



2018 - 2020 MONITORING REPORT THE JAGUAR AMAZON REDD+ PROJECT



Document Prepared by GREENOXX

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Jaguar Amazon REDD+ Project is a project whose proposed activity is to avoid unplanned deforestation of forests that are managed sustainably by the certified timber concessions "Inversiones Forestales Chullachaqui SAC" and "Forestal Otorongo SAC" in the province of Tahuamanu, department of Madre de Dios, in south-eastern Peru.

The project is specifically located in the province of Tahuamanu (districts of Iñapari, Iberia and Tahuamanu).

The project area (PA) comprises the consolidated areas of Otorongo and Chullachaqui covering a total of 183,015 hectares.

The Jaguar Amazon REDD+ project is composed by two forest concessions and its area is 100% certified by FSC for its sustainable forest management. The Chullachaqui Concession is managed by Inversiones Forestales Chullachaqui SAC and is formed by the merge of four adjacent concessions, which have consolidated their respective areas in order to optimize the sustainable use of forest resources and enter the Voluntary Forest Certification process as a block. The "Forestal Otorongo" concession, managed by Forestal Otorongo SAC, is made up of six concessions, which have also entered a Voluntary Forest Certification process as a single unit.

Both Chullachaqui and Otorongo, have signed a permanent production forestry concession contract with the Peruvian government for a 40-year renewable period beginning between 2002 and 2003, for an area of 183,015 hectares (81,238 hectares for Otorongo and 101,777 hectares for Chullachaqui). This contract grants legal rights over the forest land for both forest use and environmental services.

The Project Area located 17 km from the Interoceanic Highway (IOH), the main communication route between Peru and Brazil. In addition, the project area operates as part of the Vilcabamba - Amboró Biological Corridor, which has a total area of approximately 30 million hectares. The presence of the IOH is a major risk of deforestation and degradation. It has greatly facilitated the immigration of new settlers, mainly from rural Andean areas, and the establishment of economic activities not compatible with the forest that are consequently practiced, such as slash-and-burn agriculture, cattle ranching in poor pastures, etc. Deforestation and forest degradation are the result of these activities.

The project was created as a response to increasing threats over the surrounding forests, including not only the project area but also other small forest concessions that face uncontrolled agrarian expansion from new migrants and old settlers. The expected carbon income will be used to support sustainable development within the neighboring communities, who are open and look favorably to the REDD project.

There are no native indigenous population within the project area. In the neighbouring towns of Alerta, Portillo, San Francisco and Carachamayoc there are settlers dedicated to collecting Brazil nuts and eventually rubber. One hundred percent of the people that collect Brazil nuts, through a contract harvesting service with the project, live in the town of Alerta. Peruvian legislation allows for a combination of timber and non-timber product harvesting activities. As a result, a complementary Brazil nut management plan has been elaborated to develop the use of Brazil nuts in a compatible way with timber extraction, minimizing impacts. The project holds meetings with Brazil nut harvesters and exchanges mutually beneficial proposals (minutes of these meetings are kept).

Both Forestal Otorongo and Inversiones Forestales Chullachaqui aim to promote the conservation of the forest and its resources through sustainable forest management. Preventive measures include low-impact logging and the design and construction of infrastructure to reduce the impact on habitats and trees important to wildlife, as well as strictly prohibits hunting and raising awareness among workers about the importance of wildlife in the forest ecosystem.

The presence of wildlife in forest ecosystems is important because of its positive influence on natural regeneration processes, which are key to forest sustainability. The biodiversity of the tropical forest ecosystem is the basis for the richness of its natural resources and its use must be sustainable, without compromising its benefits for future generations.

The general objective of the project is to manage the forest extension granted by the Peruvian State, improving the production of forest goods and services in a continuous and sustainable manner with an adequate long-term strategy for its implementation.

The project started on January 1st, 2018, and the validation process was completed under the Verified Carbon Standard (VCS) on March 12th, 2021.

Up to 2020, the accumulated avoided emissions have been 3,489,877.84 t CO₂-e.

Project objectives:

- o Climate objective: Reduce the rate of deforestation.
- o Community Objective: to promote and consolidate a sustainable use of agricultural land by increasing family income without the need to expand into new areas.
- o Biodiversity objective: protect the rich ecosystem that harbors many important endangered species of fauna and flora.

Activities in favor of the surrounding communities.

Considering the reality of the sector and the economic activities carried out in the area surrounding the project area, such as subsistence agriculture, raising small animals and, on a smaller scale, livestock for self-consumption and commercialization in the local Iberia market, the following have been considered as strategic activities to be carried out in favor of the communities:

- o Identification of productive projects in the surrounding communities. The projects will be selected according to the local settlements in order to ensure the suitability of the initiatives to be supported by the community groups that will implement and have ownership of the initiatives.
- o Capacity building of stakeholder organizations. The success of productive initiatives depends on capacity building. These include technical, entrepreneurial, organizational and business skills, which are key to helping them achieve productive success.
- o Promotion of sustainable productive projects. With these two preconditions, it is the implementation of productive projects previously selected and on which training has been previously received. The training will be carried out simultaneously but on a pilot scale and then scaled up.
- o Implementation of research projects. As a complement to the productive activities, research is necessary to improve techniques, include new raw materials and processes, and develop new by-products for the market in order to maximize the value obtained from productive activities.

1.2 Sectoral Scope and Project Type

The current AFOLU project is classified as a REDD+ project, mainly a reduction of deforestation project. This is not a grouped project.

As stated in VM0006, this project is applicable to this methodology as this project meets the following activities, eligible for VM0006:

- o Strengthening of land-tenure status and forest governance.
- o Supporting the development and implementation of sustainable forest and land use management plans.
- o Demarcating forest, tenure and ownership boundaries; promoting forest protection through patrolling of forests and forest boundaries; promoting social inclusion and stewardship in local communities; facilitating social fencing through capacity building; and creating mechanisms to alert law enforcement authorities of forest trespassing.
- o Fire prevention and suppression activities including fire belts among others
- o Sustainable intensification of agriculture on existing agricultural land.
- o Development of local enterprises based on sustainably harvested non-timber forest products (NTFPs) such as Brazil nuts.

1.3 Project Proponent

Table 01. Multiple Project Proponent

Organization name	Greenoxx Sociedad Civil
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Contact person	Eng. Rocco Cheirasco & Eng. Silvia Gómez Caviglia
Title	Chairman CEO & Executive Vice-President
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Organization name	Forestal Otorongo SAC
Contact person	Eng. Vittorio De Dea Peña
Title	Legal Representative
Address	Road to La Cachuela Km. 1.8, Tambopata, Madre de Dios, Peru
Telephone	+51 989 067 284
Email	vdedea@bozovich.com

1.4 Other Entities Involved in the Project

No other entities directly involved in the project.

1.5 Project Start Date

November 8th, 2017 is the project start date in order to meet with a new forest cycle and to be comparable with official forest loss maps provided by MINAM, through GEOBOSQUES platform. The FSC certificate obtained by the Otorongo concession started on 8 November 2017, while the transfer of the two smaller forest concessions to Otorongo also occurred in 2017. The FSC certificate obtained by the Otorongo concession started in 2011, while the transfer of the two smaller forest concessions to Otorongo also occurred in 2017. With both achievements, the forest area has consolidated in a contiguous managed area and with the FSC certification, the guarantee of sustainable management has been confirmed by an independent audit team. Forest certification is considered the milestone for the project start date not only because it ensures that the forest is being well managed environmental and socially, under independent international recognized standards (in a contiguous area that facilitates the logging and transportation stages and the patrolling of borders) but also because, with the extra incomes of carbon sales, it ensures financially the operations as certified timber allows the access to more attractive market niche.

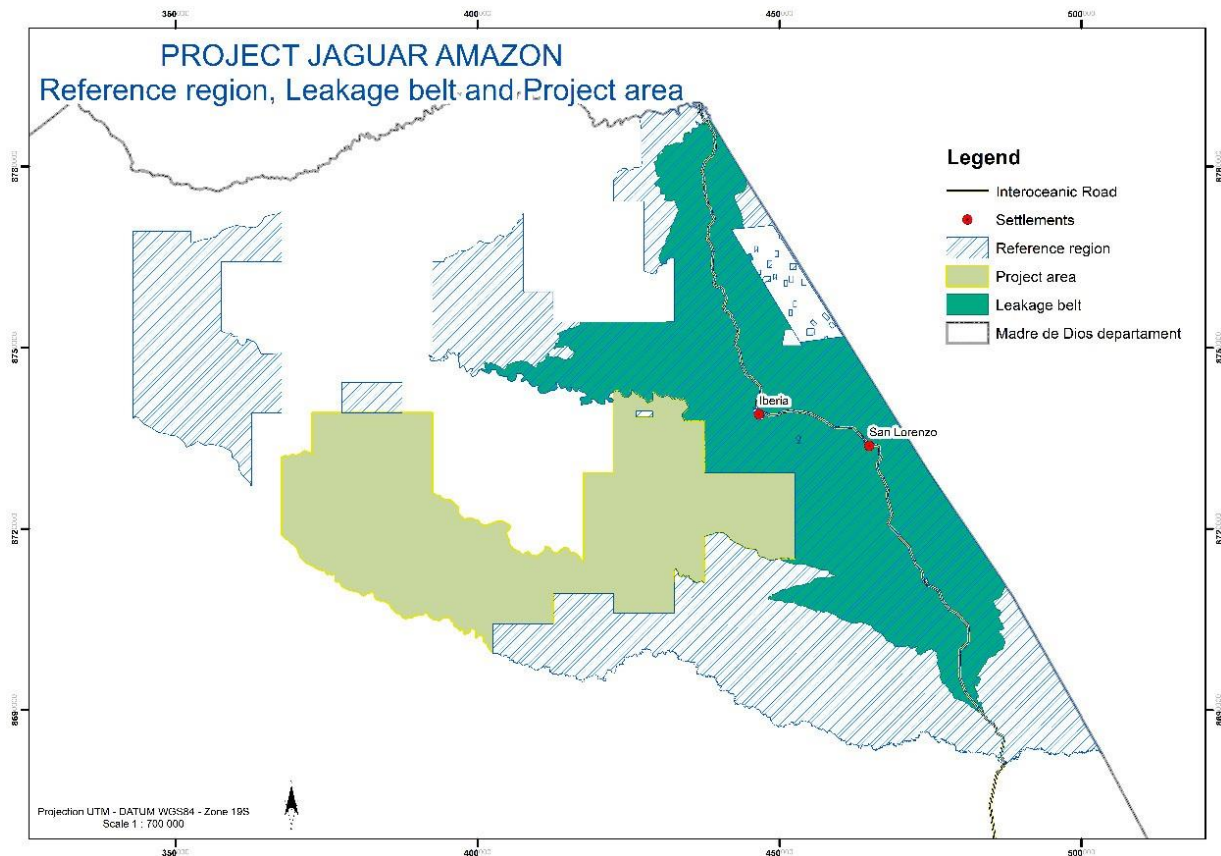
1.6 Project Crediting Period

01 January 2018 - 31 December 2041; 24-year total period.

1.7 Project Location

The project is located in Peru, in the south-east area of the Department of Madre de Dios, in the province of Tahuamanu (districts of Iñapari, Iberia and Tahuamanu). The project area (PA) comprises the consolidated Otorongo and Chullachaqui areas covering a total of 183,015 hectares. The coordinates of each forest concession that make up these consolidated projects are shown in Annex 1.

MAP 1: REFERENCIA REGION, LEAKAGE BELT AND PROJECT AREA



A table with the geodetic characteristics of each one of the key areas: reference region, leakage belt and project area is also presented below:

MAP 2: PROJECT AREA AND SURROUNDING COMMUNITIES

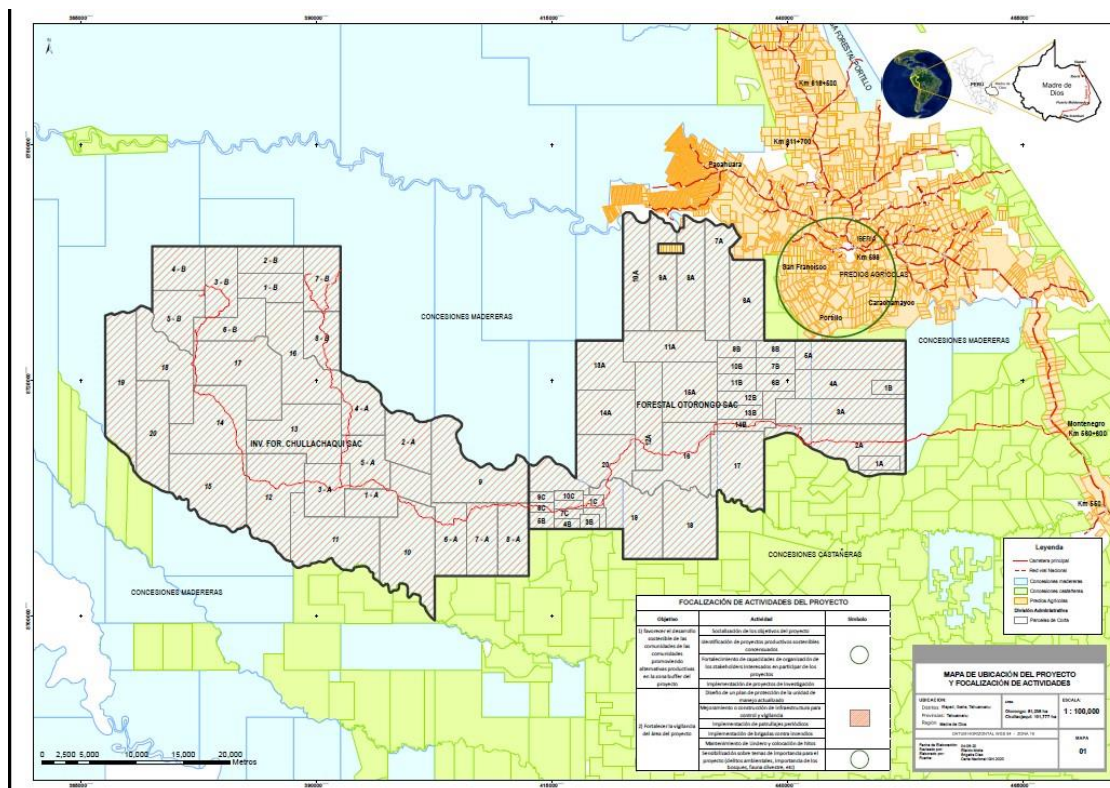


Table 02: Geodetic Characteristics of PA, RR and LB

Entity	Project Area	Reference Region	Leakage Belt
Centroid X	407287	447623	452331
Centroid Y	8721397	8702255	8736370
Latitude	11° 33' 54.165" S	11° 29' 13.894" S	11° 25' 50.560" S
Longitude	69° 51' 1.011" W	69° 35' 48.212" W	69° 26' 12.552" W
Area (ha)	183,015.29	516,554.22	232,114.34
Tenure	Forest concessions	Forest concessions, agrarian plots, BN concessions	Forest concessions, agrarian plots, BN concessions
Department	Madre de Dios	Madre de Dios	Madre de Dios
Province	Tahuamanu	Tahuamanu	Tahuamanu
District	Iñapari - Tahuamanu - Iberia	Iñapari - Tahuamanu - Iberia	Iñapari - Tahuamanu - Iberia

1.8 Title and Reference of Methodology

VM0006. Methodology for Carbon Accounting for Mosaic and Landscape-scale REDD Projects. Version 2.2 - 17 March 2017 - Sectoral Scope 14.

VT0001: Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities. Version 3.0 - 1 February 2012 - Sectoral Scope 14.

1.9 Participation under other GHG Programs

The project is not registered, nor is seeking registration under any other GHG programs. It is not discarded that in the future, this will be evaluated as an alternative. The project expects to be registered in the Peruvian National GHG Registry.

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates.

The project is not registered, nor is seeking registration under any other GHG programs. It is not discarded that in the future, this will be evaluated as an alternative.

The project GHG emissions reductions are not included in any other emissions trading program nor any other mechanism that includes GHG allowance trading.

1.11 Sustainable Development Contributions

The project contributes to many international and nationally stated sustainable development priorities as:

- o SDG. The current project contributes to 15 of the Sustainable Development Goals, please see Annex 31.
- o Millennium Development Goals. Specifically, those related with “Ensure environmental sustainability”, “promote a world association for development” and, at some level, “eradicate extreme poverty” by creating permanent employment and supporting and increase in sustainable agrarian incomes in surrounding communities.
- o Bicentennial Plan. This is a planning tool, developed by the Peruvian Government, with the purpose to define the priorities for the coming 200 years of Peru Independence. It has six strategic axes, being the sixth “Natural Resources and Environment”.
- o Forest and Wildlife Law, approved in 2011, has the goal to promote the conservation, protection, increase and sustainable use of forest and wildlife heritage within national territory, integrating the

management with the maintenance and enhancement of forest ecosystem services and other ecosystems. Clearly, The Jaguar Amazon REDD+ Project is in line with this law.

- o National Strategy on Forest and Climate Change: The National Strategy on Forest and Climate Change (ENBCC, as its acronym in Spanish) is the Peruvian REDD+ Strategy. It includes eight strategic lines. One of them refers to the “increment of the value of natural forests” including the sustainable forest management (as is the case of The Jaguar Project).
- o NDC. Peru has also updated its Nationally Determined Contributions as the country contribution to climate targets as established in Paris Agreement. One of the Mitigation Measures in the LULUCF sector is also “Sustainable Forestry Management” with a target of 4.1 million of hectares that the government commits to promote in order to achieve the management of the area.
- o Axes to fight against deforestation. Launched by the Ministries of Agriculture, Environment and Energy, is based on four axes, one of them referred to “sustainable production”.

2 SAFEGUARDS

2.1 No Net Harm

No potential negative environmental and socio-economic impacts are expected to happen with the project implementation. Any adoption of sustainable agrarian practices in local families will be voluntary.

In the baseline scenario, there is a risk that illegal agrarian frontier expansion will occur as a strategy to obtain subsistence incomes for migrant rural neighboring families. Banning the unsustainable use of natural resources could impact negatively on the economics of local families. To mitigate this impact, the project has planned to implement a different set of actions as:

- o Organize the sustainable collection of Brazil nut fruits, a non-timber forest product existing within the concession
- o Promote sustainable agrarian crops

2.2 Local Stakeholder Consultation

All meetings with local stakeholders are called and summoned with at least three days of anticipation. The channels used to spread the calls include announcement in community auditoriums and local radios and, in pandemic times, emphasizing virtual channels as WhatsApp groups (one with each community), text messages and using the social networks as Facebook page of the project proponent among others.

The call includes information about the agenda, date and hour of the meeting.

During the meeting, a summary of the discussions is prepared and signed, with the main agreements taken during the meeting. The participants may access to a copy of that summary.

Meetings with the neighboring communities are being carried out during August 2021 to update them on:

- o The results of project implementation

- o The results of climate, community and biodiversity monitoring
- o The coming validation/verification body's site visit.

The project proponent, as described in the PD, designed and has operational a Grievance and Redress Mechanism.

During 2018, 16 forms were sent through this mechanism. We can organize them as follows:

- o 12 of them were submitted by the workers of the company
- o 3 of them were submitted from neighbors of the company.
- o 1 of them is not identifiable.
- o From the 16, 13 of them were anonymous and 3 of them were submitted with its full name.

During 2019, only 5 forms were received. Only one of them was anonymous and all the cases were complaints related to labor conditions and procedures. All the complaints were favorably solved.

Finally, in 2020, one form was received, associated with a request for more medical and psychological campaigns in the framework of the stress caused by the pandemic crisis. The response of the company was to schedule three medical and psychological campaigns with 17 attendants.

In each case, the social responsibility manager submits a letter of response in the next day after the filled form was received indicating that the final response will be communicated within the next 30 days.

In summary, most cases, especially those complaints submitted by the workers of the company, are positively answered and solved. In the cases of needs from surrounding communities, the responses depend on the financial situation of the company.

See Annex 21 for the original forms submitted under the FGRM, the letters of response and the final decision of the company for both years currently under this verification period.

Regarding labor legal framework, no relevant changes have occurred during the current verification period, while referred to changes in risks, costs and benefits, the main critical change is related with the pandemic crisis in 2020, which has been a global sanitary crisis with very large impacts on the economy of the families.

2.3 AFOLU-Specific Safeguards

No relevant changes on legal framework referred to land use rights since December 2020, when the project was validated. In that sense, the project implementation does not impact negatively on indigenous special rights as no indigenous people are settled in the surrounding areas of the project.

Regarding risks associated with the project over local stakeholders, there were four risks identified:

- o Any change in land use pattern caused by productive practices. Meetings with leaders show an openness to adopt improved techniques of sustainable agriculture. Some of them have started by their own initiative, contacts to include agroforestry systems (cocoa) in their plots.
- o Insufficient prevention of migrants' impact and engagement. This is a risk identified also by current communities and local authorities. An alliance with all these stakeholders is being designed to avoid that new migrants may settle over forest areas. It must be said that old settlers are also afraid that

migrants may affect their forest areas that they still have on their own titled plots. In that sense, this partnership is realistic to be achieved.

- o Internal conflicts in settlements: no conflicts have been identified. Even more, the project has identified a potential way to access to Arca Pacahuara community through students of IST Iberia that are sons of Pacahuara families. Working with them, there is a room of changing the mind to show that it is feasible to do agriculture without affecting forest frontier.
- o Forest fires: in section 3, evidence of training and other actions to prevent forest fires are being implemented.

Finally, the project has developed specific procedures for stakeholders' engagement in an official policy document called "Social Monitoring Handbook", approved in 2020. Details of those procedures have been described in section 2.2.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The Jaguar REDD+ Project has defined in the PD the following activities:

- 1.1 Identification of productive projects in the surrounding communities
- 1.2 Capacities strengthening to stakeholders' organizations.
- 1.3 Promotion of sustainable productive projects
- 1.4 Implementation of research projects

- 2.1 Design of a protection plan of project area
- 2.2 Building / improvement of control and surveillance infrastructure
- 2.3 Periodical patrolling
- 2.4 Forest fire prevention patrolling
- 2.5 Land demarcation, border maintenance and signaling

- 3.1 Socialization of the REDD+ Project
- 3.2 Dialogues about environmental crimes and legal framework

Regarding each one, during the current verification process (2018-2020), the project proponent has made relevant improvements that will be described briefly and whose evidence may be found in more detail in annexes:

- *Identification of productive projects in the surrounding communities*

In 2018, the project proponent had a first meeting with the communal authorities from the San Francisco

Sector (the president, the treasurer and two other authorities) to analyze the situation of said sector and to define productive activities that may be supported as agroforestry, reforestation and sustainable agriculture and cattle ranching and to face diseases and plagues in cocoa.

In the zone, also a Communal Company (ECOMUSA) has been identified, who has received forest areas for harvesting of natural rubber, but the company is not working because of lack of experience and working capital. For local families, these concessions are seen negatively as these families consider that it blocks their expansion plans and titling expectations. But, in any case, rubber is also an option.

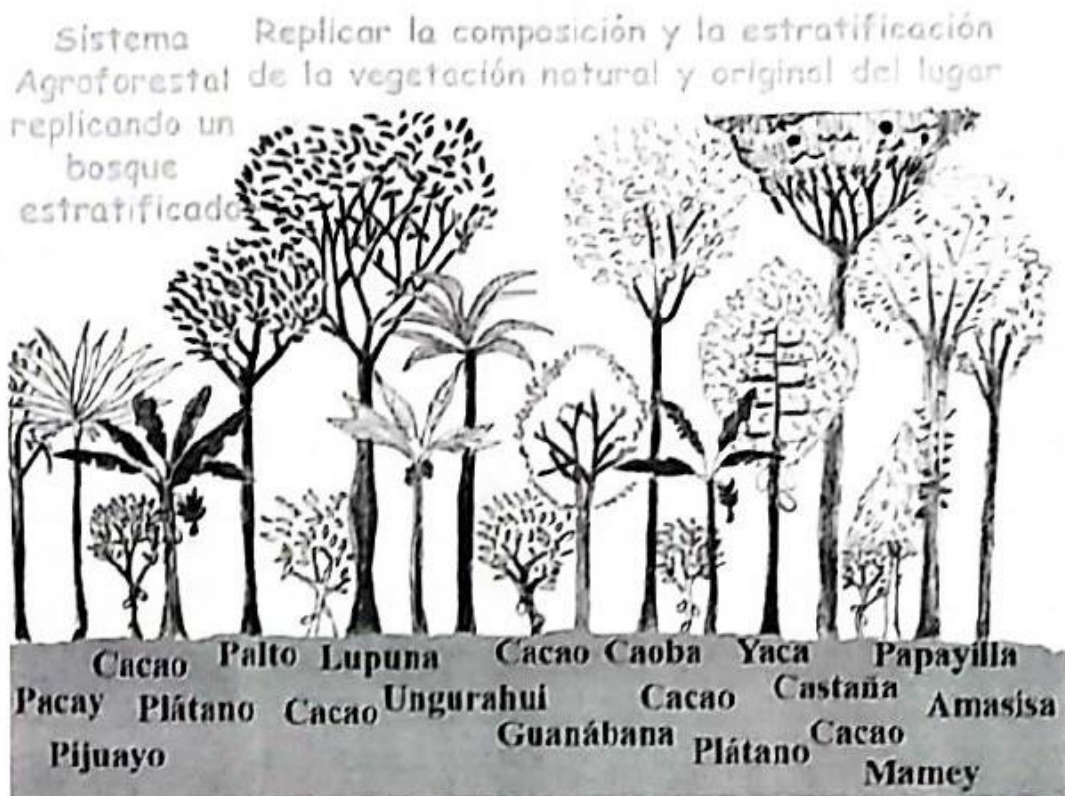
Finally, some representatives of San Francisco community travelled to Brazil to visit some experiences of EMBRAPA, UFAC, Chico Mendes Extractive Reserve, ACOOPERACRE, Peixe do Amazonia, among others to learn about associativity and cooperatives dedicated to Brazil nuts, rubber, acai, fish farming, and agroforestry and reforestation with cocoa, coconut, and different palm trees (ungurahui, wasai, aguaje). The local municipality is also involved in this process (See Annex 1).

- *Capacities strengthening to stakeholders' organizations*

In 2018, with the technical support of IIAP, the Research Institute for Peruvian Amazon, and AAE, the Association of Ecological Agriculture, a workshop for the neighboring families was carried out. Topics included were:

- o Soil conservation
- o Organic fertilization
- o Recovery and revalorization of native seeds
- o Reforestation
- o Plant production in nurseries
- o Criteria to choose reforestation species
- o Plantation systems

The workshop included field visits to plots of some participants (see Annex 7).



During 2019, 17 workshops were carried out, related to different purposes. This is presented in the following table (see Annex 2):

Table 03. Workshops

TOPIC	Feb.	Mar.	Apr.	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 Meeting for the beginning of Brazil nut campaign	11										
2 Good practices for Brazil nut Management	11										
3 Conflict Solution Management / Feedback and Grievance Redress Mechanism	14										
4 Waste Management / Recycling		9									
5 Social Intervention Plan		16									
6 Permanent Production Forests / Forest value / Forest Management Plan			20								
7 Agroforestry Systems						20					
8 Institutional Policy						23					
9 Post-campaign meeting with BN harvesters							2				
10 Cocoa cultivation Handbook							4				
11 Conflict Solution Management / Feedback and Grievance Redress Mechanism							4				
12 Organic Certification								4			
13 Environmental Crimes								7			
14 Controlled burns and fire prevention								14			
15 Experiences on Voluntary Forest Certification										13	

16	Wildlife importance										12
17	Waste Management / Plastic Contamination										12

Some of them are related with this activity (# 2, 6, 7) while others are indirectly related and will be described in following items.

Training in agroforestry was given to San Francisco, Carachamayoc and Portillo communities and to Iberia Technological Institute students.

Another training was carried out specially for cocoa with the technical support from IIAP. IIAP has established a strategic alliance with the project proponent to provide capacitation on different topics including cocoa cultivation. Fifteen participants attended the workshop (see Annex 3). The purpose is to prepare them for a pilot project with 25- 30 rural producers for a future cocoa plantation. The specific size of each area (of each producer) must be defined by the producer, who will assume the cost of fertilizers, labor and others. The project proponent will donate timber seeds from our concession to IIAP (see Annex 4).

San Francisco, Chullachaqui - Yacare among other communities were invited.

- *Promotion of sustainable productive projects*

Brazil nut harvesting is promoted by the project proponent within its own forest areas.

33 local families are hired every year (see Annex 5 for 2018 and Annex 6 for 2019) to collect the nuts. The agreement implies a share from BN sales: around 70% after discounting pro-rata the transportation and commercialization costs. This is a very valuable support for these families, who appreciate that the company has invited them for sharing the benefits of an area that is inside the company forest concession.

Other sustainable productive projects, as cocoa production, are still under evaluation.

- *Implementation of research projects*

Both concessions that are part of the current REDD Project (Chullachaqui and Otorongo, see Annexes 8 and 9) have signed Framework Partnerships with the Superior Educational Institute of Iberia in order to support different applied researches and professional practitioners with the purpose to reduce the productive weaknesses in the forest management and timber transformation, ensuring the national legislation and the economic, social and environmental sustainability. These partnerships may be renewed annually.

In addition, during the current verification period, two students from Forest Engineering and Environment School from the Public Amazonian University of Madre de Dios are developing their thesis and a third one was accepted to do their pre-professional practices in the company facilities.

The thesis is referred to “Shape factor in three timber species: Ana Caspi, Misa and Ishpingo”. As known the shape factor is key to determine commercial volume, very relevant for financial results of the operations and for the economic value of the forests (see Annex 10). In previous years, similar theses were formulated.

In addition, researches implemented within the project area were carried out by recognized international

researchers and published in indexed papers. Mathias Tobler, for instance, published in 2018 in the review “Biological Conservation” a paper called “Do responsible managed logging concessions adequately protect jaguars and other large and medium-sized mammals? Two case studies from Guatemala and Peru”. In 2019, another paper with the conclusions of a research in the project area was published in “Remote Sensing in Ecology and Conservation” called “How does FSC certification affect the acoustically active fauna in Madre de Dios, Peru?” by Marconi Campos- Cerqueira and others.

- *Design of a protection plan for the project area*

A Security Protocol was developed in 2017 for each one of both concessions (see annexes 12 and 13). It included specific mitigation measures against different types of risks such as:

- o Migratory agriculture
- o Illegal hunting
- o Forest fires
- o Illegal non-timber forest products

Also, it described preventive and corrective strategies to solve conflicts. They include:

- o Preventive:
 - Friendly contact
 - Dialogue with neighbours
 - Control and surveillance sites
- o Corrective
 - Legal actions

- *Building / improvement of control and surveillance infrastructure*

Internet connection is being established in the main surveillance and control sites. With this improvement, the forest guards are better equipped for rapid reaction and communication with external support if needed.

- *Periodical patrolling*

A periodical patrolling is carried out by the company as may be seen in Annex 20, that describes a report of a typical patrolling route, describing the vertexes visited, the distance travelled, and the works done. Any key finding is also included in the report and some photos of the activities as evidence too.

- *Forest fire prevention patrolling*

The forest fire prevention has included not only patrolling actions, but also, training actions as a workshop carried out in 2019 with participation of important entities as the Regional Government of Madre de Dios, the San Antonio Abad Public University of Cusco, the Amazonian Public University of Madre de Dios, the

Agrarian Federation of Madre de Dios, OSINFOR (the organism of forest supervision), the Police, the Agrarian Regional Direction and NGOs as World Wildlife Fund (WWF), AIDER, CINCIA and local associations as CHULLACHAQUI YACARÉ (see Annex 15).

- *Land demarcation, border maintenance and signalling*

The maintenance of the REDD+ project borders is a permanent concern for the project proponent. In that sense, every year, we develop periodical works for maintaining the milestones and borders of the project area.

During 2018, Sector Portillo PV2, Vertex 23-24 and 5 km to V1 were cleaned and restored (see Annex 11) and during 2019, seven signboards were settled in the Northern Boundaries of the project area (see Annex 18).

Unfortunately, some local authorities, ignoring that the project area has been granted for forest management and production to project proponent, pretended to give some land rights to third parties, especially farmers and agrarian families.

For this reason, in 2019, the company has submitted formal communications to these authorities informing the boundaries and coordinates of the enabling forest rights, encouraging them to avoid giving any type of land rights overlapping this area. Authorities included are local municipalities, Special Projects, Agrarian Direction, Forest Direction, among others (see Annexes 16 and 17). Even though it has not happened, the communication about the borders was made from a preventive approach as some authorities say that they do not have access to a clear map with the boundaries.

- *Socialization of the REDD+ Project*

In 2020, a meeting was carried out to spread and inform about the REDD+ project, with participation of communal authorities from Portillo and San Francisco. The attendants expressed their favorable opinion towards the project and their interests to be beneficiaries by means of the support of productive projects as agroforestry and other sustainable productive initiatives. They committed to get involved in the design of those up-coming productive projects and both parts, the company and the communities agreed to open a fluid dialog related to the project development (see Annex 19).

- *Dialogues about environmental crimes and legal framework*

A workshop about environmental crimes was carried out in 2019 with 7 participants. A brochure was also designed and shared between participants. It included information on penalties established by the Peruvian laws for each type of crimes, such as:

- o Flora and wildlife depredation
- o Illicit traffic of flora and fauna
- o Environmental Affectation
- o Illicit traffic of forest products

- o Other crimes against forest heritage

Prison of 3 to 6 years are expected in those cases (see Annex 14).

No relevant event that may impact on the GHG emission reductions or removals occurred during the current verification period.

Most of these activities are designed not only to reduce emissions within the project area but also in the leakage belt. Even though that, the project will also monitor the deforestation in the leakage area to make adjustments during project implementation.

The project is being implemented within the same original forest concessions that were validated and working with the same neighboring communities defined in the PD. Some of the activities described above were already being carried out before the project start date but the project allowed to expand the intensity of its scope, while others commenced with the project and, finally, others plan to start and expand when the first carbon incomes flow into the project.

The monitoring of the factors of leakage risk and non-permanence of the project are carried out through a daily satellite supervision, by means of bi-weekly reports for early alerts that the MINAM directs through their GOEBOSQUES platform.

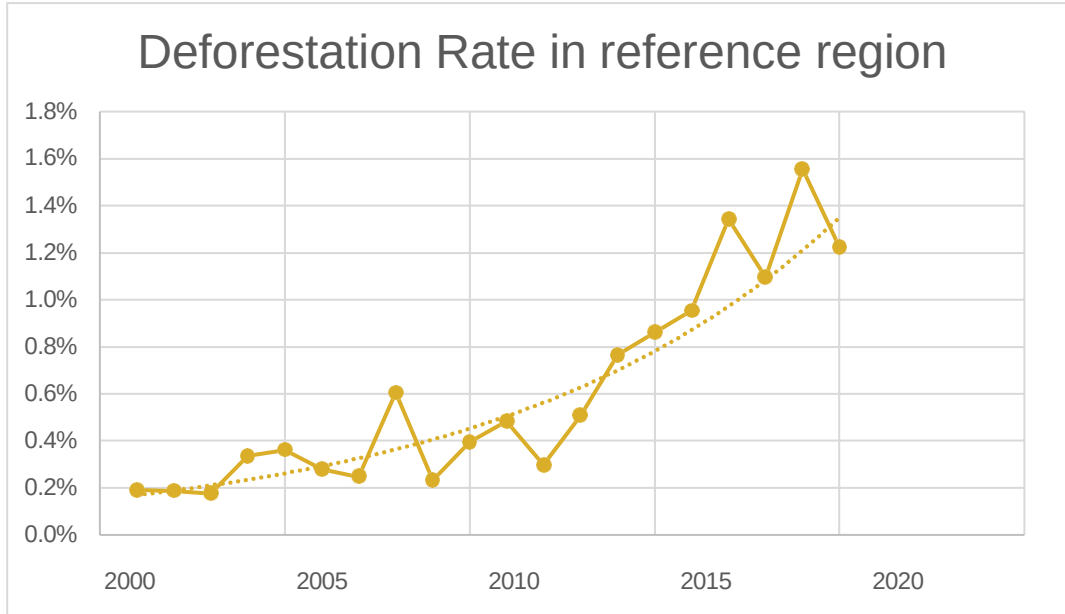
3.2 Deviations

3.2.1 Methodology Deviations

Scarcity factor

This is a deviation from the measurement criteria and procedures established in the methodology. A methodology deviation is required for not using the scarcity factor equations as no geographical modeling of location of deforestation was required. Even though that, as the methodology suggests and a lot of experiences worldwide confirm, the forest transition curve is a pattern that reflects the land use change trends through time with deforestation rates climbing in the first stages with forests mostly undisturbed and with declining rates with remnant forests below 50%. This approach is shared and has been fully described as a typical behavior in Peruvian Amazon, in general, and in the reference region of the project in particular.

For this reason, with near than 80% of area still covered by forests, and with an exponential deforestation rate, this methodology deviation does not affect the principle of conservativeness (It means that this methodological deviation does not have a negative impact on the conservativeness of the quantification of GHG emission reductions or removals). As described in the methodology, scarcity factor appears when remnant forests are around than 50%, which in this case is very far in the short term. The most likely scenario is that rate projections will underestimate real upcoming threats as recent years have showed.



The data is based on official source GEOBOSQUES.

The parameter affected by this deviation is the equation that must be used to model the scarcity factor:

$$f_{scarcity}(t) = \frac{1}{1 + e^{sc_1 \left(sc_2 \frac{area(t, nonForest)}{size_{projectArea}} \right)}} \quad [EQ40]$$

The value adopted for the scarcity factor is 1.

LULC Classes

This is a deviation from the measurement criteria and procedures established in the methodology. To define the LULC classes, we have worked with the official stratification used by the Government of Peru, which are the ecozones. In this case, in the project area and in the reference region, the entire area corresponds to the "Selva Baja" ecozone, so there is only one forest stratum. For LULC classes, there are 6 classes proposed by the Peruvian State, to be consistent with Chapter 2 of the IPCC Guidelines on LULC 2003. The six classes are forest lands, croplands, grazing lands, wetlands, settlements, and other lands in the LULC definitions.

The change in land use that occurs in Madre de Dios is mainly due to self-consumption agriculture (9.1%) and pastures (90.1%), according to the AIDER¹ document (2015) "Motores, agentes and causes of deforestation in the Peruvian Amazon"; conservatively, only a change of use from the forest stratum (Selva ecozone) to the pasture stratum (more conservative land use due to the higher carbon content, see the following table) will be used.

¹ Uploaded to the cloud as "AIDER.2015. Motores, agentes, causas defores."

Table 04. Carbon Pool

Carbon Pool	Pasture ²	Crop ³	Infrastructure ⁴
AGL+BG (tCO ₂ eq)	121.87	69.91	0.00

According to second deviation, the assessment determines a unique deforestation driver (conversion from forest lands to pasture lands), with the following results of total carbon loss.

Table 05. Annual carbon loss by conversion from forest land to pastures

L1: Annual carbon loss by conversion from forest land to pastures [Mg.C/year]	Proportion of gradual carbon loss that causes deforestation or forest degradation, respectively caused by driver L(d).	Total carbon loss caused by deforestation. [MgC/year]	Relative contribution from driver "L1" to deforestation
281796.26	100%	281796.26	1.00
319907.84	100%	319907.84	1.00
360842.63	100%	360842.63	1.00
404423.40	100%	404423.40	1.00
450256.32	100%	450256.32	1.00
497701.17	100%	497701.17	1.00
545834.56	100%	545834.56	1.00
593411.53	100%	593411.53	1.00
638830.59	100%	638830.59	1.00
680106.40	100%	680106.40	1.00

This deviation does not negatively affect the conservative nature of the quantification of GHG emission reductions or eliminations, since the most representative change in use is employed (close to 100%) and at the same time the most conservative, since it has almost double of carbon content. As a result, no modelling is required as the modelling is not going to change the value of net emissions. Modelling process determines where the deforestation is expected to occur within the project area but, as there is only one forest stratum, nevertheless where the deforestation is expected to occur, it will always emit the same volume of tons (as in the whole project area, there is always the same amount of carbon content). For this reason, not modelling does not impact in the net emissions.

In addition, regarding carbon content in logging areas $C_{harvest}(t, i)$, the project only uses official information of the country. In this case, Peru has developed a methodology and time series for annual deforestation and sampling plots for each stratum throughout the Amazonia. Some of the sampling plots in the Selva Baja stratum are located in logging concessions, i.e., logging areas, as may be seen in the following map. The difference in carbon density

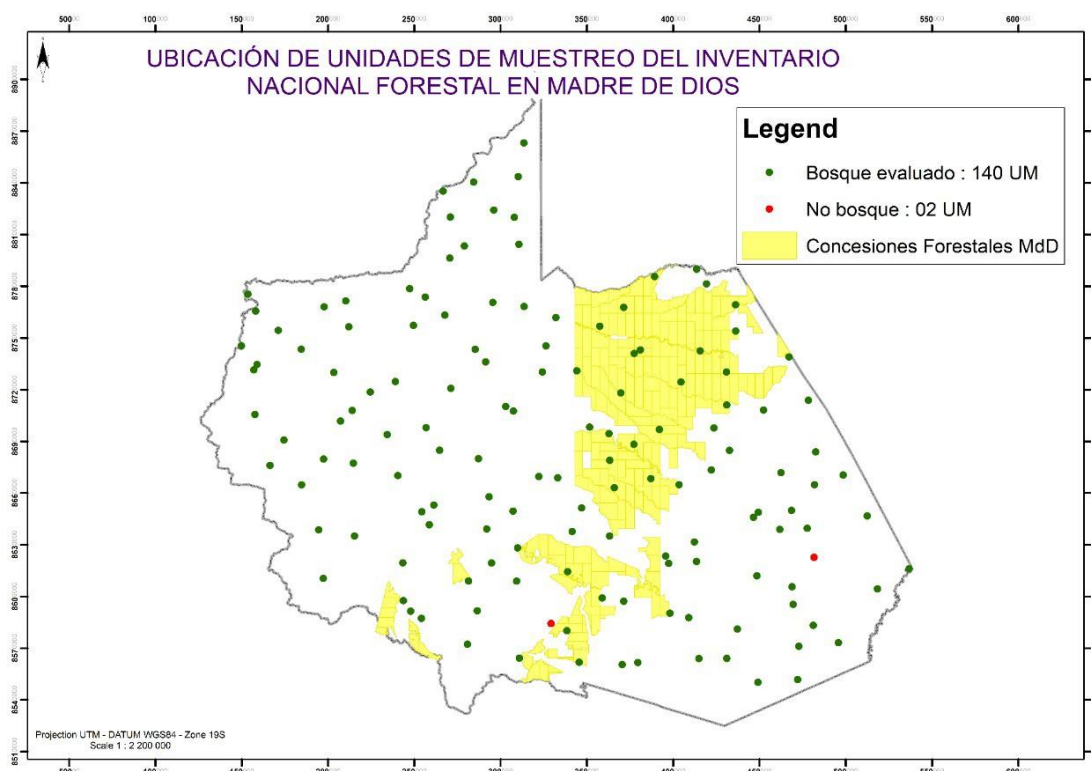
² Ramos & Martinez, 2019. https://www.scielo.sa.cr/scielo.php?pid=S0034-77442020000200440&script=sci_abstract

³ Cuellar & Salazar, 2016. <http://repositorio.inia.gob.pe/handle/20.500.12955/490>

⁴ IPCC 2006 – Chapter 8 Settlements.

of sampling plots in logging areas compared with other areas in the same stratum Selva Baja, are negligible. The annual average logging emissions is 0 0.26 tCO₂eq, which is naturally recovered, especially considering that annual growth in this type of forest is over 5 tCO₂eq, according to IPCC 2006. Said that, and according with Section 8.2.7.1, the project meets with the requirement that sampling plots must be located within logging areas.

MAP 3: LOCATION OF SAMPLING UNITS OF THE NATIONAL FOREST INVENTORY



Leakage

The following deviation was already approved by Verra during validation stage on March 12th, 2021.

To determine the additional or extra time that the deforestation agents will be willing to displace themselves to continue doing its activities, the project has opted for not obtaining that information by applying a social assessment but instead of that, has obtained that information by analyzing real historical pattern of those agents in the past, i.e., how far they have deforested in the past and this value is multiplied times 1.5, as indicated by the methodology.

The reason why the information was not collected by asking deforestation agents directly is because this deforestation is illegal and asking them could be interpreted as an authorization to continue carrying out their illegal activity elsewhere and can even be seen as a form of promote their activities or a relaxation of governance. In any case, the promoter of the project does not agree to give this type of signals or messages and we believe that much less VERRA. According to the VCS standard in section 3.18.2: 1 the most plausible scenario should be applied according to the reality of the project area.

The alternative method (reviewing their historical behavior) is a more realistic approach as it is a proof, not of what they think they would do, but of what they have demonstrated that they did.

In addition, the methodology requires to build the leakage belt as the area where the potential deforestation will be displaced in the project scenario, and it considers that the approach is the maximum willingness to displace their activities from the project area. We maintain that approach as we consider that the leakage is the area where the drivers will have to go if they are not allowed to deforest within the project area in the project scenario. Our hypothesis is that the reason why they would deforest the project area is because it is profitable enough to establish there, their productive activities considering the distance cost to closest markets. So, based on that assumption, we assume that the maximum willingness to displace from the project area is to areas within the reference region that have a similar distance cost (multiplied by 1.5, as requested by the methodology) to closest markets. This may be considered a slight methodology deviation as the reference of maximum value is not related with the distance to project area but the distance to markets.

This deviation does not negatively impact the conservativeness of the quantification of GHG emission reductions or removals.

This deviation only modifies the way of delimiting the leakage belt in section 8.3.2.2, it does not affect any other parameter. The determination of this leak belt can be seen in depth in section 3.2.3 of the updated PD, appendix 15.

Carbon stock measurement

Following VERRA's guidelines on nesting, and the recommendation to align with jurisdictional data and reference levels, the project has employed the official information available at the moment of initiation. Therefore, the method used to measure the average carbon stock in the forest stratum has been based on the National Forest Inventory of Peru. The National Forest Inventory (INF) has established plots throughout the whole Amazon biome, including Madre de Dios Region and even the project area.

Firstly, it is important to consider that the carbon content in the project area is higher than in the Selva Baja stratum, according to the INF data, which is absolutely logical because the project area has a higher degree of protection of forest biodiversity than the rest of the Peruvian Amazon, where the level of logging (legal and illegal) and management techniques are not as responsible as within the project area, one of the oldest FSC certified forest area in Peru. In summary, this is aligned with the objective of the REDD+ project.

Accordingly, the average carbon emissions based on data from the INF is 622 tCO₂/ha, which is a conservative value compared with the data of the own inventory developed by the project proponent. Said inventory was only carried out for commercial timber purposes and therefore only measured a minor part of the carbon stocks.

For instance, in Aguirre et al (2018)⁵, the carbon content in a Peruvian forest has been measured with only

⁵ Aguirre, Z.; W. Quizpe & D. Pinza. 2018. Estimación del carbono acumulado en una parcela permanente de bosque andino en el parque universitario Francisco Vivar Castro, Loja, Ecuador. *Arnaldoa* 25 (3): 939-952. DOI: <http://doi.org/10.22497/>

64% of carbon content in the whole trunk:

Table 06. Carbon content for each part of the tree

Part of the tree	MgC/ha	%
Whole Trunk	17.14	65%
Root	5.142	19%
Canopy	4.285	16%

In the same line, a thesis developed in Ucayali, Peru by Chacon (2020)⁶ compiles different studies and ratifies the above, since the aerial biomass of the whole trunk (commercial + non- commercial trunk) represents in average 65% of the total biomass.

In addition, the INF measured other carbon pools as litter, dead wood and others (logically those carbon pools were not taken into account in the company's commercial inventory). Those represent 24% approximately of total forest biomass in Peru according to Cuellar & Salazar (2016)⁷.

Table 07. Carbon pools from INF

Pool	C/ha	%
Tree	238.3	76%
Herbaceous	2.7	1%
Litter and dead wood	73.6	23%
TOTAL	314.6	

As to the company's commercial timber inventory, in the first place this inventory does not include non-commercial species, which means that it only registered 223 species compared to the INF, which recorded more than 1900 species only in Madre de Dios.

In addition, the company's commercial inventory, being done only for commercial timber purposes, logically only measured the tree trunk up to the first bifurcation of the tree (which means that a part of the trunk, the branches and the tree top are not included in said inventory). On the other hand, the INF measured the whole biomass, including the whole trunk, branches, and non-tree biomass.

Only by adding up the substantial percentage that represent the non-commercial trunk, the branches, the tree top and the non-tree biomass in the total biomass, to the data provided by the company commercial inventory (541 tCO₂/ha), the INF data are largely surpassed.

If we add to the above that the company's commercial inventory only inventoried 223 species, while the INF inventoried more than 1900, the conservativeness principle is even more evident.

Based on all the above, we can conclude that the use of value of INF is significantly conservative compared to the data monitored in the project area.

arnaldoa.253.25307

⁶ "Ecuación para estimar el volumen de la raíz a partir de la relación R/T (raíz/tallo) en brinzales y latizales en especies forestales"

⁷ Cuellar, J. y Salazar, E. 2016. Dinámica del carbono almacenado en los diferentes sistemas de uso de la tierra en el Perú. Instituto Nacional de Innovación Agraria INIA. Lima Perú. 217 p

Transition from non-forest to forest

Transitions from non-forest to forest are not evaluated because there is no official information from the government, however, according to the IPCC (2006), the annual net biomass growth in table 4.9 of the Forest Lands chapter is 3.1 t biomass, 5.68 tCO₂eq, this growth represents the transition from non-forest to forest which is not significant (<0.001), so it is excluded.

Additionally, in a project developed in an area contiguous to ours, the evaluation of Natural Regeneration has been developed in a reference region where both meet the similarities of the comparison variables in Table 3 of the VM0006 methodology, which are deforestation drivers, landscape configuration, economic and socio-cultural conditions, policies and regulations and degrees of urbanization. This project called REDD+ AMAZON GUARDIANS with a project area of 78,489.63 ha and a reference region of 607,152.24 ha, has the following natural regeneration rates:

Table 08. Natural regeneration

Year	Forest to Cropland (ha)	Forest to Pasture (ha)	Forest to Mining (ha)	Forest to Settlement (ha)
2021 - 2030	0.28%	0.62%	0.98%	0

It can be observed that the rate of natural regeneration in the case of forest to Cropland is only 0.28% and in the higher case of forest to Mining it is 0.98%, being non-significant, they are conservatively excluded.

3.2.2 Project Description Deviations

Community Indicator

One indicator proposed in the PD was the family incomes. After a revision and considering the pandemic context, the incomes of surrounding communities are not completely under the control of the project proponent, independently that the project proponent will provide technical support for promoting sustainable agrarian production.

The income depends not only on productivity but also depend on prices, who are affected by market supply and demand factors. Extreme conditions as the pandemic may affect production. In that sense, the project promotes a new indicator in replace of that one:

- o Productivity (production per hectare) for crops specifically supported by project proponent.

Project Team

Mr. Antonio Lopez is not working in project proponent anymore for personal reasons. His position has been taken by Ms. Firella Pumarrumi Sinarahua, who is now in charge of social interrelations with neighboring communities but now, Mr. Lopez is back again working for the project proponent.

The changes as a result of the deviations (which do not affect the applicability of the methodology, the additionality or the suitability of the reference hypothesis) and the different responses to the findings of section 3, as a result of the audit, will be disclosed in appendix 15 "Climate section update".

3.3 Grouped Projects

This is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data/parameter [EA1]:	CF
Data unit:	Mg C (Mg DM)-1
Description:	Carbon fraction of dry matter in wood
Sources of data:	IPCC guidelines - Default value of 0.47
Value applied:	0.47 (Tropical region; wood, tree d ≥ 10 cm)
Justification of choice of data or description of measurement methods and procedures applied:	According to the IPCC, the default value for tropical region is 0.47 Mg C (Mg DM)-1.
Purpose of data:	Calculation of baseline emissions, Calculation of project emissions; Determination of baseline scenario, Calculation of leakage
Comments:	1 Mg C (Mg DM)-1 <> 1 t C (t DM)-1

Data/parameter [EA6]:	sc1
Data unit:	[-]
Description:	First shape factor for the forest scarcity equation; steepness of the decrease in deforestation rate (greater is steeper).
Sources of data:	N/A

Value applied:	Not applicable as the % of remnant forest cover is more than 50% of original forest cover, as has been explained in the methodological deviation (section 3.1.6 of the PD).
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of data:	N/A
Comments:	N/A

Data/parameter [EA7]:	sc2
Data unit:	[-]
Description:	Second shape factor for the forest scarcity equation; relative deforested area at which the deforestation rate will be 50% of the initial deforestation rate.
Sources of data:	N/A
Value applied:	Not applicable as the % of remnant forest cover is more than 50% of original forest cover, as has been explained in the methodological deviation (section 3.1.6 of the PD).
Justification of choice of data or description of measurement methods and procedures applied:	N/A
Purpose of data:	N/A
Comments:	N/A

Data/parameter [EA8]:	wwf(ty)
Data unit:	[-]
Description:	Fraction of carbon in harvested wood products that are emitted immediately because of mill inefficiency for wood class <i>ssee</i> . This can be estimated by multiplying the applicable fraction to the total amount of carbon in different harvested wood product category.
Sources of data:	The default applicable fraction is 24% and 19% respectively for developing and developed countries (Winjum et al. 1998).
Value applied:	24% for being a developing country.
Justification of choice of data or description of measurement methods and procedures applied:	Winjum et al. 1998 states that the default fraction is 24% for developing countries.

Purpose of data:	Calculation of baseline emissions, Calculation of project emissions; Determination of baseline scenario, Calculation of leakage
Comments:	1 Mg C (Mg DM)-1 <> 1 t C (t DM)-1

Data/parameter [EA8]:	wwf(ty)
Data unit:	[-]
Description:	Fraction of carbon in harvested wood products that are emitted immediately because of mill inefficiency for wood class <i>ssee</i> . This can be estimated by multiplying the applicable fraction to the total amount of carbon in different harvested wood product category.
Sources of data:	The default applicable fraction is 24% and 19% respectively for developing and developed countries (Winjum et al. 1998).
Value applied:	24% for being a developing country.
Justification of choice of data or description of measurement methods and procedures applied:	Winjum et al. 1998 states that the default fraction is 24% for developing countries.
Purpose of data:	Calculation of project emissions.
Comments:	Any new updates from locally generated results can be used instead of the default values.

Data/parameter [EA9]:	slp(ty)
Data unit:	[-]
Description:	Proportion of short-lived products
Sources of data:	Default values are 0.2, 0.1, 0.4 and 0.3 respectively for wood class <i>ssee</i> , i.e., sawn wood, wood-based panel, paper and paper boards and other industrial round woods as described in Winjum et al. (1998).
Value applied:	0.2 for being sawn wood
Justification of choice of data or description of measurement methods and procedures applied:	Winjum et al. (1998) provides the above values for sawn wood, wood-based panel, paper/paper boards and industrial roundwood
Purpose of data:	Calculation of project emissions
Comments:	Any new updates from locally generated results can be used instead of the default values. The methodology assumes that all other classes of wood products are emitted within 5 years.

Data/parameter [EA10]:	fo(ty)
Data unit:	[-]
Description:	Fraction of carbon that will be emitted to the atmosphere between 5 and 100 years of harvest for wood class <i>ssee</i> .
Sources of data:	See Table 19 (Winjum et al. 1998)
Value applied:	0.85 for being Sawn wood from a tropical forest region
Justification of choice of data or description of measurement methods and procedures applied:	Winjum et al. (1998) provides these values for the fraction of carbon that will be emitted into the atmosphere between 5 and 100 years after harvest for tropical wood classes.
Purpose of data:	Calculation of project emissions
Comments:	Any new updates from locally generated results can be used instead of the default values

Data/parameter [EA11]:	pwood,j																								
Data unit:	[Mg DM m-3]																								
Description:	Average basic wood density of species or species group <i>RR</i>																								
Sources of data:	GPG-LULUCF Table 3A.1.9 and Woods of Peru from the Research Institute of the Peruvian Amazon (IIAP) http://www.iiap.org.pe/Upload/Publicacion/CDinvestigacion/inia/inia-p4/inia-p4-02.htm More details in the excel spreadsheet.																								
Value applied:	<table border="1"> <tbody> <tr> <td><i>Apuleia leiocarpa</i> (Vogel) J.F. Macbr.</td><td>0.7</td></tr> <tr> <td><i>Hymenaea oblongifolia</i> Huber</td><td>0.8</td></tr> <tr> <td><i>Cedrela odorata</i> L.</td><td>0.42</td></tr> <tr> <td><i>Myroxylon balsamum</i> (L.) Harms</td><td>0.78</td></tr> <tr> <td><i>Amburana cearensis</i> (Allemão) A.C. Sm.</td><td>0.43</td></tr> <tr> <td><i>Clarisia racemosa</i> Ruiz & Pav.</td><td>0.59</td></tr> <tr> <td><i>Couratari macrosperma</i> A.C. Sm.</td><td>0.54</td></tr> <tr> <td><i>Aspidosperma macrocarpon</i> Mart.</td><td>0.67</td></tr> <tr> <td><i>Manilkara bidentata</i> (A. DC.) A. Chev.</td><td>0.87</td></tr> <tr> <td><i>Dipteryx odorata</i> (Aubl.) Willd.</td><td>0.91</td></tr> <tr> <td><i>Handroanthus serratifolius</i> (Vahl) S.O. Grose</td><td>0.92</td></tr> <tr> <td><i>Cedrelinga cateniformis</i> (Ducke) Ducke</td><td>0.45</td></tr> </tbody> </table>	<i>Apuleia leiocarpa</i> (Vogel) J.F. Macbr.	0.7	<i>Hymenaea oblongifolia</i> Huber	0.8	<i>Cedrela odorata</i> L.	0.42	<i>Myroxylon balsamum</i> (L.) Harms	0.78	<i>Amburana cearensis</i> (Allemão) A.C. Sm.	0.43	<i>Clarisia racemosa</i> Ruiz & Pav.	0.59	<i>Couratari macrosperma</i> A.C. Sm.	0.54	<i>Aspidosperma macrocarpon</i> Mart.	0.67	<i>Manilkara bidentata</i> (A. DC.) A. Chev.	0.87	<i>Dipteryx odorata</i> (Aubl.) Willd.	0.91	<i>Handroanthus serratifolius</i> (Vahl) S.O. Grose	0.92	<i>Cedrelinga cateniformis</i> (Ducke) Ducke	0.45
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Justification of choice of data or description of measurement methods and procedures applied:	IPCC table 3A. 1.9-2 provides average basic wood densities for multiple species in Tropical America. In the same way that Research Institute of the Peruvian Amazon																								
Purpose of data:	Calculation of project emissions																								

Comments:	When no species-specific or species-group specific densities are available, an average representative density may be used for all species or species groups.
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4.2 Data and Parameters Monitored

Sizes, areas, and transitions

Data / Parameter [MN1]	Size _{projectArea} , Size _{leakageArea} , Size _{ReferenceRegion} , Size _{ReferenceForest}			
Data unit	[ha]			
Description	Size of project area, leakage area, reference region.			
Source of data	Project design			
Description of measurement methods and procedures to be applied	Coverage and demarcations will be monitored and created through the use of satellite imagery.			
Frequency of monitoring/recording	Size _{projectArea} and Size _{leakageArea} may be adjusted during crediting period per the rules for grouped projects and updated at verification, but only for the additional instances that were added after the project start date. Permanent verification of the area of the project surfaces.			
Value monitored	Size _{projectArea}	Size _{leakageArea}	Size _{ReferenceRegion}	Size _{ReferenceForest}
	183,015.29	232,114.34	516,554.22	424,223.28
Monitoring equipment	Satellite imagery			
QA/QC procedures to be applied	Raster files were converted to vectors. Area was calculated for each vector and compared to calculations based on raster file.			
Purpose of the data	Calculation of baseline emissions, Calculation of project emissions; Determination of baseline scenario, Calculation of leakage emissions			
Calculation method	Multiplication of number of pixels (30m by 30m) in each region by 0.09 hectares pixel ⁻¹ for area in hectares.			
Comments	N/A			

Data / Parameter [MN2]	$\Delta \text{area}_{\text{projectAreaEAH}, \text{projectScenario}(t, i)}$
Data unit	[ha yr ⁻¹]
Description	Hectares undergoing transition <i>ii</i> within the project area, excluding ANR and harvest areas, under the project scenario during year <i>ss</i> . [ha yr ⁻¹]. Section 8.2.3

Source of data	Remote sensing analysis								
Description of measurement methods and procedures to be applied	Follow the procedures described in Section 3.2.2								
Frequency of monitoring/recording	At least once before verification								
Value monitored	$\frac{((183015.29 - 9346.001) / 183015.29 * D_{\text{projectArea}} \text{projectScenario.DF}^{(t)})}{((183015.29 - 12551.16) / 183015.29 * D_{\text{projectArea}} \text{projectScenario.DF}^{(t)})}$ $\frac{((183015.29 - 12773.83) / 183015.29 * D_{\text{projectArea}} \text{projectScenario.DF}^{(t)})}{((183015.29 - 12773.83) / 183015.29 * D_{\text{projectArea}} \text{projectScenario.DF}^{(t)})}$								
	<table border="1"> <thead> <tr> <th>Year</th><th>$\Delta \text{area}_{\text{projectAreaEAH, projectScenario}(t, i)}$</th></tr> </thead> <tbody> <tr> <td>2018</td><td>0</td></tr> <tr> <td>2019</td><td>0</td></tr> <tr> <td>2020</td><td>0</td></tr> </tbody> </table>	Year	$\Delta \text{area}_{\text{projectAreaEAH, projectScenario}(t, i)}$	2018	0	2019	0	2020	0
Year	$\Delta \text{area}_{\text{projectAreaEAH, projectScenario}(t, i)}$								
2018	0								
2019	0								
2020	0								
Monitoring equipment	Software GIS, images Landsat,								
QA/QC procedures to be applied	Field work or high-resolution images will be used to assess accuracy of results initially obtained. The application will be based on statistically robust parameters.								
Purpose of the data	Calculation of project emissions								
Calculation method	Multiplication of number of pixels (30m by 30m) in each region by 0.09 hectares pixel-1 for area in hectares.								
Comments	N/A								

Data parameter [MN3]	$\Delta \text{area}_{\text{projectAreaEAH, BaselineScenario}(t, i)}$
Data unit	[ha yr ⁻¹]
Description	Hectares undergoing transition <i>ii</i> within the project area, excluding the ANR area, and harvest areas, under the baseline scenario for year <i>ss</i> .
Source of data	Land-use change for Geobosques (MINAM)
Description of measurement methods and procedures to be applied	Follow the procedures described in Section 3.2.1
Frequency of monitoring/recording	At least once before every baseline. For added instances, may be recalculated at verification.

Value monitored	Year	$\Delta area_{projectAreaEAH,BaselineScenario}(t, i)$
	2018	2138.94
	2019	2383.41
	2020	2684.87
	$((183015.29 - 9346.001) / 183015.29 * D_{projectAreaBaselineScenario.DF^{(t)}})$ $((183015.29 - 12551.16) / 183015.29 * D_{projectAreaBaselineScenario.DF^{(t)}})$ $((183015.29 - 12773.83) / 183015.29 * D_{projectAreaBaselineScenario.DF^{(t)}})$	
Monitoring equipment	Software GIS, Landsat images	
QA/QC procedures to be applied	Baseline scenario is defined once at validation. As this is not a grouped project, no new instances may be added.	
Purpose of the data	Calculation of baseline emissions; Determination of baseline scenario	
Calculation method Comments		
Purpose of the data	Multiplication of number of pixels (30m by 30m) in each region by 0.09 hectares pixel-1 for area in hectares.	

Data / Parameter [MN4]	$\Delta area_{projectAreawithANR,BaselineScenario}(t, i)$
Data unit	[ha yr ⁻¹]
Description	Hectares undergoing transition <i>i</i> within the leakage area under the project scenario for year <i>t</i>
Source of data	Land-use change modeling
Description	Follow the procedures described in Section 8.1.5.4
Frequency of monitoring/recording	At least once before every baseline. For added instances, may be recalculated at verification.
QA/QC procedures to be applied	-Not applicable as the project does not implement this activity (ANR)
Comments	Not applicable because ANR not included in project activity

Data / Parameter [MN5]	$\Delta area_{leakageArea,projectScenario}(t, i)$
Data unit	[ha yr ⁻¹]

Description	Hectares undergoing transition <i>ii</i> within the leakage area under the project scenario for year <i>ss</i>	
Source of data	Remote sensing analysis	
Description of measurement methods and procedures to be applied	Coverage and demarcations will be monitored and created through the use of satellite imagery.	
Frequency of monitoring/recording	At least once before verification	
Value monitored	D _{leakageArea,projectScenario} (t,i)	
	Year	Δ _{area} _{leakageArea,projectScenario} (t, i)
	2018	2900.04
	2019	3292.62
	2020	3714.37
Monitoring equipment	Software GIS, images Landsat	
QA/QC procedures to be applied	Field work or high-resolution images will be used to assess accuracy of results initially obtained. The application will be based on statistically robust parameters.	
Purpose of the data	Calculation of project emissions	
Calculation method	Multiplication of number of pixels (30m by 30m) in each region by 0.09 hectares pixel-1 for area in hectares.	
Comments	N/A	

Data / Parameter [MN6]	$\Delta area_{leakageArea,baselineScenario}(t, i)$
Data unit	[ha yr ⁻¹]
Description	Hectares undergoing transition ii within the leakage area under the baseline scenario during year ss
Source of data	Land use change for GEOBOSQUES (MINAM)
Description of measurement methods and procedures to be applied	Coverage and demarcations will be monitored and created through the use of satellite imagery.
Frequency of monitoring/recording	Once every baseline update. May also be updated at the time of instance inclusion that requires new leakage area.

Value monitored	$D_{leakageArea,baselineScenario}(t,i)$	
	Year	$\Delta area_{leakageArea,baselineScenario}(t, i)$
	2018	2858.76
	2019	3245.40
	2020	3660.67
Monitoring equipment	Software GIS, Landsat images	
QA/QC procedures to be applied	Baseline scenario is defined once at validation. As this is not a grouped project, no new instances may be added.	
Purpose of the data	Calculation of project emissions	
Calculation method	Multiplication of number of pixels (30m by 30m) in each region by 0.09 hectares pixel-1 for area in hectares.	

Data / Parameter [MN7]	$\Delta area_{historical} (CS_1 \rightarrow CS_2, t_1 \rightarrow t_2)$	
Data unit	[ha yr ⁻¹]	
Description	Area of transition from LULC class or forest stratum 1 to 2 from time 1 to 2 during the historical reference period	
Source of data	Remote sensing analysis for Geobosques (MINAM)	
Description of measurement methods and procedures to be applied	Calculate based on the remote sensing-based classification and stratification procedures detailed in Section 3.2.2	
Frequency of monitoring/recording	At least once before every baseline update	
Value monitored	N/A	
Monitoring equipment	Software GIS, Landsat images	
QA/QC procedures to be applied	75 pixels in forest stratum and 75 pixels in non-forest stratum will be analyzed with high resolution images	
Purpose of the data	Calculation of project emissions	
Calculation method	Multiplication of number of pixels (30m by 30m) in each region by 0.09 hectares pixel-1 for area in hectares.	
Comments	N/A	

Data / Parameter [MN9]	$area_{historical} (CS_1, t_1)$	
Data unit	[ha]	
Description	Total area of LULC class or forest stratum 1 at time 1	
Source of data	Remote sensing analysis for Geobosques (MINAM)	
Description of measurement		

methods and procedures to be applied	Calculate based on the remote sensing-based classification and stratification procedures detailed in Section 3.2.2
Frequency of monitoring/recording	At least once before every baseline update
Value monitored	N/A
Monitoring equipment	Software GIS, Landsat images
QA/QC procedures to be applied	75 pixels in forest stratum and 75 pixels in non-forest stratum will be analyzed with high resolution images
Purpose of the data	Calculation of project emissions
Calculation method	Multiplication of number of pixels (30m by 30m) in each region by 0.09 hectares pixel-1 for area in hectares.
Comments	N/A

Data / Parameter [MN10]	Area _{biomassloss(i)}
Data unit	[ha yr ⁻¹]
Description	Total annual area of LULC class ⁱ that was cleared for creating firebreaks
Source of data	Records of implemented activities or management plan
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	At least once before verification
QA/QC procedures to be applied	Remote sensing and field assessment to measure the distance and width of fire belts
Comments	Not applicable because biomass loss for creating firebreaks not included in project activity

Data / Parameter [MN11]	Area _{firebiomassloss(i)}
Data unit	[ha yr ⁻¹]
Description	Annual area of forest stratum ⁱ that was cleared by using prescribed burning
Source of data	Records of implemented activities or management plan
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	At least once before verification
QA/QC procedures to be applied	Remote sensing and field assessment to measure the distance and width of fire belts

Comments	Not applicable because biomass loss for creating firebreaks not included in project activity
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Data / Parameter [MN12]	$area_{fireBiomassLoss,ANR}(t, i)$
Data unit	[ha]
Description	Area of biomass removed by prescribed burning within ANR stratum i during year t
Source of data	Records of implemented activities or management plan
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	At least once before verification
Value monitored	N/A
QA/QC procedures to be applied	Not applicable because ANR is not included in project activity
Comments	Not applicable because ANR not included in project activity

Data / Parameter [MN13]	$area_{projectAreaWithANR,projectScenario}(t, i)$
Data unit	[ha]
Description	Amount of land on which ANR activities are planned under the project scenario for year t and in stratum i
Source of data	Records of implemented activities or management plan
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	At least once before verification
Value monitored	N/A
QA/QC procedures to be applied	Not applicable because ANR is not included in project activity
Comments	Not applicable because ANR not included in project activity

Data / Parameter [MN14]	$Area_{harvest}(t, i)$
Data unit	[ha]
Description	Area of forest in harvest stratum ii that is harvested at time ss .

Source of data	PGMF	
Description of measurement methods and procedures to be applied	Forest analysis described in FMP	
Frequency of monitoring/recording	At least once before verification	
Value monitored	Year	Area harvest (t, i)
	2018	9,346.001
	2019	12,551.160
	2020	12,773.830
Monitoring equipment	GPS	
QA/QC procedures to be applied	Every 5 years in the general forest management plan, and annual operational plans.	
Purpose of the data	For to EQ116 and EQ117.	
Calculation method	The area is divided into 20 felling plots, which are four divisions per five years and is harvested on a consecutive annual basis as determined by the project proponent.	
Comments	N/A	

Data / Parameter [MN15]	Area _{projectArea} withHarvest,ProjectScenario(t, i)	
Data unit	[ha yr ⁻¹]	
Description	Size of strata <i>ii</i> within the project area with harvest activities during year <i>ss</i> under the project scenario.	
Source of data	PGMF	
Description of measurement methods and procedures to be applied	Forest analysis described in FMP	
Frequency of monitoring/recording	At least once before verification	
Value monitored	Year	Area _{projectArea} withHarvest,ProjectScenario(t, i)
	2018	9,346.001
	2019	12,551.160
	2020	12,773.830
Monitoring equipment	GPS	
QA/QC procedures to be applied	Every 5 years in the general forest management plan, and annual operational plans.	
Purpose of the data	Calculation of project emissions	
	The area is divided into 20 felling plots, which are four divisions per five years and	

Calculation method	is harvested on a consecutive annual basis as determined by the project proponent.
Comments	N/A

Data / Parameter [MN16]	Area _{projectArea} withHarvest,BaselineScenario(t, i)									
Data unit	[ha yr ⁻¹]									
Description	Hectares undergoing transition <i>ii</i> within the harvest areas under the baseline scenario during year <i>ss</i> .									
Source of data	Own Forest Management Plan									
Description of measurement methods and procedures to be applied	Through an exploratory inventory									
Frequency of monitoring/recording	At least once before every baseline update									
Value monitored	((Area _{projectArea} withHarvest,ProjectScenario(t,i)/183015.29)* D _{projectArea} baselineScenario.DF(t)) <table><tr><td>Year</td><td>Area_{projectArea}withHarvest,BaselineScenario(t, i)</td></tr><tr><td>2018</td><td>115.11</td></tr><tr><td>2019</td><td>175.49</td></tr><tr><td>2020</td><td>201.46</td></tr></table>		Year	Area _{projectArea} withHarvest,BaselineScenario(t, i)	2018	115.11	2019	175.49	2020	201.46
Year	Area _{projectArea} withHarvest,BaselineScenario(t, i)									
2018	115.11									
2019	175.49									
2020	201.46									
Monitoring equipment	GPS, software & hardware, laptop, compass									
QA/QC procedures to be applied	Every 5 years in the general forest management plan, and annual operational plans.									
Purpose of the data	Calculation of baseline emissions; Determination of baseline scenario									
Calculation method	(Area _{projectArea} withHarvest,ProjectScenario(t,i)/183015.29)* D _{projectArea} baselineScenario(t, i)									
Comments	N/A									

Data / Parameter [MN17]	$BetaReg_{DF}(t)$ and $BetaReg_{DG}(t)$
Data unit	[ha yr ⁻¹]
Description	Beta regression model describing the relationship between time and deforestation/degradation rate in the reference region during the historical reference period.
Source of data	Historic forest degradation and deforestation modeling

Description of measurement methods and procedures to be applied	Procedure described in Section 8.1.5.1 or similar approach from peer-reviewed scientific literature.		
Frequency of monitoring/recording	At least once every baseline update		
Value monitored	2007	614.76	
	2008	781.81	
	2009	989.50	
	2010	1245.87	
	2011	1559.07	
	2012	1935.23	
	2013	2374.39	
	2014	2866.50	
	2015	3397.49	
	2016	3963.36	
	2017	4570.12	
	2018	5224.81	
	2019	5931.44	
	2020	6690.42	
	2021	7498.45	
	2022	8348.24	
	2023	9227.92	
	2024	10120.37	
	2025	11002.50	
	2026	11844.62	
2027	12609.92		
Monitoring equipment	Statistical Software R-STUDIO and Excel.		
QA/QC procedures to be applied	Several types of links were used in Rstudio and the best model was chosen.		
Purpose of the data	Calculation of baseline emissions, Determination of baseline scenario		
Calculation method	Applying a Beta Regression to historical values		
Comments	N/A		

Locations, descriptions, qualitative and social data

Data / Parameter [MN18]	Area under agricultural intensification
Data unit	[ha]
Description	Size of the area of agricultural intensification separated for each agricultural intensification measure

Source of data	Participatory rural appraisals
Description	Calculate based on areas of cropland in the leakage and project areas
Frequency of monitoring/recording	At least once before verification
QA/QC procedures to be applied	The project does not implement agricultural intensification
Comments	Not applicable because agricultural intensification activities not included in project activity

Data on drivers and actions

Data / Parameter [MN27]	CT _{baseline} (h, j, ty, t)			
Data unit	[m³ yr ⁻¹]			
Description	Annually extracted volume of harvested timber round-wood for commercial on-sale under the baseline scenario during harvest ^h by species j and wood product class ty during year t			
Source of data	1. Participatory rural appraisals conducted by the project proponent. 2. Recent (<10 yr) literature in the reference region 3. Recent (<10 yr) literature in an area similar to the reference region 4. Recent (<10 yr) non-peer reviewed reports by local organizations			
Description of measurement methods and procedures to be applied	Cabinet work based on census results and legal minimum allowed DBH			
Frequency of monitoring/recording	At least once before every baseline update			
Value monitored	<table><tr><td>CT_{baseline} (h, j, ty, t)</td></tr><tr><td>252.15</td></tr></table>		CT _{baseline} (h, j, ty, t)	252.15
CT _{baseline} (h, j, ty, t)				
252.15				
Monitoring equipment	Computers, software, diametric ribbon, hypsometer, others			
QA/QC procedures to be applied	A field brigade re-measures a percentage of measured trees			
Purpose of the data	Calculation of baseline emissions, Determination of baseline scenario			
Calculation method	Σ ((π * DBH²)/4) * h for commercial species with DBH > minimum allowed			
Comments	N.A.			

Data / Parameter [MN29]	$CT_{project}(h, j, ty, t)$
Data unit	$[m^3 yr^{-1}]$

Description	Annually extracted volume of harvested timber round-wood for commercial on-sale inside the project area under the project scenario during harvest h by species j and wood product class ty during year t .
Source of data	Project design, surveys, statistical records.
Description of measurement methods and procedures to be applied	Cabinet work based on census results and legal minimum allowed DBH
Frequency of monitoring/recording	At least once before verification
Value monitored	See the Excel "Monitoring Report – Net carbon y VCU´s - Jaguar"
Monitoring equipment	Computers, software, diametric ribbon, hypsometer, others
QA/QC procedures to be applied	A field brigade re-measures a percentage of measured trees
Purpose of the data	Calculation of project emissions
Calculation method	$\Sigma ((\pi * DBH^2)/4) * h$ for commercial species with DBH > minimum allowed
Comments	N/A.

Data / Parameter [MN33]	Contribution _{DF} (d) and Contribution _{DG} (d)
Data unit	[-]
Description	Relative contribution of driver i respectively to total deforestation and forest degradation.
Source of data	LULC maps and statistics from GEOBOSQUES combined with Beta Regression. Methodology
Description of measurement methods and procedures to be applied	Application of the methodology based on GEOBOSQUES Data
Frequency of monitoring/recording	At least once before baseline update.
Value monitored	Contribution _{DF} (d): 1.00
Monitoring equipment	N/A.
QA/QC procedures to be applied	A driver analysis is done again to assess the contribution.
Purpose of the data	Calculation of baseline emissions, Determination of baseline scenario
Calculation method	$contribution_{DF}(i) = \frac{proportion_{DF}(d) \cdot L(d)}{\Delta C_{DF}}$

Comments	See Workbook Calculations
Data / Parameter [MN34]	RelativeDriverImpact _{DF} (t,d) and RelativeDriverImpact _{DG} (t,d)
Data unit	[-]
Description	Relative impact of the geographically unconstrained driver <i>cc</i> at time <i>ss</i> of the crediting period respectively on deforestation and forest degradation.
Source of data	Not applicable as no geographically unconstrained driver has been identified in the baseline scenario
Measurement procedures	N/A
Frequency of monitoring/recording	At least once before baseline update.
Value monitored	N/A
QA/QC procedures to be applied	N/A
Comments	N/A

Data / Parameter [MN35]	leakage _{unconstrained} (d)
Data unit	[-]
Description	Leakage cancellation rate for avoiding deforestation/degradation from geographically unconstrained drivers.
Source of data	Valid sources to substantiate a smaller leakage rate include social assessments, scientific literature, and reports from civil society or governments. Sources must be reliable and based on scientific methods and a good statistical design.
Measurement procedures	N/A
Frequency of monitoring/recording	At least once before baseline update.
Value monitored	A default rate of 100% was used as recommended by the methodology.
Monitoring equipment	N/A
QA/QC procedures to be applied	Not applicable
Comments	Not applicable.

Data / Parameter [MN36]	Effectiveness (<i>a</i> , <i>d</i>)
Data unit	[-]
Description	Effectiveness of every project activity <i>a</i> in decreasing any driver of deforestation “ <i>d</i> ” relative to that driver’s contribution to deforestation and forest degradation,
Source of data	Relevant academic literature or documented expert opinion.

Description of measurement methods and procedures to be applied	VM0006-REDD-Mosaic-Methodology-v2.2 Section 8.2 - Project emissions.
Frequency of monitoring/recording	At least once before baseline update.
Value monitored	Alternative livelihoods: 0.312 Legal recognition of the land tenure status: 0.040 Demarcation and forest protection: 1.000
QA/QC procedures to be applied	Monitoring of the development of activities.
Comments	N/A

Data / Parameter [MN48]	E_{forest}
Data unit	[t CO ₂ e]
Description	Emission factor related to leakage.
Source of data	1. If comprehensive national-level statistics on biomass densities are available, E_{forest} must be calculated based on the average biomass of the country. 2. If local data is not available, sources of the data allowed are (1) academic research papers and (2) studies and reports published by the forestry administration or other organizations, including the FAO's Forest Resource Assessment reports, (3) the upper range of biomass in the GPG-LULUCF (2003) Table 3A.1.2.
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	At least once before verification
QA/QC procedures to be applied	Not applicable
Comments	Not applicability.

Data on organic matter and carbon densities

Data / Parameter [EA2]	Carbon stock of the sources in the forest stratum.
Data unit	tCO ₂ e / ha
Description	Carbon stock by stratum in baseline before deforestation.
Source of data	https://redd.unfccc.int/files/nref_peru_final.pdf (2021).
Description of measurement methods and procedures to be applied	Calculations were done using EValidator tool built by US Forest Service in the context of National Forest Inventory, considering a statistical design for sampling of INFFS.

Frequency of monitoring/recording	At least once before verification		
Value monitored		t C/ha	tCO ₂ e/ha
	AGL	116.47	427.07
	BG	53.30	195.44
Monitoring equipment	Literature review		
QA/QC procedures to be applied	Peru National Forest and Wildlife Inventory.		
Purpose of the data	Calculation of baseline emissions, Calculation of project emissions; Determination of baseline scenario		
Calculation method	N/A		
Comments	N/A		

Data / Parameter [MN49]	$OM_o(i)$
Data unit	[Mg DM ha ⁻¹]
Description	Plant-derived organic matter of LULC class or forest stratum i in pool o. [Mg DM ha ⁻¹]
Source of data	Field measurements using sampling plots in forest strata or LULC classes.
Description of measurement methods and procedures to be applied	The average biomass stock density in applicable organic matter pools: aboveground tree – $OM_{AGT}(i)$, aboveground non-tree – $OM_{AGNT}(i)$, lying dead wood – $OM_{LDW}(i)$, standing dead wood $OM_{SDW}(i)$, belowground $OM_{BG}(i)$, and soil organic matter $OM_{SOM}(i)$
Frequency of monitoring/recording	At least once before every baseline update
Value monitored	Follow uncertainty deduction procedures described in methodology.
Monitoring equipment	Re-measure plots by independent teams.
QA/QC procedures to be applied	Summed across multiple pools and divided into $OM_{plant}(i)$ and $OM_{soil}(i)$
Purpose of the data	Calculation of baseline emissions, Calculation of project emissions; Determination of baseline scenario
Calculation method	N/A
Comments	N/A

Data / Parameter [MN50]	Proportion _{DF} (d) and Proportion _{DG} (d)
Data unit	[-]

Description	Proportion of the gradual carbon loss that leads to deforestation or forest degradation, respectively, due to driver d						
Source of data	Estimate using the procedure detailed in Table 9.						
Description of measurement methods and procedures to be applied	N/A						
Frequency of monitoring/recording	At least once before every baseline update						
Value monitored	<table><tr><th>Driver</th><th>$proportion_{DF}(i)$</th><th>$proportion_{DG}(i)$</th></tr><tr><td>1. Conversion of forest land to cropland</td><td>100%</td><td>0%</td></tr></table>	Driver	$proportion_{DF}(i)$	$proportion_{DG}(i)$	1. Conversion of forest land to cropland	100%	0%
Driver	$proportion_{DF}(i)$	$proportion_{DG}(i)$					
1. Conversion of forest land to cropland	100%	0%					
Monitoring equipment	N/A						
QA/QC procedures to be applied	When updating the baseline, the proportion must be set according to the methodology.						
Purpose of the data	Calculation of baseline emissions, Calculation of project emissions; Determination of baseline scenario						
Calculation method	N/A						
Comments	N/A						

Data / Parameter [MN51]	$C(t, i)$
Data unit	[Mg C ha ⁻¹ yr ⁻¹]
Description	Carbon stock density at time in stratum (AGL+BG)
Source of data	Estimate within the biomass inventory plots
Description of measurement methods and procedures to be applied	Forest: 169.78 Pasture: 31.24
Frequency of monitoring/recording	At least once before verification
Value monitored	N/A
QA/QC procedures to be applied	In each verification apply the most updated bibliography.
Comments	N/A
Data / Parameter [MN52]	$f_{allometric}(y)$
Data unit	Equation
Description	Allometric relationship to convert a tree metric such as DBH or tree height into biomass

Source of data	Forest National Inventory
Measurement procedures:	Algometric equations were used to calculate aboveground biomass by ecozone: $AGB.t = \rho * \exp(-1.499 + 2.148 * \ln(dap) + 0.207 * \ln(dap)^2 - 0.0281 * \ln(dap)^3)$ (INFFS 2019)
Frequency of monitoring/recording	At least once before every baseline update
Value monitored	$AGB.t = \rho * \exp(-1.499 + 2.148 * \ln(dap) + 0.207 * \ln(dap)^2 - 0.0281 * \ln(dap)^3)$ (INFFS 2019)
QA/QC procedures to be applied	In each verification apply the most updated bibliography.
Comments	N/A

Data / Parameter [MN53]	$f_{belowground}(y)$
Data unit	Equation
Description	Algometric relationship to convert a tree metric such as DBH or tree height into biomass
Source of data	Forest National Inventory
Measurement procedures:	Algometric equations were used to calculate aboveground biomass by ecozone: $AGB.t = \rho * \exp(-1.499 + 2.148 * \ln(dap) + 0.207 * \ln(dap)^2 - 0.0281 * \ln(dap)^3)$ and to estimate necromasa of standing dead wood $Vol = (\pi \sum (dn)^2) / (8 * L)$. (INFFS 2019)
Frequency of monitoring/recording	At least once before every baseline update
QA/QC procedures to be applied	In each verification apply the most updated bibliography.
Comments	-

Data / Parameter [MN54]	$C_{\text{harvest}}(t,i)$	
Data unit	Mg C ha ⁻¹	
Description	Biomass carbon stock density at time [‡] in stratum [‡] in harvested areas.	
Source of data	Field inventory	
Description of measurement methods and procedures to be applied	Generic procedure is described in Section 8.1.4.4. Estimate must be made from plots located areas where harvesting takes place.	
Frequency of monitoring/recording	At least once before verification	
Value monitored	Year	$C_{\text{harvest}}(t,i))$
	2018	622.51
	2019	622.51
	2020	622.51

Monitoring equipment	Carbon stocks in harvested strata must come from sampling. It may be necessary to include additional plots in harvested strata for a precise estimation of carbon stocks. The exact measurement of aboveground and below tree carbon must follow international standards and follow IPCC GPG LULUCF 2003. These measurements are explained in detail in CDM approved methodology AR-AM0002 Restoration of degraded lands through afforestation/reforestation.
QA/QC procedures to be applied	Peru National Forest and Wildlife Inventory.
Purpose of the data	Calculation of baseline emissions, Calculation of project emissions; Determination of baseline scenario
Calculation method	Carbon Stock – (carbon content in timber harvested / harvested area)
Comments	

Data / Parameter [MN55]	$CE_{inventory, harvest}(t,i)$
Data unit	[-]
Description	Combined error in estimate of average biomass stock density in harvest areas in stratum i at time t.
Source of data	Field inventory
Description of measurement methods and procedures to be applied	Generic procedure is described in Section 8.1.4.4. Estimate must be made from plot located in areas where harvesting takes place.
Frequency of monitoring/recording	At least once before verification
Value monitored	0.03
Monitoring equipment	Uncertainty estimate in carbon stocks in harvested strata must come from sampling of plots in harvested areas.
QA/QC procedures to be applied	Peru National Forest and Wildlife Inventory.
Comments	N/A

Data / Parameter [MN56]	$CE_{inventory, ANR}(t,i)$
Data unit	[-]
Description	Combined error in estimate of average biomass stock density in ANR areas in stratum I at time t
Source of data	Field inventory
Measurement procedures:	Procedure is described in Section 8.2.5.3.
Frequency of monitoring:	At least once before verification
Value monitored	N/A
QA/QC procedures to be applied:	N/A

Comments	N/A
Data / Parameter [MN57]	$u_{\text{classification}}$
Data unit	[-]
Description	Discounting factor for NERs from avoided deforestation, based on the accuracy of classification, i.e. dividing land into broad land use types.
Source of data	"Classification protocol for forest loss in Amazon Rainforest in years 2001-2011" (MINAM)
Measurement procedures:	Section 8.1.2.7
Frequency of monitoring/recording	At least once before verification
Value monitored	0.962
QA/QC procedures to be applied	Peru National Forest and Wildlife Inventory – Geobosques.
Comments	N/A

Data / Parameter [MN58]	$u_{\text{stratification}}$
Data unit	[-]
Description	Discounting factor for NERs from avoided degradation, based on the accuracy of stratification, i.e. dividing forest into individual forest biomass classes. Section 8.1.2.7
Source of data	0.75
Measurement procedures:	Section 8.1.2.7
Frequency of monitoring/recording	At least once before verification
Value monitored	0.75
QA/QC procedures to be applied	Peru National Forest and Wildlife Inventory – Geobosques.
Comments	N/A

Data / Parameter [MN59]	$u_{\text{transition}} (i)$
Data unit	[-]
Description	Discounting factor for the emission factor for the transition from LULC class or forest stratum 1 to class 2 according to the uncertainty of the biomass inventory.

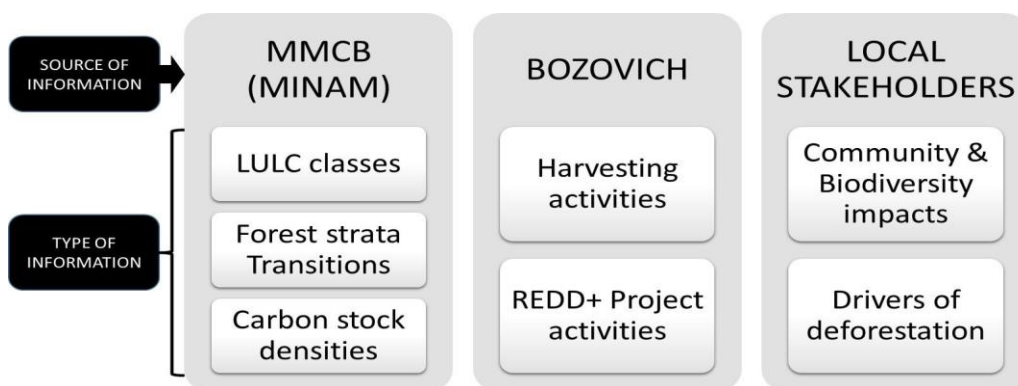
Source of data	Eder Ramos-Hernández & José Luis Martínez-Sánchez in "Biomass and aboveground and root carbon stores in Urochloa decumbens and Paspalum notatum (Poaceae) grasslands in southeastern Mexico.
Measurement procedures:	Section 8.1.2.4.3
Frequency of monitoring/recording	At least once before verification
Value monitored	1.00
QA/QC procedures to be applied	Peru National Forest and Wildlife Inventory – Geobosques.
Comments	N/A

4.3 Monitoring Plan

As described in the previous section, the monitoring plan must consider the following issues:

- *Drivers of deforestation, project activities and emissions sources related to REDD+ project activities inside and outside of the project area.*
- *LULC class and forest strata transitions in the project area, leakage area, and reference region using remote-sensing technologies, and validated with ground-truthing data.*
- *Carbon stock densities in LULC classes and forest strata.*
- *Carbon stock in long-lived wood products.*
- *Natural disturbances.*
- *Monitoring of harvesting activities.*

CHART 01: SOURCES OF INFORMATION BY TYPE

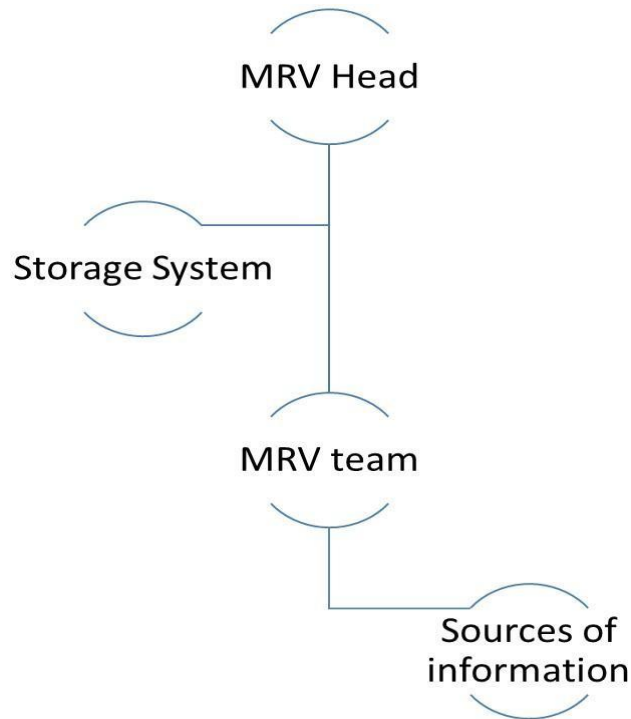


ORGANIZATIONAL STRUCTURE

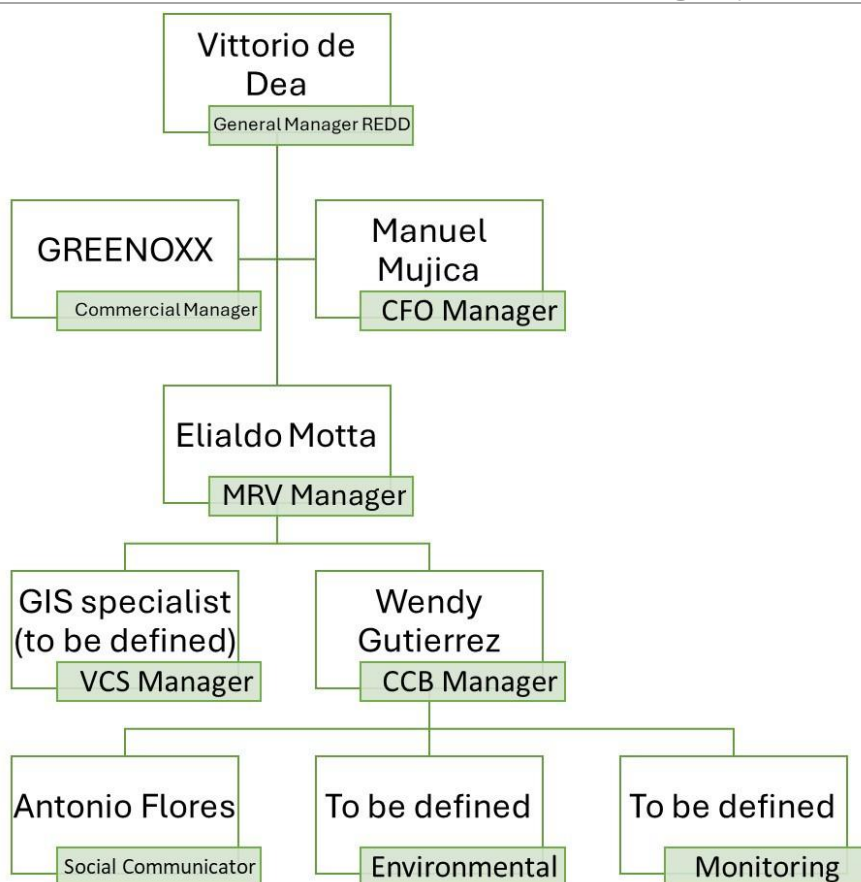
Forestal Otorongo will implement a MRV Department composed by a head and an undetermined number of specialists, depending on the intensity of information that needs to be monitored, specially to monitor the community and biodiversity impacts and the REDD project activities.

The MRV will have two types of storage: a physical storage in FORESTAL OTORONGO offices and in a safe platform in the cloud, being MEGA the platform that is being explored.

CHART 02: MONITORING INSTITUTIONAL ARRANGEMENTS



This is integrated in the following organizational chart structure:



The information will be recorded whenever the field operations are planned, during and after them, i.e. at the end of each campaign the basic information will be available to be able to carry out the respective reports. With the exception of internal audits that are carried out all year round. These reports that are taken from the field are systematized in the company's office in Puerto Maldonado and stored in the company's server. Reports are presented to the monitoring manager for the preparation of the reports relevant to the project. Additionally, as a security measure against the risk of information loss, a backup is saved to physical storage media (CD-USB) and a copy is stored in the MEGA cloud. In turn, each Area Manager must submit reports each time those activities occur.

Summarizing, the distribution of responsibilities and sources of information are detailed below for each one of the key data required. More detail is contained in section 3.2.

Table 09: Data to be collected by sources

Data	Responsible	Source
Drivers of deforestation	Technical team	To be defined
project activities	Project proponent	Project proponent reports

emissions sources	Technical team	Project proponent reports
LULC class and forest strata transitions.	Technical team	MINAM
Carbon stock densities	Technical team	MINAM
Carbon stock in long-lived wood products	Technical team	Project proponent reports
Natural disturbances.	Technical team	Different sources
Monitoring of harvesting activities.	Project proponent	Own reports

DATA

Methods for generating and storing data are described in the relevant Monitoring Manuals (see Annex 14). Forestal Otorongo will ensure that data is properly collected, stored, and reported in the Monitoring and Implementation Report prior to verification. Likewise, the MRV Head is responsible to ensure that all Manuals are adhered to by the team managers.

Quality Assurance and Control

Forestal Otorongo is responsible for the creation and adoption of QA/QC protocols as required, and for any technical direction of the sector experts or teams. Forestal Otorongo is responsible of making sure the QA/QC protocols are carried out by the sector experts.

The Forestal Otorongo team minimizes errors by working as teams to check the identification of tree species and diameter measurements, and community and biodiversity data collected. These teams verify each other's readings. To reduce and eliminate transcriptional error spreadsheets is proofed by re-reading the field notebooks and comparing it to the data that has been entered.

All persons involved in the field measurement work, will be fully trained to the current measurement manual before measurements. The dates of training sessions and the persons trained shall be recorded and stored.

The team member names and team leader taking the measurements shall be recorded for each plot measurement.

All data will be reported to project proponents and local stakeholders and any discrepancies or disagreements will be rectified by explanation or joint visitation of activities in question. All publicly available satellite data used in monitoring, validation, verification, and certification will be archived and made available to auditors.

It includes the following steps:

1. TRAINING

Training will be provided to staff in general in the different roles that they must play in the framework of the project, activities, and the methodologies to be followed, as well as the care they must take in those critical points of information management in its different stages: collection of field data, fingering, processing.

2. ON-SITE VERIFICATION

It basically consists of the monitoring in the field that the Security Coordinator must carry out on the work of the technical team, taking care at all times that the procedures established in the methodological guidelines of the guides and manuals are implemented and that have been disseminated to the staff in the process. training.

An error in the implementation of the procedures must be corrected in the field during the execution of the samplings or evaluations.

3. REVIEW OF DATA COLLECTED BEFORE AND AFTER DIGITIZATION.

- Field data collection: form header review, complete fields, data consistency (values within parameters).
- Typing: once 100% of the information contained in the form has been entered into the database, an indication of “typing” must be entered in the corresponding form and once the consistency of the fingering has been checked, it must be entered an indicative of “revised”.
- Processing: is the responsibility of the Security Coordinator. They should take into consideration the methodological guidelines defined in the monitoring guides or manuals developed by the project.

If any inconsistency of information is identified at the field form level, this information must be verified in the field. If the inconsistency is found in the digitized information, it must be corroborated in the field forms and if the inconsistency persists, it must be corroborated in the field.

4. REVIEW OF MONITORING REPORTS BEFORE PUBLICATION.

The monitoring reports should be reviewed before publication to confirm that the calculations, analysis, and conclusions are correct and if they have been obtained following the corresponding guidelines. This work oversees the Forestry Specialist.

If there are non-conformities during the internal or external audit processes, the data should be reviewed, and the non-conformities addressed.

INFORMATION MANAGEMENT: COLLECTION, TREATMENT and REPORTS

The project is based on the premise of “Adaptive Management”, in this sense all intervention in the forest is based on previous information collected in the field as a knowledge base. Based on this knowledge, the Management Plans, Operational Plans, and other management instructions necessary for the

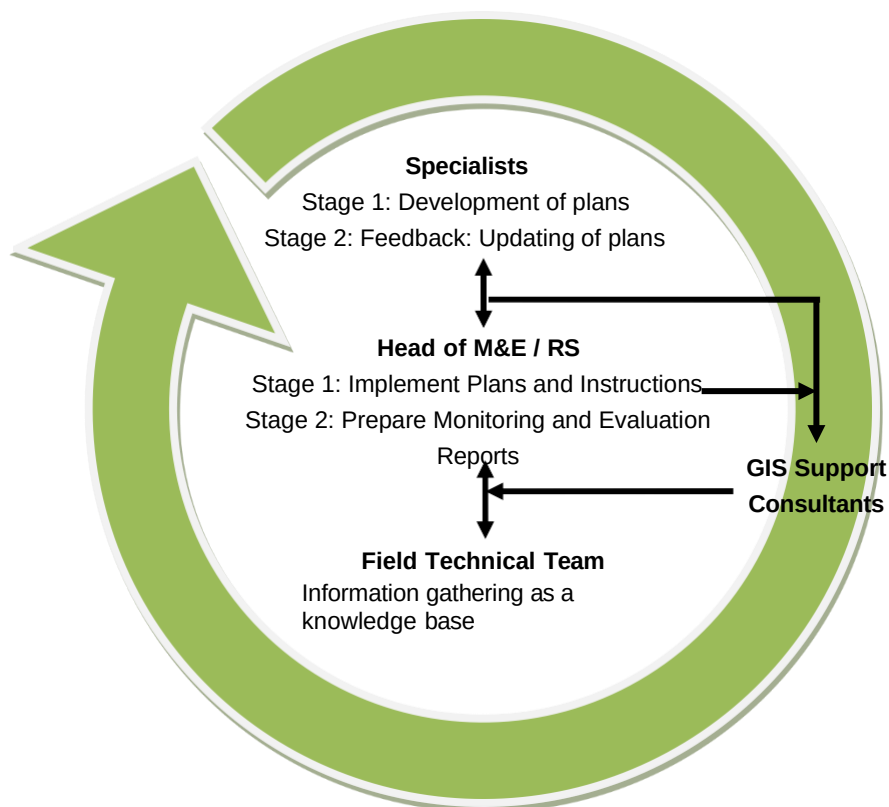
implementation of the project, the interventions in the forest and the treatment of the social component are defined.

The permanent implementation of the Monitoring Plan allows to identify the trends of the different indicators, which are oriented to measure the fulfillment or impact of the project activities. The knowledge that is generated allows to validate or adapt the system, and if necessary, make changes in the management tools or in the project activities.

The information collected in the field by the technical staff is entered, reviewed and systematized by the Head of Monitoring and Evaluation for the environmental component and by the Social Responsibility Coordinator (SR) for the community component, both at the end of the period (annually) They present the corresponding monitoring reports to the forestry specialist and social specialist for their review and validation. The relevant information is incorporated in the process of reviewing the management tools and in the preparation of the new Operational Plan for the project.

The information flow in the framework of the adaptive management of the project is presented below:

Graph 01. Adaptive Management



Forms have been developed to collect field data for those variables to be monitored. The data collected is

digitized, reviewed, and incorporated into a database in Excel-type spreadsheets, also designed according to the information requirements. The calculations are made in said spreadsheets using the corresponding formulas and they are the ones that allow calculating the monitoring plan indicators that are then presented in the monitoring reports for the period.

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

The physical files are stored in the project's administrative office located in the town of Iñapari, while the digital files are stored in an electronic folder called "JAGUAR PROJECT" located on the BOZOVICH server, which is managed by the Specialist. Forest. These files will be kept throughout the useful life of the project and for at least two years after the end of their crediting period.

ANALYSIS OF DEFORESTATION AND DEGRADATION

For this monitoring component, information management comprises the following steps or processes:

Step 1: Selecting and analyzing the source of land use change

1.1 For the 5-year monitoring period, the following actions will be taken:

- a) The data collected and analyzed should cover the entire project area and the leak belt. The data must correspond to the year in which the verification occurs.
- b) For the calculation of each category of land use change:
 - The area of each category will be calculated within the project area and, when necessary, within the leakage belt.
 - The reference forest cover maps for the project area and leakage belt will be updated.
 - The remaining forest area within the project area will be updated.

1.2 For the 10-year monitoring period, a review of the baseline corresponds:

- a) Use of medium resolution images (30 mx 30 m or less, if available) at the end of the period in which the baseline will be renewed.
- b) The data collected and analyzed must cover:
 - Entire reference region: data available for the baseline renewal year or no less than one year earlier.
 - For the processing of Land Use Capacity data, geometric corrections will be georeferenced and made, as well as cloud and shadow detection.
 - The area of each category will be calculated within the reference region, the project area and, when necessary, within the leakage belt.

- The reference forest cover maps will be updated for the reference area, the project area and the leakage belt.
- The total deforested areas will be estimated during the first 10 years to adjust the baseline and the deforestation rate if necessary.

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

Step 2: INTERPRETATION AND ANALYSIS

2.1 MONITORING DEFORESTATION

- a) Deforested area within the Project Area (PA) by stratum.
- b) Deforested area within the leakage belt (LB) by stratum.

In both cases, it must be specified to which type of Land Use (LU) the deforested areas have been changed. For the recalculation of the baseline, it must be established or indicated whether the percentages of change in land use remain the same as in the initial baseline.

- c) Carbon stocks in carbon pools:
 - The carbon stock is maintained in each stratum defined in the baseline. It will be re-evaluated for the baseline review (in 10 years).
 - The carbon stock of each land use is maintained. It will be re-evaluated for the baseline review (in 10 years).
- d) Volume of wood harvested in each concession, by stratum and by year.
- e) Deforested area within the Reference Region (for baseline review).

2.2. DEGRADATION MONITORING

The Project has a Custody System in the process of implementation (checkpoints, defined boundaries, periodic patrolling, etc.). In this sense, it is expected that there will be no degradation due to wood extraction due to illegal logging or the production of firewood or charcoal. If this occurs within the concessions, this degradation will be discounted in the calculations.

A Participatory Rural Assessment (PRA) will be conducted to determine if degradation occurs. In this sense, the following steps will be followed:

- a) Degradation due to illegal logging:

The PRA will take place every 2 years. If the results indicate that the project area does not have pressure for this type of degradation, then it will be assumed that: $\Delta C_p, \text{Deg}, i, t = 0$.

If the PRA results indicate that there is a potential for degradation, then you should:

- Obtain a “penetration distance” in the PRA (distance that degradation agents can enter from the closest access points).

- Identify the most important access points to the vulnerable area.
- From these points, the penetration distances are projected and a Buffer Area is created with a width equal to the length.
- Transects will be established to assess the buffer zone. The evaluated area should not be less than 1% of the buffer area.
- If no stumps (harvested trees) are found, it is assumed that ΔC_p , Deg, i, t = 0 and the evaluation is repeated every 2 years.
- If stumps are found, a systematic assessment is carried out. For this, the plots are systematically distributed, with the area to be evaluated being $\geq 3\%$ of the buffer area.
- Take into account the diameter of the stumps, which will be assumed as their DBH. If they are very large (for example, due to buttresses), then the stump species is identified and standing trees of the same species are located. Subsequently, its DBH and stump diameter are measured and a DBH / stump diameter ratio is calculated. With this relationship, the DBH of the stump diameter of the cleared individuals found is estimated.
- With the DAP data, the carbon stock of the harvested trees is calculated, using the allometric equation that was used to estimate the carbon stocks of the trees in the baseline (Chavé Equation).
- All stocks will be assumed to be lost to the atmosphere.
- This evaluation must be repeated every 5 years.

b) Degradation by fire:

- Burned areas should be measured in the field using GPS.
- For the calculation of its emissions, the Module E-BB of the approved VCS REDD Methodology Modules will be followed.

2.3 MONITORING OF AREAS WITH HIGHER CARBON STOCKS

The increase in carbon stocks is assumed to be zero and therefore does not require monitoring.

2.4 Monitoring of project emissions

Non-CO₂ GHG emissions will be calculated:

- a) N₂O and CH₄ from the burning of agricultural and forestry biomass. It is carried out in those areas of land where the change of use occurred. For ex ante calculations of the biomass burned within the forest, it was estimated (through expert consultation) that 50% of the deforested forest was burned. If deforestation occurs within the project area, a new percentage will be established (based on actual measurements to be made or supported by literature). It will indicate what was done for the new calculation of the baseline (every 10 years).
- b) N₂O emissions from fertilizer use within deforested areas. If deforestation and the use of N₂O occur during the life of the project, the amount of nitrogen fertilizer used per hectare deforested will be determined.

ANALYSIS AND INTERPRETATION OF SATELLITE IMAGES

Analysis of deforestation and source of land use change should be done using satellite imagery and field verification. The procedures to be considered are the following:

1. Selection of satellite images:

The image must be obtained from image servers, its technical characteristics such as: source, type of image, path, row, date, sensor and percentage of cloud cover must be known. This information must be detailed in the "Image Acquisition Form" and incorporated into the corresponding monitoring reports.

Images with a cloud cover that exceeds 10% of the total image area should not be used, this to ensure their correct analysis.

2. PROCESSING OF SATELLITE IMAGES:

For the processing of the selected satellite images, software such as Erdas Imagine and ArcGis should be used. This activity should include the following steps:

a) Band composition:

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

b) Geometric correction

This process is applied to transform images by removing geometric distortions from the sensor, which means that they must be georeferenced. It is a very important step because it ensures that the image is in the same geographic space as the historical images.

c) Radiometric improvement

This is done to get a better visual appearance of the image.

d) Visual classification

The IIAP methodology can be used to classify satellite images. An appropriate scale must be defined and the classes to be identified are:

- Forest
- Non-forest land, which was divided into subcategories:
 - grasses
 - farming
 - Infrastructure
 - Secondary forest, included here to avoid taking into account positive changes in the forest (natural regeneration).

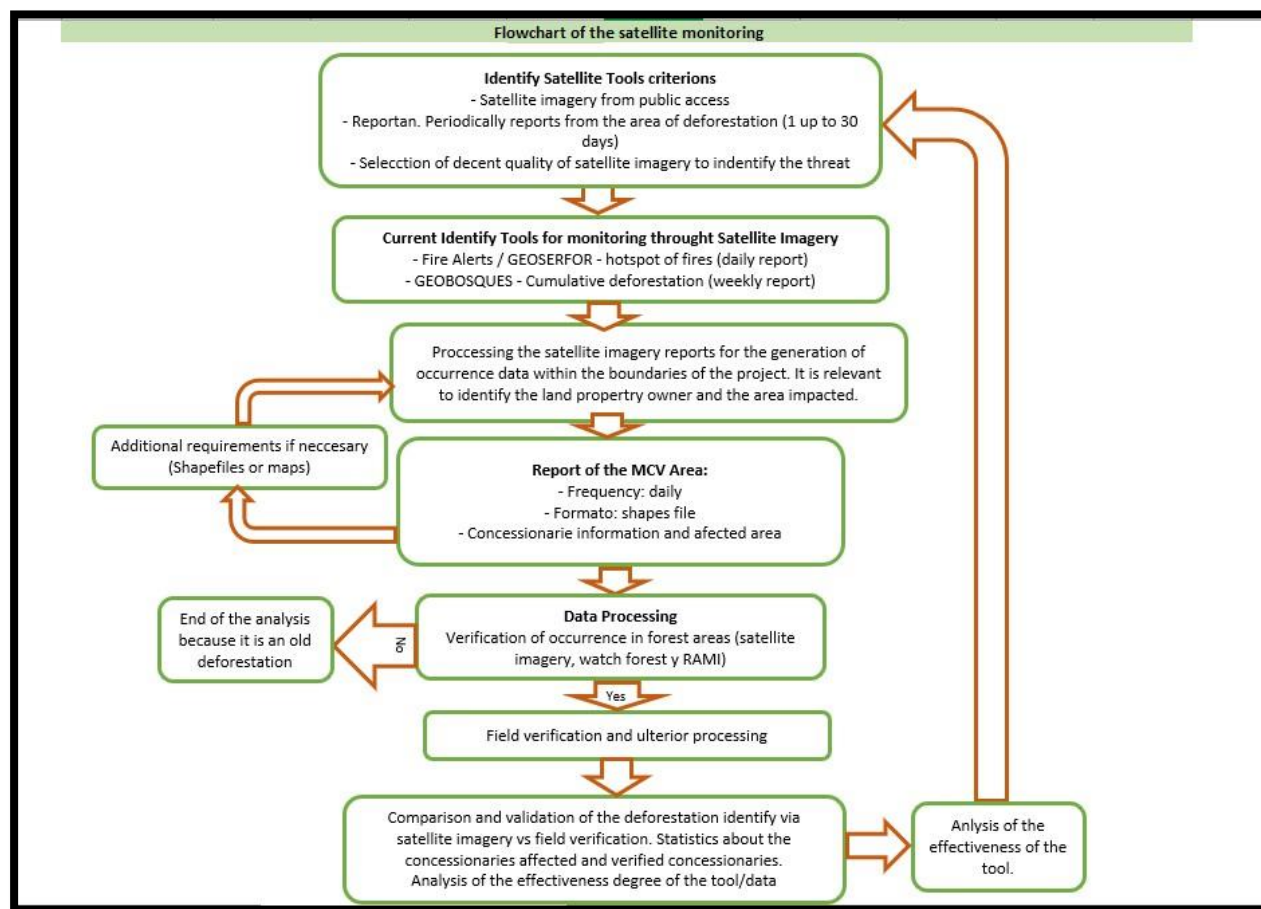
The project will execute Citizen Participation Workshops (at the start and close of logging operations) twice per year to spread the main results and conclusions of their multidimensional monitoring system, complementing other methods to make publicly available those results as the webpage of the company.

Here, the main conclusions of the monitoring systems of previous year and the expected activities for next year will be shared.

INTERNAL AUDIT PROCEDURES

For the internal Audit Procedures, the project will follow the flowchart depicted in Chart 03. With this procedure, the project will validate the appropriate usage of satellite imagery to identify areas of deforestation because it indicates the steps to follow in case of any threat of the area within the project. In addition, this procedure contemplates a comparison between satellite imagery monitoring and field verification

Chart 03. Flowchart of the internal procedure to analyze the satellite monitoring.



National Forestry and Wildlife Inventory Report - INFFS

The application of the sampling approaches, including target precision levels, sample sizes, location of sampling sites, can be found in the following document: https://redd.unfccc.int/files/nref_peru_final.pdf.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Specific deforestation rates in a year were calculated based on the following relationships: Remaining area

(year 1) = Remaining area (year 0) - Forest loss (year 1)

Deforestation rate (year 1) = (Loss of forests (year 1)) / (Remaining area at the end of year 0 (beginning of year 1))

In this way, with the information provided, deforestation rates were calculated (Table 21).

Table 10: Calculation of the observed annual deforestation rate

Year	Remnant area ⁸ (ha)	Deforestation ⁹ (ha)	Deforestation Rate
2006	471,244.99		
2007	470,083.90	1,161.09	0.00246
2008	467,255.51	2,828.39	0.00602
2009	466,176.69	1,078.82	0.00231
2010	464,342.47	1,834.21	0.00393
2011	462,107.54	2,234.94	0.00481
2012	460,735.84	1,371.70	0.00297
2013	458,403.75	2,332.08	0.00506
2014	454,921.18	3,482.57	0.00760
2015	451,041.49	3,879.69	0.00853
2016	446,784.19	4,257.29	0.00944
2017	440,864.57	5,919.62	0.01325

The provided code was implemented using the R (4.1) software, in the RStudio environment, using the "gam" and "mgcv" packages, which allow the data to be adjusted to a linear model under a "beta" type distribution, having transformed the original data under a "logit" function used by default in packages. The beta distribution is widely used to model the behavior of rates or ratios, since they are between the limits of 0 and 1 (Cribari-Neto & Zeileis, 2010).

As shown in the PD in section 3.2.1, in table 82, this is the projected deforestation for these years in a scenario without the project.

⁸ GEOBOSQUES

⁹ GEOBOSQUES

Table 11: Beta regression and deforestation in the project area.

Year	Beta regression describes the relationship between time and deforestation rate in reference region during reference historical period [ha/year]	Project area [ha]	Reference forest [ha]	Deforestation in project area in baseline scenario [ha/year]
2007	614.76	183,015.29	424,223.28	265.22
2008	781.81			337.28
2009	989.50			426.88
2010	1245.87			537.49
2011	1559.07			672.60
2012	1935.23			834.88
2013	2374.39			1,024.34
2014	2866.50			1,236.64
2015	3397.49			1,465.72
2016	3963.36			1,709.84
2017	4570.12			1,971.61
2018	5224.81			2,254.05
2019	5931.44			2,558.90
2020	6690.42			2,886.33
2021	7498.45			3,234.93
2022	8348.24			3,601.54
2023	9227.92			3,981.04
2024	10120.37			4,366.06
2025	11002.50			4,746.62
2026	11844.62			5,109.92
2027	12609.92			5,440.08

Table 12: Baseline emissions in the project area

Year	$D_{projectArea,baselineScenario,DF}(t)$ [ha/year]	Emission factor [Mg.CO2e/ha]	[Mg.CO2/year]
2018	2,254.05	-426.63	-961,642.63
2019	2,558.90	-435.66	-1,114,822.56
2020	2,886.33	-444.70	-1,283,554.25

5.2 Project Emissions

Project emissions are estimated applying the VM0006 methodology “Methodology for Carbon Accounting for Mosaic and Landscape-scale REDD Projects” – version 2.2.

Project ex-post emissions for this verification period were calculated using emissions from deforestation observed during this monitoring period.

The calculation of the project's emissions has been made with the most recent data on carbon stocks, together with the country's official tool GEOBOSQUES to spatially determine deforestation in this monitoring period.

Project deforestation emissions were calculated following the guidelines in section 9.3.2 of the VM0006 methodology. These guidelines require that an annual rate of change, $\Delta area_{projectAreaEAH,(t,i)}$, be calculated for each transition. This rate is then used in the calculations of the final NETs. The map (GEOBOSQUES) of transition from Forest Lands to Pastures (respecting the methodological deviation of PD 3.1.6) for this monitoring period has been used to generate the results of this rate of change for the transition throughout the follow-up period.

The monitoring found the following deforestation (ha / year) in the project area.

Table 13: Deforestation rate in the project scenario

Year	Hectares in transition ii within the project area, excluding ANR and harvest areas, in the project scenario during year t (ha/year)
2018	00.00
2019	00.00
2020	00.00

Deforestation monitoring indicates that there are only a few clearings and small roads resulting from sustainable harvesting operations, these areas are not significant, for the same reason that this type of harvesting guarantees the sustainability of the forest and each year it is covered with its own recovery of the forest, even resulting in greater benefits for the flora and fauna of the project area; that is why the monitored deforestation is 0 ha, because no transition from forest land to grassland was identified in the project area during the monitoring period.

During the monitoring period, firewalls were created, which were measured and evaluated with the tool "Tool for testing significance of GHG emissions in A/R CDM project activities" (Version 01) to demonstrate their insignificance, as shown in the following development.

* Area of the firebreak: 5.85 ha

* Emission factor (Forest to Bare Soil): 622.51 tCO₂

- * Emissions from the single firebreak applied in 2019: 3,641.68 tCO₂/ha
 - * Emissions from the single firebreak implemented in 2019: 3,641.68 tCO₂/ha
 - * Emissions from conversion of forest land to pasture as the single most conservative driver: 1,172,995.41 tCO₂/ha.
 - * Relative contribution from firebreaks: 0.003
 - * Relative contribution from conversion of forest land to grassland: 0.997
- Firebreaks with a contribution of less than 5% are considered insignificant.

Monitoring of Long-Term Average Carbon Stock in Harvest Areas

The average density of long-term carbon stocks (LTACHarvest) in the collection areas have been updated in the attached spreadsheets "Monitoring report - Net carbon and VCU's Jaguar".

The procedure to estimate $C_{harvest}(i)$ and $u_{inventory,harvest}(i)$, is as described in Section 8.1.4.4 but the estimates are based on only the plots located in harvest areas.

DETERMINING LONG-TERM AVERAGE CARBON STOCK

$$LTAC_{harvest} = \frac{\sum_{t=0}^T \sum_{i=1}^{nrStrata} C_{harvest}(t, i) \cdot u_{inventory,harvest}(i)}{T} \quad [EQ79]$$

where:

$LTAC_{harvest}$	= Long-term average Carbon stock density contained in harvested areas. [tCO _{2e} ha ⁻¹]
$nrStrata$	= Number of forest strata. [-]
$C_{harvest}(t, i)$	= Biomass carbon stock density at time t in stratum i in harvested areas. [tCO ₂ ha ⁻¹]
$u_{inventory,harvest}(i)$	= Discounting factor for the uncertainty in biomass estimation in harvested areas in stratum i in harvest areas. The most recent $u_{inventory,harvest}(t, i)$ value must be used for discounting the estimate for future years. [-]
T	= Minimal time period for estimating long term average. [yr].

T: 40 yr

To estimate the $u_{inventory, harvest(i)}$, we need to develop EQ (17 – 22):

$$OM_o(i) = average(OM_{o, plot-wise}(i, p)) \quad [EQ17]$$

$$stdev(OM_o(i)) = stdev(OM_{o, plot-wise}(i, p)) \quad [EQ18]$$

$$stderr(OM_o(i)) = \frac{stdev(OM_o(i))}{\sqrt{n_i}} \quad [EQ19]$$

$$HCWI(OM_o(i)) = t_{0.95, n-1} \cdot stderr(OM_o(i)) \quad [EQ20]$$

$$CE_{inventory}(i) = \frac{\sqrt{\sum_o HCWI(OM_o(i))^2}}{\sum_o OM_o(i)} \quad [EQ21]$$

$$u_{inventory}(i) = \begin{cases} 1 & \text{if } CE(i) \leq 0.15, \\ 1 - CE(i) & \text{if } 0.15 < CE_{inventory}(i) < 1, \\ 0 & \text{if } CE(i) \geq 1 \end{cases} \quad [EQ22]$$

Table 14: Statistical Parameters of AGL and BG according FREL 2021¹⁰

Parameter	Average (t/ha)	Standard deviation	Sample size	Confidence Level	Degrees of freedom	Standard error	HCWI(OM)
AGL	247.82	104.65	540	95%	118	4.50	8.8462
BG	113.41	43.95	540	95%	118	1.89	3.7151

According to EQ21 $CE_{inventory}(i)$ is equal to 0.03, and according to EQ22, $u_{inventory, harvest(i)}$ is equal to 1.00.

To find the $C_{harvest}(t, i)$, we need to determine the following info:

- Average annual carbon density in harvested timber, equal to 0.26 tCO₂/ha.

According to IPCC (2006), the net growth of aboveground biomass in tropical rainforest in South America for forests ≥ 20 years old is 3.1 t/ha/year, respectively. This growth, in tCO₂ is 5.68. Calculations are more detailed in “Monitoring report – Net carbon y VCU´s – Jaguar” Excel workbook, sheet “10”.

Table 15: Long-term average carbon stock density contained in harvested areas

LTAC _{harvest} : Long term average density in harvest zones. [tCO ₂ e ha ⁻¹]	Year	C _{harvest} (t, i): Carbon density in harvest zone by time and harvest area
---	------	---

¹⁰ https://redd.unfccc.int/files/nref_peru_final.pdf

622.51	2018	622.51
	2019	622.51
	2020	622.51

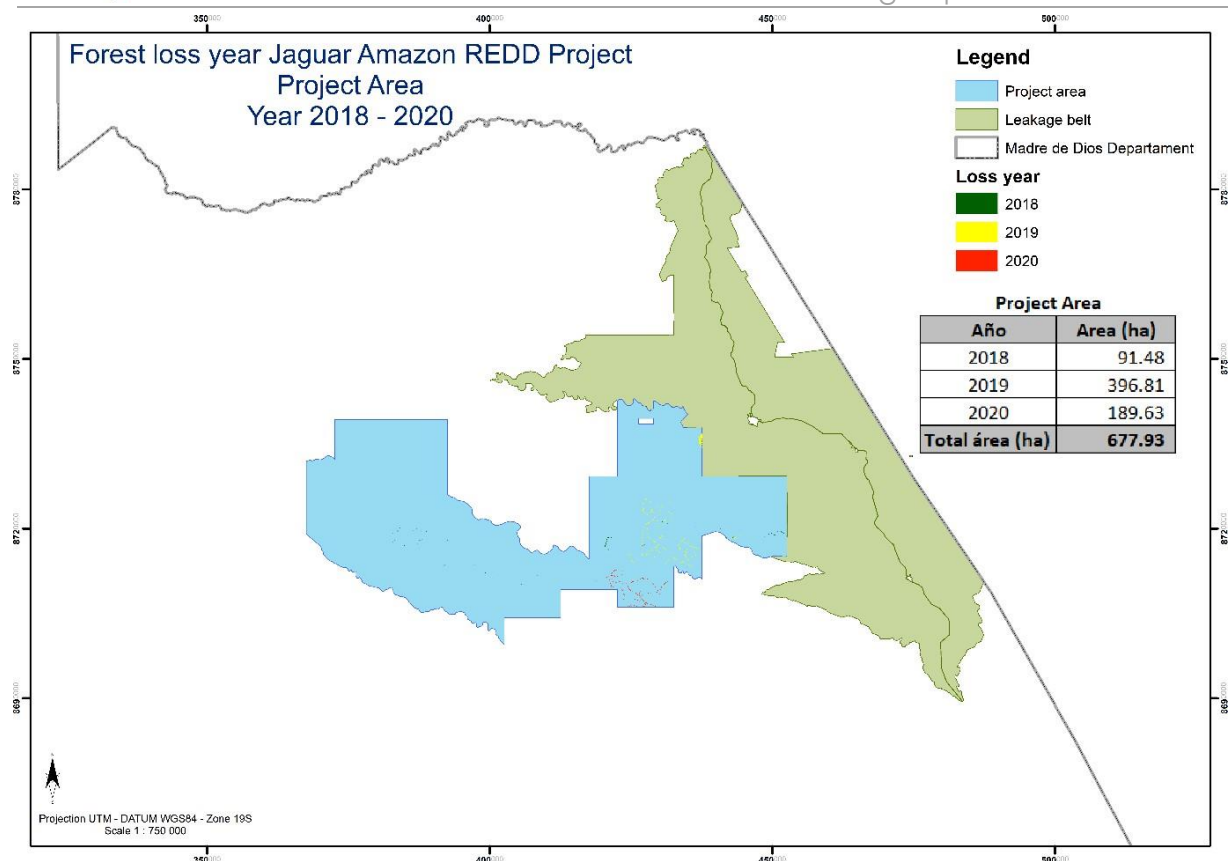
CALCULATE EMISSIONS OR SINKS ON LAND ON WHICH HARVESTING ACTIVITIES ARE IMPLEMENTED

$$\Delta C_{areaWithHarvest}(t) = \quad [EQ80]$$

$$\begin{aligned} & \sum_{i=1}^{nrStrata} area_{projectAreaWithHarvest,projectScenario}(t,i) \cdot \left(\frac{C_{harvest}(t_2,i) - C_{harvest}(t_1,i)}{t_2 - t_1} \right) \\ & \quad \cdot u_{inventory,harvest}(i) \\ & - \sum_{i=1}^{nrFNFTtransitions} \sum_{tt=1}^t \left(\begin{aligned} & u_{classification} \cdot u_{transition}(i) \\ & \cdot \Delta area_{projectAreaWithHarvest,baselineScenario}(t,i) \\ & \cdot (EF_{AGL}(i) + EF_{AGD}(i,t-tt) + EF_{BG}(i,t-tt) + EF_{SOM}(i,t-tt)) \end{aligned} \right) \\ & - \sum_{i=1}^{nrStrataTransitions} \sum_{tt=1}^t \left(\begin{aligned} & u_{stratification} \cdot u_{transition}(i) \\ & \cdot \Delta area_{projectAreaWithHarvest,baselineScenario}(t,i) \\ & \cdot (EF_{AGL}(i) + EF_{AGD}(i,t-tt) + EF_{BG}(i,t-tt) + EF_{SOM}(i,t-tt)) \end{aligned} \right) \end{aligned}$$

Year	$\Delta C_{areaWithHarvest}$: Density of carbon stocks in harvested areas in stratum ii in year t. [tCO ₂ /ha]
2018	84,072.88
2019	130,889.86
2020	153,374.00

MAP 04: PROJECT AREA MONITORING



The recorded forest loss is the result of the project's management of the forest. This loss is considered insignificant since it is recovered each year and the measures for sustainable forest management with reduced-impact use are complied with. Therefore, there is zero deforestation within the project area.

5.3 Leakage

Leakage of the project was calculated following the guidelines of section 9.3.3 of the VM0006 methodology - version 2.2. These guidelines require that an annual rate of change, $\Delta area_{leakagearea,projectScenario}(t,i)$, be calculated for each transition. This rate is then used in the final NET calculations. The map (GEOFORESTOS) of transition from Forest Lands to Pastures (respecting the methodological deviation of PD 3.1.6) for this monitoring period has been used to generate the results of this rate of change for the transition throughout the monitoring period.

The "Market leakage assessment" was not carried out, as they only need to be included when illegal logging activities that supply timber to national or international markets are an identified driver, according to 8.3.1 of the methodology and the only driver that is being evaluated conservatively is the change of use of forest lands to pastures. In addition, this project has only identified geographically constrained drivers.

The monitoring confirmed the following deforestation (ha / year) in the project's leakage belt.

MAP 05: LEAKAGE BELT MONITORING

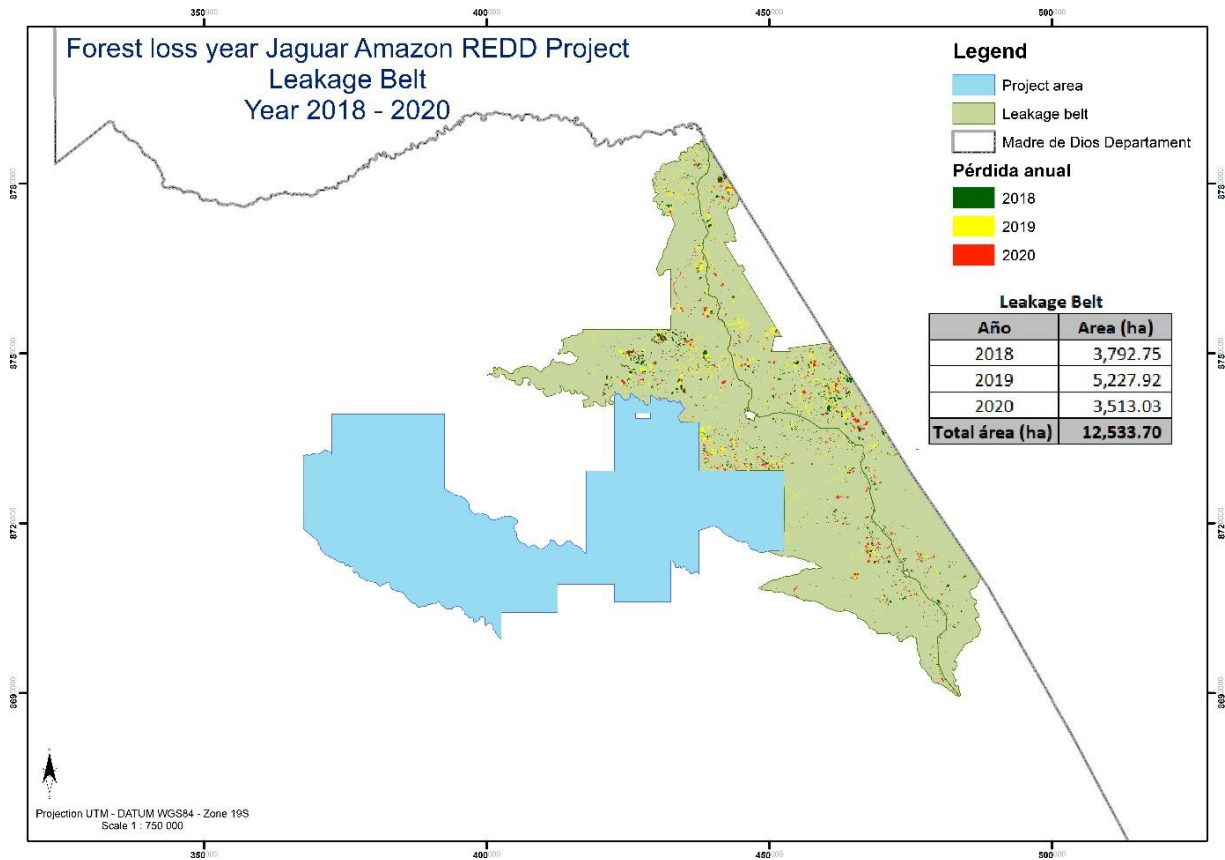


Table 16: Deforestation rate in the leakage area

Year	Absolute rate of deforestation in leakage (ha/year)
2018	2900.04
2019	3292.62
2020	3714.37

By definition (Program Definitions v.4.3), the leakage are the net emissions outside the limits of the project, but which are attributable to the project, i.e., is what is displaced from the project area to the leakage belt.

It means that, even in the case that emissions in the leakage belt in the project scenario are higher than the

emissions in the project area in the baseline scenario (as has occurred during the current monitoring period), not all these emissions may be attributed to the project leakage because the most that may be displaced is what would have been occurred in the PA in the BL scenario. The rest should be attributed to other causes.

For this reason, that is consistent with the Program Definition of leakage, the calculations have attributed to leakage emissions only the maximum that could have been displaced.

5.4 Net GHG Emission Reductions and Removals

EQ105 of the methodology was used to estimate NER for the whole crediting period of the project.

Table 17: Sources of emissions

Net Emission Reductions (NERs)	=
ΔGHG from avoided deforestation excluding ANR and harvest areas	01 +
+ ΔGHG from deforestation due to leakage	02 +
+ ΔGHG from avoided degradation	03 +
+ ΔGHG from degradation due to leakage	04 +
+ΔGHG from leakage by unconstrained geographic drivers	05 +
+ ΔGHG from assisted natural regeneration	06 +
+ ΔGHG from changes in long-lived wood products	07 +
+ ΔGHG from improved cook stoves	08 +
+ ΔGHG from other and secondary sources	09 +
+ΔGHG from avoided deforestation from areas under harvest	10

All calculations are found in greater detail in Excel: Monitoring report - Net carbon and VCU's Jaguar.

Δ GHG from avoided deforestation:

$$\mathbf{0} = \sum_{i=1}^{nrFNFtransitions} \sum_{tt=1}^t u_{classification} \cdot u_{transition}(i) \cdot \left(\begin{array}{l} +\Delta area_{projectAreaEAH,projectScenario}(t,i) \\ -\Delta area_{projectAreaEAH,baselineScenario}(t,i) \end{array} \right) \cdot (EF_{AGL}(i) + EF_{AGD}(i, t - tt) + EF_{BG}(i, t - tt) + EF_{SOM}(i, t - tt)) \quad [EQ107]$$

According to the table 77 of the PD:

Table 18. Emission factor per type of land transition

Year	Forest stratum	LULC class	AGL (tCO2/ha)	BG (tCO2/ha)
2	Selva Baja	Pasture	0	-9.04
3	Selva Baja	Pasture	0	-9.04
4	Selva Baja	Pasture	0	-9.04
5	Selva Baja	Pasture	0	-9.04
6	Selva Baja	Pasture	0	-9.04
7	Selva Baja	Pasture	0	-9.04
8	Selva Baja	Pasture	0	-9.04
9	Selva Baja	Pasture	0	-9.04
10	Selva Baja	Pasture	0	-9.04

In the article “PROTOCOLO METODOLÓGICO PARA LA DETECCIÓN DE LA PÉRDIDA DE BOSQUE” (MINAM), the accuracy attained is $\geq 85\%$ (0.962) and the number of images in historical reference period are > 3 , following the table 5 and 6 of the methodology, the $u_{classification}$ is 0.962.

$u_{classification}$: 0.962

$$CE_{transition}(CS1 \rightarrow CS2) = \frac{\sqrt{\sum_o (HWCI(OM_o(CS1))^2 + HWCI(OM_o(CS2))^2)}}{|\sum_o OM_o(CS2) - \sum_o OM_o(CS1)|}$$

According to the excel “Monitoring report - Net carbon and VCU's Jaguar”: $CE_{transition}$: 0.024 -> $u_{transition}$: 1

The $\Delta area_{projectAreaEAH,projectScenario}(t,i)$ and $\Delta area_{projectAreaEAH,projectScenario}(t,i)$ is the transition area, excluding harvest area in the project scenario and baseline scenario, respectively.

$\Delta area_{projectAreaEAH,projectScenario}(t,i)$: (Project Area – harvest area)/Project Area * deforestation rate in Project

area in baseline scenario)

$\Delta area_{projectAreaEAH,projectScenario}(t,i)$: (Project Area – harvest area)/Project Area * deforestation rate in Project area in baseline scenario)

Table 19: Δ GHG from avoided deforestation excluding ANR and harvest areas

Year	1	Hectares in transition within project zone, excluding RNA and harvest areas, under project scenario during year t	Hectares in transition within project zone, excluding RNA and harvest areas, under baseline scenario during year t
2018	877,858.32	0.00	2138.94
2019	998,910.21	0.00	2383.41
2020	1,148,595.89	0.00	2684.87

Δ GHG from deforestation due to leakage:

$$\begin{aligned}
 \mathbf{2} = & \sum_{i=1}^{nrFNFtransitions} \sum_{tt=1}^t u_{classification} \cdot u_{transition}(i) \\
 & \cdot \left(\begin{array}{l} +\Delta area_{leakageArea,projectScenario}(t,i) \\ -\Delta area_{leakageArea,baselineScenario}(t,i) \end{array} \right) \\
 & \cdot (EF_{AGL}(i) + EF_{AGD}(i, t - tt) + EF_{BG}(i, t - tt) + EF_{SOM}(i, t - tt))
 \end{aligned}
 \quad [EQ108]$$

$\Delta area_{leakageArea,projectScenario,DF}(t)$: Hectares undergoing transition ii within the leakage area under the project scenario during year tt . [ha yr⁻¹].

$\Delta area_{leakageArea,baselineScenario,DF}(t)$: Hectares undergoing transition ii within the leakage area under the baseline scenario during year tt . [ha yr⁻¹].

In both cases, transition area is 100% of deforestation rate in the leakage area in both scenarios.

Table 20: + Δ GHG from deforestation due to leakage

Year	2	$\Delta area_{leakageArea,projectScenario,DF}(t)$	$\Delta area_{leakageArea,baselineScenario,DF}(t)$
2018	-16,941.21	2900.04	2858.76
2019	-19,793.17	3292.62	3245.40
2020	-22,970.85	3714.37	3660.67

Δ GHG from avoided degradation:

$$\textcircled{3} = \sum_{i=1}^{nrStrataTransitions} \sum_{tt=1}^t u_{stratification} \cdot u_{transition}(i) \cdot \left(\begin{array}{l} +\Delta area_{projectAreaEAH,projectScenario}(t,i) \\ -\Delta area_{projectAreaEAH,baselineScenario}(t,i) \end{array} \right) \cdot (EF_{AGL}(i) + EF_{AGD}(i, t - tt) + EF_{BG}(i, t - tt) + EF_{SOM}(i, t - tt)) \quad [\text{EQ109}]$$

It is equivalent to 0.00.

Δ GHG from degradation due to leakage: [EQ110]

$$\textcircled{4} = \sum_{i=1}^{nrStrataTransitions} \sum_{tt=1}^t u_{stratification} \cdot u_{transition}(i) \cdot \left(\begin{array}{l} +\Delta area_{leakageArea,projectScenario}(t,i) \\ -\Delta area_{leakageArea,baselineScenario}(t,i) \end{array} \right) \cdot (EF_{AGL}(i) + EF_{AGD}(i, t - tt) + EF_{BG}(i, t - tt) + EF_{SOM}(i, t - tt))$$

It is equivalent to 0.00.

Δ GHG from leakage by unconstrained geographic drivers:

$$\textcircled{5} = -GHG_{otherLeakageSources}(t) - GHG_{marketLeakage}(t) \quad [\text{EQ111}]$$

It is equivalent to 0.00.

Δ GHG from assisted natural regeneration:

$$\textcircled{6} = C_{ANR}(t) \quad [\text{EQ112}]$$

It equals to 0.00.

Δ GHG from changes in long-lived wood products:

$$\textcircled{7} = \frac{44}{12} \cdot (C_{LWP,project}(t) - C_{LWP,baseline}(t)) \quad [\text{EQ113}]$$

$C_{LWP,project}(t)$: Carbon stock in long-lived wood products under the baseline scenario during year t [Mg C]

$C_{LWP,baseline}(t)$: Carbon stock in long-lived wood products under the project scenario during year t [Mg C]

$$C_{LWP,project}(t) = \sum_{s,wp,ppb,oir}^{ty} C_{HWP,project}(ty, t) \cdot (1 - ww f(ty))(1 - slp(ty))(1 - fo(ty)) \quad [EQ103]$$

$$C_{LWP,baseline}(t) = \sum_{s,wp,ppb,oir}^{ty} C_{HWP,baseline}(ty, t) \cdot (1 - ww f(ty))(1 - slp(ty))(1 - fo(ty))$$

wwf (ty): Fraction of carbon in harvested wood products that is emitted immediately because of mill inefficiency for wood class, 24%.

slp (ty): Proportion of short-lived products, 0.2.

fo (ty): Fraction of carbon that will be emitted to the atmosphere between 5 and 100 years of harvest for wood class, 0.85.

$$C_{HWP,project}(ty, t) = \sum_{h=1}^{H_{PS}} \sum_{j=1}^{S_{PS}} \left((DT_{project}(h, j, ty, t) + CT_{project}(h, j, ty, t)) \cdot \rho_{wood,j} \cdot CF \right) \quad [EQ102]$$

$$C_{HWP,baseline}(ty, t) = \sum_{h=1}^{H_{PS}} \sum_{j=1}^{S_{PS}} \left((DT_{baseline}(h, j, ty, t) + CT_{baseline}(h, j, ty, t)) \cdot \rho_{wood,j} \cdot CF \right)$$

where:

$C_{HWP,project}(ty, t)$	= Total carbon stock in long-lived wood products within the project boundary for class ty during time t of wood product ty in the project and baseline scenario, respectively [Mg C]
and	
$C_{HWP,baseline}(ty, t)$	
$DT_{project}(h, j, ty, t)$	= The volume of timber extracted from within the project boundary during harvest h by species j and wood product class ty during year t in the project and baseline scenario, respectively. DT = domestic timber; CT = commercial timber [m ³].
$DT_{baseline}(h, j, ty, t)$	
$CT_{project}(h, j, ty, t)$	
$CT_{baseline}(h, j, ty, t)$	
$\rho_{wood,j}$	= Wood density of harvested species or species group j [Mg DM m ⁻³]
h	= 1, 2, 3, ..., H_{PS} number of harvests [-]
j	= 1, 2, 3, ..., S_{PS} harvested tree species [-]
ty	= Wood product class – defined here as sawn wood (sw), wood-based panels (wp), other industrial round wood (oir), and paper and paper board (ppb).
CF	= Carbon fraction of wood [Mg C (Mg DM) ⁻¹] (default value = 0.5)

$DT_{project}$ y $DT_{baseline}$ are equal to 0.00.

For $CT_{baseline}$, it was used the unauthorized timber volume for Tahuamanu is 10,086.120 m³ for the years 2012 – 2016 (OSINFOR 2018¹¹) multiplied by the proportion represented by the project area as the share of Tahuamanu area (0.1), obtaining 1008.61 m³, then it was divided between the 4 years, resulting in an average of 252.15 m³ per year.

According to EQ102, the $C_{HWP, baseline}$ (ty, t) was obtained by multiplying the $CT_{baseline}$ by the CF and the mean of the densities of the timber species, then, following the EQ103 we obtain the $C_{LWP, baseline}$ 7.74 tC.

For the $CT_{project}$, according to the extractions that it has been carrying out from 2018 to 2019, obtaining the volume of wood extracted annually from each species harvested in m³ / year.

Then the $C_{HWPproject}$ is found by multiplying the basic density of each species by the harvested volume and the carbon factor, this for each year in the same way, likewise the carbon in long- lived wood products is found in the project scenario multiplying the $C_{HWPproject}$ by the Fraction of carbon that will be emitted into the atmosphere (fo), by the proportion of short-lived products (slp), and by the applicable fraction (wwf) which is 24%. And finally, there is the net change in carbon stocks in long-lived wood products for each year, subtracting the carbon in long-life wood products from the project scenario minus the reference scenario.

All these calculations can be seen in the excel calculations of emissions and net removals.

Table 21: Carbon content in harvested wood products within project area (2018)

$C_{HWP,project}(ty,t)$ Total carbon content in harvested wood products within project boundaries [Mg C]	$CT_{Project}$: Volume of annual harvested wood, round wood for commercial sales [m ³ /year]	Scientific Name	Basic density per specie, using Table GPG-LULUCF 3A.1.9. [Mg.dm/m ³]
969.17	2769.06	<i>Apuleia leiocarpa</i> (Vogel) J.F. Macbr.	0.7
749.57	1873.93	<i>Hymenaea oblongifolia</i> Huber	0.8
175.51	835.76	<i>Cedrela odorata</i> L.	0.42
243.43	624.17	<i>Myroxylon balsamum</i> (L.) Harms	0.78
120.86	562.15	<i>Amburana cearensis</i> (Allemão) A.C. Sm.	0.43
908.18	3078.56	<i>Clarisia racemosa</i> Ruiz & Pav.	0.59
1232.42	4564.53	<i>Couratari macrosperma</i> A.C. Sm.	0.54

¹¹ <https://www.osinfor.gob.pe/wp-content/uploads/2018/07/APROVECHAMIENTO-FORESTAL-CASTA%C3%91A-VF.pdf>

4.52	13.48	<i>Aspidosperma macrocarpon</i> Mart.	0.67
556.11	1278.42	<i>Manilkara bidentata</i> (A. DC.) A. Chev.	0.87
2571.41	5651.45	<i>Dipteryx odorata</i> (Aubl.) Willd.	0.91
292.21	635.24	<i>Handroanthus serratifolius</i> (Vahl) S.O. Grose	0.92
863.78	3839.02	<i>Cedrelinga cateniformis</i> (Ducke) Ducke	0.45

Table 22: Net variation of existences in 2018

Net variations of carbon content in long-term wood products during year t [Mg CO ₂]	Carbon in long-term wood products within project scenario. [Mg C]
295.70	88.39
250.66	68.36
58.69	16.01
81.40	22.20
40.42	11.02
303.69	82.83
412.12	112.40
1.51	0.41
185.96	50.72
859.88	234.51
97.72	26.65
288.85	78.78

The total net variation of the carbon content in wood products in the long term in 2018 -2019 is found in the following table:

Table 23: ΔGHG from changes in long-lived wood products tCO₂

Year	7
2018	2876.60

2019	3276.21
2020	2886.81

Δ GHG from GHG Emissions Reduction from Cookstove and Fuel Efficiency (CFE):

$$\textcircled{8} = ER_{CFE}(t) \quad [\text{EQ114}]$$

It is 0.00.

Δ GHG from other and secondary sources:

$$\textcircled{9} = -GHG_{fireBreaks}(t) - GHG_{sources,leakagePrevention}(t) - GHG_{sources,ANR}(t) \quad [\text{EQ115}]$$

It is 0.00.

Δ GHG from avoided deforestation and degradation from areas under harvest

[EQ116]

In case:

$$\begin{aligned} \sum_i^t \Delta C_{areaWithHarvest}(i) \\ \geq \sum_{i=1}^{nrStrata} area_{projectAreaWithHarvest,projectScenario}(t,i) \cdot LTAC_{Harvest} \end{aligned}$$

$$\textcircled{10} = 0$$

$$\Delta C_{areaWithHarvest}(t) = \quad [\text{EQ80}]$$

$$\begin{aligned} & \sum_{i=1}^{nrStrata} area_{projectAreaWithHarvest,projectScenario}(t,i) \cdot \left(\frac{C_{harvest}(t_2,i) - C_{harvest}(t_1,i)}{t_2 - t_1} \right) \\ & \quad \cdot u_{inventory,harvest}(i) \\ & - \sum_{i=1}^{nrFNFTtransitions} \sum_{tt=1}^t \left(\frac{u_{classification} \cdot u_{transition}(i)}{\cdot \Delta area_{projectAreaWithHarvest,baselineScenario}(t,i)} \cdot (EF_{AGL}(i) + EF_{AGD}(i,t-tt) + EF_{BG}(i,t-tt) + EF_{SOM}(i,t-tt)) \right) \\ & - \sum_{i=1}^{nrStrataTransitions} \sum_{tt=1}^t \left(\frac{u_{stratification} \cdot u_{transition}(i)}{\cdot \Delta area_{projectAreaWithHarvest,baselineScenario}(t,i)} \cdot (EF_{AGL}(i) + EF_{AGD}(i,t-tt) + EF_{BG}(i,t-tt) + EF_{SOM}(i,t-tt)) \right) \end{aligned}$$

$area_{projectAreaWithHarvest,projectScenario}(t,i)$: Hectares in transition ii within project area in harvest zone, in project scenario.

Table 24: Transition areas in harvest zone in project area

Year	$area_{projectAreaWithHarvest,projectScenario}(t,i)$: Hectares in transition ii within harvest area in project scenario during year t
------	--

2018	9,346.00
2019	12,551.16
2020	12,773.83

$area_{projectAreaWithHarvest,baselineScenario}(t,i)$: Hectares in transition ii within project area in harvest zone, in baseline scenario was obtained as (proportion of harvest area of total project area) * deforestation rate in project.

Table 25: Transition areas in harvest zone in project area

Year	$area_{projectAreaWithHarvest,baselineScenario}(t,i)$: Hectares in transition ii within harvest area in baseline scenario during year t
2018	115.11
2019	175.49
2020	201.46

$u_{stratification}$ is equivalent to 0.75 and $u_{inventory,harvest}(i)$ to 1. According to EQ80, $\Delta C_{areaWithHarvest}(t)$ for every year is:

Table 26: Carbon density in harvest zones in stratum ii in year t

Year	10: [tCO ₂ ha ⁻¹]
2018	84,072.88
2019	130,889.86
2020	153,374.00

$$LTAC_{harvest} = \frac{\sum_{t=0}^T \sum_{i=1}^{nrStrata} C_{harvest}(t,i) \cdot u_{inventory,harvest}(i)}{T} \quad [EQ79]$$

With project crediting period (T) of 40 years, the $LTAC_{harvest}$ is 622.51 tCO_{2e} ha⁻¹.

For this reason, according to EQ80, as $area_{projectAreaWithHarvest,projectScenario}(t,i) * LTAC_{harvest}$, is greater than $\Delta C_{areaWithHarvest}(t)$, ΔGHG from avoided deforestation from areas under harvest (10) is equal to $\Delta C_{areaWithHarvest}(t)$.

Table 27: Net GHG emissions reductions tCO₂

Year	Net Emission Reductions (NERs)	1	2	7	10
2018	947,866.59	877,858.32	-16,941.21	2,876.60	84,072.88
2019	1,113,283.10	998,910.21	-19,793.17	3,276.21	130,889.86
2020	1,281,885.87	1,148,595.89	-22,970.85	2,886.81	153,374.00

Table 28: Buffer pool allocation and VCUs.

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)	Buffer pool allocation	VCUs eligible for issuance
2018	-84,072.88	1,048,880.68	-16,941.21	947,866.59	96,480.78	851,385
2019	-1,008,748.18	2,141,824.46	-19,793.17	1,113,283.10	113,307.63	999,975
2020	-1,152,284.21	2,457,140.92	-22,970.85	1,281,885.87	130,485.67	1,151,400
Total	-2,245,105.27	5,647,846.06	-59,705.23	3,343,035.56	340,274.08	3,002,761

ANNEXES:

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.

Annex 1. San Francisco community support meeting Annex 2. 2019

Annex 3. IIAP meeting on training - 2019

Annex 4. The project proponent will donate timber seeds Annex 5. Promotion of sustainable productive projects 2018 Annex 6. Promotion of sustainable productive projects 2019

Annex 7. Technical training in agroforestry, soil reforestation and reforestation with promising species

Annex 8. Implementation of research projects - Chullachaqui Annex 9. Implementation of research projects - Otorongo Annex 10. Results of implementation of research projects

Annex 11. Land demarcation, border maintenance and signaling 2018 Annex 12. Security Protocol - Chullachaqui

Annex 13. Security Protocol - Otorongo

Annex 14. Dialogues about environmental crimes and legal framework Annex 15. Forest fire prevention patrolling

Annex 16. Boundaries and coordinates of the enabling forest rights - Otorongo Annex 17. Boundaries and coordinates of the enabling forest rights - Chullachaqui Annex 18. Land demarcation, border maintenance and signaling 2019

Annex 19. Socialization of the REDD+ Project Annex 20. Periodical patrolling

Annex 21. Coordinates of forest concessions Annex 22. Roadside forest restoration Annex 23. Complaint 2020

Annex 24. Benchmark

Annex 25. CV

Annex 26. Monitoring report -Net carbon y VCU´s Jaguar Annex 27. Significance Test

Annex 28. Sizes

Annex 29. Harvest plan

Annex 30. Justification of outlier

Annex 31. Sustainable Development Goals The Jaguar Amazon REDD+ Project