

SERFOR (SEP 17): training on concession management regulations and measures, as well as the responsibility of timber extraction in Brazil nut concessions, taking into account the regulatory framework to be respected and the management documents that must be fully complied with to avoid incurring in infractions that could lead to possible sanctions for the concessionaire.

OSINFOR (DEC 17): training on OSINFOR's process for supervising Brazil nut concessions: notifications, supervision, regulation, formalities, sanctions, etc.

In this manner, the project sought to strengthen the concession holders in their different capacities and also to connect them with the competent authorities to maintain a close relationship in order to ensure optimal management of the concessions.

Documents: Activities 2017.doc

Technical and legal assistance for concessionaires

During the verification period, activities were carried out to assist concessionaires in terms of technical and legal support. E.g. in the demarcation of the limits of their concessions (required in the concession contract), as well as in the process for preparing the DEMA (Management Declaration) and other management documents such as the annual execution reports, necessary to carry out the formal management and harvesting of Brazil nuts.

Technical assistance was carried out to monitor forest loss and field visits to control logging activities in the concession areas. Legal assistance was also provided to concession holders to denounce to the competent authorities in the event of illegal acts such as deforestation

caused by burning, agriculture, livestock, among others, as well as illegal logging may be occurring in the concessions.

Documents: Report 01,02,03,04,05,06,07,08,09,10,11,12 WFC 2017.

Promotion of the Brazil nut sector: fair and festival

In order to promote the value of the Brazil nut sector for the sustainable development of the region and to bring together Brazil nut concessionaires in order to generate synergies/groupings to strengthen their position in the production and commercial chain of the nut, FEPROCAMD periodically organizes festivals and fairs to this end.

Documents: Activities 2017.doc; Video BN Festival 2017.

Regarding non-permanence risk, the financial viability is not a problem since the main investments for initiating the project have already been. Furthermore, as the carbon market has been recovering during the period of verification, projecting considerable growth in demand for forestry carbon credits (VCUs) in the coming years, aligned with increased global awareness of the environmental crisis.

In addition, the longevity of the Project is based on the concession contracts between each Brazil nut Concessionaire and the Peruvian State (these documents are available at BAM headquarters). These contracts commit the Brazil nut Concessionaires to ensure sustainable forest management through the elaboration of a Forest Management Plan and its proper execution; and legally protect them from any intrusion for deforestation or other activities in their areas. The concessions were granted by the state to the families for 40 years renewable, and the renewal of the contract is automatic if it is demonstrated that all the requirements established by the state have been met. In addition to the State, the project provides support to the concessionaires to ensure that their concessions are managed in accordance with the law. Therefore, it is considered that the Project does not present a major internal risk in this regard.

As previously mentioned, the 18 concessionaires that were not accounted for climate contribution (net reductions) in the period, benefited from these activities as the concessionaires that were accounted for in the verification period. The 18 concessionaires are still part of the project and receive benefits from it.

Furthermore, as for the 18 concessions that have not been accounted for in the current verification period due to the restriction of the methodology described above, this approach follows the principle of conservatism required by the standard.

Not considering concessions where legal/artisanal/selective logging was performed in the accounting of net emission reductions occurred within the period is a conservative approach due to the following:

considering only the non-accounted concessions for calculations (emission reductions) in 2017, and according to the baseline scenario, 174,328 tCO2e would have been emitted due to land use change in the mentioned area. In the with-project-scenario, the actual deforestation in those 18 concessions was zero.

	$\Delta C_{BSL,unplanned}$	ΔC_P	$\Delta C_{LK-AS,unplanned}$	$C_{REDD,t}$	Adjusted $C_{REDD,t}$	$Buffer_{UNPLANNED}$	VCU_t
Period 2017	174,328	0	5,060	169,268	161,438	17,433	144,005

During this period, the emissions caused by the deforestation in baseline within the excluded area (15,161 hectares) would have been 174,328 tCO2 (ΔCBSL,unplanned), however, the actual reported deforestation in the area was zero (ΔCP = 0). Hence, as the real avoided emissions (CREDD,t) is the result of discounting the emissions in baseline minus the reported emissions from deforestation and emissions from leakage, for this period the real avoided emissions were: 174,328 – 0 – 5,060 = 169,268 tCO2e.

Furthermore, to calculate adjusted avoided emissions uncertainty was assessed at 19.63% (Excel file: uncertainty analysis). According to methodology, real avoided emissions were discounted, multiplying its value by the result of 100%-19.63%+15%, resulting in 161,438 tCO2e (Adjusted CREDD,t),

For calculating the buffer, the difference between emissions from deforestation in the baseline scenario and emissions from real deforestation was first calculated (174,328 – 0 = 174,328) and then discounted by multiplying the value by the non-permanence risk (Document: non-permanence risk tool), resulting in 174,328 * 10% = 17,433 tCO2e.

According to methodology, the value of VCUs is the adjusted emissions reductions minus the buffer, hence the number of VCUs calculated for the period is: 161,438 – 17,433 = 144,005 tCO2e.

Year	Harvested m3	Carbon stock	t CO2-e	Added emissions	VCUs	ER not considered
2017	12,027	5,893	21,609	-	144,005	122,396

On the other hand, to consider emissions caused by degradation, the total volume of timber extracted (in cubic meters) by the concessionaires temporarily excluded for the emission reduction calculations in this period (Excel file: BAM Castañeros excluidos por periodo), was multiplied by the factor 0.49 (carbon fraction, IPCC 2006) (12,027*0.49 = 5,893) to convert it to carbon, and finally multiplied by 44/12 to convert it to tCO2e, resulting in: 5,893 * 44/12 = 21,609 tCO2e.

Additionally, after subtracting the emissions from legal logging (harvested m3) during the period from the calculated VCUs for 2017, the value of net emission reductions was 122,369 tCO2e (144,005 – 21,609 = 122,369 tCO2e).

Due to the methodological restriction, these 122,369 tCO2e net emission reductions occurring in the aforementioned area have not been accounted for in the final calculations of the project. In other words, the **122,369 tCO2e ER has not been generated in favor of the project despite having occurred as a result of the project's management, following the principle of conservatism required by the methodology.**

This demonstrates that the "exclusion" of the 18 concessions has followed a conservative approach.

In addition, external risks are also considered low since the community is engaged in the project, as the concessionaires themselves mention in their testimonies and the Peruvian political risk is low (Non-permanence Risk tool assessment).

While the natural risks are also under control and the only type rarely reported is fire, the project is already addressing that problem by a fire alert system, supported by our technical team present in the FEPROCAMD.

3.2 Deviations

3.2.1. Methodology Deviations

According to the methodology, a Participatory Rural Appraisal must be conducted every 2 years to monitor forest degradation (fires and illegal timber) within the project area. The project conducted a PRA in 2012 and then another one in 2018. For the current verification period, 2017, the 2018 PRA data has been used to maintain a conservative stance.

Although this is a deviation, the approach taken is considered to be more conservative, as this includes not only trees illegally logged during and before 2017, but also those logged between 2017-18.

In addition, the methodology suggests that the process be as follows: that the area potentially susceptible to degradation be delimited from all access points, making several transects, and thus covering at least 1% of the area susceptible to degradation to look for stumps. Then, he suggests counting the stumps and checking their importance. In contrast,

the procedure followed in 2018 was as follows: the different project partners were brought together in a meeting (focus group) to report the illegal logging that was occurring within the project area. Then, the project team together with the concessionaires went to the field to verify the occurrence of illegal logging in the total area according to what was surveyed by the concessionaires.

In terms of accuracy, the field work has considered the registration of all trees reported as illegally cut, including those that did not require the opening of new roads, but used roads already opened for BN harvesting. So, in that sense, for the sample taken, the accuracy is the highest, as it is based on measuring 100% of the reported trees.

The criteria to choose PRA locations were not related with legal logging occurrence as this is not the purpose of PRA. The non-accounted concessions (18), which presented legal/selective/artisanal levels of timber extraction, respecting the permits granted to them within their concession contract with the Peruvian state, were only excluded from the accounting of emission reductions in the period due to a methodological restriction.

It is important to mention that this is artisanal logging, carried out by the concessionaires (rural families) seldom as a legal and sustainable complementary activity within their concessions. No illegal deforestation or land use change activities have occurred or been reported in these concessions, an aspect which is evaluated by the PRA. Therefore, there is no reason to treat concessions excluded from the contribution to emissions reductions differently and consider them specifically for the PRA, since deforestation events have not occurred in those areas.

3.2.2. Project Description Deviations

During the previous monitoring period (2015-2016), the following project deviations where described:

A1. Implementation of the forest monitoring and surveillance system

Monitoring was done communally through the same Brazil nut concessionaires. When the partners detected deforestation agents within the project area, they communicated immediately directly to FEPROCAMD, who, through the technical staff and lawyers dedicated to giving assistance to concessionaires, provided them with necessary support to confront the threats, accompanying partners in the process of making the correspondent denunciations to the competent authorities and following up on them.

The project deviation does not affect the methodology, nor the additionality nor the appropriateness of the baseline scenario. It is an improvement of the original design.

A2. Training deforestation agents in alternatives and sustainable production initiatives

The Project Design (PD) contemplated that, in order to reduce the deforestation trend, the project "will seek to promote sustainable activities among the main deforestation agents in the nearby areas". According to the PD, "training will be focused on explaining to specific groups of miners, the ones who are organized and interested in reducing their negative impact on water quality and natural forests (mainly the ones who work on river sands, not within forests), which requirements they need to obtain the legal certificate."

It is important to mention that the concessions part of the project relatively close to mining activities is very small. The main area of the Madre de Dios region affected by illegal mining is outside of the project area further south, in the Pampa area and the Tambopata buffer zone.

Training workshops conducted in the previous verification period (2015-2016) were presented and reviewed. During the present verification period (2017) the project continued to prioritize training other deforestation agents which are more relevant for the project area overall e.g. agents of deforestation from agriculture, such as BN concessionaires that are not part of the project and are located in the surroundings of the PA. In order to strengthen the capacities of these concessionaires in sustainable forest management and sustainable production alternatives, the project gave permanent training sessions to both BN concessionaires project partners and non-project partners during the verification period.

These training and capacity building are aimed at ensuring that the Madre de Dios Brazil nut concessionaires (all of them) dedicate themselves to manage their concessions in a sustainable manner and in accordance with the law, instead of allowing the change of use for other types of activities, including mining activities within their concessions.

The project deviation does not affect the methodology, nor the additionality nor the appropriateness of the baseline scenario. It is an improvement of the original design.

A3. Implementation of a forest nursery

A forest nursery will be implemented as a result of the forest genetic improvement program being developed by Bosques Amazónicos. After more than 15 years of research on native species, the company has generated a genetic capital of more than 850,000 trees developed from the selection of the best specimens from multiple origins in Peru.

The genetic improvement program is being worked on in cooperation with the Technological Institute of Costa Rica (TEC), one of the leading institutions in research of native species worldwide and is being led by Dr. Olman Murillo, PhD with 35 years of experience in genetic improvement processes.

This knowledge will be transmitted to FEPROCAMD to finally reach each of the concessionaires and, in this way, enrich the forest with native species and contribute to sustainability and local development.

The project deviation does not affect the methodology, nor the additionality nor the appropriateness of the baseline scenario. It is an improvement of the original design.

A4. Enrichment by planting native species

Through the aforementioned in point A3, the selected species will be taken to the forest with the help of the FEPROCAMD.

The project deviation does not affect the methodology, nor the additionality nor the appropriateness of the baseline scenario. It is an improvement of the original design.

A8. Implementation of a Brazil nut processing plant

At the beginning of the project, one of the strategies presented was the construction of a Brazil nut processing plant for the concessionaires. At that time, studies were carried out, the plant was designed, and part of the machinery and land were purchased to implement the plant. At the same time, BAM and FEPROCAMD carried out activities to strengthen Brazil nut producers in their position as BN nut traders: institutional strengthening (11 different associations and the consolidation of the Federation of Brazil nut producers of Madre de Dios, FEPROCAMD), a fund for pre-operational capital (working capital in favor of the Project partners to finance their crops and improve their position in the market), and a joint marketing strategy were generated (facilitated an auction to jointly bid the production of all the BN partners, obtained with the aforementioned financing, to sell crops at the highest market bid).

By the time the implementation phase of the plant was reached, the reality of the Brazil nut market had changed. At the beginning there were few processing plants in Madre de Dios. Then, and after the Project Proponent implemented different activities to improve concessionaires position in the market, the market emerged, became more dynamic and new buyers entered. Thus, after a while, many processing plants were built in Madre de Dios, which not only processed the production from Peruvian forests but also from Bolivian forests and also offered transformation services for those initiatives that were interested in national and international markets. The conclusion reached in this different scenario was that an important investment of a transformation facility was no longer the best financial alternative for the project partners and that there were other immediate and priority activities needed to strengthen the project.

The project deviation does not affect the methodology, nor the additionality nor the appropriateness of the baseline scenario. It is an improvement of the original design.

For this verification period, the following project deviations were presented:

A1. Implementation of the forest monitoring and surveillance system

Monitoring was done communally through the same Brazil nut concessionaires. When the partners detected deforestation agents within the project area, they communicated immediately directly to FEPROCAMD, who, through the technical staff and lawyers dedicated to giving assistance to concessionaires, provided them with necessary support to confront the threats, accompanying partners in the process of making the correspondent denunciations to the competent authorities and following up on them.

Attached*: Activities 2017; Reports 2017; Videos 2017.*

A3. Implementation of a forest nursery

The nursery will be implemented according to the technology and capacities currently developed BAM's genetic improvement program: in its more than 15 years of research working with native species BAM has accumulated a genetic capital made up of more than 850,000 trees developed from the selection of the best specimens from multiple provenances in Peru. Within this universe, 10 best specimens of each species were selected for the genetic improvement program.

To improve forest capacity, BAM have initiated a cutting-edge program in cooperation with the Instituto Tecnológico de Costa Rica (TEC), one of the leading institutions in research of native species worldwide and is being led by Dr. Olman Murillo, PhD with 35 years of experience in genetic improvement processes. This program entails reproducing the highest-quality individual trees: taller, thicker, healthier and straighter trees that grow efficiently.

This knowledge will be transmitted to FEPROCAMD to finally reach each of the concessionaires and, in this way, enrich the forest with native species and contribute to sustainability and local development.

Attached: *Genetic improvement program proposal BAM*

A4. Enrichment by planting native species

Through the aforementioned in point A3, the selected species will be taken to the forest with the help of the FEPROCAMD.

A8. Implementation of a Brazil nut processing plant

At the beginning of the project, one of the strategies presented was the construction of a Brazil nut processing plant for the concessionaires. At that time, studies were carried out, the plant was designed, and part of the machinery and land were purchased to implement the plant. At the same time, BAM and FEPROCAMD carried out activities to strengthen Brazil nut producers in their position as BN nut traders:

- **Institutional strengthening (11 different associations and the consolidation of the FEPROCAMD):** which gave the Brazil nut producers a space in the country's forestry and agricultural sector. Formalizing and strengthening their organization has allowed them to have a position in front of forest authorities, regional authorities, inter-institutional roundtables, among others.
- **Fund for pre-operational capital (working capital in favor of the Project partners to finance their crops and improve their position in the market):** it was identified that many of the existing companies (BN traders) were taking advantage of the need for working capital at the beginning of each harvesting season (known as "Zafra"). For this reason, BAM provided funding to the project partners as working capital for enabling them to collect the Brazil nut fruit before selling it, allowing them not to depend on companies or intermediates that offered unfair conditions for future harvests.
- **Joint marketing strategy:** as concessionaires were already grouped together, BAM and FEPROCAMD facilitated an auction to jointly bid the production of concessionaires at the highest market bid, generating a better market position for them.

By leaving this dependency and being able to sell to the highest offer, as well as by being able to group crops of different concessionaires they strengthen their competitiveness in the market.

By the time the implementation phase of the plant was reached, the reality of the Brazil nut market had changed. At the beginning there were few processing plants in Madre de Dios. Then, and after the Project Proponent implemented different activities to improve concessionaires position in the market, the market emerged, became more dynamic and new buyers entered. Thus, after a while, many processing plants were built in Madre de Dios, which not only processed the production from Peruvian forests but also from Bolivian forests and also offered transformation services for those initiatives that were interested in national and international markets. In that different scenario and considering the limited resources from the sales of carbon credits generated in the period, an important investment of a transformation facility was no longer the best financial alternative for the project partners and that there were other immediate and priority activities needed to strengthen the project.

As a project, REDD Brazil nut concessions is always looking at the possibility of generating added value for its members and for this reason the project have been working, under the leadership of REDD+ Brazil nut concessions Projects area and in coordination with FEPROCAMD, on solutions that allow an even better market situation for project members: direct export, cooperatives, new technologies, among others.

Suggestion box

In addition, regarding the implementation of the System of Complaints and Conflicts, according to the flowchart presented in the PDD, the mailbox should have been installed in the provincial municipalities of Tahuamanu and Tambopata, and after receiving the signed complaint should be sent for communication to the project manager for internal evaluation. However, in practice it was not feasible to install it in each municipality because they are governmental entities and the Project cannot use these facilities. So, it was decided to install it in the Federation, because it is the authority that brings together the largest number of Brazil nut concessionaires.

3.3 Grouped Projects

For this 2017 verification period, no new BN concessionaires have been included as project partners.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	Map of Forest / Non-forest Coverage in the Reference region.
Data unit	n/a
Description	Map that shows the stratification and location of forest and non-forest areas in the Reference Region 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 the adequate resolution and they are an available tool to all public.
Purpose of Data	Through the accuracy assessment. (QA/QC)
Comments	The stratification is based on the Ecological and Economic Zoning of the Region of Madre de Dios, that was developed

	by the IIAP in 2009 and it is used by the regional government 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 / Parameter	Map of Forest Coverage in the Project Area.
Data unit	n/a
Description	Map that shows the stratification and location of forest areas in the Project area 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 the adequate resolution and they are an available tool to all public.
Purpose of Data	Through the accuracy assessment. (QA/QC)
Comments	The stratification is based on the Ecological and Economic Zoning of the Region of Madre de Dios, that was developed by the IIAP in 2009 and it is used by the regional government 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 / Parameter	Map of Forest Coverage in the Leakage Belt.
Data unit	n/a
Description	Map that shows the stratification and location of forest in the Leakage belt 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 the adequate resolution and they are an available tool to all public.

Purpose of Data	Through the accuracy assessment. (QA/QC)
Comments	The stratification is based on the Ecological and Economic Zoning of the Region of Madre de Dios, that was developed by the IIAP in 2009 and it is used by the regional government 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 / Parameter	Deforested Area in the Project Area
Data unit	Ha
Description	Total deforested area during the term of reference (until 2009).
Source of data	Valued taken from the Landsat 7 satellite images, used by the Deforestation Model of Madre de Dios.
Value applied	87,805.65
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.
Comments	n/a

Data / Parameter	Carbon stock of the sources 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 stock estimation carried out in Madre de Dios: - Carbon Stock – Belgium Community (Madre de Dios). - Forest concession of forest stocks MADERYJA and MADERACRE. Carbon stock - REDD Project Bahuaja –Sonene.
Value applied	BTI 457.54 tCO_2 / ha PA 943.09 tCO_2/ ha BPT 506.72 tCO_2/ ha BT 1015.95 tCO_2/ ha P 761.93 tCO_2/ ha BCB 1040 tCO_2/ ha

	BPCB 496.57 tCO_2/ ha
Justification of choice of data or description of measurement methods and procedures applied	Inventories have been carried out in nearby areas and with forest stratum similar to the project in the region of Madre de Dios. The next steps were followed: - Parcels were built in the different stratum. - DBH (Diameter Breast Height) and HT (Total Height) 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.
Comments	The exact data for each stratum is found in module CP-AB.

Data / 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	54 % Farming 4 % Farmland 40 % Pasture 2 % Infrastructure
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.
Comments	n/a

Data / 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 burning and agriculture residues.
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 has been taken from official sources[6].
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).
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.
Comments	n/a

4.2 Data and Parameters Monitored

DATA AND PARAMETERS FOR BASELINE RENEWAL

Data / 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.
Description of measurement methods and procedures to be applied	The Landsat images have an adequate resolution and they are an available tool to all public.

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

Frequency of monitoring/recording	At minimum 3 times over the 10 years leading up to baseline renewal.
Value monitored	
Monitoring equipment	
QA/QC procedures to be applied	Through the accuracy assessment.
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 / 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 satellite images.
Description of measurement methods and procedures to be applied	The Landsat images have an adequate resolution and they are an available tool to all public.
Frequency of monitoring/recording	At minimum every 10 years prior to baseline renewal.
Value monitored	
Monitoring equipment	
QA/QC procedures to be applied	Through the accuracy assessment.

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 / 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 satellite images.
Description of measurement methods and procedures to be applied	The Landsat images have an adequate resolution and they are an available tool to all public.
Frequency of monitoring/recording	At minimum every 10 years prior to baseline renewal.
Value monitored	
Monitoring equipment	
QA/QC procedures to be applied	Through the accuracy assessment.
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 are used as access roads (rivers, bridges, Interoceanic Highway, alternate roads).

Data / Parameter	A_i
Data unit	Ha
Description	Total area of each stratum *i*.
Source of data	Landsat satellite images.
Frequency of monitoring/recording	Frequency at a minimum every 10 years prior to baseline renewal.
Value monitored	
Monitoring equipment	
Comments	Ex-ante it is assumed that strata area will remain constant.

Data / Parameter	$A_{RRD,\ unplanned,\ hrp}$
Data unit	Ha
Description	Total deforested area during the term of reference (until 2009) in the RRD.
Source of data	Valued taken from the Landsat 7 satellite images, used by the Deforestation Model of Madre de Dios.
Description of measurement methods and procedures to be applied	The Landsat images have the adequate resolution and they are a free and available tool to all public.
Value monitored	-
Monitoring equipment	
Comments	Monitored for the purpose of baseline revisions.

Data / Parameter	C*F*

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
Description of measurement methods and procedures to be applied	The value chosen is 0.49 t C t-1 d.m. for Tropical Forests.
Value monitored	-
Monitoring equipment	
Comments	n/a

Data / 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.
Description of measurement methods and procedures to be applied	The value chosen is 0.49 t C t-1 d.m. for Tropical Forests.
Value monitored	-
Monitoring equipment	
Comments	n/a

Data / 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.
Description of measurement methods and procedures to be 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).
Value monitored	
Monitoring equipment	
Comments	n/a

Data / 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.
Description of measurement methods and procedures to be 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).
Value monitored	-
Monitoring equipment	
Comments	n/a

Data / 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.
Description of measurement methods and procedures to be 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.
Value monitored	
Monitoring equipment	
Comments	The validation of the equations will be performed with either of both methods presented in VMD0015 module: - Limited Measurements - Destructive sampling

Data / 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	BTI 398.54 T CO_2 / ha

	PA 911.8 T CO_2/ ha BPT 477.1 T CO_2/ ha BT 945.1 T CO_2/ ha P 726.9 T CO_2/ ha BCB 1010.7 T CO_2/ ha BPCB 475.2 T CO_2/ ha
Description of measurement methods and procedures to be applied	- The inventory was made in year 2011 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.
Value monitored	908.10
Monitoring equipment	
Comments	The exact data for each stratum is found in module CP-AB.

Data / 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	54 % Farming 4 % Farmland 40 % Pasture 2 % Infrastructure
Description of measurement methods and procedures to be 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.
Value monitored	
Monitoring equipment	
Comments	n/a

Data / 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[7].
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).
Description of measurement methods and procedures to be applied	The percentage of 55% is moderate. Some experts consulted consider that 100% of hectares that are torn down are burnt.
Value monitored	960.94
Monitoring equipment	
Comments	n/a

DATA AND PARAMETERS MONITORED FOR VERIFICATION

Data Unit / Parameter:	Project Forest Cover Monitoring Map.
Data unit:	ha
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.

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Source of data:	Satellite images and field verification of deforested areas if any (GPS).
Description of measurement methods and procedures to be applied:	By using satellite images covering the Project Area it would be determined if there are any variations in the forest stratum identified in the project area. In case there are deforested areas it would be verified in the field and confirmed by using GPS.
Frequency of monitoring / recording:	Every 5 years with images. Verification of deforested areas will be permanent in the field by the surveillance carried out by the monitoring equipment.
Value monitored	314,403.13
Monitoring equipment	*Software GIS, available satellite images, GPS, professional monitoring equipment in the field.*
QA/QC procedures to be applied:	*Permanent verification of the area of the project surfaces.*
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:	By using satellite images covering the Leakage Belt it would be determined if there are any variations in the forest stratum identified in the Leakage Belt. In case there are deforested areas it would be verified in field and confirmed by using GPS.
Frequency of monitoring/recording:	Every 5 years with images.
Value monitored:	706,555.52

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.*
Any comment:	*Stratification is the same as the one used at the beginning of the term.*

Data Unit / Parameter:	Degradation PRA Results
Data unit:	t CO2
Description:	The PRA will be executed from interviews and/or surveys to local actors with the purpose of identifying the existence of depredation potential within the area of the project due to: ● Extraction of firewood. ● Illegal logging If the >= 10% of the surveys indicate that there is a risk of depredation then the procedures to verify and estimate the depredation should be executed. An additional result of the PRA would be the penetration distance that should be applied to calculate the area with depredation potential (buffer area).
Source of data:	PRA 2018
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 monitored:	6,135. Not significant.
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.
Any comment:	

Project Partner	Contract	Sector
Pedro Quispe Quispe	17-TAM/C-OPB-J-083-03	Planchon

	Francisco Chavez Chura	17-TAM/C-OPB-A-147-04	1ero Mayo
	Cecilia Cacuna Racua	17-TAM/C-OPB-J-152-03	Río Manuripe - Colpac
	Oscar Sahuarico Begazo	17-TAH/C-OPB-J-122-04	Alerta
	Eleuterio Jurado Frisancho	17-TAM/C-OPB-A-209-04	Quebrada Galindo
	Abigail Sanz Salinas	17-TAM/C-OPB-A-112-04	Río Pariamanu
	Manuel Quispe Gutiérrez	17-TAM/C-OPB-J-025-03	Planchon
	Mateo Vargas Dueñas	17-TAM/C-OPB-A-125-04	Botijón
	Mirian Marice Herbozo Reategui	17-TAH/C-OPB-J-095-04	La Novia
	Santiago Taipe Chuima	17-TAH/C-OPB-J-023-04	Alerta

Data Unit / Parameter:	Results of Limited Degradation Survey
Data unit:	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 monitored:	17
Monitoring equipment:	GPS, compass, tape line.
QA/QC procedures to be applied:	Trained staff for field measurement.
Any comment:	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 monitored:	22.86
Monitoring equipment:	GPS
QA/QC procedures to be applied:	n/a
Any comment:	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:	Every 5 years with satellite images. Constant monitoring in the field.
Value monitored:	

	<table><tr><th>STRATUM</th><th>HA</th></tr><tr><td>Bosque de terraza inundable</td><td>0</td></tr><tr><td>Pantano arboreo</td><td>0</td></tr><tr><td>Bosque con paca de terrazas altas y medias</td><td>0</td></tr><tr><td>Bosque de terraza</td><td>7.54</td></tr><tr><td>Pacal</td><td>0</td></tr><tr><td>Bosque de colina baja</td><td>12.11</td></tr><tr><td>Bosque con paca de colinas bajas</td><td>3.21</td></tr><tr><td>TOTAL</td><td>22.86</td></tr></table>
Monitoring equipment:	*Software GIS, available satellite images, verification in field with GPS and professional equipment.*
QA/QC procedures to be applied:	n/a
Any comment:	If there is a change in the land use, the new use and GHG emission (CH_4 or N_2O) will be registered by arboreal and agricultural biomass burning, and incorporation of nitrogen. This will be registered and recorded.

Data Unit / Parameter:	$A_{DefLB,i,t}$
Data unit:	Ha.
Description:	Deforested area in the Leakage belt 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:	Every 5 years with satellite images. Constant monitoring in field.
Value monitored:	<table><tr><th>Stratum</th><th>Ha</th></tr></table>

	Bosque de terraza inundable	13.84
	Pantano arboreo	20.39
	Bosque con paca de terrazas altas y medias	0
	Bosque de terraza	107.57
	Pacal	0
	Bosque de colina baja	7.22
	Bosque con paca de colinas bajas	12.14
	TOTAL	161.15
Monitoring equipment:	*Software GIS, available satellite images, verification in field with GPS and professional equipment.*	
QA/QC procedures to be applied:	n/a	
Any comment:	*Deforestation shall be confirmed at least every five years in the Leakage belt and verified with what is determined in baseline in order to assess if there is any leakage or not caused by the project.*	

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 trothing.
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 monitored:	6,740
Monitoring equipment:	GIS software

QA/QC procedures to be applied:	n/a
Any comment:	There is no evidence of degraded 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.
Justification of choice of data or description of measurement methods and procedures applied:	A systematic sampling to ensure all decks within area logged are identified and a conservative estimate of area produced.
Value monitored	0
Monitoring equipment	
QA/QC procedures to be applied:	At least every 5 years.
Any comment:	Ex-ante estimations will be based on field measurements once FSC is implemented.

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.
Justification of choice of data or description of measurement methods and procedures applied:	Minimum monitoring unit equal to a minimum of 11 Landsat pixels or one hectare.
Value monitored	0
Monitoring equipment	

QA/QC procedures to be applied:	At least every 5 years.
Any comment:	Ex ante estimations of emissions from natural disturbances will be based on historic incidence of such event in the Project region.

Data Unit / Parameter:	$A_{ROAD, l, t}$
Data unit:	Ha
Used in equations:	17
Description:	Area of roads in stratum *i* at time *t*.
Source of data:	Field measurements.
Justification of choice of data or description of measurement methods and procedures applied:	The area of roads is based on the length of roads times the average width of roads. Both length and width of roads will be estimated through systematic samplings, with sufficient number of measurements, and a precision equal or less than 15% of the mean at 95% confidence interval.
Value monitored	0
Monitoring equipment	
QA/QC procedures to be applied:	At least every 5 years.
Any comment:	Ex-ante estimations will be based on field measurements once FSC is implemented.

Data Unit / Parameter:	$A_{RRL, forest, t}$
Data unit:	Ha
Used in equations:	n/a
Description:	Remaining area of forest in RRL.
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:	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 monitored	1,572,524.07
Monitoring equipment	
QA/QC procedures to be applied:	n/a
Any comment:	There is no evidence of degraded areas or parcels ex-ante within the project area.

Data Unit / Parameter:	AP_i
Data unit:	Ha.
Used in equations:	8
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 monitored:	566.89
Monitoring equipment:	GPS, field equipment: tape line, compass. And field staff.
QA/QC procedures to be applied:	Trained staff for field measurement.
Any comment:	There is no evidence of depredated areas or parcels ex-ante within the project area.

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 monitored:	*309.85*
Monitoring equipment:	*GPS, field equipment: tape line, compass. And field staff.*
QA/QC procedures to be applied:	n/a
Calculation method:	Through an allometric equation, using the DBH as one of its variables.
Any comment:	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.
Any comment:	n/a
Frequency of monitoring/recording:	Every 5 years.
Value monitored:	0
Monitoring equipment:	

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.
Value monitored:	0
Monitoring equipment:	
Any comment:	The root-to-shoot ratio 0.24 is used (same used in baseline carbon stock calculations).
Frequency of monitoring/recording:	Every 5 years.

Data Unit / Parameter:	F_{LU}
Data unit:	Dimensionless
Description:	Land use factor before or after conversion.
Source of data:	Stock Change Factors are provided in Tables 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4.
Description of measurement methods and procedures to be applied:	This parameter did not was applied because the concessionaires who was logging were temporarily excluded of the project (for this monitoring period).

Value monitored:	0
Monitoring equipment:	
Any comment:	n/a

Data Unit / Parameter:	F_{MG}
Data unit:	Dimensionless
Description:	Management factor before or after conversion.
Source of data:	Stock Change Factors are provided in Table 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4.
Description of measurement methods and procedures to be applied:	This parameter did not was applied because the concessionaires who was logging were temporarily excluded of the project (for this monitoring period).
Value monitored:	0
Monitoring equipment:	
Any comment:	n/a

Data Unit / Parameter:	F_I
Data unit:	Dimensionless
Description:	Input factor before or after conversion.
Source of data:	Stock Change Factors are provided in Table 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4.
Description of measurement methods and procedures to be applied:	This parameter did not was applied because the concessionaires who was logging were temporarily excluded of the project (for this monitoring period).
Value monitored:	0
Monitoring equipment:	
Any comment:	n/a

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.
Value monitored:	0
Monitoring equipment:	
Any comment:	n/a
Frequency of monitoring/recording:	Every 5 years.

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:	This parameter did not was applied because the concessionaires who was logging were temporarily excluded of the project (for this monitoring period).
Value monitored	0
Monitoring equipment:	
Any comment:	n/a
Frequency of monitoring/recording:	Every 5 years.

Data Unit / Parameter:	$V_{EXT,j,z,i,t}$
Data unit:	m^3

Description:	Volume of timber extracted of species j for logging stratum z, in stratum i at time t.
Source of data:	Records of wood extracted.
Description of measurement methods and procedures to be applied:	This parameter did not was applied because the concessionaires who was logging were temporarily excluded of the project (for this monitoring period).
Value monitored:	0
Monitoring equipment:	
Any comment:	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:	This parameter did not was applied because the concessionaires who was logging were temporarily excluded of the project (for this monitoring period).
Value monitored:	0
Monitoring equipment:	
Any comment:	n/a

Data Unit / Parameter:	Sequestered carbon in Forest Enrichment areas in forest concessions.
Data unit:	T CO_2 / year
Description:	Sequestered carbon in trees due to Forest Enrichment in concessions (Project Area).
Source of data:	Growth Register in Permanent Parcels. Growth in DBH and growth in height.
Description of measurement methods and procedures to be applied:	Annual entries of reforested species will be kept on enrichment parcels with the purpose to know which is the annual increase volume and then take it to T CO_2/ha (through allometric equations or other indirect calculation).

Frequency of monitoring/recording:	Annual.
Value monitored:	Measured in field.
Monitoring equipment:	Tape line, GPS.
QA/QC procedures to be applied:	n/a
Calculation method:	Allometric equations or any other indirect validated calculation.
Any comment:	n/a

4.3 Monitoring Plan

The purpose of the monitoring is to have all information necessary to assess the development of the Project activities, possible deviations between what was estimated and what is real, and finally, the calculation (ex-post) of net GHG reductions attributed to the project and the leakage occurred.

This document presents the parameters evaluated to be used in the calculation ex-ante, and parameters to be evaluated during the life of the project, especially on each Monitoring and Evaluation of the Baseline.

The Monitoring will be carried out a maximum of every 5 years, and the Revision of Baseline every 10 years. During each period all data will be gathered according to the occurrence of each programmed activity (PRA, training courses, etc.) and of those that will be avoided (fires, degradation, use of fertilizers, etc.).

The gathering of information will be carried out directly in field, and indirectly by using satellite images, as well as representative studies of the area and official information if necessary.

The Monitoring has been carried out following the guidelines of module M-MON (Approved VCS Module VMD0015).

It is important to mention that 18 concessionaires were temporarily excluded from calculating climate contribution for this monitoring period as indicated in this document.

STEP 1. Selection and analyses of sources of land-use and land-cover (LU/LC) change data

The remotely sensed spatial data to be used for monitoring periods and baseline renewal is Landsat images from sensors 5TM and 7TM, which have a resolution of 30 x30 m.

The selection and acquisition of the most adequate satellite images will be accomplished by:

Search of images in the web sites of National Institute for Space Research from Brazil (INPE) and USGS Global Visualization Viewer.

Selection of 5TM and Landsat 7TM satellite images with less than 10% cloud cover over the desired areas. This will be achieved by comparing quick looks and their %CC reported for each quadrant, shown in both websites. If not possible, then images with the lowest overall percentage of cloud cover will be selected and a mosaic constructed.

As stated in the methodology, if a new source with higher resolution becomes available or if the used source is no longer available, then a change of source will only occur if the new data complies with the requirement set in the module.

The data collected and analyzed will cover:

- For the monitoring period: The Project Area and Leakage Belt, in the year of verification.
- For Baseline renewal: The entire RRD, in the same year of baseline renewal or no further in the past than the year prior to it.

STEP 2. Interpretation and analysis

Monitoring deforestation

For the estimation of net carbon stock change as a result of deforestation, the following criteria will be considered:

- The forest strata will remain the same in the entire baseline period.
- The selected pools for the baseline estimation will be maintained in the entire baseline period. All carbon pools excluded are counted as zero.
- The carbon stocks in the forest strata and the post-deforestation land-uses will be maintained across the baseline.

$\Delta C_{p,DefPA,i,t} = \sum(A_{DefPA,u,i,t} * \Delta C_{pools,P,Def,u,i,t})$ = 20,208.37 t CO_2

Details in the attached: Cp Estimations in Castañeros REDD Project 3rd monitoring report

$\Delta C_{p,DefLB,i,t} = \sum(A_{DefLB,u,i,t} * \Delta C_{pools,P,Def,u,i,t})$ = 134,293.26 t CO_2

Details in the attached: Leakage Estimations in BAM 2017

Where: $\Delta C_{pools,P,Def,u,i,t} = C_{BSL,i} - C_{P,post,i} - C_{WP,i}$

Monitoring degradation

The Project Area will be monitored to account any emissions due to degradation activities, which are represented by degradation through extraction of trees for selective logging from forest management areas possessing FSC certificate.

$$\Delta C_{P,Deg,i,t} = \Delta C_{P,DegW,i,t} + \Delta C_{P,SelLog,i,t}$$

Degradation through extraction of trees for illegal timber or fuelwood and charcoal

Step 1. Delineation of area that is potentially subject to degradation:

The roads for illegal logging can be found in the a*ttached: illegal logging roads* and have the following lengths: 1,616 m, 568 m, 1,640 m and 205 m. and following the methodology (width by length) we find the table in the attached "Arboles ilegales", the buffer is 566.89.

The buffer is obtained by multiplying the illegal road (interpreted as degradation penetration) by a similar value (as the methodology states that a width similar to length). So, it gives 566.89 ha.

Step 2. After that, the methodology requires to sample plots across degradation area covering at least 1% of buffer access, it means, at least 5.66 ha. The field work has made 9 transects, each one from 1 hectare, so the sampled area covers 9 ha, which is 1.59% of buffer access, meeting the requirement of the methodology.

Step 3: The methodology states that in the case of the emissions from degradation is significant, an additional sampling must be done and they must be discounted from the net VCUS. The methodology establishes to use the T-SIG tool to determine significance. We have used the "Tool for testing significance of GHG emissions in A/R CDM project activities" (Version 01)" for this analysis.

$$RC_{E_i} = \frac{E_i}{\sum_{i=1}^{I} E_i}$$

So, first we need to determine the emissions from degradation to add to other sources of emissions and determine its significance.

Step 3. Following the indications of M-MON, we have used the equations approved during validation for estimating the carbon pool in trees (CP-AB) in the baseline scenario.

TREES SPECIES EQUATION

For the calculation of biomass of tree species, the allometric equation *Biomass-Diameter Regression (Model II)* proposed in Chavé et al (2005)[5] for *Moist Forest*[6] was applied. This equation was validated by the author using datasets from previous studies in several tropical countries.

B = ρ*exp(-1.499 + 2.148*Ln (DBH) + 0.207*(Ln (DBH)) ^2 – 0.0281*(Ln (DBH)) ^3) in Kg (dry)

Where,
P = Density by species (gr/cm3)
DBH = Diameter at breast height, (cm)

The 17 trees harvested illegally in the 4 concessions, with Chave equation, represent a total emission of 309.85 tCO2e

Step 4: Then, if degradation is occurring, we have to apply the equation (8).

$$\Delta C_{P,DegW,i,t} = A_{DegW,i} * \frac{C_{DegW,i,t}}{AP_i}$$

Where $A_{DegW,I}$ is total degraded area and AP is sample plots area.

So, the equation determines that $\Delta C_{P,DegW,I,t}$ is:

309.85 * (233,761.20 * 40%/4,298.76) = 6,740 tCO2e.

Step 5: Finally, applying the T-SIG, we obtain the following results:

$\Delta C_{P,DegW,l,t}$ + $\Delta C_{P,Def}$ as 6,740 + 321,220.87 = 327,960.51 tCO2e, where $\Delta C_{P,DegW,l,t}$ is 2.06% and, according to T-SIG, it is not significant and must be discarded and not monitored in more detail.

Monitoring degradation due to selective logging of forest management areas possessing a FSC certificate

On the other hand, degradation and thus reduction of carbon stocks resulting from the selective logging in areas holding a FSC certificate is expected to happen, as being one of the proposed activities, and will be included in the ex-post estimations. It will be monitored as early as it is approved and implemented.

For these reasons, the ex-ante with-project case estimation is set to zero.
$\Delta C_{P,Deg,i,t} = 0$

Monitoring areas undergoing natural disturbance

Natural disturbances such as forest fires, pests, decease outbreaks and extreme weather (flooding) do not have significant presence in the Project area according to INDECI, therefore they are not estimated.

Monitoring areas undergoing carbon stock enhancement

No carbon stock enhancement is occurring in the baseline and the with-project scenario. This activity won't be monitored, in order to be conservative.

$C_{P,Enh,i,t} = 0$

Monitoring project emissions

Where significant, non-CO_2 gas greenhouse emissions occurring within the project boundary must be evaluated.

$$GHG_{P,E,i,t} = E_{FC,i,t} + E_{BiomassBurn,i,t} + N_2O_{direct\text{-}N,i,t}$$

N_2O and CH_4 emissions from agriculture and forest biomass burning

To estimate ex-ante biomass burnt in forests, it was calculated (according to MINAM, 2009) that 55% of the deforested forest is burnt. This index will be the same for the entire baseline period.

For the case of agriculture biomass burnt, it has been determined based on traditional management of farmland that stubble burning is made every year in all parcels at the end of the harvest period. In the calculations ex-ante, Corn is used as farmland reference because is the most representative crop of the area. However, for real estimations it can be taken as reference the crop that is actually in the parcel when known or the one with major representation in the area. This reference crop should be corroborated for baseline renewal.

Table 5. GHG Emissions for biomass burning in Forest Strata:

Strata	*Aburn,i,t* (ha)	B (t d.m./ha)	e*Biomass Burn CH4* *(T CO2)*	e*Biomass Burn N2O* *(T CO2)*	Total e*Biomass Burn* in Forest *(T CO2)*
Flooded terraces forest (1)	-	174.99	-	-	**-**
Swamp trees (2)	-	417.09	-	-	**-**
High and mid terrace with bamboo (paca) forest (3)	-	224.27	-	-	**-**
Terraces forest (4)	7.54	423.83	228.17	99.06	**327.23**
Bamboos (Pacal) (5)	-	338.44	-	-	**-**
Low hills forest (6)	12.11	458.03	396.01	171.94	**567.95**
Low hills with bamboo (paca) forest (7)	3.21	203.63	46.73	20.29	**67.02**
TOTAL	22.86		**670.91**	**291.29**	**962.20**

STEP 3. Documentation

For each monitoring period, the procedures detailed in steps 1 and 2 above will be documented providing the following information:

a) Data sources and pre-processing
Type, resolution, source and date of acquisition of the remotely sensed data that will be used; description of corrections performed; projection and parameters used to geo-reference the images; error estimate of geometric correction; software used and software version; etc.

b) Data interpretation
Definition of land classes and categories; standardized description of each category; all information corresponding to the interpretation process already described in step 2.

c) Accuracy assessment
Accuracy assessment technique used; coordinates and description of the ground-truth data collected for the assessment; and final classification accuracy assessment.

d) Changes in Data sources and pre-processing / Data classification
If changes will be made to the original data or use of data in next periods:
- Each change and its justification shall be explained and recorded; and
- When data from new satellites are used, the documentation must follow a) to c) above.

Organization and Responsibilities

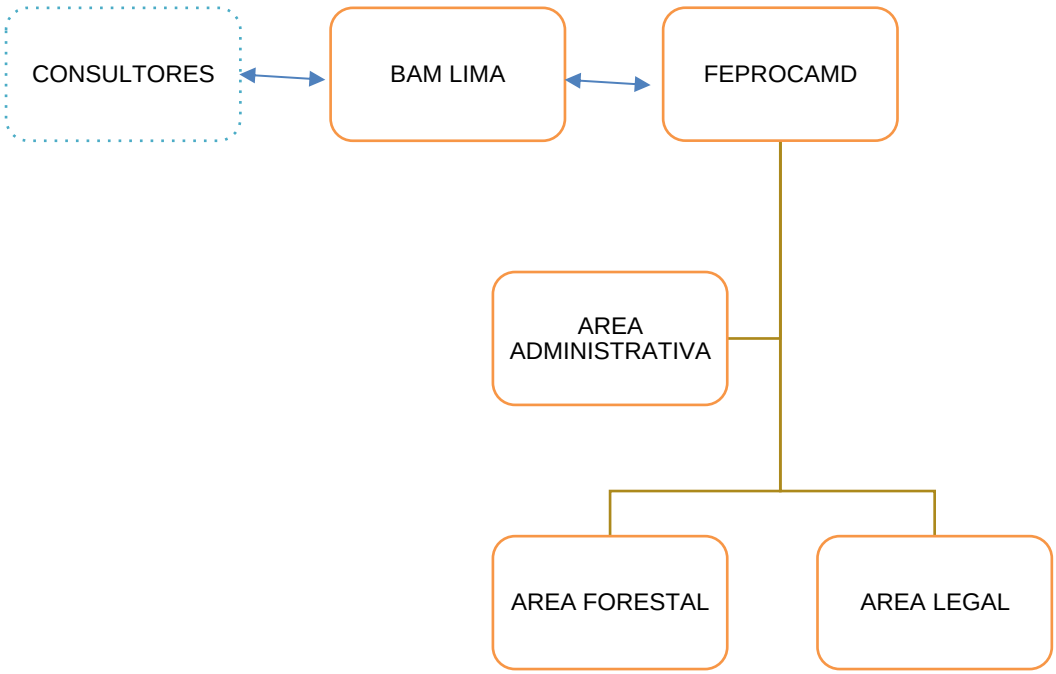
The design and execution of the Project and its Monitoring is handled by a multidisciplinary technical team, duly qualified and with experience in Project development.

In addition, it is supported by recognized institutions related to the Amazon investigation as the IIAP and AIDER. Specialists in forest, social, and economic areas lead the team, who are in charge of defining the objectives and provide guidelines to the correct development of the activities.

During previous monitoring periods the BAM's team was active and was in charge of the implementation, with the head of monitoring and a team of specialists in charge of gathering all parameter information that will be monitored to evaluate the performance of the project.

For this verification period 2017, the regional management in Madre de Dios-- BAM is deactivated to allow FEPROCAMD to take responsibility for the technical-- legal area of the project. In addition, a team of consultants was hired to prepare the monitoring report based on the information provided by FEPROCAMD, leaving the organizational structure as follows.

Figure 1: Organizational structure of the team for this monitoring period.



Information Management

To minimize the impact of changes in BAM staff members, all the information from validation and each verification, including the modules and calculation spreadsheets that are not accessible in VERRA webpage, will be uploaded in the cloud. They explain clearly the followed steps, according to the methodology.

There will also be forms for each parameter that will allow documenting them clearly and consistently through time.

Even though they are standard forms, additional information considered as relevant by the field operator can be included.

Furthermore, unique procedures will be fixed for the management, processing and archive of the gathered information with the purpose to secure information and availability to any subsequent revision.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Estimation of carbon stock and changes per stratum

Carbon stocks of the forest

The equation used to calculate the carbon stocks in the forest strata is:

$$C_{BSL} = C_{AB\_tree,i} + C_{BB\_tree,i} + C_{AB\_non\text{-}tree,i} + C_{BB\_non\text{-}tree,i} + C_{DW,i} + C_{LI,i} + C_{SOC,i}$$

Where:

C_{BSL}	Carbon stock in all carbon pools in forest stratum *i*; t CO_2-e ha^{-1}
$C_{AB\_tree,i}$	Carbon stock in aboveground tree biomass in forest stratum *i*; t CO_2-e ha^{-1}
$C_{BB\_tree,i}$	Carbon stock in belowground tree biomass in forest stratum *i*; t CO_2-e ha^{-1}
$C_{AB\_non\text{-}tree,i}$	Carbon stock in aboveground non-tree biomass in forest stratum *i*; t CO_2-e ha^{-1}
$C_{BB\_non\text{-}tree,i}$	Carbon stock in belowground non-tree biomass in forest stratum *i*; t CO_2-e ha^{-1}
$C_{DW,i}$	Carbon stock in dead wood in stratum *i*; t CO_2-e ha^{-1}
$C_{LI,i}$	Carbon stock in litter in the forest stratum *i*; t CO_2-e ha^{-1}
$C_{SOC,i}$	Carbon stock in soil organic carbon in the forest stratum *i*; t CO_2-e ha^{-1}
i	1,2,3,…. *M* strata

Table 6. Carbon stocks for each stratum are presented in following table.

n°	***ID***	**Name**	***Above Ground*** t CO_2-e ha^{-1}	***Below Ground*** t CO_2-e ha^{-1}	***Cstock*** t CO_2-e ha^{-1}
001	BTI	Flooded terraces forest	314.39	75.45	389.84
002	PA	Swamp tres	749.38	179.85	929.23
003	BPT	High and mid terrace with bamboo (paca) forest	402.93	96.70	499.63
004	BT	Terraces forest	761.48	182.76	944.24
005	P	Bamboos (Pacal)	608.06	145.93	753.99
006	BCB	Low hills forest	822.93	197.50	1020.43
007	BPCB	Low hills with bamboo (paca) forest	365.85	87.80	453.65

The carbon stocks have been obtained from the forest inventory applied to the project area strata during validation period.

Estimation of post-deforestation carbon stocks

To establish the carbon stocks for each post-deforestation land use, information from several studies[8] made in the Peruvian Amazon was gathered and compared. We also checked the information provided in the Agricultural National Census of 2007, and based on the cultivated area of each crop (table 33), we established that the main crops of the region were Rice and Corn (preferred for having more carbon stock), and that the most common pasture was *Brachiaria decumbens.*

The following values were determined for each land use class:

Table 7. Carbon stocks per activity.

n°	*ID*	Name	*Above Ground* t CO_2-e ha^{-1}	*Below Ground* t CO_2-e ha^{-1}	*Cstock* t CO_2-e ha^{-1}
008	DP	Deforestation for Pastures	15.11	3.52	18.63
009	DF	Deforestation for Farming*	28.82	2.93	31.75
010	DI	Deforestation for Infrastructure	0.00	0.00	0.00
011	DA	Deforestation for Agriculture (Corn)	28.82	2.93	31.75
012	DM	Deforestation for Illegal Mining	0.00	0.00	0.00

Estimation of the sum of baseline carbon stock changes

Based on land use change from initial forest strata to final post-deforestation land uses, and considering the changes in respective stocks, we estimated the total change in carbon stocks for the reference period of the Project Area and Leakage Belt. In both cases, no timber harvest is carried out in the process of deforestation and therefore C_{wp} was not accounted.

The equations used for that end are:

$$\Delta C_{TOT} = C_{BSL} -- C_{post} -- C_{wp}$$
$$C_{BSL} = \sum\sum ((C_{BSL,i)} * A_{unplanned,i,t)}$$
$$C_{post} = \sum\sum ((C_{post,i)} * A_{unplanned,i,t)}$$

Where:

ΔC_{TOT}	Sum of the baseline carbon stock change in all pools up to time *t**; t CO_2-e
C_{BSL}	Total forest carbon stock in areas deforested; t CO_2-e
C_{post}	Total post-deforestation carbon stock in areas deforested; t CO_2-e
C_{wp}	Total carbon stock in harvested wood products; t CO_2-e

8

$C_{BSL,i}$	Carbon stock in all carbon pools in the forest stratum *i*; t CO_2-e
$A_{unplanned,i,t}$	Area of unplanned deforestation in forest stratum *i* at time *t*; ha
$C_{post,i}$	Carbon stock in all carbon pools in the post-deforestation stratum *i*; t CO_2-e
$A_{unplanned,i,t}$	Area of unplanned deforestation in post-deforestation stratum *i* at time *t*; ha
t	1,2,3,… *t* years elapsed since the projected start of the REDD project activity
I	1,2,3, …. *M* strata

The results for all the years in the baseline period are presented in the following tables for Project Area and Leakage Belt. Considering only the 387 Brazil nut harvesters that are part of this verification period, the baseline projections (in hectares and in tCO2e) per stratum are in following table. This is obtained by cutting the baseline maps per year with the 2017 project area (only the 387 BN harvesters).

Table 8. Total Forest Carbon stock in areas deforested in Project Area

Carbon stock changes in initial (pre-deforestation) forest classes in Project Area																Total C stock change in initial forests	
Strata i		BTI		PA		BPT		BT		P		BCB		BPCB		Cumulative	Annual
T	Year	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	t CO_2-e	t CO_2-e
8	2017	351	136,778	640	594,432	946	472,751	26,947	25,444,466	324	244,017	641	654,317	2,430	1,102,271	28,649,032	2,801,726

Based on the percentage calculated and used during validation of the share of each post-deforestation land use, the total deforested area is allocated between the different post-deforestation strata every year and, with the carbon stocks of each post-deforestation land use, the total post deforestation carbon stock in deforested areas in Project Area is obtained:

Table 9. Total post-deforestation carbon stock in areas deforested in Project Area

Carbon stock changes in final (post-deforestation) non forest classes in Project Area												Total C stock change in final post-deforestation classes	
Strata f		Deforestation for Pastures		Deforestation for Farming*		Deforestation for Agriculture (Corn)		Deforestation for Infrastructure		Deforestation for Illegal Mining		Cumulative	Annual
t	Year	Ha	t CO_2-e	ha	t CO_2-e	Ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	t CO_2-e	t CO_2-e
8	2017	16,716	311,410	12,592	399,782	1,049	33,317	750	-	1,168	-	744,508	73,611

So, the net baseline carbon stock change in Project Area is obtained by discounting the carbon stocks in post-deforestation classes from carbon stocks in initial forest classes in baseline scenario only in the 2017 Project Area (i.e. the 387 BN harvester's area).

Table 10. Sum of the baseline carbon stock change in all pools in Project Area

Classes		Total C stock change in initial forests		Total C stock change in final post-deforestation classes		Total baseline carbon stock change in Project Area	
		cumulative	annual	cumulative	annual	annual	cumulative
t	Year	t CO_2-e	t CO_2-e	t CO_2-e	t CO_2-e	tCO_2-e	tCO_2-e
8	2017	28,649,032	2,801,726	744,508	73,611	2,728,115	27,904,524

The same procedure is followed for the Leakage Belt, considering that the Leakage Belt area contains Brazil nut concessions that are not part of the Project Area (Brazil nut concessions non-project partners). It is important to mentioned that the leakage belt does not include the 18 BN concessionaries that have been excluded from emission reductions accounting in the period, as they are still part of the REDD+ project but were only excluded from the calculation of net reductions generated by the project during the specific verification period due to the methodology restriction previously explained. A similar approach was applied in previous verification satisfactorily

Table 11. Carbon stock changes (pre-deforestation) in Leakage Belt.

Carbon stock changes in initial (pre-deforestation) forest classes in Leakage Belt																Total C stock change in initial forests	
Strata i		BTI		PA		BPT		BT		P		BCB		BPCB		Cumulative	Annual
T	Year	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	t CO_2-e	t CO_2-e
8	2017	1,522	593,491	4,736	4,400,389	1,572	785,315	43,367	40,948,379	763	575,074	810	826,641	3,384	1,534,947	49,664,236	5,616,625

Table 12. Total post-deforestation carbon stock in areas deforested in Leakage Belt

Carbon stock changes in final (post-deforestation) non forest classes in Leakage Belt												Total C stock change in final post-deforestation classes	
Strata f		Deforestation for Pastures		Deforestation for Farming*		Deforestation for Agriculture (Corn)		Deforestation for Infrastructure		Deforestation for Illegal Mining		Cumulative	Annual
T	Year	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	ha	t CO_2-e	t CO_2-e	t CO_2-e
8	2017	29,079	541,738	21,905	695,473	1,825	57,958	1,304	-	2,033	-	1,295,169	149,153

Table 13. Sum of the baseline carbon stock change in all pools in Leakage Belt

Classes		Total C stock change in initial forests		Total C stock change in final post-deforestation classes		Total baseline carbon stock change in Leakage Belt	
		Cumulative	Annual	Cumulative	Annual	Annual	Cumulative
t	Year	t CO_2-e	t CO_2-e	t CO_2-e	t CO_2-e	tCO_2-e	tCO_2-e
8	2017	49,664,236	5,616,625	1,295,169	149,153	5,467,473	48,369,067

Estimation of the sum of baseline greenhouse gas emissions

The emissions of GHG as a consequence of deforestation activities within the project area in baseline, are determined according to module by the sum of CO_2 emissions of the combustion of fossil fuel by stratum each year, the greenhouse gas emissions different to CO_2 by biomass burnt by stratum per year and the direct emissions of N_2O by application of nitrogen within the project area.

$$GHG_{BSL,E} = \sum\sum (E_{FC,i,t} + E_{BiomassBurn,i,t} + N_2O_{direct\text{-}N,i,t})$$

Where:

$GHG_{BSL,E}$	Greenhouse gas emissions as a result of deforestation activities within the project boundary in the baseline; t CO_2-e
$E_{FC,i,t}$	CO_2 emission from fossil fuel combustion in stratum *i* in year *t*; t CO_2-e
$E_{BiomassBurn,i,t}$	Non- CO_2 emissions due to biomass burning as part of deforestation activities in stratum *I* in year *t*; t CO_2-e
$N_2O_{direct\text{-}N,i,t}$	Direct N_2O emissions as a result of nitrogen application on the alternative land use within the project boundary in stratum *i* in year *t*, t CO_2-e

Emissions of CO_2 by combustion of fossil fuel

The estimation of CO_2 by combustion of fossil fuel, according to module E-FFC is optional. However, its quantification is proposed if CO_2 emissions of combustion of fossil fuel with project are larger than the estimated emissions in baseline.

There is no information about the number of machinery, equipment, trucks, etc. that would be incorporated annually as a consequence of agriculture or farming activities during baseline (after deforestation) in the project area. In the other hand, there is strong evidence that these activities

are carried in self-consumption/ small-scale way[9], which is supposed to minimally use fuel consuming' machinery. Therefore, it was decided not to measure the variable. This is a conservative approach. Likewise, the module indicates that fossil fuel is an optional source of emission.

Emissions of N_2O due to nitrogen application

No application of fertilizers is supposed in the post-deforestation activities given their traditional management.

With those assumptions, and the hectares of deforested area per stratum and the deforested area converted to agriculture, we obtain the following non-CO2 emissions:

Table 14. GHG Emissions (CH_4 and N_2O) due to forest burning in Project Area as part of deforestation activities

GHG emissions due to biomass burning in forest strata as part of deforestation activities inside Project Area													
Biomass Burnt per Forest Strata = Area (ha) x 0.55*** x AG biomass (t/ha)										Total GHG Emissions			
Strata i		BTI	PA	BPT	BT	P	BCB	BPCB	Total	CH_4		N_2O	
AG Biomass t/ha		174.99	417.09	224.27	423.83	338.44	458.03	203.63	Cumulative	Cumulative	Annual	Cumulative	Annual
T	Year	T	t	t	t	T	t	T	t	t CO_2-e	t CO_2-e	t CO_2-e	t CO_2-e
8	2017	33,767	146,749	116,709	6,281,550	60,241	161,533	272,121	7,072,671	504,989	49,385	219,253	21,442

Table 15. GHG emissions (CH_4 and N_2O) due to biomass burn in agriculture in Project Area

GHGs Emissions from Biomass Burning (from Agricultural wastes) in Project Area						
		Burnt Areas*	CH_4		N_2O	
			Cumulative	Annual	Cumulative	Annual
T	Year	ha	t CO_2-e	t CO_2-e	t CO_2-e	t CO_2-e
8	2017	1,049.3	796.00	78.70	304.64	30.12

These are the expected emissions in the baseline scenario for the current verification area from biomass burning in the forest area and in the agriculture post-deforestation area. They will be summed to estimate the total net baseline emissions for the current verification area.

9

Calculation of net emissions

The previous calculations are summarized with the following equations:

$$\Delta C_{BSL,unplanned} = \Delta C_{BSL,PA,unplanned} + GHG_{BSL,E}$$
$$\Delta C_{BSL,PA,unplanned} = \Delta C_{TOT,PA}$$
$$\Delta C_{BSL,LK,unplanned} = \Delta C_{TOT,LB}$$

Where:

$\Delta C_{BSL,unplanned}$	Net greenhouse gas emissions in the baseline from unplanned deforestation; t CO_2-e
$\Delta C_{BSL,PA,unplanned}$	Net CO_2 emissions in the baseline from unplanned deforestation in the project area; t CO_2-e
$\Delta C_{BSL,LK,unplanned}$	Net CO_2 emissions in the baseline from unplanned deforestation in the leakage belt ; t CO_2-e
$GHG_{BSL,E}$	Greenhouse gas emissions as a result of deforestation activities within the project boundary in the baseline; t CO_2-e
$\Delta C_{TOT,PA}$	Sum of the baseline carbon stock change in all pools up to time *t**in the project area, t CO_2-e
$\Delta C_{TOT,LB}$	Sum of the baseline carbon stock change in all pools up to time *t**in the leakage belt, t CO_2-e

The total net GHG emissions in the Project Area in the baseline from unplanned deforestation are 28,629,866.07 t CO_2-e.

For Leakage Belt, the values found for $\Delta C_{BSL,LK,unplanned}$ will be used in LK-ASU module for subsequent calculations. As it is equal to $\Delta C_{TOT,LB}$ the results are already presented in Table 41.

The Final result for the emissions in Project Area can be seen in the next table:

Table 16. Net GHG Emissions in the Baseline from Unplanned Deforestation Cumulative.

T	Year	Total Sum of carbon stock change in baseline (t CO_2) $\Delta C_{BSL,PA,unplanned}$	Greenhouse Gas Emissions in the Project Area in baseline (t CO_2 -e) $GHG_{BSL,E}$	Net GHG Emissions in the Baseline from Unplanned Deforestation Cumulative (t CO_2 -e) $\Delta C_{BSL,unplanned}$
8	2017	27,904,523.93	725,342.14	28,629,866.07

In this table we can see the GHG emissions reductions per year in the project area, thus, showing the impact this project has in Madre de Dios. Without the project activity, the cumulative CO2 in the area would have been 28,629,866.07 for 2017.

It must be remained that future deforestation will be monitored permanently following the procedures described in M-MON module, which follows the technical parameters that have been used by IIAP during the preparation of historic reference period maps. These results will be compared with deforested areas in baseline scenario to calculate the real net emission reductions generated by the project.

Spreadsheet used: "Castañeros REDD Project Calculations MODIFIED 2017"

5.2 Project Emissions

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

Table 17. Project emissions per stratum.

Stratum	*CpDef,PA,i,t*	*Cpdeg,PA,i,t*	*CpDist,PA,i,t*	*GHGp-e,i,t*	*Cp,Enh,i,t*	TOTAL
BTI	-	-	-	-	-	-
PA	-	-	-	-	-	-
BPT	-	-	-	-	-	-
BT	6,880.18	-	-	335.12	-	7,215.31
P	-	-	-	-	-	-
BCB	11,972.07	-	-	580.65	-	12,552.72
BPCB	1,356.11	-	-	70.39	-	1,426.50
Total	20,208.37	-	-	986.16	-	21,194.53

Source: Self–made
Spreadsheet *"Cp Estimations in Castañeros REDD project"*

In the case of deforestation, the methodology establishes that the same procedure followed above is applicable, estimating the real deforested area per stratum.

5.3 Leakage

For the 2017 verification period, the module VMD0010 (LK-ASU) v. 1.1 approved in March 2015. Specifically, in STEP 2 about Estimation of the proportions of area deforested by immigrant and

local deforestation agents in the baseline, the methodology requires that the data used is valid for 5 years since the information was generated. For the first verification the 2007 census was used, so in this period it loses its validity. Instead, for calculating the proportion of migrants and local deforestation in this verification period, the 2017 data from the National institute of statistics and informatics (INEI, for its acronym in Spanish) was used and processed to comply with the methodology requirements.

$$\Delta C_{P,DeflB,i,t} = \sum_{u=1}^{U} \left(A_{DeflB,u,i,t} * \Delta C_{pools,P,Def,u,i,t} \right)$$

First, we processed satellite image to obtain and locate deforested in areas by stratum and determine the type of activity that has been established after deforestation: In the Leakage Belt, results are below:

Table 18. Deforested area in Leakage Belt during the monitoring period.

AdefLB,u,i,t						
u i	**Pastures (8)**	**farming (9)**	**Infraestructure (10)**	**Agriculture (11)**	**Secundary Forest (12)**	**TOTAL**
Flooded terraces forest (1)	-	-	-	13.84	-	13.84
Swamp trees (2)	9.84	-	-	10.55	-	20.39
High and mid terrace with bamboo (paca) forest (3)	-	-	-	-	-	-
Terraces forest (4)	37.75	23.75	-	46.06	-	107.57
Bamboos (Pacal) (5)	-	-	-	-	-	-
Low hills forest (6)	-	-	-	7.22	-	7.22
Low hills with bamboo (paca) forest (7)	-	-	-	12.14	-	12.14
TOTAL	47.59	23.75	-	89.81	-	161.15

All the deforested data collected by satellite analysis were put by stratum and crossed with the activity that caused it. This was extracted from the spreadsheet Leakage estimations BAM 2017.xls

In the following table, we discount the carbon stock in the post-deforestation stratum from the carbon stock in the pre-deforestation stratum. We produced a matrix as follows:

Table 19. Carbon pools per stratum

ΔC*pools,P,Def,u,i,t* (t CO_2/ha)					
u i	Pastures (8)	farming (9)	Infraestructure (10)	Agriculture (11)	Secundary Forest (12)
Flooded terraces forest (1)	371.21	358.09	389.84	358.09	311.08
Swamp trees (2)	910.60	897.48	929.23	897.48	850.47
High and mid terrace with bamboo (paca) forest (3)	481.00	467.88	499.63	467.88	420.87
Terraces forest (4)	925.61	912.49	944.24	912.49	865.48
Bamboos (Pacal) (5)	735.36	722.24	753.99	722.24	675.23
Low hills forest (6)	1001.80	988.68	1020.43	988.68	941.67
Low hills with bamboo (paca) forest (7)	435.02	421.90	453.65	421.90	374.89

Here, we crossed the carbon pools per stratum with the activity that is taking place. This was extracted from the spreadsheet Leakage estimations BAM 2017.xls

By multiplying the hectares of land change by the net loss of carbon stock per hectare in each cell of the matrix, we obtain the following emissions in the leakage belt area.

Table 20. Net carbon stock change as a result of deforestation is equal to the area deforested multiplied by the emission per unit area.

Period 2017			
Stratum i,u	A*def,LB,u,i,t*	ΔC*pools,P,Def,u,i,t*	ΔCp,defLB,i,t
	Ha	t CO2/ha	t CO2
1,8	-	371.21	-
1,9	-	358.09	-
1,10	-	389.84	-
1,11	13.84	358.09	4,954.37
1,12	-	311.08	-
2,8	9.84	910.60	8,956.10
2,9	-	897.48	-
2,10	-	929.23	-
2,11	10.55	897.48	9,470.47
2,12	-	850.47	-
3,8	-	481.00	-
3,9	-	467.88	-
3,10	-	499.63	-

3,11	-	467.88	-
3,12	-	420.87	-
4,8	37.75	925.61	34,945.20
4,9	23.75	912.49	21,674.55
4,10	-	944.24	-
4,11	46.06	912.49	42,029.91
4,12	-	865.48	-
5,8	-	735.36	-
5,9	-	722.24	-
5,10	-	753.99	-
5,11	-	722.24	-
5,12	-	675.23	-
6,8	-	1,001.80	-
6,9	-	988.68	-
6,10	-	1,020.43	-
6,11	7.22	988.68	7,141.20
6,12	-	941.67	-
7,8	-	435.02	-
7,9	-	421.90	-
7,10	-	453.65	-
7,11	12.14	421.90	5,121.46
7,12	-	374.89	-
	161.15		134,293.26

Net CO_2 emissions due to unplanned deforestation displaced from the project area to leakage belt

$$\Delta C_{LK-ASU-LB} = \Delta C_{P,LB} - \Delta C_{BSL,LK,unplanned}$$

Table 21. Net CO_2 emissions from PA to LB.

$\Delta C_{P,LB}$	$\Delta C_{BSL,LK\text{-}unplanned}$	$\Delta C_{LK\text{-}ASU\text{-}LB}$
134,293.26	5,467,472.70	-

With the difference between the projected deforestation with the real deforestation we obtained the net CO_2 emissions and, according to module LK-ASU, when it is less than 0, it must be set as 0.

Net CO_2 emissions due to unplanned deforestation displaced outside the leakage belt

$$\Delta C_{LK-ASU,OLB} = PROP_{CS} * (\sum_{t=1}^{t^*} A_{LK-OLB,t})$$

As a first step, we need to calculate $A_{LK-OLB,t}$:

$$A_{LK-OLB,t} = A_{LK-IMM,t} - A_{LK-ACT-IMM,t}$$

$A_{LK-IMM,t}$			$A_{LK-ACT-IMM,t}$				$\Delta A_{LK-OLB,t}$	$\Delta C_{LK-ASU,OLB}$
$PROP_{IMM}$	**$A_{BSL,PA-unplanned,t}$**	**Total 1**	**$PROP_{IMM}$**	**$A_{Def,PA-i,t}$**	**$A_{Def,LB-i,t}$**	**Total 2**		
from Step 2 LK-ASU	Baseline estimations	Eq 7 LK-ASU	from Step 2 LK-ASU	from M-MON	from M-MON	Eq 8 LK-ASU	Eq 9 LK-ASU	Eq 10 LK-ASU
2.34	3,191.46	7,474.49	2.34	22.79	161.15	430.79	7,043.69	5,059.90

The $PROP_{IMM}$ comes from the spreadsheet Encuestas data.xls, while the expected baseline deforestation in the monitoring period was extracted from the spreadsheet Castañeros REDD Project Caltulations MODIFIED_2017.xls. Both values need to by multiply and resulted in 7,474.49, according to equation 7 LK-ASU, to get $A_{LK-IMM,t}$

Then, we used equation 8 (LK-ASU) to obtain ALK-ACT-IMM,t by multiply $PROP_{IMM}$ with the sum of $A_{Def,PA-i,t}$ and $A_{Def,LB-i,t}$, obtaining 430.79.

Finally, the difference between $A_{LK-IMM,t}$ and ALK-ACT-IMM,t resulted in $\Delta A_{LK-OLB,t}$, which was 7,043.69.

After that, according to equation 4 of LK-ASU, we calculated $PROP_{CS}$

$PROP_{CS}$ (Eq 4 LK-ASU)		
C_{OLB}	C_{LB}	**Total 3**
379.78	528.68	**0.72**

C_{OLB} is the average stock per ha established in the 2nd Communication on Climate Change. Step 4C of LK-ASU and C_{LB} is the weighted average is the AG biomass (t CO2/ha) per stratum in Leakage Belt.

With the division of C_{OLB} and C_{LB} we obtained 0.72.

Then, $\Delta C_{LK\text{-}ASU,OLB}$ was the multiplication of $PROP_{CS}$ and ΔALK-OLB,t resulting in 5,059.90.

Greenhouse gas emissions as a result of leakage of avoided deforestation activities

$$GHG_{LK,E} = \sum_{t=1}^{t^*} \sum_{i=1}^{M} \left(E_{BiomassBurn,i,t} + N_2O_{direct-N,i,t} \right)$$

There are no GHG emissions in LB because no leakage prevention activities were done.

Net greenhouse gas emissions due to activity shifting leakage for projects preventing unplanned deforestation Net CO_2 emissions

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

$\Delta C_{LK\text{-}ASU\text{-}LB}$	$\Delta C_{LK\text{-}ASU,OLB}$	$GHG_{LK,E}$	$\Delta C_{LK\text{-}AS,unplanned}$
-	5,059.90	-	**5,059.90**

This is the result of the net GHG emissions due to activity shifting leakage for the project. No emissions were displaced from the project area to leakage belt and no GHG emissions as a result of leakage avoided deforestation.

5.4 Net GHG Emission Reductions and Removals

According to the non-permanence risk assessment, the risk rating for the current verification period is 10%. This value has been used to calculate the VCUs to be reserved in the buffer pool.

Table 22. Emissions and removals

Year	**Baseline emissions or removals (tCO_2e)**	**Project emissions or removals (tCO_2e)**	**Leakage emissions (tCO_2e)**	**Net GHG emission reductions or removals (tCO_2e)**	**Buffer pool allocation**	**VCU eligible for issuance**
2017	2,799,051	21,195	5.060	2,772,796	277,786	2,366,747

Source: Self–made

Spreadsheets “VCU Estimations 2017”.

While the resulting degradation from the PRA resulted in 2,06% if compared to the total hectares, it was not discounted from the total emissions.

According to M-MON, if degradation results less than 5% of the total emissions it would be considered not significant, so it would not be discounted from the Net GHG emissions reductions, so, after all calculations, the emissions went from an initial 2,799,051 to 21,195 t CO2 e and, after the uncertainty and risk buffer, the net GHG emission reductions were **2.366.747 t CO2 e.**

6 APPENDIX 1 TECHNICAL DOCUMENTS

1. *BAM Monitoring Report 2017*
2. *Non permanence Risk Report*
3. *Castañeros REDD Project Calculations 2017*
4. *Cp estimations in Castañeros REDD Project 3rd monitoring report*
5. *Encuestas Data*
6. *Leakage estimations in BAM 2017*
7. *Deforestación y cambio de uso 2017*
8. *VCUs estimations 2017*