TAHUAMANU AMAZON REDD PROJECT

Document Prepared by

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Project Title	TAHUAMANU AMAZON REDD PROJECT
Version	06
Date of Issue	26-07-2023
Project Location	Peru, Madre de Dios
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Project Lifetime	19 April 2017 – 18 April 2047; 30-year lifetime
GHG Accounting Period	19 April 2017 – 18 April 2047; 30-year lifetime
History of CCB Status	No previous validation
Gold Level Criteria	Biodiversity
Expected Verification Schedule	2022

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1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Table 1.1. Outcome or Impact estimated by the end of project lifetime

Outcome or Impact Estimated by the End of Project Lifetime	Estimated by the end of project	Section Reference
1) Number of beneficiaries in health of indigenous peoples as a result of project activities.	110	4
2) Number of beneficiaries in education of indigenous peoples as a result of project activities.	18	4
3) Number of women of indigenous peoples benefiting through project activities.	54	4
4) Number of promotional activities for the protection of indigenous peoples in isolation, PIACI.	4	4

1.2 Standardized Benefit Metrics

Table 1.2. Standardized benefit metrics

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
GHG emission reductions or removals	Net estimated emission removals in the project area, measured against the without-project scenario	0	3
	Net estimated emission reductions in the project area, measured against the without-project scenario	13,067,541 (the first 10 years)	3
Forest cover	For REDD projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario	35,407.20	3
	For ARR projects: Estimated number of hectares of forest cover increased in the project area measured against the without-project scenario	Not applicable	
Improved land management	Number of hectares of existing production forest land in which IFM practices are expected to occurred as a result of project activities, measured against the without-project scenario	Not applicable	3
	Number of hectares of non-forest land in which improved land management practices are expected to occurred as a result of project activities, measured against the without-project scenario	Not applicable	
Training	Total number of community members who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities	96	4
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	12	4

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Employment	Total number of people expected to be employed in project activities, expressed as number of full-time employees	150	4
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	20	4
Livelihoods	Total number of people expected to have improved livelihoods or income generated as a result of project activities	418	4
	Number of women expected to have improved livelihoods or income generated as a result of project activities	141	4
Health	Total number of people for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	2,000	4
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	881	4
Education	Total number of people for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	377	4
	Number of women and girls for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	Data not available	4
Water	Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	3,256	4
	Number of women who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	1,388	4
Well-being	Total number of community members whose well-being is expected to improve as a result of project activities	206	4
	Number of women whose well-being is expected to improve as a result of project activities	66	4
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation, measured against the without-project scenario	171,584.08	5
	Expected number of globally Critically Endangered or Endangered species benefiting from reduced threats	6 fauna (Pionites leucogaster, Spizaetus	7

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	as a result of project activities, measured against the without-project scenario	isidori, Leucopternis occidentalis, Ateles chamek, Pridontes maximus and Dinomys branickii) and 1 flora (Amburana cearensis) species are in IUCN list.	

2 GENERAL

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Summary Description of the Project (G1.2)

The proposed project is based on the enhancement and strengthening of the sustainable forest management of a consolidated group of forest concessions managed by a local company with long forest tradition, Maderera Río Acre SAC (hereinafter MADERACRE SAC), who also has previous successful experience with REDD+.

The whole area managed by MADERACRE SAC, including the current proposed project area and others already VCS/CCB verified, are FSC certified, which guarantees that logging activities are being done under adequate techniques.

The area faces increasing threats from unsustainable agrarian practices from neighboring local religious communities and others. To deal with it, the project plans to combine an increase in protection measures (patrolling, working together with other forest concessions and the forest and political authorities) with the promotion of productive activities for neighboring communities, as a strategy to offer alternative sources of income that do not imply the clearing of forest areas. Based on this approach, the project expects to reduce projected deforestation.

The project is located in Madre de Dios, a region in the south-east of the Peruvian Amazon with the most accelerated deforestation rate of Peru. Peru is recognized as a HFLD country. Peruvian FREL for 2015-2020 is based on a linear growing trend, so the project applies the same approach for the reference region.

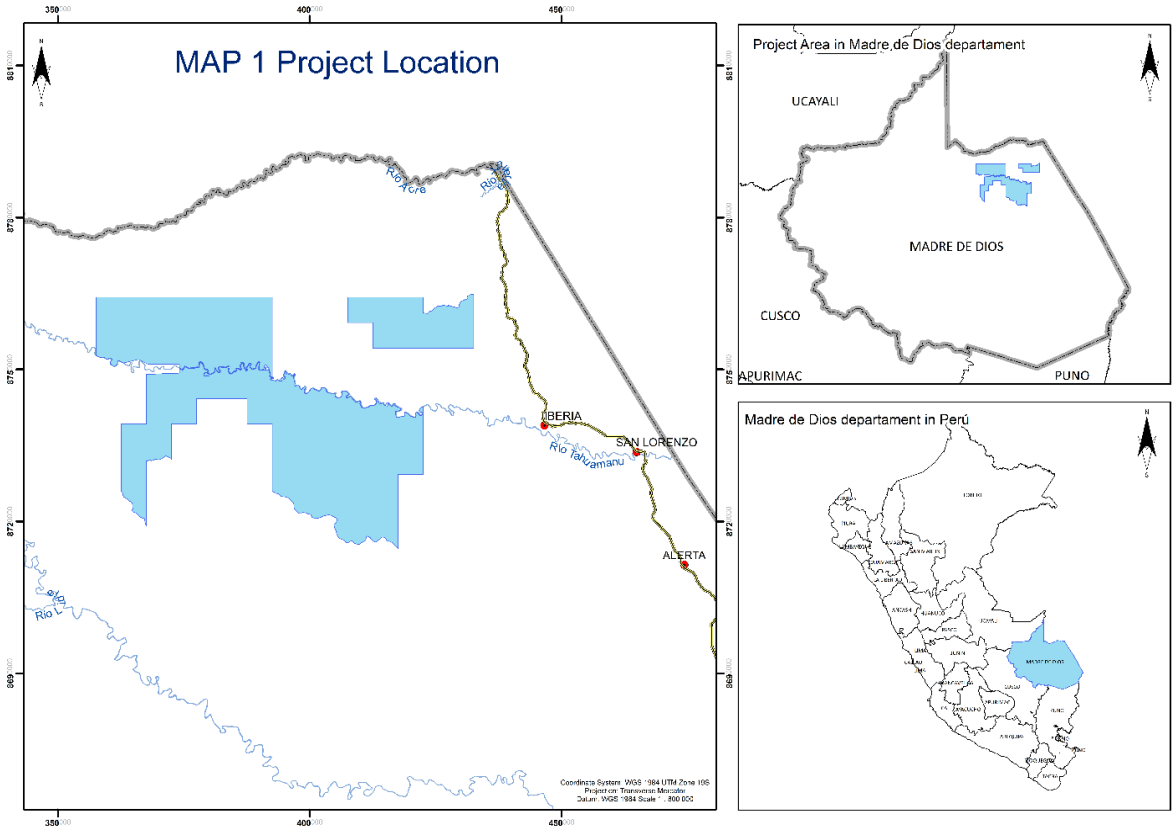


Figure 2.1. Project locations

Up to now, MADERACRE has been able to manage and conserve the project but the surrounding area (as close as 50 meters of distance, including other smaller forest concessions) but without additional resources, it is not likely that they will be able to continue protecting their concession as has already occurred to neighboring smaller concessions. The scenario existing prior to the implementation of the project is an increasing migration from surrounding regions, which causes a growing exponential deforestation rate.

So, the objectives of the project are:

- Avoid 29,685.33 ha of forest loss in the coming 10 years
- Avoid the negative impact over the biodiversity (including 09 species under some risk of extinction) that lives within or depend on the area under threat
- Contribute with the improvement of welfare of 12 neighboring communities

An estimate of annual average of net GHG emission reductions and removals is 1,575,029.70 tCO_2e/year.

2.1.2 Project Scale

Table 2.1. Project Scale

Project Scale	
Project	
Large project	X

2.1.3 Project Proponent (G1.1)

Table 2.2. Project Proponent

Organization name	MADERACRE SAC
Contact person	José Luis Canchaya / Nelson Kroll
Title	Commercial Manager / Regional Manager
Address	Carretera Interoceánica Sur Puerto Maldonado-Iñapari Km. 227
Telephone	+51 954 688 869 / +51 982 798 120
Email	jcanchaya@matim.pe / nkroll@maderacre.com

2.1.4 Other Entities Involved in the Project

No other entities permanently involved in the project.

2.1.5 Physical Parameters (G1.3)

Climate

Santos (2017)[1] indicates that the climate of Madre de Dios is tropical: warm, humid and with annual rainfall over 1000 mm with an average temperature of 17°C to 20°C in the months of June and July and a maximum of up to 36°C in the months of December to March. It is occasionally presenting influences of cold air masses, which come from the southeast of the Americas, causing temperature declines, which reach up to 8°C and are locally known as "friaje". Likewise, it collects the data from the 1981-2015 period for the preparation of the precipitation map where a seasonal rainfall behavior is observed, where the largest accumulated are recorded between January to April and October to December, where the largest accumulated rainfall is in February. The months of reduced rainfall are between June and August. The basins of the Madre de Dios region have an average multi-year precipitation of over 1600 mm/yearly, with the basins CO, CP, IAL, IAA being the least humid, with average annual precipitation ranging from 1599.5 to 1793 mm.

The Department of Madre de Dios is characterized by three types of climates:

- Sub Humid and Warm. It includes the north-eastern sector of the department. It is characterized by presenting annual average temperatures of 25°C. A moderately and rainy climate.
- Humid and Warm. It includes the central and south-western sector of the department. It is characterized by average annual rainfall of 2,000 mm. and average annual temperatures of 25°C. A rainy climate, dry winter, warm humid season.
- Very humid and Semi-warm. Includes the foothills of the eastern cordillera. It is characterized by an average annual rainfall of 2,300 mm. and average annual temperatures of 22°C. A very rainy climate with abundant rainfall, almost all year round.

Table 2.3. Types of climates (IIAP, 2009)

Types of Climates	Area (ha)	%
Sub humid and warm	3,687,543	43.3
Humid and warm	1,061,173	12.5
Very humid and semi-warm	3,769,680	44.3
Total	**8,518,396**	**100.0**

[1] Santos, D. Hydrological characterization of the Madre de Dios Region. National Service of Meteorology and Hydrology of Peru (SENAMHI). Hydrology Department. December 2017.

Hydrology

The Local Water Administration (2010)[2] states that the Madre de Dios Basin is the third largest in the country and is part of the large basins of the Madeira River, a tributary of the Amazon River. In Peruvian territory, it has an area of 111,933 km^2, which includes the Inter-basin Acre. The Madre de Dios Basin politically is within three regional governments; 96% extends over Madre de Dios, 32% in Puno and 12% in Cuzco. Nine sub-basins have been defined for the Madre de Dios Basin: Tambopata Basin, Inambari Basin, Las Piedras Basin, Tahuamanu or Orthon Basin, Alto Madre de Dios Inter-basin, Alto Madre de Dios Middle Inter-basin, Madre de Dios Middle Inter-basin, Madre de Dios Middle Lower Inter-basin and the Alto Acre Inter-basin[3].

The Project is located in the Tahuamanu or Orthon Basin, presenting an area of 15,190.20 km^2 and a main channel length of 308.51 km, which is located between the provinces of Tahuamanu and Tambopata. The Tahuamanu River travels in a NW-SE direction and crosses the entire province of Tahuamanu. In this sector, its course is meandering presenting meanders and small lagoons. Present a regular width that varies from 150 to 180 m.

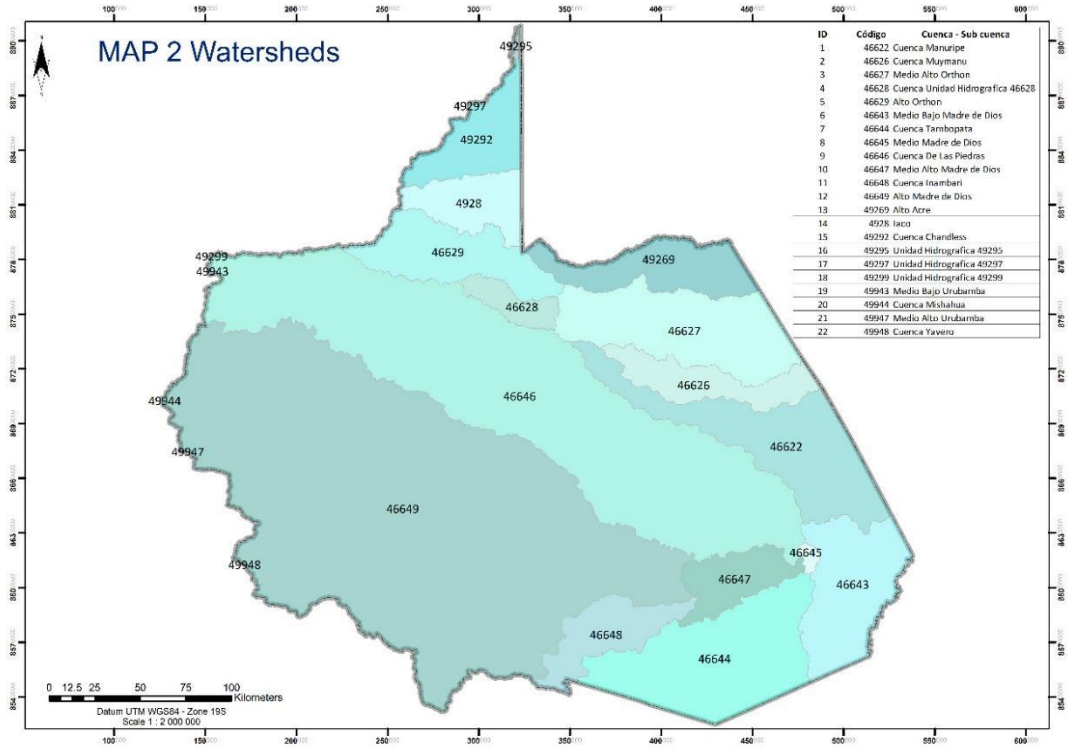


Figure 2.2. Watersheds (SENAMHI, 2010)

The Tahuamanu River (navigable with limitations in dry season) borders the Tahuamanu REDD+ Project in the south, the river with the highest flow and navigable all year round. The Muymanu and Manuripe Rivers borders the south of the concession and are seasonally navigable during the winter months (January-March). In the north-east. The Quebrada Noaya borders the concession.

[2] Local Water Administration (ALA) Maldonado. Hydrological Diagnostic Study of the Madre de Dios Basin. Water Resources Conservation and Planning Department - Surface Water Area. 2010.
[3] The Alto Acre Inter-basin belongs to the Purus Hydrographic Unit. For the purposes of the Study, it was considered to be within the Madre de Dios Basin.

There are the Cocama and Titimanu gorges, tributaries of the Tahuamanu River which are short-distance and seasonal flows, conditioned to the winter season and the presence of rains in the summer.

Soils

Due to the constant arrival of new material from the Andean mountain range, Madre de Dios has relatively young and fertile soils compared to most of the Amazon. The mainland soils, which occupy approximately 80% of the department, are consistently sandier, more acidic, and less fertile than floodplain soils. While the appearance and texture of these soils vary greatly from place to place, the vast majority of soils in Madre de Dios fall into only two categories of the soil taxonomy system: Ultisols and Inceptisols.

At the regional level, soil varieties have been identified and classified according to their origin:

- Recent Rainfall Soils. Very close to rivers, they occupy low flat-relief terraces that can withstand annual or sporadic flooding.
- Sub-recent alluvial soils. They have originated from sub-recent quaternary deposits distributed in non-flood plated terraces, from flat to wave decline.
- Local colluvial soils. Originated from thick materials derived from a mixture of alluvionic sediments and material from mountain formations.
- Old alluvial soils. Originated by ancient sediments due to the process of fluvial erosion, they have reached heights ranging from 15 to 40 or 50 m, forming the so-called medium and high terraces.
- Raised floors of waste materials. These are soils that have originated in situ from sedimentary materials from the Tertiary and Quaternary periods (siltstones, sandstones, gravels) and that due to various phenomena have originated low and high hills. In the Manu National Park area, the majority of the study is made up of deep to very shallow soils, located in areas of rugged or very dissected relief, with slopes greater than 50% and whose main limitations are related to the rugged topography and very steep to extremely steep slopes, which increase erosion risks.

Taxonomically, the IIAP (2009) has identified five soil orders Entisols, Inceptisols, Histosols, Alphisols and Ultisols; of which it determined 8 suborders, 11 large soil groups. Edaphically, 58 soil series were identified, divided into 28 consociations and 18 soil associations, and a unit of miscellaneous areas has been recognized.

After the technical interpretation of the soils, the IIAP established, according to the Land Classification Regulation (D.S. Nº 0062-75-AG), the following groups of Major Use Capacity. Table 2.4 below shows the Major Use Capacity Groups in the department of Madre de Dios.

Table 2.4. Major Land Use Capacity in Madre de Dios (IIAP, 2009)

Major Land Use Capacity	Area (ha)	%
Lands Suitable for Clean Cultivation	570,613	6.7
Lands Suitable for Permanent Cultivation	1,055,358	12.4
Lands Suitable for Pasture	755,261	8.9
Land suitable for forestry production	4,001,474	47.0
Protection Lands	2,035,632	23.9
Water bodies	1,600	0.0
Urban Areas	98,682	1.2
Total	**8,518,396**	**100.0**

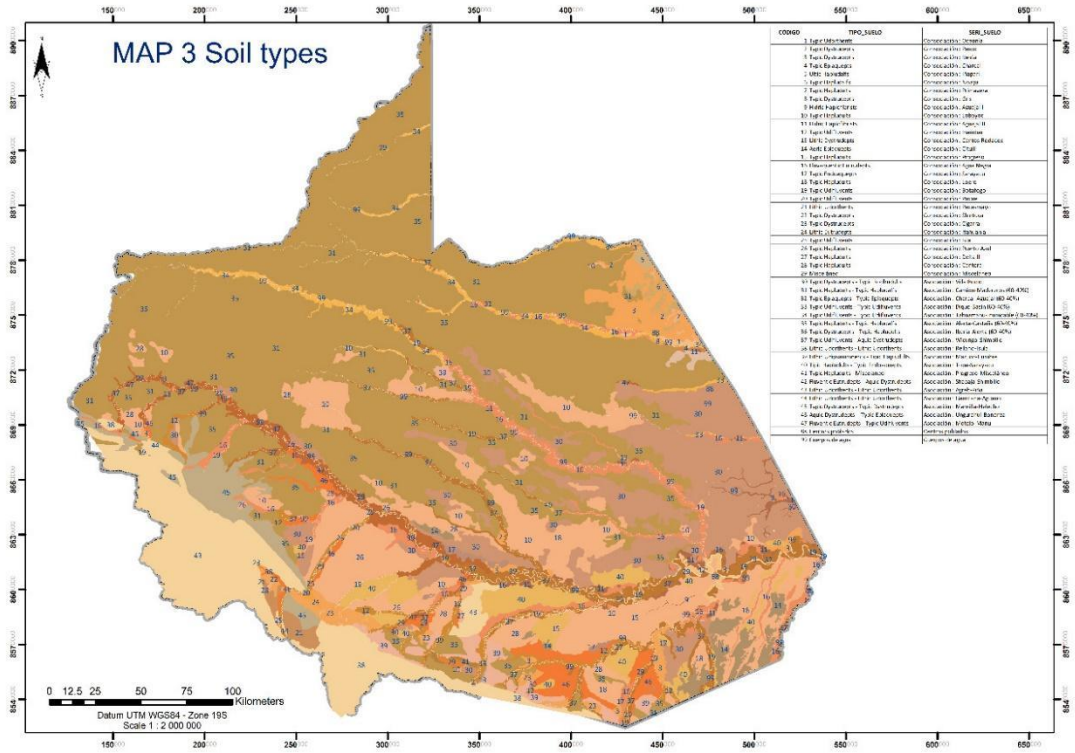
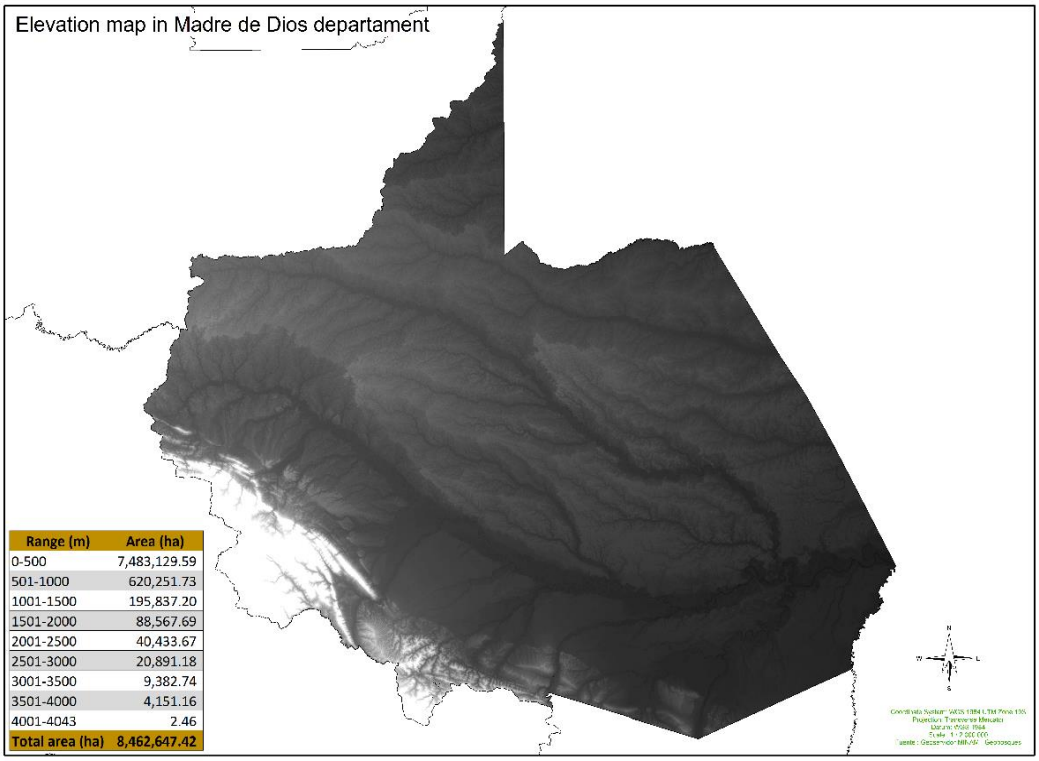


Figure 2.3. Soil types in Madre de Dios (IIAP, 2009)

Topography

In terms of elevation and slope, the project area is homogeneous, as 100% of the total area is between the altitude range of 255-462 m.a.s.l. while the maximum slope is 4% (see Figure 3.8). In this sense, the project area is very similar to the landscape in Madre de Dios, where 88.4% of its territory is under 500 m.a.s.l. and 99.7% of it has maximum slopes of 4%. Figure 2.4 of the elevation classes in Madre de Dios.



Range (m)	Area (ha)
0-500	7,483,129.59
501-1000	620,251.73
1001-1500	195,837.20
1501-2000	88,567.69
2001-2500	40,433.67
2501-3000	20,891.18
3001-3500	9,382.74
3501-4000	4,151.16
4001-4043	2.46
Total area (ha)	**8,462,647.42**

Figure 2.4. Elevation ranges in Madre de Dios (IIAP, 2009)

Geology

All the lithostratigraphic units present in the Project area are from the Cenozoic era, in the Quaternary and Neogene systems. Among them we have Subrecent Alluvial Deposits (Qsr-a), Recent Fluvial Deposits (Qr-fl), Mazuco Formation, Maldonado Formation and Madre de Dios Formation (Nmp - md); These last two units are the most representative in extension in the entire Project Area with 29% and 60% respectively; The significant aspects of these units are the following:

- The Madre de Dios Formation (Nmp – md), that represents about 31.5% of the formation in the entire region of Madre de Dios, is one of the most important units in the entire region. This formation is approximately 400 m thick and consists of the base of a conglomerate of medium to coarse-grained sandy matrix, yellowish gray to reddish in color, in its middle portion of mottled violet-red clays, with some sand interdigitations; in its upper portion it consists of brown, red-violet, plastic clays interdigitated with medium to fine-grained quartz sands of a yellowish-beige color and gravels as channel deposits. It forms the system of high terraces up to 50 meters high and a system of low flat-topped hills.
- The Maldonado formation, that represents about 2.2% of Madre de Dios. This unit considers all the gravel, conglomerate and sandstone deposits distributed in the Madre de Dios peneplain, which unconformably overlie the Madre de Dios Formation. This formation is characterized by being part of the largest outcrop in the Madre de Dios basin.

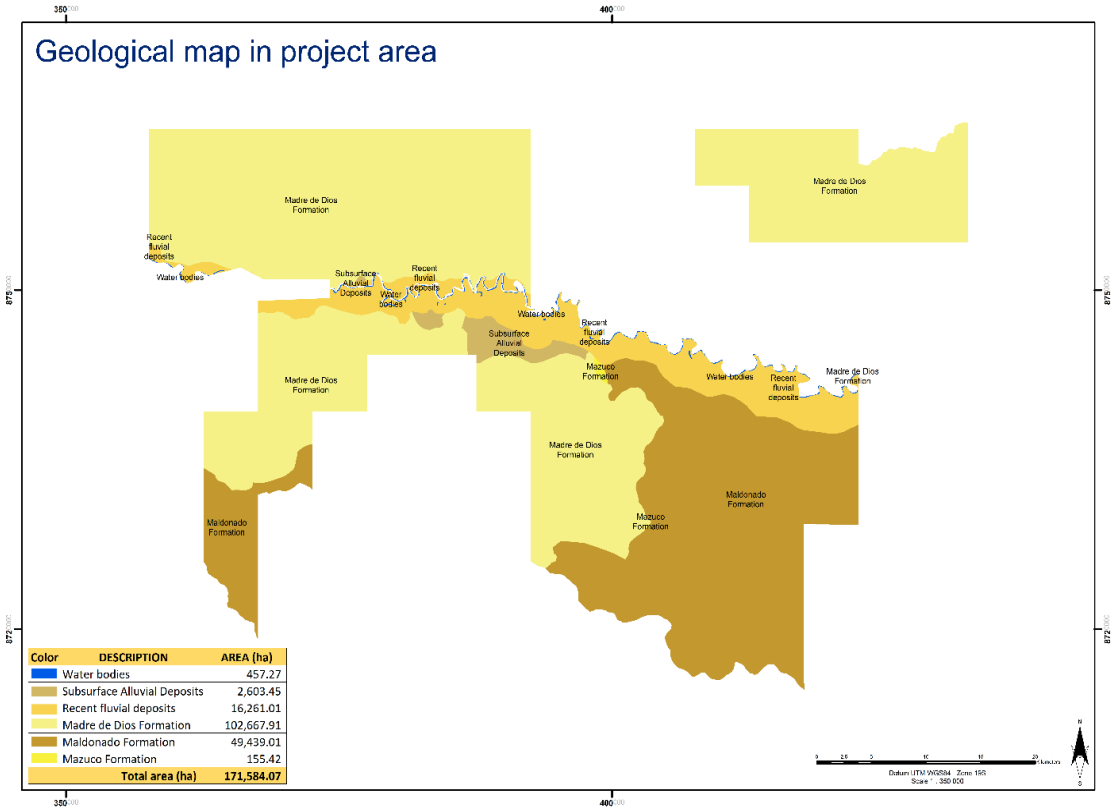


Figure 2.5. Geology classes in the Project Area (IIAP, 2009)

Geomorphology

All the relief units present in the Project Area belong to a single morphostructure called Madre de Dios Plains, with three provinces called Holocene Fluvial Plains, Pleistocene Plains and Quaternary Hills and Hillocks. Among them we have Fluvial plains, Non-flooded fluvial plains (Holocene), Pleistocene erosive plains, Hillocks and Erosional hills. This last unit is the most important as it represents 65.2% of the Project Area and 40% of the total area of Madre de Dios.

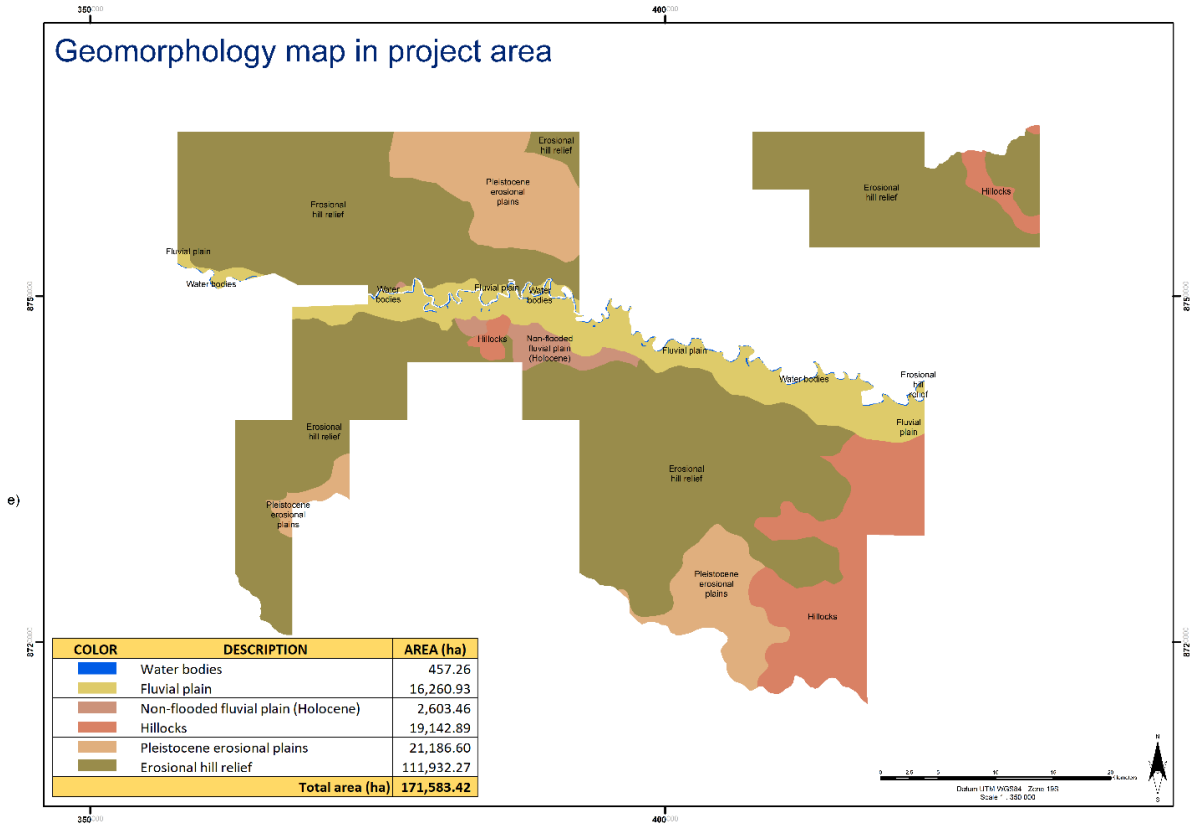


Figure 2.6. Geomorphology classes in the Project Area (IIAP, 2009)

The Erosional hills of the penillanura are a highly evolved type of erosional relief; erosional processes created these forms, without the influence of Andean tectonics. They were generated from the process of arroyada by means of which a transport of meteorized material is produced by the waters. Additionally, this class is characterized by their rounded tops and not excessive height (< 80 m) or slope. The hills are separated from each other by ravines of different dimensions depending on the evolutionary phase they are going through. The older the form, the larger the dimensions of the erosive traces.

Physiography

All landscape elements are found within two genetic units of relief (large landscape) Hill and Alluvial Plain, which are subdivided into four Landscapes and four sub-landscapes as shown in the following table:

Table 2.5. Landscape Elements in the Project Area (IIAP, 2009)

Large Landscape	Landscape	Sub Landscape	Landscape elements	Total
Hilly	Tertiary hilly	Low hills	Moderately dissected low hills	7,018.80
	Quaternary hills	Low hills	Strongly dissected low hills	24,552.56
			Slightly dissected low hills	41,094.19
			Moderately dissected low hills	39,266.97
			Hills	19,143.06
Water bodies	Water bodies	Water bodies	Water bodies	457.27

Large Landscape	Landscape	Sub Landscape	Landscape elements	Total
Alluvial plain	Ancient alluvial	High terraces	High terraces strongly dissected	14,323.73
			Slightly dissected high terraces	1,109.97
			Moderately dissected high terraces	5,753.05
		Middle terraces	Medium terraces with good to moderate drainage	2,603.45
	Recent alluvial	Low terraces	Low terraces with good to moderate drainage	12,172.41
			Low terraces with very poor drainage	4,088.60
Total				171,584.07

The most representative landscape in the Project Area is Quaternary low hills with 72%, which is also the main sub-landscape at a regional level (30.1% of the regional area).

This landscape comprises all low hills whose tops are below the original level of the high terraces (less than 50 meters), have convex tops and slopes with lengths of less than 25 m and slopes ranging from 15 to more than 75%.

These geoforms have originated from sedimentary rocks, mainly shales and limonites, and to a lesser extent, sandstones, with erosive effects due to the direct action of heavy rainfall and surface runoff water. They are widely distributed in the study zone, having determined by dissection, the following units: - Slightly dissected low hills (15-25 % slope in dissection) - Moderately dissected low hills (25-50 % slope in dissection) - Strongly dissected low hills (more than 50 % slope in dissection).

The hillsides have slopes with an inclination ranging from 8 to more than 15 %. Their sediments are of ancient alluvial origin, with sandy clay predominance.

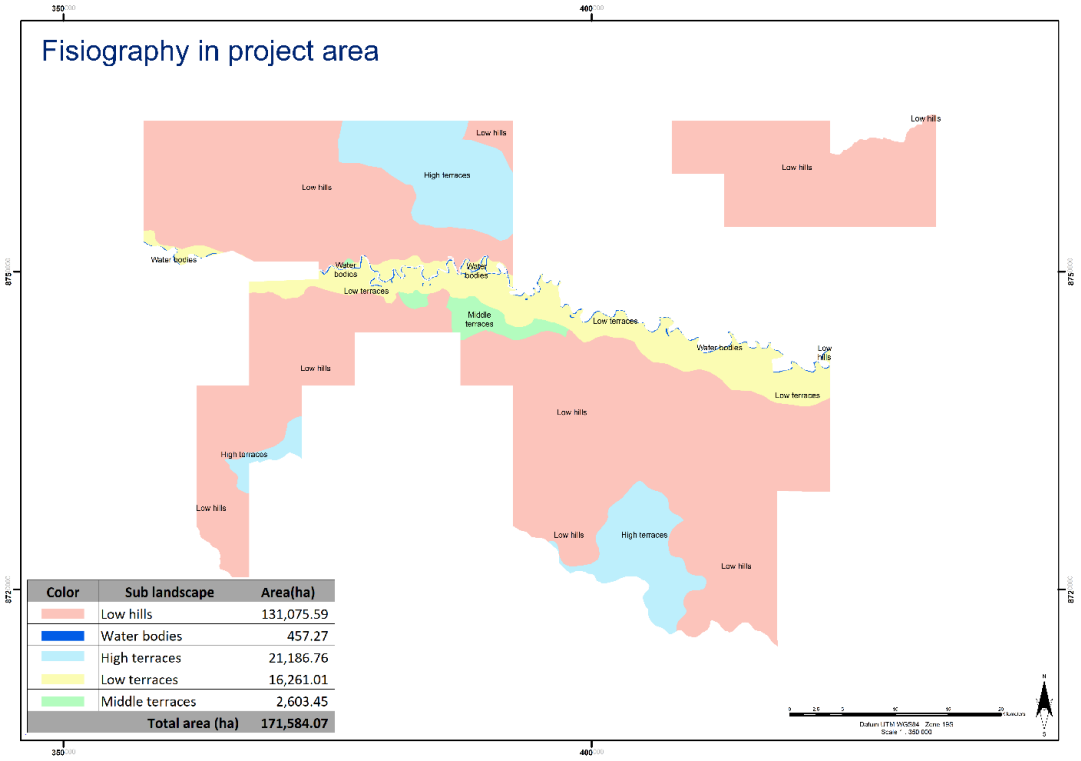


Figure 2.7. Physiography classes in the Project Area (IIAP, 2009)

Types of vegetation

Madre de Dios has an area of natural forest of 8,102,917 hectares, which places it in third place in the country of departments with the greatest forest area, after Ucayali and Loreto (CESVI, 2005).

According to the work carried out by IIAP in 2009, it was determined that the Madre de Dios department has 22 types of natural vegetation that contain at least 2,429 plant species (angiosperms and gymnospermas), including 869 genres and 172 families.

The most extensive types of vegetation are: Mixed communities of bamboo, or mixed pacales, associated with trees scattered in hills (28.84 percent), dense semi-sumycifolium forests in hills (16.98 percent) and dense semi-sumycifolium forests in plains (15.42 percent).

Table 2.6. Types of vegetation in Madre de Dios (IIAP, 2009)

Types of Vegetation	Area (ha)	%
Successional communities on the banks of white water	89,578	1.05
Dense floodplain communities	294,463	3.45
Tree swampy communities (Renacal and palm trees)	483,032	5.67
Herbaceous-tree swamp communities	2,010	0.02
Pampas del Heath Savannah Complex	6,543	0.08
Swamp communities of Mauritia flexuosa or "aguajales" palms	163,412	1.92
Dense bamboo communities, or dense pacales, in floodplains	7,002	0.08
Dense bamboo communities, or dense pacales, in plains	95,250	1.12

Types of Vegetation	Area (ha)	%
Dense communities of bamboos, or dense pacales, on hills	104,802	1.23
Dense bamboo communities, or dense pacales, in the Andean foothills	5,054	0.06
Dense bamboo communities, or dense pacales, in high mountains	15,499	0.18
Mixed communities of bamboos, or mixed pacales, associated with scattered trees on flood plains	188,039	2.22
Mixed communities of bamboos, or mixed pacales, associated with scattered trees on plains	503,163	5.91
Mixed communities of bamboos, or mixed pacales, associated with trees scattered on hills	2,456,462	28.84
Mixed communities of bamboos, or mixed pacales, associated with scattered trees in the sub-Andean foothills	61,654	0.72
Mixed communities of bamboos, or mixed pacales, associated with scattered trees in high mountains	76,714	0.90
Dense semi-deciduous forests on plains	1,314,252	15.42
Dense semi-deciduous hill forests	1,446,328	16.98
Complex of semi-panorous and semi-deciduous forests	272,211	3.19
Semi-deciduous forests with scattered trees in low mountains	232,018	2.72
Mixed forests with medium trees and high mountain shrubs	259,642	3.05
High Andean shrub-herb communities	8,505	0.09
Water bodies	98,682	1.15
Complexes of farms and secondary forest	334,081	3.95
Total	**8,518,396**	**100.0**

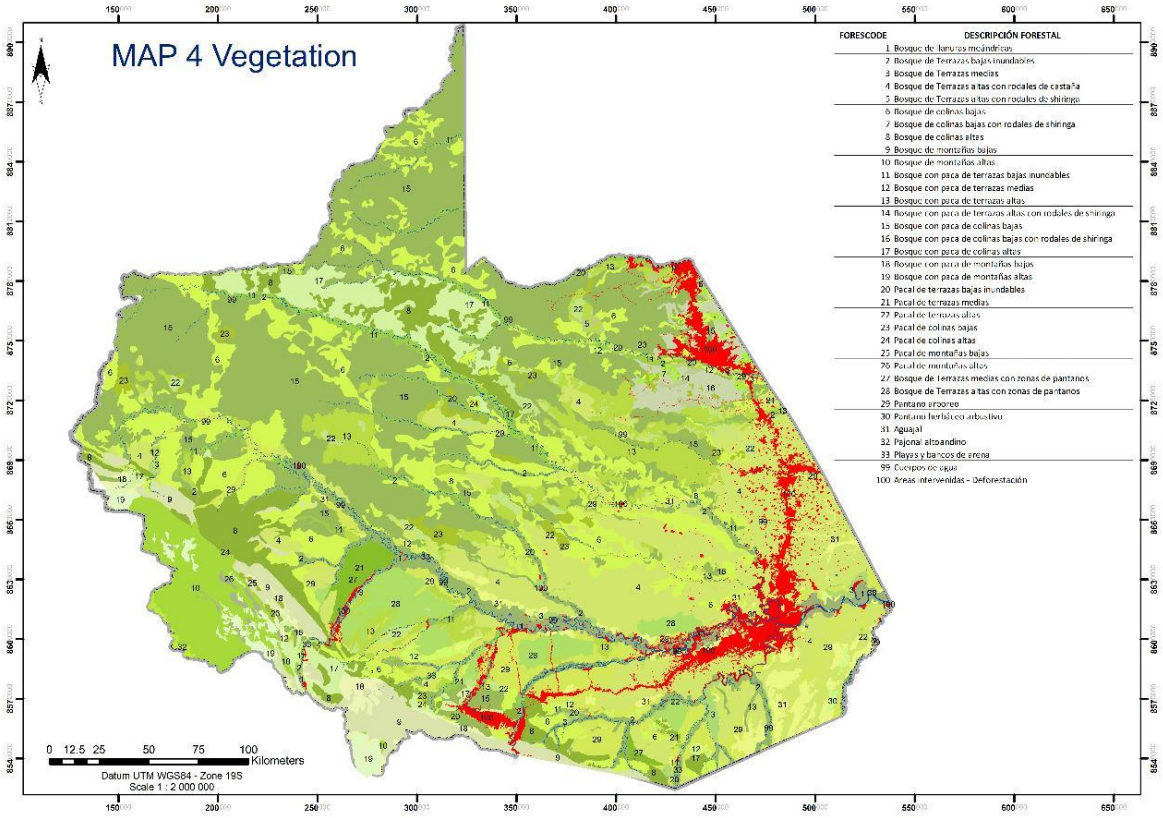


Figure 2.8. Types of vegetation in Madre de Dios (IIAP, 2009)

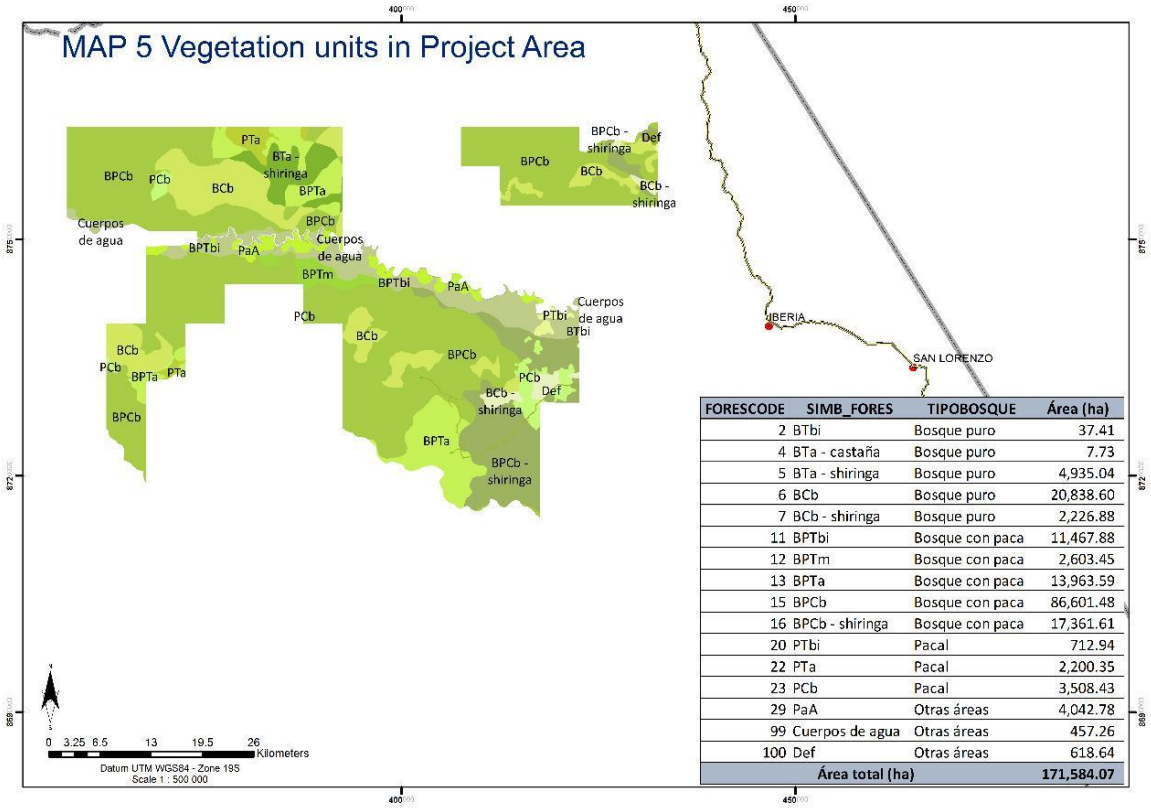
Table 2.7. Types of vegetation in project area (IIAP, 2009)

Forest types	Area (ha)	%
Bosque con Paca de colinas bajas	86,601.48	50.47%
Bosque de Colinas bajas	20,838.60	12.14%
Bosque con paca de colinas bajas con rodales de shiringa	17,361.61	10.12%
Bosque con paca de terrazas altas y medias	13,963.59	8.14%
Bosque con paca de terrazas bajas inundables	11,467.88	6.68%
Bosque de Terrazas altas con rodales de shiringa	4,935.04	2.88%
Pantano arbóreo	4,042.78	2.36%
Pacal de colinas bajas	3,508.43	2.04%
Bosque con paca de terrazas medias	2,603.45	1.52%
Others	6,261.21	3.65%
Total	**171,584.07**	**100%**

In the project area, the three largest units identified are low hill forest with paca (50.47%), low hill forest of paca with shiringa (10.12%) and low hill forest (12.14%). In Table 2.7, we can see the different vegetation units within the project area. Figure 2.9 shows the vegetation units within the project area.

Table 2.8. Land use in the Project Area

Deforestation	Forest under management	Protection forest	Other	Total
0.0	171,584.08	10,995.65		171,584



FORESCODE	SIMB_FORES	TIPOBOSQUE	Área (ha)
2	BTbi	Bosque puro	37.41
4	BTa - castaña	Bosque puro	7.73
5	BTa - shiringa	Bosque puro	4,935.04
6	BCb	Bosque puro	20,838.60
7	BCb - shiringa	Bosque puro	2,226.88
11	BPTbi	Bosque con paca	11,467.88
12	BPTm	Bosque con paca	2,603.45
13	BPTa	Bosque con paca	13,963.59
15	BPCb	Bosque con paca	86,601.48
16	BPCb - shiringa	Bosque con paca	17,361.61
20	PTbi	Pacal	712.94
22	PTa	Pacal	2,200.35
23	PCb	Pacal	3,508.43
29	PaA	Otras áreas	4,042.78
99	Cuerpos de agua	Otras áreas	457.26
100	Def	Otras áreas	618.64
Área total (ha)			171,584.07

Figure 2.9. Types of vegetation in the Project Area (IIAP, 2009)

2.1.6 Social Parameters (G1.3)

The Project is located within the Tahuamanu Province. Therefore, the characterization of the population will focus on the districts of Tahuamanu. With respect to the province of Tahuamanu, the project area is distributed as follows:

Table 2.9. Project location by districts

District	Area (ha)	%
Iñapari	89,957.00	52.4%
Iberia	76,590.00	44.6%
Tahuamanu	5,034.00	2.9%
Las Piedras	4.00	0.0%

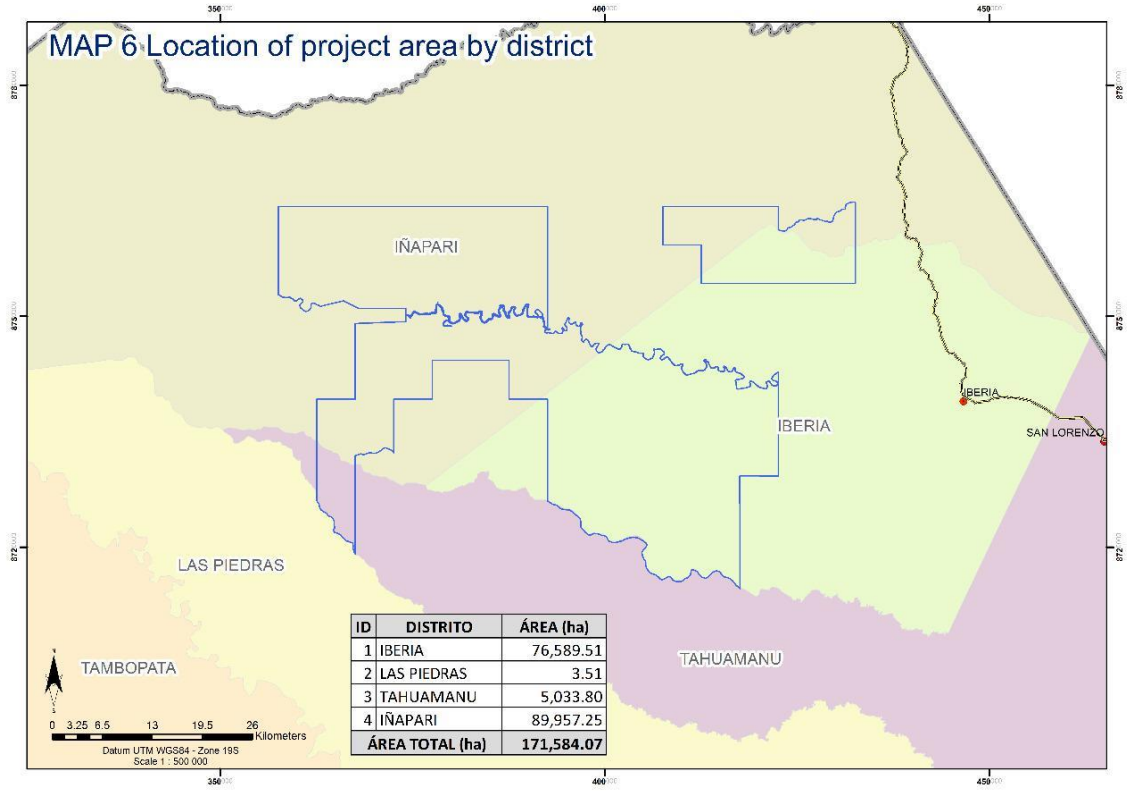


Figure 2.10. Project location by districts

The province of Tahuamanu covers approximately 21,196.86 km^2, which represents 24.85% of the surface area of the department of Madre de Dios, concentrating a population of 12,479 inhabitants (Source: INEI CENSO 2020).

Table 2.10. Population over the years in Tahuamanu (INEI, 2020)

Year of Census	2007	2017	2020
Population	10,742	11,047	12,479

The spatial distribution of the province's population centers is generally located on both sides of the inter-oceanic road, the main communication route with the economic activities that take place there. Likewise, the district capitals generally have better facilities and services due to the use of natural resources, provision of services and others. The district capital is Iñapari. The locations close to the project are:

- San Francisco de Asis
- Flor de Acre
- Oceania
- La Republica
- Chilina Vieja
- San Antonio de Abad
- San Isidro de Chilina
- Noaya
- Arca Pacahuara (religious community)
- Villa Primavera (association)
- Nueva Esperanza

- Belgica (indigenous community)
- Iñapari town

The specific information regarding each town is described in more detail in the Community Section.

Population

The Madre de Dios region is divided into three political-administrative provinces: Tambopata, Manu and Tahuamanu. The province of Tahuamanu has three districts: Iñapari, Iberia and Tahuamanu; this province has a total of 11,047 inhabitants (representing 7.83% of the total population of Madre de Dios), of which 6,138 are male (55.5%) and 4,909 are female (44.5%). Likewise, the majority age group is between 1 and 14 years old and between 15 and 29 years old, which means that the population in the province is mostly young. In the districts of Iñapari and Iberia, the trend is similar since there is also a slight majority of males.

The province of Tambopata has four districts: Tambopata, Inambari, Las Piedras and Laberinto; this province has 111,474 habitants (representing 79% of the total population of Madre de Dios) of which 52% are men and 48% are women. In the Piedras district, out of a total of 12,644, there are 6,595 males and 6,049 females, then, in relation to age groups, the group between 1 and 14 years old is also the majority, followed by the population between 15 and 29 years old. Details are shown in the following table:

Table 2.11. Population by age group by region/province, gender and urban/rural area (INEI, 2017)

Department / Province, Urban / Rural, Gender	Total	Large Age Groups (in years)					
		< 1	1 - 14	15 - 29	30 - 44	45 - 64	≥ 65
Tahuamanu province	11,047	197	3,068	2,616	2,614	2,070	482
Men	6,138	95	1,593	1,402	1,453	1,292	303
Women	4,909	102	1,475	1,214	1,161	778	179
Iñapari district	2,391	45	640	616	581	421	88
Men	1,389	23	325	352	359	271	59
Women	1,002	22	315	264	222	150	29
Iberia district	5,791	101	1,576	1,275	1,389	1,158	292
Men	3,159	41	825	673	741	702	177
Women	2,632	60	751	602	648	456	115
Tahuamanu district	2,865	51	852	725	644	491	102
Men	1,590	31	443	377	353	319	67
Women	1,275	20	409	348	291	172	35
Tambopata province	111,474	2,099	32,254	29,693	25,753	17,658	4,017
Men	57,632	1,082	16,415	14,561	13,279	9,934	2,361
Women	53,842	1,017	15,839	15,132	12,474	7,724	1,656
Las Piedras district	12,644	278	4,001	3,243	2,815	1,857	450
Men	6,595	132	1,991	1,588	1,500	1,107	277
Women	6,049	146	2,010	1,655	1,315	750	173

The province of Manu has four districts: Manu, Fitzcarrald, Madre de Dios and Huepetuhe; this province has a total of 20,290 inhabitants (representing 18.52% of the total population of Madre de Dios) of which 57.27% are male and 42.73% are female.

The population of the project area totals 10,742, of which 62.51% is concentrated in the Iberia district, especially in the urban population center of the same name.

One of the characteristics of the population of Madre de Dios and, therefore, of the project, is its high population mobility caused mainly by the expectation of working in mining (an expectation that is increasing due to the constant rise in the price of gold) and by the demand to take advantage of the region's forest and agricultural resources. At the departmental level, migration due to the expectation of working in mining or in the services and businesses that are sustained by this activity, are the main causes of the increase in population. Migrants enter Madre de Dios from other regions, mainly from the Andes.

Table 2.12. Internal migration in Madre de Dios (Yamada, 2010)

Period	Output	Input	Net Migration
2002-2007	6.3	21.1	14.8
1988-1993	13.1	21.7	8.6

This feature makes the Madre de Dios department (as part of Peruvian internal migration) ranked first in net migration in 2007. "The department that relatively attracted the majority of the population was Madre de Dios (in the Jungle), with a net migration balance of 14.8% (a very high rate of 21.1 percent, corresponding only partially offset by 6.3% departures)" (Yamada, 2010).

Table 2.13. Comparative migration rates in key regions in Peru (Yamada, 2010)

Region	Output	Input	Net Migration
Madre de Dios	6.3	21.1	14.8
Lima	3.4	8.0	4.6
Tacna	5.7	10.2	4.5
Callao	8.7	13.1	4.4
Tumbes	6.7	9.6	2.9

As of 2007, with the Madre de Dios department as the residence department, the following migration type data are available: 45.3% non-migrants, 28.6 %of established migrants, 26.1% of migrants in the last five years, 50.6 %of primary migrants, 35.6% of regular migrants and 13.8% of return migrants (2007 Census).

Considering the official information from INEI, it is identified that in the department of Madre de Dios, from the period from 2002 to 2007, 1% of immigrants have developed, while in the period from 2012 to 2017 it rose to 1.2%. On the other hand, the indicators of emigrants have also increased from period to period, as detailed below:

Table 2.14. Inter-census migration in Madre de Dios (INEI, 2017)

Immigrants					Migrants				Net migration
Department	2002-2007	%	2012-2017	%	2002-2007	%	2012-2017	%	
Madre de Dios	13,601	1	17,299	1.2	5,939	0.4	10,998	0.8	0.4

Recent migration data for the department of Madre de Dios is shown below.

Table 2.15. Recent migration in Madre de Dios (INEI, 2017)

Immigrants					Migrants				Net migration
Department	**2002-2007**	**%**	**2012-2017**	**%**	**2002-2007**	**%**	**2012-2017**	**%**	
Madre de Dios	38,535	0.8	56,096	0.9	11,713	0.2	14,610	0.2	0.7

Socio-economic Profile

By 2007, 39.3% of the country's population was in poverty, that is, had insufficient spending to purchase a basic consumption basket. Of the 39.3% of poor people in the country, 13.7% are extremely poor, that is, they have per capita spending below the cost of the basic food basket, and 25.6% are non-extreme poor, with per capita spending above the cost of the food basket, but below the value of the basic consumption basket.

The main indicators of poverty in the project districts are presented in the following table, showing that the Iñapari and Iberia districts have 26% and 20% of the much smaller rural population respectively compared to 54% in Tahuamanu district. The Madre de Dios department has 27% rural population, and Peru has 24%. This inequity is reflected and reinforced in the other indicators such as the population without water which is 6% for Iñapari and 14% for Iberia compared to 48% recorded for the district of Tahuamanu being an even higher percentage than that recorded for the department of Madre de Dios (20%) and Peru (23%).

The indicator of population without drainage or latrine is led by the district of Iñapari with 24%, followed by the district of Iberia with 10% close to 8% of the district of Tahuamanu. With respect to the indicator of population without electricity is 57% in the district of Tahuamanu, 37% in Iñapari and 24% in Iberia. The indicators for illiterate women, children aged 1-12 years and malnutrition rate for the three districts were close.

Table 2.16. Key social indicators (FONCODES, 2006)

Scope	Peru	Madre de Dios	Tahuamanu (p)	Iñapari (d)	Iberia (d)	Tahuamanu (d)
Population 2007	27,428,169	109,555	10,742	1,288	6,715	2,739
Rural population (%)	24	27	29	26	20	54
Quintile[4]		3	2	2	2	2
Population without water (%)	23	20	22	6	14	48
Population without letter / drainage (%)	17	19	11	24	10	8
Population without electricity (%)	24	31	34	37	24	57
Illiterate women (%)	11	5	6	6	6	7
Children 0-12 years (%)	26	27	23	27	23	22
Malnutrition rate Children 6-9 years	22	13	12	10	12	12

p = province, d = district.

According to INEI information, development indicators in the districts of the province of Tahuamanu, where the project is located, are variable. In Iñapari, a total population of 2,391 as of 2017 is identified where the life expectancy at birth is 84.46 years, the population with 18 years and complete regular basic education represents only 48% being on average 8.24 years of education of a settler in the district. On the other hand, the average family income is 1,571.68 Peruvian soles, an income that is above the minimum living wage in Peru, which would provide an indication of a good economic income for families in Iñapari. Regarding basic

[4] Quintiles weighted by population, where 1 = Poorest and 5 = Less Poor

services, Iñapari has 35.04% of homes without access to public water, 49.08% without access to sanitation and 13.91% without access to electricity. The percentage of female illiteracy in the district is 5.98% of the total illiterate population. These indicators and the other indicators for the province are shown below:

Table 2.17. Socioeconomic development indexes at district level (INEI, 2017)

Parameters	Iñapari	Iberia	Tahuamanu
Population (n° people)	2,391.00	5,791.00	2,865.00
Life expectancy at birth (years)	84.46	84.25	85.69
18-years old population with full high school level (%)	48.00	58.22	49.13
Education years (for people > 25 years old) (years)	8.24	8.59	7.02
Family income per capita (S/.)	1,571.68	1,075.44	946.79
Households without sanitary facilities (%)	49.08	41.01	63.29
Households without access to electricity (%)	13.91	12.50	28.17
Households without access to drinking water network (%)	35.04	47.16	24.27
Illiterate females (%)	5.98	5.79	6.56

On the other hand, for the Madre de Dios region, in the 2005-2007 period, economic participation indicators such as the EAP (the economically active population (EAP) includes all persons of either sex who contribute their work to produce economic goods and services) were 72.0%, 74.9% and 78.1% respectively. As an occupation category, the percentage of wage earners increased slightly (31.9%, 33.9% and 36.2%), and there was a notable increase in unpaid family workers (22.0%, 21.0 % and 35.7%).

For the project districts, the 2007 Census records a district average of 58.01% occupied EAP and 1.49%, unoccupied ADP. The Madre de Dios region registers 52.43% of occupied EAP and 1.51% of unoccupied EAP. It is worth noting that this same census registers 22.27% (2,392 people) of non-EAP (non-EAP is the population of working age, but who, in the adopted reference period, did not carry out or seek to carry out any economic activity) for the province of Tahuamanu, being almost half of the regional average of 46.06% of non-EAP.

Table 2.18. Key economic indicators in Madre de Dios (INEI, 2007)

Variables & Indicators	2005			2006			2007		
	Total	Poor	No Poor	Total	Poor	No Poor	Total	Poor	No Poor
Activity condition (%)									
EAP	72.0	67.3	73.7	74.9	71.5	75.7	78.1	68.9	79.4
NO EAP	28.0	32.7	26.3	25.1	28.5	24.3	21.9	31.1	20.6
Occupation category (%)									
Employer	11.6	6.8	13.1	12.2	6.0	13.4	12.9	11.1	13.1
Salaried	31.9	22.5	34.9	33.9	24.9	35.7	36.2	36.6	36.1
Self-employed	34.4	42.8	31.9	32.9	35.4	32.4	17.3	32.6	33.7
Unpaid family worker	22.0	28.0	20.1	21.0	33.6	18.5	35.7	19.7	17.0
Economic sector (%)									
Primary	35.7	56.7	29.2	32.6	64.1	26.3	38.6	63.3	35.6
Secondary	5.3	4.2	5.7	6.8	4.4	7.3	8.9	5.1	9.4
Tertiary	58.9	39.1	65.1	60.6	31.4	66.4	52.4	31.6	55,0

Variables & Indicators	2005			2006			2007		
	Total	Poor	No Poor	Total	Poor	No Poor	Total	Poor	No Poor
Income and expenses (monthly per capita in local currency, soles)									
Incomes	353.0	144.9	445.7	435.0	173.5	507.8	480.5	196.5	533.0
Expenses	313.2	145.0	388.2	373.8	156.3	434.3	404.9	164.6	449.3

Regarding the economic conditions of the districts, it can be identified that in Iñapari the occupation of laborer and independent worker are the most registered, in the first instance the laborers refer to the influence of forestry companies who demand local labor on a constant basis. It can also be seen that the majority of workers are men, while women have a greater presence in the categories of employees or self-employed workers. In all occupational categories, men account for more cases. Only in the unemployed group are women more representative. The economic areas and occupations in all districts by sex are shown in the following table:

Table 2.19. Economic areas and occupations per district (INEI, 2017)

Gender, EAP, occupied and economic sector	Total	Employment Status						Unoccupied
		Employer	Independent worker	Employee	Dependent worker	Entrepreneurial	Housewife	
DISTRICT IÑAPARI	1,258	28	305	260	592	32	13	28
Men	920	16	202	137	535	17	1	12
Women	338	12	103	123	57	15	12	16
Public servants	1	-	-	1	-	-	-	-
Scientists and researchers	57	2	7	48	-	-	-	-
Technicians	47	2	9	34	-	2	-	-
Administrative workers	67	-	2	65	-	-	-	-
Traders	212	10	95	83	-	24	-	-
Agriculture, forestry and fishery workers	86	6	80	-	-	-	-	-
Civil construction and others	111	6	28	-	77	-	-	-
Machinery operators and drivers	329	2	52	1	274	-	-	-
Unqualified workers	306	-	32	14	241	6	13	-
Army and policemen	14	-	-	14	-	-	-	-
Unoccupied	28	-	-	-	-	-	-	28
DISTRICT IBERIA	2,679	65	970	665	747	83	25	124
Men	1,833	29	689	349	677	23	1	65
Women	846	36	281	316	70	60	24	59
Public servants	7	-	-	7	-	-	-	-
Scientists and researchers	205	1	7	197	-	-	-	-
Technicians	120	2	17	101	-	-	-	-
Administrative workers	197	1	-	196	-	-	-	-
Traders	428	38	213	104	3	70	-	-
Agriculture, forestry and fishery workers	536	13	523	-	-	-	-	-
Civil construction and others	230	6	77	-	144	3	-	-

Gender, EAP, occupied and economic sector	Total	Employment Status						Unoccupied
		Employer	Independent worker	Employee	Dependent worker	Entrepreneurial	Housewife	
Machinery operators and drivers	233	1	64	3	164	1	-	-
Unqualified workers	582	3	69	40	436	9	25	-
Army and policemen	17	-	-	17	-	-	-	-
Unoccupied	124	-	-	-	-	-	-	124
DISTRICT TAHUAMANU	1,237	53	482	112	503	42	4	41
Men	952	35	364	47	458	23	1	24
Women	285	18	118	65	45	19	3	17
Public servants	2	-	-	2	-	-	-	-
Scientists and researchers	21	-	-	21	-	-	-	-
Technicians	46	6	19	20	-	1	-	-
Administrative workers	20	-	1	17	-	2	-	-
Traders	147	11	73	34	2	27	-	-
Agriculture, forestry and fishery workers	367	30	337	-	-	-	-	-
Civil construction and others	59	4	26	-	28	1	-	-
Machinery operators and drivers	44	1	10	-	33	-	-	-
Unqualified workers	480	1	16	8	440	11	4	-
Army and policemen	10	-	-	10	-	-	-	-
Unoccupied	41	-	-	-	-	-	-	41

Table 2.20. Level of employment at project districts (INEI, 2007)

Economic Activity of the Population (EAP)	Iñapari (d)		Iberia (d)		Tahuamanu (d)		Madre de Dios	
	Cases	%	Cases	%	Cases	%	Cases	%
Occupied EAP	670	59.6	3,376	56.5	1,495	61.1	49,712	52.4
EAP Unoccupied	31	2.8	92	3.1	20	0.8	1,428	1.5
No EAP	424	37.7	1,037	40.5	931	38.1	43,668	46.1
Total	1125	100.0	5,981	100.0	2,446	100.0	94,808	100.0

This economic population is associated with various economic activities, mainly gold mining, traditional monoculture agriculture, timber and Brazil nut extraction, livestock and small animal husbandry. The population of the rural zone is mainly made up of former residents and migrants with more than fifteen years in the zone, dedicated to monoculture agriculture, hunting, fishing, Brazil nut gathering, wood extraction, and seasonal artisanal mining and small businesses (wineries, restaurants, bars, lodges, others) (Lourdes Fernandez 2009).

Then with respect to the indicators of the Economically Active Population, the following results are shown:

Table 2.21. Economically active population per district (INEI, 2017)

Population, occupied / unoccupied PEA and gender	Department Madre De Dios		District Iñapari		District Iberia		District Tahuamanu	
Population	99,971	100.00%	1,736	100%	4,214	100%	1,997	100.00%
Men	52,840	52.86%	1,057	60.89%	2,341	55.55%	1,137	56.94%
Women	47,131	47.14%	679	39.11%	1,873	44.45%	860	43.06%
PEA	67,301	67.32%	1,258	72.47%	2,679	63.57%	1,237	61.94%
Men	42,675	63.41%	920	73.13%	1,833	68.42%	952	76.96%
Women	24,626	36.59%	338	26.87%	846	31.58%	285	23.04%
Occupied	64,206	104.82%	1,230	97.77%	2,555	95.37%	1,196	96.69%
Men	41,219	64.20%	908	73.82%	1,768	69.20%	928	77.59%
Women	22,987	35.80%	322	26.18%	787	30.80%	268	22.41%
Unoccupied	3,095	4.60%	28	2.23%	124	4.63%	41	3.31%
Men	1,456	47.04%	12	42.86%	65	52.42%	24	58.54%
Women	1,639	52.96%	16	57.14%	59	47.58%	17	41.46%
NO PEA	32,670	32.68%	478	27.53%	1,535	36.43%	760	38.06%
Men	10,165	31.11%	137	28.66%	508	33.09%	185	24.34%
Women	22,505	68.89%	341	71.34%	1,027	66.91%	575	75.66%

As shown in the table above, the EAP of Iñapari represents 67.32% of the total population (ages 14 and older), with 63.41% of men and 36.59% of women.

In the Department of Madre de Dios, the Gross Domestic Product increased by 13.6%, mainly due to the growth of the activity of oil, gas, minerals and related services (25.6%), which represents 52.5% of the departmental GDP; and by the activities: construction (16.1%), telecommunications and other information services (10.3%), public administration and defense (8.3%), and lodging and restaurants with 5.8%. In particular, the extraction of minerals and related services in 2016 recorded an increase of 32.5% in the gross value added of the activity as compared with the previous year because of the greater production of gold ore in fine Grams of 38.0%. (INEI, 2017).

Table 2.22. Gold Production

Product	2015 (fine gr)	2016 (fine gr)	Var. %
Gold	12,730,632	17,569,475	38%

Gold price has continue increasing in the recent years. An interesting fact is that gold price is negatively correlated with pressure on forest areas. An increase in price attracts population to mining areas from agrarian areas, while a decrease in gold prices expulse population to areas surrounding forests.

Figure 2.11. Gold Price in Peru (soles/ounce).

Source: https://www.goldrate24.com/es/precios-del-oro/america-del-sur/peru/

2.1.7 Project Zone Map (G1.4-7, G1.13, CM1.2, B1.2)

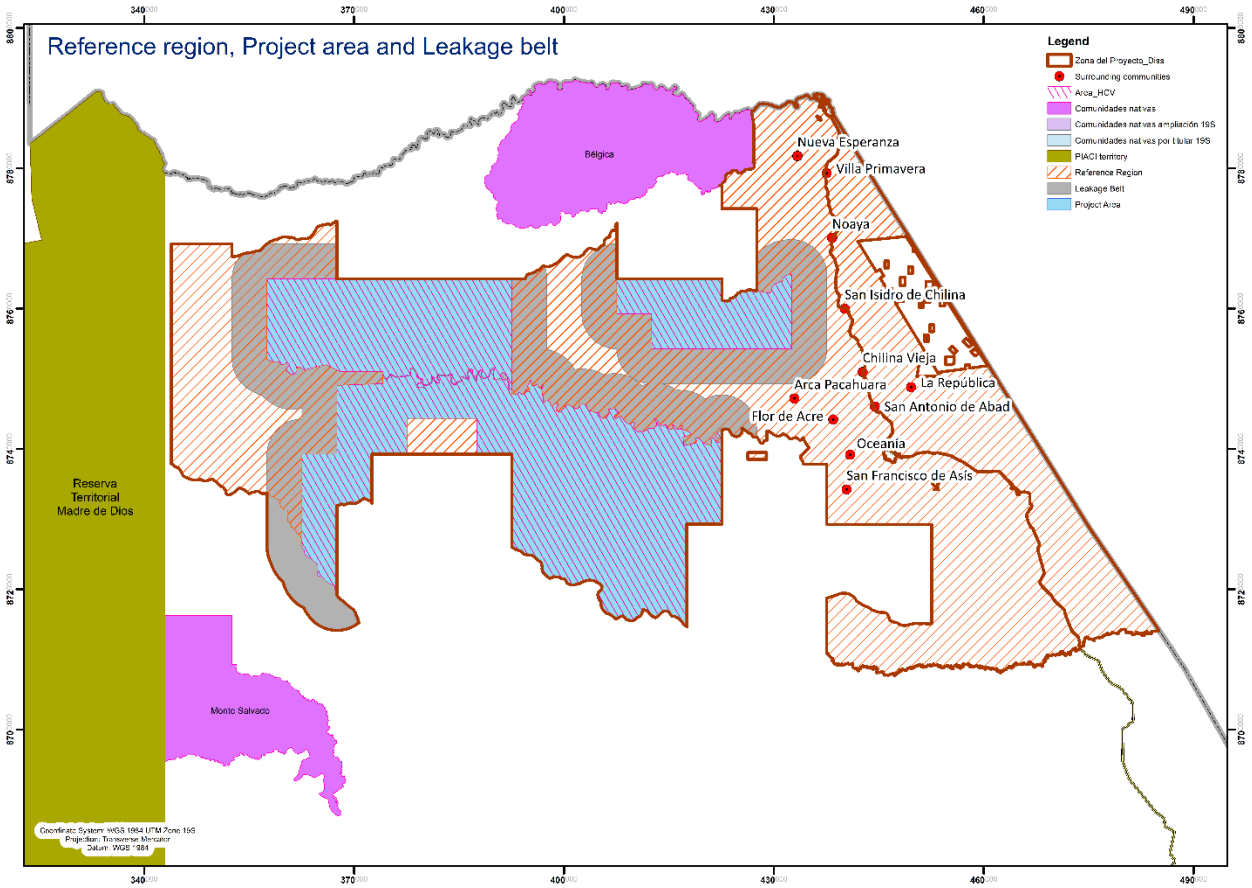


Figure 2.12. Reference Region, Project Area and Leakage Belt

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

Table 2.23. Geodetic Characteristics

Entity	Project Area	Reference Region	Leakage Belt
Centroid X	393749	422107	392869
Centroid Y	8744142	8746285	8750200
Latitude	11° 21' 32.578" S	11° 20' 25.063" S	11° 18' 14.982" S
Longitude	69° 58' 25.324" W	69° 42' 48.941" W	69° 58' 53.953" W
Area (ha)	171,584.07	341,552.03	100,554.47
Tenure	Forest concessions	Forest concessions, Agrarian plots, Brazil nut concessions, Conservation concessions, Ecotourism concessions	Forest concessions, agrarian plots
Department	Madre de Dios	Madre de Dios	Madre de Dios
Province	Tahuamanu, Tambopata	Tahuamanu	Tahuamanu, Tambopata
District	Iberia, Tahuamanu, Iñapari, Las Piedras	Iberia, Tahuamanu, Iñapari	Iberia, Tahuamanu, Iñapari, Las Piedras

Table 2.24. High Conservation Values in Project Area

HCV	Result
Significant concentrations of biodiversity values at global, regional or national levels	Present
Globally, regionally or nationally significant large forests on a landscape scale	Present
Forest areas within or containing rare, threatened or endangered ecosystems	Not present
Forest areas that provide basic ecosystem services in critical situations	Present
Forest areas essential to meet the basic needs of local communities	Not present
Forest areas critical to the traditional cultural identity of local communities	Not present
Significant concentrations of biodiversity values at global, regional or national levels	Not present

The geodetic coordinates of the polygon of the project area, leakage belt, reference region and surrounding communities and towns are included in a KML file attached.

2.1.8 Stakeholder Identification (G1.5)

The process of stakeholders' identification is based on the consideration of following criteria:

- Social relevance: especially neighboring social groups (communities, producers, etc.)
- Technical relevance: especially entities who have a key role related with forests and forest resources

- Political relevance: especially administrative authorities at a local, regional or national level
- Economic relevance: here are included the type of actors that develop a similar activity than the project proponent and in the surrounding area as potential synergies may occur

2.1.9 Stakeholder Descriptions (G1.6, G1.13)

Table 2.25. Characterization of stakeholders

Stakeholders	Rights, Interest and Overall Relevance to the Project
Rural producers	Right: They do not have the right to occupy forest concessions to install their crops or cattle. In Peru, almost all deforestation is illegal Interest: To get enough incomes for livelihood, mainly from their traditional activity, agrarian production Relevance: High because depending on how they produce crops, they may need or not to expand to new areas, mostly recently cleared forest areas
Local municipalities	Right: They have competences referred to land planning at its province or district level, among others Interest: To promote the development of their jurisdiction and welfare of their citizens Relevance: Depending on the point of view of the political party of the municipality, they may have different positions and actions with the forest. They are subject to pressure from citizens and migrants for new urban areas to live or develop agrarian activities.
Religious community	Right: They do not have the right to occupy forest concessions to install their crops or cattle. In Peru, almost all deforestation is illegal Interest: Because of their beliefs, they think the land is to be worked (what is understood as agrarian production) so they are expanding very quickly the agrarian areas. Relevance: Very relevant because they are putting a lot of pressure on neighboring forest areas.
SERFOR	Right: The national forest authority is in charge of promoting sustainable forest management. Interest: To value the forest heritage and resources as a strategy for its conservation. Relevance: It could be a good partner for strategies to reduce forest loss rate in the project area and surrounding forests.
Regional Government	Right: The mission of the regional governments is to promote the sustainable integral development, promoting public and private investment, and employment, guaranteeing the rights and equal opportunities of its people, as indicated in the national and regional plans and programs. Interest: To attract private investment that creates local employment in order to achieve a good social environment than ensures interesting political capital Relevance: Many forest functions have been transferred from national government to regional entities as the Forest Directorate (GERFOR) so it plays a role (that may be a facilitator or an obstacle) in the development of forest concessions
Forest concessions	Right: They have the right to sustainably exploit their concession forest area. Interest: They are under growing pressure from deforestation drivers and illegal loggers so a positive experience as JAGUAR REDD PROJECT may be an incentive to develop similar projects Relevance: They can be good allies of the project as a model forest cluster can become a barrier of deforestation expansion
Ministry of	Right: As the climate change authority, MINAM has the function to promote

Stakeholders	Rights, Interest and Overall Relevance to the Project
Environment	actions to reduce GHG emissions, including from land use change. Interest: The reduction of deforestation rate is key for MINAM to achieve its NDC targets but rules about how to share reductions between government and private sector are pending of definition. Relevance: Very high because it defines many of the key rules for REDD+ projects.
OSINFOR	Right: It has the function to supervise and ensure the accomplishment of sustainable management of forest resources and punish crimes against forest heritage. Interest: The conservation of forest heritage. Relevance: High because it plays a key role in the surveillance and sanction to illegal activities that affect forest cover and forest resources.
Native Community	Right: There is only one indigenous community in the Project zone: Native Community of Belgica. This human ethnic group covers a territory of more than 53 thousand hectares, where they develop their hunting, fishing and harvesting activities, combining with subsistence agriculture and cattle ranching activities. Additionally, they also do forest management, having obtained FSC certification for wood products. This group does not have current or ancient rights over the project area. Interest: To get enough incomes for subsistence, mainly from their traditional activities and forest management. Relevance: Low because they develop their productive activities in their own land.
PIACI, represented by FENAMAD	Right: Indigenous isolated groups, semi-nomadic, likely part of Yine ethnic group. Studies estimate that they are around 350 individuals living in a territory reserve of 867,692 hectares, where they develop their traditional hunting and harvesting activities. This group does not have current rights over the project area and, since the concessions were granted, there have not been evidence of their presence. Interest. To obtain resources from hunting and harvesting to satisfy their basic needs of subsistence. Relevance: Very low as they do not know or practice agriculture.
Management Committee of Alto Purus National Park (AP-NP)	Right: Inter-institutional coordination group of civil society stakeholders with the purpose to contribute to the management of AP-NP with interventions in the buffer zone. Interest. Conservation of AP-NP. Relevance. Very low, as their objectives are similar to the project goals. The conservation and reduction of deforestation.
Forest Management Committee of Tahuamanu	Right: Inter-institutional coordination group of civil society stakeholders with the purpose to contribute to the sustainable management of permanent production forests (BPP) of the province of Tahuamanu. Interest. To protect Permanent Production Forests. Relevance: Very low as they have similar targets than the REDD project: forest management and reduction of deforestation.

2.1.10 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.

2.1.11 Project Activities and Theory of Change (G1.8)

The current project is not implemented in a jurisdiction where a jurisdictional REDD+ program is being implemented.

Table 2.26. Theory of change

Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
Project diffusion	Banners Workshops about citizen participation Diffusion programs Brochures	Project known by stakeholders	Project activities visible and with social license	High
FMU Protection Integral Plan implementation	4 surveillance sites operational 100% of milestones marked 100% of milestones defined Signaling located in main accesses and key sites Patrolling system operating	Project area efficiently protected	No deforestation in Project area	Very high
Satellite monitoring and field assessment of sectors with risk of invasion	Land use maps	Project area efficiently protected	No deforestation in Project area	High
Support pilot sustainable productive initiatives of surrounding communities, reducing the expansion of agrarian activities and improving livelihood conditions with 2% of project incomes.	Projects identified	Projects funded and implemented	Reduction of local pressure over the Project area environment	Very high
Strengthen / develop skills and capacities in family members that are part of selected projects, including local company workers	Individuals identified	Individuals trained	Stakeholders are convinced and loyal with the Project and are allies to share the benefits of the project and the benefits to manage forests sustainably	High
Participate in dialogue spaces and management of Protected Areas, including the Territorial Reserve Madre de Dios, searching for strategic partnerships focused on its conservation	Spaces with a permanent and active presence of the project	Project socialized and known between the stakeholders	Project activities, visible and with social license	High

Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
Promote activities with entities whose goals are addressed to protect ANP and PIACI territories (isolated and initially contacted indigenous people) with 1% of annual project incomes	Organizations and activities aligned with the project goals, identified, promoted and cofounded by the project	Strengthening of the conservation strategies of ANP and PIACI[5] lands	Biodiversity and PIACI protected	High
Promote activities with entities whose goals are addressed to protect emblematic fauna and flora species with 1% of annual project incomes	Organizations and activities aligned with the project goals, identified, promoted and cofounded by the project	Strengthening of the conservation strategies of emblematic or with a degree of threat species	Biodiversity protected	High
Promote activities with entities whose goals are addressed to contribute to the sustainable development of the population (according to prioritization of the Consulting Committee of Community Relationship of the project, with 1% of annual project incomes	Intervention components and activities, identified and funded by the project	Communities with improved services and infrastructure	Families improving their live conditions and find alternatives for their development	Very high
Implement Reduced Impact Logging techniques in the FMU to ensure healthy wildlife population	Management plans based on sustainability criteria	Healthy forests, sustainably managed	Biodiversity and landscapes protected	Very high
Develop and implement mechanisms for the diffusion of environmental education within children, teenagers and surrounding communities	Brochures Banners Speeches Diffusion programs	Communities with an increased environmental consciousness	Increased conservation initiatives	High

2.1.12 Sustainable Development

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

- SDG. The current project contributes directly with at least two of the Sustainable Development Goal, which are: SDG 15: Life of terrestrial ecosystems, specially forests and its biodiversity; and SDG 13: Action for climate, because it expects to reduce GHG emissions from forest cover change caused by deforestation, that the project expects to prevent or reduce significantly.

- Bicentennial Plan. This is a planning tool, developed by 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".

- Forest and Wildlife Law, approved in 2016, has the goal to promote the conservation, protection, increase and sustainable use of forest and wildlife heritage within national territory, integrating the

[5] PIACI: Isolated and with initial contact indigenous people

management with the maintenance and enhancement of forest ecosystem services and other ecosystems.

- National Strategy on Forest and Climate Change: The National Strategy on Forest and Climate Change (ENBCC, as its acronyms 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.

- 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.

- 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".

2.1.13 Implementation Schedule (G1.9)

Table 2.27. Project Milestones

Date	Milestone(s) in the project's development and implementation
2015	The concessions conforming the Project Area were added to the joint management of Maderacre and got the FSC certificate.
2016	Test year to implement FCS certificate in the new areas.
2017	FSC re-certification of the entire area under Maderacre´s management.
	Starting Date of GHG accounting period in the project area.
2022	Expected validation and first verification audit.
2047	Ending date of REDD+ project.

2.1.14 Project Start Date

The start date of the project and the start date of the accreditation is April 19, 2017, date on which the government resolution that authorizes the implementation of the forest management plan for the 2017 period comes into force, empowering the execution of management and protection activities in the project area. The document to which reference is made is RDF No. 186-2017-GOREMAD-GRRNYGA-DRFFS/DFFS TAH.

On the other hand, the scope of the FSC certificate obtained by MADERACRE covers the new areas transferred and added to the MADERACRE forests since November 2015. Therefore, the proponent of the project considers that 2016 can be considered a year of consolidation and 2017, the beginning of the life cycle of the REDD project. It should be noted that, during 2016, a new FSC reassessment was successfully carried out, renewing the FSC forest management and chain of custody certificate since January 2017, this being the guarantee of the implementation of sustainable forest management, accredited by an external audit team. Independent. This reassessment is considered a milestone to define the start date of the project, not only because it ensures good environmental and social management of the forest, but also because the extra income generated by the sale of carbon bonds improves the economy of the operations and allows that certified wood has access to market niches that are more committed to forest conservation.

The project start date is covered by the scope of the official forest loss maps, prepared by MINAM, through the GEOBOSQUES platform. These maps have been made with a limited number of satellite images which were selected taking as a criterion the least presence of clouds present in the images, that is, images of the months of the dry season were selected, mainly between June and September.

2.1.15 Benefits Assessment and Crediting Period (G1.9)

April 19st, 2017 is the project crediting period start date and it lasts until April 18, 2047, providing a total of 30 years of project life, even though the forest concession contract states that it is renewable automatically every 5 years so it never ends.

2.1.16 Differences in Assessment/Project Crediting Periods (G1.9)

There are no differences between the GHG emissions accounting, climate adaptive capacity and resilience, community, and/or biodiversity assessment and periods.

2.1.17 Estimated GHG Emission Reductions or Removals

Table 2.28. Estimated GHG emissions reductions

Year	Estimated GHG emission reductions or removals (t CO_2e)
2017	819,602.00
2018	877,454.00
2019	1,021,676.00
2020	1,120,515.00
2021	1,226,377.00
2022	1,354,958.00
2023	1,490,803.00
2024	1,632,902.00
2025	1,780,147.00
2026	1,708,435.00
Total estimated ERs	13,032,869.00
Total number of crediting years	10
Average annual ERs	1,303,286.90

2.1.18 Risks to the Project (G1.10)

The Project has identified four major risks that must be faced in order to minimize the risk of occurrence and, if they happen, mitigate their impacts. This analysis has been done using The Project Risks Table of Appendix 3 of VCS PD template and is presented below:

Table 2.29. Risk analysis

Identified Risk	Potential impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk
Productive activities are not enough attractive to change the pattern of land use of agrarian neighbors	Negative impacts on climate benefits because producers will continue pressing for agricultural lands inside of project area	Design feasibility study and provide continuous technical assistance including accompanying commercial activities in order to access to improved and specialized markets with premium prices
New migrants that are not part of the original beneficiaries of the REDD+ project will become	Negative impacts on climate benefits because migrants won't receive the benefits of REDD+	Work jointly with authorities to a planning process of settlements of new migrants

Identified Risk	Potential impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk
new deforestation drivers as they do not participate in the project activities	projects and will search for lands inside of project area to settle and produce	
Internal conflicts within local settlements	Negative impacts on community benefits as the conflicts will not allow access to activities offered as part of REDD+ project. As a consequence of that, they will press on project area or leakage belt	Work jointly with local leaders and social specialists in order to understand the expectations, interests and power groups and networks inside local communities
Fires cannot be controlled because of dry seasons	Negative impacts on climate and biodiversity benefits because it will cause forest loss affecting fauna and emitting GHG	Incorporate scientific and research information in the forest fires patrolling strategy

2.1.19 Benefit Permanence (G1.11)

Based on risk analysis, the measures proposed to guarantee the permanence of climate, community and biodiversity benefits are:

- Develop feasibility studies of products that will be produced with the support of REDD+ project in order to analyze previously if the activity is profitable enough to convince producers to dedicate to these activities instead of looking for new areas to produce conventional crops
- Provide a permanent technical assistance to producers including marketing aspects as part of a strategy to access to premium markets
- Support local and regional authorities urban planning process in order to reduce the risk of uncontrolled migration
- Implement a diagnosis of local relationships inside each community as part of the strategy of sharing benefits and activities at an equitable way to minimize the risk of internal conflicts that affect the project development
- Identify scientific sources of information related with intensity and location of forest fires and incorporate that information in patrolling strategy

2.1.20 Financial Sustainability (G1.12)

The project cash flow starting at 2017 shows that at the first two years of the project, incomes from timber sales allowed MADERACRE to achieve the breakeven point. Since 2019, the timber production and sales decreased significantly (as the activities needed to avoid deforestation increased, as there is increasing deforestation pressure). Carbon sales are expected to help from 2022. The estimations are conservative as the project assumes starting with a fraction of sales from total VCUs generated of 5% and improving to a percentage of 28% in 2026. Prices are also conservatively assumed.

2.1.21 Grouped Projects

1) Eligibility Criteria for Grouped Projects (G1.14)

The Tahuamanu REDD+ Project is not a grouped project, so this section is not applicable.

2) Scalability Limits for the Grouped Projects (G1.15)

The Tahuamanu REDD+ Project is not a grouped project, so this section is not applicable.

3) Risk Mitigation Approach for Grouped Projects (G1.15)

The Tahuamanu REDD+ Project is not a grouped project, so this section is not applicable.

2.2 Without-project Land Use Scenario and Additionality

2.2.1 Land Use Scenarios without the Project (G2.1)

Madre de Dios was a pristine region and for this reason, it was the capital of biodiversity until 2009, when the Interoceanic Highway was finally completely paved and the transportation cost reduced dramatically, increasing exponentially the internal migration from the highlands of Peru.

This is the reason why Madre de Dios shows an exponential increase of the deforestation rate since that year as can be seen in following figure:

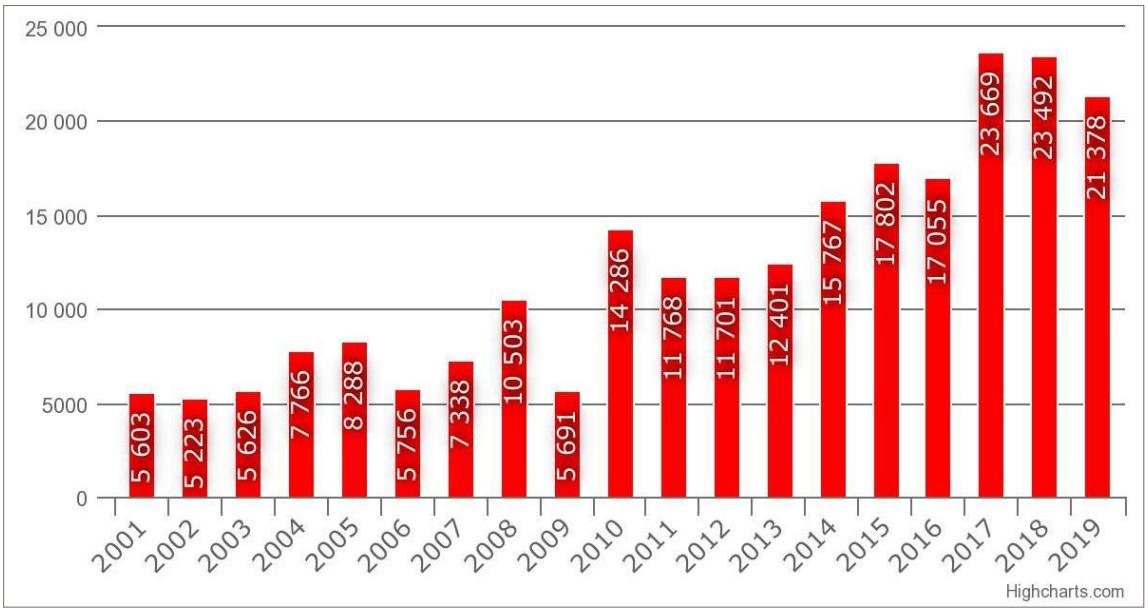


Figure 2.13. Annual Forest Loss in Madre de Dios (ha) (GEOBOSQUES - MINAM)

If we only take data since 2009, the slope of the trend is even higher. Migration is focusing on mining areas (in the south of Madre de Dios) and in agrarian activities (around both axes of IOH). Migration for agrarian purposes is putting a lot of pressure over forest concessions as may be seen in the map that shows all the timber concessions in Madre de Dios overlapped with deforested areas. Almost 25 thousand hectares of timber concession have been deforested during this century (2001-2018), but 22% was lost only in the last year (2018) showing the growing threat that close forests face.

As described in more detail in Community section 3.1.4), there are different settlements located in the surrounding areas to the concession. One of them, a religious community, is, according to the different interviews applied to local stakeholders (including the leaders of the other local communities), the most aggressive in terms of time dedicated to the expansion of agricultural activities . Newcomers may increase in the next years attracted by the lack of governance and the promotion of this activity by local authorities. It must be remembered that the major of the district is a member of this religious community.

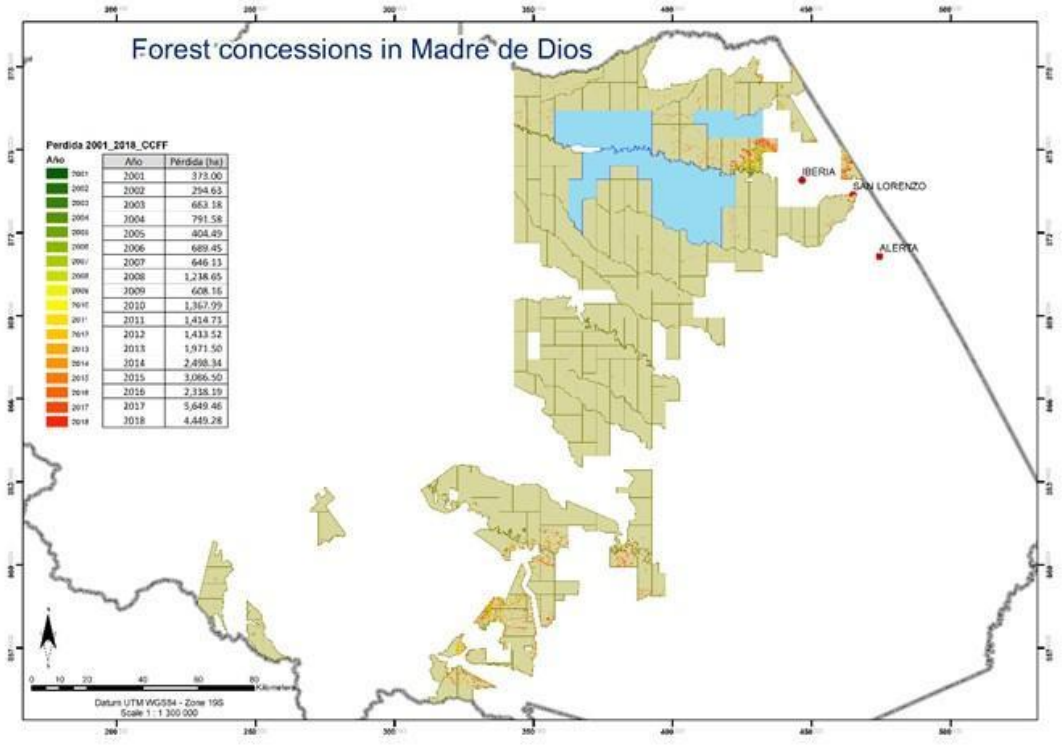


Figure 2.14. Forest concessions in Madre de Dios (SERFOR, 2017)

The timber concession, basis of the REDD+ Project, was granted in 2002 but logging is a traditional activity in the zone since decades ago and the project proponent is a very well-known family in the forest sector in Peru and also in Madre de Dios.

Without the REDD+ incomes, TAHUAMANU project will not be able to spend financial resources from its core business to implement a sustainable productive development program with families living in neighboring towns, now dedicated to agrarian production nor will be able to strengthen the patrolling system. In that scenario, the most likely scenario is that agrarian production will enter into the forest concession as it is already happening in other smaller concessions that do not have the resources to protect as effectively as TAHUAMANU CONCESSION has done until now in the project area.

2.2.2 Most-Likely Scenario Justification (G2.1)

The most likely scenario described in 2.2.1 is proposed, based in two elements:

- Statistical data of increasing deforestation rate in similar type of land tenure, it means, other forest concessions, in the same administrative unit, Madre de Dios Region.
- Expert opinions from a diverse range of stakeholders (community leaders, forest authorities, etc.) about the profile of each local settlement and the trends on land use

2.2.3 Community and Biodiversity Additionality (G2.2)

Biodiversity is intrinsically connected with the climate targets. The reduction of GHG emissions from reduction of forest loss cause automatically the reduction of biodiversity loss as forests hosts many fauna and flora species that compose the rich biodiversity of the project area. This is described in more detail in the Biodiversity Section.

In the case of community additionality, the main positive impact will come from the support that TAHUAMANU REDD+ PROJECT will bring to neighboring communities, through productive projects, organizational strengthening, and enhanced governance. At this time, since 2002 when the concessions started operations, timber incomes did not generate enough profits to be invested in this type of activities. This is based on evidence of more than 18 years. As shown in the cash flow, these investments come from a fraction of expected carbon sales.

2.2.4 Benefits to be used as Offsets (G2.2)

At this time, TAHUAMANU REDD PROJECT does not plan to access to any type of market for biodiversity offsets nor community offsets. This can be reviewed in the cash flow where incomes are originated only from the timber and carbon sales.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

Documents generated for REDD project and reports containing the monitoring results will be stored in the administrative offices of the project, in Iñapari, and virtually stored in the web page of MADERACRE, in order to be of free access. A summary of those reports will be shared with stakeholders at the end of each year, physically. The main outcomes and conclusions of the monitoring system will be announced in citizen participation workshops.

2.3.2 Dissemination of Summary Project Documents (G3.1)

- Twice per year, the project will execute Citizen Participation Workshops (at the start and close of logging operations). Here, the main conclusions of the monitoring systems of previous year and the expected activities for next year will be shared.
- Internal meetings for MADERACRE workers.
- Formal communication to stakeholders (local communities, public and private entities) will be sent sharing the main results of the monitoring reports.
- Public summaries of the monitoring reports and other relevant documents generated by the project will be available in the web page of the company.

2.3.3 Informational Meetings with Stakeholders (G3.1)

Invitations to stakeholders with no less than 1 week of anticipation will be submitted previous to Citizen Participation Workshops, carried out twice per year (at the beginning and at the end of logging operations).

Local radios will be used for publicizing the Citizen Participation Workshops. MADERACRE has two partnerships with two local radios of Iñapari.

2.3.4 Community Costs, Risks, and Benefits (G3.2)

In the workshops, the Project will share relevant information about the costs of the activities and the risks and benefits of the project that is being implemented as a response to increasing threat and in order to enhance the surveillance and protection of project area with the development of environmentally friendly projects, proposed by local communities of the project zone. Also, we will support initiatives of entities linked to nature conservation, ANP management, care of emblematic or endangered wild fauna and flora and the protection of PIACI (isolated indigenous people).

The dynamic of the activities, the launch of the calls for contests, the improvements and achievements of each activity and the initiatives supported will be exposed every year in the abovementioned workshops.

2.3.5 Information to Stakeholders on Validation and Verification Process (G3.3)

Through letters to stakeholders and radio announcements, the CCB validation and verification processes will be announced. Here, key information about dates and field work will be included and described.

2.3.6 Site Visit Information and Opportunities to Communicate with Auditor (G3.3)

Through letters to stakeholders and radio announcements, the CCB validation and verification processes will be announced. Here, key information about dates and field work will be included and described. There will be option for any stakeholder to communicate with the audit team during the field visit to express their perception about the project. We will guarantee that those interviews to be carried out directly, spontaneously and without presence of team project. If it is needed that the audit team to visit the local communities, the project will support it.

2.3.7 Stakeholder Consultations (G3.4)

A stakeholders' map has been developed for the Corporate Social Responsibility Program, updated and complemented with the Community Development Plan. The information carried out during the implementation of the activities has allowed to realize about the necessity to count with an Advisory Committee for Community Relationships. This committee brings support to define actions and decisions about how to channel the support to local communities. Twice per year and in parallel with the Citizen Participation Workshops, the advisory committee meetings are organized to review the improvements and discuss future actions to support the improvement of the communities. The conclusions are included in a report prepared by the Community Relationship Area of the company and provide guidance for future work and monitoring. This level of interaction has allowed to identify the main communities and stakeholders in the influence zone, learning about their needs and proposing action mechanisms for the project. For instance, health and education have been identified as relevant for local development but usually not prioritized by the Peruvian State. Also, to guarantee the project area conservation, we have identified that a focused strategy is to promote productive activities that are environmentally friendly, accessible for local communities and families, that may become alternatives to bring them development.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

The development of 2 Citizen Participation Workshops and 2 annual meetings with the Advisory Committee are the main strategies that the project has defined for its interaction with the community and they have been executed since the beginning of the project, the continuity of the development of these spaces is guaranteed which are complemented by the routine work of the project's Social Responsibility area, which has a constant presence in the project area. At the same time, a Citizen Participation Workshop has been established.

The suggestion box that is enabled so that the general population can anonymously present their concerns, complaints or proposals. This is installed at the entrance of the company to the administrative offices of the project and is managed by the Social Responsibility area, which systematizes and channels the attention of the comments received through this channel (checkpoint 1).

On the other hand, considering the new COVID-19 situation and prioritizing preventive measures against a possible contagion, digital channels have been established for people and the community in general to submit their requests or contributions. The virtual communication channels are: responsabilidadsocial@maderacre.com and the telephone number is 985582143 in charge of a MADERACRE social facilitator.

At the same time, the project has developed and implements the dissemination of the "Procedure for handling complaints, queries or external requests." This tool is disseminated to the main representatives of communities, organizations and public and private institutions, settlements and by means of this document, the population is informed that direct consultations with the company can also be made and the procedure

is detailed. The Social Responsibility area collects these requests and takes care of their timely management, preventing them from becoming major conflicts.

Every 2 years the project develops a participatory rural appraisal validated methodologies in order to collect information that allows us to infer or know the use that communities make of forest resources to satisfy their needs or meet their livelihoods. The results of these consultation and interaction processes with the community in general are managed by the Social Responsibility area, reflected in reports or reports, and incorporated into the project management as part of the adaptive management in implementation.

2.3.9 Stakeholder Consultation Channels (G3.5)

The results of the socialization and consultation processes are reflected in the reports prepared by the Social Responsibility area, addressing spaces and media such as:

- Report of Citizen Participation Workshops, which contains the methods and a copy of the material used, Preparation and record of the development of the Citizen Participation Workshop, where a list of attendance, photographs and material used, etc. is attached (see reports in Appendix 1).
- Archives of minutes of meetings of the Advisory Committee (see reports in Appendix 2).
- Elaboration of Reports and reports of the suggestion box, attaching filled-in files (see reports in Appendix 3). (It was not held in 2020, due to a pandemic).
- Management of conflict resolution files, which must include details of each process and formal communication by those affected, considering their request accepted and the process closed (see reports in Appendix 4).

2.3.10 Stakeholder Participation in Decision-Making and Implementation (G3.6)

The communities present in the project's area of influence correspond to groups of settlers who have migrated to these territories from different towns or cities in the country, with the exception of the Belgian Native Community made up mainly of people of the Yine ethnic group, which is fully integrated into the social and economic dynamics of the area and whose livelihoods are very similar to the other populations of the place (food supply, use of resources, forest management, etc.), so the interaction with all the actors has been designed through the same mechanism, which corresponds to the Citizen Participation Workshops and the Community Relations Advisory Committees, as well as the tools available to collect and attend to queries or complaints from communities in general. These spaces and tools have been designed to allow equal participation by all members of the communities.

Regarding gender, in the Community Relationships Advisory Committee, a representative of the Women has a permanent seat and brings the approach of local communities' women to be part of the main discussion and prioritization.

2.3.11 Anti-Discrimination Assurance (G3.7)

An anti-discrimination and labor equity policy has been updated in 2021 for MADERACRE operations. It is completely forbidden any kind of physical or verbal violence or discrimination based on disability, language, gender, age, social, legal or economic condition, culture or ethnicity, civil status, religion, opinions, sexual preferences, migratory situation or others. The policy is included in Appendix 5, and is accessible also in the webpage of MADERACRE. This policy is published in the web page of MADERACRE.

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

A process for receiving, hearing, responding to and attempting to resolve grievances within a reasonable time period, which takes into account traditional conflict resolution methods. Three stages, each with reasonable time limits: attempt at resolution, mediation and arbitration or courts are described.

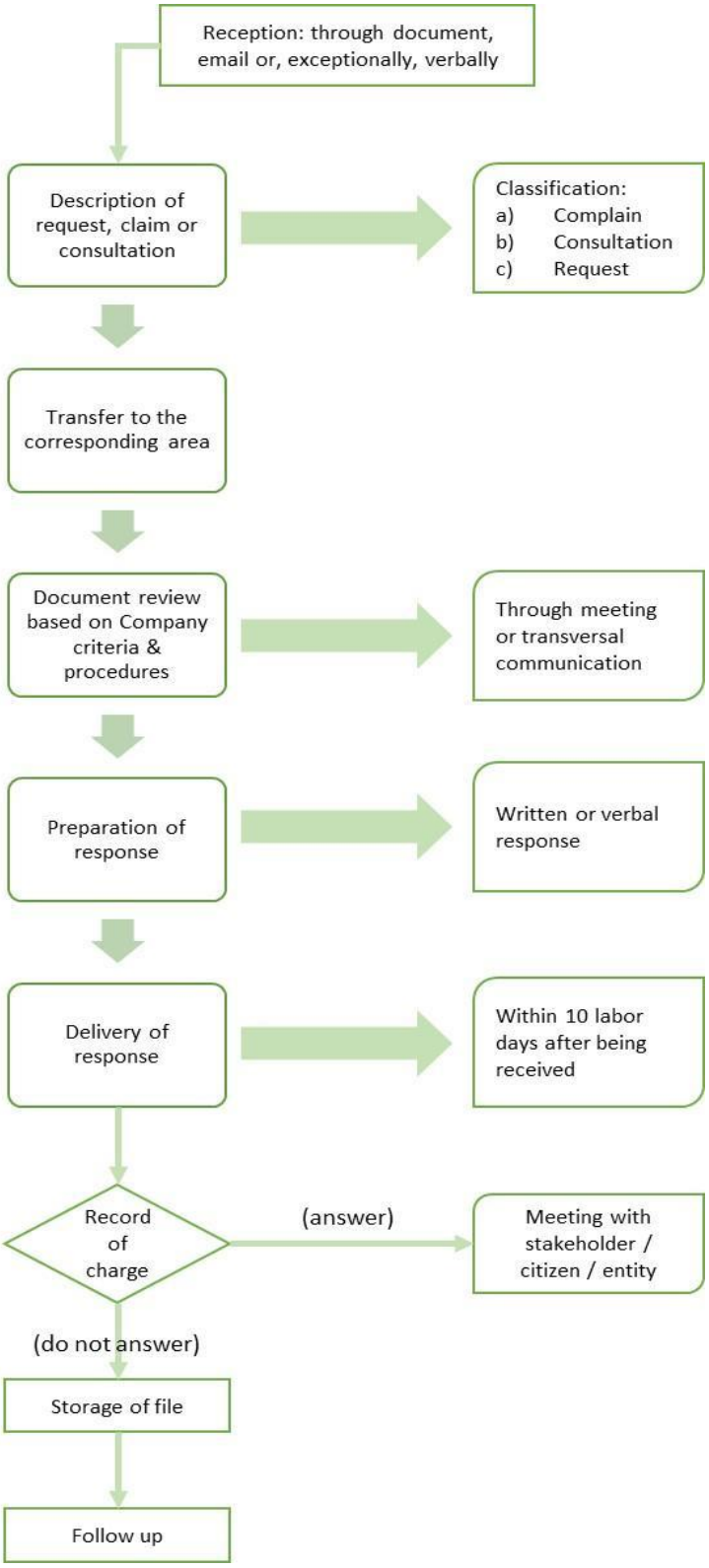


Figure 2.15. Project Feedback and Grievance Redress Mechanism (In-house elaboration)

2.3.13 Accessibility of the Feedback and Grievance Redress Procedure (G3.8)

By means of letters, the tools developed by the project for this purpose are disseminated to the stakeholders, additionally in the Citizen Participation Workshops the corresponding dissemination and explanation is made to the attendees. The "Procedures for dealing with complaints, inquiries or external requests" and the "Labor Equality and Anti-Discrimination Policy" are also publicized, which are also accessible through our website.

2.3.14 Worker Training (G3.9)

Training to workers is a key aspect for MADERACRE operations.

The process to design and implement the annual training program to workers. The process encompasses five steps:

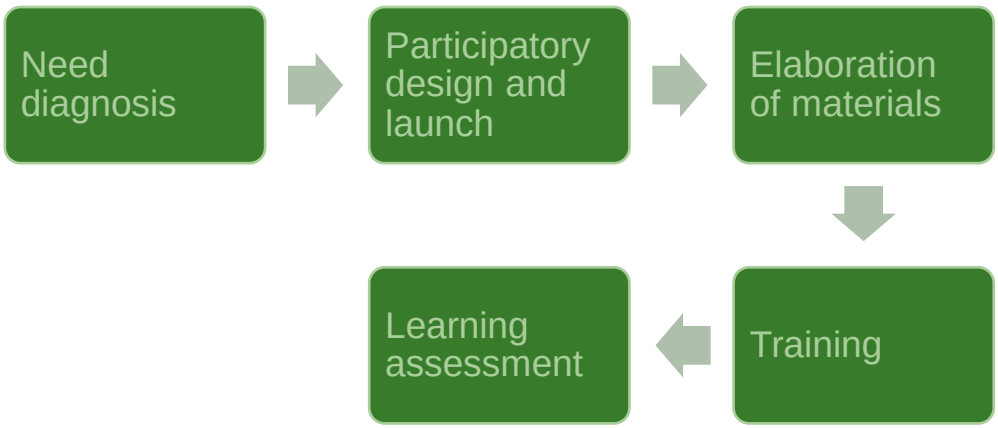


Figure 2.16. Training prioritization process

There are four types of training:

- Induction Speeches
- Theory & practical workshops
- Coordination meetings
- Short speeches

The purposes of the trainings are three: to learn (new knowledge), to know (skills) and to develop (soft skills). More details about it may be found in Appendix 6, that contains the referred policy.

2.3.15 Community Employment Opportunities (G3.10)

A procedures guideline for personnel hiring has been approved. This guideline clearly demonstrates that the project provides preferred conditions for community members and disabled persons as one of the vulnerable and marginalized groups.

The guideline identifies 8 steps in the hiring process:

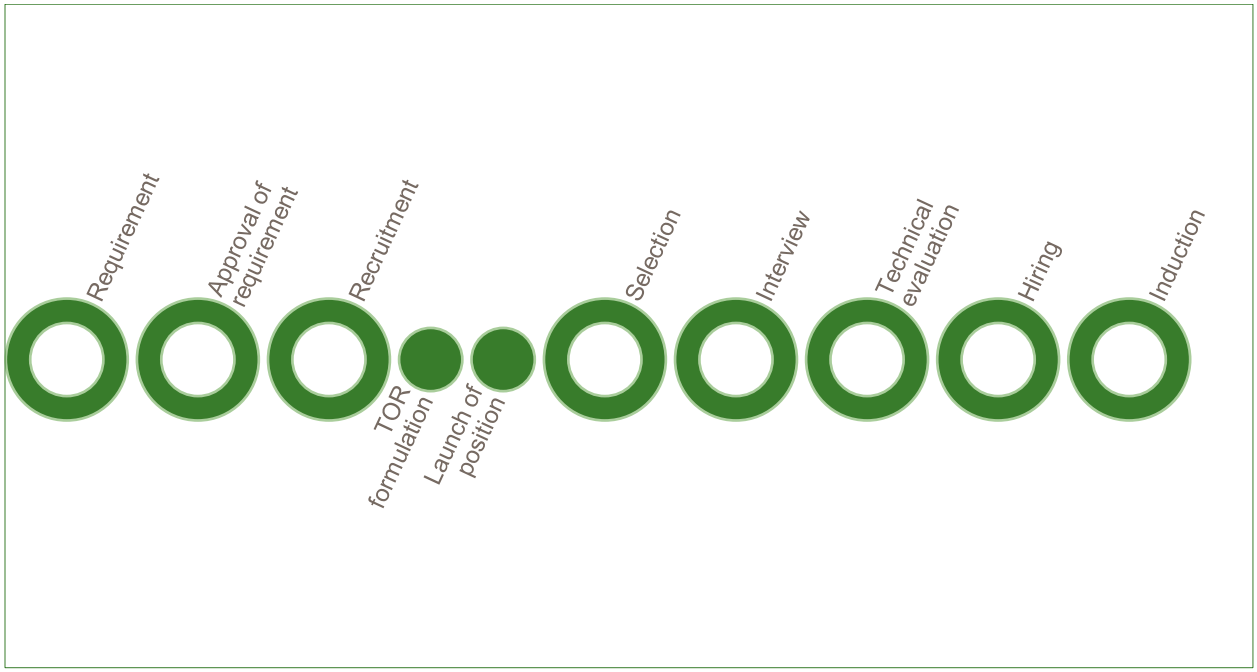


Figure 2.17. Personnel hiring procedure

During the launch of position, the diffusion of the requirement is done in two local radios and local municipality. This provides an advantage to community members, compared to non-local people, who have not access to these media.

In addition, and in agreeance with the Supreme Decree 002-2014-MIMP, the project channels announcements through the Regional Labor Office, focused on persons with disabilities.

In any case, the hired worker must meet the requirements of the profile.

2.3.16 Relevant Laws and Regulations Related to Worker's Rights (G3.11)

A list of relevant legal framework referred to worker's rights is detailed in Table 2.30. The company fully accomplish all the applicable laws with its workers.

Table 2.30. National Labor Legal Framework

Norm	Effective Date	Relevant articles demonstrating compatibility with the layout/implementation of the Project
Legislative Decree 728 (TUO Supreme Decree 003-97-Tr) Productivity And Competitiveness Law	March 28th ,1997	This law promotes the massive access to employment through special programs and stimulates productive private sector investment. Furthermore, it improves levels of appropriateness in the country so substances, as well as combating unemployment and underemployment. Finally, ensures job security and incomes of workers, while respecting the constitutional rules of job security.
Supreme Decree 001-96-Tr Productivity And Competitiveness Regulation	January 26th ,1996	This regulation develops and specifies the objectives and tenets of Legislative Decree 728.

Norm	Effective Date	Relevant articles demonstrating compatibility with the layout/implementation of the Project
Law 29245 Third-Party Services Provider Law	June 26th, 2008	This law regulates private third-party services. Also it regulates the cases from outsourcing, the requirements, rights and obligations, and penalties for companies that distort the use of this method for corporate engagement.
Supreme Decree 006-2008-Tr Third-Party Services Provider Regulations	September 12th, 2008	This regulation develops and specifies the objectives and tenets of Law 29245.
Tuo Supreme Decree 001-97-Tr Seniority Benefits Law	March 1st, 1997	This law regulates compensation for length of service that has the quality of social benefit provision of contingencies that causes the cessation of work and promotion of workers and their families.
Supreme Decree 004-97-Tr Seniority Benefits Regulation	April 15th, 1997	This regulation develops and specifies the objectives and tenets of Supreme Decree 001-97-TR
Legislative Decree 713 Vacation Law	November 8th, 1991	This law regulates the consolidation of the benefits provided by the existing labor laws.
Supreme Decree 012-92-Tr Vacation Regulation	December 3rd, 1992	This regulation develops and specifies the objectives and tenets of Legislative Decree 713.
Law 27735 Half/End-Of-Year Holiday Bonuses Law	May 8th, 2002	This law establishes the right of workers subject to the labor of the private sector to receive two bonuses in the year, among others.
Supreme Decree 005-2002-Tr Half/End-Of-Year Holiday Bonuses Regulation	July 4th, 2002	This regulation develops and specifies the objectives and tenets of Law 27735.
Legislative Decree 892 Profit Sharing Law	November 8th, 1996	This standard regulates the right of workers to participate in the profits of companies that develop income-generating activities.
Supreme Decree 009-98-Tr Profit Sharing Regulation	November 6th, 1998	This regulation develops and specifies the objectives and tenets of Supreme Decree 009-98-TR.
Legislative Decree 688 Social Benefits Consolidation Law	5th, 1991	This law regulates social benefits for workers.
Supreme Decree 024-2001-Tr Social Benefits Consolidation Regulation	July 22nd, 2001	This regulation develops and specifies the objectives and tenets of Legislative Decree 688.
Supreme Decree 007-2002-Tr Law On Days Of Work, Hours And Overtime	July 4th, 2002	This law regulates days of work, hours and overtime in benefit of workers and proceedings for Peruvian labor authority and registries in order to organize quality and quantity of work hours. Finally, it sets the maximum days and hours of work, including for night work, and regulate overtime.
Supreme Decree 008-2002-Tr Regulation On Days Of Work Hours And Overtime	July 4th, 2002	This regulation develops and specifies the objectives and tenets of Supreme Decree 008-2002-TR.
Legislative Decree 25593 (TUO Supreme Decree 010-2003-Tr) Law On Collective Labor Relations	October 5th, 2003	This law regulates union's freedom, i.e., all those relations through which workers can bargain collectively for better working conditions or otherwise.

Norm	Effective Date	Relevant articles demonstrating compatibility with the layout/implementation of the Project
Supreme Decree 011-92-Tr Regulation On Collective Labor Relations	October 14th, 1992	This regulation develops and specifies the objectives and tenets of Law on Collective Labor Relations.
Law 28806 Labor Inspection Law	July 22nd, 2006	This law aims to regulate the labor inspection system, its composition, organization structure, powers and duties in accordance with Convention 81 of the International Labor Organization.
Supreme Decree 019-2006-Tr Regulation Of Labor Inspection System	September 1st, 2007	This regulation develops and specifies the objectives and tenets of Law 28806.
Law 26636 Procedural Labor Law	June 21st, 1996	This law regulates all the judicial procedures that workers and employers need to do in order to access justice.
Supreme Decree 039-91-Tr Internal Regulation	December 30th, 1991	Every employer who employs more than 100 workers is required to have internal work regulations. The regulation must contain the main provisions of the labor regulations in force and will be approved by the administrative labor authority upon presentation. Workers who consider that the regulation violates legal or conventional provisions in force at the workplace may take legal action.

The company pays vacations, holiday bonuses, extra hours and CTS, as requested by law. As the company does not outsource, but hire all our personal directly, all our workers receive all the labor benefits established by national law. In addition, the company verifies that contractors also meet these standards. Workers have life insurance and have the right to unionize as stated in ILO 169.

There is an internal regulation approved by the Company and inspections from MINTRA (Ministry of Labor) and SUNAFIL (Labor Inspection Superintendence). Based on all these standards, the company ensures that all labor opportunities offered to local communities are appropriately communicated and fair. The company is not forced to share net profits.

2.3.17 Occupational Safety Assessment (G3.12)

Company has analyzed the main legal framework related to occupational safety and also has done a specific analysis of the main risks associated to its operations. Based on that, the company provides periodically training to its workers on a module called IPERC (Identification of Dangers, Risk Assessment and Measures of Control). All workers in 2017, 2018 and 2019 have attended this training. Table 2.31 shows a list of laws related with occupational safety is detailed.

Table 2.31. National Occupational Safety Legal Framework

Norm	Effective Date	Relevant articles demonstrating compatibility with the layout/implementation of the Project
Law 29783 Health And Safety Law		This law aims to promote and organize safety and health in the workplace.
Supreme Decree 009-2005-Tr Health And Safety Regulation	September 28th, 2005	The regulation aims to promote a culture of risk prevention in the country. It counts with the participation of workers, employers and the State, who through social dialogue ensure the promotion, dissemination and enforcement of relevant legislation.

Norm	Effective Date	Relevant articles demonstrating compatibility with the layout/implementation of the Project
		This regulation on safety and health in the workplace establishes minimum safety and health standards, enforcement responsibilities, and rights.
Ministerial Decree 148-2007-Tr Regulation Of Committee For Supervision Of Security And Health At Work	May 25th, 2005	This regulation creates a committee for supervision and enforcement of security and health at the workplace.
Law 26842 General Health Law	July 20th, 1997	This law stipulates that those who lead or manage the extraction, production, transport and trade in goods and services have an obligation to take the necessary measures to ensure the protection of health and safety of workers and third parties on their premises.
Law 26790 Social Security Modernization Law	May 17th, 1997	This law regulates health and social security; it is founded on constitutional principles that recognize the right to welfare and guarantee free access to services by public, private or mixed. It takes place in a framework of equity, solidarity, efficiency and ease of access to health services. This standard promotes efficiency for occupational health and integration of efforts of the entities that provide health services, whatever their nature is.
Supreme Decree 009-97-Sa Social Security Modernization Regulation	September 8th, 1997	This regulation develops and specifies the objectives and tenets of Law 26790.
Supreme Decree 003-98-Sa Insurance Risk Work	April 14th, 1998	This standard regulates occupational accident coverage and occupational diseases to workers employed and workers who have the quality of regular member of the social health insurance and work in a workplace in which the employing entity carries out its regular activities.

Additionally, an analysis of risks and its levels per job position was performed and mitigation measures were stablished accordingly. Table 2.32 and Table 2.33 summarize the evaluations of the risk levels by activities per job position in their respective process. The complete evaluation, in the form of a Risk matrix (IPERC Matrix) can be seen in Appendix 13 called "Process of identification, evaluation and control of occupational risks".

Table 2.32. Risk Levels by work activities in the Forest Harvesting process (Forest Management Area)

N°	Job title	Tolerable	Moderate	Important
1	Chief of Forest Harvesting	10	4	0
2	Chief of Forest Management	10	4	0
3	Chain of Custody Coordinator	11	3	0
4	Logging Coordinator	11	3	0
5	Logging Coordinator	10	3	0
6	Nursing Technician	12	3	0
7	Cook	13	1	0
8	Kitchen Assistant	13	1	0

N°	Job title	Tolerable	Moderate	Important
9	Dragging Coordinator	11	3	0
10	Chain Sawyer	8	6	0
11	Chainsaw Assistant	9	5	0
12	Matero	11	3	0
13	Assistant Matero	11	3	0
14	Forestry Tractor or Skidder Operator	11	3	0
15	Assistant Forestry Tractor or Skidder Operator	10	4	0
16	Bucket Cutter	11	3	0
17	Assistant Bucket Layer Operator	11	3	0
18	Motor Grader Operator	11	3	0
19	Caterpillar Tractor Operator	11	3	0
20	Caterpillar Tractor Helper	10	4	0
21	Front End Loader Operator	11	3	0
22	Dispatcher	11	3	0
23	Guide man	4	0	0
24	Assistant Guide man	10	1	0
25	Driver	12	1	0

According to the Appendix 13 the main existing control measures for the Forest Harvesting process are:

- Training and training on Ophidism.
- Use of safety glasses and gloves
- OSH recommendations in the workplace
- And the main control measures to be implemented are:
- Schedule training on the hazards and risks exposed in the workplace.
- Schedule occupational medical evaluations.
- Use of rubber boots, safety helmet, safety gloves, safety glasses, windbreaker, mask and complete work uniform, machete.
- Electrical installations according to the CNE.
- Signaling the proper use of electrical outlets.
- Schedule training in defensive driving.
- Schedule training on hazards and risks exposed in the workplace, Safe Forest Management Operations.
- Schedule occupational medical evaluations.

Table 2.33. Risk levels by work activities in the Timber Census process (Assessment and Monitoring Area)

N°	Job title	Tolerable	Moderate	Important
1	Evaluation and Monitoring Coordinator	11	3	0
2	Head of Evaluation and Monitoring	11	3	0
3	Aforador	11	3	0
4	Matero	11	3	0

N°	Job title	Tolerable	Moderate	Important
5	Assistant Slaughterer	11	3	0
6	Nursing Technician	11	3	0
7	Cook	13	1	0
8	Kitchen Assistant	13	1	0

According to the mentioned Appendix 13, the main existing control measures for the Timber Census process are:

- Training and Training on Ophidism.
- Use of safety glasses and gloves
- OSH recommendations in the workplace
- And the main control measures to be implemented are:
- Schedule training on the hazards and risks exposed in the workplace.
- Schedule occupational medical evaluations.
- Use of rubber boots, safety helmet, safety gloves, safety goggles, windbreaker, mask, machete and complete work uniform.
- Electrical installations according to the CNE.
- Signalling the proper use of electrical outlets.
- Implement rest frequencies.

In this last area of evaluation and monitoring, the job positions Evaluation and Monitoring Coordinator, Evaluation and Monitoring Chief, Aforador, Matero, Matero Assistant and Nursing Technician are those that present tasks and/or activities directly related to the Project activities, such as Execution and follow-up of monitoring and surveillance activities, Species identification, measurements, trail opening, HCV protection, among others, as shown in Appendix 12.

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

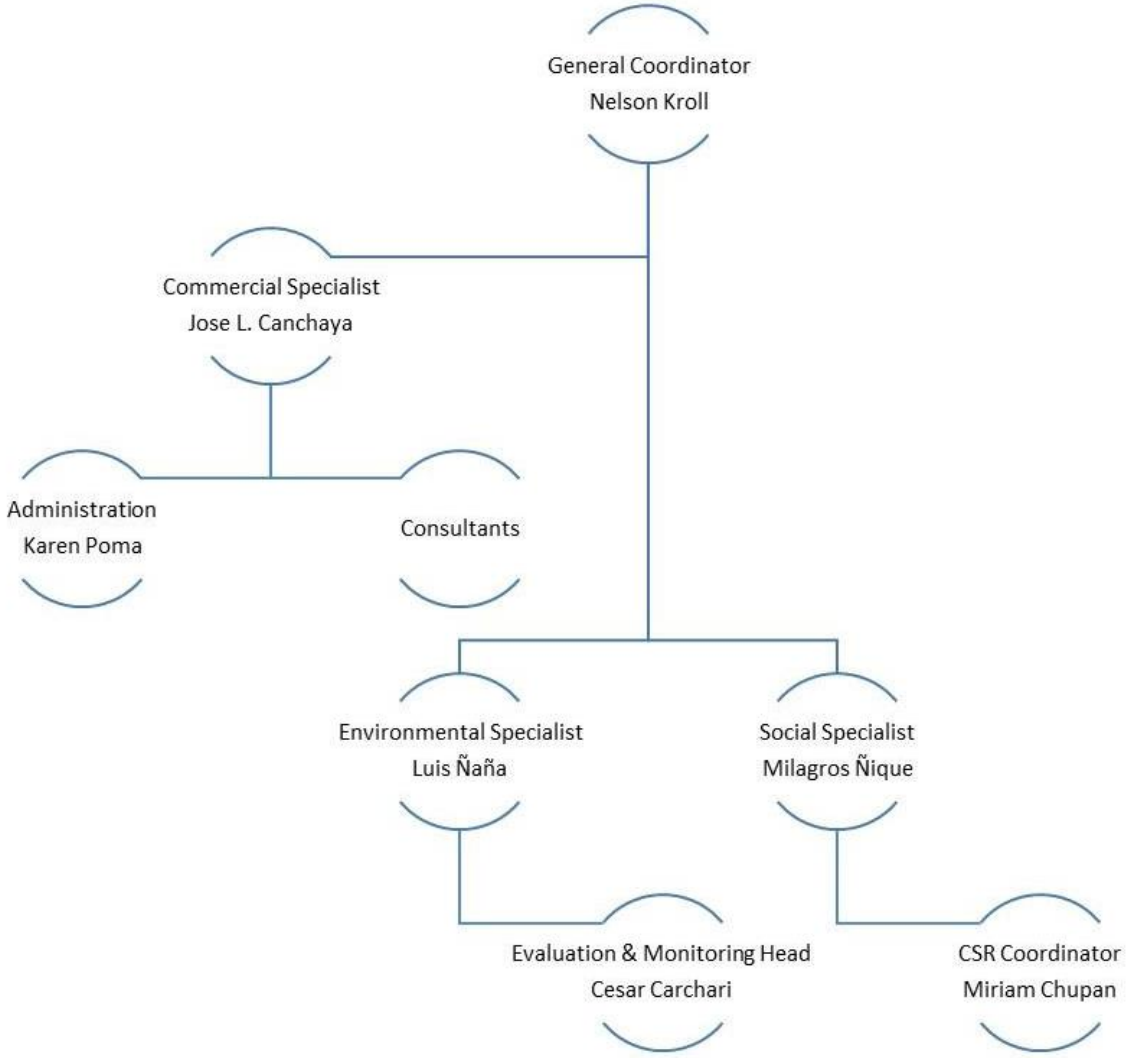


Figure 2.18. Organizational Structure

2.4.2 Required Technical Skills (G4.2)

The project team is implementing another REDD+ project of similar characteristics since 2012 successfully. The project is VCS and CCB Gold validated and verified, which is a guarantee of proved skills in terms of community and biodiversity. In addition, the project proponent is FSC certified. FSC certification is composed by a set of principles that includes community engagement and biodiversity assessment.

Regarding carbon measurement, MADERACRE has hired PASKAY, who is a consultant company, composed by professionals who have been involved in the design, implementation, monitoring, validation and verification of many of the REDD+ projects taking place in Peru: Brazil nut REDD project, Madre de Dios REDD project, Jaguar REDD project, among others. CVs are in Appendix 7.

2.4.3 Management Team Experience (G4.2)

The technical team in charge of the implementation of the project combines different profiles with more than 20 years of experience managing Tropical Natural Forests and is responsible to manage one of the largest forest management units (FMU) in Peru with more than 220 thousand hectares, located southeast of the Peruvian Amazon. The area is managed under FSC standards of FM/CoC since January 2007. As part of the integrated forest management, the team is implementing a REDD project since 2009, who has achieved the CCB Gold and VCS certification. In 2019, the project achieved FSC ecosystem services certification thanks to its biodiversity conservation and carbon sequestration. These efforts have contributed to make MADERACRE to be the # 9 in the SPOTT global ranking of sustainability and transparency.

2.4.4 Project Management Partnerships/Team Development (G4.2)

As indicated in 2.4.2, carbon accounting and monitoring is being implemented by PASKAY, a specialized consultant company.

PASKAY is leaded by Jorge Torres Padilla, an economist with more than 15 years working in the design and implementation of forest carbon projects, including reforestation and REDD, under VCS and CCB standards. He has been the technical manager of a company in charge of developing a REDD project with more than 4 hundreds of rural families. He is part of VCS stakeholders' group. Jean Pierre Adriano is a forest engineer, who has been in charge of the carbon and biodiversity sections of PD of Jaguar REDD+ project, recently validated under the same methodology than the current project. Finally, Pedro Ruiz is the GIS specialist, with large experience in BAM, Madre de Dios, and Jaguar REDD projects.

2.4.5 Financial Health of Implementing Organization(s) (G4.3)

MADERACRE has a proven history of forest operations since 2003, which generates during the first 10 years of the REDD project an average of US$ 3.4 million per year with an average annual expense of US$ 2.2 million. Even though, it is not enough to deal with the increasing deforestation threats, it may be a support to maintain the project with limited actions under the scenario where the carbon incomes are not as expected.

2.4.6 Avoidance of Corruption and Other Unethical Behavior (G4.3)

The CEO of the company has signed a sworn declaration committing to avoid any practice of corruption or other unethical behavior. The sworn declaration may be found in the official webpage of the company: DJ-Etica.pdf (maderacre.com).

2.4.7 Commercially Sensitive Information (Rules 3.5.13 – 3.5.14)

Commercial information as prices, contracts and costs are considered commercially sensitive and will be shared confidentially with audit team during the validation visit.

2.5 Legal Status and Property Rights

2.5.1 Statutory and Customary Property Rights (G5.1)

Madre de Dios is a region characterized by its pristine forests. A significant portion of its territory is legally protected with the creation of Natural Protected Areas while another significant portion of its territory has been granted as forest concessions. In the project zone, most of the areas are forest concessions (for timber purposes or for non-timber forest products such as Brazil nuts and shiringa). In the adjacent areas to the Interoceanic Highway, agrarian plots (titled and untitled) and settlements can be found.

In the northern part of the region, in the frontier with Brazil, there is an indigenous community. There are more indigenous communities in the southern part of Madre de Dios, some of them very threatened by illegal mining that operates in the south of Madre de Dios.

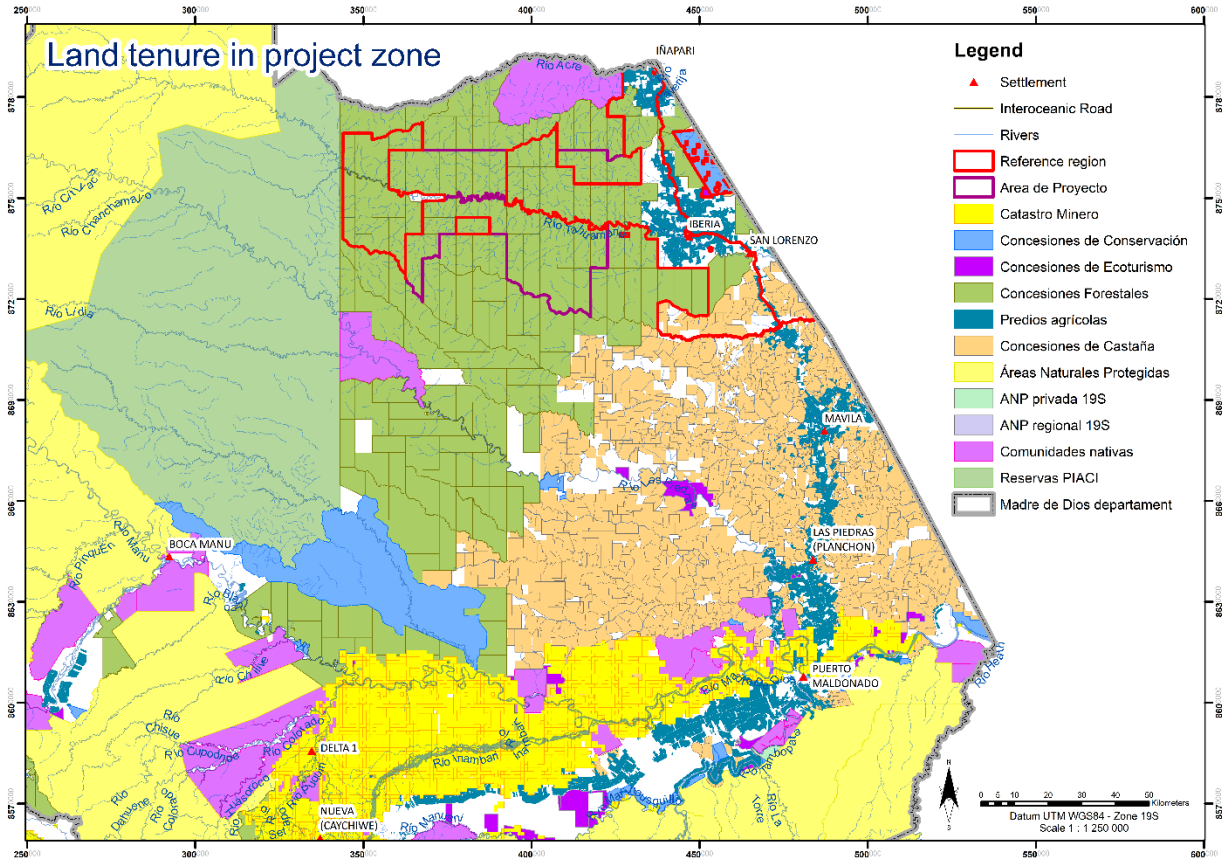


Figure 2.19. Land tenure in project zone

2.5.2 Recognition of Property Rights (G5.1)

The Forestry and Wildlife Law No. 27308 and its regulations indicate that the management and use of forest resources in permanent production forests are carried out under public tender (40,000 ha) or public auction (10,000 ha) and that this award is for a period of 40 years, renewable. Likewise, it specifies that the Concessionaire is directly responsible for the area but not for the subsoil. The timber forest concessions that make up the project area were awarded under the public tender modality and for their approval the General Forest Management Plans (PGMF) and the Annual Operating Plans (POA) were presented; as well as the payment for the right to use that is made to the State. It should be noted that each concession works as a large Concession, that is, it has only one PGMF and additionally can carry out the harvesting of other forest products, in this case Brazil nuts (*Bertholletia excelsa*) through a Complementary Plan (PC) presented to the competent authority. The concession contract with the Peruvian Government may be found in Appendix 8.

2.5.3 Free, Prior and Informed Consent (G5.2)

As already documented during FSC certification and other independent audits, there are no indigenous groups or traditional uses of forest resources that have been limited with the assignment of the forest concession. For this reason, no FPIC is needed.

2.5.4 Property Rights Protection (G5.3)

Concessions of timber products in forests of permanent production are contracts between the concession holder and the State. This contract defines UTM coordinates (Zone 19L WGS 84) of the concession where the project is being implemented, thus protecting the right to use the surface within the area. The coordinates are detailed below:

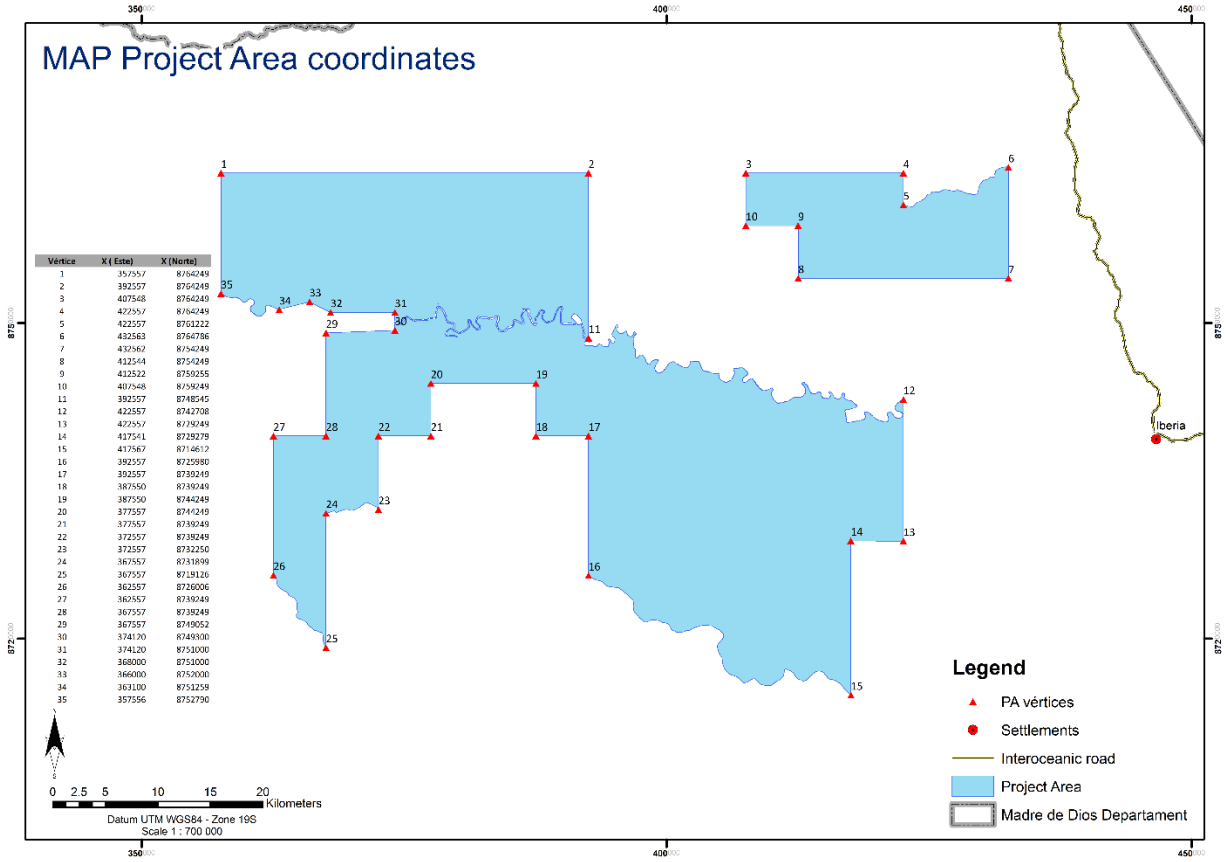


Figure 2.20. Project area coordinates

Table 2.34. Coordinates of Project Area (WGS84, UTM Zone 19S)

Vertex	X (East)	Y (North)
1	357,557	8,764,249
2	392,557	8,764,249
3	407,548	8,764,249
4	422,557	8,764,249
5	422,557	8,761,222
6	432,563	8,764,786
7	432,562	8,754,249
8	412,544	8,754,249
9	412,522	8,759,255
10	407,548	8,759,249
11	392,557	8,748,545
12	422,557	8,742,708
13	422,557	8,729,249

Vertex	X (East)	Y (North)
14	417,541	8,729,279
15	417,567	8,714,612
16	392,557	8,725,980
17	392,557	8,739,249
18	387,550	8,739,249
19	387,550	8,744,249
20	377,557	8,744,249
21	377,557	8,739,249
22	372,557	8,739,249
23	372,557	8,732,250
24	367,557	8,731,899
25	367,557	8,719,126
26	362,557	8,726,006
27	362,557	8,739,249
28	367,557	8,739,249
29	367,557	8,749,052
30	374,120	8,749,300
31	374,120	8,751,000
32	368,000	8,751,000
33	366,000	8,752,000
34	363,100	8,751,259
35	357,556	8,752,790

2.5.5 Illegal Activity Identification (G5.4)

Many illegal activities could affect project objectives. They are described in Table 2.35.

Table 2.35. Illegal activities identified and mitigation measures proposed

Illegal activities	Mitigation measures to be taken
Illegal logging	An enhanced surveillance plan, including periodical patrolling and new control sites in rivers and access roads
Illegal hunting	An enhanced surveillance plan, including periodical patrolling
Illegal harvesting of non-timber forest products	Agreements with local families so they can provide an organized and sustainable harvesting of Brazil nuts
Invasion	An enhanced surveillance plan, including periodical patrolling
Forest fires / clearance of areas	Control sites, monitoring and patrolling actions

2.5.6 Ongoing Disputes (G5.5)

Tahuamanu concessions have been clearly granted and there are no pending conflicts or disputes with third parties regarding the legality or legitimacy over the project area. Wood milestones and signaling throughout the whole borders of the concession have been installed for this purpose.

As may be found in the Management Plan, there are 39 signals that indicate the borders of the concession. The project proponent has also analyzed the level of risk of each one of the accesses in order to develop an appropriate strategy for each level of vulnerability. Concession contracts are included in Appendix 8.

Table 2.36. Milestone's locations

Lugar	Este (E)	Norte (N)	Material
Letreo 1	423419	8774125	Tipo banner con marco y postes de madera
Letreo 2	422557	8742708	Tipo banner con marco y postes de madera
Letreo 3	417566	8714612	Tipo banner con marco y postes de madera
Letreo 4	392557	8725980	Tipo banner con marco y postes de madera
Letreo 5	367557	8719126	Tipo banner con marco y postes de madera
Letreo 6	362557	8726006	Tipo banner con marco y postes de madera
Letreo 7	357556	8752790	Tipo banner con marco y postes de madera
Letreo 8	357556	8764249	Tipo banner con marco y postes de madera
Letreo 9	382557	8784889	Tipo banner con marco y postes de madera
Letreo 10	394083	8789787	Tipo banner con marco y postes de madera
Letreo 11	387811	8773437	Tipo banner con marco y postes de madera
Letreo 12	387811	8771057	Tipo banner con marco y postes de madera
Letreo 13	391515	8772062	Tipo banner con marco y postes de madera
Letreo 14	392557	8748545	Tipo banner con marco y postes de madera
Letreo 15	416012	8770263	Tipo banner con marco y postes de madera
Letreo 16	409345	8768093	Tipo banner con marco y postes de madera
Letreo 17	407546	8762644	Tipo banner con marco y postes de madera
Letreo 18	412678	8755396	Tipo banner con marco y postes de madera
Letreo 19	432519	8756401	Tipo banner con marco y postes de madera
Letreo 20	417599	8754284	Tipo banner con marco y postes de madera
Letreo 21	429556	8755713	Tipo banner con marco y postes de madera
Letreo 22	429292	8754337	Tipo banner con marco y postes de madera
Letreo 23	392414	8761797	Tipo banner con marco y postes de madera
Letreo 24	375219	8764178	Tipo banner con marco y postes de madera
Letreo 25	367547	8764178	Tipo banner con marco y postes de madera
Letreo 26	360669	8764178	Tipo banner con marco y postes de madera
Letreo 27	369663	8751110	Tipo banner con marco y postes de madera
Letreo 28	374319	8750104	Tipo banner con marco y postes de madera
Letreo 29	372203	8749152	Tipo banner con marco y postes de madera
Letreo 30	382520	8750475	Tipo banner con marco y postes de madera
Letreo 31	389715	8751480	Tipo banner con marco y postes de madera
Letreo 32	398922	8745290	Tipo banner con marco y postes de madera
Letreo 33	407546	8744338	Tipo banner con marco y postes de madera
Letreo 34	417493	8742486	Tipo banner con marco y postes de madera
Letreo 35	421038	8740528	Tipo banner con marco y postes de madera
Letreo 36	422519	8731428	Tipo banner con marco y postes de madera
Letreo 37	412572	8716190	Tipo banner con marco y postes de madera
Letreo 38	411197	8717090	Tipo banner con marco y postes de madera
Letreo 39	400985	8720687	Tipo banner con marco y postes de madera

2.5.7 National and Local Laws (G5.6)

Table 2.37. Relevant national legal framework

Laws	Term	Content
The Constitution	October 31st 1993	It has a chapter that establishes the State's policy with respect to the environment and natural resources. Thus, it provides in article 66 that natural resources, both renewable and non-renewable, are the heritage of the Nation, and that an organic law establishes the conditions for their use and their granting to individuals. The concession grants its holder a right in rem, subject to that legal rule. With respect to environmental policy, article 67 of the Constitution recognizes the role of promoting the use of natural resources, affirming the State's commitment to developing possible mechanisms for the conservation and sustainable use of its biological diversity. Likewise, article 69 emphasizes the role of the State in promoting the sustainable development of the Amazon.
Law No. 28611 "General Environment Law"	October 15th, 2005	In Article VI of this Law, it stipulates that environmental management has as priority objectives to prevent, watch and avoid environmental degradation, and that when it is not possible to eliminate the causes that generate it, the corresponding measures of mitigation, recovery, restoration or eventual compensation are adopted. Likewise, article XI mentions that the design and application of environmental public policies are governed by the principle of environmental governance, which leads to the harmonization of policies, institutions, regulations, procedures, tools and information in such a way that it is possible for the effective and integrated participation of public and private actors in decision making, conflict management and consensus building, based on clearly defined responsibilities, legal security and transparency. On the other hand, Article 150 of the Law stipulates that those measures or processes that, on the initiative of the owner of the activity, are implemented and executed with the purpose of reducing and/or preventing environmental pollution and the degradation of natural resources, constitute conducts that can be rewarded with incentives. Article 92 of the law states that the State promotes the sustainable use of forest and wildlife resources, as well as the conservation of natural forests, emphasizing the principles of management and zoning of the national forest area, the management of forest resources, legal security in the granting of rights and the fight against illegal logging and hunting. It also promotes and supports the sustainable management of wild fauna and flora, prioritizing the protection of endemic and endangered species and varieties, based on technical, scientific and economic information and traditional knowledge. Article 94 of this Act states that environmental services include the protection of water resources, the protection of biodiversity, the mitigation of greenhouse gas emissions and scenic beauty, among others. In addition, while they generate benefits that are used without retribution or compensation, it establishes the need for the State to establish mechanisms to value, compensate and maintain the provision of these environmental services, seeking to achieve the conservation of ecosystems, biological diversity and other natural resources. This article ends by mentioning that the National Environmental Authority (Ministry of the Environment) promotes the creation of financing, payment and supervision mechanisms for environmental services.

Laws	Term	Content
DL No. 1013 "Law for the Creation of the Ministry of the Environment"	May 15th, 2008	Through this standard, the Ministry of Environment is created, its scope of sectorial competence is established and its organic structure and its functions are regulated. The Ministry of Environment is the governing body of the executive branch of the environmental sector, which develops, directs, supervises and executes the National Environment Policy. The environmental sector includes the National Environmental Management System as a functional system, which integrates the National Environmental Impact Assessment System, the National Environmental Information System and the National System of Natural Areas Protected by the State. Among its functions is to develop and coordinate the national strategy against climate change and adaptation and mitigation measures, as well as supervise its implementation. It is also up to it to establish policies on environmental services, prepare the inventory and establish mechanisms to value, reward and maintain the provision of environmental services, as well as to promote financing, payment and supervision thereof. Finally, it is up to him to promote the creation of financing, payment and supervision mechanisms for environmental services.
DS No. 12-2009-MINAM "National Environment Policy	May 23rd, 2009	The elaboration of the National Environmental Policy is a mandate that comes mainly from the Political Constitution of Peru and the General Environmental Law, constituting a set of guidelines, objectives, strategies and instruments of a public nature that have the purpose of defining and orienting the actions of the entities of the National, Regional and Local Government, the private sector and the civil society, in environmental matters. The National Environmental Policy is divided into 5 objectives, 4 policy axes and specific objectives and guidelines for each policy. One objective of the National Environmental Policy relevant to the Project is to achieve the conservation and sustainable use of the country's natural heritage, with efficiency, equity and social welfare, prioritizing the integrated management of natural resources. The environmental services are identified within the National Policy of the Environment in diverse points, indicating the necessity to foment its economic valuation through economic and financial instruments, emphasizing the importance of implementing systems of conservation of forests and protection of such as far as the degradation and deforestation.
DS No. 006-2009-MINAM "Accurate denomination and proper functioning of the National Commission for Climate Change in accordance with Legislative Decree No. 1013"	March 29th, 2009	The general function of the National Commission on Climate Change is to monitor the various public and private sectors involved in the issue, through the implementation of the United Nations Framework Convention on Climate Change, as well as the design and promotion of the National Climate Change Strategy, whose content should guide and inform national, sectoral and regional development strategies, plans and projects.
RM 104-2009-MINAM "Approves procedure for the assessment and authorization of Greenhouse Gas	May 24th, 2009	With the approval of this procedure, the Ministry of the Environment proposes to promote the conservation of the environment, guaranteeing the sustainable use of natural resources in the framework of projects developed under the Clean Development Mechanism provided for in the Kyoto Protocol, forestry projects, projects to reduce emissions from deforestation and degradation (REDD) and programmatic CDM. The

Laws	Term	Content
(GHG) emissions and carbon sequestration projects"		General Directorate of Climate Change, Desertification and Water Resources of the Ministry of the Environment is responsible for responding to project conformity.
DS No. 014-2011-MINAM "National Plan of Environmental Action" PLANAA - PERU 2011-2021	July 9th, 2011	It is an instrument of long term national environmental planning, which is formulated from a situational environmental diagnosis and from the management of natural resources, as well as from the potentialities of the country for the use and sustainable use of such resources; in the same way, it is based on the legal and institutional framework of the National System of Environmental Management. The fulfillment of the priority goals will contribute with the conservation and the sustainable use of the natural resources, the improvement in the environmental quality; and therefore, to improve the quality of life of our population. Goals are presented in the areas of water, solid waste, air, forest and climate change, biological diversity, mining and energy, and environmental governance. The goal in the area of Forests and Climate Change is that by 2021 the rate of deforestation in 54 million hectares of primary forests under various categories of land management will be reduced to zero, contributing, together with other initiatives, to reducing 47.5% of GHG emissions in the country, generated by changes in land use; as well as reducing vulnerability to climate change.
DS No. 011-2015-MINAM "National Strategy on Climate Change" update of DS No 086-2003-PCM	September 23rd, 2015	It is based on adaptation to the adverse effects and takes advantage of the opportunities imposed by climate change, laying the foundations for low-carbon sustainable development. The main objectives are for the population, economic agents and the state to increase awareness and adaptive capacity for action against the adverse effects and opportunities of climate change and; for the population, economic agents and the state to conserve carbon reserves and contribute to the reduction of GHG emissions. The means necessary for implementation are based on institutional and governance, public awareness and capacity building, scientific knowledge and technology, and financing.
Law 26839 "Law on the Conservation and Sustainable Use of Biological Diversity"	July 17th, 1997	It regulates the general framework for the conservation of biological diversity and the sustainable use of its components. It includes provisions for planning, inventory and monitoring, conservation mechanisms, rural and indigenous communities, and scientific and technological research. The Act establishes that the principles and definitions of the Convention on Biological Diversity govern its implementation and contains a title on protected natural areas, which is consistent with the provisions of Act No. 26834.
Law 26821 "Organic Law for the Sustainable Use of Natural Resources"	June 27th, 1997	It regulates the general framework for the sustainable use of natural resources, as they are part of the Nation's heritage. This law establishes that the natural resources maintained at their source, whether they are renewable or nonrenewable, are part of the Nation's heritage. The fruits and products of the natural resources, obtained in the manner established in this Act, are the property of the holders of the rights granted over them. The rights over natural resources are granted to individuals through concessions, permits, and authorizations in accordance with the conditions established by the special rules for each resource. The special rules include the mechanisms for financial compensation to the State for the granting thereof, the maintenance of the right in force, the conditions for

Laws	Term	Content
		registration in the appropriate registry, and the possibility of assignment between individuals. This means that ownership, i.e. the ownership of the fruits and products obtained in accordance with this organic law, belongs to the holders of the rights granted over the areas where the natural resources providing them are located. The regulation for the grant of rights to private individuals for the use of natural resources, renewable and non-renewable, varies according to the nature of such resources.
DL No. 997 "Law on the Organization and Functions of the Ministry of Agriculture"	March 13th, 2008	The Ministry of Agriculture is the governing body of the agricultural sector and establishes the National Agricultural Policy, which is mandatory at all levels. Likewise, the Agrarian Sector includes the lands of agricultural use, of shepherding, the forest lands, the deserted lands with agrarian aptitude, the forest resources and their use; the flora and fauna; the hydric resources; the agrarian infrastructure; the activities of production, transformation and commercialization of crops and of breeding; and the services and activities linked to the agrarian activity such as the health, the investigation, the training, the extension and the transference of agrarian technology.
DL No. 1085 Establishes the Forest and Wildlife Resources Monitoring Agency"	June 28th, 2008	It created OSINFOR, which is responsible for supervising and overseeing the sustainable use and conservation of forest and wildlife resources, as well as the environmental services provided by the State through the various forms of use recognized in the Forestry and Wildlife Law and its regulations.
DS No. 030-2005-AG "Approve regulations for the Implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in Peru"	July 10th, 2005	This standard is intended to regulate CITES provisions and establish the conditions and requirements for trade, trafficking and possession of species included in them CITES Appendices I, II and III. Its provisions are intended to ensure compliance with all the precepts of the Convention, with the purpose and to protect the species of wild fauna and flora threatened due to their intense trade. It was modified and updated by Supreme Decree No. 001-2008-MINAM where the Ministry of Agriculture (through SERFOR) and the Ministry of Production are designated as CITES Administrative Authorities Peru, to the Ministry of Environment as CITES Peru Scientific Authority.
DS No. 009-2013-MINAGRI "National Forest and Wildlife Policy"	August 14th, 2013	The National Forest and Wildlife Policy is a state policy that involves all levels of government and public and private actors, being mandatory for regional governments. The purpose is to contribute to the sustainable development of the country, through an adequate management of the National Forest and Wildlife Heritage, which ensures its sustainable use, conservation, protection and increase, for the provision of ecosystem goods and services, forestry, other ecosystems of wild vegetation and wildlife, in harmony with the social, cultural, economic and environmental interest of the Nation through five political axes: institutionalism and governance; sustainability; competitiveness; social inclusion and intercultural and; knowledge, science and technology.
Law No. 29763 "Forestry and Wildlife Law" and its four Regulations	September 30th, 2015	Aims to promote the conservation, protection, increase and sustainable use of forest and wildlife heritage within the national territory, integrating its management with the maintenance and improvement of forest and other wild vegetation ecosystem services, in harmony with the social, economic and environmental interest of the Nation; as well as to promote forest development, improve its competitiveness, generate and increase forest and wildlife resources and their value to society. The purpose of this Law is to establish the legal framework to regulate, promote and

Laws	Term	Content
		supervise forestry and wildlife activities in order to achieve their purpose. Article 13 creates the Forestry and Wildlife Service (SERFOR) as a specialized technical public body, being the National Forestry and Wildlife Authority. Likewise, the SERFOR is the governing body of the National System of Forestry and Wildlife Management (SINAFOR) and is constituted as its technical-normative authority at the national level, in charge of dictating the rules and establishing the procedures related to its scope. It coordinates its technical operation and is responsible for its proper functioning. With regard to its functions, Article 14 highlights paragraph e) To monitor compliance with the obligations of the rights granted under its jurisdiction and to sanction violations arising from its failure to comply, respecting the powers of the Forestry and Wildlife Resources Oversight Agency (OSINFOR), the Environmental Assessment and Monitoring Agency (OEFA), regional and local governments and other public bodies; paragraph g) Exercise the function of Authority of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in Peru for the specimens of the species of wild flora and fauna that reproduce on land, including all kinds of amphibians and emerging aquatic flora. Article 18 of the Forestry and Wildlife Resources Oversight Agency (OSINFOR) is responsible for supervising and monitoring the sustainable use and conservation of forest and wildlife resources and the services provided by forest and other wild vegetation ecosystems, granted by the State through enabling titles regulated by this Act. The SERFOR and the regional and local governments, through their corresponding officials, compulsorily inform OSINFOR about the forest and wildlife management, the scope and status of the enabling titles granted, under administrative responsibility and without prejudice to civil and criminal liabilities. OSINFOR reaches in a timely manner all information that may be useful for the administration and control of forest and wildlife resources to the corresponding entity. In article 19, the regional government is the regional forestry and wildlife authority (ARFFS). Article 23. Forest and wildlife manager is the natural person with training and professional experience in the area that requires being managed and registered in the National Registry of Forest and Wildlife Regents, who formulates and subscribes to forest management or wildlife. He is responsible for directing the activities in application of the approved management plan, to guarantee the sustainability of the forest resource. It is jointly and severally responsible with the holder or holder of the enabling title of the veracity of the content of the management plan and its implementation, as well as the correct issuance of the forest transport guides. Article 29. Permanent production forests are established by ministerial resolution of the Ministry of the Environment, at the proposal of SERFOR, in category I and II forests, for the purpose of permanent production of wood and other forest products other than wood, as well as wildlife and the provision of ecosystem services. The State promotes the integrated management of these forests. To this end, the regional forestry and wildlife authority prepares, directly or through third parties, and approves the Master Management Plan containing, at a minimum, the identification of sites requiring special treatment to ensure the sustainability of harvesting, access routes, common roads and control points. Prior to its

Laws	Term	Content
		establishment, the State carries out the environmental impact assessment and consults the population that may be affected by its establishment.
DL No. 1085 “Law that creates the agency for the Supervision of Forest and Wildlife Resources”	June 28th, 2008	OSINFOR is attached to the Presidency of the Council of Ministers and constitutes a budgetary statement. It is the entity in charge, at the national level, of supervising and monitoring the use and conservation of forest and wildlife resources, as well as environmental services from the forest, for their sustainability, in accordance with the national policy and strategy for integrated management of natural resources and the policies on environmental services established by the Ministry of the Environment, within the scope of its competence. OSINFOR's competencies do not involve Natural Protected Areas, which are governed by their own Law.
DS No. 007-2013-MINAGRI “Regulation of Organization and Functions of the National Forest and Wildlife Service - SERFOR”	July 18th, 2013	It is the national forestry and wildlife authority, which exercises its powers and functions at the national, regional and local levels, is subject to the regulatory framework on the subject and acts in accordance with national policies, plans and objectives, constituting the governing body of the National System of Forestry and Wildlife Management, hereinafter SINAFOR, and its technical-normative authority, responsible for issuing regulations and establishing procedures related to the area of its competence.
DS No. 018-2015-MINAGRI “Regulation for Forest Management”	September 30th, 2015	The regulation aims to promote the conservation, protection, enhancement and sustainable use of the forest heritage, integrating its management with the maintenance and improvement of forest and other wild vegetation ecosystem services. This applies to the different natural or legal persons, of public or private law, linked to the management of forests and wildlife, to the sustainable use of forest resources, to the services of the ecosystems of wild vegetation and to the forest and other forestry and related activities, throughout the national territory.
Law No. 29263 "Law on Ecological Crimes"	October 2nd, 2008	Law that modifies the penal types of ecological and environmental crimes and typifies their aggravated figures, such as illegal trafficking of protected wild flora and fauna species, illegal trafficking of aquatic species of protected wild flora and fauna, illegal extraction of aquatic species, depredation of protected flora and fauna, illegal trafficking of genetic resources, crimes against forests and forest formations, among other related crimes.

Table 2.38. Relevant regional legal framework

Laws	Term	Content
Law No. 27783 "Law on the Bases of Decentralization	July 17th, 2002	It regulates the structure and organization of the State in a democratic, decentralized and deconcentrated way, corresponding to the National Government, Regional Governments and Local Governments. It also defines the rules that regulate administrative, economic, productive, financial, tax and fiscal decentralization. Likewise, this law establishes the competencies of the three levels of government and determines the assets and resources of the regional and local governments; and regulates the relations of government in its different levels. Article 36 mentions shared competences, one of them being the promotion, management and regulation of economic and productive activities in their

Laws	Term	Content
		scope and level, corresponding to the different sectors, including the environmental sector.
Law No. 27867 "Organic Law of Regional Governments"	November 19th, 2002	Law that, in its sections 9 and 10, establishes constitutional, exclusive and shared competences to Regional Governments in environmental matters to promote and regulate activities or services in the environmental sector. They also establish exclusive competences to promote the sustainable use of forest resources and biodiversity; and shared competences for the sustainable management of natural resources, the improvement of environmental quality and the preservation and administration of regional reserves and natural protected areas. Article 53 of the same law establishes the functions of the regional governments in environmental and land-use planning matters. For the Regional Governments to be able to exercise the competences assigned by this law, a process of transference of those competences must be followed, which has the objective of accrediting that this level of government has the institutional capacities to assume them.
Regional Ordinance 007-2009-GRMDD/CR	February 17th, 2009	Approves Opinion No. 003-2009-GOREMAD/CAMAYA establishing the Technical Commission on Climate Change in the Madre de Dios Region, which is responsible for proposing short-, medium- and long-term measures to raise awareness among the population and for establishing plans and programs to prevent a worsening of the conditions affecting the region's Amazon region, within the framework of the regional governments' responsibilities for the sustainable management of natural resources and the improvement of environmental quality and for the preservation and protection of regional reserves and protected natural areas Later modified by Regional Ordinance 005-2010-GRMDD/CR, where the name is changed to Technical Commission for Adaptation and Mitigation to Climate Change in the Madre de Dios region.
Regional Ordinance 032-2009-GRMDD/CR	December 4th, 2009	Approves Ecological and Economic Zoning of Madre de Dios at macro level at a scale of 1:250,000 as a basic instrument of territorial planning, for the implementation of development policies, programs, public and private investment projects that lead to the achievement of sustainable development of the department. Identifies the Ecological and Economic Units from which the most appropriate use is defined for each space. This means identifying areas with agriculture, livestock, forestry, fishing, mining, energy, protection, biodiversity conservation, ecotourism, urban-industrial, and so on. The Ecological and Economic Zoning of Madre de Dios establishes 20 productive zones, including 14 agricultural production zones and 4 forest production zones and other associations. All of them make use of agriculture, agroforestry, tourism, conservation, reforestation and research. These areas are graphically represented on the map of Ecological and Simplified Economic Zoning.
Regional Ordinance 001-2012-RMDD / CR (August 26th, 2010) modifies Regional Ordinance 011-	July 7th, 2012	The Regional Environmental Commission (CAR) of the region of Madre de Dios is created, in attention to the Legislative Decree N°1013, Law of Creation, Organization and Functions of the Ministry of the Environment; being constituted, like the instance of environmental management, in charge to coordinate and to arrange the regional environmental policy, promoting the dialogue and the agreement between the sectors public, private and civil society, articulating its environmental policies with the

Laws	Term	Content
2010-GRMDD / CR		Ministry of the Environment.

2.5.8 Approvals (G5.7)

Appendix 9 shows the forest management plan approved by the Forest Regional Authority that establishes that MADERACRE has all the required approvals to exploit commercially to forest resources and forest ecosystem services in the Project area as described in legal analysis of 2.5.7.

2.5.9 Project Ownership (G5.8)

Appendix 8 shows the concession contracts signed with the State that establishes that MADERACRE has clearly the legal rights to access to the forest resources and forest ecosystem services in the Project area as described in legal analysis of 2.5.7.

2.5.10 Management of Double Counting Risk (G5.9)

The project does not seek to commercialize carbon reduction units in other programs, systems, or markets, except the voluntary market and through VERRA platforms. In the case that a national regulation requires some change in this decision, MADERACRE will communicate and retire the carbon reduction units appropriately.

2.5.11 Emissions Trading Programs and Other Binding Limits

The GHG emission reductions and removals generated by the project will not be used for compliance under such programs or mechanisms. Forest and Wildlife Law clearly states that the rights that are assigned to enabling titles forest holders (as timber forest concessions) include the right to benefit from environmental services, including the forest carbon storage.

2.5.12 Other Forms of Environmental Credit

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

2.5.13 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.

2.5.14 Projects Rejected by Other GHG Programs

The project has never been rejected by any other GHG programs because it never applied to any GHG program as it is recently being developed.

2.5.15 Double Counting (G5.9)

Double sale and double counting are not allowed and will not be practiced. All the sales, including the type of market or standard used for the transaction, will be uploaded in the webpage of the project proponent (without publishing sensitivity information of the sale).

3 CLIMATE

3.1 Application of Methodology

3.1.1 Title and Reference of Methodology

- VM006: 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.

3.1.2 Applicability of Methodology

According to the methodology:

General Applicability Conditions

The following applicability conditions apply. Note that in case the project area consists of multiple discrete project area parcels, each discrete project area parcel must also meet all applicability conditions below.

All the consolidated MADERACRE complies with the following applicability conditions.

a. Conditions Related to Eligible Land Conditions

This methodology is applicable to areas where land prior to project implementation meets the following conditions:

- Land in the project area consists of either one contiguous area or multiple discrete project area parcels, and must meet an internationally accepted definition of forest, such as those based on UNFCCC host-country thresholds or FAO definitions and must qualify as forest for a minimum of 10 years before the project start date.

The project area has been a forestry concession since 2002, in addition, satellite images (GEOBOSQUES) from ten years prior to the start of the project have been analyzed to show that the land in the project area qualifies as forest according to the definition of the National Forest and Wildlife Inventory of Peru: “Predominantly arboreal ecosystem that must have a surface greater than 0.5 ha, with a minimum width of 20 meters and present a minimum canopy cover of 10% of its area. The predominant vegetation is represented by trees of woody consistency that have a minimum height of 2 meters in their adult state for the Coast and Sierra, and 5 meters for the Amazon Forest. In its comprehensive conception, it includes the relief, soil, water, plants, wildlife, and microorganisms that condition floristic, edaphic, topographical and climatic associations with self-sustaining functional capacity to provide goods and services. In the case of dense forest, it is structured in several strata" (Report of the National Forest and Wildlife Inventory of Peru, 2019). This definition complies with the internationally accepted definition of FAO.

- The project area must be deforested or degraded in absence of the REDD project activity and the deforestation and degradation must be mosaic in nature as described in the VCS AFOLU Requirements.

The definition of mosaic configuration from the AFOLU Requirements were adopted in the VCS Methodology Requirements (v4.1, Section A1.9, 2,b) that states:

> *<<The mosaic deforestation and/or degradation pattern can result when human populations and associated agricultural activities and infrastructure are spread out across the forest landscape. In a mosaic configuration most areas of the forest landscape are accessible to human populations.*

Mosaic deforestation and/or degradation typically occur: where population pressure and local land use practices produce a patchwork of cleared lands, degraded forests, secondary forests of various ages, and mature forests; where the forests are accessible; and where the agents of deforestation and/or degradation are present within the region containing the area to be protected.>>

The historical analysis carried out in the project area through GEOBOSQUES reveals the great threat of unplanned deforestation suffered by the Project Area in the form of a mosaic. Forest concessions and surrounding forest areas are already accessible to deforestation agents, mainly to do agriculture and cattle grazing, and usually joined and/or preceded by illegal extraction of wood (Reaño, 2021). In fact, it is observed that the 26% of the perimeter of the area is only at 350 m to previously deforested areas (between 2007-2016), and 65% of it is less than 1 km away[6]. This is a much smaller distance that the one reported in Barber et al. (2014), where the 95% of deforestation in the Brazilian Amazon is located within 5.5 km to roads and 1 km to navigable rivers.

Furthermore, the rural property in Peru is very small and the agrarian production is mainly caused by small-scale agriculture. Less than 5 ha explains more than 90% of Amazon Forest loss according to the Climate Change and Forest National Strategy[7] (MINAM, 2016, pg. 36). In the case of the province of Tahuamanu, the size of patches of deforestation also show that it happens in small areas, though the proportion of patches between 5-50 ha is increasing over time.

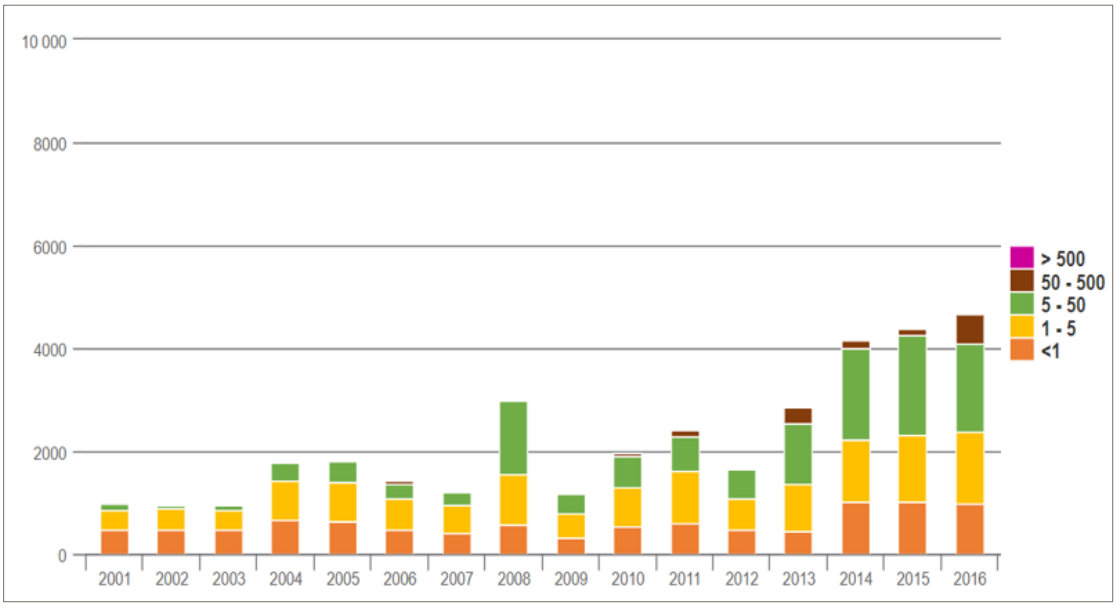


Figure 3.1. Size of the patches of forest loss in the Tahuamanu province (GEOBOSQUES - MINAM)

It is worth noting that the land use change of forest areas is an illegal activity. It could only be performed in zones with land use capacity for agricultural production or pastures, after the approval of the Regional Forest and Wildlife Authority or SERFOR. In areas with land use capacity of forest production and protection, land use change is forbidden. These procedures are explained in the Law N° 29763 and Supreme Decree N° 018-2015-MINAGRI (Articles 127, 128 and Annex 1, number 3 and 4).

[6] An analysis was performed by generating buffers of different distances to deforestation areas from the 2007-2016 period reported in GEOBOSQUES. The initial distance is 120 m and the final is 1000 m. The percentage was estimated when the buffers intersected the perimeter of the project area.

[7] https://www.minam.gob.pe/wp-content/uploads/2016/07/ESTRATEGIA-NACIONAL-SOBRE-BOSQUES-Y-CAMBIO-CLIM%C3%81TICO-DECRETO-SUPREMO-007-2016-MINAM11.pdf

On the other hand, results from the land use change mapping of period 2013-2016 performed by GEOBOSQUES, show that there is a mixture of land uses in previously deforested areas of the Reference Region (50,865.8 ha). By 2016[8], the 50.7% of them were Pastures, 34.3% were Secondary Vegetation, 12.9% were agricultural lands and 2.1% were settlements. Other categories also present but represent less than 1%. Secondary Vegetation is defined in the National LULUCF GHG inventory[9] as "*a residual class that includes the vegetation originated by the succession process after the intervention of the primary forest, such as purmas and secondary forests, but it can also include other covers that are difficult to detect such as perennial crops, agroforestry systems and silvopastoral, agricultural fallow, among others.*" (MINAM, 2019).

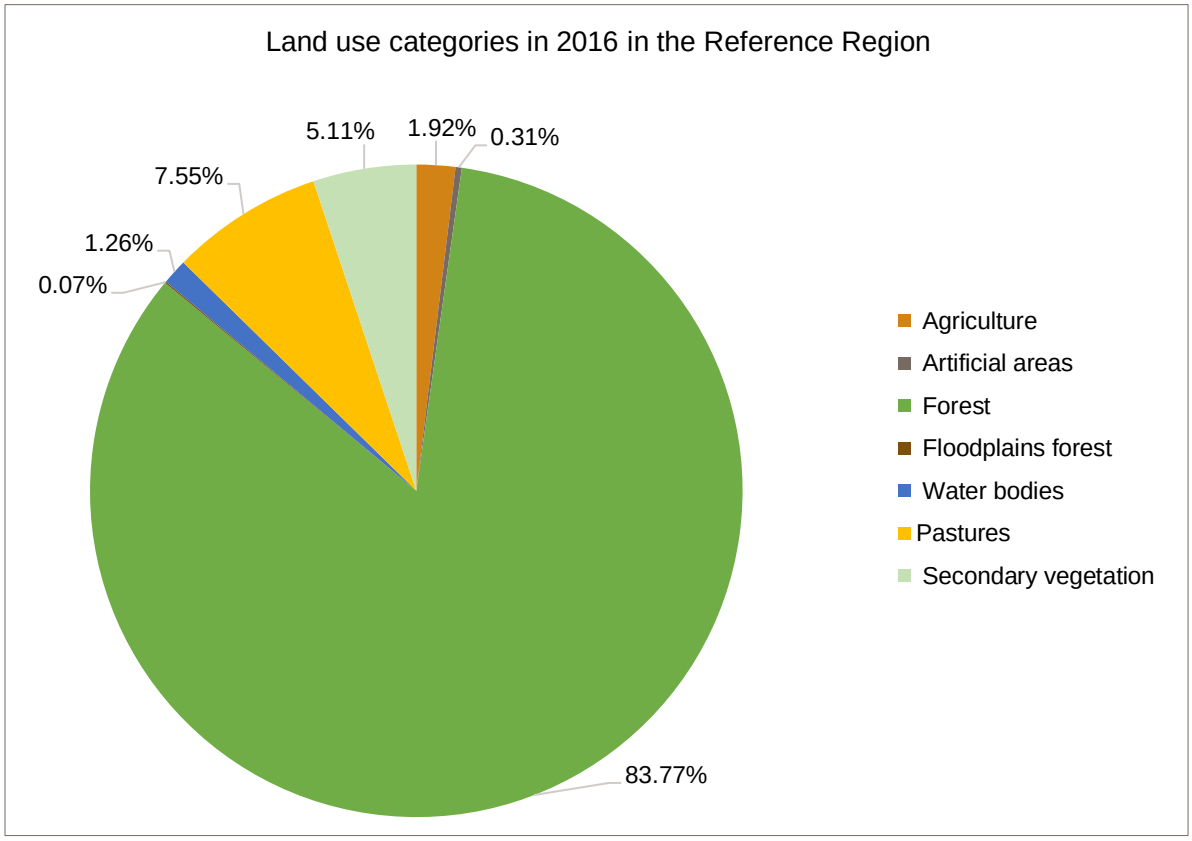


Figure 3.2. Land use categories in 2016 in the Reference Region (GEOBOSQUES - MINAM)

On the remaining forest, there is also a mix of degraded/conserved status depending on the activities performed in them. In general, these are mature forests where timber and non-timber products are extracted.

- Drivers of deforestation and forest degradation must fall into one or more of the following categories:

[8] Land use change maps are available for periods 2000-2005, 2005-2011, 2011-2013 and 2013-2016; and use the general land use categories from IPCC 2006. Inside each one, there are subcategories that represent the highest level of detection achieved at a national level. The maps could be found in the GEOBOSQUES platform: https://geobosques.minam.gob.pe/geobosque/view/descargas.php?122345gxxe345w34gg

[9] National GHG Inventory of year 2014 - Land Use Land Use Change and Forestry Sector (LULUCF): https://infocarbono.minam.gob.pe/wp-content/uploads/2017/09/RAGEI-USCUSS-2014_VERSION-FINAL.pdf

- Conversion of forest land to cropland for subsistence farming.
- Conversion of forest land to settlements.
- Conversion of forest land to infrastructure, including new roads.
- Logging of timber for commercial sale (e.g., wood planks or poles for commercial sale).
- Logging of timber for local enterprises and domestic uses.
- Wood collection for commercial sale of fuelwood and charcoal.
- Fuelwood collection for domestic and local industrial energy needs (e.g., cooking, home heating, tobacco curing, brick making).
- Cattle grazing in forests.
- Extraction of understory vegetation (e.g., thatch grass collection for roof and livestock bedding materials, shrubs, and small trees for straw fences).
- Forest fires to the extent that they are not part of natural ecosystem dynamics (e.g., forest fires related to hunting, honey collection, intentional land clearing on land with a high fuel-load).

- None of the drivers listed above must be planned in nature. If deforestation from a specific driver is occurring as a result of planned forest conversion activities, then such a driver must be excluded from analysis.

The unplanned driver identified is: Conversion of forest land to cropland for subsistence farming.

- This methodology is not applicable to organic soils or peatland.

Organic soils and peatland were not taken into account.

b. Conditions Related to Eligible Project Activities

This methodology is applicable to projects that implement one or more of the following activities:

- Strengthening of land-tenure status and forest governance.
- Supporting the development and implementation of sustainable forest and land use management plans.
- 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.
- Fire prevention and suppression activities including the construction of fire breaks, reduction of fuel loads, prescribed burning, education to minimize intentionally started fires, support for fire brigades, water cisterns, fire lookouts, and communication systems.
- Reducing fuelwood consumption and/or increasing energy efficiency by introducing fuel-efficient woodstoves or brick kilns and curing equipment.
- Creation of alternative sources of fuelwood through agroforestry, farm woodlots management and introduction/intensification of other renewable and non-fossil fuel-based energy sources (such as solar).
- Sustainable intensification of agriculture on existing agricultural land.
- Development of local enterprises based on sustainably harvested non-timber forest products (NTFPs) such as honey, medicinal plants, etc.

This project implements the following activities:

- Strengthening of land-tenure status and forest governance.
- 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.

- ❖ Creation of alternative sources of fuelwood through agroforestry, farm woodlots management and introduction/intensification of other renewable and non-fossil fuel-based energy sources (such as solar).
- ❖ Supporting the development and implementation of sustainable forest and land use management plans.

c. Conditions Related to Optional Harvest Activities in the Project Area

Implementing harvesting in the project area as described in Section 8.2.7 is optional but is only is eligible under this methodology only if the following applicability conditions are met:

- The harvest plan and harvest activities must follow Best Management Practice (BMP) guidance of the country or jurisdiction, if such BMP guidance exists.

The harvest plan and harvest activities follow the following guidelines. There are two official tools for forest management: 1) The General Forest Management Plan (PGMF), which provides an overview of the original state of the forest and the plan for future use. 2) The Annual Operational Plan (AOP) that includes the forest census, which records 100% of the existing trees and details all the activities that will be carried out in the Forest Management Unit (UMF) during the implementation, monitoring and control, focused on in order to guarantee the sustainability of the system. These documents must be approved by the Regional Technical Authority for Flora and Wildlife (ARTFFS) for the granting of the requested area and to start forest harvesting.

- The harvest plan must describe procedures to protect soil, water and residual trees in the harvest area and provide documentation on the presence/absence of any threatened or endangered species on the site, potential impacts on species and mitigation measures that will be employed.

This is described in the General Forest Management Plan (PGMF).

- The harvest plan must describe the biophysical sustainability of the harvesting practices. At minimum, the biophysical sustainability must be demonstrated by ensuring that the net removal of biomass from harvesting is less than the net increment of the biomass in the forest. Where possible, the project proponent should use criteria and indicators such as from International Tropical Timber Organization (ITTO) to assess the sustainability of harvesting practices. In addition, it is recommended to obtain sustainability certification from third parties, such as the Forest Stewardship Council or the Sustainable Forestry Initiative.

The whole area has been certified under FSC standard since 2007.

d. Applicability Conditions for TOOL FOR THE DEMONSTRATION AND ASSESSMENT OF ADDITIONALITY IN VCS AGRICULTURE, FORESTRY AND OTHER LAND USE (AFOLU) PROJECT ACTIVITIES

The tool is applicable under the following conditions:

a) AFOLU activities the same or similar to the proposed project activity on the land within the proposed project boundary performed with or without being registered as the VCS AFOLU project shall not lead to violation of any applicable law even if the law is not enforced.

Forest concessions may be reverted to Peruvian State if the concessionaries are not capable to accomplish with the obligations assumed in the Concession Contract. It is a common practice that abandoned areas are soon occupied for agrarian purposes, recognized by municipalities and other public entities in the coming years.

b) The use of this tool to determine additionality requires the baseline methodology to provide for a stepwise approach justifying the determination of the most plausible baseline scenario. Project

proponent(s) proposing new baseline methodologies shall ensure consistency between the determination of a baseline scenario and the determination of additionality of a project activity.

No new baseline methodology different to the approach described in this methodology is being proposed.

3.1.3 Project Boundary

a) Gases

This methodology requires accounting of all potential emissions of CO_2, N_2O and CH_4 from sources not related to changes in carbon pools

Table 3.1. GHG emissions from sources not related to changes in carbon pools (emission sources) to be included in the GHG assessment

Source		GHG	Included?	Explanation	Justification
BASELINE	Deforestation and forest degradation baseline	CO_2	No	Emissions are related to changes in carbon pools. Include only when the degradation has not been included in the estimation of changes in carbon pools and if CFE activities are implemented.	Degradation not included in the estimation of carbon pools but does not implement CFE activities
		CH_4	No	Conservatively omitted, except when CFE activities are implemented.	Does not implement CFE activities.
		N_2O	No	N_2O emissions from burning woody biomass are assumed negligible and conservatively excluded except when CFE activities are implemented.	Does not implement CFE activities.
PROJECT SCENARIO	Cook stove and fuel efficiency (CFE) activities	CO_2	No	Emissions are already included in the changes of carbon pools. Include only when the degradation has not been included in the estimation of changes in carbon pools.	Does not implement CFE activities.
		CH_4	No	CH_4 emissions of burning woody biomass in CFE activities are significant.	Does not implement CFE activities.
		N_2O	No	N_2O emissions of burning woody biomass in CFE activities are significant.	Does not implement CFE activities.
	Biomass burning from unplanned large and small scale fires	CO_2	No	Emissions are already included in the changes of carbon pools	Already included.
		CH_4	No	CH_4 emissions of burning woody biomass from unplanned fires are insignificant. If the fires are catastrophic, CH_4 emissions must be estimated and demonstrated negligible or otherwise accounted for.	Insignificant. No catastrophic fires registered
		N_2O	No	N_2O emissions of burning woody biomass from unplanned fires are insignificant, unless fires are catastrophic, N_2O emissions must be estimated and demonstrated negligible, or otherwise accounted for.	Insignificant. No catastrophic fires
		CO_2	No	Emissions from fossil fuel combustion is considered *de-minimis* for REDD.	Minimum

Source		GHG	Included?	Explanation	Justification
	Fossil fuel used during harvesting	CH_4	No	Insignificant	Insignificant
		N_2O	No	Insignificant	Insignificant
	Removal of woody biomass during assisted natural regeneration (ANR) activities	CO_2	No	Emissions related to changes in carbon pools are taken into account	Does not implement ANR activities.
		CH_4	No	CH_4 emissions from removal of woody biomass are significant when fire is used in preparing the land for ANR activities	Does not implement ANR activities.
		N_2O	No	N_2O emissions from burning woody biomass during ANR activities are assumed negligible and conservatively excluded.	Does not implement ANR activities.
	Fertilizer used during enrichment planting for assisting natural regeneration	CO_2	No	Assumed negligible	Does not implement ANR activities.
		CH_4	No	Assumed negligible	Does not implement ANR activities.
		N_2O	No	Assumed negligible per VCS guidance	Does not implement ANR activities.
	Increased area of rice production systems	CO_2	No	Assumed negligible	No rice production areas
		CH_4	No	CH_4 emissions from rice cropping systems are significant	No rice production areas
		N_2O	No	Assumed negligible per VCS guidance	No rice production areas
	Increased fertilizer use	CO_2	No	Not applicable	-
		CH_4	No	Not applicable	-
		N_2O	No	N_2O emissions related to increased fertilizer use are *de-minimis*	No Fertilizers
	Increased livestock stocking rates	CO_2	No	Not applicable	No grazing
		CH_4	No	CH_4 emissions related to increases in livestock stocking rates are significant	No grazing
		N_2O	No	N_2O emissions related to increases in livestock stocking rates are significant	No grazing

No other sources of emissions caused by changes in pools.

b) Carbon Pools

Table 3.2. Sources, sinks and reservoirs

Carbon Pools	Included?	Justification/ Explanation of Choice
Aboveground tree biomass	Yes	Major carbon pool affected by project activities
Aboveground non-tree biomass	Yes	Expected to increase from project activities. Must be included when the land cover under the baseline scenario is perennial tree crop. May be excluded when baseline land cover is annual crop or pasture grass.
Belowground biomass	Yes	Major carbon pool affected by project activities. May be conservatively excluded.

Carbon Pools	Included?	Justification/ Explanation of Choice
Dead wood	No	Major carbon pool affected by project activities. May be conservatively excluded. If included either or both of standing or lying deadwood may be included.
Litter	No	Excluded as per VCS AFOLU Requirements.
Soil organic carbon	No	Conservative to exclude since this pool is expected to decrease under the baseline scenario. However, may be only included per VCS AFOLU Requirements on the condition that the land cover under the baseline scenario is comprised of annual cropping systems.
Wood products	Yes	Major carbon pool affected by project activities

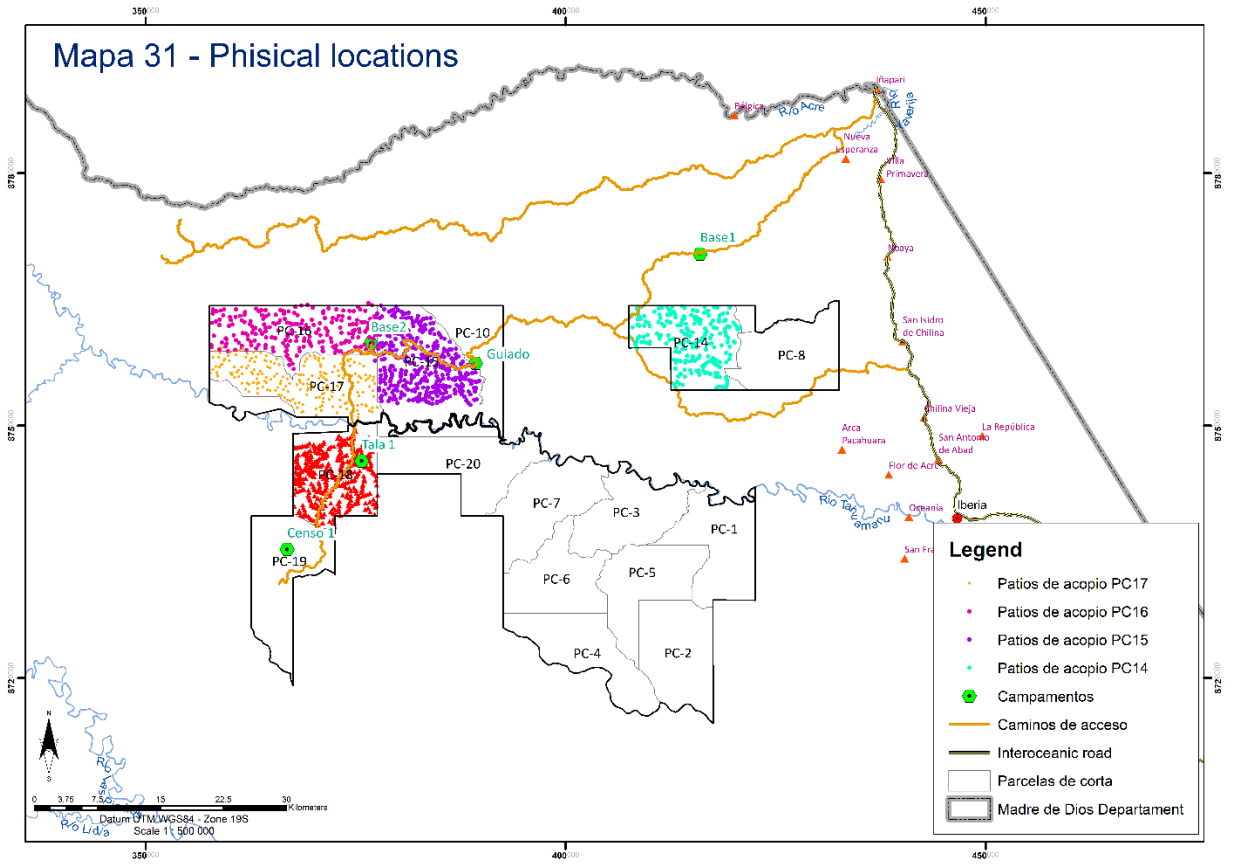


Figure 3.3. Physical locations

3.1.4 Baseline Scenario

As described in Section 2.2.1, the baseline scenario is the expansion of the agricultural activities of local communities and migrants.

Under Methodology VM0006, the most plausible baseline scenario for a project is the existing or historical changes in carbon stocks in the carbon pools within the project boundary. This baseline scenario is consistent with scenario identified in the CDM Modalities and Procedures for afforestation and reforestation, project activities (Decision 5/CMP.1), paragraph 22, option (a):

Existing or historical, as applicable, changes in carbon stocks in the carbon pools within the project boundary.

As such, the main driver of deforestation is the agricultural activities of local communities and migrants, as described in Section 2.2.1. and Section 3.2.1. It is clear that the trend of deforestation, that has an inflection point in 2009 due to the increase of gold price and the construction of the Interoceanic Highway, will keep rising. Even though the province of Tahuamanu, where the project is located, is not the main target for the mining activity in the region, it has a similar evolution of the deforestation rates (Figure 3.4).The Iberia town, which is located next to the project area, is a main deforestation hotspot. This, together with the increasing of roads for legal and illegal wood extraction, is threatening the forest cover in the project area and its surroundings.

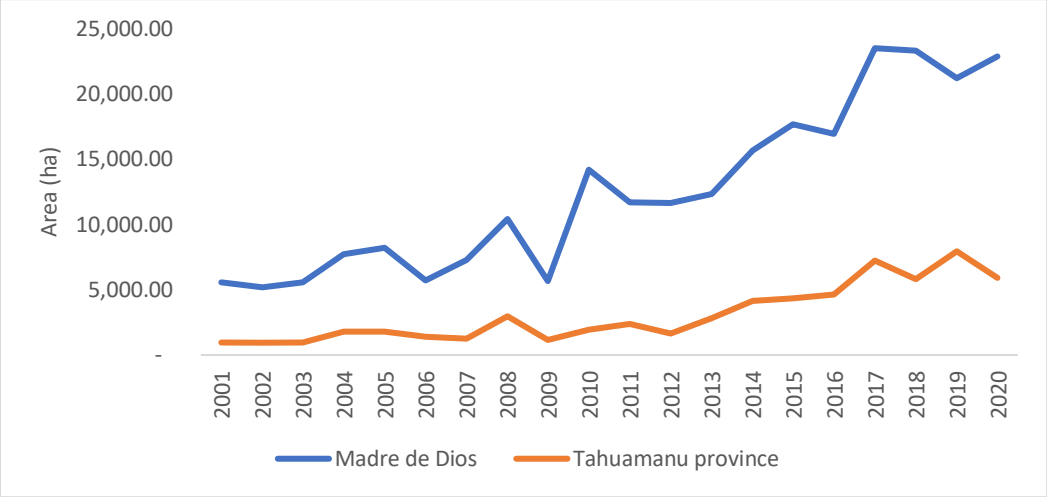


Figure 3.4. Evolution of forest loss in Madre de Dios and Tahuamanu province, period 2001-2020 (GEOBOSQUES - MINAM)

3.1.5 Additionality

To develop this section, we have applied the "Tool for the demonstration and assessment of additionality in VCS agriculture, forestry and other land use (AFOLU) project activities" (VT 0001). Version 3.0 from February 2012, Sectoral Scope 14.

STEP 1: IDENTIFICATION OF ALTERNATIVE LAND USE SCENARIOS TO THE PROPOSED VCS AFOLU PROJECT ACTIVITY

Sub-Step 1a. Identify credible alternative land use scenarios to the proposed VCS AFOLU project activity.

There are the following alternative land use scenarios that may occur in the project area in the without-project or business as usual scenario.

i) Project activities without being registered as a REDD project: One option is that the area may continue being sustainable managed by MADERACRE until the end of its concession contract but without the carbon incomes. This is in conformance with legal framework.

ii) Continuation of the pre-project land use: The other option and the most credible land use in the without project scenario is the continuous deforestation of the Project Area for developing agricultural activities from rural producers living in the surrounding settlements. This assumption is based on the evidence registered by forest cover monitoring module MMCB, in

charge of the Programa Nacional de Conservación de Bosques de Ministerio de Ambiente (PNCB-MINAM).

As can be seen in following figure, deforestation in other forest concessions shows an increasing rate. This is key to understand the level of thread faced as the project area is in the same land tenure class: timber forest concession.

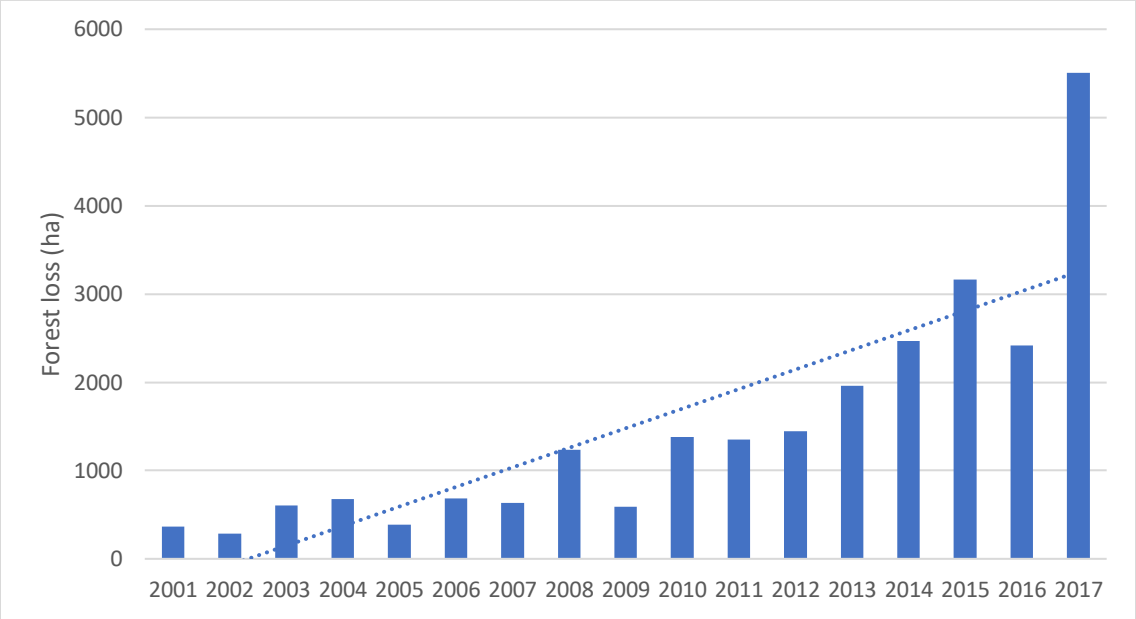


Figure 3.5. Forest loss in forest concessions in Madre de Dios (GEOBOSQUES - MINAM)

More details on the threat that the project faces may be found in Community Section.

Reforestation is not a current practice in Peru nor in Madre de Dios region. According to official statistics from SERFOR, 0 hectares were reforested between 2010 to 2017 in Madre de Dios[10]. Many reasons explain this situation, but the main factor is referred to the inexistence of financial products appropriated to the needs and time window required for this long-term investment. Other factor is that land tenure in Peruvian Amazon is characterized by small-scale, untitled agrarian plots. Reforestation needs scale investments.

Outcome sub-step 1a: List of credible alternative land use scenarios:

- *Scenario A: Project activities without being registered as a REDD project*
- *Scenario B: Continuation of the pre-project land use*

Sub-step 1b: Consistency of credible land use scenario with enforced mandatory applicable laws and regulations.

Scenario A

The Forestry and Wildlife Law (Law N° 29763) and its Regulation (Supreme Decree N° 018-2015-MINAGRI) state all the rights and obligations applicable to Forest Concessions. The concessionaires are required to develop General Forest Management Plans and Annual Management Plans that must describe the land use planning inside the concession, the activities and criteria for wood extraction and all the activities to

[10] https://sinia.minam.gob.pe/modsinia/index.php?accion=verIndicador&idElementoInformacion=1408&idformula=133&idTipoElemento=1&idTipoFuente=&verPor=tema&idfuenteinformacion=

safeguard the granted area. These documents have to comply with the guidelines approved by SERFOR (with the support of the ARFFS and MINAM), are approved by the ARFFS and their execution is supervised periodically by OSINFOR.

By law, the concessionaire is also required to stablish and maintain good relations with the local communities to prevent conflicts, respect local traditions and activities and demarcate the concessions borders.

Scenario B

Even though the land use change in areas whose main capacity is the forest production (and forest protection) is forbidden, according to Article 37 of the Law N° 29763, the empirical evidence shows that current traditional practices prevails, and it is being more and more intensive on time. Many forest concessions in Madre de Dios are not feasible anymore because they were forced to reduce their forest production area because of the deforestation and illegal logging.

According to official data of forest loss, there are 88 contracts of forest concessions (the similar type of land tenure than project proponent) in Madre de Dios, and incredibly in all of them (100%) have suffered illegal deforestation within their granted area at some moment between 2001 and 2017, with 10% with more 1,000 hectares deforested and 30% with more than 100 hectares lost. For this reason, we considered that this illegal activity is prevalent under the definition used by the methodology.

Outcome sub-step 1b:

- *Scenario A: Project activities without being registered as a REDD project*
- *Scenario B: Continuation of the pre-project land use*

Sub-step 1c. Selection of the baseline scenario

The baseline scenario is Scenario B that implies the continuation of the pre-project land use. Thus, the expansion of agrarian activities inside the project area at an increasing deforestation rate is expected.

STEP 2: INVESTMENT ANALYSIS

Sub-step 2a. Determine appropriate analysis method

The REDD project generates incomes from VCU sales and from timber sales. In that sense, Option I is not applicable. The approach used is Option II, which is designed to compare the most commonly used financial indexes in project scenario, baseline scenario and a scenario with the cost of REDD activities (except REDD certification) but without the incomes of VCU sales.

Sub-step 2b – Option II. Apply investment comparison analysis

A cash flow has been done for each one of the three following scenarios:

- The project scenario (including carbon incomes and REDD project activities, including REDD+ certification costs)
- The baseline scenario (with the expected trends of deforestation used to calculate baseline forecasts of forest loss area
- A scenario that includes REDD activities required to face deforestation trends (except certification costs) but without the expected incomes from carbon sales

The results, replicable in the Excel Spreadsheet named "*Cash Flow and Sensitivity Analysis.xlsx*", for NPV per hectare (in US$) are as follows:

Table 3.3. NPV per hectare

Scenarios	NPV per hectare (US$)
Project Scenario	$ 62.83
Baseline Scenario	$ 15.82
Project Scenario without carbon incomes	$ 14.47

Sub-step 2c. Calculation and comparison of financial indicators

As seen in previous table, the NPV per hectare is higher in the baseline scenario ($15.82) than in project scenario without the carbon incomes. This situation meets the requested condition to demonstrate additionality as it demonstrates that carbon incomes are essential to sustain the REDD activities over time. If the third scenario would be more profitable than baseline scenario, carbon incomes would not be necessary. But, if baseline scenario would be more profitable than project scenario, carbon incomes would not be enough.

Based on this theoretical framework, we describe the assumptions used in the cash flow:

- The analysis horizon is 10 years from 2017 to 2026.
- During the first 4 years, no carbon incomes are expected (as the project is just being validated and verified at 2021).
- The project proponent expects to sell an average of 75% of total VCUs available. This is based on data from the current PD, but a conservative and increasing percentage of VCU sales from total VCU is assumed, starting with 5% at 2021 and growing until 28% at 2026. This is very conservative.
- VCU price is also very conservative with an initial price of $3.13/ton and an annual growth of 5%.
- Regarding timber incomes, values from 2017 to 2020 are based on real data from official reports of the company to forest authority and, from 2021 to 2026, are 20% less than the average of previous period (2017-2020), which is considered conservative too. The wood extraction volumes are the same in the baseline and project scenario (with or without carbon).
- Regarding timber price, the starting value is $80/cubic meter, increasing at the rate of yearly inflation.
- Finally, regarding costs, there is a detailed description of logging operations costs and REDD activities costs, which matches with investment commitments described in theory of change of this current document. Logging costs from 2018 to 2020 are real costs from accounting books of the company, that may be shared with auditors during validation process. These costs are assumed to increase at the yearly inflation rate.
- The discount rate is by default, 10%.

Therefore, the company, without the incomes from carbon sales, will not implement the activities needed to prevent growing deforestation rate with the subsequent impact on the loss of forest area at the rates established in the baseline scenario registering the progressive and proportional reduction of its harvestable area and timber incomes. So, the NPV in the without project scenario will continue reducing through the years as is observed in surrounding forest concessions.

It is concluded that project scenario without the carbon incomes is not the most financially attractive scenario (worse than the alternative baseline scenario). Then, let's proceed to sensitivity analysis.

Sub-step 2d: Sensitivity analysis

Table 3.4. Sensitivity analysis of cash flow

NPV	Total	Per ha
a. With carbon incomes	$ 10,780,677	$ 62.83
b. Without project scenario	$ 2,714,108	$ 15.82
c. Without carbon incomes	$ 2,482,992	$ 14.47

Sensitivity Analysis	Base scenario	-10%	-20%
1. Carbon price	3.13	2.82	2.50
NPV per ha – a	$ 62.83	$ 57.17	$ 46.99
NPV per ha – b	$ 15.82	$ 15.82	$ 15.82
NPV per ha – c	$ 14.47	$ 14.47	$ 14.47
Volume sold (in %)	75%	68%	60%
NPV per ha – a	$ 62.83	$ 57.17	$ 46.99
NPV per ha – b	$ 15.82	$ 15.82	$ 15.82
NPV per ha – c	$ 14.47	$ 14.47	$ 14.47
Timber price	S/ 212.72	S/ 191.45	S/ 170.17
NPV per ha – a	$ 62.83	$ 57.72	$ 52.61
NPV per ha – b	$ 15.82	$ 11.90	$ 7.98
NPV per ha – c	$ 14.47	$ 10.55	S 6.64

A sensitivity analysis has been done considering three variables: carbon price, percentage of carbon volume sold and timber price. The first two of them related to carbon business while the third one related to the core business of the project proponent. Results show that REDD project is very sensitive to carbon volume sold. For this reason, we conclude that the REDD project is unlikely to be financially attractive and is under a high degree of vulnerability without the incomes from carbon sales. So, the analysis moves to Step 4.

STEP 3: BARRIER ANALYSIS

This step is not necessary as the results of Step 2(d).

STEP 4: COMMON PRACTICE ANALYSIS

No similar practices as the ones proposed by the project proponent as project activities specifically designed to reduce deforestation rate by change the pattern of land use and offering alternative sustainable economic incomes to neighboring rural families. Only other VCS REDD+ projects implement this type of activities successfully, but the tool clearly states that this type of initiatives must be excluded in this mapping.

Even though there were granted many timber concessions since 2002, with most of them having reverted or sanctioned (in process of reversion) to State for many reasons:

- Expired by national forest supervision office, OSINFOR, for any violation of legal framework (sale of forest permissions, debt of canon payment, logging of seedling trees or trees outside of forest concession or annual harvest area.
- Abandoned by the concessionaire because illegal logging or invasions.

There are 91 forest concessions in Madre de Dios. All of them recorded forest loss within their areas. 64% was less than 100 ha. 27%, between 100 to 1000 ha lost. And 9% with deforestation over than 1000 ha.

In 2015, according to OSINFOR, 23% had reverted (some of them were in the courts or were appealing administratively). On the red list, mentioned above, for a period going from 2011 to 2019, 16 timber concessions of Madre de Dios appeared. This is very characteristic of the institutional landscape.

Forest management is a good strategy to deal with drivers, but, in the changing situation with increasing pattern of threat, they show clear limitations to face successfully this new context. Other forest concessions, before having the same destination than those concessions, were transferred to others, creating consolidated concessions, scaling up to a level that makes profitable the operations.

As a consequence, almost all the forest concessions in Madre de Dios have suffered deforestation as may be seen in map.

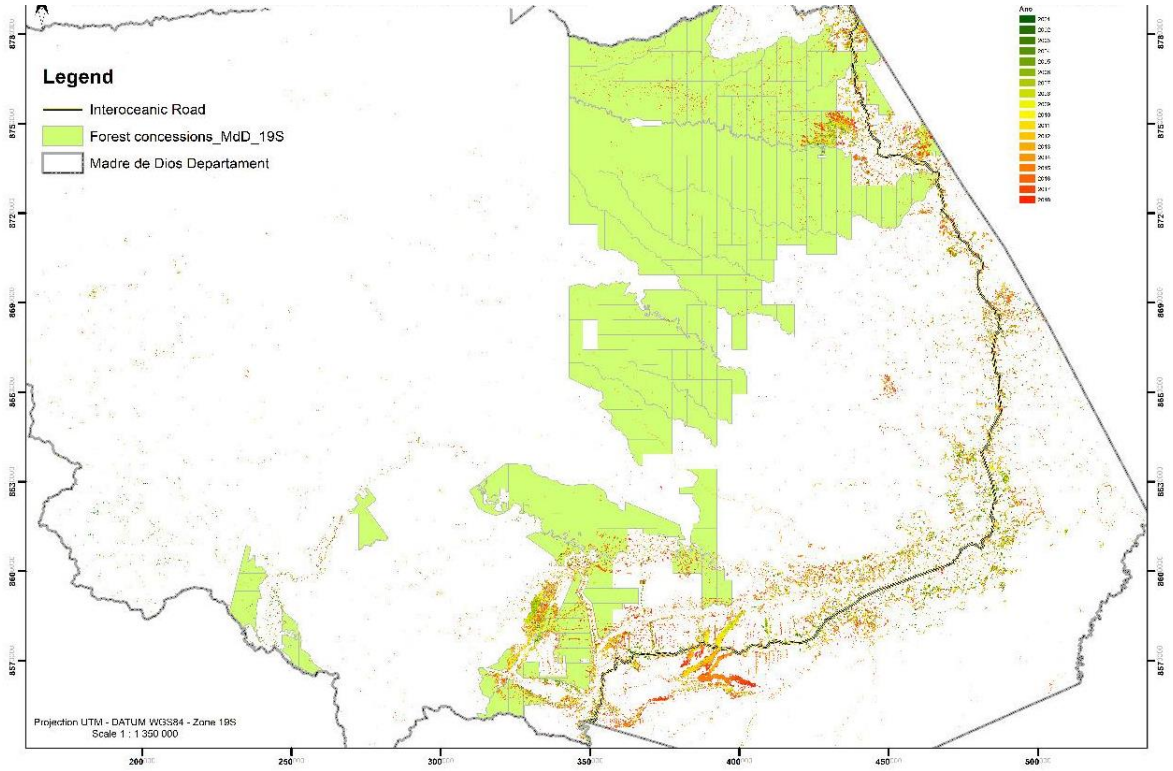


Figure 3.6. Forest loss in timber concessions 2001-2018

Appendix 8 shows the list of forest concessions expired and the red list of illegal logging are attached.

For this reason, and following the methodological tool, the VCS AFOLU project activity is not the most likely scenario, but the continuation of scenario showing the historical growing deforestation trend is the most likely scenario. For this reason, the project is clearly additional as it requires the carbon incomes to make it feasible.

3.1.6 Methodology Deviations

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 Lowland Forest (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 Tahuamanu - Madre de Dios is mainly due to self-consumption agriculture (9.1%) and pastures (90.1%), according to the AIDER11 document (2015) "Motors, agents 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.

Table 3.5. Comparison of emission factors

Carbon Pool	Pasture[12] (tC/ha)	Crop[13] (tC/ha)
AGL+BG	121.87	69.91

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 used (close to 100%) and at the same time the most conservative, since it has almost double of carbon content. The parameters affected by this deviation are:

In the EQ1:

$$L(1) = CF * \sum_{i=1}^{nrStrata} (\Delta area_{cropland,baseline}(i) * (OM(i) - OM(cropland)))$$

Affected parameters:

nrStrata: 1. Only one stratum.

Cropland: Pastures. Pastures will be taken as more conservative.

Leakage

This is a deviation from the measurement criteria and procedures established in the methodology. To determine the additional or extra time that deforestation agents will be willing to travel to continue carrying out their activities, the project has chosen not to obtain this information by applying a social assessment, but rather an analysis of the project area and its areas has been carried out following the principles of the methodology to determine the leakage belt, which will be explained in section 3.2.3.

The reason the information was not collected by asking them directly is that deforestation is illegal. Asking them directly, in addition to being risky, could be interpreted as an authorization to continue their illegal activity and at some point, a way to promote them or a relaxation of governance. In no case, the proponent of the project undertakes to give this type of signals or messages. It is for this reason that this methodological deviation does not have a negative impact on the conservativeness of the quantification of GHG emission reductions or removals.

The alternative method is to define a belt of 5 km buffer to the project area. The value of 5 km was established considering that the reference region, after discounting the area of the leakage belt and project area, cannot be lower than 250 thousand hectares.

[11] Uploaded to the cloud as “AIDER.2015. Motores, agentes, causas deforestación”
[12] Ramos & Martinez, 2019. https://www.scielo.sa.cr/scielo.php?pid=S0034-77442020000200440&script=sci_abstract
[13] Cuellar & Salazar, 2016. http://repositorio.inia.gob.pe/handle/20.500.12955/490

Considering that, with a belt of 5 km, the net area of the reference region is just a little bit higher than 250 thousand hectares (251,280 ha).

This deviation only modifies the way of delimiting the leakage belt in section 8.3.2.2, it does not affect any other parameter.

Emission Factor

The National Forest and Wildlife Service (SERFOR) has been conducting since 2013 the National Forest and Wildlife Inventory (INFFS), in an effort to evaluate the country's forest resources. This inventory is permanent and covers all types of forests (and conservation condition).

The methodology[14] used in the INFFS was established in a participatory process between inventory specialist from MINAM, SERFOR, IIAP, national universities, Regional Government representatives, with the technical support of the US Forest Service and FAO. The strata were defined based on physiographic, floristic and accessibility characteristics, among others, resulting in 6 stratum or e*cozones*: Cost (Costa), Highlands (Sierra), Lowland Jungle (Selva Baja), High Accessible Forest (Selva Alta Accesible), High Non-Accessible Forest (Selva Alta de Difcíl Acceso), and Hydromorphic zone (Zona Hidromórfica). The sample size for each ecozone was determined, totaling 1854 parcels systematically distributed throughout the national territory. The plots are then divided into 5 panels for staggered fieldwork. After visiting the last panel, the first panel is re-evaluated, and so on.

One of the results that the INFFS produces is the information on carbon stocks for each ecozone. These values are being used, since the publication of the first results, in the national carbon accounting system: the National GHG Inventory, which is done in a periodical basis, the Forest Reference Level presented to the UNFCCC, and the National Determined Contributions for the AFOLU sector.

In addition, it is important to note that MINAM is developing a process to nest all REDD projects in the national accounting system, to improve environmental integrity. For this reason, the project has considered it opportune to use, as far as possible, official sources of information to advance in national alignment. This involves the use of the forest stratification and carbon stocks values from the INFFS.

The whole project area falls inside the Lowland Jungle ecozone, with a carbon stock of 372.68 t d.m/ha that was taken from the LULUCF National GHG Inventory of 2016[15]. After conversions, the value is equal to 683.24 t CO_2/ha.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

A. Select spatial boundaries

Project area are the forest concessions of the TAHUAMANU CONCESSION.

a.1. Describe spatial boundaries of the discrete project area parcels

The project KML has been uploaded to the project cloud.

a.2. Select a valid reference region

[14] The INFFS methodological framework is available in: https://sniffs.serfor.gob.pe/inventarios/gestor/api/public/api/serfor/files/02.marco_metodologico_del_inffs_Peru.pdf
[15] The workbook of the GHG inventory is available in: https://infocarbono.minam.gob.pe/wp-content/uploads/2021/06/RAGEI_UTCUTS_2016_11-06-21.xlsx

According to section 8.1.1.2 of the methodology, the reference region must have the following characteristics:

- A minimum size of 250,000 ha, excluding the project area and leakage belt
- Boundaries may be a combination of natural, geopolitical, satellite footprint factors. If possible, coincide with administrative or jurisdictional boundaries.
- Excluding protected and other areas with effective restriction access; planned deforestation; and naturally deforested areas
- Minimum of 15% of forest cover at the beginning of crediting period.
- Similar drivers of deforestation with the ones predominant on project area
- Similar proportion (± 10%) of forest types; elevation (in groups of 500 meters); slope (at 5%)
- Similarity in land tenure classes
- The same administrative jurisdiction
- The same degree of urbanization

The analysis has been done to each one of these criteria and the RR selected meets all these criteria as will be demonstrated.

Administrative Jurisdiction

MADERACRE's forestry concession is mainly located in the Iñapari and Iberia districts. For this reason, the reference region focuses on those districts and has been built including the entire remaining area of the Iberia district (since the focus of deforestation comes from that district) while the difference covers part of the Iñapari district.

Table 3.6. Project area location, by districts (%)

ID	Distrito	Area [ha]	%
1	Iberia	76,589.51	44
2	Las Piedras	3.51	1
3	Tahuamanu	5,033.80	3
4	Iñapari	89,957.25	52
Area total (ha)		**171,584.07**	

While, the reference region is distributed as follows:

Table 3.7. Reference region location, by districts (%)

ID	Distrito	Area [ha]	%
1	Iberia	105,606.47	30.92
2	Tahuamanu	77,603.35	22.72
3	Iñapari	158,342.22	46.36
Area total (ha)		**341,552.03**	**100.00**

Physiography similarities

In addition, RR and PA are similar in elevation and slope, 100% of PA and RR are below 500 m.a.s.l., while 100% of PA and RR have a slope of less than 15%; as can be seen in following maps:

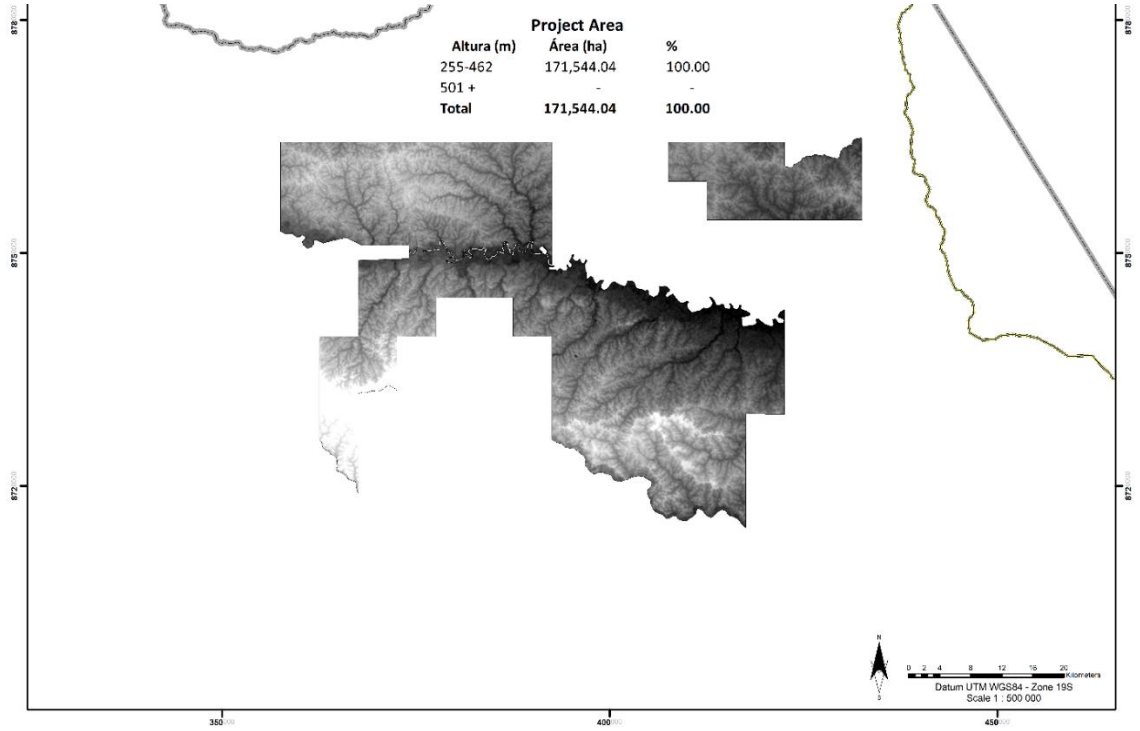


Figure 3.7. Elevation map in project area

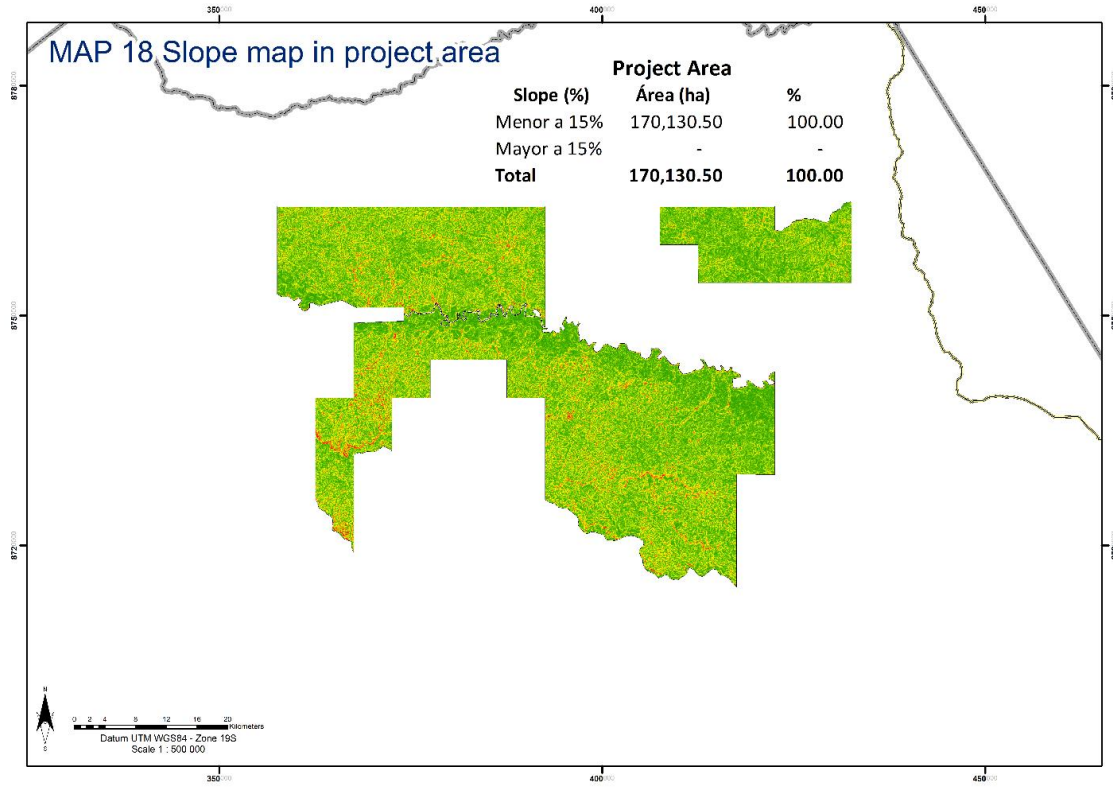


Figure 3.8. Slope map in project area

According to official data, the only stratum present in the PA and RR is “Selva Baja” so the similarity is complete on this regard too.

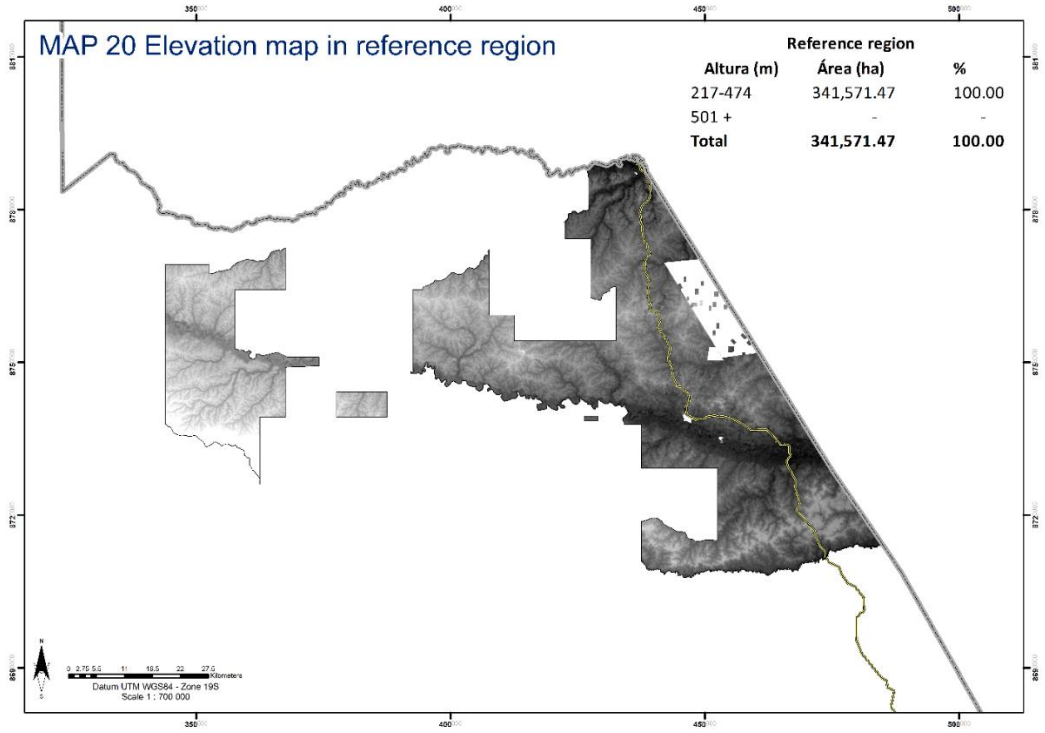


Figure 3.9. Elevation map in reference region

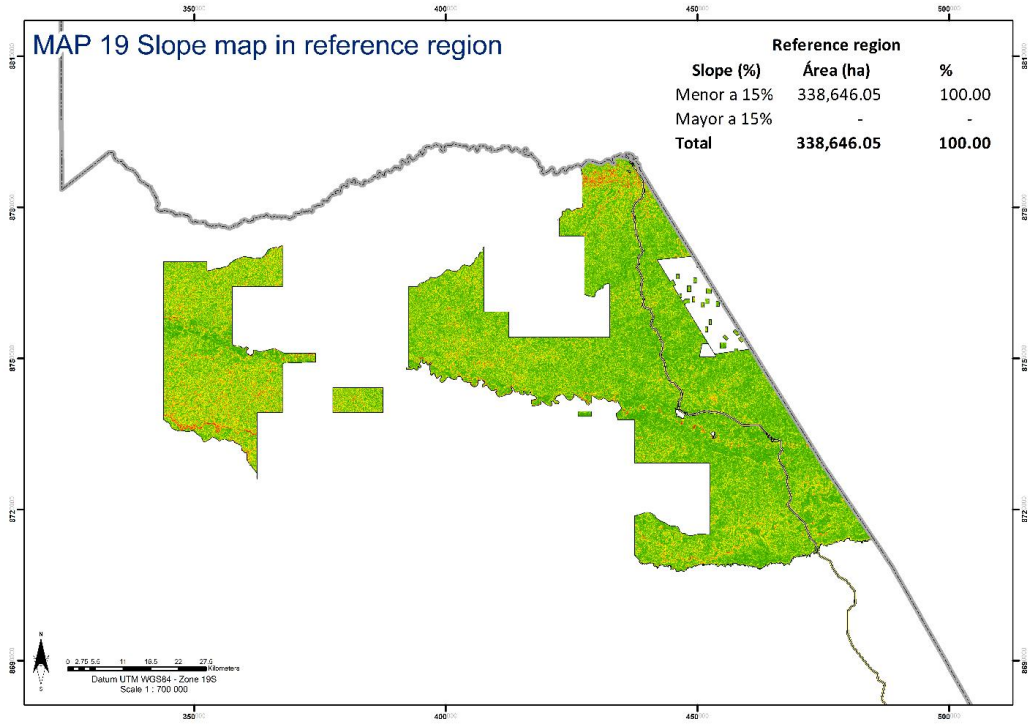


Figure 3.10. Slope map in reference region

Finally, in 2017, 80% of the reference region area is forest covered, largely higher than the minimum required by the methodology, which is defined in 15%.

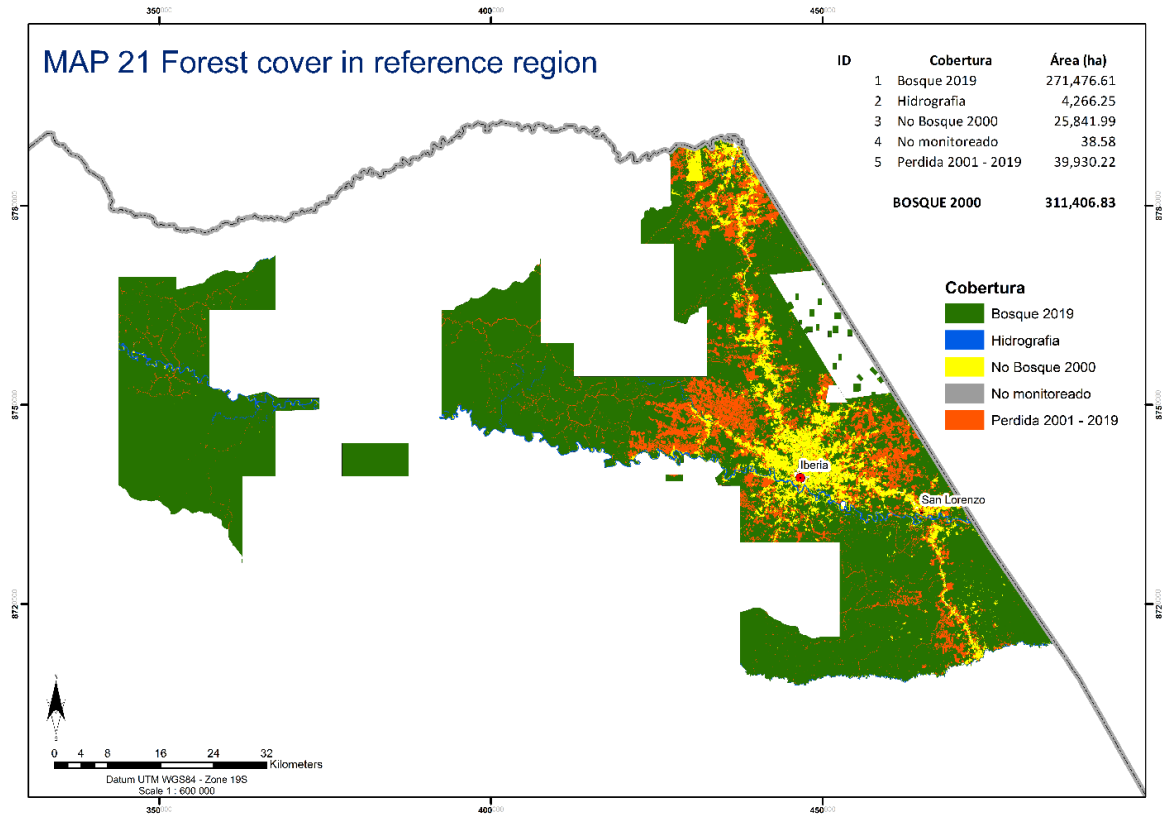


Figure 3.11. Forest cover in reference region

Below, you will find a comparative analysis of the reference region and the project area, according to requirements of the methodology:

Table 3.8. Comparison between project area and reference region

Category	Variable	Reference Region	Project Area
Drivers of deforestation	Drivers of deforestation	The pattern of deforestation in Madre de Dios is pushed by two agents: in the south, by illegal mining while in the rest of the department, by agrarian expansion. In the case of the reference region, located in the northeast part of Madre de Dios, the main drivers are related to expansion of agrarian activities. With the paving of the Interoceanic Highway, the phenomenon has accelerated dramatically.	In the project area, as described in section 4, there are several communities settled in the surroundings that are the main threats to the project area, mainly engaged in the production of maize and other subsistence crops and livestock. For this reason, the main drivers in both cases are very similar as are also associated to the expansion of the agrarian activities.

Category	Variable	Reference Region	Project Area
		The historical analysis of land use change, available in GEOBOSQUES webpage, confirms that conversion to croplands (25%) and pastures (60%) are the main patterns of land use change in the province of Tahuamanu, which contains most of the reference region. Meanwhile, the Tambopata province has a different pattern of conversion, where pastures represent 29%, mining 28% and agriculture 25%. This difference in patterns re-enforces the concept that most of the reference region should be located in the Tahuamanu province.	
Landscape configuration	Distribution of native forest types	Based on official sources, the forest national inventory stratifies the Peruvian Amazon Rainforest in four ecozones. The reference region, as most of Madre de Dios department, is under the "Selva Baja" ecozone. Specifically, this ecozone covers 100% of total forest area within the Reference Region.	Similar to the reference region, 100% of the project area is located in the Selva Baja ecozone.
	Elevation	100% of reference region has an elevation lower than 500 meters above sea level.	100% of the project area has an elevation lower than 500 meters above sea level
	Slope	100% of the reference region has a slope lower than 15%. Madre de Dios, as most of the Selva Baja ecozone is characterized by plain terrains	100% of the project area has a slope lower than 15%. Most of the area are plain terrains
Socio-economic and cultural conditions	Land tenure status	The reference region is composed by a mix of different land tenures. Forest concessions represent 52% of total area of the RR, while agrarian titled plots represent 18.1% and the castaña concessions represent 11.25%. Areas without data (probably, a share of these are being untitled plots) are 17.5%. As seen, there is a 2.76% of overlapping rights. Culturally, most of the families are migrants or descendants of	The project area is composed by forest concessions. As definition, the project area must be fully forest covered, not allowed to be granted as private property so, there is no option than the project area included agrarian lands.

Category	Variable	Reference Region	Project Area
		migrants. The pattern of migration is that recent newcomers do not settle in new areas (which is difficult) but they are relatives to old migrants and settle in the areas of expansion of the communities where their families live.	
	Policies and regulations	The reference region is located in the province of Tahuamanu. The southern boundary corresponds to a natural division, which is River Manuripe.	The project area is located 99.8% in Tahuamanu Province, bordering in the south frontier with Tambopata Province. Only 0.2% of the project area is located within the Tambopata Province. Being located in the same province and districts and with the scope of the some forest authority, the policies and regulations are similar.
	Degree of urbanization	The reference region proposed has intentionally exclude towns and the highway since, according to the methodology, no planned deforestation is allowed to be part of the reference region. It is controversial to state that urbanization is planned in the Peruvian Amazon, as most of the towns are invasion to forest areas, lately legalized by local authorities, but for conservative purposes, those areas have been excluded.	As a forest concession, settlements are forbidden to establish within the project area. If this would happen, the concession would have to be re-measured to exclude the deforested area. In conclusion, both the reference region and the project area have zero degree of urbanization.

Exclusion of restricted areas

After having analyzed, those characteristics, the proposed reference region is the following:

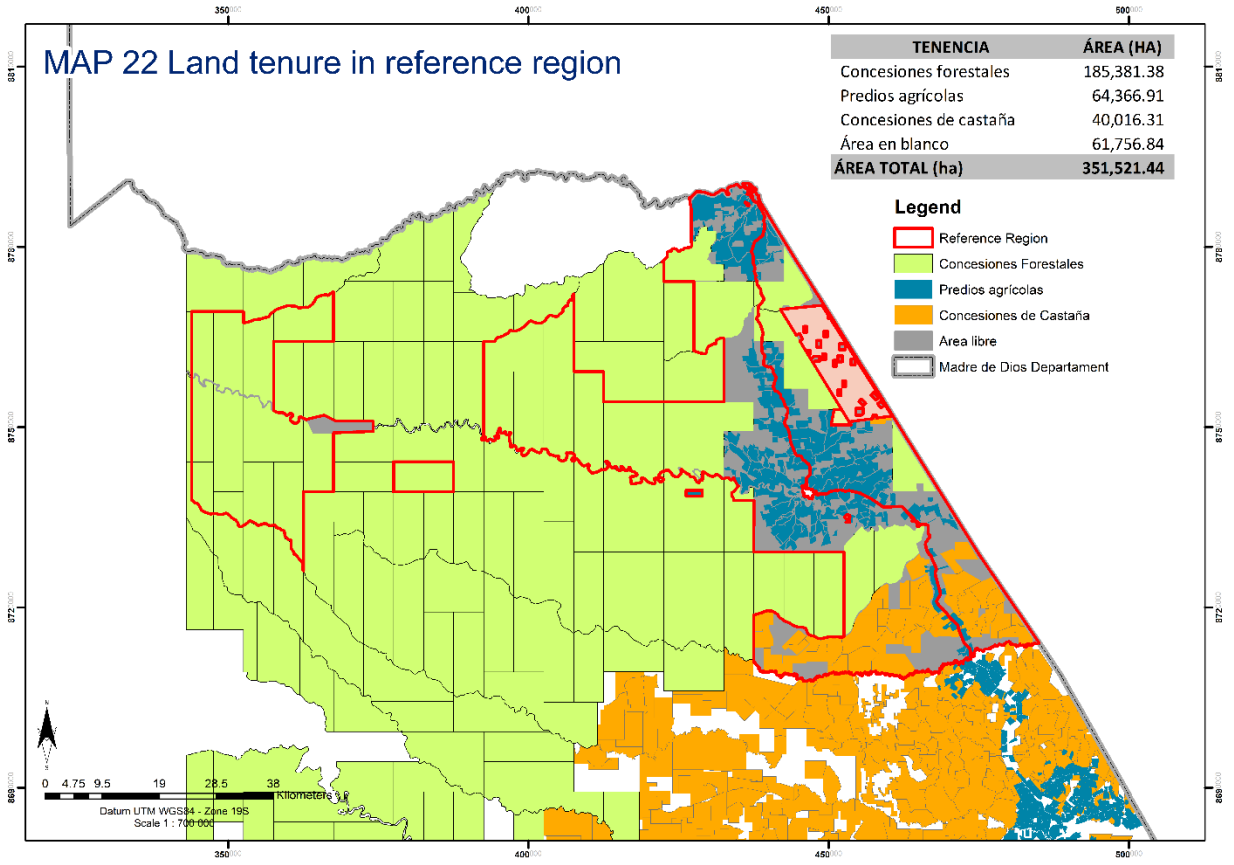


Figure 3.12. Land tenure in reference region

The proposed reference region limits, as far as possible, the project area to the east, south, north and west. To the south, another forest concession, owned by the Bozovich Group, is excluded, as it is assumed that the future REDD + project area will achieve the same successful governance recorded in its REDD+ project. But, beyond that area, to the west, the reference region continues, being limited to the north by the international limits with Brazil, to the south by the Las Piedras river, to the west by the territory of PIACI (the land of the uncontacted indigenous peoples) and to the east by the international border with Brazil.

In the south, the excluded areas only include the Otorongo and Chullachaqui forest concessions, because they have demonstrated a total and effective achievement of conservation and control of their area through their forest management. The Indigenous Community of Belgica, supported by the Madre de Dios REDD Project, has also been excluded. The indigenous community monitors and patrols their area together with the Madre de Dios Amazon REDD Project (by land and by river) and also shares a checkpoint at the entrance of the community's lands to be able to control each person that enters.

As for the small white area in the north, not included in the reference region, the area was originally granted and managed by a very internationally recognized NGO, ACCA (ACA, Amazon Conservation Association). This group has included the area in their regular patrol routes, as protecting it helps reduce the presence of illegal loggers and even invaders, as is already happening in other forest concessions. For these reasons, the area should be considered as part of the Bozovich protected forest and excluded like the rest of the area under its management.

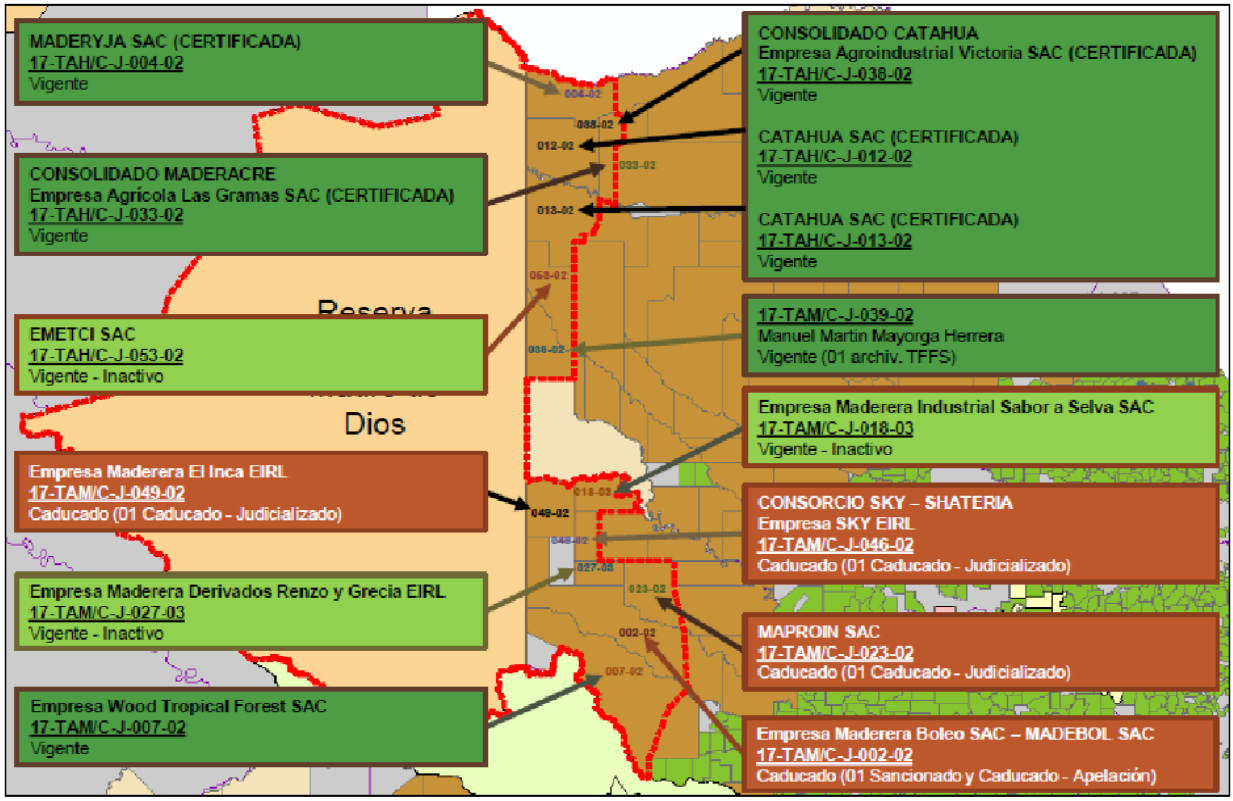


Figure 3.13. Potential expansion of PIACI territory

All other southern forest concessions have been included. The southern areas also include Brazil nut concessions.

The conservation concession in the northeast part of the reference region (very close to the Interoceanic Highway) and two minor ecotourism concessions have been excluded as required in the methodology.

We consider this reference region to be the most accurate based on the methodology requirements for the reference region and the leakage belt and best reflects the future trajectory of land use within the project area.

The proposed reference region balances areas with a low deforestation rate (0.05%) and areas with a high deforestation rate (0.79%) in percentages very similar to the areas that make up the project area, to the west, such as the area that will face a lesser degree of deforestation pressure, and on the other side, seeing the expansion of Arca Pacahuara already very close to its limit.

But second, and most important, and decisive for our decision to exclude is that Forest Authority is divided by different Technical Forest and Wildlife Authorities. In some cases, there may be huge differences as we will analyze below. As can be seen in the following map, the forest promotion and control is under two different authorities: The Tahuamanu Office (that governs the group concessions) and the Tambopata Office (that governs the area at the South of River Manuripe).

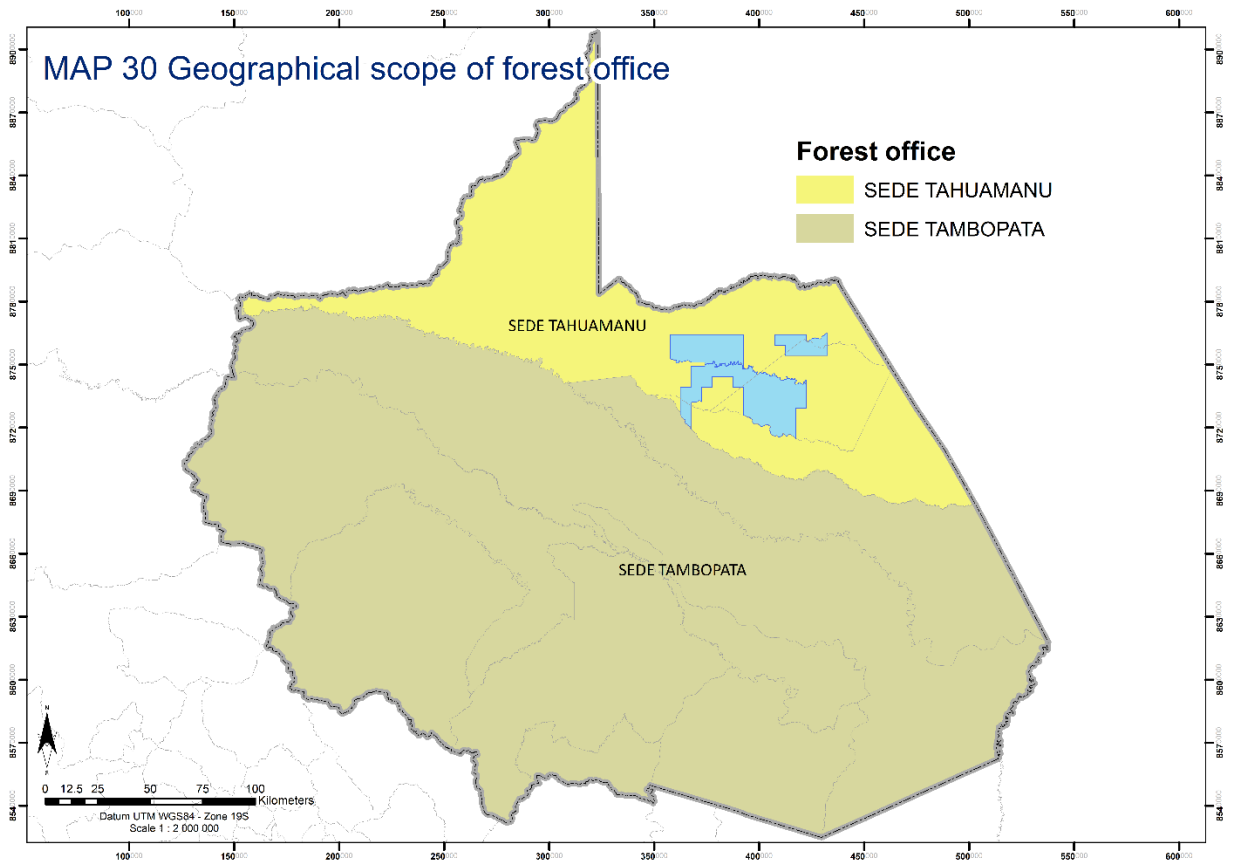


Figure 3.14. Geographical scope of forest offices

The main differences between both offices are:

- Tahuamanu manages more forest concessions than Tambopata and, at the same time, there is a larger percentage of the forest concessions in Tahuamanu are still operating while Tambopata has a larger percentage of concessions with a caducity process.
- Tahuamanu has the highest area of certified forests in Madre de Dios and in Peru
- This may be explained by what has been mentioned before. Tambopata deals against more dangerous threats than Tahuamanu. Corruption networks involving public servants, murder of environmental activists by illegal miners, land trafficking among others set up a very different landscape than in Tahuamanu. In Tahuamanu, Forest Certification prevails in this province, setting up a lower level of threat than in similar areas of Tambopata. For all these reasons, excluding forest areas located in Tambopata province is conservativeness as Tahuamanu has a significant higher forest governance than Tambopata.

The reference region meets the attributes indicated in the methodology. It is over 250,000 ha. There is not biased because it is located in the same districts than the project area (and in very similar proportions). It does not include areas with restricted access and the forest cover is largely higher than 15% of total reference region area.

As can be seen in Table 3.8, the drivers of deforestation are similar in reference region and project area, as both are geographically close between them. These are mainly expansion of agrarian activities, mostly for corn production for regional market. Elevation and slope, among other components of landscape

configuration confirm the similarities between both areas. Finally, land tenure in both cases is composed by forest concessions and agrarian plots and a few urban areas.

B. Analysis of historical deforestation and forest degradation in the reference region

b.1. Data sources

Project only worked with official information of the country. In this case, as Peru has only developed a methodology and systematic data series for deforestation, the project has only considered this activity as part of the REDD accounting. When Peru completes the methodological process for measuring degradation, the project will add this activity enhancing the significance of measurements. The methodology for generating the data may be reviewed in the GEOBOSQUES platform[16].

Table 3.9. Data sources description

Information Needed about the Data Collected	
Source Type	Landsat 7 Images ETM+
Resolution (spatial and spectral)	Spatial Resolution 30 m and Spectral resolution 8 bands
Acquisition date	1999 to 2016
Coordinate system and pre- processing	WGS84 - 18S
Minimum Mapping Unit (ha) Description of method used to produce these data	30 m
Descriptions of the LULC classes and/or LULC-change categories	Forest/Non Forest- Loss/ No change
Source Type	RapidEye
Resolution (spatial, spectral) Acquisition date	5 m – 2017
Coordinate system and pre-processing	WGS84 - 18S

b.2. Definition of LULC classes and forest strata

The government has stratified the forests of Peru into the following ecozones: Coastal Ecozone, Sierra Ecozone, High Accessible Jungle Ecozone, High Jungle Ecozone with Difficult Access, Low Jungle Ecozone, and Hydromorphic Ecozone. Of all this forest stratification in the study area, there is only one stratum called Ecozona Selva Baja.

Based on the same criteria, according to section 3.1.6, the second deviation to the methodology is that only a single and more conservative transition of classes was estimated, from forest lands to pasture lands.

b.3. Definition of land transitions between LULC classes / forest strata

Table 3.10. Land transitions

LULC classes Forest strata	Pastures
Lowland Jungle	100%

[16] http://geobosques.minam.gob.pe/geobosque/view/index.php

b.4. Analysis of historical LULC class and forest strata transitions

The historical indices of the transition from the forest stratum to the pasture stratum were worked out (according to the second deviation of the methodology in section 3.1.6), on the union of the reference region, the leakage area, and the area of the project, based on a remote sensing analysis carried out by the project proponent. This analysis was carried out with the "GEOBOSQUES" tool produced by the country's government.

b.5. Pre-processing of remote sensing data

The base projection of these images is the UTM projection, which are re-projected to the Sinusoidal projection, this projection is characterized by maintaining the pixel of 30 x 30m (1 pixel = 0.09 ha) for the entire Peruvian territory, to facilitate the use of the data and maintain consistency with previous data published by MINAM are re-projected again to the UTM projection, Zone 18S (For the years 2012 to 2016, the re-projection was to geographic coordinates and then to UTM Zone 18S). All the images are calibrated to Reflectance at the Top of the Atmosphere (TOA) to which a group of decision tree models are applied to detect the presence of clouds, shadows, mist and water, the samples of these materials were selected at Starting from ETM+ images of the tropical biome, the decision tree model selects 10% of the samples and uses them as a reference to detect clouds, shadows, mist, and water. The result is a probability image of the presence of land and water free of clouds and shadows.

b.6. LULC classification and forest stratification

The INFFS methodology is proposed to be applied at the national level, taking as a division the ecozones used in the INFFS, which are: Coast, Sierra, High Forest (Accessible and Difficult), Low Forest and Hydromorphic zone.

The INFFS defines forest as a "predominantly arboreal ecosystem that must have a surface greater than 0.5 ha, with a minimum width of 20 meters and present a minimum crown cover of 10% of its area. The predominant vegetation is represented by trees of woody consistency that have a minimum height of 2 meters in their adult state for the Coast and Sierra, and 5 meters for the Amazon Forest. In its comprehensive conception, it includes the relief, soil, water, plants, wildlife, and microorganisms that condition floristic, edaphic, topographical and climatic associations with self-sustaining functional capacity to provide goods and services. In the case of the dense forest, it is structured in various strata".

The 6 subpopulations, also called ecozones, were defined based on five criteria: physiographic, physiognomic, floristic, carbon storage capacity and accessibility (Ministry of Agriculture and Irrigation, et al. 2014):

- Lowland Jungle, the jungle forests of the Peruvian Amazon between 100 and 500 meters above sea level predominate.
- Hydromorphic, determined by the fan of the Pastaza River and the Ucamara depression, flooded forest areas predominate, more homogeneous and due to their floodable conditions, a greater storage of carbon in soils is expected.
- Accessible High Jungle, the jungle forest predominates between 500 and 3800 meters above sea level, not farther than 20 km from human infrastructure or deforested areas.
- High Jungle of Difficult Access, the jungle forest predominates between 500 and 3800 meters above sea level, farther than 20 km from human infrastructure or deforested areas.
- Sierra, area of the Andes from 2,000 meters above sea level from the Coastal area, reaching up to 6,000 meters above sea level and going down in the eastern zone to 3,800 meters above sea level. Coverages of high Andean grasslands and moors predominate. The forests are short, tall relict type and homogeneous meso-Andean with strong interventions, complemented by the dry forests of inter-Andean valleys.
- Coast, predominantly desert area between 0 and 2000 meters above sea level, with the presence of dry forests, distributed mainly in the north of the country.

The algorithm used for forest classification is based on decision trees and is a supervised classification algorithm, so it requires the creation of forest loss training samples for the algorithm to identify similar areas throughout the study area. The training samples were created manually on the metrics and based on visual interpretation, as auxiliary information for the creation of training areas, the Vegetation Cover Map, Google Earth and other available satellite data were used. Once the samples were created, the classification algorithm was executed. The classification in the UMD methodology is an iterative process, which is based on expert criteria. If the classification result does not have the expected quality, the expert must add more training samples and run the classification algorithm again, this step is repeated until satisfactory results are obtained, for the period 2001 - 2011 the algorithm was executed 15 times.

At this stage there were some methodological changes in the periods analyzed:

- Period 2001 – 2011, in this period only data from the ETM+ sensor was used, and samples based on visual interpretation were created.
- Period 2012 – 2013, in this period TM, ETM+ and OLI data were used, this is because for that year the USGS updated its geometric correction algorithm for TM data, making them consistent with ETM+ data and therefore these data can be used together, as in the previous period here manual samples were created based on visual interpretation.
- Period 2014 – 2016, in this period, unlike the previous two, no manual samples were made due to algorithm updates (machine learning) and manual samples from the previous period were used.
- Period 2016 – 2019, the Direct Spectral Unmixing (DSU) method was used, which is also used in the generation of early warnings of deforestation and as with previous periods, all available Landsat L1TP data are used for the study period.

b.7. Map accuracy assessment and discounting factor determination

The accuracy assessment allows the user to value the degree of similarity among maps and reality. To assess data accuracy, a statistic validation of the whole map of forest cover loss was done. For sampling, a stratified random method was used to divide the research are in two strata: areas with the highest risk of land change and areas with the lowest risk of land change. From those strata, as requested by the methodology for an area larger than 500 sq. km, each stratum must have 75 plots. In this case, as the project zone has 6,996 km^2, 75 plots are required for forest stratum and 75 for non-forest stratum.

The procedure, described in detail in Appendix 11, uses SENTINEL high-resolution satellite images to assess the official maps developed by MINAM. This has been already done by MINAM and independent third parties hired by MINAM. The reason why those official accuracy assessments were not used is because the methodology requests that plots were located within project zone and plots location is not available. For this reason, the same method was followed by project proponent and results were similar, with the Global Accuracy of 90%. Other values were between 94 to 98% but with the difference that the percentage of plots in forest stratum in those works were significantly higher and this stratum use to have a higher accuracy. In any case, the value obtained is higher than 85% so the discount factor is still 1.

Table 3.11. Confusion matrix

Map \ Interpretation	Forest	Non-forest	User Accuracy	Commission Error
FOREST	73	2	97%	3%
NON-FOREST	13	62	83%	17%
Producer Accuracy	85%	97%	**Global Accuracy**	**90%**
Omission Error	15%	3%		

According to section 8.1.2.7 of the methodology, the discount factor for LULC is determined in three steps:

Table 3.12. Step 2 factor (Table 5 of the methodology VM0006)

Accuracy attained	Step 2 factor
≥85%	1.00
≥80 to <85%	0.80
≥75 to <80%	0.75
≥70 to <75%	0.70
<70%	Project is not eligible

Table 3.13. Step 3 factor (Table 6 of the methodology VM0006)

Number of images in historical reference period	Step 3 factor
1-2	Project is not eligible
3	0.90
>3	1.00

Table 3.14. Steps to calculate the discount factor for LULC

Step 1: determine the accuracy of LULC classification of each map creating a confusion matrix	Step 2: multiply the accuracy of LULC classification of step 1 with a factor obtained from the lower accuracy of all maps	Step 3: multiply the factor of step 2 with a factor based on the number of images in the historical reference period to obtain $u_{classification}$
0.9733	1.00	1.00

Accuracy was determined by MINAM (2011) in the Land Use Map Validation Report 2011 for Amazon biome – REDD+ Project. The value obtained, 97.33%, Table 3.12 indicates that, for an accuracy of 85% or higher, the factor is 1; this new result is multiplied by the factor of Table 3.13, which is 1 again, considering that the number of images available is more than 3. The final $u_{classification}$ result is 1.00.

Information to be reported with respect to remote sensing and other spatial data employed for assessing deforestation and forest degradation.

Table 3.15. Stratification factor (Table 7 of the methodology VM0006)

Number of time points available in biomass inventories	$u_{stratification}$
1	0.75 for ex-ante; not eligible for ex-post
2	0.75
3	0.90
>3	1.00

$u_{stratification}$ is equivalent to 0.75.

Table 3.16. Assessment of conformance of maps with methodology requirements

Methodology Request	Analysis
The average location error between 2 images must be less or equal to 1 pixel	

Methodology Request	Analysis
Clouds or shadows must be masked and excluded when calculating deforestation rate	All the images used in the process were masked for clouds, shadows and mist
The maximum allowed of clouds is 20% for one image or 20% as an average of pairs of images used in the analysis of transition rate	The work has been done only with normalized images with less than 5% of clouds, shadows or mist
A forest reference map must be generated to show the status of forest cover in project area and leakage belt	Annual measurements from 2007 to 2016 corresponding to series developed to obtain the best cloud-free images, since 2007 to 2016. First (2007) and Last (2016) show a set of cloud-free observations since the start of 2007 (First) and the last cloud-free observation for 2016 (Last).
The estimation of GHG benefits in the project area and leakage belt after the start of the project must include only cloud-free images	Three cloud-free observations were selected for years 2000 (Med-First) and 2016 (Med-Last). From these observations, the mean and median for bands 3, 4, 5, 7, NDVI and NBR are used for visual analysis and product assessment as these data are less sensitive to the noise. In the composition of metrics, it is always prioritized the use of pixels of year of analysis, and, in the case, there are not pixels, neighboring years are used.

b.8. Summary of all historical land transitions

Table 3.17. Transition areas per year

Year	Transition from forest land to pasture [ha]
2007	918.95
2008	2,447.12
2009	913.22
2010	1,557.00
2011	1,748.08
2012	1,084.61
2013	1,854.78
2014	2,558.32
2015	2,991.64
2016	3,545.06

C. Agents of deforestation

c.1. Identification of agents and drivers of deforestation and forest degradation

As explained in the first deviation, in section 3.1.6, the main change in use is from forest land to pasture, so the main driver of deforestation is the conversion of forest land to pasture.

c.2. Assessment of the relative importance of deforestation drivers

Alarcon, et al. (2016) indicates in its study that the Peruvian Amazon has the fourth largest accumulated forest loss in the region (9.1%) between 2010 and 2013. Agriculture and livestock are the most important direct causes of deforestation, but since 2009 agro-industrial plantations (palm and cocoa), which demand ever-increasing areas of primary forest, are a growing threat. In particular, in Madre de Dios Region, the

main cause of deforestation is alluvial gold mining, in addition to the accelerated immigration of the people of the Andean region, the rise of gold in the international market and the inadequate policies of the Peruvian government in territorial order (2002-2010).

Madre de Dios was on the sidelines of the presence of the State and most of the rest of the national population until the early years of the twentieth century. From 1930 on, Brazil nuts (Bertholletia excelsa) began to be used for export. The construction of penetration roads to the basin from the Andean Mountain range began during the first government of President Fernando Belaúnde, in the 1960s. These roads were accompanied by rural settlement projects driven by the Peruvian state. Andean migrants who arrived deforested areas of several kilometers on either side of the roads for their crops, mainly rice, and grasslands for cattle farming, degrading tropical soils and reduced vast expanses of wild Brazil nut. However, these were abandoned due to the unproductivity of the soils, being covered by invasive species such as the paca (Guadua spp.). In addition, the roads made way for the loggers who installed, along them, small sawmills that in a few years wiped out the trees of the most valuable species, such as mahogany (Swietenia macrophylla), cedar (Cedrela odorata), screw (Cedrelinga cateniformis), and ishpingo (Amburana cearensis). The Interoceanic Highway was planned since 1983 and was only completed between 2005 and 2011, with an investment of more than $4.5 billion. To accompany this process, the Peruvian State assumed in 2006 an additional credit from the Andean Development Corporation (CAF) for $10 million, plus the contribution of another $7,785,957 by the State through the National Institute of Natural Resources (INRENA) to advance the process of territorial ordering of the Interoceanic Highway environment, in order to mitigate its impact. The tasks included the legal physical sanitation of rural property, among other interventions, through the Regional Government of Madre de Dios (GOREMAD).

Gold mining took off in 1978, when Andean gold miners discovered gold concentrated in ancient channels of the Madre de Dios River two and more meters deep. This finding led to a massive boom in gold mining in similar locations throughout the Inambari, Malinowski, Huepetue, Kaichiwe, Pukiri and Madre de Dios River areas, using heavy machinery to remove overload. This extended the deforestation of large areas that had previously been covered by primary forests using front loaders, track tractors and large trucks to move the land. What has led to the most intense conflicts and the greatest deforestation has been the Peruvian government's policy of prioritizing mining rights over the ordering of processes, as well as the adoption of inappropriate legal standards for the area and socio-environmental reality. In 2012, a set of legislative decrees was issued in an attempt to control illegal mining. These rules established procedures for the interdiction of illegal mining, beginning with dredgers that undermined the banks of the main course of the Madre de Dios River. The new legislative decrees incorporated modern technical criteria but no knowledge of the socio-environmental reality of the area. Currently, this activity is located in the southeastern part of the Region, so it is not considered within the drivers of deforestation.

Agriculture, livestock, and agribusiness, in 2012 the total area of land under agricultural cultivation was 68 900.78 ha, while the area planted in natural pastures was 30 133.54 ha. Both activities are mostly located on the sides of the Interoceanic Highway. Previously, there were premises of up to 300 ha, but they have been plotted in smaller units, from three ha, although most range from 20 to 100 ha. An analysis carried out in 2014 by the Madre de Dios Consortium records 32,243.49 has deforested at the heart of the current Interoceanic Highway in 1999, when the road had not yet been completed, which does not include areas subsequently occupied by informal gold miners. Such deforestation would also have reached 77 684.75 ha in 2013, when the mining operations of La Pampa and Guacamayo were already active. Most of the deforestation, generated by gold mining, would be on the stretch between Puerto Maldonado and the Inambari Bridge. Another critical factor will be forest logging for papaya and cocoa crops, mostly on the stretch of road between Puerto Maldonado and Iñapari.

In addition to traditional crops such as rice, yellow maize, banana and cassava, and some permanent crops such as citrus. The opening of the Interoceanic Highway has entered farmers from other parts of the Peruvian jungle, such as Ucayali, San Martín and Loreto, who have introduced papaya and cocoa crops to the national market. The ACCA MAAP Project has documented the deforestation of 204 ha of forest for the cultivation of papaya by the Interoceanic Highway in 2015, compared to 55 ha in 2014 (Finer et al., 2016). Since the monoculture of papaya began several years earlier and continues, and we are aware of papaya

plantations along the Madre de Dios and De las Piedras rivers, in addition to the Interoceanic Highway, the threat of deforestation for this purpose will probably be substantially greater than reported so far. Another crop that is entering is sacha inchi (Plukenetia volubili). Data on its extent or deforested areas are not yet available, but it is yet another example of development planning based on ephemeral markets rather than sustainable production. Now the Ministry of Agriculture and Irrigation (MINAGRI) has been promoting the Sierra y Selva Exportadora program, with support from the Ministry of the Environment (MINAM), and funding from the Andean Development Fund (CAF).

The extraction of wood has been carried out in small areas by local people, mostly residents in the area. This situation changed from 2000, when the new Forestry Law 27308 was passed and forest concessions of up to 50,000 ha were initiated with management plans, which were never adequately supervised. This Law allowed the determination of permanently produced forests in Madre de Dios of 2'522,141 hectares that were declared suitable for the preferential use of wood and other forest resources and wildlife. As of 2003, 82 forest concessions had been granted for timber purposes in permanently produced forests over an area of 1 248 037 ha (SERFOR, 2013). The area with the most wooden concessions is the north of Tambopata province and most of Tahuamanu province, where loggers entered forests away from the De las Piedras and Tahuamanu rivers in a disorderly manner and without proper controls and swept through the mahogany and red cedar of the area. This situation was partially remedied when mahogany was included in Appendix II to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and its legal marketing was limited to production with certified management under international standards, limiting the export possibilities of mahogany that did not meet these requirements.

Another outstanding problem is that different entities, who grant different rights (forest, soils, sub-soil) do not coordinate, often overlapping between the different public sectors, and the inability of the State to expire the private rights previously established to give way to territorial order, however, however that theoretically forests and minerals belong to the State. This confusion continues to lead to deforestation, despite the technical criteria of professionals in each sector.

From the above, we conclude that the main deforestation agents of the project are farmers, ranchers, and infrastructure, of which the most conservative scenario is the ranchers.

Sub-Step 1: Estimating the absolute annual carbon loss per driver, using the formulas in Table 8 of the methodology, which are based on GPG-LULUCF.

Table 3.18. Annual carbon loss from conversion of forest land to pasture

Year	L (1): Annual carbon loss from conversion of forest land to pasture [t C/year]
2017	319,857.25
2018	360,450.86
2019	404,406.61
2020	451,834.71
2021	502,735.19
2022	556,970.24
2023	614,250.49
2024	674,231.48
2025	736,320.69
2026	799,870.49

Sub-Step 2: Estimating the relative contribution of each driver to the total carbon loss from deforestation.

Table 3.19. Relative contribution of drivers

Year	L (1)	Proportion of gradual carbon loss leading to deforestation due to driver L(d)	Total carbon loss due to deforestation [t C/year]	Relative contribution of driver "d" to total deforestation L(d)
2017	319,857.25	100%	319,857.25	1.00
2018	360,450.86	100%	360,450.86	1.00
2019	404,406.61	100%	404,406.61	1.00
2020	451,834.71	100%	451,834.71	1.00
2021	502,735.19	100%	502,735.19	1.00
2022	556,970.24	100%	556,970.24	1.00
2023	614,250.49	100%	614,250.49	1.00
2024	674,231.48	100%	674,231.48	1.00
2025	736,320.69	100%	736,320.69	1.00
2026	799,870.49	100%	799,870.49	1.00

c.3. Mobility of each deforestation drivers

The deforestation drivers are in all the cases rural families, local communities, or former migrants, so the access to production areas is mostly with motorcycles.

c.4. Identification of the quantitative driving variables of deforestation and forest degradation

Possible driving spatial variables that explain the location of land cover change, also called "predisposing factors" are:

- Access to forests.
- Proximity to markets.
- Proximity to settlements.
- Management category of the land.

D. Land use stratification and carbon stocks

d.1. Identification of LULC classes and forest strata for which carbon stocks are to be quantified.

Table 3.20. LULC and Forest strata

LULC classes	Forest strata
Forest land	Lowland jungle
Pasture	

d.2. Revision of existing data of biomass stock densities and biomass net annual increments

Table 3.21. Biomass stock data sources and sampling design

<table>
<tr><th>Elements required</th><th>Forest land</th><th>Pasture</th></tr>
<tr><td>Methodology (field inventory, extrapolation from satellite imagery, ecosystem model or GIS analysis)</td><td>1. The INFFS sampling design is "systematic, spatially unaligned, distributed in panels with subsamples clustered in units of unequal size" 2.
2. Stratification into 6 ecozones, they were defined based on five criteria: physiographic, physiognomic, floristic, carbon storage capacity and accessibility, these are: Lowland Rainforest, Hydromorphic, High Accessible Rainforest, High Forest of Difficult Access, Highlands, and Coast.
3. Use of satellite images.
4. The INFFS classification follows a hierarchical order and has four levels:
<u>Level 1</u>: Classifies land use into two general categories, "forest" and "no-bosque". The classification is based on the INFFS definition of forest.
<u>Level 2</u>: Separates level 1 categories according to their natural or anthropogenic origin.
Level 3: For "forest" categories, the classification criterion is based on climatic condition, while for "non-forest" categories on a physiognomic criterion.
<u>Level 4:</u> For "forest" and "natural non-forest" categories, the classification is based on physiographic and floristic criteria". For the "non-anthropic forest" categories, the criterion is the specific current use.
5. Estimation of biomass per ecozone.</td><td>1. Inventory design with predefined number of plots (3), without statistical calculation.
2. Location of plots supported by old photomap records and field visits.
3. Random assignment of the distribution of subplots within each plot.
4. Description of the floristic composition and structure of the grassland systems, using Sorensen's coefficient.</td></tr>
<tr><td>Number of measurement plots used</td><td><table><tr><th>Ecozone</th><th>Total UTM</th><th>Grid size</th></tr><tr><td>Low jungle</td><td>808</td><td>24</td></tr><tr><td>Hydromorphic</td><td>91</td><td>31</td></tr><tr><td>High Jungle accessible</td><td>288</td><td>20</td></tr><tr><td>High Jungle of Difficult Access</td><td>101</td><td>34</td></tr><tr><td>Coastal</td><td>460</td><td>19</td></tr><tr><td>Mountain range</td><td>5545</td><td>8</td></tr><tr><td>Total</td><td>7293</td><td></td></tr></table></td><td>3 plots of 40 x 40 m, by type of grassland, spaced in a range between 300 and 1500 m.

Each plot had 10 subplots of 2 m x 2 m for vegetation, biomass and aerial carbon studies.

9 subplots of 1.5 m x 0.5 m x 1 m for root biomass evaluation.</td></tr>
<tr><td>The minimum DBH of the trees measured in the</td><td>Definition of forest for INFFS 2019:
1. minimum area: greater than 0.5 ha.
2. Minimum Forest cover: 10%.</td><td>No threshold is established because it is a complete</td></tr>
</table>

Elements required	Forest land	Pasture
biomass inventory or any other relevant threshold.	3. Minimum tree height: 5 m for Selva. 4. Minimum width of the total area: 20 m. Thresholds for INFFS: Trees: Greater than 30 cm DBH. Shrubs: 10-30 cm DBH. Latizales: Greater than 3 m in height and less than 10 cm DBH. Brinzales: 1-3 m in height.	destructive evaluation of all the material present in the evaluation subplot.
Region in which the samples were taken	1. Coastal 2. Mountain range 3. Jungle	Yumka Park, Tabasco, México

d.3. Measurement of carbon stocks

Table 3.22. Carbon density statistics

Parameters	Forest land[17] [t d.m./ha]		Pasture[18] [t d.m./ha]	
	AGL	BG	AGL	BG
n	119	119	6	6
gl	118	118	5	5
X (t/ha)	295.410	77.270	5.502	60.973
SE	1.010	0.264	0.545	3.346
DE	11.020	2.880	1.335	8.196
IC	2.000	0.523	1.401	8.601
HWCI(OM)	2.000	0.523	1.401	8.601

d.4. Determination of emission factors

We have taken official data from Peruvian Government for emission factor of forest stratum “Lowland Jungle”, as explained in the methodology deviation, and for emission factor of LULC, we have collected from the REDD+ project previously mentioned.

Table 3.23. Carbon stock in LULC classes and forest stratum

Forest stratum / LULC classes	AGL + BG [t C/ha]
Forest stratum “Lowland Jungle”	186.34
LULC Class: pasture	33.24

The pasture’s carbon stock was obtained from Ramos H, E. & Martinez S, J. (2019) in “Biomass and aboveground and root carbon stores in grasslands of Urochloa decumbens and Paspalum notatum (Poaceae) in southeastern Mexico", the data of the species with the highest total biomass (P. notatum) were taken, thus being the most conservative data, (66.48 t d.m./ha), this value was multiplied by the carbon fraction 0.5, resulting 33.24 t C/ha.

[17] https://infocarbono.minam.gob.pe/wp-content/uploads/2021/06/RAGEI_UTCUTS_2016_11-06-21.xlsx
[18] https://www.scielo.sa.cr/scielo.php?script=sci_arttext&pid=S0034-77442020000200440

Based on those data, we can calculate the emission factor for all the transitions, by using EQ26 – EQ30:

$$EF_{AGL}(CS1 \rightarrow CS2) = \frac{44}{12} \cdot \left(C_{AGL}(CS2) - C_{AGL}(CS1)\right) \qquad \text{[EQ26]}$$

where:

EF_{AGL} (CS1→CS2)	=	Emission factor for change in aboveground live plant organic matter from an LULC Class or forest Stratum (CS) 1 to 2. [tCO_2e/ha]
CS1→CS2	=	Land transition from LULC class or forest stratum 1 to 2.
C_{AGLF}(i)	=	Carbon density of aboveground plant organic matter of classes or forest stratum ii. [tC/ha]

As allowed by the methodology, non-CO_2 gases are omitted, and it is the same for other pools (soil organic carbon and dead wood.).

Table 3.24. Emission factor per type of land transition

Forest stratum	LULC class	AG
Lowland Jungle	Pasture	-534.49

The belowground biomass and the aboveground deadwood factors was gradually spread overtime. It must be noted that this value is conservative if compared with the carbon content estimated from the exploratory inventory of forest concession. Calculations are available for comparison.

$$u_{transition}(CS1 \rightarrow CS2) = \begin{cases} 1 & \text{if } CE_{transition}(CS1 \rightarrow CS2) \leq 0.15, \\ 1 - CE_{transition}(CS1 \rightarrow CS2) & \text{if } 0.15 < CE_{transition}(CS1 \rightarrow CS2) < 1, \\ 0 & \text{if } CE_{transition}(CS1 \rightarrow CS2) \geq 1 \end{cases}$$

$$HCWI\left(OM_o(i)\right) = t_{0.95,n-1} \cdot stderr\left(OM_o(i)\right)$$

$$CE_{inventory}(i) = \frac{\sqrt{\sum_o HWCI\left(OM_o(i)\right)^2}}{\sum_o OM_o(i)}$$

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

Table 3.25. Discounting factors for Harvest and Non-Harvest Areas

CE transition	U transition	CE inventory	U inventory
0.014	1	0.011096182	1

Table 3.26. Conformance analysis of measurement sampling with methodology requirements

Methodology (field inventory, extrapolation of satellite images, ecosystem model or GIS analysis)	Field inventory with sampling in measurement plots, called Sampling Units
Number of plots measured	Number of sampling units per ecozone:

Ecozone	Total Units	Accessible Units	Size of the square (km)
Lowland Jungle	808	804	24
Hidromórfica	91	88	31
Accessible High Jungle	288	261	20
Difficult to access High Jungle	101	101	34
Coast	460	112	19
Sierra	5545	489	8
	7,293	1,855	

¿Are all the species included in the sample?	Yes, all the species with a DBH > 10cm
¿Which is the minimum DBH of trees sampled?	10 cm DBH
¿Regions where samples were taken?	All the ecozones with a sampling size of 1855 units
Demonstration that all the data sources for biomass stock density based on classes of section 8.1.4.2 of the methodology were consulted	Forest and Wildlife National Inventory
Information about source of carbon stock densities in non-forest land cover of the project	Ramos H, E. & Martinez S, J. (2019) in “Biomass and aboveground and root carbon stores in grasslands of Urochloa decumbens and Paspalum notatum (Poaceae) in southeastern Mexico", the data of the species with the highest total biomass (P. notatum) [19]

E. Emissions in baseline

e.1. Calculation of total rates of deforestation and degradation in the project area

Beta regression is developed in Appendix 10, the results are as follows:

[19] https://www.scielo.sa.cr/scielo.php?pid=S0034-77442020000200440&script=sci_abstract

Table 3.27. Beta regression results

Year	Beta regression describes the relationship between time and deforestation rate in reference region during reference historical period [ha/year]	Project area [ha]	Reference Region [ha]	Deforestation in project area in baseline scenario [ha/year]	Carbon emission from deforestation within the project area during the year [tCO_2e/year]
2017	3,486.94	171,584.07	286,356.23	2,089.37	-1,116,737.99
2018	3,929.28			2,354.42	-1,258,401.84
2019	4,408.48			2,641.55	-1,411,874.06
2020	4,925.62			2,951.42	-1,577,493.14
2021	5,480.50			3,283.90	-1,755,200.85
2022	6,071.66			3,638.13	-1,944,528.77
2023	6,696.27			4,012.39	-2,144,568.24
2024	7,350.02			4,404.12	-2,353,938.80
2025	8,027.05			4,809.79	-2,570,767.17
2026	8,719.98			5,224.99	-2,792,685.35

After calculation the annual deforestation rate in the project area in the baseline scenario, we apply EQ1 and results obtained are in Table 3.28.

$$L(1) = CF \cdot \sum_{i=1}^{nrStrata} \left(\Delta area_{cropland,baseline}(i) \cdot \left(OM(i) - OM(cropland)\right)\right)$$

Where:

CF: Carbon fraction of dry matter (default = 0.5). [Mg C (Mg DM)$^{-1}$]

Forest area converted from forest stratum ii to pasture at the beginning of the crediting period. [ha yr.$^{-1}$]

Table 3.28. Conversion of forest land to pastureland

Year	Forest area converted from forest stratum to pastures at the start of crediting period [ha/year]	OM (i): Organic matter for forest stratum according to INFF (2019) [t d.m./ha]	OM (pasture): Average organic matter in pastures [t d.m./ha]	OM (i) - OM (pasture) [t d.m./ha]	L (1): Annual carbon loss by conversion of forest lands in pastures [tC/year]
2017	2,089.17	372.68	66.47	306.21	319,857.25
2018	2,354.31	372.68	66.47	306.21	360,450.86
2019	2,641.41	372.68	66.47	306.21	404,406.61
2020	2,951.19	372.68	66.47	306.21	451,834.71
2021	3,283.65	372.68	66.47	306.21	502,735.19
2022	3,637.89	372.68	66.47	306.21	556,970.24
2023	4,012.02	372.68	66.47	306.21	614,250.49

Year	Forest area converted from forest stratum to pastures at the start of crediting period [ha/year]	OM (i): Organic matter for forest stratum according to INFF (2019) [t d.m./ha]	OM (pasture): Average organic matter in pastures [t d.m./ha]	OM (i) - OM (pasture) [t d.m./ha]	L (1): Annual carbon loss by conversion of forest lands in pastures [tC/year]
2024	4,403.79	372.68	66.47	306.21	674,231.48
2025	4,809.33	372.68	66.47	306.21	736,320.69
2026	5,224.41	372.68	66.47	306.21	799,870.49

Applying the following equations of the methodology:

$$\Delta C_{DF} = \sum_{d=1}^{nrDrivers} proportion_{DF}(d) \cdot L(d)$$

$$contribution_{DF}(i) = \frac{proportion_{DF}(d) \cdot L(d)}{\Delta C_{DF}}$$

We obtain that the total carbon loss caused by deforestation is similar thanks to the fact that the proportion of gradual loss of carbon that conducts to forest deforestation ($proportion_{DF}(d)$) is 100% and, as a consequence, the relative contribution of driver 1 to total deforestation is 100% too.

e.2. Calculation of LULC class or forest stratum-specific relative forest cover increase and regeneration rates

Regeneration is not significant and is omitted.

e.3. Calibration and validation of a space model

A valid model was developed following sections 8.1.5.3 and 8.1.5.4 of the VM0006 methodology. It was performed using TerrSet v.2020 software, under its Land Change Modeler (LCM) module. The descriptive results and step-by-step methodology can be reviewed in Appendix 15.

e.4. Calculation of all Class or Stratum-Specific Transition Rates.

The scarcity factor is a requirement within the VM0006 methodology, which reduces the rate of deforestation based on the remaining forest area in a given location. In order to calculate it, it was necessary to establish a proxy area, which has a similar landscape, but has suffered a much greater advance of deforestation. Based on a multi-temporal analysis, it is possible to estimate the level at which forest loss affects the progressive decrease in the rate of deforestation due to forest loss, for this purpose a non-linear model is established to fit the observed data to the scarcity function defined in the methodology. The Appendix 14 develops the procedure to obtain the scarcity factor through its two coefficients.

Table 3.29. Application of scarcity factor

Year	Baseline rate of deforestation within the project area during the year [ha/year]	Calculation of Scarcity Factor				Baseline Deforestation rate with scarcity factor [ha/year]
		SC1	SC2	Remaining area in the project area [ha]	Scarcity factor value	
2017	2,089.37	-15.06	0.6683	171,584.07	0.9999422	2,089.25
2018	2,354.42	-15.06	0.6683	169,494.70	0.9999397	2,354.27
2019	2,641.55	-15.06	0.6683	167,140.29	0.9999367	2,641.39
2020	2,951.42	-15.06	0.6683	164,498.73	0.9999332	2,951.22
2021	3,283.90	-15.06	0.6683	161,547.31	0.9999291	3,283.67
2022	3,638.13	-15.06	0.6683	158,263.41	0.9999242	3,637.85
2023	4,012.39	-15.06	0.6683	154,625.28	0.9999183	4,012.07
2024	4,404.12	-15.06	0.6683	150,612.88	0.9999113	4,403.73
2025	4,809.79	-15.06	0.6683	146,208.77	0.9999027	4,809.33
2026	5,224.99	-15.06	0.6683	141,398.97	0.9998923	5,224.43

3.2.2 Project Emissions

The assumption of effectiveness is presented in the following table:

Table 3.30. Procedures to quantify the maximal effectiveness of strengthening land-tenure for target drivers

Target driver	Maximal effectiveness quantification	Effectiveness quantification
Conversion of forest land to pasture (by people other than participating communities)	$effectiveness < 5\%$ Legal recognition of the land tenure status will reduce the potential of conversion of forest land to pasture land within the project area because it will provide clarity on the legal land uses. However, on-the-ground patrolling is necessary to effectively avoid conversion to pasture.	The theory of change is based on a production-protection approach that establishes that the strengthening of governance must be combined with productive development. The project includes activities related to improving surveillance and control such as patrolling on the ground to effectively prevent conversion to cropland. $effectiveness = 0.04$

Table 3.31. Procedure to quantify the maximal effectiveness of forest and land use plans for target drivers

Target driver	Maximal effectiveness quantification	Effectiveness quantification
Conversion of forest land to pasture by		

Target driver	Maximal effectiveness quantification	Effectiveness quantification
participating communities	$effectiveness = \left(1 - \frac{\Delta area_{pasture,allowed}}{\Delta area_{pasture,baseline}}\right)\%$ Forest and land-use plans usually explicitly indicate how much land can be converted from forest to pasture. The baseline conversion rates must be estimated based on remote sensing analysis or social assessments when no remote sensing analysis is feasible.	$effectiveness = \left(1 - \frac{0}{1751.72}\right)\%$ $effectiveness = 0.01$

Table 3.32. Procedures to quantify the maximal effectiveness of demarcating boundaries for target drivers

Target driver	Maximal effectiveness quantification	Effectiveness quantification
Conversion of forest land to pasture by people other than participating communities	$effectiveness = 100\%$ Boundary demarcation and forest protection can eliminate conversion of forest land to pastureland in most instances.	The maximum effectiveness (100%) is being assumed since first year as the project proponent has large experience in controlling project boundaries. It does not mean that they will immediately change the land use pattern in surrounding communities and drivers of deforestation. In the leakage cancellation rate, a large discount has been assumed, associated to Arca Pacahuara maintaining current agrarian expansion that will displace the threat to leakage area. $effectiveness = 1$

Table 3.33. Procedures to quantify the maximal effectiveness of alternative livelihoods for target drivers

Target driver	Maximal effectiveness quantification	Effectiveness quantification
Conversion of forest land to pasture	$effectiveness = 0.75 \frac{\sum \ income\ through\ alternative\ livelihood}{\sum \ total\ value\ of\ forest\ products}$	$effectiveness = \frac{S/.\ 119{,}800.00}{S/.\ 2{,}880.00}$

The concessions are already FSC certified, which guarantees sustainable forest management that includes logging operations. Therefore, there are no plans to decrease the volume harvested as was done when FSC certification was obtained.

On the other hand, the project proponent hopes that the activities proposed in the theory of change will reduce all pressure and threat on the project area, as they focus on creating alternative sources of income for the surrounding families with the objective to change the land use pattern.

Table 3.34. Forest area converted from forest stratum "*i*" to pasture at the beginning of the crediting period

Year	Area that will be converted in pasture for surrounding communities in project scenario [ha]
2017	595.41
2018	670.98
2019	752.80
2020	841.09
2021	935.84
2022	1,036.80
2023	1,143.43
2024	1,255.08
2025	1,370.66
2026	1,488.96

The area that will be converted in pastures within the project zone is 28.5% of projected deforestation in the baseline scenario.

Forest impact of a driver “d” in deforestation and forest degradation, respectively at the moment “t” of crediting period is in EQ64.

$$RelativeDriverImpact_{DF}(t,d) = \sum_{a=1}^{nrActivities} \left(rate(a,t) \cdot effectiveness(a,d) \cdot contribution_{DF}(d)\right) \quad \text{[EQ64]}$$

Table 3.35. Annual adoption rate per activity

Activity	Year	Rate
Strengthening of Land-Tenure Status and Forest Governance	2017	0.750
	2018	0.750
	2019	0.750
	2020	0.750
	2021	0.750
	2022	0.750
	2023	0.750
	2024	0.750
	2025	0.750
	2026	1.000
Support with the Development and Implementation of Sustainable Forest and Land Use Management Plans	2017	0.900
	2018	0.900
	2019	0.900

Activity	Year	Rate
	2020	0.900
	2021	0.900
	2022	0.900
	2023	0.900
	2024	0.900
	2025	0.900
	2026	1.000
Demarcating Forest, Tenure and Ownership Boundaries, and Areas of Forest Protection	2017	0.900
	2018	0.900
	2019	0.900
	2020	0.900
	2021	0.900
	2022	0.900
	2023	0.900
	2024	0.900
	2025	0.900
	2026	1.000
Providing Alternative Livelihoods to the Agents of Deforestation	2017	0.450
	2018	0.450
	2019	0.450
	2020	0.450
	2021	0.600
	2022	0.600
	2023	0.600
	2024	0.600
	2025	0.600
	2026	1.000

The effectiveness is obtained from the previous tables and the contribution is 100%. As a consequence, the relative driver impact is 1.08 for the years 2017-2020 and 1.13 for the rest of the years.

Then, considering that there is only one driver, the relative project impact would be 1.08 for the years 2017-2020 and 1.13 for the rest of the years., according to EQ66.

$$RelativeProjectImpact_{DF}(t) = \sum_{d=1}^{nrDrivers} RelativeDriverImpact_{DF}(t,d) \quad [EQ66]$$

The deforestation rate in the project scenario is obtained multiplying the deforestation rate in the baseline scenario because of the relative impact on the project, according to EQ68.

$$D_{projectArea,projectScenario,DF}(t) = RelativeProjectImpact_{DF}(t) \cdot D_{projectArea,baselineScenario,DF}(t) \quad \text{[EQ68]}$$

For calculation of the Relative Project Impact, the value was set to 1 when the result obtained from equation 66 was higher than that (see (Appendix 16: Deviation to derive the Relative Impact of the Project Scenario). Also, Equation 68 of methodology VM0006 was modified to allow a better understanding of the deforestation in the project scenario.

Table 3.36. Absolute deforestation rate in hectares per year in the project area in the project scenario

Year	Absolute rate of deforestation in project area [ha/year]
2017	0.00
2018	0.00
2019	0.00
2020	0.00
2021	0.00
2022	0.00
2023	0.00
2024	0.00
2025	0.00
2026	0.00

Determining long-term average carbon stock

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

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 for 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):

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

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

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

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

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

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

Table 3.37. Statistical parameters of above-ground biomass (AGB) and below-ground biomass (BGB)

Parameter	Average [t/ha]	Standard deviation	Sample size	Confidence Level	Degrees of freedom	Standard error	HCWI (OM)
AGB	295.41	11.02	119	95%	118	1.01	1.68
BGB	77.27	2.88	119	95%	3.73	118	0.26

According to EQ21 $CE_{inventory}(i)$ is equal to 0.005, 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 0.32 tCO_2/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 tCO_2 is 5.68. Calculations are more detailed in "Net Carbon and VCU" Excel workbook, sheet "10".

Table 3.38. Long-term average carbon stock density in harvested areas

$LTAC_{harvest}$: Long term average density in harvest zones. [tCO_2e ha-1]	**Year**	**$C_{harvest}(t,i)$: Carbon density in harvest zone by time and harvest area**
729.64	2017	683.01
	2018	687.04
	2019	687.30
	2020	690.96
	2021	693.30
	2022	695.65
	2023	697.99
	2024	700.34
	2025	702.69
	2026	705.03

Calculate emissions or sinks on land on which harvesting activities are implemented

$$\Delta C_{areaWithHarvest}(t) = \sum_{i=1}^{nrStrata} area_{projectAreaWithHarvest,projectScenario}(t,i) \cdot \left(\frac{C_{harvest}(t_2,i) - C_{harvest}(t_1,i)}{t_2 - t_1}\right) \cdot u_{inventory,harvest}(i) - \sum_{i=1}^{nrFNFtransitions} \sum_{tt=1}^{t} \left(\begin{array}{c} u_{classification} \cdot u_{transition}(i) \\ \cdot \Delta area_{projectAreaWithHarvet,baselineScenario}(t,i) \\ \cdot \left(EF_{AGL}(i) + EF_{AGD}(i,t-tt) + EF_{BG}(i,t-tt) + EF_{SOM}(i,t-tt)\right) \end{array} \right) - \sum_{i=1}^{nrStrataTransitions} \sum_{tt=1}^{t} \left(\begin{array}{c} u_{stratification} \cdot u_{transition}(i) \\ \cdot \Delta area_{projectAreaWitHarvest,baselineScenario}(t,i) \\ \cdot \left(EF_{AGL}(i) + EF_{AGD}(i,t-tt) + EF_{BG}(i,t-tt) + EF_{SOM}(i,t-tt)\right), \end{array} \right) \quad \text{[EQ80]}$$

Developed in section 3.2.4.

3.2.3 Leakage

The location of the project area and the reference region, in the department of Madre de Dios is as follows:

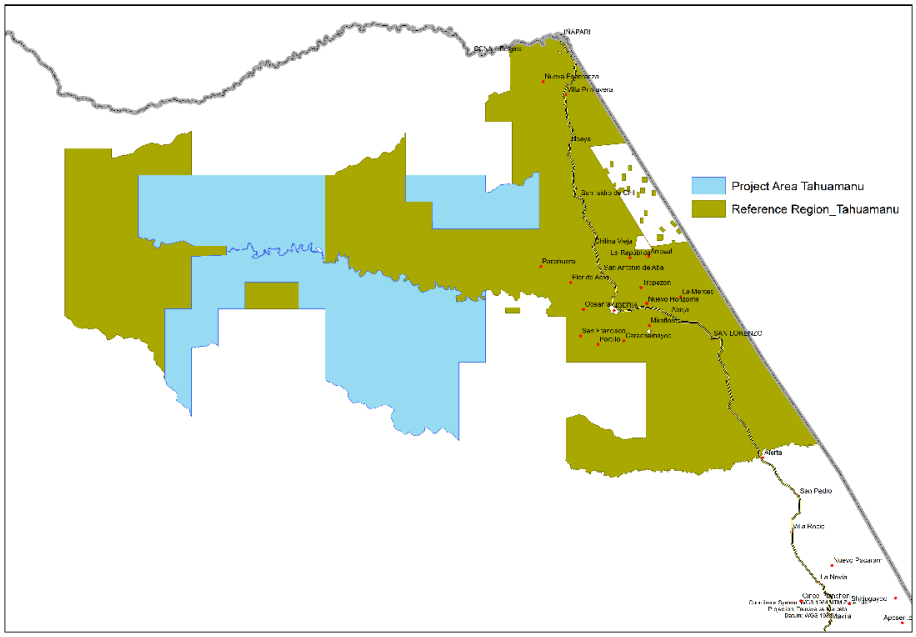


Figure 3.15. Project area and reference region location

To the north side we have the Maderyja and Maderacre project area, while to the south we have the Bozovich project area, as shown in the following image:

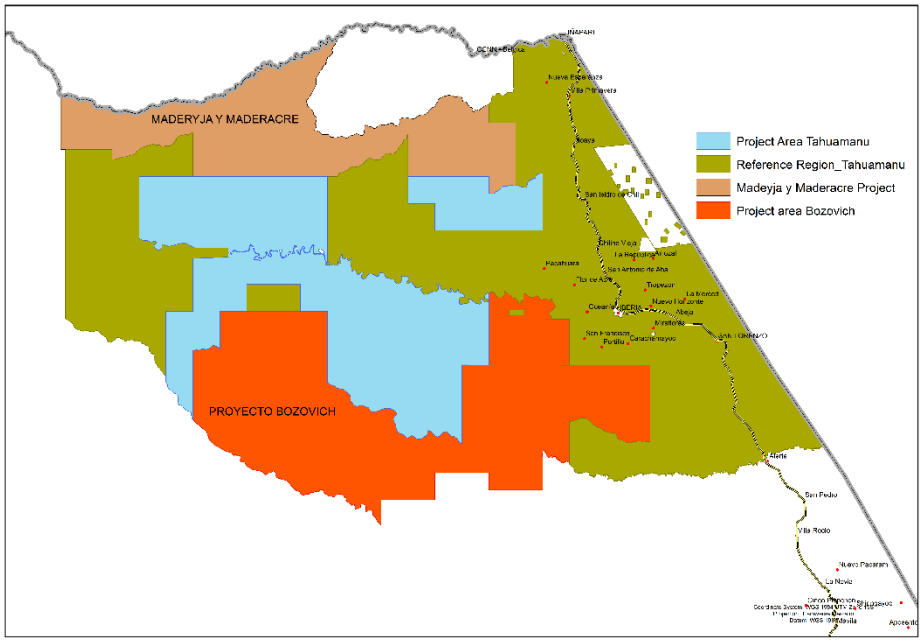


Figure 3.16. Other conservation efforts near the project area

While, to the west, we have the lands destined for Indigenous Peoples in Isolation and Initial Contact - PIACI:

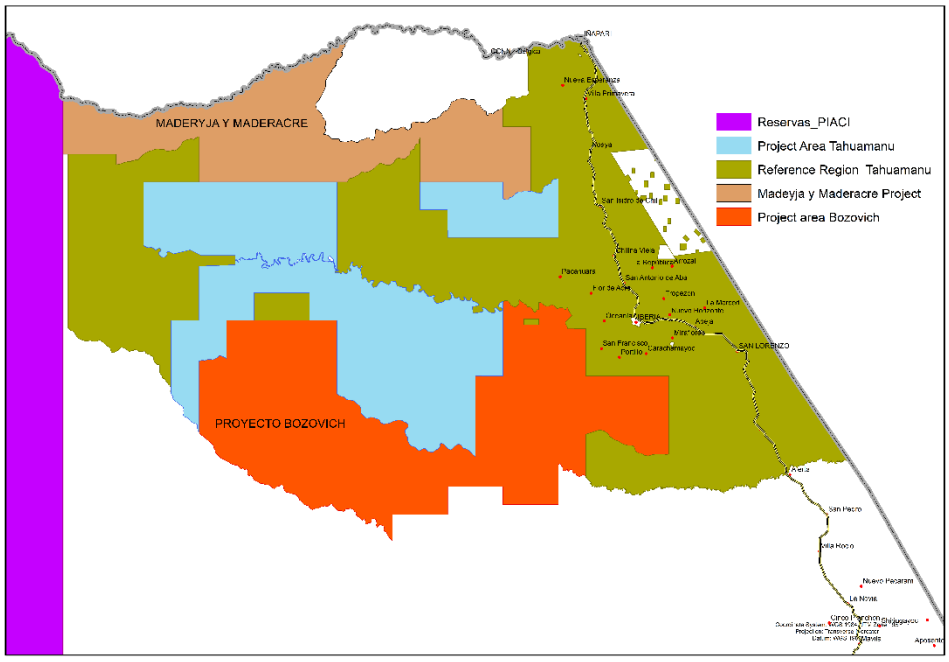


Figure 3.17. PIACI areas near the project area

Given the scarce free space that this scenario leaves us, and since the leakage belts of the projects should not overlap the project areas, according to experience in the matter and that the only area available respecting the minimum 250,000 ha of the reference region is close to 5 km, they leave us, as the only spatial option, the creation of a buffer area around the Tahuamanu project area of 5 km, without there being any type of overlap with neighboring project areas.

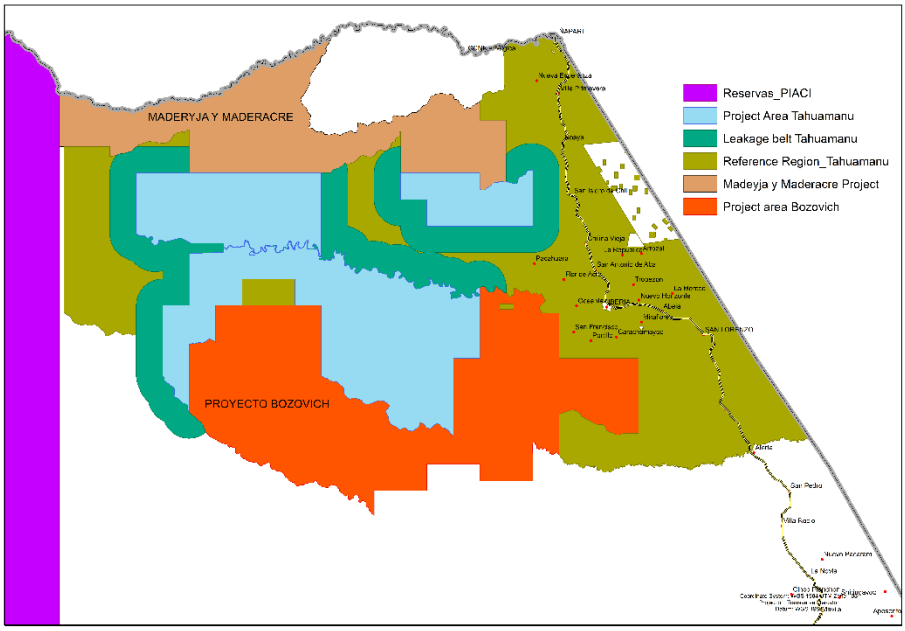


Figure 3.18. Delimitation of leakage area using a buffer

Finally, the spatial occupation scenario of the department of Madre de Dios is configured as follows:

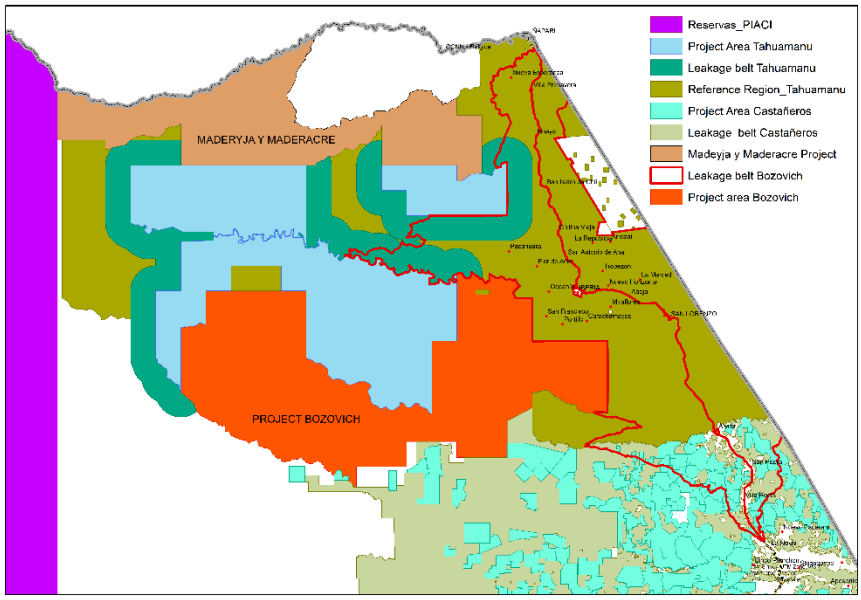


Figure 3.19. Complete spatial occupation scenario

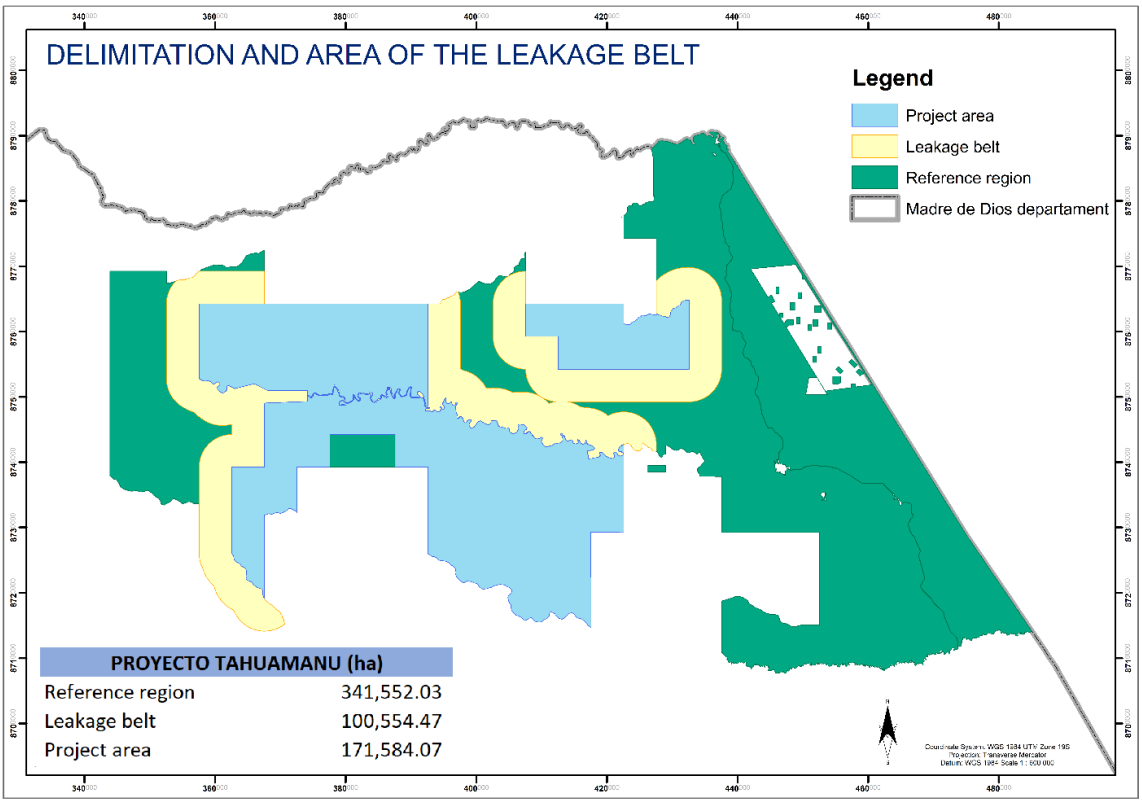


Figure 3.20. Delimitation and area of the leakage belt

Then, for the leakage cancellation rate:

Table 3.39. Level of engagement per community and main activities

Community	Level of Engagement	Families	Cropland	Grazing	Logging
San Francisco de Asis	100%	38	●	●	
Flor de Acre	50%	60		●	●
Oceania	100%	38	●	●	
La República	100%	21	●	●	
Chilina Vieja	100%	23		●	
San Antonio de Abad	100%	37		●	
San Isidro de Chilina	100%	35	●		
Noaya	100%	4		●	
Arca Pacahuara	0%	428	●	●	
Villa Primavera	100%	25	●	●	
Nueva Esperanza	100%	10		●	
Bélgica	100%	37	●		

The assumptions are:

- The project has a good communication and relationships with most of the surrounding communities, as they already work with them and provide different kind of support (education, health, others). This ensures that those communities will easily engage in adopting sustainable land use practices with the technical and financial support of MADERACRE.
- Arca Pacahuara is a religious community, strongly convinced that God has ordered to work the land and the work they know are mainly agriculture (corn production). They are a close community. MADERACRE has been able to access but we do not expect to obtain significant results in adopting sustainable practices. The strategy with them is strengthening the surveillance of forest boundaries. We will assume that these combined actions will reduce the expansion interest of Arca Pacahuara from 100% to 50%.
- Flor de Acre, on the other side, has close relationships with Arca Pacahuara but, in some sense, they are not so a close community, so the project expects to have some impact there.
- Grazing and crops are present in most of the communities with different weights. A table calculating the area dedicated to each activity in each community may be found in the baseline survey.
- To estimate the leakage factor cancellation, we will assume that no expansion is allowed but there is a risk that, in the case of Arca Pacahuara, it will occur in the project scenario in the case of croplands at a rate of 50%. Δ Area allowed = 0.
- To estimate the percentage of impact in the whole cropland leakage cancellation factor of this null level of engagement, we must multiply by the weight of Arca Pacahuara, compared to the other communities. According to baseline survey, Arca Pacahuara has 57% of the total families of the 12 surrounding communities. For this reason, we will use a weight of 28.5% (50% of 57%).

Summarizing:

Table 3.40. Weight of each community in terms of number of families

Community	Weight [number of families in the community / total families]	%
San Francisco de Asís	38	5%
Flor de Acre	60	8%
Oceanía	38	5%
La República	21	3%
Chilina Vieja	23	3%

Community	Weight [number of families in the community / total families]	%
San Antonio de Abad	37	5%
San Isidro de Chilina	35	5%
Noaya	4	1%
Arca Pacahuara	428	57%
Villa Primavera	25	3%
Nueva Esperanza	10	1%
Bélgica	37	5%

Based on those assumptions, we have calculated the Δ(Area) in project scenario, for each driver of deforestation:

Table 3.41. Leakage cancellation rate - cropland

Community \Code	Participation	Weight	Level of Engagement	Discount Factor thanks to PM-BPP	Final rate
	P	W	LE	DF	If P = Yes, W * (1-LE) * DF If P= No, 0
San Francisco de Asis	Yes	5%	100%	N.A.	0%
Flor de Acre	Yes	8%	50%	N.A.	0%
Oceanía	Yes	5%	100%	N.A.	0%
La República	Yes	3%	100%	N.A.	0%
Chilina Vieja	Yes	3%	100%	N.A.	0%
San Antonio de Abad	Yes	5%	100%	N.A.	0%
San Isidro de Chilina	Yes	5%	100%	N.A.	0%
Noaya	Yes	1%	100%	N.A.	0%
Arca Pacahuara	No	57%	0%	50%	28.5%
Villa Primavera	Yes	3%	100%	N.A.	0%
Nueva Esperanza	Yes	1%	100%	N.A.	0%
Bélgica	Yes	5%	100%	N.A.	0%

The sum is 28.5% which must be multiplied by the area expected to be changed in the baseline scenario to estimate the Δ(Area) in project scenario for cropland.

Grazing (applying the same formulae than cropland because, in the methodology, grazing is within the forest causing mostly degradation at 95%, while in the project zone, grazing cause deforestation)

Table 3.42. Leakage cancellation rate – pastures

Community \Code	Participation	Weight	Level of Engagement	Discount Factor thanks to PM-BPP	Final rate
	P	W	LE	DF	If P = Yes, W * (1-LE) * DF If P= No, 0
San Francisco de Asis	Yes	5%	100%	N.A.	0%
Flor de Acre	Yes	8%	50%	N.A.	0%

Community \Code	Participation	Weight	Level of Engagement	Discount Factor thanks to PM-BPP	Final rate
	P	W	LE	DF	If P = Yes, W * (1-LE) * DF If P= No, 0
Oceanía	Yes	5%	100%	N.A.	0%
La República	Yes	3%	100%	N.A.	0%
Chilina Vieja	Yes	3%	100%	N.A.	0%
San Antonio de Abad	Yes	5%	100%	N.A.	0%
San Isidro de Chilina	Yes	5%	100%	N.A.	0%
Noaya	Yes	1%	100%	N.A.	0%
Arca Pacahuara	No	57%	0%	50%	28.5%
Villa Primavera	Yes	3%	100%	N.A.	0%
Nueva Esperanza	Yes	1%	100%	N.A.	0%
Bélgica	Yes	5%	100%	N.A.	0%

The sum is 28.5% which must be multiplied by the area expected to be changed in the baseline scenario to estimate the Δ(Area) in project scenario for pastures.

Domestic Timber

Only Flor de Acre extracts timber for domestic uses and as this community is engaged with the project so the risk of leakage will be assumed 0.

Infrastructure

No projections of new roads have been used to project changes in the baseline scenario to calculate the forest loss area so the value is 0.

Summarizing:

Table 3.43. Leakage factor cancellation – all the drivers

Drivers	Rate
Cropland	28.5%
Settlement	N.A.
Infrastructure	N.A.
Fuel Wood	N.A.
Understory vegetation	N.A.
Domestic Timber	0
Grazing	28.5%

Leakage belt: 100,554.47 ha.

The leakage cancelation rate to avoid deforestation caused by conversion of forest lands in croplands was obtained from EQ85.

$$leakage_{constrained}(cropland\ conversion\ by\ participating\ communities) = \frac{\Delta area_{cropLand,project} - \Delta area_{cropLand,allowed}}{\Delta area_{cropLand,baseline} - \Delta area_{cropLand,allowed}} \quad [EQ85]$$

Where:

$leakage(cropland\ conversion)$	=	Leakage cancellation rate for avoiding deforestation/degradation due to conversion of forest land to settlements. [-]
$\Delta area_{cropLand,baseline}$	=	Area that would be converted to cropland by participating communities under the baseline scenario. [ha yr^{-1}]
$\Delta area_{cropLand,project}$	=	Area that will be converted to cropland by participating communities under the project scenario after reduction in demand for cropland conversion. [ha yr^{-1}]
$\Delta area_{cropLand,allowed}$	=	Area that will be converted to cropland within the project area under the project scenario as defined in the management plan or project document. [ha yr^{-1}]

Table 3.44. Land use transitions area

$\Delta area_{(pasture,baseline)}$: Forest area converted from forest stratum "i" to pasture at the beginning of the crediting period [ha/year]	**$\Delta area_{(pasture,project)}$: Area that will be converted to pasture by the communities participating in the project scenario after the reduction of the demand for conversion of cropland [ha/year]**	**$\Delta area_{(pasture,allowed)}$: Area to be converted to pasture within the project area in the project scenario as defined in the management plan or project document [ha/year]**
2,089.17	595.41	0.00
2,354.31	670.98	0.00
2,641.41	752.80	0.00
2,951.19	841.09	0.00
3,283.65	935.84	0.00
3,637.89	1,036.80	0.00
4,012.02	1,143.43	0.00
4,403.79	1,255.08	0.00
4,809.33	1,370.66	0.00
5,224.41	1,488.96	0.00

With the $\Delta area_{(pasture,baseline)}$, $\Delta area_{(pasture,project)}$ and $\Delta area_{(pasture,allowed)}$ in the table above, we obtain the leakage cancellation rate ($Leakage_{(pasture\ conversion)}$) valued in 0.29.

The total relative impact of leakage in reduction of GHG emissions due to project activities ($RelativeLeakageImpact_{DF}(t)$), according to EQ83 is obtained multiplying the leakage cancellation rate with the relative driver impact. In this case, we obtain a value within 0.31 - 0.39.

$$RelativeLeakageImpact_{DF}(t) = \sum_{d=1}^{nrCDrivers} leakage_{constrained}(d) \cdot RelativeDriverImpact_{DF}(t,d) \quad \text{[EQ83]}$$

With these data, we obtain the induced increase in leakage from deforestation rate in leakage area (EQ95 and EQ97).

$$D_{leakageArea,baselineScenario,DF}(t) = D_{projectArea,baselineScenario,DF}(t)\frac{size_{leakageArea}}{size_{projectArea}} \quad \text{[EQ95]}$$

$$D_{leakageArea,projectScenario,DF}(t) = \Delta D_{LK,DF}(t) + D_{leakageArea,baselineScenario,DF}(t) \quad \text{[EQ97]}$$

Table 3.45. Deforestation rate in leakage area

Year	Carbon emissions from deforestation in leakage area during year t (t CO_2e/year)	$D_{leakageArea,projectScenario,DF}^{(t)}$: Deforestation rate in leakage area under the project scenario in time t of crediting period [ha/year]	$D_{leakageArea,baselinetScenario,DF}^{(t)}$ Reference deforestation rate in leakage area at time t of crediting period [ha/year]	$\Delta D_{LK,DF}$: Induced increasing deforestation rates by leakage during year t of crediting period [ha/year]
2017	-997,895.14	1,867.02	1,224.33	642.69
2018	-1,124,539.65	2,103.96	1,379.71	724.25
2019	-1,261,673.39	2,360.54	1,547.96	812.57
2020	-1,409,640.27	2,637.38	1,729.50	907.87
2021	-1,591,849.33	2,978.28	1,924.34	1,053.94
2022	-1,763,577.96	3,299.58	2,131.94	1,167.64
2023	-1,944,948.87	3,638.91	2,351.19	1,287.73
2024	-2,134,871.31	3,994.25	2,580.78	1,413.47
2025	-2,331,469.18	4,362.08	2,818.44	1,543.64
2026	-2,720,347.74	5,089.65	3,061.69	2,027.96

3.2.4 Net GHG Emission Reductions and Removals

A. Estimate change in carbon stocks in the long-lived wood product pool

a.1. Calculate carbon in harvested wood products

Table 3.46. Carbon in harvested wood products

Year	$C_{HWP,project}$(ty,t): Total carbon stocks in harvested wood products within the project boundary, at harvest [t C] Annual average	$C_{HWP,\ baseline}$(ty,t):Total carbon stocks in harvested wood products within the limits of the reference scenario, at harvest. [t C] Annual average

2017	18,644.84	18,644.84
2018	10,567.72	10,567.72
2019	17,857.23	17,857.23
2020	6,695.81	6,695.81
2021	13,441.40	13,441.40
2022	13,441.40	13,441.40
2023	13,441.40	13,441.40
2024	13,441.40	13,441.40
2025	13,441.40	13,441.40
2026	13,441.40	13,441.40

a.2. Calculate the carbon in long-lived wood products

Table 3.47. Carbon in long-lived wood products

Year	$C_{LWP,project}$(t): carbon in long-lived wood products within the project [t C]	$C_{LWP,baseline}$(t): carbon in long-lived wood products under the reference scenario [t C]
2017	1,700.41	1,700.41
2018	963.78	963.78
2019	1,628.58	1,628.58
2020	610.66	610.66
2021	1,225.86	1,225.86
2022	1,225.86	1,225.86
2023	1,225.86	1,225.86
2024	1,225.86	1,225.86
2025	1,225.86	1,225.86

a.3. Calculate net change in carbon in long-lived wood products

Table 3.48. Net change in carbon in long-lived wood products

Year	ΔC_{LWP}(t): Net change in carbon stocks in long-lived wood products during year t [tCO_{2e}]
2017	0.00
2018	0.00
2019	0.00
2020	0.00
2021	0.00
2022	0.00
2023	0.00
2024	0.00
2025	0.00

B. Summarize the projected land use change

Table 3.49. Total deforestation rates under the baseline and project scenarios for the project area and leakage area for every year of the project duration.

Year	Deforestation rate in the baseline scenario in the project area (ha)	Deforestation rate in the project scenario in the project area (ha)	Deforestation rate in the baseline scenario in the leakage area (ha)	Deforestation rate in the project scenario in the leakage area (ha)
2017	2,089.17	0.00	1,224.33	1,867.02
2018	2,354.31	0.00	1,379.71	2,103.96
2019	2,641.41	0.00	1,547.96	2,360.54
2020	2,951.19	0.00	1,729.50	2,637.38
2021	3,283.65	0.00	1,924.34	2,978.28
2022	3,637.89	0.00	2,131.94	3,299.58
2023	4,012.02	0.00	2,351.19	3,638.91
2024	4,403.79	0.00	2,580.78	3,994.25
2025	4,809.33	0.00	2,818.44	4,362.08
2026	5,224.41	0.00	3,061.69	5,089.65

Table 3.50. LULC class and forest-strata specific land transitions for the project and leakage area under the baseline and project scenarios

Year	Forest land to pasture in the baseline scenario in the project area [ha]	Forest land to pasture in the baseline scenario in the leakage belt [ha]	Forest land to pasture in the project scenario in the project area [ha]	Forest land to pasture in the project scenario in the leakage belt [ha]
2017	2,089.17	1,224.33	0.00	1,867.02
2018	2,354.31	1,379.71	0.00	2,103.96
2019	2,641.41	1,547.96	0.00	2,360.54
2020	2,951.19	1,729.50	0.00	2,637.38
2021	3,283.65	1,924.34	0.00	2,978.28
2022	3,637.89	2,131.94	0.00	3,299.58
2023	4,012.02	2,351.19	0.00	3,638.91
2024	4,403.79	2,580.78	0.00	3,994.25
2025	4,809.33	2,818.44	0.00	4,362.08
2026	5,224.41	3,061.69	0.00	5,089.65

- Leakage from Geographically Unconstrained Drivers is not considered.
- Net GHG benefits from ANR is not considered.

Table 3.51. Net GHG benefits from harvested wood products pool.

Year	$\Delta C_{LWP}(t)$: Net change in carbon stocks in long-lived wood products during year t [t CO_2]
2017	0.00
2018	0.00
2019	0.00

Year	ΔC_{LWP}(t): Net change in carbon stocks in long-lived wood products during year t [t CO_2]
2020	0.00
2021	0.00
2022	0.00
2023	0.00
2024	0.00
2025	0.00

- Net GHG benefits from fuel-efficiency activities is not considered.
- Net GHG benefits from areas subject of harvest activities.

Table 3.52. Density of carbon stocks in harvested areas

Year	$\Delta C_{areaWithHarvest}(t)$: Density of carbon stocks in harvested areas in stratum ii in year t. [tCO_2/ha]
2017	121,653.37
2018	177,466.49
2019	143,637.76
2020	139,511.90
2021	185,727.88
2022	202,025.56
2023	219,238.33
2024	237,262.68
2025	255,920.54
2026	275,017.32

C. Test the significance of GHG emissions

No emissions sources are being claimed as de-minimis and therefore significance cannot be tested.

D. Estimate ex-ante Net Emission Reductions

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

Table 3.53. 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 +

Net Emission Reductions (NERs)	=
+ 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

ΔGHG from avoided deforestation:

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

Uclassification, Utransition and emission factors was used in section 3.2.1 of the PD, for all equations. 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 3.54. ΔGHG from avoided deforestation excluding ANR and harvest areas

Year	1	$\Delta area_{projectAreaEAH,projectScenario}(i)$ Hectares in transition within project zone, excluding RNA and harvest areas, under project scenario during year t	$\Delta area_{projectAreaEAH,baselineScenario}(i)$ Hectares in transition within project zone, excluding RNA and harvest areas, under baseline scenario during year t
2017	1,041,457.71	0.00	1,948.52
2018	1,087,126.85	0.00	2,033.97
2019	1,312,319.37	0.00	2,455.29
2020	1,466,225.91	0.00	2,743.24
2021	1,603,992.44	0.00	3,001.00
2022	1,777,031.06	0.00	3,324.75
2023	1,959,785.53	0.00	3,666.67
2024	2,151,156.75	0.00	4,024.72
2025	2,349,254.32	0.00	4,395.35
2026	2,552,011.98	0.00	4,774.70

ΔGHG from deforestation due to leakage:

$$❷ = \sum_{i=1}^{nrFNFtransitions} \sum_{tt=1}^{t} u_{classification} \cdot u_{transition}(i) \cdot \left(\frac{+\Delta area_{leakageArea,projectScenario}(t,i)}{-\Delta area_{leakageArea,baselineScenario}(t,i)} \right) \cdot \left(EF_{AGL}(i) + EF_{AGD}(i,t-tt) + EF_{BG}(i,t-tt) + EF_{SOM}(i,t-tt) \right) \quad \text{[EQ108]}$$

$\Delta area_{leakageArea,projectScenario,DF}^{(t)}$: 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 3.55. ΔGHG from deforestation due to leakage

Year	2	$\Delta area_{leakageArea,projectScenario,DF}^{(t)}$	$\Delta area_{leakageArea,baselineScenario,DF}^{(t)}$
2017	-343,508.79	1,866.96	1,224.27
2018	-387,138.88	2,104.02	1,379.70
2019	-434,280.54	2,360.52	1,548.00
2020	-485,222.40	2,637.36	1,729.53
2021	-563,342.86	2,978.28	1,924.29
2022	-624,097.88	3,299.58	2,131.92
2023	-688,220.17	3,638.88	2,351.25
2024	-755,517.29	3,994.29	2,580.75
2025	-825,027.19	4,362.03	2,818.44
2026	-1,083,921.51	5,089.68	3,061.71

ΔGHG from avoided degradation:

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

It is equivalent to 0.00.

ΔGHG from degradation due to leakage: [EQ110]

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

It is equivalent to 0.00.

ΔGHG from leakage by unconstrained geographic drivers:

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

It is equivalent to 0.00.

ΔGHG from assisted natural regeneration:

$$❻ = C_{ANR}(t) \quad [EQ112]$$

It equals to 0.00.

ΔGHG from changes in long-lived wood products:

$$❼ = \frac{44}{12} \cdot \left(C_{LWP,project}(t) - C_{LWP,baseline}(t) \right) \quad [EQ113]$$

$C_{LWP,project}(t)$: 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]

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

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

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.

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

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

where:

$C_{HWP,project}(ty,t)$ and $C_{HWP,baseline}(ty,t)$	=	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]
$DT_{project}(h,j,ty,t)$, $DT_{baseline}(h,j,ty,t)$, $CT_{project}(h,j,ty,t)$ $CT_{baseline}(h,j,ty,t)$	=	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].
$\rho_{wood,j}$	=	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 the $CT_{baseline}$ *and CTproject*, it was utilized the values provided by the consolidated MADERACRE, according to the extractions that it has been carrying out from 2017 to 2020, obtaining the volume of wood extracted annually from each species harvested in m3 / year.

The *CHWPproject* and CHWP,baseline were calculated 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 *CHWpproject* 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 3.56. Carbon content in harvested wood products within project area (2017)

$C_{HWP,project}(ty,t)$ Total carbon content in harvested wood products within project boundaries [t 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. [t d.m./m^3]
892	2,549.343	*Apuleia leiocarpa*	0.70
1,504	4,854.056	*Hymenaea oblongifolia*	0.62
17	82.588	*Swietenia macrophylla*	0.43
61	165.673	*Calycophyllum spruceanum*	0.74
1,711	4,389.258	*Myroxylon balsamum*	0.78
815	3,795.113	*Amburana cearensis*	0.43
734	1,688.302	*Manilkara bidentate*	0.87
12,823	27,578.268	*Dipteryx odorata*	0.93
82	179.763	*Tabebuia serratifolia*	0.92

The total net variation of the carbon content in wood products in the long term in 2017 -2020 is found in the following table, the average of this term was used for the following years 2021-2026.

Table 3.57. ΔGHG from changes in long-lived wood products tCO_2

Year	7
2017	0.00
2018	0.00
2019	0.00
2020	0.00
2021	0.00
2022	0.00
2023	0.00
2024	0.00
2025	0.00
2026	0.00

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

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

It is 0.00.

ΔGHG from other and secondary sources:

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

It is 0.00.

ΔGHG from avoided deforestation and degradation from areas under harvest [EQ116]

In case:

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

$$❿ = 0$$

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

$$\sum_{i=1}^{nrStrata} area_{projectAreaWithHarvest,projectScenario}(t,i) \cdot \left(\frac{C_{harvest}(t_2,i) - C_{harvest}(t_1,i)}{t_2 - t_1}\right) \cdot u_{inventory,harvest}(i)$$

$$- \sum_{i=1}^{nrFNFtransitions} \sum_{tt=1}^{t} \left(\begin{array}{c} u_{classification} \cdot u_{transition}(i) \\ \cdot \Delta area_{projectAreaWithHarvet,baselineScenario}(t,i) \\ \cdot \left(EF_{AGL}(i) + EF_{AGD}(i,t-tt) + EF_{BG}(i,t-tt) + EF_{SOM}(i,t-tt)\right) \end{array} \right)$$

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

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

Table 3.58. Size of strata "*ii*" within the project area with harvest activities during year "*tt*" under the project scenario

Year	$area_{projectAreaWithHarvest,projectScenario}(t,i)$
2017	11,551.45
2018	23,346.86
2019	12,090.06
2020	12,090.06
2021	14,769.61
2022	14,769.61
2023	14,769.61
2024	14,769.61

Year	$area_{projectAreaWithHarvest,projectScenario}(t,i)$
2025	14,769.61
2026	14,769.61

$area_{projectAreaWithHarvest,baselineScenario}(t,i)$: 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 3.59. 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
2017	140.65
2018	320.34
2019	186.12
2020	207.95
2021	282.65
2022	313.14
2023	345.35
2024	379.07
2025	413.98
2026	449.71

$u_{stratification}$ is equivalent to 0.75 and $u_{inventory,harvest}(i)$ to 1.

According to EQ80, $\Delta C_{areaWithHarvest}(t)$ for every year is:

Table 3.60. Carbon density in harvest zones in stratum *ii* in year *t*

Year	10: [tCO_2]
2017	121,653.37
2018	177,466.49
2019	143,637.76
2020	139,511.90
2021	185,727.88
2022	202,025.56
2023	219,238.33
2024	237,262.68
2025	255,920.54
2026	275,017.32

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

With project crediting period (T) of 40 years, the LTACharvest is 787.68 tCO2e $ha^{-1.}$

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 3.61. Net GHG emissions reductions tCO_2

Year	NERs	1	2	7	10
2017	819,602.00	1,041,457.71	-343,508.79	0.00	121,653.37
2018	877,454.00	1,087,126.85	-387,138.88	0.00	177,466.49
2019	1,021,676.00	1,312,319.37	-434,280.54	0.00	143,637.76
2020	1,120,515.00	1,466,225.91	-485,222.40	0.00	139,511.90
2021	1,226,377.00	1,603,992.44	-563,342.86	0.00	185,727.88
2022	1,354,958.00	1,777,031.06	-624,097.88	0.00	202,025.56
2023	1,490,803.00	1,959,785.53	-688,220.17	0.00	219,238.33
2024	1,632,902.00	2,151,156.75	-755,517.29	0.00	237,262.68
2025	1,780,147.00	2,349,254.32	-825,027.19	0.00	255,920.54
2026	1,743,107.00	2,552,011.98	-1,083,921.51	0.00	275,017.32

$$\text{Verified Carbon Units} = \text{NERs} - buffer \cdot (❶ + ❸ + ❻ + ❼ + ❿) \qquad \text{[EQ106]}$$

Table 3.62. Verified carbon units (VCUs)

Year	VCU	NER	Buffer	1	7	10
2017	**703,290**	819,602	0.1	1,041,457.71	0.00	121,653.37
2018	**750,994**	877,454	0.1	1,087,126.85	0.00	177,466.49
2019	**876,080**	1,021,676	0.1	1,312,319.37	0.00	143,637.76
2020	**959,941**	1,120,515	0.1	1,466,225.91	0.00	139,511.90
2021	**1,047,404**	1,226,377	0.1	1,603,992.44	0.00	185,727.88
2022	**1,157,052**	1,354,958	0.1	1,777,031.06	0.00	202,025.56
2023	**1,272,900**	1,490,803	0.1	1,959,785.53	0.00	219,238.33
2024	**1,394,060**	1,632,902	0.1	2,151,156.75	0.00	237,262.68
2025	**1,519,629**	1,780,147	0.1	2,349,254.32	0.00	255,920.54
2026	**1,460,404**	1,743,107	0.1	2,552,011.98	0.00	275,017.32

3.3 Monitoring

3.3.1 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:	Default value of 0.5
Value applied:	0.50 (Tropical region; wood, tree d ≥ 10 cm)
Justification of choice of data or	According to the Vm0006, the default value is 0.5 Mg C $(Mg\ DM)^{-1.}$

description of measurement methods and procedures applied:	
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]:	sc_1
Data unit:	[-]
Description:	First shape factor for the forest scarcity equation; steepness of the decrease in deforestation rate (greater is steeper).
Sources of data:	See Appendix 14
Value applied:	-15.06
Comments:	-

Data/parameter [EA7]:	sc_2
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:	See Appendix 14
Value applied:	0.6683

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 $ssee$. 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 $ssee$, 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 sawnwood, woodbased 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 $ssee$.
Sources of data:	See Table 19 (Winjum et al. 1998)
Value applied:	0.85 for being Sawnwood 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]:	$\rho_{wood,j}$
Data unit:	[Mg DM m^{-3}]
Description:	Average basic wood density of species or species group RR
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
Value applied:	*Apuleia leiocarpa* 0.7 *Hymenaea oblongifolia* 0.62 *Swietenia macrophylla* 0.43 *Calycophyllum spruceanum* 0.74 *Myroxylon balsamum* 0.78 *Amburana cearensis* 0.43 *Manilkara bidentata* 0.87 *Dipteryx odorata* 0.93 *Tabebuia serratifolia* 0.92
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.

3.3.2 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 applied	$Size_{projectArea}$: 171,584.08 $Size_{leakageArea}$: 100,554.47 $Size_{ReferenceRegion}$: 341,552.03 $Size_{ReferenceForest}$: 286,356.23
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 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	-

Data/parameter [MN2]:	$\Delta area_{projectAreaEAH,projectScenario}(t, i)$
Data unit	[ha yr^{-1}]
Description	Hectares undergoing transition ii within the project area, excluding ANR and harvest areas, under the project scenario

	during year ss. [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 applied	$\Delta area_{projectAreaEAH,projectScenario}(t, i)$ 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
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 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	-

Data/parameter [MN3]:	$\Delta area_{projectAreaEAH,BaselineScenario}(t, i)$
Data unit	[ha yr^{-1}]
Description	Hectares undergoing transition ii within the project area, excluding the ANR area, and harvest areas, under the baseline scenario for year ss.
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 applied	((171584.075109-(11848.94))/171584.075109 *$D_{projectAreabaselineScenario.DF^{(t)}}$)

$\Delta area_{projectAreaEAH,BaselineScenario}(t, i)$
1,948.52
2,033.97
2,455.29
2,743.24
3,001.00
3,324.75
3,666.67
4,024.72
4,395.35
4,774.70

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 data	Calculation of baseline emissions; Determination of baseline scenario
Calculation method	Multiplication of number of pixels (30m by 30m) in each region by 0.09 hectares pixel-1 for area in hectares.
Comments	-

Data/parameter [MN4]:	$\Delta areaprojectAreaWithANR,baselineScenario(t, i)$
Data unit	[ha yr^{-1}]
Description	Hectares undergoing transition i within the leakage area under the project scenario for year t
Source of data	Land-use change modeling
Measurement procedures:	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.
Value applied	N/A
QA/QC procedures to be applied	-

Comments	Not applicability 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 ii within the leakage area under the project scenario for year ss
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 applied	
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 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	-

Year	$D_{leakageArea,projectScenario}^{(t,i)}$
2017	1,867.02
2018	2,103.96
2019	2,360.54
2020	2,637.38
2021	2,978.28
2022	3,299.58
2023	3,638.91
2024	3,994.25
2025	4,362.08
2026	5,089.65

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 applied	

Year	$D_{leakageArea,baselineScenario}^{(t,i)}$
2017	1,224.33
2018	1,379.71
2019	1,547.96
2020	1,729.50
2021	1,924.34
2022	2,131.94
2023	2,351.19
2024	2,580.78
2025	2,818.44
2026	3,061.69

Monitoring equipment	Software GIS, imágenes Landsat
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 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	-

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 applied	

Year	Forest to Pasture
2017	673.64
2018	818.57
2019	991.70
2020	1,196.98
2021	1,437.40
2022	1,713.24
2023	2,019.89
2024	2,350.18

	2025: 2,701.91 2026: 3,079.11
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 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	-

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 applied	

Year	Forest to Pasture
2017	302,665.21
2018	301,846.64
2019	300,854.94
2020	299,657.96
2021	298,220.56
2022	296,507.33
2023	294,487.43
2024	292,137.25
2025	289,435.34
2026	286,356.23

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 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	-

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	No firebreaks created.
Frequency of monitoring/recording	At least once before verification
Value applied	N/A
QA/QC procedures to be applied	-
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
Measurement procedures:	-
Frequency of monitoring/recording	At least once before verification
Value applied	N/A
QA/QC procedures to be applied	-
Comments	Not applicable because biomass loss for creating firebreaks not included in project activity

Data/parameter [MN12]:	$areafireBiomassLoss,ANR(t, i)$
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	-
Frequency of monitoring/recording	At least once before verification
Value applied	N/A
QA/QC procedures to be applied	-
Comments	Not applicability because ANR not included in project activity

Data/parameter [MN13]:	$areaprojectAreaWithANR,projectScenario(t, i)$
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	-
Frequency of monitoring/recording	At least once before verification
Value applied	N/A
QA/QC procedures to be applied	-

Comments	Not applicability 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	Project Description or Forest/Harvest Management Plan
Description of measurement methods and procedures to be applied	Forest analysis described in FMP
Frequency of monitoring/recording	At least once before verification
Value applied	

Year	$Area_{harvest}(t, foresti)$
2017	11,551.45
2018	23,346.86
2019	12,090.06
2020	12,090.06
2021	14,769.61
2022	14,769.61
2023	14,769.61
2024	14,769.61
2025	14,769.61
2026	14,769.61

Monitoring equipment	GPS
QA/QC procedures to be applied	Every 5 years in the general forest management plan, and annual operational plans.
Purpose of 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	-

Data/parameter [MN15]:	$Area_{projectAreawithHarvest,ProjectScenario}(t, i)$
Data unit	[ha yr^{-1}]
Description	Size of strata ii within the project area with harvest activities during year ss under the project scenario.
Source of data	Forest/Harvest Management Plan
Description of measurement methods and procedures to be applied	Forest analysis described in FMP
Frequency of monitoring/recording	At least once before verification
Value applied	

Year	$Area_{harvest}(t, i)$
2017	11,551.45
2018	23,346.86

	2019: 12,090.06 2020: 12,090.06 2021: 14,769.61 2022: 14,769.61 2023: 14,769.61 2024: 14,769.61 2025: 14,769.61 2026: 14,769.61
Monitoring equipment	GPS
QA/QC procedures to be applied	Every 5 years in the general forest management plan, and annual operational plans.
Purpose of data	Calculation of project emissions
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	-

Data/parameter [MN16]:	$Area_{projectAreawithHarvest,BaselineScenario}(t, i)$
Data unit	[ha yr^{-1}]
Description	Hectares undergoing transition ii within the harvest areas under the baseline scenario during year ss.
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 applied	$Area_{projectAreawithHarvest,BaselineScenario}(t, i)$: 140.65; 320.34; 186.12; 207.95; 282.65; 313.14; 345.35; 379.07; 413.98; 449.71
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 data	Calculation of baseline emissions; Determination of baseline scenario
Calculation method	$(Area_{projectAreawithHarvest,ProjectScenario}(t, i)/171584.075109) * D_{projectAreabaselineScenario}(t, i)$
Comments	-

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 applied	

Year	$BetaReg_{DF}$ (t)
2017	3,486.94
2018	3,929.28
2019	4,408.48
2020	4,925.62
2021	5,480.50
2022	6,071.66
2023	6,696.27
2024	7,350.02
2025	8,027.05
2026	8,719.98

Monitoring equipment	Statistical Software R-STUDIO
QA/QC procedures to be applied	Several types of links were used in Rstudio and the best model was chosen.
Purpose of data	Calculation of baseline emissions, Determination of baseline scenario
Calculation method	Applying a Beta Regression to historical values
Comments	-

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 of measurement methods and procedures to be applied	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	-
Comments	Not applicability 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	[m^3 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 applied	See Workbook "Net Carbon y VCU´s MADERACRE" sheet 7
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 data	Calculation of baseline emissions, Determination of baseline scenario
Calculation method	Σ ((π * DBH^2)/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 applied	See sheet 7 in the workbook "Net Carbon y VCU´s MADERACRE"
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 data	Calculation of project emissions
Calculation method	Σ ((π * 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 applied	See sheet "contribution" in the workbook "Net Carbon y VCU´s MADERACRE"
QA/QC procedures to be applied	-
Calculation method	$contribution_{DF}(i) = \frac{proportion_{DF}(d) \cdot L(d)}{\Delta C_{DF}}$
Comments	-

Data/parameter [MN34]:	$RelativeDriverImpact_{DF}$ (t,d) and $RelativeDriverImpact_{DG}$ (t,d)
Data unit	[-]
Description	Relative impact of the geographically unconstrained driver cc at time ss 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:	-
Frequency of monitoring/recording	At least once before baseline update.
QA/QC procedures to be applied:	-
Comments	Not applicable

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 have to be reliable and based on scientific methods and a good statistical design.
Measurement procedures:	-
Frequency of monitoring/recording	At least once before baseline update.
QA/QC procedures to be applied:	-
Comments	Not applicability.

Data/parameter [MN36]:	effectiveness(a, d)
Data unit	[-]
Description	Effectiveness of every project activity a in decreasing any driver of deforestation d relative to that driver's contribution to deforestation and forest degradation,
Source of data	Relevant academic literature or documented expert opinion.

Measurement procedures:	They are described in section 3.2.2 Alternative livelihoods: 0.312 Legal recognition of the land tenure status: 0.040 Demarcation and forest protection: 1.000 Support with the Development and Implementation of Sustainable Forest and Land Use Management Plans: 0.010
Frequency of monitoring/recording	At least once before baseline update.
QA/QC procedures to be applied	Monitoring of the development of activities.
Purpose of data	Calculation of baseline emissions, Calculation of project emissions; Determination of baseline scenario
Comments	-

Data/parameter [MN48]:	Efforest
Data unit	[t CO2 e]
Description	Emission factor related to leakage.
Source of data	1. If comprehensive national-level statistics on biomass densities are available, Efforest 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.
Measurement procedures:	-
Frequency of monitoring/recording	At least once before baseline update.
QA/QC procedures to be applied:	-
Comments	Not applicable.

Data on Organic Matter and Carbon Densities

Data/parameter [EA2]:	Carbon stock of the sources in the forest stratum.
Data unit	tCO2 e / ha
Description	Carbon stock by stratum in baseline before deforestation.
Source of data	Peru National Forest and Wildlife Inventory (2019).
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 applied	<table><tr><td></td><td>t C/ha</td><td>tCO_2e/ha</td></tr><tr><td>AGL</td><td>147.71</td><td>541.59</td></tr><tr><td>BG</td><td>38.64</td><td>141.66</td></tr></table>
Monitoring equipment	Literature review
QA/QC procedures to be applied	Peru National Forest and Wildlife Inventory.

Purpose of data	Calculation of baseline emissions, Calculation of project emissions; Determination of baseline scenario
Calculation method	-
Comments	-

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 applied	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 data	Calculation of baseline emissions, Calculation of project emissions; Determination of baseline scenario
Calculation method	-
Comments	-

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.
Measurement procedures:	Was established by the methodology in table 9.
Frequency of monitoring/recording	At least once before every baseline update
QA/QC procedures to be applied:	When updating the baseline, the proportion must be set according to the methodology.
Comments	-

Driver	$proportion_{DF}(i)$	$proportion_{DG}(i)$
1. Conversion of forest land to cropland	100%	0%

Data/parameter [MN51]:	$C(t, i)$
Data unit	[Mg C ha-1 yr-1]
Description	Carbon stock density at time in stratum (AGL and BG)
Source of data	Estimate within the biomass inventory plots
Value applied	Forest: 186.34 Pasture: 33.24
Frequency of monitoring/recording	At least once before verification.

QA/QC procedures to be applied:	In each verification apply the most updated bibliography.
Comments	-

Data/parameter [MN52]:	$f_{allometric}(y)$
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= ρ*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 = (π2∑(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 [MN53]:	$f_{belowground}(y)$
Data unit	Equation
Description	Relationship between aboveground and belowground biomass, such as a root-to-shoot ratio
Source of data	National Forest and Wildlife Inventory (2019)
Measurement procedures:	BGB.t = 0.489*AGL.t$^{0.890}$
Frequency of monitoring/recording	May be updated at baseline update
QA/QC procedures to be applied:	In each verification apply the most updated bibliography.
Comments	-

Data/parameter [MN54]:	Charvest (t,i)
Data unit	Mg C ha-1
Description	Biomass carbon stock density at time t in stratum i 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 applied	See sheet 10 in the Excel “Net carbon and VCU´s MADERACRE”.
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 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 applied	0.011
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	-

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
QA/QC procedures to be applied:	-
Comments	Not applicable

Data/parameter [MN57]:	$u_{classification}$
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 applied	1.00
QA/QC procedures to be applied	Peru National Forest and Wildlife Inventory – Geobosques.
Comments	-

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	N/A
Measurement procedures:	Section 8.1.2.7
Frequency of monitoring/recording	At least once before verification
QA/QC procedures to be applied	Peru National Forest and Wildlife Inventory – Geobosques.
Comments	Not applicable because there is only one stratum.

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 "Almacenes de biomasa y carbono aéreo y radicular en pastizales de Urochloa decumbens y Paspalum notatum (Poaceae) en el sureste de México[20]
Measurement procedures:	Section 8.1.2.4.3
Frequency of monitoring/recording	At least once before verification
Value applied	1.00
QA/QC procedures to be applied	Peru National Forest and Wildlife Inventory – Geobosques.
Comments	-

3.3.3 Monitoring Plan

The main objective of the Monitoring Plan is the collection of data that allow the verification of deforestation and degradation within the project area and its leakage belt over time, periodically updating the emission estimates as well as the generation of information. sufficient and timely to measure the results of the implementation of the activities defined to achieve the objectives of the Tahuamanu Amazon REDD Project and from there make the necessary adjustments in the strategies or activities as part of the adaptive management being implemented.

[20] https://www.scielo.sa.cr/pdf/rbt/v68n2/0034-7744-rbt-68-02-440.pdf

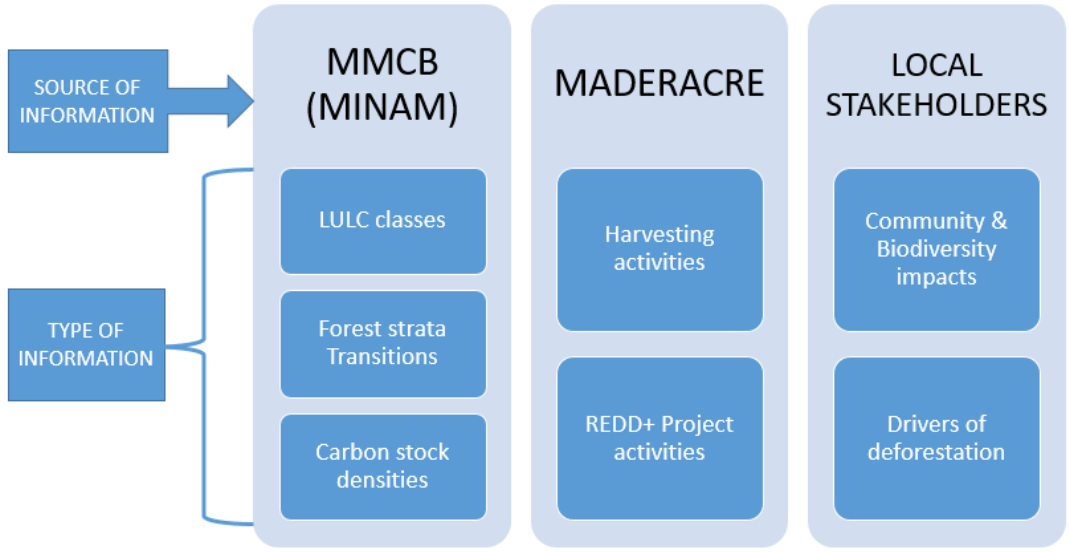


Figure 3.21. Sources of information by type

A. Organizational structure

The Project is implemented by MADERACRE SAC, a company with almost two decades of experience in the sustainable management of natural tropical forests in order to obtain ecosystem benefits from the sustainable management of the landscape. MADERACRE SAC has a trained and experienced technical team for the implementation of the project, capacities that also extend to monitoring tasks.

The development of the Monitoring Plan is in charge of a multidisciplinary team, led by an economist, a forestry specialist and a social specialist, allowing a comprehensive approach to the different components of the plan. Its implementation is in charge of the head of the Monitoring and Evaluation Area (M&E), who must articulate it with the technical field staff, the latter is the one who performs the measurements on the ground and corroborates the information in the office. It has specialized consultants with extensive experience who provide support in the calculations of emissions, as well as support in GIS for the analysis and interpretation of satellite images necessary for the calculation of deforestation.

The information flow of the monitoring system and the organizational structure of the project monitoring system are detailed below:

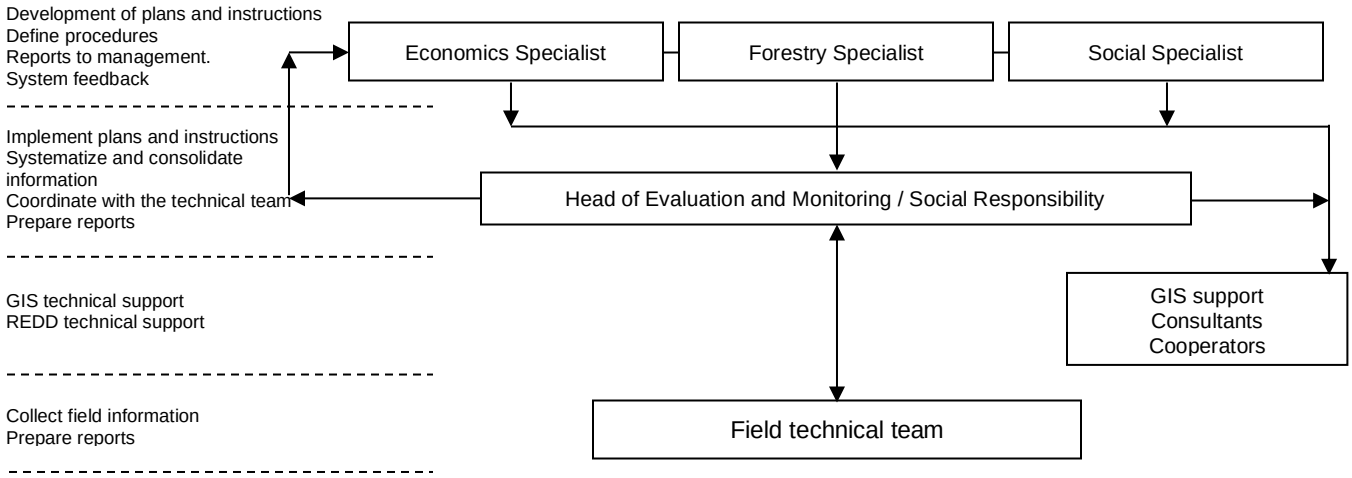


Figure 3.22. Information flow of the monitoring system

B. 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:

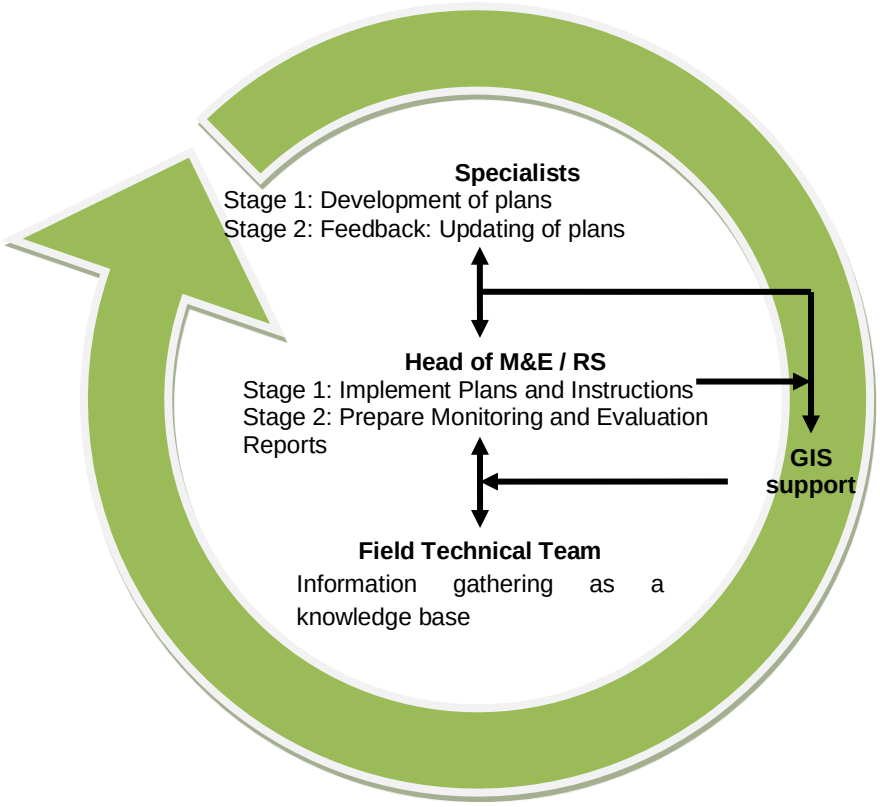


Figure 3.23. Adaptive management

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 "TAH REDD PROJECT" located on the MADERACRE 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.

C. 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: $\Delta Cp, Deg, i, t = 0$.

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 $\Delta Cp, Deg, i, t = 0$ 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 ≥ 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-CO_2 GHG emissions will be calculated:

a) N_2O and CH_4 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. In the event that 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) N_2O emissions from fertilizer use within deforested areas. In the event that deforestation and the use of N_2O occur during the life of the project, the amount of nitrogen fertilizer used per hectare deforested will be determined.

D. Analysis and interpretation of satellite images

Analysis of deforestation and source of land use change should be done through the use of 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 located 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).

3. QA

Review processes will be carried out in order to ensure the quality of the project information, minimizing the risks of error, thus obtaining reliable data as the basis of a solid monitoring system. It includes the following steps:

a) 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.

b) On-site verification

It basically consists of the monitoring in the field that the Head of E&M 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.

4. Review of data collected before and after digitization

- Field data collection: form header review, complete fields, data consistency (values within parameters).
- Fingering: once 100% of the information contained in the form has been entered into the database, an indication of "fingering" 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 Head of E&M and the Social Responsibility 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.

5. 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 is in charge of 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.

Methodology and data quality control for the calculation of forest loss.

For the methodological protocol for detecting forest loss in the Peruvian Amazon (http://geobosques.minam.gob.pe/geobosque/view/descargas.php?122345gxxe345w34gg), two methodologies have been used, for periods of years included.

a) Period 2001 - 2016: Methodology proposed by the University of Maryland (UMD).
b) Period 2017 - 2019: Direct Spectral Demixing Method (DSU)

Each of them has had criteria in accordance with the information that could be obtained from satellite images, the information on annual forest loss (2001 - 2019) generated by the PNCBMCC within the framework of the MMCB, uses Landsat data. Between 2001 - 2011 data from the Landsat-ETM + sensor was used, for the period 2012 - 2013 Landsat-TM, Landsat-ETM + and Landsat-OLI data were used. Finally, for the period 2014 - 2019, Landsat-ETM + and Landsat-OLI data were used.

Detection of annual forest loss period 2017 – 2019:

For the detection of forest loss for this period, the Direct Spectral Desmixing (DSU) method is used, which is also used in the generation of early warnings of deforestation of the PNCBMCC and as with the previous periods, all of them are used. Landsat L1TP data available for the study period.

E. Internal audit procedures

As part of the Adaptive Management System implemented by the project, there are internal audit procedures that aim to ensure the quality of the information collected during the monitoring of wood extraction and the quality of all forestry operations based on to the degradation in terms of area that they may cause in the forest management unit (FMU).

Quality Control Components

1. First level: Corresponds to the transfer of information carried out by technicians and field personnel, including:

a. Transfer of the production information in charge of the operations personnel that are part of the Forest Use Area, has the objective of collecting the information on the production and traceability of the forest use operations (Logging, Skidding, Sanitation/Transportation of the forest product). Formats designed specifically for each activity are used.

b. Transfer of the information of the evaluation of the impact of the forestry operations that are implemented within the framework of the management plan of the project area. It is in charge of the technicians of the Forest Evaluation and Monitoring Area and its objective is to quantify the level of impact caused by harvesting operations in terms of degraded area following the methodology established in the "Forest Operations Monitoring Guidelines". The information collected allows us to infer the quality of the operations from the quantification of their level of impact.

2. Second Level: Corresponds to internal audits carried out by the Heads of Area on the work carried out in the field by the personnel of each area. It consists of the replication by sampling of the evaluations carried out by the field staff.

a. Audit of production and traceability information: it is in charge of the Head of Forest Harvesting, who validates, based on field samples, the quality of the information previously collected and reported by the operations brigades in his area, prepares the corresponding report and referred to the project management.

b. Audit of degradation information: it is in charge of the Head of Forest Evaluation and Monitoring, who validates, based on field sampling, the quality of the information previously collected and reported by the technicians of his area and following its forestry operations monitoring guidelines. Based on the results, he prepares the reports and reports to the project management to provide feedback to the system.

It is worth noting the autonomy of the Evaluation and Monitoring Area with respect to the Forest Exploitation Area, thus providing transparency in the data collected by the former on the work and management carried out by the Exploitation area, which concentrates the greatest impacts in the management of the project area and the implementation of its management plan.

Quality criteria followed in the information management process:

- Staff training.
- Planning of activities and tasks to be carried out in the field.
- Complete format headers as step 1.
- Indicate with a “DIGITATED” seal the formats whose data has been transferred by typing to a database in the Excel program.

- Indicate with the "REVISED" seal the formats that have been validated by sampling by the head of the area.
- File the physical formats in the administrative offices of the project.
- Keep a backup copy of the databases entered for each year and corresponding activity.

3.3.4 Dissemination of Monitoring Plan and Results (CL4.2)

As described in 2.3.2, 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.

3.4 Optional Criterion: Climate Change Adaptation Benefits

3.4.1 Regional Climate Change Scenarios (GL1.1)

This section is not applicable.

3.4.2 Climate Change Impacts (GL1.2)

This section is not applicable.

3.4.3 Measures Needed and Designed for Adaptation (GL1.3)

This section is not applicable.

4 COMMUNITY

4.1 Without-Project Community Scenario

4.1.1 Descriptions of Communities at Project Start (CM1.1)

SAN FRANCISCO DE ASIS SECTOR

DESCRIPTION

The San Francisco de Asis sector is located at the east of the Consolidated MADERACRE, it was founded in the 90s, with people who previously worked with the extraction of latex from the Shiringa, but when it was no longer profitable, they started agricultural or livestock activities, settling in the area.

REPRESENTATIVES:

- President: Lesly Celidonio Dulante Chapiama
- Vice President: Julio Alvarado Chapiama
- Secretary: Gladys Alvarado Chapiama
- Treasurer: Celsa Cari Condori
- Lieutenant Governor: Lupe Tahuarico Kan

POPULATION:

There are 38 recognized residents in the sector, who reside in the Sector and also in Iberia, only 5 families reside permanently. In the last 5 years, approximately 10 people have entered Iberia, or relatives of other residents from different places

LAND TENURE:

Approximately 23 residents who have title to property and the rest have a certificate of possession or are in the process of titling.

ORGANIZATION:

They do not have a glass of milk or a mothers' club. They are not registered as residents' association in SUNARP. They do not have RUC yet. They are members of the Agrarian Federation of Tahuamanu.

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

The San Francisco Sector is located 4.6 km from the city of Iberia. To get there, you use the carriageway that leaves from Iberia to Puerto Portillo. Once you cross the bridge over the Tahuamanu River, 3.4 km later you will reach the San Francisco Sector. The telephone signal is by zones mainly from Claro and Movistar companies.

BASIC SERVICES:

They do not have electricity service, their main source with the use of lighters and candles. They do not have drinking water service, they are supplied from springs and water springs. Excreta disposal occurs through latrines or anywhere. Solid waste is buried or in some cases burned. They use gas mainly and firewood as a complement for cooking when they are in the sector.

PRODUCTIVE ACTIVITY:

The entire area is distributed among families, used for their productive activities. Mainly agriculture and on a lesser scale livestock. They cultivated mainly rice until two years ago, now they have increased the quantities of plantain and corn (between 1 and 3 ha) for sale. Monthly income is not fixed in permanent population, but ranges between 400 and 600 soles. Leasing is made to third parties for productive activities (mainly papaya planting)

EDUCATION:

It does not have an initial, primary or secondary institution, in order to study they must go to Iberia

HEALTH:

They do not have a health post, to be treated they go mainly to the Iberia Health Center.

OPINION ON FORESTS

They have not been working on any activity that involves forest conservation, they are predisposed to know and if it is possible to implement activities that contribute to forest conservation.

FLOR DE ACRE SECTOR

DESCRIPTION

The Flor de Acre sector is located to the East of the Consolidated MADERACRE, this has approximately 60 years of being founded, it began with a population that was dedicated to the extraction of Shiringa located up to km 13, starting with 13 to 15 farmers, having as access road only a carriageway.

REPRESENTATIVES: (to be renewed early 2021)

- President: Baltazar Condori Champi
- Vice President: Rudi León Valdez
- Secretary: Rubén Alfonte Arocutipa

- Treasurer: Angélica Olmedo Vilca
- Prosecutor: Gabriel Barrera Quispe
- Member: Víctor Raúl Flores Cutipa
- Member: Fernando Omar Asinardo Cuadros
- Lieutenant Governor: Rosa Ana Valdez Encinas

POPULATION:

There are 60 families approximately recognized in the sector, which reside in the sector and also in Pacahuara and others in Iberia, having 20 families residing permanently, mostly from Iberia, but approximately 40% come from Cusco, Puno, Abancay who are of Israelite religion. In the last 10 years, there has been an entry of approximately 30 to 40 people, who formed an Association called Flor de Tahuari; which are in a process of recognition, with approximately 20 inhabitants of these who have a certificate of possession of their land and the rest have not been recognized because their land is located in the Corforest Concession.

LAND TENURE:

60% of families have a property title and the rest have a certificate of possession and some of them are in the process of obtaining their property title. Of the foreigners who entered in the last 10 years, 20 families have certificate of possession inhabitants and the rest have not been recognized. Most of the families have 30 hectares that are dedicated to agriculture, with 100 to 200 hectares dedicated to livestock.

ORGANIZATION:

They do not have a glass of milk or a mothers' club. They are not registered as residents' association in SUNARP. They do not have RUC yet. There is a sector that formed the Flor de Tahuari Association. They are members of the Agrarian Federation of Tahuamanu.

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

The Flor de Acre Sector is located 13 km from the city of Iberia. To get to the town there is a road that emerges from km 1 of the Interoceanic Highway that goes to Iñapari. Up to km 11 are all the recognized settlers and from this onwards are located the last settlers who entered in the last 10 years. There is no phone line signal.

BASIC SERVICES:

They do not have electricity service, approximately 15 to 18 families have access to solar panels, the rest use lighters and candles. They do not have drinking water service; some homes have artisanal wells and the Flor de Acre stream. Excreta disposal occurs through latrines or anywhere. Solid waste is buried and, in some cases, burned. They use firewood for cooking when they are in the sector

PRODUCTIVE ACTIVITY:

The entire area is distributed among families, used for their productive activities. Mainly agriculture and on a lesser scale livestock. They mainly cultivated corn and to a lesser extent, bananas, cassava and rice. The monthly income is not fixed in the permanent population, but it ranges between 400 and 600 soles.

EDUCATION:

They have built an environment for a primary institution, but it has not been in operation for more than 10 years, because there were no students, in order to study they mainly move to Pacahuara, considering that several families have residence in the area.

HEALTH:

They have built an environment for the health post, but it has not been operational for more than 10 years, to be treated routinely they go to Pacahuara and if they are emergency cases they go to Iberia.

OPINION ON FORESTS

They have no initiative to carry out activities in favor of forest conservation, their main vision is agriculture and livestock, although they consider it necessary that their streams and slopes should be cared for to continue supplying water.

OCEANIA COMMUNITY

DESCRIPTION

The community is located to the East of the Consolidated MADERACRE, it has been recognized for more than 30 years, but its first settlers do not know since what year they live, it is known that the first families were the Nishida and Dulanto, over the years it grew over the years with people from Iberia.

REPRESENTATIVES:

- President: Judith Carneiro Huamán
- Vice-president: no elected
- Secretary: Gregorio Puma Anco
- Treasurer: Yaneth Mishida Añez
- Member: Teresa Ruiz Quispe
- Lieutenant Governor: Freddy Huaywa Huamán

POPULATION:

There are 38 families recognized in the sector, which reside in the Community and also in Iberia, with 08 families residing permanently, mostly from Iberia. In the last 5 years there has been entry of foreigners, from Ayacucho, with approximately 22 people already recognized by the community.

LAND TENURE:

Approximately 50% already have a property title and the rest are in this process, having a certificate of possession of their properties. The division of the land is indistinct, most of the families have 30 ha, but some have up to 100 ha, which they have been acquiring by purchase.

ORGANIZATION:

They do not have a glass of milk or a mothers' club. They do not have RUC yet. They belong to the Agrarian Federation of Tahuamanu.

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

The Community of Oceania is located approximately 30 minutes from Iberia, to reach the sector is through Port Sambayo which is 02 km from Iberia. There is a telephone line in most of the community and low intensity cell phone internet.

BASIC SERVICES:

They do not have electricity service, 06 residents have access to solar panels, the rest use lighters and candles. They do not have drinking water service, they are supplied from the Tahuamanu River, springs

and streams. Excreta disposal occurs through latrines. Solid waste is buried for the sake that they dispose of within their lands. They use firewood for cooking when they are in the sector.

PRODUCTIVE ACTIVITY:

The entire area is distributed among families, used for their productive activities. Mainly agriculture and to a lesser extent livestock. They especially cultivated banana, yucca, rice and beans. The monthly income is not fixed in the permanent population, but it ranges between 400 and 600 soles.

EDUCATION:

They do not have an initial institution, but they do have a primary school with 8 students. To study secondary school, they must go to the Iberia district.

HEALTH:

They have built an environment for the health post, but it has not worked in 2020 because in 2019 the number of people who required the service decreased considerably, to be treated they go mainly to the Iberia Health Center.

OPINION ON FORESTS

If they have a notion of forest conservation and promote the non-indiscriminate felling of trees, although they no longer have forest areas, all their land has been distributed and designated as agriculture.

SECTOR OF LA REPÚBLICA

DESCRIPTION

The Sector of the Republic is located to the East of the Consolidated MADERACRE; In the 70s, at the time of extraction of the Shiringa, there were families that inhabited this place, the Vílchez and Pereyra families, until times when the latex of the shiringa stopped being commercialized and they began to dedicate themselves to agriculture or livestock.

REPRESENTATIVES:

- President: Jesús Flores Montesinos
- Vice President: Cosme Pucllura Quispe
- Secretary: Milagros Barra Melendes
- Treasurer: Graciano Chavez Condori
- Lieutenant Governor: Humberto Huaman Anco

POPULATION:

There are 21 recognized residents in the sector, who reside in the sector and also in Iberia, there are only 07 residents who reside permanently in the area. In the last 10 years there has been the entry of new residents, approximately 07 from the Iberia district. It is mentioned that there has been an entry of invaders of approximately 10 people who carry out their productive activities in the area, but it is not recognized by the population.

LAND TENURE:

At the beginning, the distribution of the land was between 60 and 70 ha per family, however, as the years went by, those who entered were given land of 30 ha for their productive activities. 95% of the population have a title and 5% have a certificate of possession, a farmer certificate issued by the community

ORGANIZATION:

They do not have a glass of milk organization (for more than 10 years). They are not registered as residents' association in SUNARP. They do not have RUC yet. They are members of the Agrarian Federation of Tahuamanu.

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

The La Republica sector is accessible by a road of 3 km from the city of Iberia. This is used by the private company INFOSUR that is dedicated to the reforestation of the TECA species. From the beginning of this road to the sector, there is approximately 10 km. There is a telephone line in high areas, mainly from Claro.

BASIC SERVICES:

They do not have electricity, so the 18 residents and the school have solar panel; the rest is made using lighters or others. They do not have drinking water service, they are supplied from underground wells or springs and the Nareuda stream. Excreta disposal occurs through latrines or anywhere. Solid waste is sometimes burned or buried anywhere on their land. They use firewood for cooking when they are in the sector.

PRODUCTIVE ACTIVITY:

The main productive activity is agriculture and, to a lesser extent, livestock and fish farming. They mainly grow corn and papaya. The INFOSUR company that is dedicated to teak reforestation has been operating, carrying it out on land that it acquired by buying and selling approximately 12 years ago. The entire area is distributed among families, used for their productive activities. There are 2 or 3 residents who rent foreign land, who sow papaya or corn. The monthly income is not fixed in the permanent population, but it ranges between 400 and 600 soles.

EDUCATION:

They do not have an initial institution, but they do have a primary institution with 6 students. To study secondary school, they must go to the Iberia district.

HEALTH:

They do not have a Medical Centre (Posta Medica), to be treated they go to the Posta Medica in Arrozal town, which provides supplies.

OPINION ON FORESTS

They do not practice forest conservation activities and have already assigned to agriculture or livestock, however, they are interested in knowing how they can contribute to the conservation of forests.

CHILINA VIEJA SECTOR

DESCRIPTION

The Chilina Vieja sector is located to the East of the Consolidated MADERACRE, at the time of the extraction of Shiringa, Chilina was the main extraction and commercialization headquarters approximately 70 years ago, when the latex business of the Shiringa stopped being profitable, all the population of the area began to disperse and possess land to dedicate themselves to agriculture or livestock.

REPRESENTATIVES:

- President: Arturo Balcárcel Cueva
- Secretary: Eder kan Gonzales

- Treasurer: Luz Ovalle Veintemillas
- Members: Emerson Roca Córdova
- Santos Ovalle Veintemillas
- Lieutenant Governor: Héctor Rodríguez Canelo

POPULATION:

There are 23 families recognized in the sector, which reside in the Community and also in Iberia, having approximately 05 families residing permanently, mostly from Iberia. In the last 5 years there has been only the entry of 3 families that are recognized by the community from Iberia, they are children of ancient settlers who did not reside in the area.

LAND TENURE:

There are 15 families that have property titles to their properties and 08 are in the process of titling, having a certificate of possession of their land. The division of the land is indistinct, there are families that have from 80 to 100 ha and those who own less land are at least 30º ha.

ORGANIZATION:

They do not have a glass of milk or a mothers' club. They are not registered as residents' association in SUNARP. They do not have RUC yet. They are members of the Agrarian Federation of Tahuamanu.

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

The Chilina Vieja Sector is located from km 7 to km 13 of the interoceanic highway, scattered in different points. There is no telephone line.

BASIC SERVICES:

They do not have electricity service, but there is an electricity connection in the educational center and 2 families who reside on the side of the road. The rest use lighters or candles. They do not have drinking water service, they are supplied from streams. Excreta disposal occurs through latrines or anywhere. Solid waste is buried or burned in some cases. They use firewood for cooking when they are in the sector.

PRODUCTIVE ACTIVITY:

The entire area is distributed among families, used for their productive activities. Mainly agriculture and to a lesser extent livestock. They cultivated mainly corn and to a lesser extent rice, banana, cassava and papaya. The monthly income is not fixed in the permanent population, but it ranges between 400 and 600 soles.

EDUCATION:

They had an environment for primary studies that 4 years ago there was a fire that destroyed the facilities, since that date it has not been working. In order to study they have to go to Iberia.

HEALTH:

They had a health post, but 4 years ago there was a fire that destroyed the facilities, since then it is no longer working, for medical attention they have visits from the health personnel of San Isidro de Chilina once or twice a week, and also they will be treated at the Iberia Health Center.

OPINION ON FORESTS

They are currently working on a project in charge of the Directorate of Agriculture, where they are promoting the sowing of cocoa with agroforestry systems, they consider that their areas are well designated for agriculture and livestock, which is their basic economic sustenance.

SAN ANTONIO DE ABAD SECTOR

DESCRIPTION

The San Antonio de Abad sector is located to the East of Consolidated MADERACRE. The few information that is known is that, due to the need of some residents, they settled in the area, carrying out agricultural or livestock activities approximately 50 years ago and, with the growth of the population, the association was formed.

REPRESENTATIVES:

- President: Edith Verónica Quispe Aucacushi
- Vice President: Juan Pánfilo Gutiérrez Apaza
- Secretary: Cristian Huaranca
- Treasurer: Vilma Huanca Cutipa
- Lieutenant Governor: Mario Huamaní Alarcón

POPULATION:

There are 37 recognized residents in the sector, who reside in the Sector and also in Iberia, having approximately 21 residents who are permanently residing, but this occurred as a result of the current situation, where the permanent population increased.

LAND TENURE:

Approximately 80% of the population already has a property title and 20% with a certificate of possession and in the process of titling their lands. The division of the land is indistinct, there are families that have 100 hectares (but they have been bought among themselves), most of them own between 30 to 40 hectares approximately.

ORGANIZATION:

They do not have a glass of milk or a mothers' club. They are not registered as residents' association in SUNARP. They do not have RUC yet. They are members of the Agrarian Federation of Tahuamanu.

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

The San Antonio de Abad Sector is located from km 2 to 8.5 km of the interoceanic highway, scattered at different points. There is no telephone line, only in parts at the foot of the road

BASIC SERVICES:

They do not have electricity service, 18 residents have solar panels, the rest use lighters or candles. They do not have drinking water service, they are supplied from streams, springs and some have underground wells. Excreta disposal occurs through latrines. Solid waste, some are disposed of in the Iberia landfill and others are burned or buried. They use firewood for cooking when they are in the sector.

PRODUCTIVE ACTIVITY:

The entire area is distributed among families, used for their productive activities. Mainly agriculture and to a lesser extent livestock. They mainly cultivated corn, rice, bananas, cassava and the sowing of cocoa has been promoted in recent years. The monthly income is not fixed in the permanent population, but it ranges between 400 and 600 soles.

EDUCATION:

They had a primary school, but it has not been in operation for more than 10 years. In order to study they have to go to Iberia.

HEALTH:

They do not have the care of a Medical Post, to be treated they have to go to the Iberia Health Center.

OPINION ON FORESTS

They have not worked on the conservation of the forests, all their inhabitants used the lands for agriculture or pasture, however in recent years they have already started some reforestation activities in cooperation with the District Municipality of Iberia and the Agrarian Office, reforesting shihuahuaco on their farms; They consider that it is important to continue promoting reforestation in their forests in order to contribute to the recovery of areas that have already been depredated.

SAN ISIDRO DE CHILINA RURAL SETTLEMENT

DESCRIPTION

The settlement is located to the East of the Consolidated MADERACRE, they do not know how many years it was established, but it is known that it was as part of the special project around 1987, it was with the income of the residents of Cumaná and that was where they settled.

REPRESENTATIVES:

- President: Fabio Benavente Sarmiento
- Vice President: Jaime Pilco Tito
- Secretary: Isabel Peralta Silva
- Treasurer: Erwin T. Miyakawa Sánchez
- Lieutenant Governor: Erwin T. Miyakawa Sánchez

POPULATION:

There are 35 families recognized in the settlement, which reside in the Sector and also in Iberia, having 5 families residing permanently. In the last 10 years there was entry of foreigners of 6 to 8 more inhabitants.

LAND TENURE:

We do not have the data if there are families with property title, considering that there are families that have retired and others have entered, but they do not have a record of it or an updated registry, but it is known that they have proof of possession and some are in process of his title. The division of the land is indistinct, they have between 30 to 40 ha per family, although some families may have 80 or more ha, which were acquired by purchase from the other resident families.

ORGANIZATION:

They have the benefit of the glass of milk. They are not registered as residents' association in SUNARP. They do not have RUC yet

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

The Rural Settlement of San Isidro de Chilina, is located at km 24 of the interoceanic highway, dispersed in different points, located in different points of the interoceanic highway. There is a telephone line only in areas that are closer to the Interoceanic highway.

BASIC SERVICES:

Only the school and the post have electricity service. They do not have drinking water service, 35 tubular wells were made in the 90s, of which 02 work today, they have an elevated tank that collects water, this is distributed to families who live permanently, the rest is supplied by springs. Excreta disposal occurs through latrines or anywhere. Solid waste is buried or in some cases burned. They use firewood for cooking when they are in the sector and gas only occasionally.

PRODUCTIVE ACTIVITY:

The entire area is distributed among families, used for their productive activities. Mainly agriculture, fish farming and, to a lesser extent, livestock. They especially cultivated corn, banana, yucca, papaya among others. There is an area of 60 ha that belongs to the UNSAAC, currently destined for educational purposes. The monthly income is not fixed in the permanent population, but it ranges between 300 and 500 soles.

EDUCATION:

Initial and primary institution has been operating

HEALTH:

They are cared for by a Medical Post located in the same settlement.

OPINION ON FORESTS

Conservation activities have not been carried out, but if they have been implementing the cocoa planting project as an agroforestry system under the charge of the Agrarian Management, they recognize that they can contribute with activities that benefit forests and water springs.

ARCA PACAHUARA AGRARIAN ASSOCIATION

DESCRIPTION

The Arca Pacahuara Association is located east of the Consolidated Maderacre, it is an organization that belongs to the religious congregation called "Evangelical Missionary Association of the New Universal Pact" - AEMINPU, commonly known as Israelites, they are families that come from different places, mainly from Cajamarca, Cusco, Puno and Tacna.

REPRESENTATIVES:

- President: Jaime Gustavo Ramos Uscamaica
- Vice President: Benjamín Tacuri Ccana
- Secretary: Huber Layme
- Treasurer: Alejo Pinares Yucra
- Prosecutor: Rubén Alfredo Sirena

- Member: Marlene Vargas
- Lieutenant Governor: Julio Huamán Yucra

POPULATION: 1000 -1500

There are 275 families registered, but approximately 175 have not been registered, but they are recognized by the group, of which 95% reside permanently. In the last 05 years, there have been admissions of approximately 100 families.

LAND TENURE:

In the urban sector, 100% of registered families have property titles and in agricultural properties, an average of 250 lots also have property titles; There is a group that is in the process of being processed, which have a certificate of possession, but there is a sector of approximately 250 owners who do not have any document, because they are located on land that belongs to the Tres Fronteras Concession of Federico Ríos.

ORGANIZATION:

They have the benefit of the glass of milk. They are not registered as residents' association in SUNARP. They are members of the Agrarian Federation of Tahuamanu.

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

The group of houses in the town of Pacahuara is located 15 km from the city of Iberia, approximately 30 minutes, by motorcycle or car. To get to the town there is a road that emerges from km 1 of the Interoceanic Highway that goes to Iñapari. The access road that leads to Pacahuara is in good condition, in one of its sections the Ministry of Transportation has placed an asphalt layer. There is a telephone line in almost all the land and internet by cell phone of intermediate intensity.

BASIC SERVICES:

They have electricity service. Drinking water service with direct connection to 34 families and the rest is supplied by artisanal wells. Excreta disposal occurs through latrines. Solid waste is buried or burned. They use gas more often and firewood with charcoal only for cooking support.

PRODUCTIVE ACTIVITY:

The entire area is distributed among families, used for their productive activities. Mainly agriculture and small-scale logging. They mainly cultivate corn, which is commercialized and, to a lesser extent, banana, cassava, among others. The monthly income is not fixed in the permanent population, but it ranges between 400 and 600 soles.

EDUCATION:

They have an initial, primary and secondary institution in operation. CUNAMAS works

HEALTH:

They are cared for by a Medical Post located in the same settlement.

OPINION ON FORESTS

They consider that their lands should be used for agriculture, which is the main economic activity, although they believe that something should be done to take care of their streams or water springs, however, they have not been carrying out any conservation activities.

NOAYA

DESCRIPTION

Noaya is located northeast of the Consolidated Maderacre, more than 80 years ago in this land a Shiringuero center was located (placement of Shiringueros settlers), who were dedicated to the extraction of latex from Siringa, until the years when this trade was no longer profitable and people began to disperse in different points, some of them stayed in the area dedicating themselves to agriculture or livestock.

REPRESENTATIVES:

It currently does not have a board of directors, due to the small population that currently resides.

POPULATION:

It has 4 families that reside periodically, they do not have a registry, but there are properties that have owners who reside in the area, who for several years have not lived or carried out activities on their land. In the last 05 years there was no entry of foreigners.

LAND TENURE:

The owners already have property titles, in the initial period the distribution of the land was indistinct, being an approximate of 30 ha per family, however, there are some that may have more extensive areas that they acquired by purchase and sale.

ORGANIZATION:

There is no glass of milk or mothers' club or other association. They are not registered as residents' association in SUNARP. They do not have RUC yet. They belong to the Agrarian Federation of Tahuamanu.

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

To enter Noaya, go along the interoceanic highway to km 27 of the city of Iñapari, where the Noaya bridge is located and the school is located, the houses are scattered throughout the area. There is no telephone line service.

BASIC SERVICES:

They do not have electricity service. They do not have potable water service; they are supplied from the Quebrada de Noaya or from underground wells in some cases. Excreta disposal occurs through latrines or anywhere. Solid waste is buried or burned. They use firewood mainly for cooking when they are in the sector.

PRODUCTIVE ACTIVITY:

The entire area is distributed among families, used for their productive activities. They are mainly engaged in agriculture (corn, banana, cassava among others) and livestock on a smaller scale. The monthly income is not fixed in the permanent population, but it ranges between 400 and 600 soles.

EDUCATION:

It does not have an initial institution, but a primary one that has been operating with 06 students.

HEALTH:

They do not have Posta Medica (Medical Center) care. To access the service, they travel to Villa Primavera or Iñapari.

OPINION ON FORESTS

They are participating in a project with the school called Bosque de Niños de Noaya, currently in process, mainly on the part of the school there is interest in working on activities that promote the conservation and preservation of forests.

COMMUNAL ASSOCIATION VILLA PRIMAVERA

DESCRIPTION

Villa Primavera is located northeast of the Consolidated Maderacre, founded approximately 33 years ago, created by the Special Project in the first government of Fujimori, living 80 families mostly from the islands of Puno - Amantani.

REPRESENTATIVES:

- President: María de Nazaret Cardozo Mouzully
- Vice President: Luis Inuma Vargas
- Secretary: Noelia López Claudino
- Treasurer: Emilda Suana Yanarico
- Lieutenant Governor: Isaac Quintanilla Vilca

POPULATION:

It is made up of 180 partners, but currently 25 families reside, which count, and their property titles are in process. Only 3 families reside from the time in the creation of Villa Primavera, the rest are families that were incorporated over the years.

LAND TENURE:

They do not have an amount, but they affirm that most of the population already has a property title and the rest are in the process of this. The distribution of their land is unknown, because they have been acquired by buying and selling over the years.

ORGANIZATION:

There is no glass of milk organization, but families receive milk through an agreement with San Isidro de Chilina. They do not have RUC yet. They are not part of any federation.

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

To enter the Association at km 13 of the interoceanic highway, located 10 minutes from the city of Iñapari by motorcycle or car. There is no telephone line service.

BASIC SERVICES:

They have electricity service, but only 80% of the population. They are supplied with water by tubular well, available 3 times a week and administered by the neighborhood council in agreement with the MPTH in conjunction with the Sanitation Service Administrator -JASS board. Excreta disposal occurs through latrines or anywhere. Solid waste is burned or buried and some are disposed of in the Iñapari municipal dump. They use gas as a supply for cooking, firewood is a resource that is no longer used as a main source.

PRODUCTIVE ACTIVITY:

The entire area is distributed among families, used for their productive activities. Mainly agriculture (banana, cassava and papaya), livestock, aquaculture and independent jobs or in companies in the areas. The

monthly income is minimum salary and in some cases a little higher. There is an area of 20 ha that belongs to the UNSAAC, currently designated for educational purposes.

EDUCATION:

It has an initial and primary institution having 15 students in primary school. For secondary studies they go to Iñapari.

HEALTH:

They have Posta Medical care.

OPINION ON FORESTS:

They have a vision and know a little about forest conservation, considering that an Environmentally Friendly Project is currently operating called the Children's Forest. They are interested and willing to continue learning and applying activities in favor of forest conservation.

NUEVA ESPERANZA PEASANT COMMUNITY

DESCRIPTION

The peasant community of Nueva Esperanza is located northeast of the Consolidated Maderacre, this has its beginnings when the extraction of Shiringa was carried out, and the inhabitants were thus establishing themselves in the area.

REPRESENTATIVES: (will be renewed early 2021)

- President: Teófila Huamán Yupaicana
- Secretary: Rina Barra Bardales
- Treasurer: Lucia Tangoa Tangoa
- Lieutenant Governor: Samuel Elías Roca Rodríguez

POPULATION:

It is made up of 42 families recognized by the community, but 10 families reside permanently. In the last 10 years there has been no entry of new residents into the community.

LAND TENURE:

100% of the population already have their property titles. The distribution of their land in an initial stage was from 100 to 200 ha per family, but they have been reducing their areas because they have been sold to others or because they were distributed with children or grandchildren, with the majority having an average of 50 ha.

ORGANIZATION:

The service of a glass of milk is available. They are not registered as residents' association in SUNARP. They do not have RUC yet. They belong to the Agrarian Federation of Tahuamanu.

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

To enter the peasant community, it is at km 13, with entry through a road in front of the Villa Primavera entrance, from this start of the road to the Community it is approximately 9km. There is no telephone line service.

BASIC SERVICES:

They do not have electricity service, but they have solar panels that supply electricity only for home use. They are supplied with water by underground wells or springs. Excreta disposal occurs through latrines. Solid waste is buried and in some cases it is also burned. They use firewood for cooking when they are in the sector, although they also have gas.

PRODUCTIVE ACTIVITY:

The entire area is distributed among families, used for their productive activities. Mainly small-scale agriculture and livestock. They mainly cultivate cassava, plantain, rice and corn. The monthly income is not fixed in the permanent population, but it ranges between 400 and 600 soles.

EDUCATION:

It has an environment for the primary institution but these approximately 7 years without operation, because there were no students.

HEALTH:

They have a Posta Medica, but it is not working from approximately the last 7 years, because there was migration to different places and there was no population to attend to.

OPINION ON FORESTS:

There is a space available for reforestation as an initiative of each individual, they are interested in continuing to promote activities that contribute to the conservation of forests.

NATIVE COMMUNITY OF BELGIUM

DESCRIPTION

We have inherited the name “Belgium” from the farm that existed in that same place, where our parents and grandparents came to work from other Yine villages, and which remained until the 1980s. The owner of the farm died in one of his trips and as the price of the shiringa fell, his relatives left the place. The Yine natives stayed and decided to establish a community, keeping the same name.

REPRESENTATIVES:

- President: Nazareno Aspajo López
- Vice President: Valeria López López
- Secretary: Franco López Pereyra
- Treasurer: Leoncio Aspajo López
- Secretary of discipline: Arturo Aspajo López
- Secretary of production and marketing: Eleuda López Bautista

POPULATION:

It is made up of 110 inhabitants recognized by the community, who reside permanently. Before its recognition, there are inhabitants of origin of the Brazilian communities. Currently there are 2 migrant settlers who reside, but without recognition, both wives of community members.

LAND TENURE:

The territory is communally owned, has a property title 087-2002-MA-DRA-MDD. With an extension of 53,394 Ha. The distribution of its land is zoned in: Community settlement zone, agricultural - forestry zone,

forest management zone, special treatment zone and ecological protection and conservation zone. The distribution of agricultural land is given by the need of each inhabitant, they request the use according to their capacity for work that they will carry out and the community accepts whether or not the area is available.

COMMUNITY ORGANIZATION:

The highest authority is the Community Assembly, who delegate executive powers to a legal representative who is the head of the community.

General Assembly. It is the supreme governing body of the community. The general assembly is made up of all the community members, duly registered and in active position.

Board of Directors. It is the body responsible for the government and administration of the community and is made up of the president or chief, vice president or deputy chief, secretary, treasurer, secretary of discipline and secretary of production and marketing.

Legal Advisor. He is in charge of advising the community on legal and regulatory issues. FENAMAD provides this service in support of Native Communities.

Responsible for Forest and Environment certification. He is in charge of compliance with the FSC principles and criteria, in all forestry operations. Its main function is to train company personnel on sustainable forest management and certification and monitor these operations.

Forest Regency. In accordance with the Forestry and Wildlife Law No. 29673, it is jointly responsible for forest management within the UMF (Forest Management Unit) together with the holder of the enabling title, and is the one who prepares, subscribes and is responsible for the execution of the UMF's forest management plans.

FSC Regency. It is the non-profit entity that helps the Belgian Native Community to faithfully comply with the Principles and Criteria of Good Forest Management and the Voluntary Forest Certification of the FSC, managing the group certification of which the Community is a member.

Forest Committee. It is an instance of the community that carries out monitoring and surveillance activities in all activities in the forest field.

ORGANIZATION:

The service of a glass of milk is available. They have RUC No. 20527160121

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

To enter the Community, the Santa Martha highway is used 1 hour from the city of Iñapari; The road is in good condition because forestry companies use it to transport the wood. There is only a telephone line in one area of the Community and low intensity cell phone internet.

BASIC SERVICES:

They do not have electricity service, but they have solar panels that supplies the light of their communal premises, school, post and the central part of the Community. The houses are supplied with generators. They are supplied with water by two springs that are channeled to all homes and also from some springs in the most remote areas. Excreta disposal occurs through latrines. Solid waste is taken to a landfill 500 meters from the Community exit.

PRODUCTIVE ACTIVITY:

The entire area is zoned into a communal settlement zone, an agricultural-forestry zone, a forest management zone, a special treatment zone, and an ecological protection and conservation zone. Productive activities are cultivation and harvesting of cassava, banana, corn, beans, rice, etc., timber use, cattle raising, bush animals and fishing for self-consumption. Mainly timber extraction and small-scale agricultural activity.

EDUCATION:

It has an environment for the initial and primary institution, with 13 students each.

HEALTH:

They have a Medical Post environment, where a nurse technician and a licensed nurse attend; In addition, it is monitored with the Iñapari Medical Post.

OPINION ON FORESTS:

They recognize the need to protect their forests, it is for this reason that they have zoned their forest, in addition to being a Community that has FSC Certification.

IÑAPARI

DESCRIPTION

Iñapari owes its name to the ethnic group, now extinct, of the Iñapiri, a people that failed to be conquered by the Incas. It is during the Colony, in 1861, that Colonel Faustino Maldonado explored the territory for the first time. Later, in 1890, its access was facilitated through a route that was established between the Ucayali River and the Madre de Dios River. As a result, groups of adventurers and merchants enter that were dedicated to the exploitation of gold and rubber, in the middle of the "Rubber Boom". Later, with the discovery of Shiringa, a latex similar to rubber and more profitable exploitation, estates dedicated to this activity were established, which make up the current territory of the Iñapari district.

REPRESENTATIVES:

- Mayor: Abraham Cardozo Mouzully
- Municipal manager: Jorge Arturo Boyer Calderón
- Public attorney: Víctor Hugo Peralta Pinedo
- Institutional control body: Liz Terrazas Yanqui

POPULATION:

It is made up of 1890 inhabitants, however, there is a population that resides temporarily for work activities in the different companies in the area and population of the neighboring city Assisi - Brazil. has been experiencing accelerated demographic growth since the opening of the PE-30C national route (known as the Interoceanic Highway) that connects Peru with Brazil and in particular with the inauguration of the Integration Bridge over the Acre River that connects it with the town from Assis - Brazil.

LAND TENURE:

The territory is zoned as an urban area where the inhabitants have their property titles, in addition to areas of agricultural and forest areas, which also have titles.

ORGANIZATION:

The service of a glass of milk is available. There is a mothers' club organization. There is an Association for the elderly. They have RUC No. 20162315502

ROADS OF ACCESS AND MEANS OF COMMUNICATION:

The Iñapari district is located northeast of the Maderacre Concession, it is 5 minutes from the Maderacre industrial plant. It is 64.5 km from the populated center of Iberia and approximately 241.5 km from the city of Puerto Maldonado., the access road is the Interoceanic Highway that connects with Brazil. Telephone, internet and satellite television services are available.

BASIC SERVICES:

Electricity service is available to 100% of the population. Drinking water service is available to approximately 60% of the population, the rest is supplied by underground wells. There are drains for 100% of the population. Solid waste is taken to a landfill 10 minutes from the city, it is currently in a process of comprehensive improvement of solid waste.

PRODUCTIVE ACTIVITY:

Forest extraction is considered as the main economic activity in this district, along with trade and aquaculture (fish farm). Secondary activities: fishing, agriculture, considered subsistence centered on products such as rice, beans and corn. Livestock is complementary to forestry activity, the cebuina species predominates.

EDUCATION:

There are initial, primary and secondary institutions operating in the same city.

HEALTH:

There is a Medical Post, in addition to this there is a private clinic.

OPINION ON FORESTS:

With the passing of the Iñapari population and its population growth, it was losing an intense interest in conservation and care, however, there is still a high percentage that is predisposed to contribute to the care and preservation of forests.

4.1.2 Interactions between Communities and Community Groups (CM1.1)

Communities characterized in previous section are mostly migrants from other different regions from Peru. We are referring to departments such as Junín, Amazonas, Ucayali, San Martín, Arequipa and the city of Puerto Maldonado. There is also constant interaction with neighboring countries such as Brazil, mainly in the Iñapari area and nearby places, as it is the area with the greatest economic and social dynamics between the two countries. Social characteristics, such as the religion professed, vary, since the areas closest to the border have a certain tendency towards evangelical religion, while the areas close to Iberia are mainly Catholic.

The process of social and economic dynamics concentrates the district capitals in Iñapari and Iberia; however, considering the project being presented, Iñapari is the most important urban center in the social environment. The rural areas tend to go frequently to the urban area. The same is true of the rural towns near Iberia, such as Pacahuara, San Isidro and Flor de Acre. Forestry is the economic activity that has most boosted commercial and social interaction in the area surrounding the project. As a result of the years of development of the sector, local companies have emerged to provide complementary services to the

forestry sector, such as lumber, coal, transportation, food, among others. It is also important to note that the Inter-Oceanic Highway has allowed local development to grow.

The reputation of the project proponent is very remarkable thanks to its large permanence in the zone, with some of their former representatives being political leaders and authorities and with a close engagement with community needs. The support they bring to education, health and other needs is recognized.

4.1.3 High Conservation Values (CM1.2)

Table 4.1. High conservation values (HCV) analysis

High Conservation Value	Community needs. Areas and resources that are key to satisfy basic needs of local communities or indigenous people (subsistence, health, nutrition, water, etc.)
Qualifying Attribute	Improved access to basic needs
Focal Area	Lands belonging to surrounding communities

High Conservation Value	Cultural values. Areas, resources, habitats and landscapes cultural, archeological or historically significant, at the national or global scope and/or of key importance (economic, ecological, cultural or religiously for local communities or indigenous people)
Qualifying Attribute	Effective protection of PIACI lands Enhanced well-being of indigenous communities
Focal Area	PIACI territory

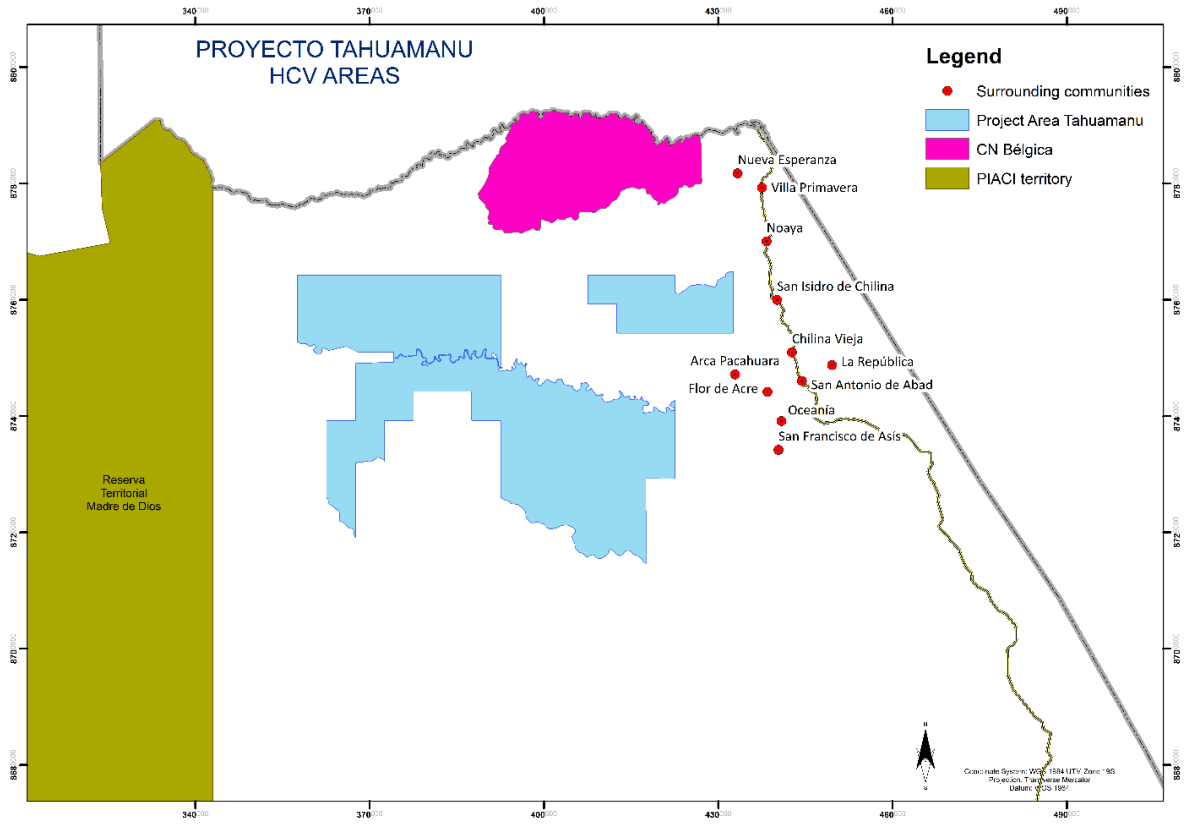


Figure 4.1. HCV zones near the project area

4.1.4 Without-Project Scenario: Community (CM1.3)

In the without project scenario, local families will likely increase their unsustainable activities. According to baseline survey, 83% of the families dedicated to cattle ranching, plan to increase their pasture areas, while 75% of the families dedicated to agriculture plan to expand their areas too. 21% recognize that they do not have enough own lands to carry out their plans.

The relatively low technologies and productive practices cause that these activities are mostly for subsistence or with a low productivity. For instance, in cattle ranching, the average number of individuals per family is 12.5 but the area dedicated to pasture is 14.09. It implies that the number of individual per hectare is less than 1, which represents a very low density.

Without the project, local families will not receive the technical support of MADERACRE, continuing their current practices. As seen before, one of the components of REDD project is to promote sustainable activities. This is expected to enhance local incomes, ceteris paribus, other variables.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

Table 4.2. Expected community impacts

Community Group	Local families
Impact(s)	Crops productivity

Type of Benefit/Cost/Risk	- Prediction. - Direct impact, given the technical assistance of REDD project. - Classified as benefit: Increase in crops productivity.
Change in Well-being	Increase in well-being as a consequence of an increase in incomes (ceteris paribus, agrarian prices) or, in case a significant decline in prices (for instance, as a consequence of an economic decline because of the pandemic), a reduction in the vulnerability from external economic negative shocks.

Community Group	Local families
Impact(s)	Agrarian activities stabilization
Type of Benefit/Cost/Risk	- Prediction. - Indirect impact: The improvement of productive practices should imply a stabilization of agrarian areas. - Classified as benefit: The expansion of agricultural activities is a necessity because productivity decreases as a consequence of inappropriate production techniques and land use, but the new areas are further away implying more costs than previous ones. For this reason, if the project may help them to maintain their actual incomes without need to expand to new areas, this will be a net benefit for local families.
Change in Well-being	Better environment conditions without affecting local incomes and needs

Community Group	Neighboring settlements
Impact(s)	Support to education, health and other resources (as water access as a consequence of the protection of water natural sources) for rural and urban neighboring settlements.
Type of Benefit/Cost/Risk	- Prediction. - Direct support from activities. - Classified as benefit: improved access to public services and water quality and availability.
Change in Well-being	Enhanced quality in education, health and water access

Community Group	Indigenous Groups
Impact(s)	Enhanced livelihood conditions
Type of Benefit/Cost/Risk	- Prediction. - Direct: - Classified as benefit, given the increased financial resources for activities that can protect and benefit the PIACI territories, as well for development of native communities.
Change in Well-being	Survival of PIACI groups and enhanced well-being of indigenous families

4.2.2 Negative Community Impact Mitigation (CM2.2)

There is no negative impact expected by the implementation of the project. According to baseline survey (PRA conducted in 2020), 88% of local families still use firewood for cooking and 55% still use charcoal,

while 68% use timber for different purposes (mainly construction or furniture). Even though, most of them states that they obtain these resources from their own plots: 94% in the case of firewood; 60% in the case of charcoal; and 82% in the case of timber, it is expected that these resources become scarce over time or they do not declare all the truth about the origin of those resources.

As a precautionary measure, the project will monitor the above mentioned indicators in the localities close to the project through the Participatory Rural Appraisal (PRA) that will be conducted every two years. This will also be supported by the regular patrolling activity. As needed, the project will design appropriate mitigation measures to avoid any negative impact regarding this issue. Potential measures may be associated to reforestation or improved cook stoves among others.

4.2.3 Net Positive Community Well-Being (CM2.3, GL1.4)

The project plans to invest 1% of incomes in the promotion of sustainable activities. The impact in terms of productivity will be part of the monitoring plan. In addition, the project will provide training, will invest in health and education conditions, and will ensure the permanent access to water quality and availability.

4.2.4 High Conservation Values Protected (CM2.4)

As described in previous sections, the PIACI territory is located at the west of the forest concession. The monitoring that the project already carries has not found any presence of these uncontacted indigenous groups even though its existence is confirmed but still located in areas far away the project area. Without the REDD project, the expansion of agrarian activities and illegal logging will put in serious risk the territories of these uncontacted groups.

The native community Belgica will also lose the technical and financial support of MADERACRE, including the FSC certification that their forest areas currently possess. Certification ensures the possibility to access to better markets for their timber products.

In the case of community needs, the project has demonstrated a history of contribution in education, health and water access for neighboring communities and in the theory of change matrix, the commitment for this type of support is ratified with 1% of REDD incomes for these purposes, according to priorities established by an Advisory Committee.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

The main expected impact on other stakeholders is on forest concessions and forest authority. In both cases, the impact is indirect as the support that the project plans to provide to rural families should decrease the pressure to expand agrarian areas (including in neighboring concessions). This should allow them to continue operating strengthening the forestry sector and the incomes that the Peruvian Government receives from this productive sector.

Table 4.3. Expected impacts on other stakeholders

Other stakeholder	Neighboring forest concessions
Impact(s)	Forest area and forest resources protection
Type of Benefit/Cost/Risk	Benefit: The support of local families will benefit indirectly to neighboring forest concessions as it will reduce the pressure from rural families over neighboring forest areas in order to search for new lands, where to establish their agrarian crops and pastures
Change in Well-being	Contribute to forestry economics

Other stakeholder	SERFOR
Impact(s)	Tax incomes from forest concessions
Type of Benefit/Cost/Risk	Benefit: Increased tax incomes from a strengthened forestry sector for implementing their roles and responsibilities, indirectly through the payment of PDAF to regional government
Change in Well-being	N. A.

4.3.2 Mitigation of Negative Impacts on Other Stakeholders (CM3.2)

No net negative impacts expected on other stakeholders.

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

Based on 4.3.1 and 4.3.2, the project expects to produce positive net impacts on other stakeholders as no negative impacts are expected.

4.4 Community Impact Monitoring

4.4.1 Community Monitoring Plan (CM4.1, CM4.2, GL1.4, GL2.2, GL2.3, GL2.5)

The designed monitoring plan identifies the communities that must be monitored, the variables and goals that need to be monitored, the types of measurements and sampling methods, and the frequency of monitoring and reporting of each type and method. The monitoring activities and indicators are developed by strategic lines of the project (see Section 2.1.11).

Table 4.4. Project diffusion

Indicator	Indicator type	Method	Data	Who measures	When	Who is measured with?
Project activities visible and with social license						
Number of meetings and training sessions held with the community	Result	Report	Baseline	Proponent of the Project	Annual	With all communities in the area of the project
Participate in dialogue spaces and management of Protected Areas, including the Territorial Reserve Madre de Dios	Result	Report - agreements or formal conventions	Baseline	Proponent of the Project	Annual	strategic actors involved in conservation and territorial reserves

Table 4.5. Strengthen /develop skills and capacities in family members that are part of selected projects, including local company workers

Indicator	Indicator type	Method	Data	Who measures	When	Who is measured with?
Stakeholders are convinced and loyal with the Project and are allies to share the benefits of the project and the benefits to manage forests sustainably						
Number of meetings and training sessions held with the community	Result	Report	Baseline	Proponent of the Project	Annual	With all communities in the area of the project

Table 4.6. Support pilot sustainable productive initiatives of surrounding communities, reducing the expansion of agrarian activities and improving livelihood conditions with 2% of project incomes

Indicator	Indicator type	Method	Data	Who measures	When	Who is measured with?
Reduction of local pressure over the Project area environment						
Number of implementing sustainable productive initiatives of surrounding communities	Result	Report of the project	Base line	Proponent of the Project	Annual	With all communities in the area of the project

The goal of the project is to contribute with the improvement of welfare of 12 neighboring communities. A biennial community survey is to be applied to monitor the evolution of key indicators. It follows a statistical sampling of a representative number of families of each neighboring community identified.

With a level of confidence of 95% and a margin of error of 10%, the number of interviews to be applied is determined as follows:

Table 4.7. Number of families per community

Community	Total # of families	%	Sample
San Francisco De Asís	38	5%	4
Flor De Acre	60	8%	7
Oceanía	38	5%	4
La República	21	3%	2
Chilina Vieja	23	3%	3
San Antonio De Abad	37	5%	4
San Isidro De Chilina	35	5%	4
Noaya	4	1%	1
Arca Pacahuara	428	57%	49
Villa Primavera	25	3%	3
Nueva Esperanza	10	1%	1
Bélgica	37	5%	4
Total	**756**		**86**

In the case, there occurs a significant change in the number of families, the sample will be recalculated.

The variables that will be measured at this level are:

- Trend of future land use
- Average size of agricultural area
- Average size of pasture area
- Average density of cattle per hectare
- Level of consumption of firewood
- Level of consumption of charcoal]
- Level of consumption of timber for non-commercial purposes
- Average distance to collect firewood / charcoal / timber
- Origin of firewood / charcoal / timber

Table 4.8. Subsistence economy

Indicator	Indicator type	Method	Data	Who measures	When
• Level of consumption of firewood • Level of consumption of charcoal • Level of consumption of timber for non-commercial purposes	% increase or lower with the starting point	Social and economic report	Baseline	Proponent: Social specialist of the project	annual

In addition, the project will record the different activities and outcomes that those activities generate. Up to now, the project has monitored activities with the following template in education and health topics:

Table 4.9. Community monitoring form – Health and Education

Description	Entity	Community	Beneficiaries		Date	Evidence
			Men	Women		

It is expected that monitoring will include productive activities supported by MADERACRE. The variables that will be measured are:

Table 4.10. Community indicators

Variable	Type of measurement	Sampling Method	Frequency	Data	Who measures	Notes
Productivity (tons/ha)	Survey	95% level of confidence 10% margin of error Base: Total beneficiaries of the project	Annual	Baseline	Proponent: Social specialist of the project	Per crop
Unit Price (compared with price of families who do not access to project benefits)	Survey		Annual			Per crop
Number of trainings received	List of attendants of workshops		Annual			Per family

Table 4.11. Other Stakeholders indicators

Indicator	Indicator type	Method	Data	Who measures	When
Deforested areas in Forest Concessions inside Reference Region	% of increment in deforestation rate	Analysis of mapping results of GEOBOSQUES	Baseline	Project proponent	Annual
Income from PDAF paid to the Regional Forest and Wildlife Administration by Forest Concessions located inside the Reference Region	% of increment of income	Annual registry from the Regional Forest and Wildlife Authority	Baseline	Project proponent	Annual

Finally, based on GIS analysis and reports from control sites, the project will report the percentage of area within the PIACI territory that has been affected or deforested.

4.4.2 Monitoring Plan Dissemination (CM4.3)

As described in 2.3.2, 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.

4.5 Optional Criterion: Exceptional Community Benefits

The project does not plan to get the Gold Community Level.

4.5.1 Exceptional Community Criteria (GL2.1)

The project does not plan to get the Gold Community Level.

4.5.2 Short-term and Long-term Community Benefits (GL2.2)

The project does not plan to get the Gold Community Level.

4.5.3 Community Participation Risks (GL2.3)

The project does not plan to get the Gold Community Level.

4.5.4 Marginalized and/or Vulnerable Community Groups (GL2.4)

The project does not plan to get the Gold Community Level.

Table 4.12. Project impact on marginalized groups

Community Group 1	PIACI
Net positive impacts	Effective protection of their traditional territories

Benefit access	Indirectly, through their representative organizations, 1% of carbon incomes to implement effective measures to protect their lands and to avoid the entrance of foreigners
Negative impacts	No expected negative impacts. This group may not be contacted directly

4.5.5 Net Impacts on Women (GL2.5)

The project does not plan to get the Gold Community Level.

4.5.6 Benefit Sharing Mechanisms (GL2.6)

The project does not plan to get the Gold Community Level.

4.5.7 Benefits, Costs, and Risks Communication (GL2.7)

The project does not plan to get the Gold Community Level.

4.5.8 Governance and Implementation Structures (GL2.8)

The project does not plan to get the Gold Community Level.

4.5.9 Smallholders/Community Members Capacity Development (GL2.9)

The project does not plan to get the Gold Community Level.

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (B1.1)

Madre de Dios is a region recognized worldwide for its high biological diversity (Voss & Emmons, 1996), which is why it has been awarded the title of Biodiversity Capital of Peru. It is estimated that one of the "Pleistocene Refuges" of the planet is in this Department and 50% of the diversity and endemism is found at the country level. A large part of this biological diversity is represented in its Natural Protected Areas. Since 1973, with the creation of Manu National Park to date, six Natural Protected Areas (NPAs) have been created in the department, some of which are shared with other regions. The following units make up the department's NPA system: Manu National Park, Manu Reserved Zone, Bahuaja-Sonene National Park, Alto Purús National Park, Tambopata Candamo National Reserve, Amarakaeri Communal Reserve and Purús Communal Reserve. Together, these areas cover 3'784,081 ha representing 44.6 %of the department's territory, and this percentage continues to increase due to new protected areas such as the Indigenous Reserve in Voluntary Isolation, Tourism Concessions, Conservation Concessions, and private Conservation Areas.

Kometter (2003)[21] conducted vegetation characterization studies in the department of Madre de Dios. According to their classification, the forests in the project have the following characteristics:

- Low Hill Forest (BCb): The forest is established on areas that have a tectonic origin but that have also been shaped by water erosion, having accentuated the ruggedness of its topography, presenting slopes that can reach up to 70%, likewise the relative height to which the elevation of

[21] Mapping and Forest Assessment of the Permanent Production Forest of the Department of Madre de Dios.

these hills can reach is up to 80 m. This type of forest presents subtypes such as forests of different vigor, forest with Paca, pacal and associations have been found with Shiringa.

- High Hill Forest (BCa): The physiography on which this type of forest develops presents undulations with elevations that can reach up to 200 m of relative height; the slopes that they present are of moderate to strong, reaching up to 100%. This type of forest presents subtypes such as forests of different vigor, forest with bales and pacal.

- Low Terrace Forest (BTb): This forest develops on land located generally after the alluvial flood zone, with a relative height above river level of less than 10 meters, relatively flat with some depressions, regular to bad drainage. This type of forest has subtypes such as forests of different vigor, forest with bales and pacal.

- High Terrace Forest (BTa): Generally located around second order rivers or streams. In some areas of the study area, they are found in the highest parts forming a kind of plateau. They have flat to slightly undulating topography, slopes ranging from 0 to 8%, no drainage problems, and are made up of old alluvial materials. This type of forest presents subtypes such as forests of different vigor, forest with bales and pacal, and associations with Brazil nut were found.

The project presents a considerable extension of moderately conserved forest, and its existence as a concession is considered the only barrier to the protection of populations of species of wild flora and fauna. Because of its size (more than 180,000 hectares), it is key to the connectivity of large mammals.

According to the threat categories of the Ministry of Agriculture, 16 mammalian species with some degree of threat are registered in the Madre de Dios region (Supreme Decree 034-2004/AG). Mammals such as the choro monkey (Lagothrix lagotricha) are at risk, although previously widely distributed in the region but with sparsely dense populations in areas of high and primary forest, now threatened by their vulnerability to intervention and alteration of their habitat and their quoted meat, such as hunting trophy and exotic pet (Redlist IUCN[22]; MINAM, 2011); the river wolf (Pteronura brasiliensis), the pacarana (Dinomys branickii), distributed throughout the Amazon basin but with more records on the river Madre de Dios. In a endangered situation we have spider monkey or Maquisapa (Ateles chamek), a resident of dense and lush forests or primary forests, this species is affected by hunting pressure and deforestation (Redlist IUCN[23]; MINAM, 2011)

The Añuje (Dasyprocta kalinowskii), the flag or bear flag (Myrmecophaga tridactyla), the giant armadillo (Priodontes maximus), the tapir (Tapirus terrestrial) are also widely distributed within the Madre de Dios region, threatened by the high pressure of subsistence hunting, among human settlements. For the water mouse (Neusticomys peruviensis) and Laval bat (Thyroptera lavali), habitat loss is the biggest threat (Pacheco 2002). Among other important species we have the bush dog (Speothos venaticus), widely distributed in the Amazon basin but very rare to observe (Solari et al., 2006), also the short ear dog (Atelocynus microtis), all these Amazonian canids are categorized within CITES I.

The mammals most sensitive to hunting pressure, which requires more awareness-raising actions, are Sachavaca and primates. Because they have long gestation periods and slow development, high hunting pressure leads to a rapid decline in their populations. Compared to primates, Saxins and Huangans, they have a better response to the decline in their populations, making them less sensitive to intense hunting pressure.

The project area has attributes of high biological and ecological value, maintains important wildlife species, diversity of natural landscapes, and the unique beauty of the Collpas. The richness and diversity of species is linked to the diversity of habitats and the abundance of food, a fundamental element to guarantee the stability of animal populations.

[22] https://www.iucnredlist.org/es/species/39927/192308336
[23] https://www.iucnredlist.org/es/species/41547/191685783

Biodiversity studies conducted in the project area, as part of the Forest Stewardship Council (FSC) Standard certification of forest management, found several species of threatened wildlife. The degrees of threat of the species found were updated with respect to Supreme Decree 004-2014-MINAGRI, if they are considered CITES species and, on the IUCN, red list. These will be detailed below:

Table 5.1. Mammals - Wildlife species with some degree of threat (PGMF Maderacre)

Order ***Family*** ***Specie***	**Local Name**	**CITES Category**	**IUCN Category**	**DS-034-2004-AG**
ORDEN XENARTHRA				
Family Dasypodidae				
Priodontes maximus	Carachupa mama, Yungunturo	I	EN	VU
ORDEN PRIMATES				
Family Cebidae				
Saguinus fuscicollis	Frailecito	II		
Family Aotidae				
Aotus vociferans	Musmuqui	II		
Family Atelidae				
Alouatta seniculus	Coto, mono coto	II	NT	NT
Ateles Belzebuth Chamek		II	VU	VU
ORDEN CARNIVORA				
Family Felidae				
Panthera onca	Otorongo	I	NT	NT
Puma concolor	Puma	I	NT	NT
Leopardus pardalis	Tigrillo	I		
ORDEN PERISSODACTYLA				
Family Tapiridae				
Tapirus terrestris	Sachavaca	II	VU	VU
ORDEN ARTIODACTYLA				
Family Tayassuidae				
Pecari tajacu	Sajino	II		
Tayassu pecari	Huangana	II		
ORDEN RODENTIA				
Family Dinomyidae				
Dinomys branickii	Pacarana	II	EN	EN

Table 5.2. Birds - Wildlife species with some degree of threat (PGMF Maderacre)

Order ***Family*** ***Specie***	**Local Name**	**CITES Category**	**IUCN Category**	**DS-034-2004-AG**
ORDEN TINAMIFORMES				
Family Tinamidae				
Tinamus osgoodi	Panguana		VU	VU
ORDEN FALCONIFORMES				
Family Accipitridae				
Elanoides forficatus	Shihuango	II		
Buteo magnirostris	Shihuango	II		

Order ***Family*** ***Specie***	**Local Name**	**CITES Category**	**IUCN Category**	**DS-034-2004-AG**
Harpia harpyja	Águila Arpía	I	NT	VU
Family Falconidae				
Daptrius ater	Halcón	II		
Ibicter americanus	Halcón	II		
Milvago chimachima	Halcón	II		
ORDEN GALLIFORMES				
Family Cracidae				
Pipile cumanensis	Pava campanilla		VU	NT
Mitu tuberosa	Paujil			NT
ORDEN PSITTACIFORMES				
Family Psittacidae				
Ara macao	Guacamayo rojo			VU
Ara militaris	Guacamayo verde	I	VU	NT
Amazona festiva	Loro			NT
ORDEN APODIFORMES				
Phaethornis hispidus	Pajarito	II		
Phaethornis philippii	Pajarito	II		
Coeligena coeligena	Pajarito	II		

Table 5.3. Reptiles and amphibians - Wildlife species with some degree of threat (PGMF Maderacre)

CLASS **ORDER** ***Family*** ***Specie***	**Local Name**	**CITES Category**	**IUCN Category**	**DS-034-2004-AG**
CLASE REPTILIA				
ORDEN TESTUNIDAES				
Family Geochelonidae				
Geochelone denticulata	Motelo		VU	
ORDEN CROCODYLIA				
Family Alligatoridae				
Paleosuchus sp	Dirindirin, Lagarto enano			VU, NT
Caiman crocodilus		I		
ORDEN SERPENTES				
Family Boidae				
Boa Constrictor	Mantona	II		

Legend: I = CITES Appendix I, II = CITES Appendix II, III = CITES Appendix III, VU = Vulnerable.

Table 5.4. Summary of endangered species according IUCN

Nº	**Common Name**	**Scientific Name**	**IUCN**
1	Carachupa	*Pridontes maximus*	EN
2	Pacarana	*Dinomys branickii*	EN
3	Mono araña	*Ateles chamek*	EN
4	Águila andina	*Spizaetus isidori*	EN

Nº	Common Name	Scientific Name	IUCN
5	Caique	*Pionites leucogaster*	EN
6	Gavilan	*Leucoptemis occidentalis*	EN

Of the mammalian species found in the evaluation, two species are in danger of extinction: the Carachupa (Priodontes maximus) and the Pacarana (Dinomys branickii); two species in Vulnerable state: The Spider Monkey (Ateles belzebuth) and the Sachavaca (Tapirus terrestris); three species in a near-threatened state: the Mono coto (Alouatta seniculus), the Otorongo (Panthera onca) and the Puma (Puma concolor).

The Otorongo, or Jaguar (Panthera Onca), is found at the top of the food chain pyramid and its existence is an unavoidable sign of the health of the surrounding ecosystem in which it lives.

When the Spanish conquerors arrived in America, the Jaguars inhabited the forests from Northern California to Patagonia. Today their range has been considerably restricted, having become extinct in much of the tropical region.

The jaguar is hunted for its valuable skin, despite being a forbidden activity, which reaches high prices on the international market. In the 1960s alone, more than 20,000 jaguar skins were exported to the United States. Europe is also in the areas of destination of these skins at high prices, which causes the decline of the population of this animal.

It should be noted that, except for man, the wild jaguar is the only predator capable of controlling populations of large herbivores, such as deer, tapirs and wild pigs. Unlike what happens in the African plains or the northern temperate forests, in the Amazon the amount of prey is reduced in relation to the extension of the forest, so the Otorongo must resort, in much of its diet, to small animals such as rodents, turkeys, partridges, lizards, snakes, monkeys and sloths.

As for the species of wild flora, it is detailed below:

Table 5.5. List of harvestable forest species under threat (PGMF Maderacre)

Nº	Common Name	Scientific Name	DS 043-2006-AG	CITES	IUCN
1	Mahogany	*Swietenia macrophylla*	VU	II	VU
2	Castaña	*Bertholletia excelsa*			VU
3	Red Cedar	*Cedrela odorata*	VU	III	VU
4	Copaiba	*Copaifera reticulata*	VU		LC
5	Ishpingo	*Amburana cearensis*	VU		EN
6	Itauba	*Mezilaurus itauba*	VU		
7	Ceiba, Huimba, Lupuna	*Ceiba pentandra*	NT		LC
8	Mashonaste, Amarillo, Tulpay	*Clarisia racemosa*	NT		LC
9	Quinilla	*Manilkara bidentata*	VU		
10	Tahuari	*Handroanthus capitatus*	VU		

According to INRENA's legal norm DS. 043-2006-AG, which approves the categorization of threatened species of wild flora in Peru, 7 species of trees with commercial value present in the consolidated Maderacre are considered Vulnerable (VU) and 2 species are considered Near Threatened (NT). According to CITES,

mahogany (*Swietenia macrophylla*) is listed under CITES II and red cedar (*Cedrela odorata*) is listed under CITES III.

There are also two species of high social and ecological value: The Brazil nut (*Bertholletia excelsa*) and the shiringa (*Hevea brasiliensis*), which is extracted for its fruits and resins, both with the IUCN Vulnerable (VU) and Least Concern (LC) category), respectively; They are also strictly protected by the State, which grants them concession rights to exploit the chestnut or shiringa to develop complementary exploitation activities. It should be noted that the felling and burning of chestnut trees was declared indefinitely closed by Ministerial Resolution No. 0729-81-AG-DGFF; and then the prohibition of felling and burning of chestnut trees was decreed in Supreme Decree No. 044-2002-AG.

Other forest species of diverse importance are the aguajales where some palm species are located such as Shapaja (*Attalea phalerata*), Huasai (*Euterpe precatoria*), Huicungo (*Astrocaryum* sp.) and Aguaje (*Mauritia flexuosa*). These palms are part of the diet of many wild animal species (Bodmer 1993), as are Sapote (*Matisia cordata*), Charichuelo (*Rheedia floribunda*), Almendro (*Geoffroya striata*), Chimicua (*Pseudolmedia laeviata*), Congona (*Brosimum* sp.), Shimbillo (*Inga ruiziana*) and Uvilla (*Pourouma cecropiaefolia*).

5.1.2 High Conservation Values (B1.2)

Table 5.6. Environmental HCV analysis

High Conservation Value	Species of the Felidae family (*Panthera onca, Puma concolor*), Tapiridae (*Tapirus terrestris*) and Accipitridae (*Harpia Harpyja*) species with some degree or risk of threat according to existing classification criteria.
Qualifying Attribute	These large species are classified as "umbrella species" or "landscape species" because they use large and ecologically diverse areas and have significant impacts on the structure and function of natural ecosystems. Their habitat requirements in time and space make them particularly vulnerable to human practices of land use and resource harvesting. (WCS, 2002). The project area is in the area of the country with the most concentrated jaguar population. The study carried out by Tobler et al. (2018) within FSC-certified concessions to evaluate the Jaguar population in Guatemala and Peru. Determined, within the Consolidated, a population density of Jaguars of 4.5 individuals per 100 km2 and emphasizes that this data is comparable only with protected natural areas.
Focal Area	The project area covers approximately 171,584 hectares under the FSC-certified sustainable forest management system between the Manuripe and Muymanu river basins to the south, and bordered by the Tahuamanu river, in the Northeast the Noaya stream borders the concession.

High Conservation Value	The entire area of the project in his condition of great landscape, due to its large area of more than 171,584 hectares and its conectivity with the conservation areas of the región.
Qualifying Attribute	Key area for the connectivity of species, especially large mammals that require large areas for the development of their populations and the hydrobiological processes involved; There are sites of great importance for wildlife such as: Cochas, Pools with water in dry pipes, Aguajales, Bañeros for sajino or huangana, Quebradas, Clay licks visited by parrots and macaws, clay licks on the ground visited by mammals or other species, Nascent or “Ojos de agua”, Burrows and nests on the ground, Burrows and nests in trees. These sites will be registered both during the annual fauna assessment and during the execution of commercial censuses. The information collected will be important for planning harvesting activities and protect the high conservation values present in the Project area.

Focal Area	The project area covers approximately 171,584 hectares under the FSC-certified sustainable forest management system between the Manuripe and Muymanu river basins to the south, and bordered by the Tahuamanu river, in the Northeast the Noaya stream borders the concession.

5.1.3 Without-project Scenario: Biodiversity (B1.3)

In the no-project scenario, the forest loss trend of Tahuamanu province would be the most likely scenario that would occur in the project area. The following chart shows that, since 2012, deforestation in Tahuamanu province has grown exponentially, having increased almost five times in just five years.

Being the main threat to biodiversity, the fragmentation and loss of habitat due to the advance of the agricultural and mining activities among the main ones.

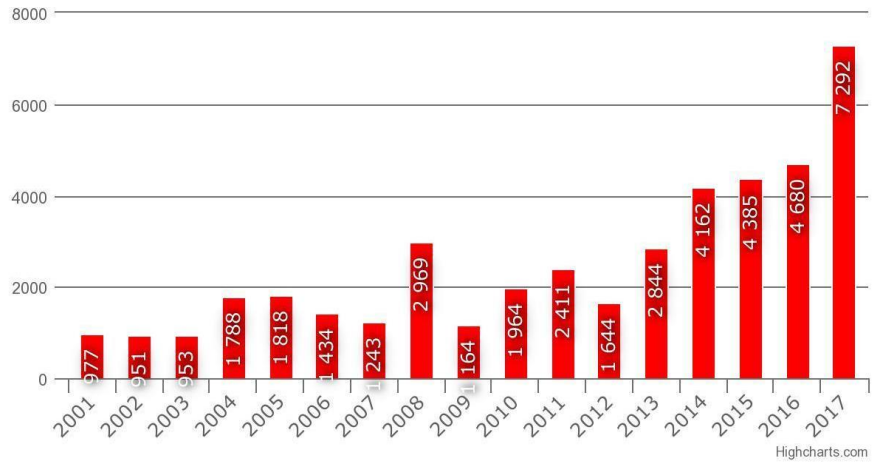


Figure 5.1. Forest loss in Tahuamanu province (GEBOSQUES – MINAM)

The expansion of the agricultural activities is caused by the continuous and accelerated pressure on the lands on both sides of the Southern Inter-Oceanic Highway (IOS) mainly by Andean migrants. They replicate traditional slash-and-burn practices, deforesting areas covered with forest, to carry out clean agriculture or intensive grazing. It is estimated that the change in land use for agriculture is growing at an annual rate of 1.29% in reduction of primary forest and 0.66% of secondary forest. Likewise, the implementation of pastures for cattle raising registers the highest annual growth rate, reaching 3.51% in reduction of secondary forest and grasslands.

In the CDC-SZF-INRENA study (2007), in section 3 of the IOS, which includes and surrounds our project area, it refers to agricultural activity (farming and livestock activities) as the main source of deforestation, representing 94.2%; agriculture 3.37% and the rest is a result of infrastructure. Likewise, the habilitation and maintenance of the IOS brings with it indirect impacts on the surrounding forests; these impacts according to Dourojeanni (2006) would be:

Deforestation, by legal and illegal agriculture in soils without agricultural aptitude.

- Forest degradation, due to forest extraction without management and replacement. The harvested species of cedar and mahogany represent 90% of the volume exploited, most of which is illegal. Myers (1980) estimates that for every m3/ha exploited, the farmers who subsequently invade the areas destroy approximately 1/5 ha of forest.
- Increased risks of forest fires (natural causes or induced fires resulting from slash-and-burn practices)

- ❖ Illegal hunting, for trade in meat, hides and skins and trafficking in live animals.
- ❖ Reduction of environmental services of the forest (water cycle, CO2 fixation, etc.).
- ❖ Loss of biodiversity and extinction of species, and the invasion of protected areas This will result in the reduction of the landscape and tourist value of these ecological niches.

Informal mining recorded, a growth rate of 3.62% per year. This increase is stimulated by the international price of gold and the lack of control mechanisms and tax inspection, which allows all mining activity to be informal, becoming a serious environmental and social threat in continuous expansion.

Mining in Madre de Dios is carried out with heavy machinery and dredging in the rivers, which produces negative impacts such as the alteration of surface water quality due to land removal; the dumping of chemicals, oils, lubricants and fuels that puts aquatic fauna at risk; direct destruction of flora and fauna, alteration of biodiversity, and alteration of the habitat due to the movement of vehicles and heavy machinery. The area is ecologically balanced. The species and habitat communities in the forest are inherently stable, but could be susceptible to alteration if there is a drastic modification of the environment with changes in land use or indiscriminate logging.

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

Table 5.7. Expected project's biodiversity impacts

Biodiversity Element	Species of the Felidae family (*Panthera onca, Puma concolor*), Tapiridae (*Tapirus terrestris*) and Accipitridae (*Harpia Harpyja*).
Estimated Change	Maintenance and increase of the umbrella species.
Justification of Change	The maintenance of the concession forest and the adjacent forest are the main factors that will allow this change to be generated, as a consequence of the fact that this is a project based on selective and low-impact logging management, allowing natural regeneration and the growth and reproduction of unharvested individuals. This allows for the conservation of almost intact forest cover, while guaranteeing the conservation of innumerable associated flora and fauna species, among them the otorongo, an umbrella species at the top of the food chain pyramid. The forest thus maintains its rhythms and cycles in a similar way to how it developed thousands of years ago, maintaining its processes, and where species that are indicators of the health of ecosystems register healthy and growing populations (as is the case with top predators such as the otorongo, the harpy eagle or the giant otter) and where other species that are highly sensitive to human presence (tapirs, deer, mountain pigs, paujiles and turkeys) maintain healthy populations. It is also worth mentioning that in the concession area, complementary activities to the sustainable use of the forest are carried out, among them, the monitoring of fauna, the fauna evaluations are carried out annually, with this it seeks to determine the status of their populations, with special emphasis on species that are indicative of a healthy environment. In addition, a database is prepared for the sites of importance for the fauna so that it can be used for the planning of the use. For this, evaluations are carried out in a specific PCA using the transect method.

Biodiversity Element	226 species inventoried with timber potential
Estimated Change	Sustainable forest management with FSC certification and Chain of Custody (CoC) certification.

Justification of Change	The project is based on selective and low-impact logging management by rotation defined from a cutting cycle and silvicultural variables such as minimum cutting diameters and harvest intensities established for each species of interest, which will allow the development of a harvest that guarantees the natural regeneration of the forest, allowing future harvests and compliance with the ecological roles of forest species. The cutting cycle divides the area under sustainable forest management into a total of 20 cutting plots, which will be harvested annually (one part each year) and at a certain intensity of harvesting (the design considers a cutting cycle every 20 years), allowing natural regeneration and the growth and reproduction of unharvested individuals. A great diversity of species (226) with timber potential has been inventoried. The methodology includes the approval of a General Forest Management Plan and the preparation of the Annual Operating Plan, which begins with a forest inventory, in which the variety and quantity of potential species to be harvested is recorded. This makes it possible to know the number of individuals of each species that are suitable for harvesting, and the approximate volume of wood that they will generate, which makes it possible to calculate and control, among other things, the total volume of wood to be harvested. This makes it possible to identify the seed trees (approximately 20% of the total number of individuals to be harvested) that are kept in the forest, guaranteeing the production of seeds and ensuring the survival of the species and favoring their natural regeneration. Felling is done by directing the fall and minimizing damage to the surrounding vegetation, so that the clearings left in the forest are of similar dimensions to those created by the natural fall of the trees. This favors regeneration since the entry of light into the clearings triggers the growth of seedlings that remained in a dormant state under the shade of the parent tree. The inventories also make it possible to identify high value conservation sites and take operational measures to exclude these areas from intervention activities and thus ensure the protection of these key wildlife spaces. This allows the conservation of the forest cover almost intact, guaranteeing in turn the conservation of innumerable species of associated flora and fauna. To this end, the project has trained personnel, created infrastructure and adapted the processes necessary to obtain the Sustainable Forest Management Certification - FSC 100% - guaranteeing an environmentally sustainable, socially inclusive and economically viable model. It also has certification of its Chain of Custody (CoC), which guarantees that the product it sells reaches the customers respecting the traceability processes and the three pillars of sustainability (environmental, social, and economic). In this way, the forest maintains its rhythms and cycles in a similar way to how it developed thousands of years ago, maintaining its processes, and where the species that indicate the health of the ecosystems register healthy and growing populations.

5.2.2 Mitigation Measures (B2.3)

There are no expected negative impacts on biodiversity as a result of the implementation of the project activities.

Presence of High Conservation Values (HCV)

Prior to forest harvesting, sites with high conservation values are identified, a buffer area is determined and in the planning process they are excluded from harvesting, thus ensuring their protection. It should be avoided as far as possible to direct the fall towards sites with High Conservation Values (HCV) such as natural regeneration, seed trees, species to protect, wildlife and their sites of importance. For this effect, regeneration with several years of development and that is already established (DBH> 10cm) is considered mainly, small seedlings are not considered, which present a high mortality rate due to natural causes.

Priority should be to protect the regeneration of the most valuable species that will favor management, in this case, Mahogany, Cedar, Shihuahuaco, Estoraque, Azucar Huayo, among others.

Avoidance of unnecessarily damage trees of ecologically important species. In the BAVC study, trees of species that produce edible fruits for the fauna have been considered as important sites for fauna and in the PGMF special guidelines have been taken for the protection of commercial species, such as defining a minimum diameter of Short and harvest intensity that guarantee the presence of remnants in sufficient quantity to allow the species to continue fulfilling its ecological roles, including serving as a source of food for the fauna. The necessary measures for other species to be protected during logging should be detailed as experience in forest management increases.

As far as possible, efforts should be made not to damage fauna species during logging, nor to sites of importance to it, as well as other protected areas for harboring High Conservation Values. In general, the larger fauna is removed from the felling sites, however, if it occurs that some species is found on the tree to be felled, the chainsaw must give the opportunity to remove it before starting the main cut. If the animal does not do so for any particular reason, especially if it is a valuable species, the manager should be consulted to make the final decision. Trees protected by having nests or burrows should not be cut down.

In order to maintain and conserve the HCV, the following activities have been defined:

Measures to Maintain Flora Species:

For forest species listed as species with some category of threat and that are part of the UMF exploitation program, the following measures must be taken into consideration:

1. Carry out evaluations and studies to define the state of Natural Regeneration.

2. Measure the growth of each species so that the necessary information is available to adjust its silvicultural variables at the PGMF level.

3. Propose silvicultural measures that allow the responsible management of these species, propose adequate silvicultural variables for each species and based on the Cutting Cycle (CC) defined for the FMU: Minimum cutting diameter (DMC) and cutting intensity (IC).

4. Define the need and feasibility of implementing silvicultural treatments by species, this based on the results of evaluations and studies carried out in the same forest. The adjustment of the variables and silvicultural treatments will be made based on the results of the monitoring, not exceeding a period of more than 5 years for their review.

5. Implement a reduced impact harvesting system (AIR), which reduces the impact on the regeneration of species of commercial interest and of other species of flora with some category of threat.

6. Establish an adequate system of control and surveillance of the accesses and limits of the concession to avoid illegal logging and invasions with the consequent change in land use.

Measures to Maintain Fauna Species:

For species of fauna present in the FMU and that are listed as species with some category of threat, the following measures must be taken into consideration:

1. Prohibit the hunting of species of fauna within the concession.

2. Conduct periodic evaluations of wildlife through sighting records carried out annually by previously trained company personnel. The objective is to know the presence of the species cataloged as important for monitoring, either because of their degree of threat or because they are indicator

species of the state of the ecosystem. Its results should be analyzed and presented in the annual monitoring report, making a comparative historical analysis with the findings of previous evaluations.

3. Carry out five-year evaluations that allow evaluating the state of wildlife populations in general, in addition to the evolution of their population indicators over time, taking into consideration or as a baseline the population densities of the species. These evaluations, due to their complexity and the high degree of specialization required for the recognition of the species of fauna, will be carried out by specialists external to the company.

4. Identify during forest census work and other assessment work, sites of importance for wildlife:
   a) Cochas: small, medium or large bodies of water that serve as a habitat for ichthyofauna and as a source of water.
   b) Pools or troughs in dry pipes: they serve as a source of water during the dry season.
   c) Aguajales-type ecosystems.
   d) "Bañeros" for the sajino (Pecari tajacu) and the huangana (Tayassu pecari)
   e) Permanent streams: The streams are home to reptile species such as the dwarf lizard (Paleosuchus sp), the ichthyofauna, as well as being a source of water supply for other species of wildlife. The fiscal strips of permanent open streams (25 m on each margin) must be protected and excluded from the exploitation.
   f) Clay licks on the banks of rivers or streams: normally visited by parrots and macaws.
   g) Clay licks on the ground: visited mainly by terrestrial mammals and birds.
   h) Headwaters of bodies of water or "water eyes".
   i) Burrows and nests on the ground.
   j) Burrows and nests in trees.

5. All sites of importance for wildlife or other HCVs that are identified during forest censuses or other evaluation work should be progressively considered in the cartography to be excluded from the use of the corresponding CP. The area occupied by these sites or HCVs, depending on their importance, will be delimited with the use of signs or other marks on the ground that allow field personnel to locate and avoid them.

6. Establish an adequate system of control and surveillance of the accesses and limits of the concession to prevent poaching.

Measures to Maintain Conservation Areas:

To maintain the integrity of the species and ecosystems that occur in the conservation areas defined in the FMU, the following measures must be taken into consideration:

1. Exclude conservation areas from forest extraction. Make a use compatible with the conservation of the area (non-timber management, ecotourism, environmental services, etc.).

2. Prohibit the hunting of fauna species within the concession.

3. Delimit and mark conservation areas with the use of pedestrian paths and information signs.

4. Establish an adequate surveillance system for the accesses and limits of the conservation areas.

Measures to Maintain the integrity of the Landscape:

To maintain the integrity of the landscape, it is necessary to avoid the fragmentation of the forests, in that sense the measures to be considered are:

1. Establish an adequate surveillance system for the UMF's accesses and limits.

2. Implement a reduced impact harvesting system.

Measures to maintain water quality:

1. Establish an adequate surveillance system for the UMF's accesses and limits.
2. Establish fiscal strips in rivers and open streams of up to 25 meters on each side of the watercourse.
3. Implement a reduced impact harvesting system.
4. Identify and mark water sources (springs) to prevent them from being affected by forestry operations.

5.2.3 Net Positive Biodiversity Impacts (B2.2, GL1.4)

The current good condition of wildlife within the Consolidated Area is apparently due to the prohibition of hunting, the implementation of reduced impact harvesting techniques, surveillance and control actions, and process monitoring and continuous staff training.

Despite the fact that hunting pressure is very low or almost non-existent thanks to the control mechanisms carried out by the concession, the roads and trails used for timber extraction within the concession area and the proximity to the IOH will facilitate access by illegal hunters. Periodic patrols in the sectors defined as most critical due to their easy accessibility are needed to ensure that no illegal hunting activity takes place within the concession area, an objective that should be achieved only through carbon finance.

On the other hand, the monitoring of the fauna that is being carried out to control and evaluate the populations of indicator species such as:

- Species of the Order Primates (Alouatta seniculus, Ateles Chamek) these species correspond to medium and large primates, easily observed that use trees as habitats and as a source of food (Pozo W, 2009), if the trees present in MADERACRE do not provide the Necessary conditions for the establishment of populations of these species the forestry activity could be having a negative impact on the wild fauna of the area.

- Species of the family Felidae (Panthera onca), Tapiridae (Tapirus terrestris) and Accipitridae (Harpia harpyja). These large species are classified as "umbrella species" or "landscape species" because they use large and ecologically diverse areas and have significant impacts on the structure and function of natural ecosystems. Their habitat requirements in time and space make them particularly vulnerable to human practices of land use and resource harvesting. (WCS, 2002). The monitoring of these species and their presence in MADERACRE can indicate the good health of their environment and in the case of predatory species they also allow us to infer the state of conservation of the species of fauna that constitute their source of food (prey).

- Species of the Cracidae Family (Pipile cumanensis, Penelope jacquacu and Mitu tuberosa) are hunted in the Peruvian Amazon. Generally, in places with a lot of hunting pressure there are very low populations, however, in MADERACRE the sightings were relatively abundant, which indicates that hunting pressure does not exist in the area, however, damage to their habitats can also affect their populations to the extent that their food requirements come from the fruits of the forest. If the populations of these species decrease, MADERACRE's forestry activities could be affecting them (Cancino and Brooks, 2006).

- Species of the families Psittacidae (Ara ararauna and Ara chloropterus), Ramphastidae (Ramphastos cuvieri) and Piscidae (Celeus sp). These species are closely related to large tree species and many of them timber. The Psittacidae build their nests in emerging trees; Ramphastidae feed on emergent tree fruits and Piscidae feed on insect larvae found in emergent trees.

- Geochelone denticulata. - This species is easy to observe, and its slow movements make it become an easy prey for its hunters, which is why its populations decrease with human presence. In MADERACRE, few individuals were observed during the evaluation, however, the workers mention that they are easily found in their daily working hours. Monitoring of this species is recommended because the decrease in its populations may indicate that there is hunting pressure on them.

Source: Indicator and suggested species for monitoring according to: (Loja 2011) (Barrio 2005) (Loja, 2017) Five-year monitoring of wildlife in the Maderacre concession.

It should also be noted that the Project contemplates other complementary activities for the sustainable use of the forest, such as: Sustainable use of Brazil nuts and wildlife monitoring.

5.2.4 High Conservation Values Protected (B2.4)

Targeted and low-impact logging does not adversely affect any HCV, but sustainable harvesting favors the conservation of almost intact forest cover, while ensuring the conservation of countless species of associated flora and fauna as well as of jaguar and other endangered species, which were shown in a table above.

The study carried out by Tobler et al. (2018) within FSC-certified concessions to evaluate the Jaguar population in Guatemala and Peru. Determined, within the Consolidated, a population density of Jaguars of 4.5 individuals per 100 km2 and emphasizes that this data is comparable only with protected natural areas. Concluding that the intensity of forest harvesting in the consolidated, adequately protects the Jaguars and thus other species; and that extraction has a positive impact on the diversity and abundance of certain species. Furthermore, states that certified concessions allow connectivity between protected areas and natural forest; this is due to the absence of hunters in concessions as a measure to protect the biodiversity that inhabits them.

Also according to the preliminary report of the study of jaguars and pumas in the certified forest concessions MADERAS COCAMA AND ASERRADERO ESPINOZA, of the "Project Areas Amazonia, WWF-PERU and San Diego Zoo Global", Within the consolidated also is the highest frequency of large carnivores and small ones, of terrestrial birds such as the paujil (Mitu tuberosa), of primates such as the spider monkey (Ateles chamek), coto monkey (Alouatta sara) and white machin monkey (Cebus macrocephalus), and also a high frequency of large ungulates such as tapirs (Tapirus terrestris), sajinos (Pecari tajacu) and red deer (Mazama americana).

In this sense, the high conservation values identified for the project as the area per se of more than 170 thousand hectares and the umbrella species are not affected by the harvesting activities.

5.2.5 Species Used (B2.5)

According to the General Forest Management Plan of the Consolidated, the following species are planned to be harvested. It also specifies the Minimum Cutting Diameters (MCD) that these species must reach in order to be considered for harvesting.

Table 5.8. Harvestable species

Nº	Common name	Scientific name	D. meta (cm)*	DMC (cm)	IC (%)
1	Aceituna caspi	*Neea sp*	70	55	100
2	Achihua	*Jacaranda copaia*	70	60	100
3	Ana Caspi	*Apuleia leiocarpa*	80	75	100
4	Azúcar huayo	*Hymenaea oblongifolia*	80	75	100
5	Cachimbo	*Allantorna decandra*	75	65	100
6	Caimitillo	*Pouteria cladantha*	65	55	100

Nº	Common name	Scientific name	D. meta (cm)*	DMC (cm)	IC (%)
7	Caoba	*Swietenia macrophylla*	100	90	100
8	Capirona	*Calycophyllum spruceanum*	75	65	85
9	Catahua	*Hura crepitans*	90	80	70
10	Catuaba	*Qualea paraensis*	75	65	90
11	Cedro	*Cedrela odorata*	80	70	100
12	Copaiba	*Copaifera reticulata*	80	75	100
13	Cumala	*Virola spp*	70	50	100
14	Estoraque	*Myroxylon balsamum*	75	60	90
15	Guacamayo caspi	*Barnebydendron riedelii*	75	65	95
16	Huayruro	*Ormosia schumkei*	80	65	100
17	Huimba	*Ceiba lupuna*	90	80	100
18	Ishpingo	*Amburana cearensis*	75	70	100
19	Isigo	*Tetragastris altissima*	70	55	100
20	Itauba	*Mezilaurus itauba*	70	65	100
21	Limoncillo	*Zanthoxylum juniperinum*	70	55	100
22	Lupuna	*Ceiba pentandra*	90	80	100
23	Manchinga	*Brosimum alicastrum*	80	75	100
24	Mashonaste	*Clarisia racemosa*	75	65	95
25	Moena	*Aniba guianensis*	70	55	100
26	Ojé	*Ficus insipida*	80	75	100
27	Palo bastón	*Astronium graveolens*	80	60	100
28	Pashaco	Schizolobium amazonicum	70	50	90
29	Paujil ruro	Pterygota amazonica	80	50	100
30	Quillobordón	Aspidosperma parvifolium	80	55	90
31	Quinilla	Manilkara bidentata	75	70	100
32	Quinilla blanca	Pouteria reticulata	70	60	100
33	Remo caspi	Aspidosperma rigidum	75	60	90
34	Requia	Guarea sp	70	60	100
35	Shihuahuaco	Dipteryx micrantha	75	70	100
36	Tahuarí	Handroanthus capitatus	80	60	100
37	Tornillo	Cedrelinga catenaeformis	80	75	100
38	Ubos	Spondias mombin	75	65	80
39	Uchumullaca	Trichilia pleeana	80	40	100
40	Yacushapana	Terminalia oblonga	75	65	100
41	Yerno en prueba	Acacia sp	80	70	100
42	Yutubanco	Drypetes amazonica	65	50	85
43	Zapote	Matisia spp.	75	65	100

Of these species, mahogany and cedar are the only ones that require a special permit for harvesting because they are species listed in Appendix II and III of CITES. In Art. 130. of FFS Law No. 29763 the CITES Management Authority approves the annual export quota of mahogany (Swietenia macrophylla) including the export of sawn wood, plywood or veneer sheets in accordance with the CITES annotation of the species.

The export quota is established for as long as this species is considered in CITES Appendix II and is defined on the basis of the recommendations of a non-detriment finding by the CITES Scientific Authority, and takes into account performance studies, among other relevant information. The general guidelines for the export quota are defined by supreme decree with the endorsement of the Ministers of Agriculture and Environment.

5.2.6 Invasive Species (B2.5)

The forestry management used is of the type of thin polycyclic highly selective, i.e., it exclusively manages the mass on foot favoring the growth of commercial species without eliminating undesirable species. In addition, this system allows forest dynamics to continue as it allows for several periods of years of rest in the previously exploited area. Harvest levels are very low and there is no induced regeneration with exotic species, natural regeneration is promoted. Therefore, there would be no possibility of the area being affected by invasive species.

5.2.7 Impacts of Non-native Species (B2.6)

Not applicable.

5.2.8 GMO Exclusion (B2.7)

Not applicable.

5.2.9 Inputs Justification (B2.8)

Not applicable.

5.2.10 Waste Products (B2.9)

The company has a Forest Operations Manual where waste management is contemplated and mentions the following:

Due to the difficulty of identifying a specific group destined to waste management, mainly due to the large extension of the work area and the different activities carried out within the concessions (camps, inventories, sampling, drag roads, roads, storage yards, etc.), each person who generates it is responsible for waste management. It is forbidden, for any reason, to dump or leave garbage out of the containers or pools established for this purpose.

Deposits must be installed for the temporary storage of waste, appropriate for the management of solid and liquid waste as the case may be; In addition to the camps, these deposits must be located in the storage yards.

The waste generated in MADERACRE's forestry operations is classified into three categories: Common, Contaminated and Hazardous.

Biodegradable waste, such as fruit and vegetable peels, food waste, paper and cardboard made of vegetable fiber or cellulose, pieces of wood, leaves and branches can be collected in the same containers as plastic sheets, plastic containers and objects, rubber, metals and glass as long as they are not contaminated by fuels, lubricants or toxic substances. All these materials will make up the COMMON WASTE group.

Slowly degrading wastes that have had contact with lubricants and / or fuels, such as plastic sheets, plastic containers and objects, rubber, metals and waypes or tow make up the POLLUTED WASTE group.

Batteries, cells and acids form the group of HAZARDOUS WASTE.

The waste must be grouped by these categories and in this way be deposited in containers of different colours, in addition to the colour, each container must include the detailed description in the following table:

Table 5.9. Waste disposal system

Category	Color	Description
Common	Green	Organic, uncontaminated paper, cardboard, plastics, metal cans and glass.
Contaminated	Yellow	Filters, fuel, and lubricant containers, used gloves, tow and other contaminated.
Dangerous	Red	Batteries and medical services

On a daily basis, the waste must be taken, separated into its groups, to the waste pits, with the exception of Contaminated and Hazardous Waste that must be temporarily placed in suitable containers to later be transported outside the FMU and deposited in the municipal garbage dump. of Iñapari. It is strictly forbidden for these residues to be buried in the wells within the FMUs.

The waste pits should be placed in holes dug in the ground not less than 10 meters away from the camp, they should have a depth of approximately 1.5 m. Periodically these holes must be covered with earth and when filling a new hole must be opened, if necessary it must be disinfected weekly with quicklime.

The burning of waste or vegetation is strictly prohibited in any of the operating areas and camps within the concessions.

The sewage from the camp should not be dumped directly into streams or natural water reservoirs, the sewage from the kitchen, showers and toilets should be evacuated to a sedimentation well, the overflow from the well must give towards the vegetation, never directly to water courses, this drainage channel will allow the oxidation and partial degradation of organic matter prior to its natural transport to a water course due to the effects of rain.

Toxic liquids, fuels, or oils should not be spilled into streams or natural water reservoirs, or at sites that drain into those areas during rains. Accidental spills of fuel or oil should be covered with sawdust or other absorbent material such as waypes and the contaminated surface soil should be removed and deposited in containers for later transfer to the town of Iñapari.

For the construction of camps, the provisions of the Manual for the construction and closure of camps of the company must be considered.

5.3 Offsite Biodiversity Impacts

5.3.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Measures (B3.2)

Table 5.10. Negative offsite biodiversity impacts

Negative Offsite Impact	Mitigation Measure(s)
Increased deforestation pressure due to the expansion of the agricultural and grazing activities in the areas adjacent to the concession.	Identify and finance every two years' pilot productive initiatives of the population around the project (families and / or associations) that contemplate a friendlier use of the land, reduce the expansion of the agricultural activity and at the same time improve their living conditions. For this purpose, 2% of the annual income of the project will be used for its financing at a pilot level, seeking that this allows them to scale over time, as well as to be replicated in other members of the community. Promote initiatives that contribute to the sustainable development of the population around the project in accordance with the prioritization determined by the Project's Community Relations Consultative Committee. 1% of the

Negative Offsite Impact	Mitigation Measure(s)
	annual income of the Project will be used for this purpose. Development and implementation of mechanisms for the dissemination of environmental education among children, adolescents and communities involved in the project. Where it articulates with workshops on the management of crops of interest, controlled burning, agroforestry systems, etc. to adjacent communities.
Increase in illegal logging of high commercial value forest species in the areas adjacent to the concession.	Implementation of the Comprehensive Custody Plan of the forest management unit (UMF). It contemplates the following sub-activities: a) Installation and maintenance of the UMF surveillance posts. b) Delimitation and maintenance of 100% of the limits of the UMF. c) Installation and maintenance of "Milestones" at the vertices of the UMF. d) Improve and maintain the UMF signage. e) Periodic patrolling of vulnerable sectors. Participate in the spaces for dialogue and management of the Protected Natural Areas (ANP) and the Madre de Dios Territorial Reserve, seeking to generate alliances with key institutions for their protection. Promote activities with institutions whose objectives are oriented to the protection of Protected Natural Areas (ANP) and the territories inhabited by the PIACI. 1% of the annual income of the Project will be used for this.
Loss of biodiversity due to increased illegal hunting of wildlife in areas adjacent to the concession	Implementation of the Comprehensive Custody Plan of the forest management unit (UMF). It contemplates the following sub-activities: a) Installation and maintenance of the UMF surveillance posts. b) Delimitation and maintenance of 100% of the limits of the UMF. c) Installation and maintenance of "Milestones" at the vertices of the UMF. d) Improve and maintain the UMF signage. e) Periodic patrolling of vulnerable sectors. Promote activities with institutions whose objectives are oriented to the protection of emblematic fauna and flora species. 1% of the annual income of the Project will be used for this purpose.

These activities, also considered as mitigation measures, are part of the theory of change that in turn respond to the objectives of the project.

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

Under the principle of adaptive management, unmitigated off-site impacts on biodiversity will be identified during the course of the project and strategies and activities to reduce negative impacts generated by the project will be reassessed.

The measures adopted will focus mainly on continuously training the local population on the benefits and appropriate use of the forest resources through informative and educational talks.

On the other hand, although deforestation pressure has increased in order to expand the agricultural and grazing activities in the areas adjacent to the concession, this has contributed to the high population density of umbrella or indicator species in the concession area, which has become a refuge area because it is a space with minimal human disturbance.

5.4 Biodiversity Impact Monitoring

5.4.1 Biodiversity Monitoring Plan (B4.1, B4.2, GL1.4, GL3.4)

The company developed a Comprehensive Monitoring Plan, which constitutes an internal management tool, this plan includes monitoring the environmental, social and economic aspects of the company's

operations, including monitoring the implementation of the REDD project and deforestation within and in the area of influence of the MADERACRE concession, this to be implemented by obtaining income from the sale of credits for the reduction of carbon emissions and other greenhouse gases. Below is a summary table with some of the activities that will be developed in the monitoring of operations in the concession:

Table 5.11. Biodiversity monitoring system

Activities	Goals	Indicator	Verification means	Responsible
Forest census	Cost	S/./ha	Record supplies and labor force	Head of Evaluation and Monitoring
	Total N° trees and volumes per ha and species into PC	Trees/ha, m^3/ha, Total trees, Total m^3	Evaluation report	Head of Evaluation and Monitoring
Silvicultural monitoring	Reported area, average and total	ha/day, ha	Daily log	Head of Evaluation and Monitoring
	Forest growth and species to be managed	m^2/ha	Evaluation report	Head of Evaluation and Monitoring
	Cost	S/./ha	Record supplies and labor force	Head of Evaluation and Monitoring
Maintenance of protected and conserved areas	Cost	S/./ha	Record supplies and labor force	Head of Evaluation and Monitoring
	Delimit and mark	km	Daily log	Head of Evaluation and Monitoring
	Control and surveillance	N° controls	Daily log	Head of Evaluation and Monitoring
Environmental management plan	Cost	S/./ha	Record supplies and labor force	Head of Evaluation and Monitoring
	Prevention and correction impacts	ha	Prevention and correction records	Head of Evaluation and Monitoring
	Control and surveillance	ha	Control and surveillance records	Head of Evaluation and Monitoring

Below, monitoring mechanisms are detailed for the assessment of the implementation of measures defined to maintain the HCV identified within the concession:

Table 5.12. Monitoring plan for AVC maintenance measures

Activity	Indicator / Verification Means *	Goal	Frequency	Responsible
Measures to Maintain Flora Species				
Evaluate the state of Natural Regeneration of forest species of commercial interest	Evaluation report	1	Annual	Head of Evaluation and Monitoring
Measure the growth of each forest species	Evaluation report	1	Biennial	Head of Evaluation and Monitoring

Activity	Indicator / Verification Means *	Goal	Frequency	Responsible
Establish adequate silvicultural variables for each species and according to the Cutting Cycle (CC) defined for the MU.	Updated silvicultural system	1	Max 5 years **	Head of Evaluation and Monitoring
Define the need and feasibility of implementing silvicultural treatments by species.	Updated silvicultural system	1	Max 5 years **	Head of Evaluation and Monitoring
Implement a reduced impact harvesting system (AIR)	Evaluation report	1	Annual	Head of Evaluation and Monitoring
Establish an adequate system of control and surveillance of the accesses and limits of the concession.	N° of invasion events	0	Annual	Head of Evaluation and Monitoring
Measures to Maintain Fauna Species				
Prohibit the hunting of fauna species within the concession.	Hunted Animals	0	Annual	Head of Evaluation and Monitoring
Periodically assess wildlife important for monitoring through sighting log	Evaluation report	1	Annual	Head of Evaluation and Monitoring
Evaluate the state of wildlife in general, in addition to the evolution of its population indicators over time	Evaluation report	1	Quinquennial	Head of Evaluation and Monitoring
Identify important sites for wildlife during forest census work	Site Map	1	Annual	Head of Evaluation and Monitoring
Exclude from harvesting areas that host sites of importance for wildlife	N° of trees felled in AC	0	Annual	Head of Evaluation and Monitoring
Establish an adequate system of control and surveillance of the accesses and limits of the concession to prevent poaching.	N° of invasion events	0	Annual	Head of Evaluation and Monitoring
Measures to Maintain Conservation Areas				
Exclude conservation areas from forest extraction. Make a use compatible with the conservation of the area.	N° of trees felled in AC	0	Annual	Head of Evaluation and Monitoring
Prohibit the hunting of fauna species within the concession	Hunted Animals	0	Annual	Head of Evaluation and Monitoring
Delimit and mark conservation areas with the use of pedestrian paths and information signs	Marked AC	2	Annual	Head of Evaluation and Monitoring
Establish an adequate surveillance system for the accesses and limits of the conservation areas	N° of invasion events	0	Annual	Head of Evaluation and Monitoring
Measures to Maintain the Integrity of the Landscape				
Establish an adequate system of control and surveillance of the accesses and limits of the concession.	N° of invasion events	0	Annual	Head of Evaluation and Monitoring

Activity	Indicator / Verification Means *	Goal	Frequency	Responsible
Implement a reduced impact harvesting system (AIR)	Evaluation report	1	Annual	Head of Evaluation and Monitoring
Measures to Maintain Water Quality				
Establish an adequate system of control and surveillance of the accesses and limits of the concession.	N° of invasion events	0	Annual	Head of Evaluation and Monitoring
Establish fiscal strips in rivers and open streams of up to 25 meters on each side.	Evaluation report	1	Annual	Head of Evaluation and Monitoring
Implement a reduced impact harvesting system (AIR)	Evaluation report	1	Annual	Head of Evaluation and Monitoring
Identify and mark water sources (springs) to avoid being affected by forestry operations.	Site Map	1	Annual	Head of Evaluation and Monitoring

* In some cases they are considered Indicators and in others the Means of Verification
** Max 5 years: The adjustment of the variables and silvicultural treatments will be made based on the results of the monitoring, not exceeding a period greater than 5 years for their review, and must occur every time an event that impacts the system is evidenced. importantly (within a period of less than 5 years).

5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

The results of the Fauna Monitoring and High Conservation Values (HCV) evaluations, as well as the related documentation, are uploaded to the official website of the project proponent for dissemination. This is shown in the following figure and the online address is http://maderacre.com/sostenibilidad/

In addition, in the case of FSC certification, as part of its public announcements on its official page for Peru, which is https://pe.fsc.org/es-pe

For the dissemination with the neighbouring communities, it is carried out through the social manager, following a social dissemination plan, through informative workshops and meetings with representatives and residents.

Figure 5.2. Company webpage

5.5 Optional Criterion: Exceptional Biodiversity Benefits

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

In the flora and fauna study carried out to obtain FSC certification, the presence of Ishpingo (Amburana cearensis) was found, the only exploitable commercial species classified as Endangered by the IUCN (2019). For its sustainable management MADERACRE has defined a minimum cutting diameter of 70 cm, which is 14 cm higher than that defined in national regulations, this in order to reduce the intensity of harvesting of the species and guarantee the presence of populations healthy for the fulfillment of their ecological roles.

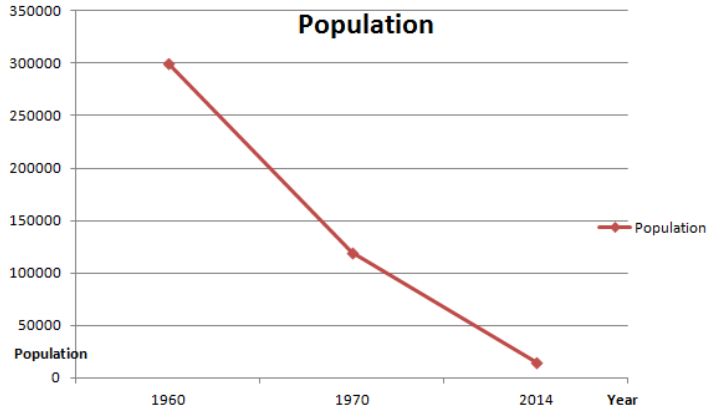
The project can obtain the Gold Level of exceptional benefits for biodiversity thanks to the fact of being a priority status of biodiversity conservation because the project area meets the criteria of hosting a threatened species from the IUCN Red List, Panthera Onca (in the near threatened category).

5.5.2 Trigger Species Population Trends (GL3.2, GL3.3)

Table 5.13. Trigger species

Trigger Species	Jaguar (*Panthera onca*).
Population Trend at Start of Project	Yet today, jaguars have been almost eliminated from the United States and populations in Central and South America are falling because of habitat destruction, trophy hunting and conflict with humans. Jaguars are listed as “Near Threatened” on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. Although they still exist in countries such as Arizona and Mexico, the species only inhabits 40% of their original, historical range (WCS, 2007)[24]. In the mid-1800s, the jaguar population extended from Southern Brazil north to Central America, and along west coasts of

[24] Wildlife Conservation Society (wcs), 2007, “Jaguars in the New Millenium Data Set Update: Th e State of the Jaguar in 2006”, wcs, Nueva York; 1998, “Edge Eff ects and the Extinction of Populations Inside Protected Areas”, Science, 280 (5372): 2126–2128.

	Mexico. Jaguars could be found in the southwestern United States, and as far north as the Grand Canyon in Arizona (Tony Davis, 2013). There were an estimated 400,000 jaguars roaming in the wild. In the 1960s and 1970s, approximately 18,000 jaguars were killed each year (Panthera Inc, 2014). By 1996, the jaguar population was almost completely eliminated from the United States. Only four jaguars sighted in New Mexico and Arizona established that the population still inhabited the U.S, and the jaguar is now listed as an endangered species in these areas by the U.S. Fish and Wildlife Service. Today it is estimated that only 15,000 jaguars remain in the wild and have been protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 1973 (Tony Davis, 2013). As number of jaguars has drastically declined in the past 150 years, the pattern of growth exhibited by the species is exponential decay. The birth rates of the jaguars are declining as their death rates are increasing, and this is causing their numbers to steadily decline.  With 22,000 jaguars in its territory, Peru is the second country in South America with the largest number of jaguars after Brazil; however, this figure is half of what should be registered, according to the corporate sustainability program Conexión Jaguar. According to international research, it is estimated that for every 100 square kilometers of protected areas in the Amazon there are 4.5 jaguars, and in unprotected areas the number is reduced by half. The threats to jaguar survival are increasing. Illegal trade and poaching have increased in recent years due to a growing demand for their tusks in the Asian market. This situation, coupled with the loss of its habitat, is accelerating the risk of extinction for the species. A bleak outlook for the region's largest cat. For this reason, Peru has asked CITES to recognize the jaguar as a flag species of the American countries where it lives and to adopt special measures to protect it.
Without-project Scenario	As can be seen from the information presented, there are no precise statistics on the population of jaguars in the American continent or in Peru. However, what all researchers agree on is the fact that this population is decreasing at an alarming rate because of the damage to its habitat and the fragmentation of the biological corridors that this species requires for its survival. As can be seen in the adjacent areas, the loss and degradation of forests is increasing with the consequent negative impact on the jaguar population and pushing this population towards the protected forests of the project area, as reported by the study by PROJECT AREAS AMAZONIA, WWF-PERU AND SAN DIEGO ZOO GLOBAL, using camera traps, the frequency of observation of larger cats such as the Jaguar is considerably higher than in other nearby conservation areas.

With-project Scenario	The study by PROJECT AREAS AMAZONIA, WWF-PERU, AND SAN DIEGO ZOO GLOBAL[25] within the Consolidated indicates that the population density of the Jaguar in the Espinoza group concessions during 2009 (Currently part of the Project area), up to 27 different jaguars could be identified through the pattern of the spots that is unique for each individual. Thanks to this information, we have been able to calculate a specific density estimate for this area, using the spatially explicit capture recapture (SECR) method, of 4.9 jaguars per 100 km2. While the average density found in all our studies was 4.4 ± 0.7 jaguars / 100km2. These measurements were made through camera traps placed in strategic locations within the forest and extraction roads. The Jaguar is an indicator of the good condition of the forest, its presence alone would demonstrate that the ecological processes of the forest are optimal and that the logging carried out does not generate a negative impact on biodiversity but on the contrary is a bridge for the transit of countless species, improving the connectivity between natural protected areas and the project.

[25] AREAS-Amazonia of WWF-Perú (2012). Preliminary report of the study of jaguars and pumas in the certified forest concessions maderas cocama and aserradero espinoza. Puerto Maldonado, September 2012.

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