

REDD+ PROJECT - REDDES LOCALES FOR DEVELOPMENT



Fundación para el Desarrollo Integral del Hombre y su Entorno

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Gold Level Criteria	<ul style="list-style-type: none"> - Climate Change Adaptation Benefits - Exceptional Biodiversity Benefits
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Acronyms

AFOLU	Agriculture, Forestry and Other Land Use
A/R	Afforestation / Reforestation
AUDD	Avoided unplanned deforestation and forest degradation
CBD	Convention on Biological Diversity
CCBS	The Climate, Community and Biodiversity Standards
CE	Collect Earth
CER	Certified Emission Reduction
COCODE	Community Development Councils
CODEDES	Departmental Development Councils
CODEMA	Departmental Environmental Commissions
CODEMARN	Departmental Commission of Environment and Natural Resources
CONAP	National Council for Protected Areas
CONRED	Coordinating Agency for Disaster Reduction
COMUDE	Municipal Development Councils
DBH	Diameter Breast Height
DMP	Municipal Planning Department
DOE	Designated Operating Entity
ER	Emission Reduction
ER-PIN	Emission Reduction Program Idea Note
ERPD	Emissions Reduction Program Document
FAO	Food and Agriculture Organization
FCPF	Forest Carbon Partnership Facility
FIP	Forest Investment Program
FFC	ForestFinest Consulting
FMP	Forest Management Plan
FREL	Forest Reference Emissions Levels
FRL	Forests Reference Levels
GCI	Inter-Agency Coordination Group
GHG	Greenhouse Gases
GIMBUT	Inter-Institutional Group for Forest Monitoring and Land Use
GIS	Geographical Information System
GISREDD	Inter-Institutional Group of REDD Safeguards
GRM	Grievance Redress Mechanism
IARNA	Research and Projection Institute on Natural Environment and Society
ILO	International Labor Organization
IPCC	Intergovernmental Panel on Climate Change
INAB	National Institute of Forests
MAGA	Ministry of Agriculture, Livestock and Food
MARN	Ministry of Environment and Natural Resources
MEM	Ministry of Energy and Mines
MINIFIN	Ministry of Finance
MRV	Monitoring, Reporting and Verification
NAMA	Nationally Appropriate Mitigation Actions
NDC	Nationally Determined Contribution
NGO	Non-Governmental Organization
NTFP	Non -Timber Forest Product
OFM	Municipal Forestry Office
PES	Payment for Ecosystem/Environmental Services
PINFOR	Forest Incentive Program

PINPEP	Forest Incentives Program for Small Forestry and Agroforestry Land Owners
PDD	Project Design Document
PROBOSQUE	Law to promote the Establishment, Recovery, Restoration, Management, Production and Protection of Forests
REDD	Reducing Emissions from Deforestation and Forest Degradation
SBIA	Social and Biodiversity Impact Assessment
SDGs	Sustainable Development Goals
SEGEPLAN	Planning and Programming Secretariat of the Presidency
SESA	Strategic Environmental and Social Assessment
SIPECIF	National System for Prevention and Control of Forest Fires
SNICC	National Climate Change Information System
tCO₂	Ton of carbon dioxide
UGAM	Municipal Environmental Management Units
UNFCCC	United Nations Framework Convention on Climate Change
URL	Universidad Rafael Landívar
UVG	Universidad del Valle de Guatemala
VCS	Verified Carbon Standard
VCU	Verified Carbon Unit
VERs	Verified or Voluntary Emissions Reductions
VVBs	Validation/Verification Bodies

1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
1) The project's climate objectives are to reduce greenhouse gas emissions related to deforestation and forest degradation through the sustainable use of forest and natural resources.	3.2
2) The project's community objectives encompass the diversification of productive activities (timber and non-timber products), training and capacity building, technical and legal support on sustainable forest management to stakeholders and beneficiaries involved in the project. These activities will enhance the municipalities administrative capacities, communication and leadership, communal technical skills, as well as environmental awareness in the region for forest conservation.	4.2
3) Increase in value-added commodities for timber and non-timber products.	4.2
4) The project's biodiversity objectives focus on the enhancement of the biological corridors and forest connectivity, which will influence the conservation of endangered species and their associated habitats. The main important species are <i>Alouatta pigra</i> (Endangered), <i>Ateles geoffroyi</i> (Endangered), <i>Tapirus bairdii</i> (Endangered), <i>Panthera Onca</i> (Near Threatened), and <i>Leopardus wiedii</i> (Near Threatened).	5.2
5) Restoration of landscape, increase in forest connectivity, and protection of local and regional fauna and flora.	5.2

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	-4,077,136 tCO ₂	3.2.4
	Net estimated emission reductions in the project area, measured against the without-project scenario	16,026,444 tCO ₂	3.2.4
Forest ¹ cover	For REDD ² projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario	54,657 ha	3.2.2
	For ARR ³ projects: Estimated number of hectares of forest cover increased in the project area measured against the without-project scenario	4,470 ha	3.2.2
Improved land management	Number of hectares of existing production forest land in which IFM ⁴ practices are expected to occur as a result of project activities, measured against the without-project scenario	Not applicable	-
	Number of hectares of non-forest land in which improved land management practices are expected to occur 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	15,000	2.2.3 4.2
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	7,500	2.2.3 4.2

¹ Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (*VCS Program Definitions*)

² Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (*VCS Program Definitions*)

³ Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (*VCS Program Definitions*)

⁴ Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood and fuelwood (*VCS Program Definitions*)

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Employment	Total number of people expected to be employed in project activities, ⁵ expressed as number of full-time employees ⁶	17 permanent jobs, 188 temporary jobs, 2,374 working days (jornales)	4.2 4.4
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	5 permanent jobs, 47 temporary jobs, 237 working days (jornales)	4.2 4.4
Livelihoods	Total number of people expected to have improved livelihoods ⁷ or income generated as a result of project activities	24,000 beneficiaries	4.2 4.4.
	Number of women expected to have improved livelihoods or income generated as a result of project activities	12,000 beneficiaries	4.2 4.4
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	Not applicable	-
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	Not applicable	-
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	Not applicable	-
	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	Not applicable	-
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	Not applicable	-
	Number of women who are expected to experience increased water quality and/or improved access to	Not applicable	-

⁵ Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.

⁶ Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from the UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])

⁷ Livelihoods are the capabilities, assets (including material and social resources) and activities required for a means of living (Krantz, Lasse, 2001. *The Sustainable Livelihood Approach to Poverty Reduction*. SIDA). Livelihood benefits may include benefits reported in the Employment metrics of this table.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	drinking water as a result of project activities, measured against the without-project scenario		
Well-being	Total number of community members whose well-being ⁸ is expected to improve as a result of project activities	24 000 beneficiaries	4.2 4.4
	Number of women whose well-being is expected to improve as a result of project activities	12 000 beneficiaries	4.2 4.4
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation, ⁹ measured against the without-project scenario	748,576.7 ha ¹⁰	5.2 5.4
	Expected number of globally Critically Endangered or Endangered species ¹¹ benefiting from reduced threats as a result of project activities, ¹² measured against the without-project scenario	3	5.2 5.4

⁸ Well-being is people's experience of the quality of their lives. Well-being benefits may include benefits reported in other metrics of this table (e.g. Training, Employment, Livelihoods, Health, Education and Water), and may also include other benefits such as strengthened legal rights to resources, increased food security, conservation of access to areas of cultural significance, etc.

⁹ Managed for biodiversity conservation in this context means areas where specific management measures are being implemented as a part of project activities with an objective of enhancing biodiversity conservation, e.g. enhancing the status of endangered species

¹⁰ Project zone: Alta Verapaz 484,145.5 ha, Huehuetenango 110,408.2 ha and Quiché 154,022.9 ha.

¹¹ Per IUCN's Red List of Threatened Species

¹² In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit

2 GENERAL

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Summary Description of the Project (G1.2)

The Reducing Emissions from Deforestation and Forest Degradation (REDD+) project is within the Agriculture, Forestry and Other Land Use (AFOLU) category. The project zone encompasses three departments and their respective municipalities in Guatemala: Huehuetenango (municipalities: Nentón, Santa Ana Huista and Jacaltenango), Quiché (municipalities: Nebaj, Chajul and Cotzal) and Alta Verapaz (municipalities: Cobán, San Pedro Carcha, Lanquín, Cahabón, San Juan Chamelco and Tamahú). These areas have been identified as vulnerable at the national level due to a continued reduction in forestry biomass and tree coverage. Annual deforestation is 1,918 ha/year, while 1,726 ha are degraded every year based on the historic analysis.

The total project extension is 748,576.7 ha, divided in Alta Verapaz (484,145.5 ha); Huehuetenango (110,408.2 ha), and Quiché (154,022.9 ha). The participation of 24,000 beneficiaries is estimated as a starting point for the entire crediting period.

The project aims to address the main drivers of deforestation which include illegal extraction of wood, firewood, resin, and “ocoteo¹³”. Other drivers that contribute to forest deforestation and degradation are the expansion of the agricultural frontier, cattle ranching, forest fires, pests and diseases, and local wood consumption. For achieving sustainable use of the forest, three main strategies are implemented: (1) Natural resources and biological diversity for securing local population livelihood, (2) Institutional strengthening for effective governance, (3) Economic and socio-environmental sustainable development.

The project objectives are:

Climate objectives: The project activities will contribute to recovering deforested and degraded land through the adoption of sustainable forest practices, capacity building, and the diversification of forest products.

The reduction of deforestation and forest degradation and therefore, the increase in forest cover and carbon stocks will contribute to the reduction of greenhouse gas emissions. It is expected a total of 10,754,376.8 tCO₂e over 30 years project lifetime, with an annual average of 358,479.23 tCO₂e.

Community objectives: The communities will be benefited through the services provided by municipalities, who are autonomous entities and governing bodies. The Reddes Locales Council will request a “Municipal Investment Plan for the Recovery, Conservation and Increase of Forest Cover” to each municipality involved, with a focus on adaptation to climate change. This plan will ensure the sustainability of the project and the proper implementation of the benefit-sharing mechanisms through the UGAM / OFM (Municipal Environmental Management Units -UGAM- and Municipal Forestry Office -OFM-). The expected benefits are forest seedlings, municipal and community nurseries, agroforestry technical assistance, forest management plans, advice on sustainable forest and land management, integral management in micro watersheds, management for the sale of environmental services, family consumption licenses, training for community leaders for the prevention and management of forest fires, and pests and diseases management.

¹³ Ocoteo is defined as a technique used to dry out the trees. It consists of making cuts in the stem with a machete or an axe, causing the tree species to die slowly and as if it were a natural cause in order to cut it afterwards.

Lastly, the project activities will strengthen the economic livelihood of rural families, local governance, alternative productive activities, education and technical skills, local administration and citizen participation, environmental awareness, and social capital.

Biodiversity objectives: The project activities, such as the establishment of agroforestry systems, forest plantations, and silvopastoral systems, will reduce the pressure on natural forests. This will allow the ecosystems to recover, maintain, or enhance the natural biodiversity habitats and their high conservation values associated with the structure, composition, and functionality.

2.1.2 Project Scale

Project Scale	
Project	
Large project	X

2.1.3 Project Proponent (G1.1)

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2.1.4 Other Entities Involved in the Project

The municipalities are the project co-proponents. The City Mayor is the legal representative of the municipality and the head of the executive body of the municipal government. The governance period is 4 years. The contact person will be updated in every monitoring period when necessary. The following contact person is the legal representative for the period 2020-2024.

Organization name	Municipality of Cobán
Contact person	Leonel Arturo Chacón Barrios
Title	City Mayor
Address	1a. calle 1-11, zona 1, Cobán, Alta Verapaz.
Telephone	(502) 79553232
Email	info@unicoban.gob.gt

Organization name	Municipality of San Pedro Carchá
Contact person	Winter Coc Ba
Title	City Mayor
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Organization name	Municipality of San Agustín Lanquín
Contact person	Roberto Pop Mo
Title	City Mayor
Address	Barrio El Centro San Agustín Lanquín, Alta Verapaz
Telephone	(502) 51987553
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Organization name	Municipality of Cahabón
Contact person	Denis Cristian Fraatz Sierra
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Organization name	Municipality of San Juan Chamelco
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Organization name	Municipality of Tamahú
Contact person	Eduardo Moll Santacruz
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Telephone	-
Email	municipalidadtamahu@gmail.com

Organization name	Municipality of Nebaj
Contact person	Virgilio Geronimo Bernal Guzman
Title	City Mayor
Address	Nebaj, Quiché
Telephone	(502) 53013797
Email	dmpnebj@yahoo.es

Organization name	Municipality of Chajul
Contact person	Juan Mateo Bop
Title	City Mayor
Address	Parque Central Z.0 Chajul, Quiché
Telephone	(502) 77551202
Email	-

Organization name	Municipality of San Juan Cotzal
Contact person	Jacinto Sambrano Medina
Title	City Mayor
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Organization name	Municipality of Nentón
Contact person	Rudi Gordillo Velazco
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Email	Tumuninenton@hotmail.com

Organization name	Municipality of Santa Ana Huista
Contact person	Filomeno Hernández Herrera
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Organization name	Municipality of Jacaltenango
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Project Document developer

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2.1.5 Physical Parameters (G1.3)

According to the National Forest Institute (INAB), 51% of the Guatemalan territory is forested. The 88% of the forest cover is concentrated in five departments: Petén, Quiché, Izabal, Huehuetenango and Alta Verapaz.

a) *Project location and geographic boundaries*

- Reference region:

Guatemala has adopted a subnational approach and it is divided into 5 REDD+ subnational regions. The project reference region is located within: Tierras Bajas del Norte, Sarstún-Motagua, and Occidente (Figure 1)

Nevertheless, in the future, the Government of Guatemala will expand from a subnational to national scope to ensure the inclusion and participation of stakeholders and sectors interested in the Emission Reduction Program (ERP) (FCPF, 2019).



Figure 1. REDD+ Subnational Guatemalan Region
Source: MARN (2014).

The grouped project is located in three departments of Guatemala (Figure 2 and Figure 3), and 12 municipalities:

- Quiché: Nebaj, Chajul and Cotzal.
- Huehuetenango: Nentón, Santa Ana Huista and Jacaltenango.
- Alta Verapaz: Cobán, San Pedro Carcha, Lanquín, Cahabón, San Juan Chamelco and Tamahú.

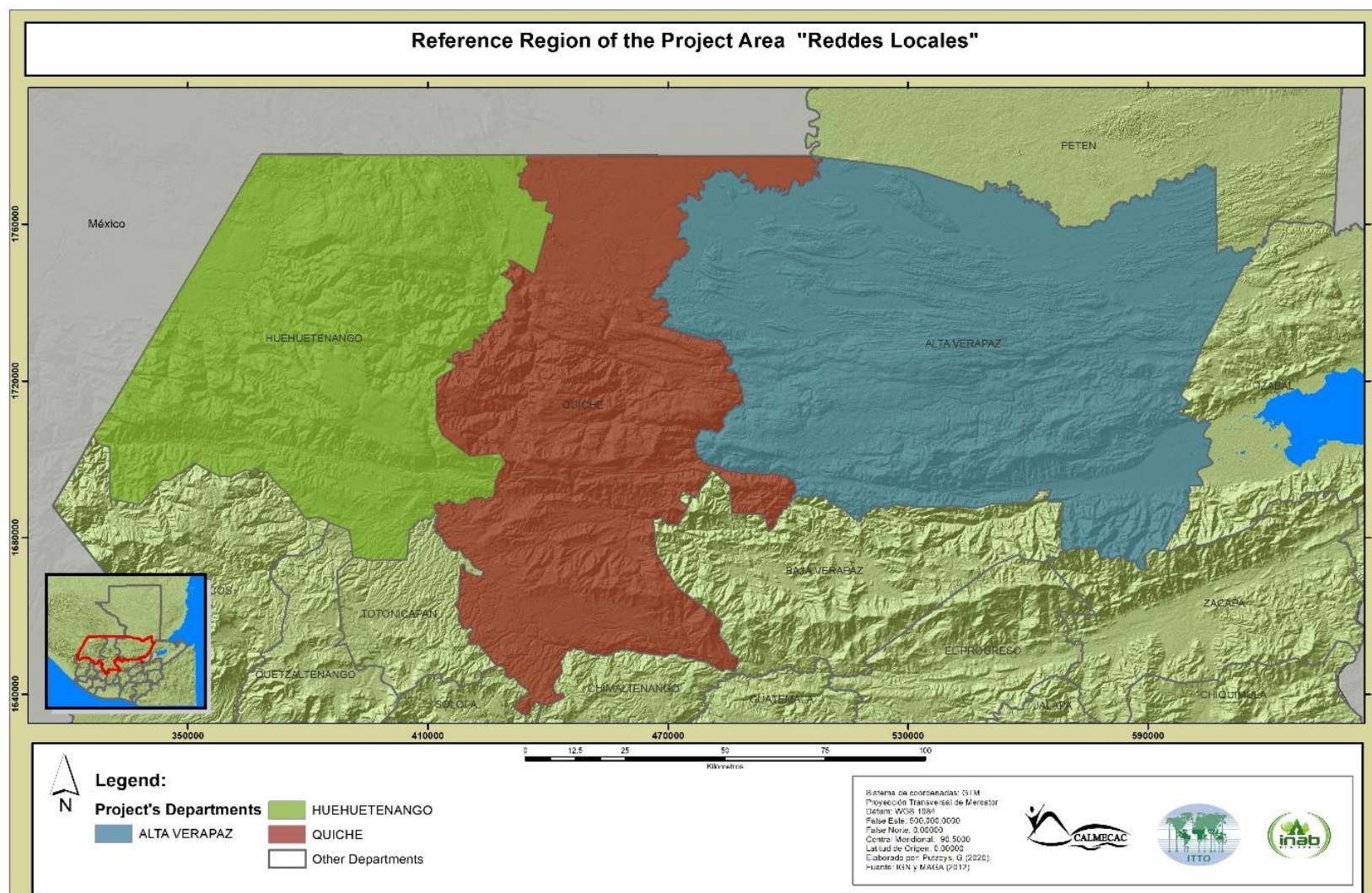


Figure 2. Reference region map.
Source: Calmecac (2020).

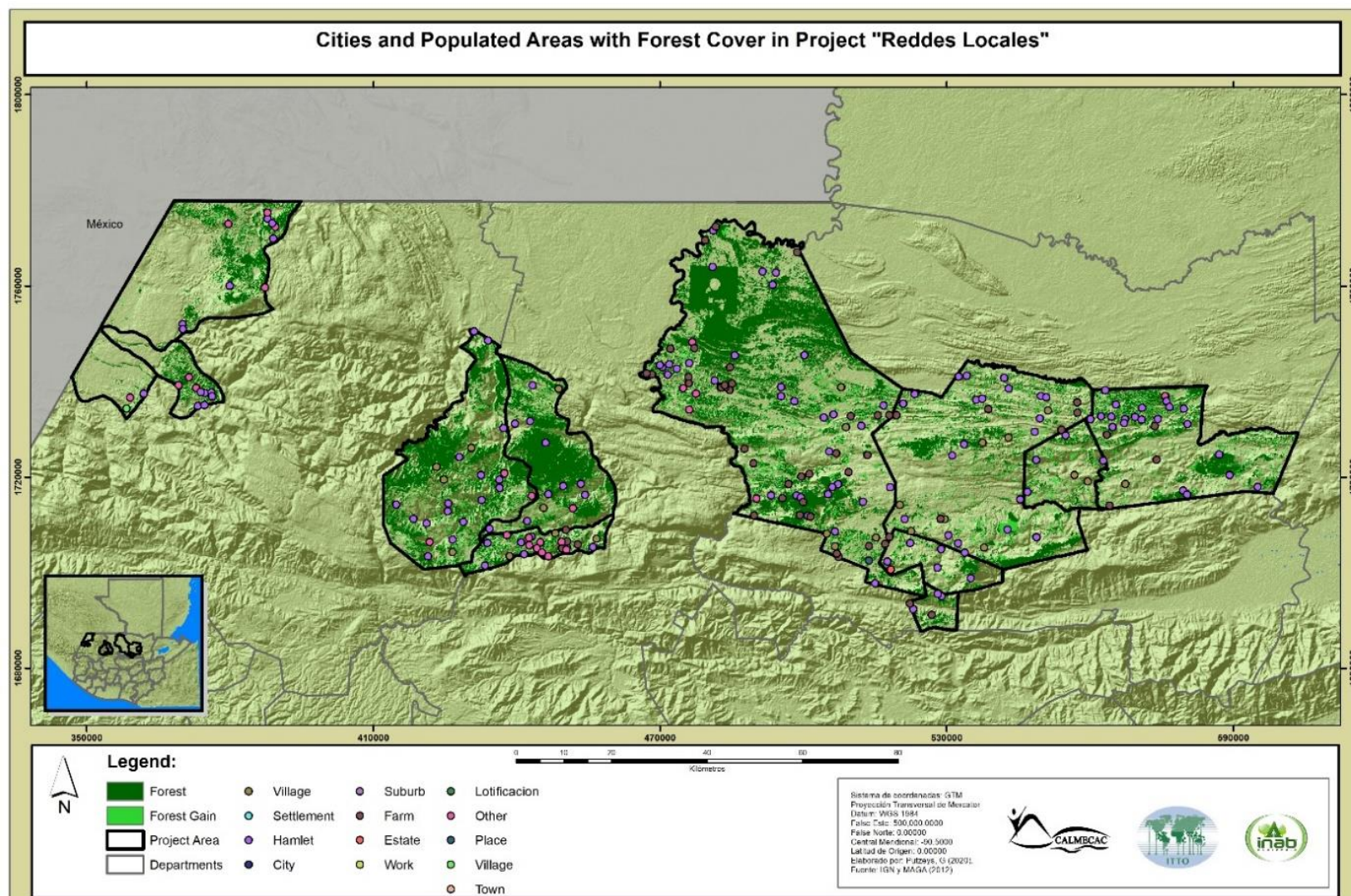


Figure 3. Cities and populated areas with forest cover map.
Source: Calmecac (2020).

b) Municipality description

A summary description of each municipality is presented in Table 1. The road connections and accessibility to the project area is shown in Figure 4.

Table 1. Description of the municipalities in the project zone.

Department	Municipality description
Huehuetenango (15°18'53"N 91°28'34"W)	<p>Nentón: Located in the northwestern region of the Republic of Guatemala, at 138 km from the departmental capital of Huehuetenango and 405 km from Guatemala City. In the north and west of the municipality is the Republic of Mexico, to the east are the municipalities of San Mateo Ixtatán and San Sebastián Coatán, and to the south are the municipalities of San Sebastián Coatán, San Miguel Acatán and Jacaltenango. The municipality of Nentón is politically divided in 13 villages, 24 hamlets and 17 farms (SEGEPLAN, 2018a) .</p> <p>Jacaltenango: Located in the Northwest part of the department of Huehuetenango in the Region VII or Northwest Region, to 385 km the city of Guatemala. The latitude is 15° 40' 00" and longitude is 91° 42' 45". It is known as the heart and center of the Huista region due to its geographical location in the valley of the Sierra Madre.</p> <p>It limits to the North with the municipalities of Nentón and San Miguel Acatán; to the South with the municipality of Concepción Huista; to the East with the municipality of San Miguel Acatán; to the west with the municipalities of Santa Ana Huista, San Antonio Huista and with the Republic of Mexico. It has a territorial extension of 269.16 km², which is equivalent to 20% of the total territory of the Huista region. The average altitude is 1,437.86 meters above sea level (masl). The municipality consists of 6 counties, 12 villages, and 16 hamlets (SEGEPLAN, 2018b).</p> <p>Santa Ana Huista: Located in the northwest of the department of Huehuetenango, on the banks of the Huista River, 800 masl, at a latitude of 15° 40' 80" and a longitude of 91° 49' 18". Since 1970 it is part of the region known as the Northern Transversal Strip. Santa Ana Huista is divided in organized in 1 town, 13 villages and 8 hamlets (SEGEPLAN, 2010i).</p>
Quiché (15°1'48"N 91°9'0"W)	<p>The Ixil Region is composed by the municipalities of Nebaj, Cotzal and Chajul. The territory is 138,800 hectares (1,388 km²), equivalent to 16.56% of the department of Quiché¹⁴.</p> <p>Santa María Nebaj: Located in the north of the departmental capital of Quiché and is one of the 21 municipalities of the department. The extension is approximately 608 km² that represents 7.06% of the territory of the department. The municipality of Nebaj is 254 km away from Guatemala City and 91 km from the departmental capital of Quiché. It is politically divided into one village, 22 counties, 68 villages and 19 hamlets (SEGEPLAN, 2010). The estimated population by 2019 was 110,034 inhabitants.</p>

¹⁴ Plan de Manejo Forestal para la Conservación de los Bosques comunitarios de la región Ixil. Municipios de Santa María Nebaj, San Juan Cotzal y San Gaspar Chajul del Departamento del Quiché. 2019.

Department	Municipality description
	<p>San Juan Cotzal: the municipality has an approximate territorial extension of 182 km², which represents 2.2% of the department of Quiché. It is located on the slopes of the Sierra de Los Cuchumatanes and in the middle part of the Sierra de Chamá. It borders to the north with the municipality of Chajul, to the east with Uspantán, to the south with Cunén and to the west with Nebaj. It is divided in 1 town, 53 counties, 244 agro-villages, 9 hamlets, and 1 farm. The estimated population by 2019 was 33,384 inhabitants (SEGEPLAN, 2010h).</p> <p>San Gaspar Chajul: Located to the north-west of the department of Quiché, to 103 km from the departmental capital and 267 kilometers from Guatemala City. It has a territorial extension of 598 km². The municipality is divided into one town, 44 villages, 6 hamlets, 6 farms, a county, and a colony. The estimated population by 2019 was 70,661 inhabitants (SEGEPLAN, 2010a).</p>
Alta Verapaz (15°30'N 90°20'W)	<p>Cobán: Located to 219 km from Guatemala City. Limits to the north with Ixcán (municipality of Quiché), with the Chixoy or Negro river and Chisec, to the south with Santa Cruz Verapaz, Tactic and Tamahú, to the east with San Pedro Carchá and San Juan Chamelco, and the west with Uspantán and Chicamán (both from Quiché) and San Cristóbal Verapaz. The territorial extension of the municipality is 2,132 km² and represents 19.80% in relation to the department of Alta Verapaz. It is located among the 15°27'23" Latitude and 90°27'23" Longitude.</p> <p>San Pedro Carchá: the municipal capital is located at 15° 28' 38" latitude north and 90° 18' 38" longitude west. It limits to the north with the municipality of Chisec and Fray Bartolomé de las Casas, to the south with the municipalities of San Juan Chamelco and Senahú, to the east with the municipalities of Cahabón, Lanquín and Senahú; and to the west, it borders with the municipality of Cobán. It is divided into 25 micro-regions (SEGEPLAN, 2010f).</p> <p>San Agustín Lanquín: Located to the east of the department of Alta Verapaz, with a territorial extension of 208 km² at an altitude of 352 meters above sea level. The geographical coordinates of the municipality are 15° 34' 26" north latitude and 89° 58' 51" west longitude. It limits to the north with San Pedro Carchá, to the south with the municipalities of San Pedro Carchá and Senahú, to the east with Santa María Cahabón and to the west with San Pedro Carchá. It is divided into 9 micro-regions (SEGEPLAN, 2010e).</p> <p>Cahabón: Located at the geographical coordinates 15° 36' 24" north latitude and 86° 48' 42" west longitude. It limits to the north with the municipalities of Fray Bartolomé de Las Casas and Chahal, to the south with Senahú and Panzós, to the east with El Estor, and to the west, to the municipality of Lanquín. There are 10 micro-regions within the municipality (SEGEPLAN, 2010j).</p> <p>San Juan Chamelco: It has an area of 213 km², which is equivalent to 18,887.7 hectares. It limits to the north with the municipality of San Pedro Carcha, to the south with Tamahu and Coban, to the east with Senahu and Tucuru, and the west with Coban. The coordinates are 15°25'22" North</p>

Department	Municipality description
	<p>latitude and 90°19'56" West longitude; with an altitude of 1,320 meters above sea level. It presents 5 micro-regions (SEGEPLAN, 2010g).</p> <p>Tamahú: The coordinates are 15° 18' 25" Latitude North and 90° 14' 02' Longitude West. The minimum altitude is 820 m and the maximum is 2,420 m. It limits to the North with San Juan Chamelco and Cobán, to the East with Tukurú, to the South with Purulhá, Baja Verapaz and to the West with Tactic. It presents 6 micro-regions (SEGEPLAN, 2019).</p>

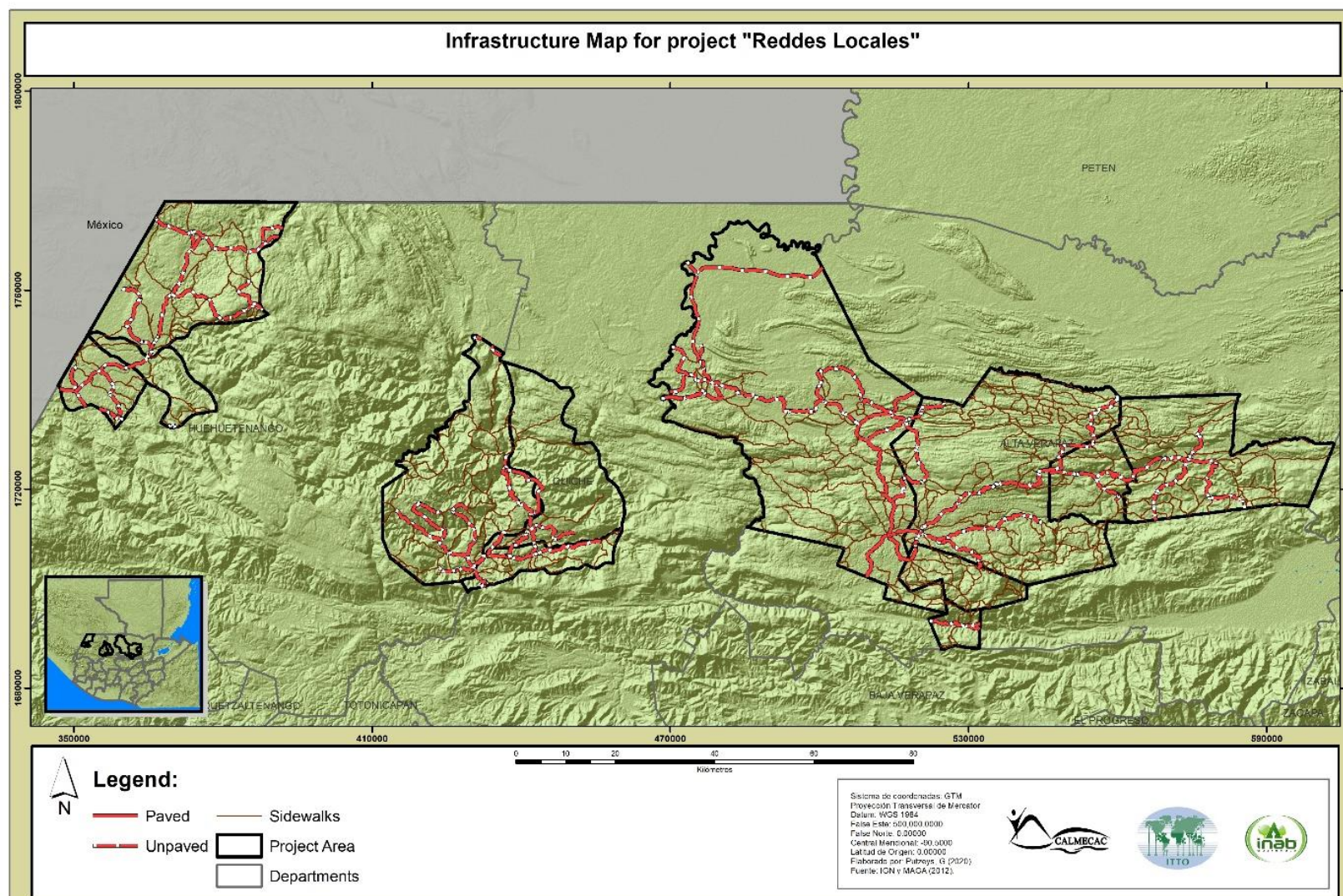


Figure 4. Infrastructure map.
Source: Calmecac (2020).

c) *Basic physical parameters*

Table 2 shows the biophysical parameters for the project area. The description is supplemented by

Figure 5, Figure 6, Figure 7, and Figure 8; where characteristics for each municipality are displayed.

Climate and topography

Table 2. Description of the municipalities' climate and topography parameters.

Department	Climate and topography description
Huehuetenango	<p>The region of the dry forest biological corridor is characterized by a varied climate where the temperature range is 10 °C to 32 °C.</p> <p>Jacaltenango: The altitude varies between 650 and 2,600 masl. The terrain is rugged and mountainous. The municipality has an average rainfall of 1,344 mm/year and an average temperature of 19 °C, with a predominantly temperate climate.</p> <p>Santa Ana Huista: The average annual temperature is 23.5 °C, with an average precipitation of 1600 mm.</p> <p>Nentón: The climate of the municipality is temperate in the mountainous regions and in the valleys is warm.</p>
Quiché	<p>The Ixil Region is characterized by a mild climate where the average temperature is 16.3°C.</p> <p>Nebaj: The maximum absolute temperature is 33.5 °C and the minimum is 3.0 °C. The relative humidity is 75%. The summer goes from January to April and the winter from May to December.</p> <p>Chajul: It belongs to the subtropical and mountain zone; the area is covered with clouds and fog. Annual rainfall is 2,000 to 3,000 mm, the temperature</p>

Department	Climate and topography description
	<p>goes from 15 °C to 25 °C. The rainy season is from June to October, and the dry season from November to May.</p> <p>Cotzal: The altitude goes from 1200 to 2800 masl. The average temperature is 22 °C. The annual relative humidity range is 75% to 80%.</p>
Alta Verapaz	<p>Cobán: The Municipality is located in a humid subtropical zone. In the low part towards the North, the climate is very humid and temperate, with heights between 150 to 700 meters above sea level; in the high part towards the South, the predominant climate is very humid, from temperate to cold, between 13 °C minimum and 23.7 °C maximum, with heights between 700 to 1,900 masl. Annual precipitation is 3,000 mm and relative humidity is 80%. Cobán has several orographic features, made up of hills and high mountains, among which stand out: The Sierra Chamá, Doce montañas, and the Hills of Ixlá, the Sultana Nimtacá, Peyaí and Tzapur.</p> <p>San Pedro Carchá: It lies at 1,284 masl, the climate is classified as warm and temperate. The average temperature is 18.9 °C, with an annual rainfall of 2,444 mm. It is characterized by steep slopes and shallow soils.</p> <p>San Agustín Lanquín: The temperature range is between 24 °C and 30 °C, and it presents an average annual rainfall between 2000 and 4000 mm. Annual average precipitation is 3,244.76 mm. The dominant topography is hilly, with slopes between 32% and 55%. Dry months are from January to April.</p> <p>Cahabón: It presents a temperature range between 24 °C and 30 °C, and an average precipitation between 2000 and 4000 mm.</p> <p>San Juan Chamelco: The climate is temperate and rainy. The temperature range is between 13 °C and 27 °C, being the average 18.1 °C. Annual precipitation is about 2,181 mm. Its topographic slopes are mostly from 32% to 45% of inclination. The elevations in the region range from 1320 to 2312 meters above sea level.</p> <p>Tamahú: The temperature ranges from 10 °C to 26 °C, where the average temperature is 20.9 °C. Annual rainfall is 2,394 mm.</p>

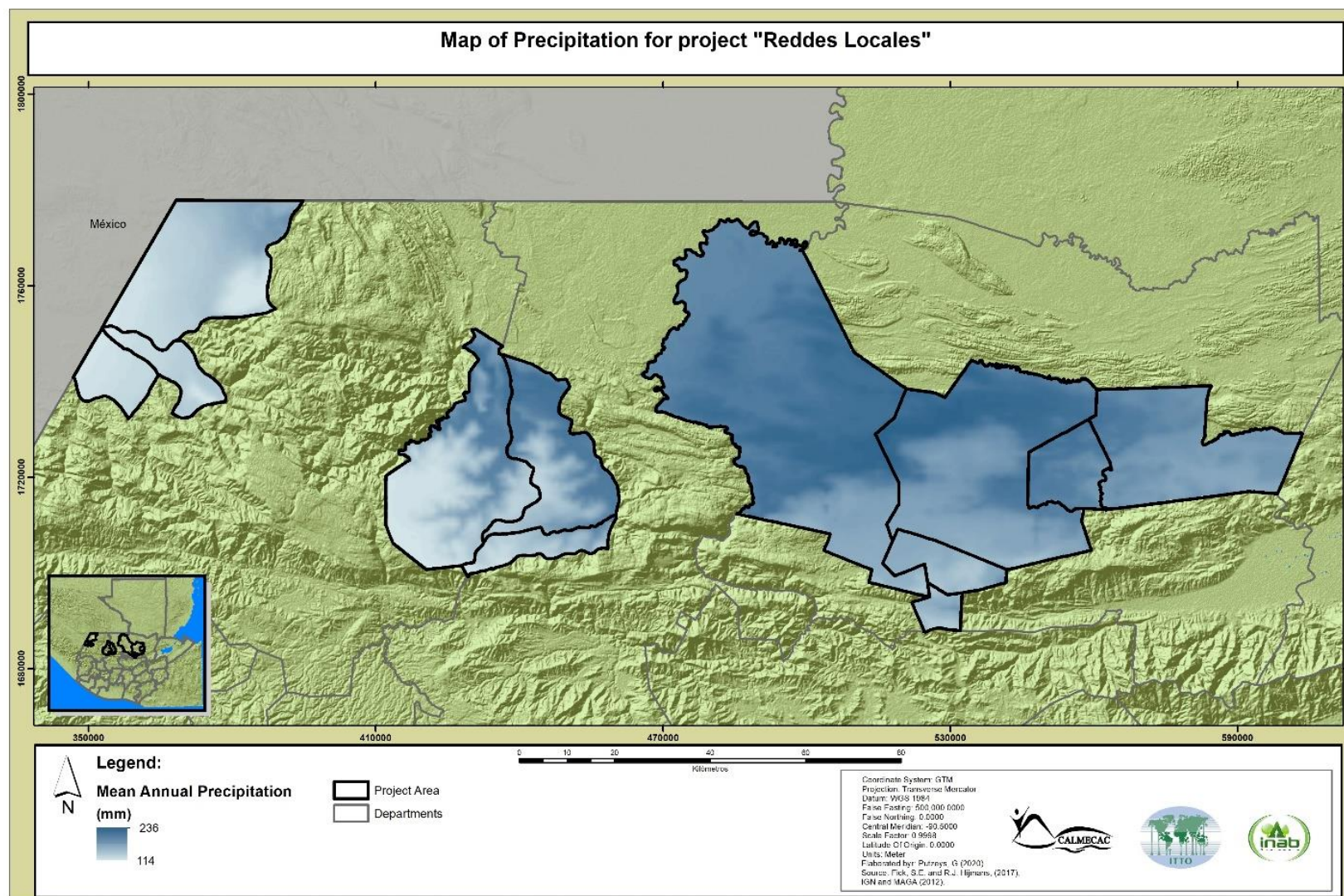


Figure 5. Precipitation map.
Source: Calmecac (2020).

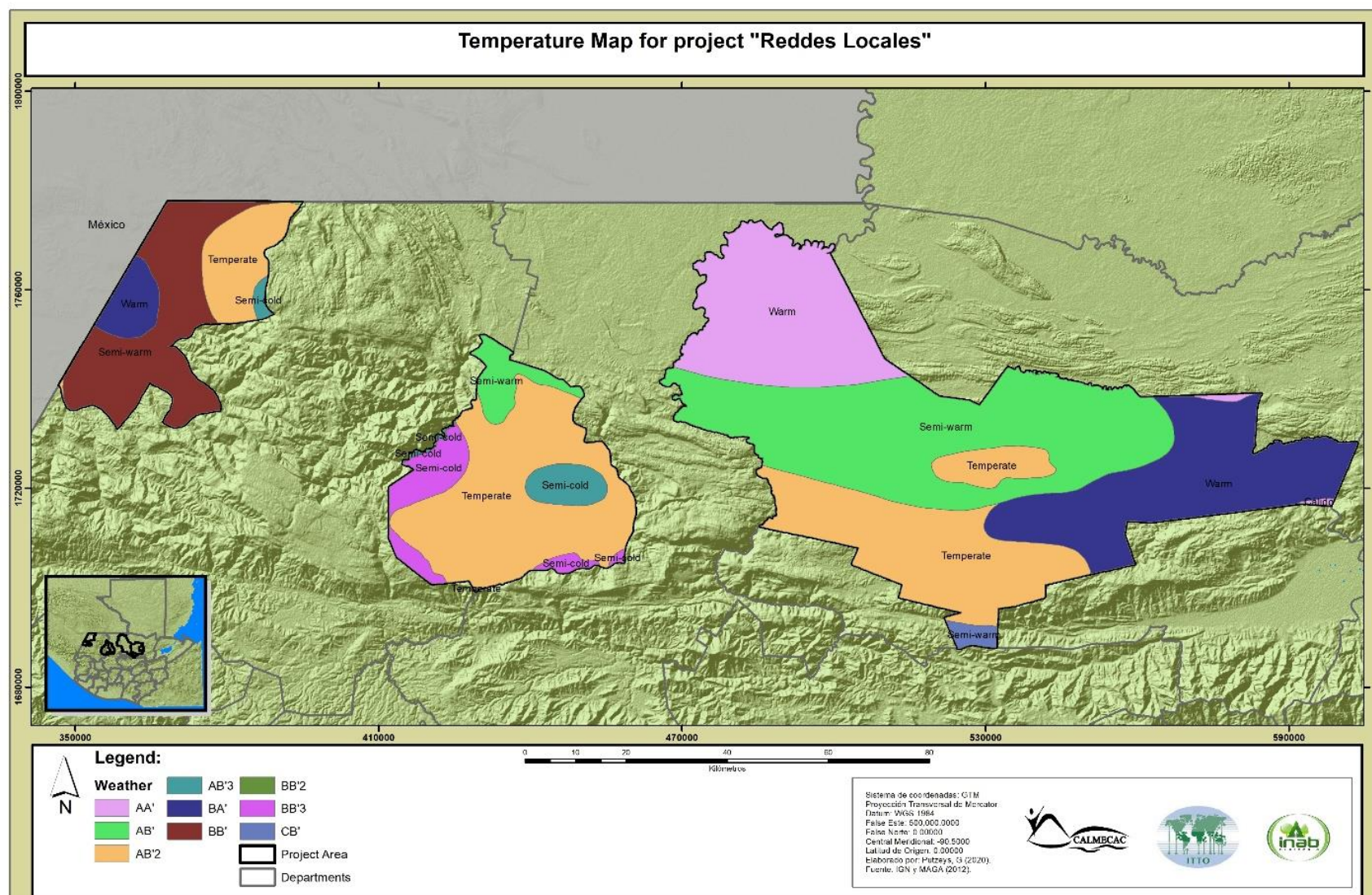


Figure 6. Temperature map.
Source: Calmecac (2020).

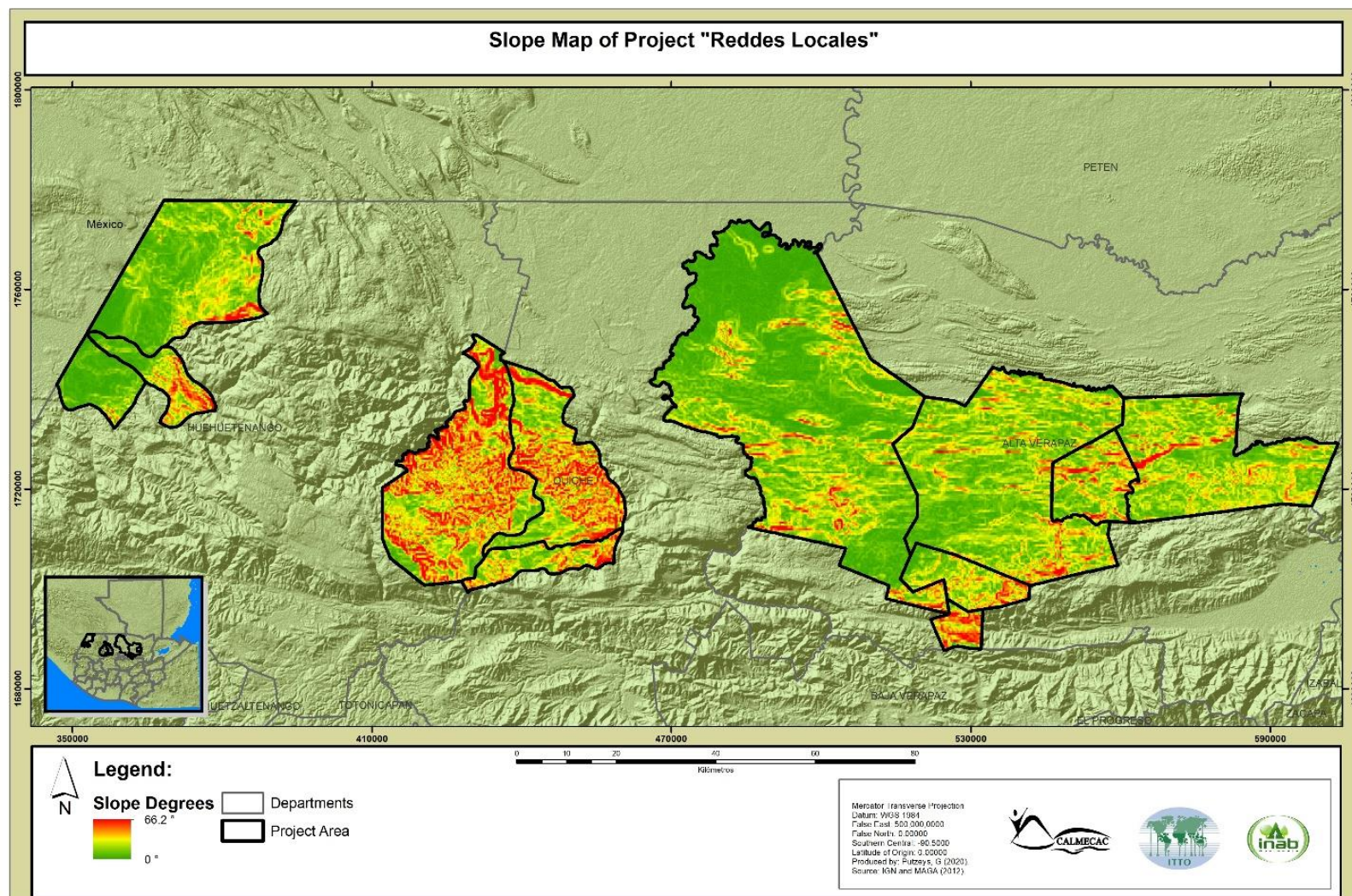


Figure 7. Slope map.
Source: Calmecac (2020).

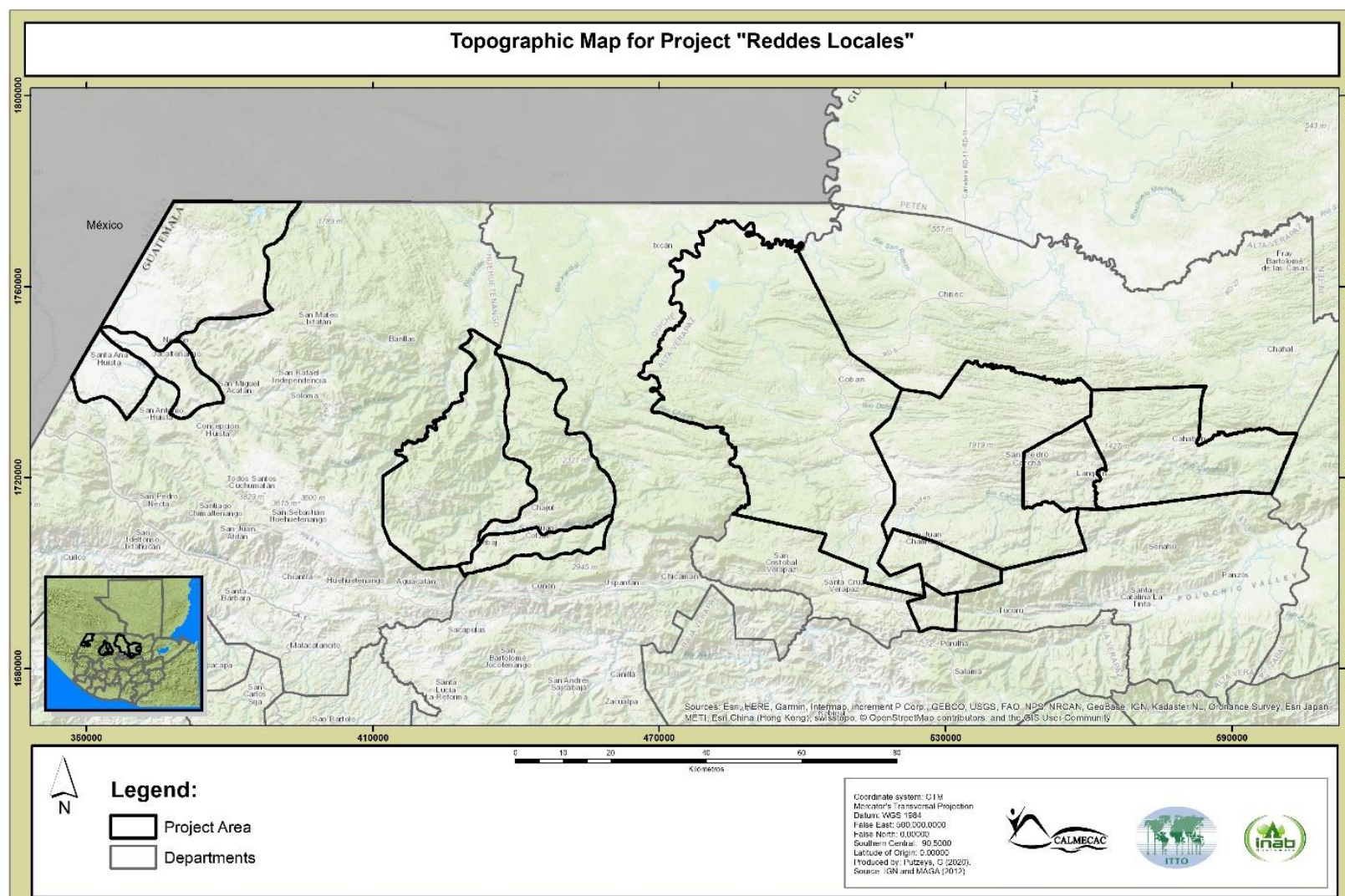


Figure 8. Topographic map.
Source: Calmecac (2020).

Hydrology

Guatemala presents three watersheds (Gulf of Mexico, Pacific Ocean, and the Caribbean Sea "Atlantic Ocean"). The reference project is located within the Gulf of Mexico (MAGA, 2006). Table 3 shows the hydrological characteristics for the project area (Figure 9).

Table 3. Description of the municipalities' hydrology.

Department	Hydrology description
Huehuetenango	The following watersheds are present in the region, Selegua river (9,352.29 ha), Nentón river (73,299.54 ha) and Pojóm river (22,715.60 ha). Nentón river watershed is the largest and therefore the most important in the region.
Quiché	The Ixil Region, consisting of the municipalities of Nebaj, Cotzal and Chajul, is located in the upper basin of the Xaclbal River and Salinas River. The Xaclbal river watershed has a coverage 74,554.57 hectares and it is the most important in the region. The second most important is the Salinas river watershed with coverage of 65,677.1 hectares, followed by the Ixcán river watershed with coverage of 7,826.38 hectares. These watersheds drain their waters to the Gulf of Mexico.
Alta Verapaz	The main watersheds are the Sarstún river and Motagua river. From there, the Cahabón and Polochic rivers are derived, and to the north the rivers Salinas and Pasion.

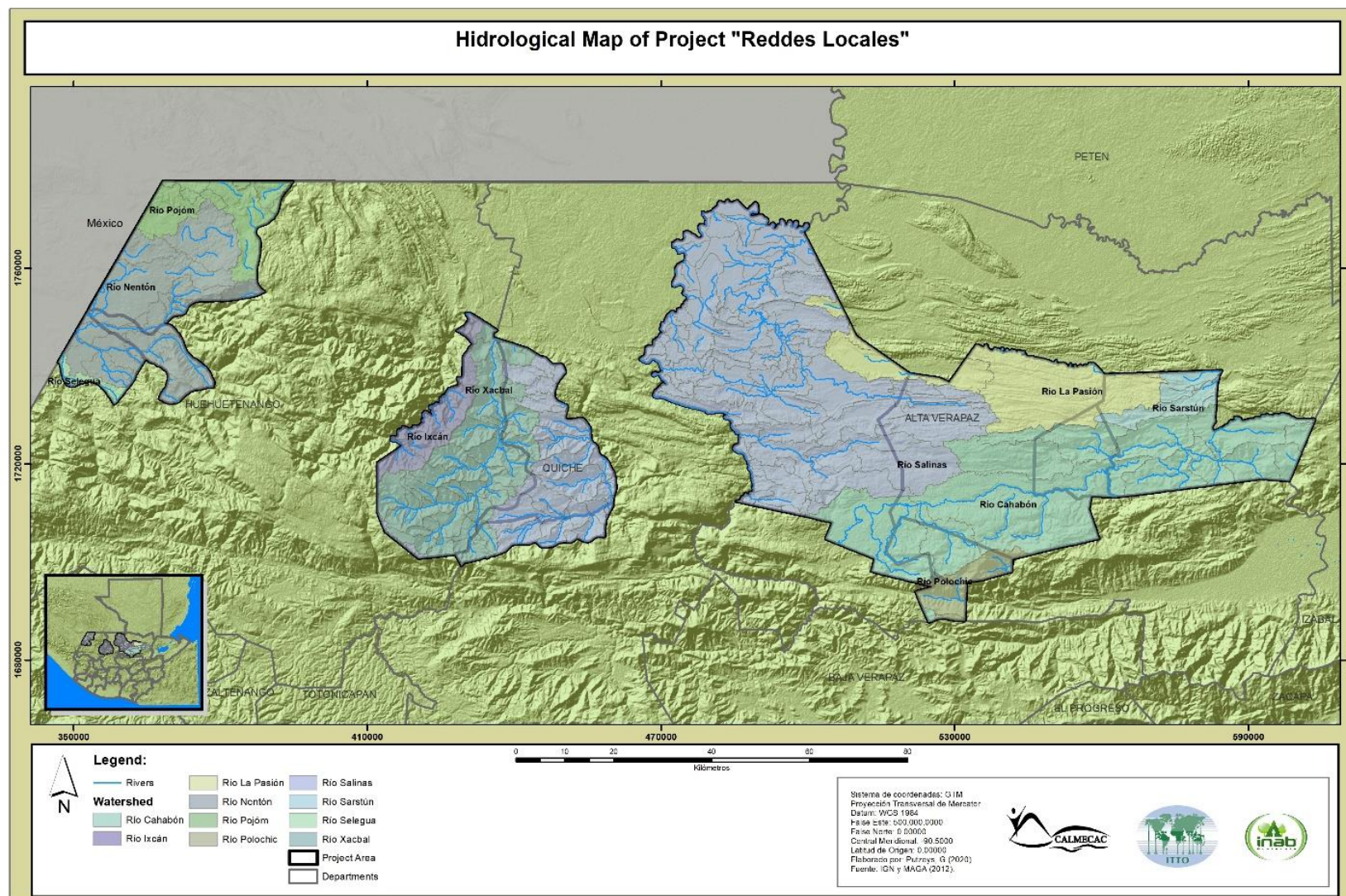


Figure 9. Hydrology map.
Source: Calmecac (2020)

Vegetation and life zones

Table 4 and Figure 10 show the Holdridge life zones classification for the project area, where plant formation (vegetation) is related to climatic data (temperature and precipitation).

Table 4. Description of the municipalities' vegetation.

Department	Life zones and vegetation description (Cruz, 1976)
Huehuetenango	<p>The territory covers 5 life zones:</p> <ul style="list-style-type: none"> - Very humid Subtropical forest (bmh-S (c)) <p>The total area of this life zone is 8,275.32 ha, which represents 7.81% of the total area of the region. The climatic conditions are variable due to wind influence. The long rainfall regime influences the floristic composition and vegetation physiognomy. The potential evapotranspiration can be estimated at an average of 0.45.</p> <ul style="list-style-type: none"> - Humid low subtropical montane forest (bh-MB) <p>It covers an area of 19,576.90 ha, which represents 18.47% of the total area of the region. The rainfall pattern varies from 1,377 mm to 2,701 mm; averaging 2,039 mm of total annual rainfall. The topography is generally flat to rugged. The typical natural vegetation is represented by stands of <i>Quercus</i> sp, generally associated with <i>Pinus pseudostrobus</i> and <i>Pinus montezumae</i>.</p> <ul style="list-style-type: none"> - Very Humid Low Subtropical Montane Forest (bmh-MB) <p>The total area is 1,277.10 ha, which represents 1.20% of the total area of the region. The potential evapotranspiration is estimated at 0.35. The predominant natural vegetation are <i>Cupressus lucitánica</i>, <i>Chiranthodendron pentadactylon</i>, <i>Pinus ayacahuite</i>, <i>Pinus hartwegii</i>, which are located in the upper part of the area. Other species observed are <i>Alnus jorullensis</i>, <i>Quercus</i> sp. and <i>Buddleia</i> sp.</p> <ul style="list-style-type: none"> - Subtropical dry forest (BS-S) <p>The total area is approximately 43,581.56 hectares, which represents 41.12%, of the total area of the region. In this life zone, climatic conditions are characterized by clear and sunny days from January to April. The rainy season corresponds especially to the months from June to October. The lands corresponding to this ecological zone go from flat to slightly rugged.</p> <ul style="list-style-type: none"> - Subtropical Humid Forest (bh-S (t)) <p>The total area is 32,134.89 ha, which represents 30.32% of the area of the region. In this life zone, the period in which the rains are more frequent corresponds to May to November, varying in intensity according to the topography. Precipitation ranges from 1,100 to 1,949 mm. The average annual temperature varies between 20°C and 26°C. The potential evapotranspiration ratio is around 1.0. This area is rugged and steep. The natural vegetation consists of <i>Pinus oocarpa</i>, <i>Curatella americana</i>, <i>Quercus</i> sp, <i>Byrsonimia crassifolia</i>, which are the most indicative species for this area.</p>

Department	Life zones and vegetation description (Cruz, 1976)
Quiché	<p>The territory covers 4 life zones:</p> <ul style="list-style-type: none"> - Very humid Subtropical Forest (bmh-S (c)) <p>The total area is 42,805.91 hectares, which represents 28.92% of the region. The annual rainfall is 1826 mm and the average temperature is 23 °C. The relief goes from flat to rugged and the climatic conditions are very variable due to wind influence. The vegetation indicators are the genera <i>Orbingya</i>, <i>Brosimun</i>, <i>Lonchocarpus</i>, <i>Virola</i>, <i>Cecropia</i>, among others.</p> <ul style="list-style-type: none"> - Humid low subtropical montane forest (bh-MB) <p>The total area is 55,686.21 hectares, which represents 37.61% of the area. This life zone has an annual rainfall of 1322 mm and an average temperature of 19°C. The vegetation indicator is represented by stands of <i>Quercus</i> sp, usually associated with <i>Pinus pseudotrobus</i> and <i>Pinus montezumae</i>. Among the common crops are maize, beans, wheat, vegetables and fruit trees such as peaches, pears and apples.</p> <ul style="list-style-type: none"> - Very Humid Low Subtropical Montane Forest (bmh-MB) <p>The total area is 43,268.47 hectares, which represents 29.22% of the area under evaluation. The life zone has an annual rainfall of 2928 mm and an average temperature of 15°C. In this area the relief is rugged, and the vegetation indicators are the genera <i>Cupressus</i>, <i>Quercus</i>, <i>Alnus</i> and <i>Pinus</i>. Due to the weather conditions, maize, beans, potatoes, vegetables and fruit crops such as apples, peaches, among others, are suitable.</p> <ul style="list-style-type: none"> - Very humid Subtropical Montane Forest (bmh-M) <p>The total area is 6,379.22 hectares, which represents 4.31% of the region. The life zone has an annual rainfall of 2,500 mm and an average temperature of 11°C. This area presents steep slopes. The vegetation indicators are <i>Abies guatemalensis</i>, <i>Pinus ayacahuite</i> and <i>Pinus hartweggi</i>. Other natural plant formations are <i>Quercus</i> sp, <i>Buddleia</i> sp, <i>Cestrum</i> sp, <i>Garia</i> sp and <i>Bacharis</i> sp.</p>
Alta Verapaz	<p>The territory covers 4 life zones:</p> <ul style="list-style-type: none"> - Very Humid Subtropical Warm Forest - bmh-S (c) <p>This area is approximately 295,091 ha, which represents 61% of the total region. The climatic conditions are very variable due to the influence of the winds. Rainfall varies from 1,500 mm to approximately 2,100 mm annually. The floristic composition is influenced by the longer rain regime duration. The predominant forest vegetation are Canxan (<i>Terminalia amazonia</i>), Madrecacao (<i>Brosimum alicastrum</i>), Palo Jiote (<i>Virola</i> sp), San Juan (<i>Vochisia guatemalensis</i>), ceiba (<i>Ceiba pentandra</i>), Caribbean pine (<i>Pinus caribaea</i>), among others.</p> <ul style="list-style-type: none"> - Very Humid Subtropical Cold Forest - bmh-S (f) <p>This life zone is located in the upper part of the Cahabon River watershed, covering approximately 113,320.69 hectares (23.45% of the project region). It is an area classified as a water recharge zone. Annual rainfall is 2,050 mm to approximately 2,500 mm, with average annual temperatures ranging from 16 °C to 23 °C. The floristic composition is characteristic for forest</p>

Department	Life zones and vegetation description (Cruz, 1976)
	<p>species such as: Liquidambar (<i>Liquidambar styracifolia</i>), avocado (<i>American Persian</i>), Sad pine (<i>Pinus pseudostrobus</i>), Candelillo pine (<i>Pinus maximinoii</i>), Bloodwood (<i>Croton draco</i>), Sweet pepper (<i>Clethra</i> sp), aguacatillo (<i>Persea schiedeana</i>), taxiscobo (<i>Perymenium grande</i>), among others.</p> <ul style="list-style-type: none"> - Subtropical Lowland Rainforest <p>This life zone is located in the watershed of the Cahabon river in the municipality of San Juan Chamelco, and it is listed as a water recharge zone. It represents 9% of the watershed with approximately 13,171 hectares, rainfall exceeding 4,100 mm, and the average temperature is 19 °C. Indicator species are: Cedar or temperate cedar (<i>Alfaroa costaricensis</i>), Mountain cypress (<i>Podocarpus</i> sp), Bilia (<i>Billia hippocastanum</i>), Taxiscobo (<i>Perymenium grande</i>), Magnolia (<i>Magnolia guatemalensis</i>), among others. Among the birds that nest in this rainy area, it can be found the national bird El Quetzal (<i>Pharomachrus mocinno</i>).</p> <ul style="list-style-type: none"> - Temperate Subtropical Humid Forest –bh-S (t) <p>Located in the Nentón river watershed in Huehuetenango, covering an area of 22,540 hectares (36% of the total area). The precipitation oscillates between 1,100 to 1,950 mm annually, the annual average temperature varies from 20°C to 28°C. The predominant vegetation: Ocote pine (<i>Pinus oocarpa</i>), Encino (<i>Quercus</i> sp), Nance (<i>Byrsonima crassifolia</i>), Chaparro (<i>Curatella americana</i>).</p>

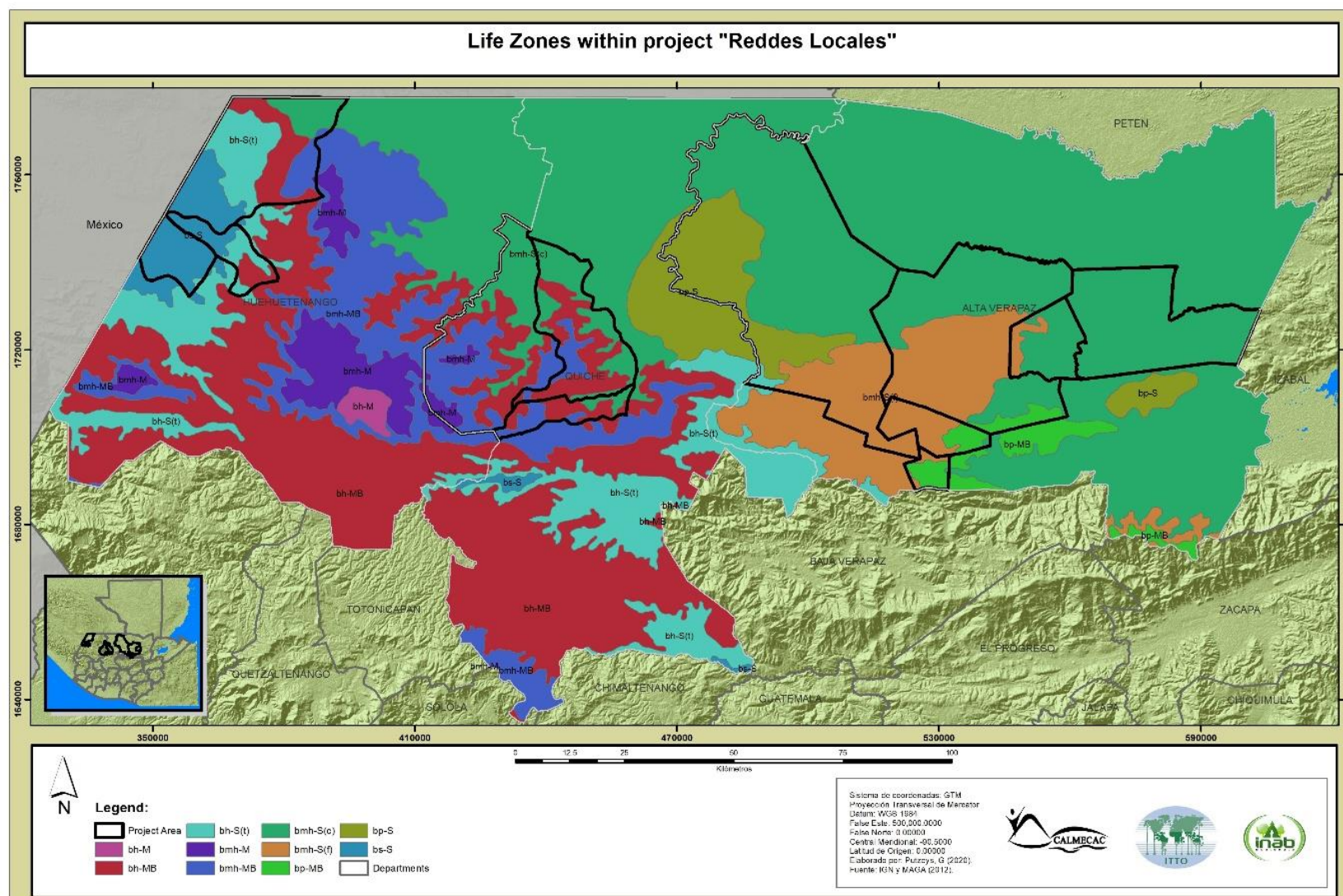


Figure 10. Holdridge's life zones map.
Source: Calmecac (2020).

Soils

The following types of soils are found in the project zone (Table 5 and Figure 11) according to the department description.

Table 5. Description of the municipalities' soil characteristics.

Department	Soils description
Huehuetenango	<p>Chixoy (Chy): The original material is limestone. This type of soil can be found at an altitude below 1,000 masl. The drainage class is called "excessive drainage", and the surface color is very dark grayish brown, the surface texture is clay, and the effective depth is 30 cm. The pH is 7.25, its fertility potential is considered undetectable, and the risk of erosion is high. This series of soils cover a total of 96.15 hectares of the prioritized area.</p> <p>Codan (Co): The original material is limestone, which we can find at an altitude below 1,200 masl, and the relief is considered Karst. The drainage class is called "good drainage" the surface color is very dark brown to almost black, the surface texture is clay, and the effective depth is 40 cm. The pH is 7.62, its fertility potential is considered as regular (low base saturation), the risk of erosion is very high. It covers 7,489.95 hectares.</p> <p>Jacaltenango (Ja): The original material is limestone and is located at an altitude below 1,800 masl. The drainage class is called "good drainage", the surface color of this soil is very dark brown to yellowish-brown, the surface texture is clay-loam, and the effective depth is 150 cm. The pH is 5.75, its fertility potential is considered from regular to high, and the risk of erosion is high. It covers 23,747.03 hectares.</p> <p>Nentón (Ne): The original material is limestone; it can be found at an altitude below 750 masl and the relief is considered Karst. The drainage class is called "good drainage", the surface color is very dark brown, the surface texture is clay, and the effective depth is 50 cm. The pH is 6.8, its fertility potential is considered from regular to high, and the risk of erosion is high. It covers 69,745.13 hectares.</p> <p>Quixal (Qx): The original material is sandstone and clay shale, this type can be found at an altitude below 750 masl, where the relief is considered as very steep. The drainage class is called "good drainage", the surface color of this soil is brown-gray, the surface texture is sandy loam, and the effective depth is 35 cm. The pH is 4.71, its fertility potential is considered as very low, and the risk of erosion is high. It covers 3,860.91 hectares.</p> <p>Toquiá (Tq): The original material is limestone, this type of soil can be found at an altitude below 2,400 masl, where the relief is considered Karst. The drainage class is called "good drainage", the surface color of this soil is very dark brown to black, the surface texture is silty loam, and the effective depth is 40 cm. The pH is 6.63, its fertility potential is considered as regular, and the risk of erosion is high. It covers 428.27 hectares.</p>
Quiché	<p>Calanté (Ca): The parental material is limestone rock and volcanic ash; this type of soil can be found at an altitude ranging from 1,800 to 2,600 masl. The drainage class is called "good drainage", the surface color is dark brown to very dark, the texture is from frank to silty loam, and the effective depth is 90</p>

Department	Soils description																																																																
	<p>cm. The pH is 5.7, the fertility potential is considered as regular and the risk of erosion goes from regular to high. It covers 101,586.89 ha of the prioritized area.</p> <p>Carcha (Cr): The parental material is volcanic ash; this type of soil can be found at an altitude ranging from 600 to 1,800 masl. The drainage class is called "good drainage", the surface color of this soil is very dark, the texture is silty loam to clay loam, and the effective depth is 1.50 cm. The pH is 5.5 its fertility potential is considered as high, and the risk of erosion goes from regular to low. It covers 2,795.75 ha.</p> <p>Toquiá (Tq): The original material is limestone, this type of soil can be found at an altitude below 3,000 masl, where the relief is considered to be slightly wavy Karst. The drainage class is called "good drainage", the surface color of this soil is very dark brown to black, the surface texture is silty, and the effective depth is 40 cm. The pH is 6.63, its fertility potential It is considered as regular, and the risk of erosion is high. It covers 15,364.91 hectares.</p> <p>Amay (Am): The original material is limestone. The drainage class is called "good", the surface color of this soil is very dark brown, the surface texture is clay loam, and the effective depth is 100 cm. The pH is 5.8, and the risk of erosion is high. It covers 28,283.43 hectares.</p> <p>Cunén (Ce): The original material is shale clay, this type of soil can be found at an altitude below 1,800 meters above sea level, the relief is considered as wavy to wavy inclined. The drainage class is called "good drainage", the surface color of this soil is very dark brown, the surface texture is silty clay loam, and the effective depth is 50 cm. The pH is 5.36, its fertility potential is considered high, and the risk of erosion is high. It covers 27.06 hectares.</p>																																																																
Alta Verapaz	<p>The fragile soils of Alta Verapaz are almost not suitable for any use other than for forestry activities (Alta Verapaz Forest Management Plan - Calmecac, 2019). However, the agriculture frontier is increasing for subsistence farming. The soil identification and its percentage for the department of Alta Verapaz are described in the next table:</p> <table><tr><th>Symbol</th><th>Soil series</th><th>Territory representation (%)</th><th>Region representation (ha)</th></tr><tr><td>Water</td><td></td><td>0.09%</td><td>419.68</td></tr><tr><td>Am</td><td>Amay</td><td>2.37%</td><td>11,452.62</td></tr><tr><td>Cb</td><td>Cobán</td><td>13.77%</td><td>66,538.11</td></tr><tr><td>Cha</td><td>Chacalte</td><td>17.98%</td><td>86,921.96</td></tr><tr><td>Chl</td><td>Chapayal</td><td>0.08%</td><td>380.11</td></tr><tr><td>Chy</td><td>Chixoy</td><td>0.05%</td><td>233.61</td></tr><tr><td>Cr</td><td>Carcha</td><td>3.89%</td><td>18,820.00</td></tr><tr><td>Gp</td><td>Guapaca</td><td>5.24%</td><td>25,341.89</td></tr><tr><td>Sb</td><td>Sebol</td><td>2.35%</td><td>11,367.50</td></tr><tr><td>Sh</td><td>Sebach</td><td>3.43%</td><td>16,602.05</td></tr><tr><td>Sr</td><td>Sarstun</td><td>0.49%</td><td>2,349.94</td></tr><tr><td>Te</td><td>Teleman</td><td>5.67%</td><td>27,412.26</td></tr><tr><td>Tm</td><td>Tamahu</td><td>34.89%</td><td>168,608.29</td></tr><tr><td>Tz</td><td>Tzeja</td><td>9.70%</td><td>46,873.82</td></tr><tr><td colspan="2">Total</td><td>100.00%</td><td>483,321.85</td></tr></table>	Symbol	Soil series	Territory representation (%)	Region representation (ha)	Water		0.09%	419.68	Am	Amay	2.37%	11,452.62	Cb	Cobán	13.77%	66,538.11	Cha	Chacalte	17.98%	86,921.96	Chl	Chapayal	0.08%	380.11	Chy	Chixoy	0.05%	233.61	Cr	Carcha	3.89%	18,820.00	Gp	Guapaca	5.24%	25,341.89	Sb	Sebol	2.35%	11,367.50	Sh	Sebach	3.43%	16,602.05	Sr	Sarstun	0.49%	2,349.94	Te	Teleman	5.67%	27,412.26	Tm	Tamahu	34.89%	168,608.29	Tz	Tzeja	9.70%	46,873.82	Total		100.00%	483,321.85
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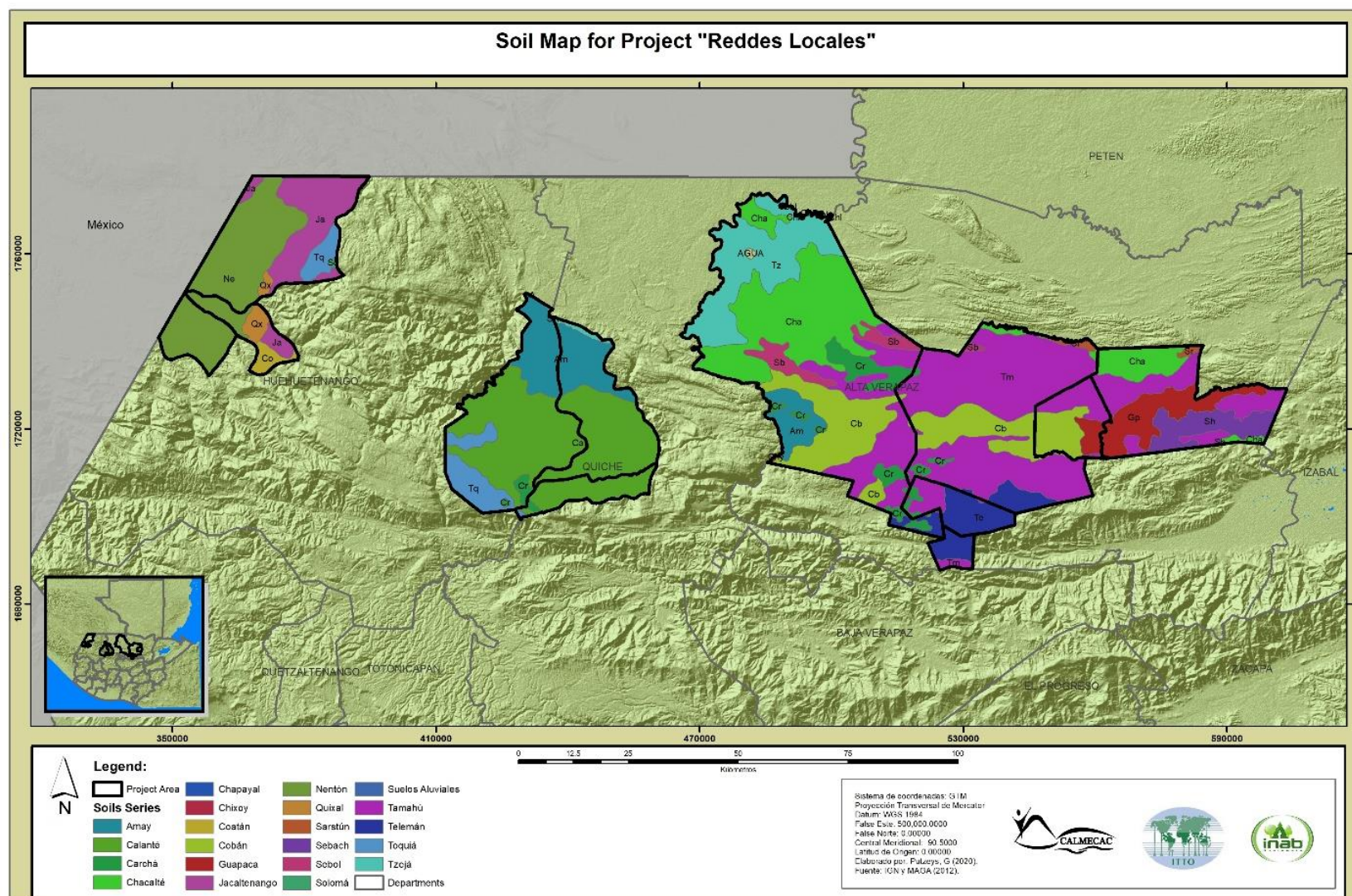


Figure 11. Soil map.
Source: Calmecac (2020).

Types of forest cover

Forests provide environmental goods and services, goods such as wood, fruits, seeds, firewood, leaf litter, food, and forest products. Also, they offer environmental services such as: microclimate regulation, flora and fauna habitat, provide oxygen, CO₂ capture, scenic beauty, and regulation of the hydrological cycle, among others. In the project zone (Table 6), it is possible to find the following types of forests (Figure 12).

Table 6. Description of the municipalities' forest cover.

Department	Forest cover description
Huehuetenango	<p>Guatemala has 3,722,595 hectares of forest cover, which represents 34.2% of the national territory (IARNA, 2012). In the project zone, there are 3 types of forests based on the species composition: Coniferous Forests, Broadleaf Forests, and Mixed Forests.</p> <p>Coniferous forest:</p> <p>It covers the 6% of Guatemalan forests. It is represented by the genus <i>Pinus</i> (<i>Pinus montezumae</i>, <i>Pinus ayacahuite</i>, <i>Pinus Rudis</i> Endl, <i>Pinus pseudostrobus</i>, <i>Pinus tenuifolia</i>, <i>Pinus oocarpa</i>, <i>Pinus caribaea</i>, <i>Pinus teocote guatemalensis</i>, <i>Pinus chapensis</i>, <i>Pinus maximinoiii</i>). Among other well -known species are <i>Abies guatemalensis</i> –Pinabete- and <i>Cupusus lusitánica</i> –Common cypress.</p> <p>Broadleaved Forest:</p> <p>Composed by broad-leafed plants such as: Palo San Juan, Palo Blanco, Madrecacao, Cedar, Mahogany, Matilisguate, Aripin, Encinos, Oaks, Canxan, Bloodwood, Lizard Stick, Ceiba, Liquidambar, among others.</p> <p>Mixed forest:</p> <p>It is a combination of broadleaf forests and coniferous forests, without a predominance of more than 85% of a type of forest. Pine is regularly associated with liquidambar, pine - oak.</p>
Quiché	
Alta Verapaz	

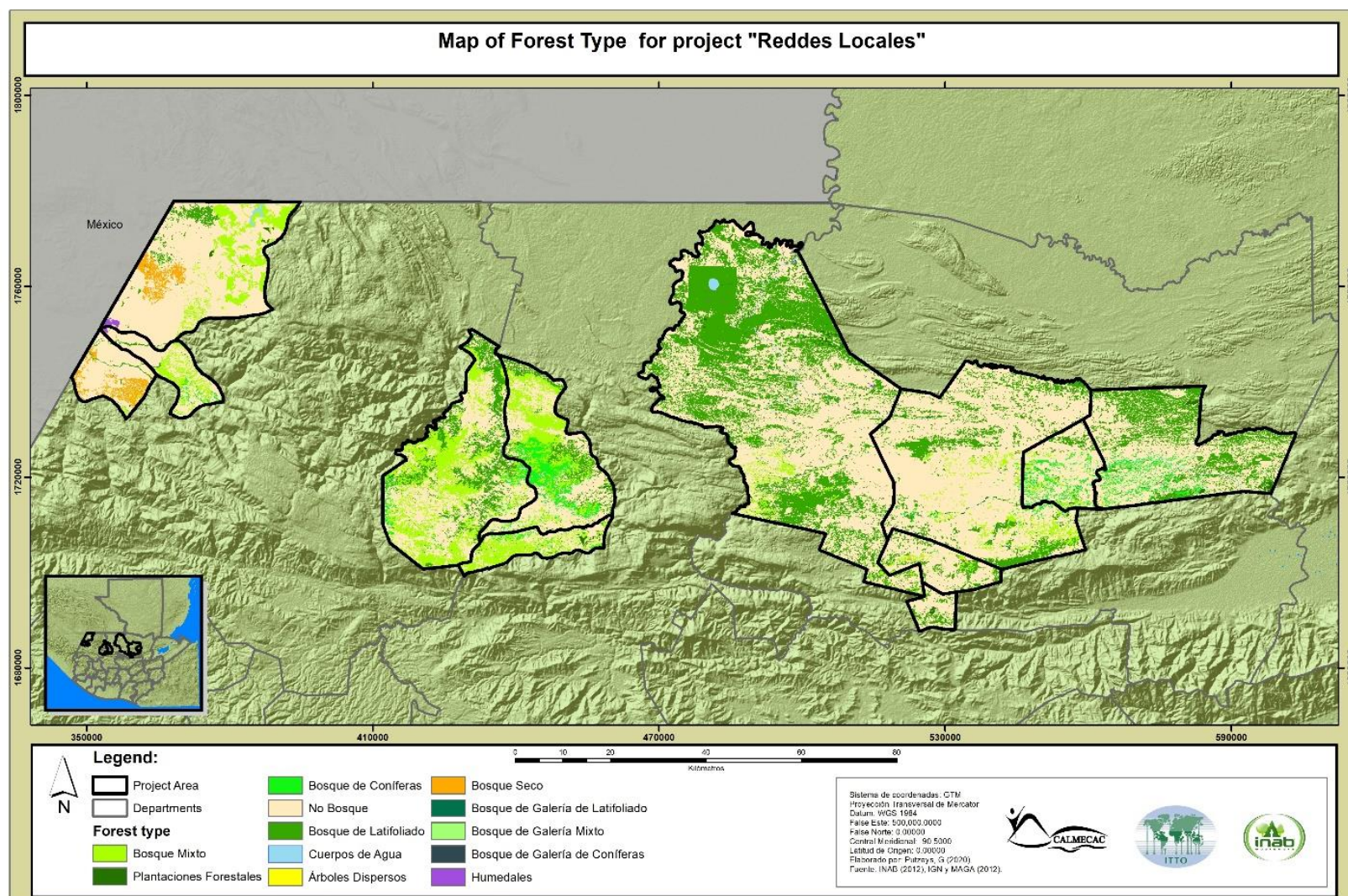


Figure 12. Forests type map.
Source: Calmecac (2020).

2.1.6 Social Parameters (G1.3)

a) Land use and economic activities

Figure 13 shows the land use and land cover of the project area, which is related to the economic activities (Table 7).

Table 7. Description of the municipalities' land use and economic activities.

Department	Land use and economic activities (SEGEPLAN, 2010b, 2011b, 2011a)
Huehuetenango	<p>The land cover is dominated by low shrub vegetation (Guamil Matorral), occupying 40.54% (42,971.53 ha), followed by pastures with 23.60% (25,009.47 ha), and forest with 19.04% that is equivalent to 20,175.31 ha. Other uses are annual agriculture (13,520.45 ha), scattered trees (143.61 ha), coffee (2,078.92 ha), water bodies (505.36 ha), permanent tree crops (44.12 ha), open spaces without or little vegetation (805.20 ha), urban areas (722.92 ha), heterogeneous agricultural areas (2.44 ha) and wetlands (8.86 ha).</p> <p>The main economic activities in the project zone are:</p> <p>Nentón: farming: maize and bean, fruit trees, livestock (cattle).</p> <p>Jacaltenango: coffee, roselle, farming greenhouses, fruit trees, livestock (cattle). The 85% of the municipal area is under forestry land use, however, the need for food production (especially basic grains) and the demand for forest resources causes the expansion of the agricultural frontier, loss of forest cover and biodiversity. This is reflected in the land use conflict, which indicates that 36% is in overuse. A deforestation rate of 56 ha/year is estimated.</p> <p>Santa Ana Huista: coffee, fruit trees, livestock (cattle). Among the main problems detected in the municipality is the degradation of forest and deforestation linked to the agricultural frontier and the conflict of land use, which indicates that 68% of the territory is overused. No soil conservation practices are implemented in steep areas. On the other hand, the municipality has an area of genetic richness because it is considered one of the few centers of the origin of corn in the country. There is currently an initiative between the municipality, communities and CONAP to declare this area as protected.</p>
Quiché	<p>The forest cover occupies more than half of its territory being 51.49% equivalent to 76,232.10 ha, followed by low shrub vegetation (Guamil Matorral) with 23.40% (34,652.82 ha), and annual agriculture 14.19% (21,012.52 ha) of the territory. The other land uses are dispersed trees (51.88 ha), coffee (5,199.60 ha), water bodies (140.96 ha), permanent herbaceous crops (260.18 ha), permanent tree crops (9.67 ha), permanent crops of plants or stems (3,554.79 ha), open spaces without or little vegetation (1,153.23 ha), grassland (2,981.27 ha), urban areas (1,264.98 ha), heterogeneous agricultural areas (1,537.71 ha) and wetlands (1,77 ha).</p> <p>In the department, maize production is the most important crop, followed by bean production. Agricultural production accounts for approximately 80% of the economy. Coffee is the most important crop in commercial terms produced mainly by small producers (80.83%) and marketed through several organizations (also exported) such as Chajulense Association and Maya Ixil, Agros Foundation. Cardamom cultivation is less important, and its</p>

Department	Land use and economic activities (SEGEPLAN, 2010b, 2011b, 2011a)
	<p>commercialization happens only through intermediaries. Other self-consumption crops are potato, cauliflower, chili, pineapple; where the surplus is sold. Nevertheless, productivity is very low due to the sowing of annual crops in sloping lands, the constant loss of the original organic layer, illegal logging, and the little tradition of soil conservation practices. Only 3% use drip and spray irrigation technology, mainly for the production of vegetables.</p> <p>Regarding livestock, the most common animals at the family level are chickens (87% of families breed for commercial purposes), pigs (40% of families) and cows (in 23% of families). Less frequently are sheep (21%), turkey (17%), ducks (16%) and goats (4%). There is a relationship between the presence of some of these animals and the micro-climate of each place. The average number of animals in families is 2 to 3. Cattle farming in the area is very incipient because of the lack of pastures, more than half of the families have to pay to use paddocks from other owners. In addition, the large extensions in pastures necessary for livestock cause competition with agricultural land.</p> <p>Santa Maria Nebaj: The high rates of poverty and extreme poverty reflect the absence of economic development opportunities for the rural inhabitants. This situation leads to seeking more practical alternatives such as agriculture.</p> <p>San Juan Cotzal: Forest cover is linked to the water recharge and it is the supply source for many communities, however; in the municipality, there are no initiatives for the valuation, conservation and sustainable use of natural resources, which leads to the increase in agriculture frontier and illegal logging.</p> <p>San Gaspar Chajul: agriculture and illegal logging for firewood extraction are the main drivers of deforestation.</p>
Alta Verapaz	<p>The broadleaf natural forest represents 25.75% of the territory of the department of Alta Verapaz; conifers represent only 0.16%, mixed forests are 3.09%, and 0.73% corresponds to wetland areas with forest.</p> <p>The production in the department is based on subsistence agriculture (maize, beans, citrus fruits trees). Other productive activities are livestock, cardamom and very recently the extensive monoculture of African palm in the Northern Transversal Strip region.</p> <p>In the central region; Cobán, Carcha, Chamelco, due to its proximity to the roads and the departmental capital, is produced coffee, cardamom, cultivation of vegetables, and handicrafts (in wood and textiles). Alta Verapaz is the department with the greatest territorial extension destined to maize cultivation, with production above 3.5 million quintals¹⁵. Nevertheless, landowners use ancestral mechanisms and subsistence production, which affect production and quality. Coffee, cardamom, achiote, cocoa and African palm are crops that are destined for the international market (Alta Verapaz is the largest cardamom producer).</p>

¹⁵ 1 quintal is about 46 kg.

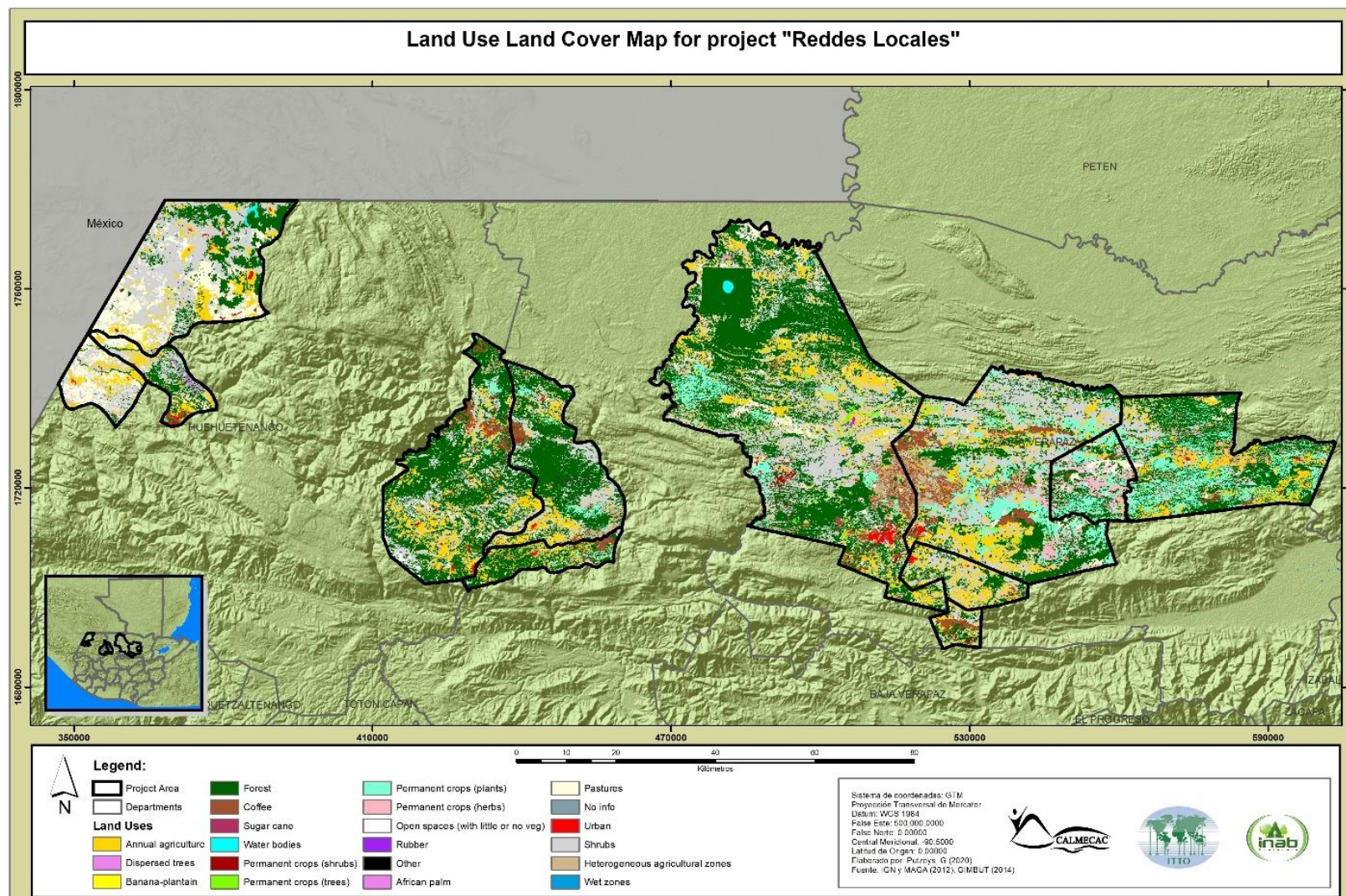


Figure 13. Land use map.
Source: Calmecac (2020).

b) Land ownership

Land ownership and land tenure in the project area is described in Table 8.

Table 8. Description of the regional land ownership.

Department	Land ownership description
Huehuetenango	The department is characterized by a high percentage of micro-farms (50.8%) which are less than 1 ha, followed by family plots (45.8%) between 1 up to 10 ha (SEGEPLAN, 2011b).
Quiché	<p>Land tenure is classified in own, leased, usufruct and occupied.</p> <p>91% of the land is owned and 4% occupied. Due to the support of international organizations, people have managed to recover the lands they had lost during the armed conflict period. The number of plots per family varies from 1 to more than 10; the average is 3 parcels per family.</p> <p>One of the main problems affecting the rural population is that they do not have legal certainty about the ownership of the land since most of them do not have legal property certificates. A cadastral map has not been carried out, which causes permanent conflicts and limitations of access to credits (for not having collateral) to increase production or switch to more productive crops.</p>
Alta Verapaz	<p>The department presents the highest number of agrarian conflicts. By April 2008, 1,563 cases in the process were registered at the country level, having a differentiated incidence in the departments of Quiché (22%), Alta Verapaz (30%) and Petén (17%).</p> <p>The main cause is the unequal land distribution (concentration of land ownership), which is verified with the high Gini coefficient of 66.37% indicating that 2% of farms (farm units) cover 65% of the area, while 98% of the farms only cover 35% of the area.</p> <p>The lack of legal certainty on land ownership constitutes a problem that has limited the access to credit, incentives and capital investments.</p>

c) Sociocultural information

Figure 14 shows the location of the population in relation to the socio-cultural description in Table 9.

Table 9. Regional sociocultural information.

Department	Socio-cultural description
Huehuetenango	<p>In the municipalities of Nentón and Santa Ana Huista, the main language spoken is Mayan.</p> <p>The male population in the dry region is 44,258 inhabitants, corresponding to 0.30% of the 48.5% (7,223,096 men) reported nationally, in the case of the female population is 48,005 corresponding to 0.32% of 51.5% (7,678,190 women) (INE, 2018). The Maya (81.03%), Garífuna (0.06%) and Xinka (0.003%) are the majority of community groups in the region. In addition, 17.77% are Ladinos¹⁶ and the rest belong to foreigners (0.09%) and Afro-descendants¹⁷ (0.05%).</p> <p>The linguistic community is represented mainly by two large groups, where the dominant is the Jakalteko / Popti' community with 47.32% of the population. This community group is present in the 3 municipalities. The second group is the Chuj linguistic community represented by 35.36% of the total Mayan linguistic community. They are located mostly in the municipality of Nentón (99.58% of the population is identified with this group).</p>
Quiché	<p>The male population in the department amounts to 48.38%, while women are 51.62%. The population density is 131 inhabitants per km².</p> <p>The ethnic composition is 88.33% indigenous people of Mayan descent, 11.60% are Ladino population. This structure allows inter-ethnic and intercultural relations due to trade, human mobility and relocation of population settlements (SEGEPLAN, 2010b).</p>
Alta Verapaz	<p>For 2010, the population was 1,078,942 inhabitants, with an equitable distribution of 49.8% for men and 50.19% women. The population density was 124.2 inhabitants per km².</p> <p>93% of the population is indigenous corresponding to the Q'echi 'and Poqomchi ethnic groups and 79% live in the rural area and is highly dispersed populated places.</p> <p>According to information from the National Survey of Living Conditions conducted by the INE in 2006, the department of Alta Verapaz ranks second in extreme poverty in the country, establishing a poverty relationship where 8 out of 10 inhabitants are poor and 4 out of 10 are extremely poor. There is evidence of a lack of employment sources, access to land, and educational opportunities (SEGEPLAN, 2011a).</p>

¹⁶ The term *Ladino* refers to Spanish-speaking people of mixed or indigenous origin who have adapted to or identify themselves with the mainstream national Hispanic culture.

¹⁷ Afro-descendants refer to people with African ancestry. There are three main groups: Afromestizos, Garífuna and Creole English speaking Afro-Antilleans (also known as "West Indians").

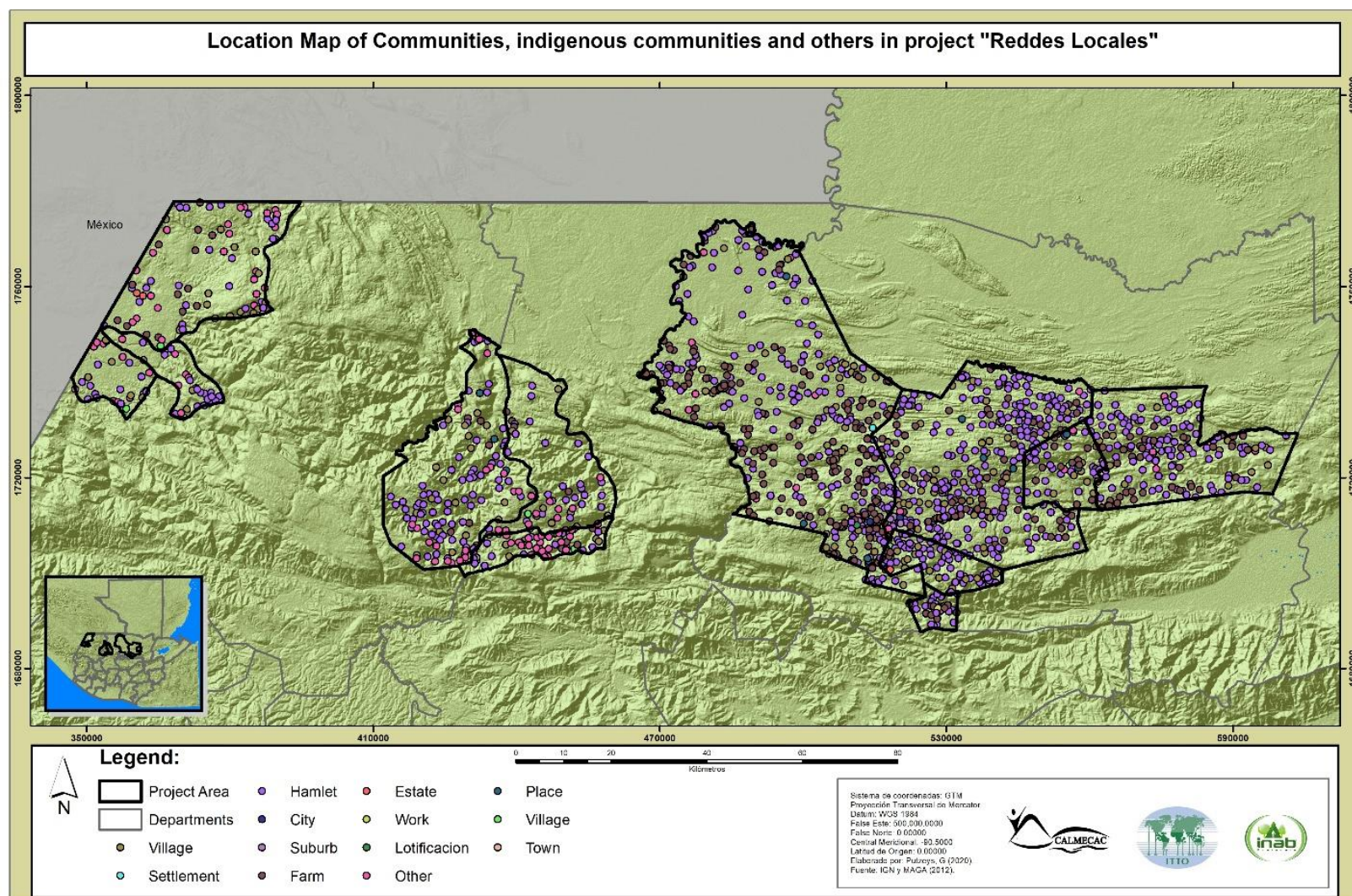


Figure 14. Location of communities, indigenous communities and others map.
Source: Calmecac (2020).

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

The departments (Figure 15) and the municipalities (Figure 16) within the project zone are:

- Alta Verapaz: Cobán, San Pedro Carcha, Lanquín, San Juan Chamelco, Tamahú.
- Quiché: Nebaj, Chajul, Cotzal.
- Huehuetenango: Nentón, Santa Ana Huista, Jacaltenango.

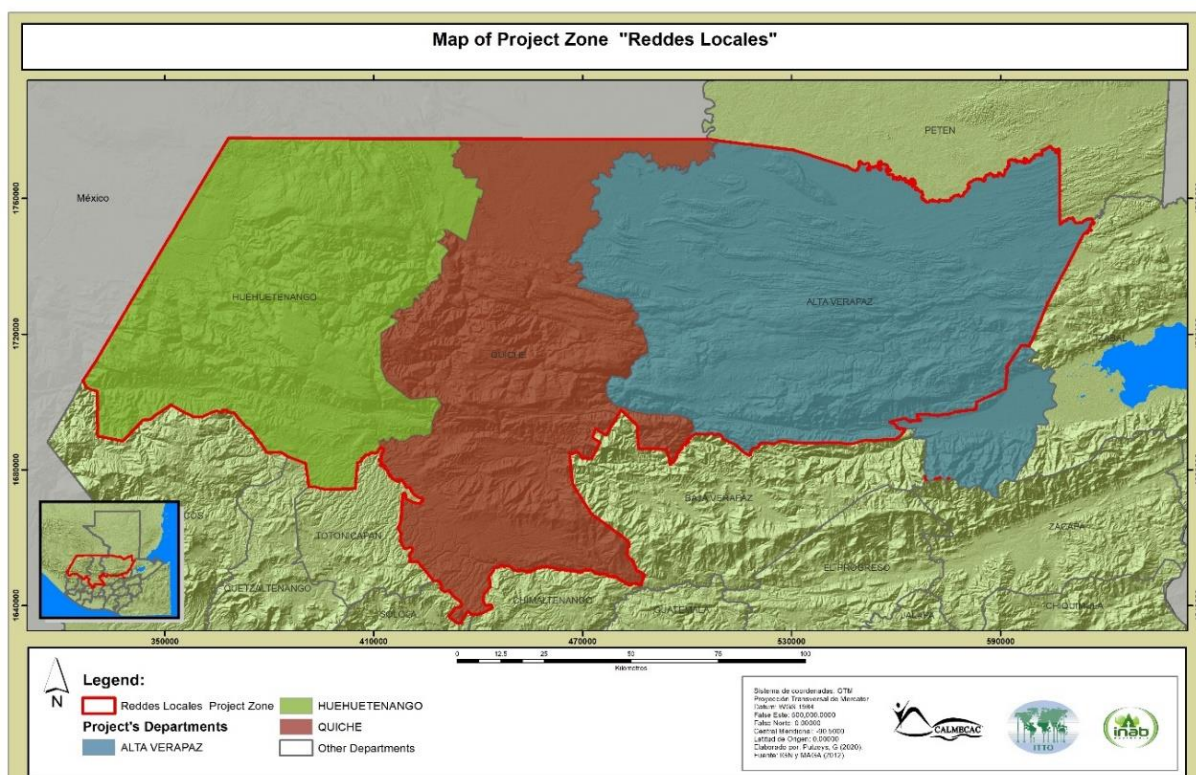


Figure 15. Map of the Project Zone
Source: Calmecac (2020).

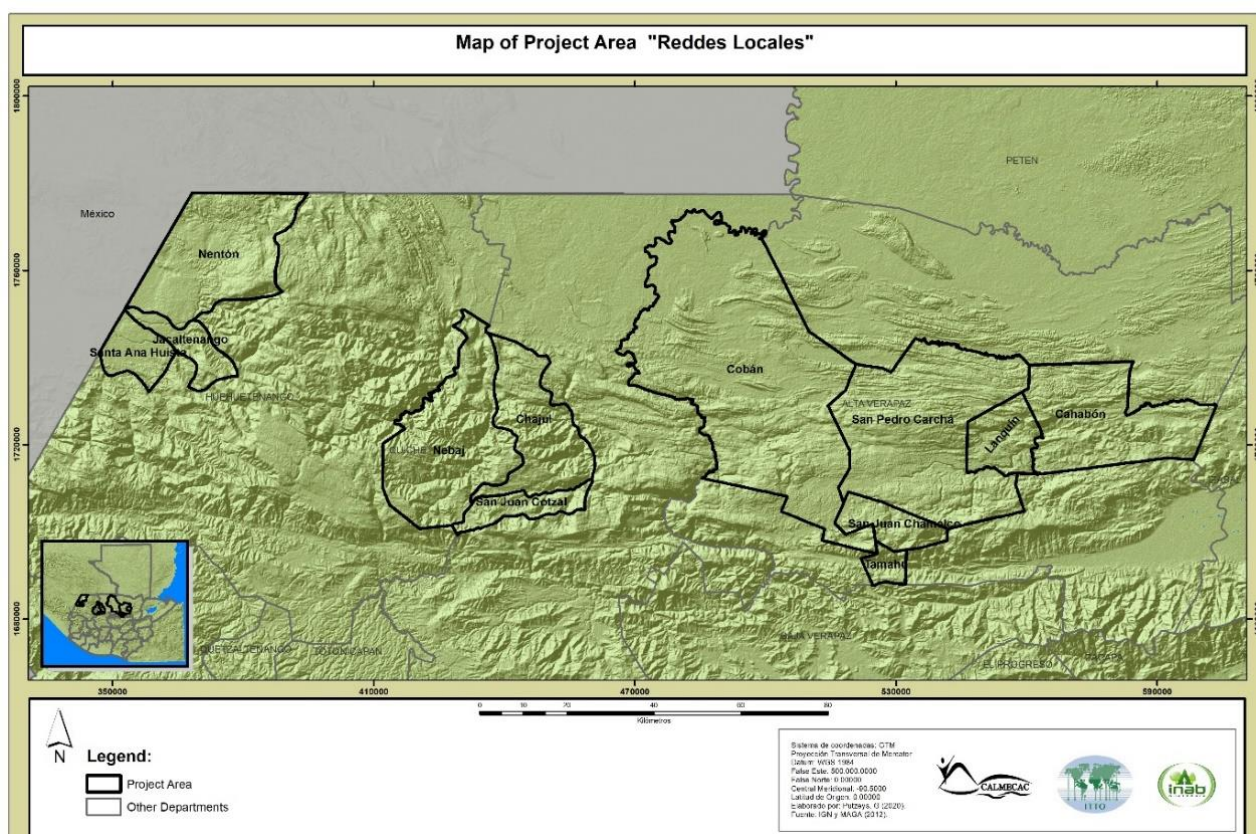


Figure 16. Project area map.
Source: Calmecac (2020).

The project is located in three areas classified as vulnerable in terms of the loss of forest mass (FCPF, 2019) but that are not classified as protected areas. Table 10 shows the forest cover and forest loss/gain of the municipalities involved in the project (Figure 17).

Table 10. Forest coverage (in hectares) and dynamics by municipality for the Reddes Locales project areas (2016).

Source: (Own elaboration based on data from GIMBUT, 2019).

Tree Cover	Forest	Without forest	Loss	Gain	Water bodies
Cahabón	17472.2	44180.7	6536.0	7670.5	312.1
Chajul	25467.7	19101.4	2856.7	5065.7	72.4
Cobán	85403.3	99825.8	20649.1	19040.7	1897.7
Jacaltenango	4304.4	9854.5	902.9	1255.4	-
Lanquín	3047.2	15801.6	1900.6	2718.4	181.3
Nebaj	32606.1	37277.8	5628.9	9414.2	176.3
Nentón	14319.3	54883.6	3280.8	3327.3	434.8
San Juan Chamelco	2937.4	12589.9	1798.6	1390.5	-
San Juan Cotzal	4995.8	7674.5	1020.8	2595.6	-
San Pedro Carchá	19476.8	89045.7	11621.4	11315.2	156.8
Santa Ana Huista	527.9	16392.9	315.4	491.9	47.3
Tamahú	1632.8	4170.1	517.0	669.8	-
Total	212192.4	410805.4	57029.3	64955.6	3280.3

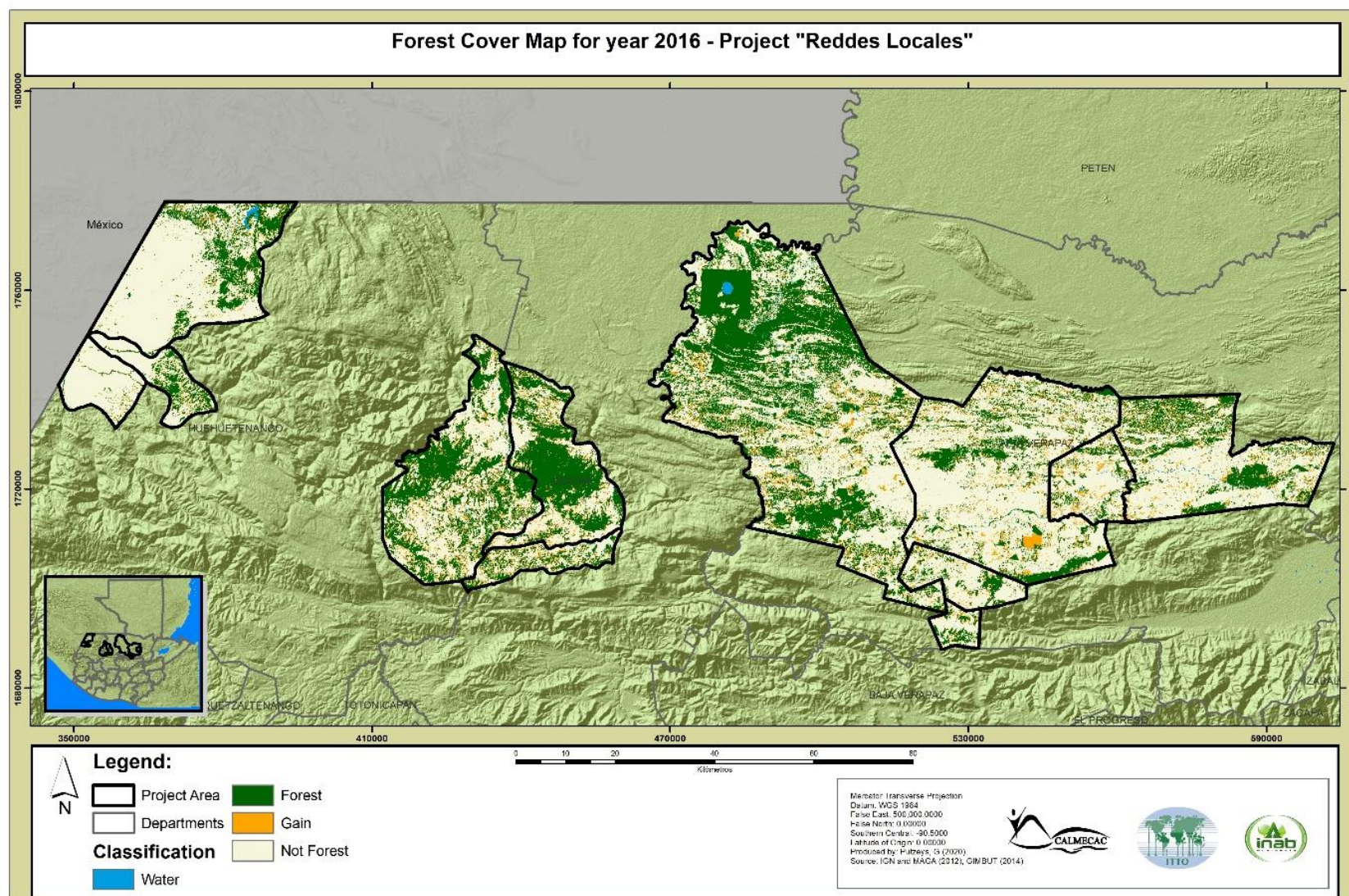


Figure 17. Forest cover map 2016.
Source: Calmecac (2020).

2.1.8 Stakeholder Identification (G1.5)

Calmecac's work experience in the project area was the first step for stakeholder identification, which was complemented with literature review based on official social information (section 4.1).

Socialization workshops were done in the municipalities within the project area following the Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ projects (Richards, 2011; Richards & Panfil, 2011). Calmecac identified the different stakeholders based on working experience from previous projects such as PINFOR and PROBOSQUE.

Department	Municipality	Community	Community groups	Other stakeholders
Alta Verapaz	Cobán, San Pedro Carcha, Lanquín, Cahabón, San Juan Chamelco and Tamahú	Private landowners, landholders, municipalities, communities.	COCODES, Agricultural producers, cooperatives, organization groups (coffee, cardamom)	INAB, Enredémonos por el Corazón Verde, private sector, academia and universities.
Quiché	Nebaj, Chajul and Cotzal			
Huehuetenango	Nentón, Santa Ana Huista and Jacaltenango			

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

The Reddes Locales project seeks to reduce deforestation and forest degradation in 12 municipalities from Alta Verapaz, Huehuetenango and Quiché.

In the future, the grouped project can allow the inclusion of new instances (municipalities) that meet the eligibility criteria (Section 2.1.21)

Stakeholder	Rights, Interest and Overall Relevance to the Project
Private landowners, land holders, municipalities, communities.	<p><i>Rights:</i> Be consulted and involved in project development and implementation. Training and capacity-building regarding the project activities.</p> <p><i>Interest:</i> Improve their livelihood, diversify their economic activities, and the sustainable management of natural resources.</p> <p><i>Relevance:</i> Direct participation in the project activities, direct beneficiaries.</p>
Agricultural producers, cooperatives, organization groups (coffee, cardamom)	<p><i>Rights:</i> Be consulted concerning project development.</p> <p><i>Interest:</i> Assess the impact on their agriculture activities (socio-economic interest).</p> <p><i>Relevance:</i> Direct and indirect beneficiaries of the project's impacts (climate, biodiversity, and community).</p>
Municipalities of Cobán, San Pedro Carcha, Lanquín, Cahabón, San Juan Chamelco, Tamahú, Nebaj, Chajul, Cotzal,	<p>The municipalities actions are channeled through their Municipal Environmental Management Units (UGAM) and Municipal Forestry Office (OFM).</p> <p><i>Rights:</i> Regulation of the land use and enforcement of the forest and climate policies in the project area.</p>

Stakeholder	Rights, Interest and Overall Relevance to the Project
Nentón, Santa Ana Huista, and Jacaltenango.	<p><i>Interest:</i> Reduce deforestation and forest degradation, ensure compliance with land use regulations. Through their technical team, they manage, operate, and assist the municipal population about sustainable forest uses.</p> <p><i>Relevance:</i> Direct and indirect beneficiary, an autonomous entity of the territorial planning in the project area.</p>
Enredémonos por el Corazón Verde	<p><i>Rights:</i> Be consulted in the design and implementation of the project activities, act as a counselor regarding the sustainable use of natural resources.</p> <p><i>Interest:</i> Assure the sustainable management of natural resources and generate diversified economic alternatives (timber and non-timber products) for the organization involved.</p> <p><i>Relevance:</i> Direct and indirect beneficiary, contribute to the supervision of the project's activity implementation, technical advisor.</p>
National Forest Institute - INAB	<p><i>Rights:</i> Regulation of the forest resources and oversees that the project activities are aligned to the national policies and regulations.</p> <p><i>Interest:</i> Ensure the sustainable management of forest resources.</p> <p><i>Relevance:</i> National forest authority, direct and indirect beneficiary.</p>
Calmecac	<p><i>Rights:</i> Coordinate the design and implementation of the project.</p> <p><i>Interest:</i> Reduce deforestation and forest degradation in the project area, successful implementation and monitoring of project activities to achieve the project's objective (climate, community, and biodiversity).</p> <p><i>Relevance:</i> Primary project proponent, direct and indirect beneficiary.</p>
Private sector, academia and universities.	<p><i>Rights:</i> Be consulted in the design and implementation of the project activities, act as a counselor regarding the sustainable use of natural resources.</p> <p><i>Interest:</i> Assure the sustainable management of natural resources and generate diversified economic alternatives (timber and non-timber products).</p> <p><i>Relevance:</i> Indirect beneficiary, contribute to the supervision of the project activity implementation, technical advisor.</p>

2.1.10 Sectoral Scope and Project Type

The project is within the VCS Sectoral Scope 14: Agriculture, Forestry and Other Land Use (AFOLU). The project category corresponds to landscape-scale REDD+ for avoiding unplanned deforestation and forest degradation (AUDD). The project uses a nested approach within a Governmental subnational REDD+ accounting system. The project also follows a grouped project approach.

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

Project activities

The project activities are designed to avoid unplanned deforestation and forest degradation. They are divided into three main strategies, which are in accordance with national policies and programs. In

addition, the project is located in three REDD+ subnational regions: Tierras Bajas del Norte, Sarstún-Motagua, and Occidente, as shown in section 2.1.5. The project activities are:

Natural resources and biological diversity for securing local population livelihood

- Project activity 1: Design and implement control and surveillance plans at the municipal level in the project zone.
- Project activity 2: Community forest monitoring system.
- Project activity 3: Design and implementation of a sustainable land use management plan.

The strategy will be developed in coordination with the local partner organizations belonging to the network “Enredémonos por el Corazón Verde” and the local community administrations to legally promote and register the sustainable forest management at a family level. Municipalities’ capacities will be strengthened for recording, controlling, and monitoring family consumption. Municipalities can authorize up to 15 m³ for family consumption (no commercial). At a commercial level (above 15 m³) municipalities will be strengthened to develop specific regulations in coordination with INAB.

Institutional strengthening for effective governance

- Project activity 4: Training program for partner organizations belonging to the network “Enredémonos por el Corazón Verde” about forest environmental justice.
- Project activity 5: Organization and training to reduce illegal activities related to the forest.
- Project activity 6: Strengthen the Municipal forestry offices to promote legal forest activities.
- Project activity 7: Training for municipal / community forest brigades on forest management and prevention of forest fires.
- Project activity 8: Capacity building on sustainable forestry practices to the project beneficiaries.
- Project activity 9: Improve the forest fire equipment of the municipal forest offices.

The activities to be developed by the forest brigades are divided into three main topics: (1) prevention activities from October to January (4 months), training, fire-breaking rounds, prescribed burns, agricultural control for using slash-and-burn, prevention and awareness campaigns. (2) Control activities from February to June based on the implementation of an early warning system in coordination with CONRED and the government, surveillance and monitoring. Lastly, (3) awareness and training activities from July to September applying information dissemination through the media and environmental education campaigns.

Economic and socio-environmental sustainable development

- Project activity 10: Capacity building for organizations and partner communities on formalization and promotion of new legal forestry companies.
- Project activity 11: Design of an environmental compensation mechanism at the municipal level.
- Project activity 12: Provide technical and legal support to the implementation of Forest Incentive Programs.
- Project activity 13: Strengthen the value chain of timber and non-timber¹⁸ forest products.
- Project activity 14: Strengthen the production capacities of timber and non-timber forest products.

The strategy includes the implementation of community forest nurseries, reforestation campaigns and projects, technical studies for natural resource management, biodiversity monitoring, agroforestry systems for food diversification, forest plantations and forest landscape restoration, creation of forest for energy use, sustainable licenses for firewood logging and timber logging, sustainable forest management through family consumption licenses, and the sustainable management of firewood

¹⁸ Non-timber forest products include coffee, cardamom, honey, handicrafts, and textiles.

through energy gardens and efficient cookstoves. Also, support and boost the legal trade of timber and non-timber forest products. In addition, the strategy aims to protect the forest through the implementation of forest incentive projects: The Incentive Program for the Establishment, Recovery, Restoration, Management, Production and Protection of Forests in Guatemala (PROBOSQUE) and the Forest Incentives Program for Small Forestry and Agroforestry Land Owners (PINPEP).

The integrated territorial management follows a sustainable rural development approach involving the activities (Ibid.) described in Figure 18:

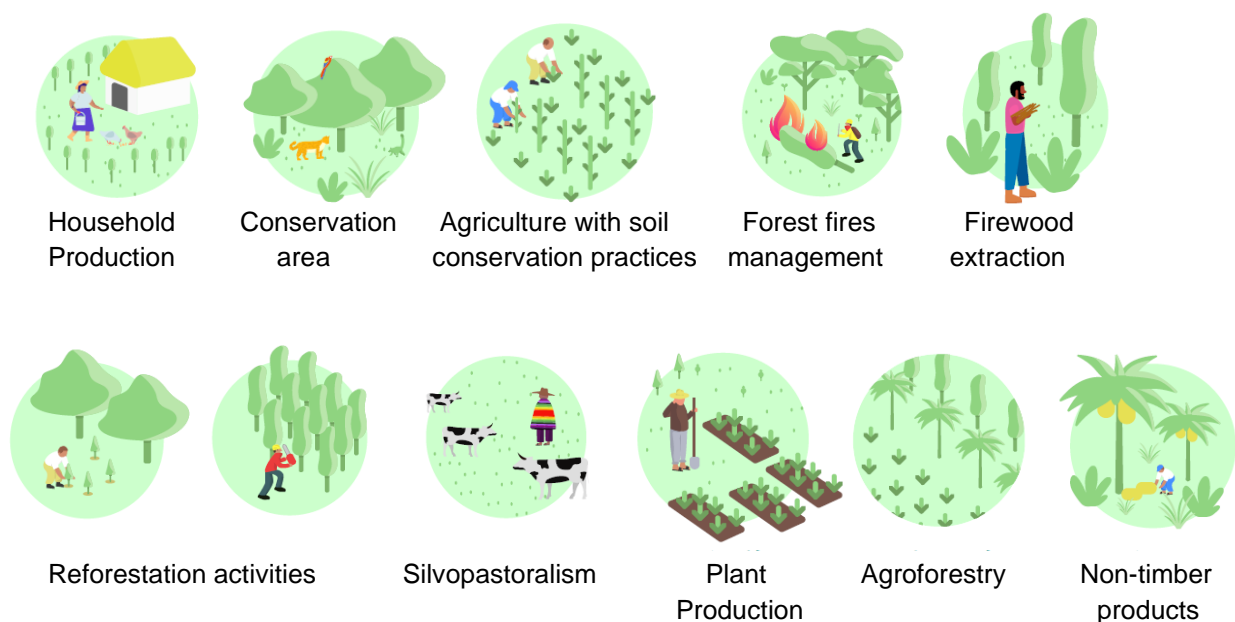


Figure 18. Project activities for the Reddes Locales REDD+ project

Source: Manual de Elegibilidad para proyectos REDD+ - Reddes Locales. Consortium Sud-Austral, GOPA; Calmecac, ForestFinest Consulting, 2020 (forthcoming.)

The main steps that beneficiaries should follow to participate in the project are (Calmecac, 2020a):

1. The landowners or land holders go to the municipal forestry office, where the project participant can ask for a registration form.
2. After registration, the local technician verifies that the land complies with the eligibility criteria for the REDD+ project and its activities. If yes, the land is registered as part of the project.
3. The local technician is in charge of carrying out the community forest monitoring in the area of interest.
4. The forest technician validates annually that the areas are complying with the primary objective of reducing greenhouse gas emissions and conserving forests.
5. At the verification event of the REDD+ Reddes Locales project (reduce deforestation and forest degradation), the project will receive compensation for forest conservation. This money will go directly to a common fund that will be administered by the municipality, and it will be invested in projects benefiting the entire community.

Theory of change

In order to explain how the project activities will achieve the project's predicted climate, community, and biodiversity benefits, a theory of change (Table 11) was developed for each main strategy described in the previous section.

Table 11. Theory of change for the project activities.

Strategy	Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
		Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
Natural resources and biological diversity for securing local population livelihood	1. Design and implement control and surveillance plans.	<p>Number of control and surveillance plans.</p> <p>Number of trained people on forest patrolling.</p> <p>Number of consumption family plans registered at municipal level.</p>	<p>People trained in control and surveillance skills (desk and fieldwork capacities).</p> <p>To legally promote and register sustainable forest management at family level (allowing the production trade).</p>	<p>Enhance of community and organization knowledge and skills on forest conservation and monitoring.</p> <p>Increase in forest cover, sustainable management plan at municipal and family levels.</p>	<p><i>Climate:</i> reduction of GHG emissions.</p> <p><i>Community:</i> improvement of family livelihood, communities trained in sustainable forest management.</p> <p><i>Biodiversity:</i> recovery of forest cover and biodiversity.</p>
	2. Community forest monitoring.	Number of communities trained in forest monitoring.	People trained in community forest monitoring.	Ecological rehabilitation and reduction of illegal logging.	
	3. Design and implementation of sustainable land use management plan.	<p>Number of sustainable management plans for potential land uses.</p> <p>Number of community forest nurseries.</p> <p>Number of reforestation campaigns and projects.</p>	<p>Revenues from the sale of carbon credits.</p> <p>People trained in sustainable forest management.</p>	<p>Increase in carbon stock.</p> <p>Increase in forest cover and restoration of ecosystem services.</p> <p>Increase in forest connectivity between the forest fragment (mosaic).</p>	<p><i>Climate:</i> reduction of GHG emissions.</p> <p><i>Community:</i> communities trained in sustainable forest management.</p> <p><i>Biodiversity:</i> recovery of forest functions, connectivity and</p>

Strategy	Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
		Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
		Number of trained people in best management practices (biodiversity monitoring, agroforestry systems, forest plantation for multiple uses).			conservation of biological diversity.
Institutional strengthening for effective governance	4. Training program for partner organizations about forest environmental justice.	Number of courses/ workshops on forest environmental justice, sustainable forest management and prevention of forest fires.	People trained in sustainable forest management practices.	Enhance access to information and communication.	<i>Climate:</i> reduction of GHG emissions. <i>Community:</i> enhance the regional economy. People trained in sustainable forest management. <i>Biodiversity:</i> recovery of forest cover and an increase in biodiversity through the adoption of sustainable agriculture practices.
	5. Organization and training to reduce illegal activities.		Increment on environmental education at the municipal and regional levels.	Increase in organization and communities' knowledge and skills, as well as, forest governance.	
	6. Strengthen the Municipal forestry offices to promote legal forest activities.	Number of people trained in sustainable forest management.	Reduction of forest fires events.	Increase in economic livelihood opportunities.	
	7. Training for municipal / communities forest brigades on forest management and prevention of forest fires.		Raise awareness towards the prevention and control of forest fires.	Increase in forest cover and carbon stocks.	

Strategy	Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
		Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
	8. Capacity building on sustainable forestry practices to the project beneficiaries.				
	9. Improve the forest fire equipment of the municipal forest offices.	<p>Number of forest fire equipment.</p> <p>Number of people trained on the proper use of Personal Protective Equipment.</p>	<p>Reduction of forest fire events.</p> <p>People with better access to safety and health conditions.</p> <p>Control and avoid anthropogenic catastrophic events to preserve ecosystems.</p>	<p>Increase in forest cover and carbon stocks.</p> <p>Awareness in occupational health and safety.</p>	<p><i>Climate:</i> reduction of GHG emissions.</p> <p><i>Community:</i> people trained and have access to proper equipment for reducing forest fires.</p>
Economic and socio environment sustainable development	10. Capacity building for organizations and communities on the formalization of forestry companies.	<p>Number of courses/ workshops on the formalization of forest companies</p> <p>Number of people trained in sustainable forest management.</p>	<p>People trained in legal and administrative topics for the formalization of forest companies.</p> <p>People trained in sustainable forest management practices.</p>	Reduce the number of informal forest companies and illegal activities.	<p><i>Climate:</i> reduction of GHG emissions.</p> <p><i>Community:</i> enhance the regional economy. People trained in sustainable forest management.</p>
	11. Design of an environmental	Compensation mechanism plan for benefit sharing.	Communities informed and participating actively in the project.	Increase in economic livelihood opportunities.	<i>Community:</i> communities are aware

Strategy	Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
		Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
	compensation mechanism.	Number of forest hectares participating under forest incentives		Recognition of each project beneficiary's rights.	of how to access the project benefits.
	12. Provide technical and legal support to the Forest Incentive Programs.	Number of courses/workshops on legal forest aspects. Number of new projects under forest incentives (PINPEP and PROBOSQUE)	People trained and informed to access the project benefits. Development of new forest projects under sustainable management.		<i>Biodiversity:</i> conservation (forest protection, reforestation, forest plantation) of forest natural resources.
	13. Strengthen the value chain of timber and non-timber products.	Number of forest products business plan. Number of trained people in business skills.	Increase the business capacity of communities. Increase the potential sustainable uses of forest products (initiatives). Promotion and strengthening of value chains and market access. Improvement in the local economy.	Increase in economic and livelihood opportunities. Improvement of the commodity chains to be competitive and socially inclusive. Improvement of community knowledge in sustainable business skills.	<i>Community:</i> improvement of family livelihood economy, communities trained in business models, strengthening community cooperation. In addition, increase the incomes of communities for product diversification, and reduction of poverty at the municipal level.

Strategy	Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
		Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
			Additional income from alternative activities.		<i>Biodiversity</i> : valorization of other potential use of the forest reducing pressure on natural forests.
	14. Strengthen the production capacities of timber and non-timber products.	<p>Number of technical studies for forest products.</p> <p>Percentage of increase in production.</p>	<p>Promotion and development of family / communal production models.</p> <p>Increase in the yield of forest products.</p> <p>Increase in family income.</p>		

2.1.12 Sustainable Development

Guatemala has a National Development Plan called: "K'atun Nuestra Guatemala 2032", in which five topics are prioritized:

1. Urban and rural Guatemala,
2. Welfare for the people,
3. Wealth for all and for all,
4. Natural resources for today and the future and
5. State as guarantor of human rights and driver of development.

These five topics guide the formulation of all public policies, fiscal spending, and the geographic and sectoral orientation of public and private investment. Within this framework, it's constituted the national policy of long-term development that articulates policies, plans, programs, projects and investments. The project will contribute to the fulfillment of the established goals, mainly in the fourth axis "Natural Resources for today and for the future", whose objective is to protect and to harness the natural resources in balance, with the social, cultural, economic and territorial development, so that they allow to satisfy the present and future demands of the population in conditions of sustainability and resilience. It establishes ten priorities:

1. Adaptation and mitigation to climate change.
2. Conservation and sustainable use of forests and biodiversity for climate change adaptation and mitigation
3. Sustainable water resources management for social, economic and environmental objectives
4. Agricultural technification and family agriculture for food security with relevance to Mayan, Xinca, Garifuna, elderly adults and gender communities.
5. Land use planning for the sustainable use of natural resources, agricultural production and adaptation to and mitigation of climate change
6. Agricultural production for food security
7. Integrated and participatory management of solid waste
8. Sustainable management of coastal marine systems, Ramsar sites, and lake and river systems, considering the gender relevance of Maya, Xinca, Garifuna, and elderly adults.
9. Access to quality energy with national coverage
10. Increase in the participation of renewable energy in the energy matrix, considering citizen participation and with the relevance of Mayan, Xinca, Garifuna, gender and age groups

The project zone presents a high index of poverty and low rural development (section 4.1). The project activities are designed and aligned with the national development plans which promote forest conservation, improve livelihood in the rural areas, and enhance ecosystem services. In addition, it is also in line with the following Sustainable Development Goals (SDG):

- **SDG1 - No Poverty:** The project contributes to reducing poverty by developing new timber and non-timber value chain. The project beneficiaries will have alternative productive activities. Further, the forest incentives program will contribute to the livelihood of the project beneficiaries.
- **SDG4 – Quality education:** The project activities involve capacity training and technical workshops on different topics such as environmental justice, prevention of forest fires, environmental awareness, reforestation, and others.
- **SDG5 – Gender equality:** Through the forest incentives (PINPEP and PROBOSQUE), women's participation is encouraged and prioritized. Women will not be discriminated against in the implementation of the project and they will have the same opportunities in every activity.

- **SDG12 – Responsible Consumption and production:** The project expects to reduce deforestation and forest degradation rates, therefore, reducing the expansion of agriculture frontiers. New development of forest products is expected under sustainable practices and efficient use of natural resources.
- **SDG 13 – Climate action:** The project activities aim to reduce GHG emissions during the project lifetime.
- **SDG 15 – Life on land:** The project activities are focused on restoring land degradation, promoting reforestation and protection of the forest. By reducing the pressure on natural resources, it is expected to enhance the high conservation values associated with the structure, composition and functionality of the ecosystems.

2.1.13 Implementation Schedule (G1.9)

Project's start and end dates for the GHG accounting period are 2017 to 2047.

Forest incentives' PINPEP and PROBOSQUE have a limited lifetime of 15 years and 30 years, respectively. The project implementation schedule is presented in Table 12.

Table 12. Implementation schedule for the project development.

Component/ Institutional Program	Activities / year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Institutional strengthening for effective governance	Project activity 1: Design and implement control and surveillance plans at the municipal level in the project zone.	x	x		x	x		x		x	x		x		x	x		x		x	x		x		x	x		x		x	
	Project activity 5: Organization and training to reduce illegal activities related to the forest.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Project activity 6: Strengthen the Municipal forestry offices to promote legal forest activities.	x	x		x		x		x		x		x		x		x		x		x		x		x		x		x		x
	Project activity 9: Improve the forest fire equipment of the municipal forest offices.	x	x		x		x		x		x		x		x		x		x		x		x		x		x		x		x
	Project activity 7: Training for municipal / community forest brigades on forest management and prevention of forest fires.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Project activity 8: Capacity building on sustainable forestry practices to the project beneficiaries.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Natural Resources and Biodiversity to secure people's livelihoods	Project activity 2: Community forest monitoring system.		x	x		x		x		x		x		x		x		x		x		x		x		x		x		x	
	Project activity 3: Design and implementation of a sustainable land use management plan.	x	x			x	x				x	x				x	x				x	x					x	x			
	Project activity 11: Design of an environmental compensation mechanism at the municipal level.				x											x										x					
	Project activity 12: Provide technical and legal support to the implementation of Forest Incentive Programs.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sustainable Economic and Social development	Project activity 10: Capacity building for organizations and partner communities on formalization and promotion of new legal forestry companies.				x					x						x					x						x				x
	Project activity 13: Strengthen the value chain of timber and non-timber forest products.		x	x		x		x		x		x		x		x		x		x		x		x		x		x		x	
	Project activity 14: Strengthen the production capacities of timber and non-timber forest products.		x	x		x		x		x		x		x		x		x		x		x		x		x		x		x	
Project monitoring	Biodiversity monitoring		x	x		x		x		x		x		x		x		x		x		x		x		x		x		x	
	Social (co-benefits) monitoring		x	x		x		x		x		x		x		x		x		x		x		x		x		x		x	
	Climate (carbon) monitoring	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Project validation and verification	First Validation and re-validation event			x						x											x										
	Monitoring	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Administration	Verification event			x						x						x					x										x
	Project administration	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

2.1.14 Project Start Date

The project start date is September 27, 2017. On this date, an agreement was signed between Santa Maria Nebaj municipality and Calmecac for reducing deforestation and forest degradation and promote sustainable forest management in the region.

Supporting documents are available to the auditor.

2.1.15 Benefits Assessment and Crediting Period (G1.9)

The project crediting period is 30 years, from 27/09/2017 to 26/09/2047.
The benefits assessment period is the same as the crediting period.

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

There is no difference 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

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
2017	358,479.23
2018	358,479.23
2019	358,479.23
2020	358,479.23
2021	358,479.23
2022	358,479.23
2023	358,479.23
2024	358,479.23
2025	358,479.23
2026	358,479.23
2027	358,479.23
2028	358,479.23
2029	358,479.23
2030	358,479.23
2031	358,479.23
2032	358,479.23
2033	358,479.23
2034	358,479.23
2035	358,479.23
2036	358,479.23
2037	358,479.23

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
2038	358,479.23
2039	358,479.23
2040	358,479.23
2041	358,479.23
2042	358,479.23
2043	358,479.23
2044	358,479.23
2045	358,479.23
2046	358,479.23
2047	358,479.23
Total estimated ERs	10,754,376.82
Total number of crediting years	30
Average annual ERs	358,479.23

2.1.18 Risks to the Project (G1.10)

Table 13. Risk analysis of the project activities implementation.

Project activity	Identify risk	Actions needed and designed to mitigate the risk
Design and implement control and surveillance plans at the municipal level in the project zone.	Increase the bureaucracy for registration and consumption of participant time and money.	Design systems and programs to be implemented and monitored by local governments.
Capacity building for organizations and partner communities on formalization and promotion of new legal forestry companies.	Increase in forest companies could not be sustainable over time.	Provide legal and administrative advice for the formalization of forestry companies.
Training program for partner organizations belonging to the network "Enredémonos por el Corazón Verde" about forest environmental justice.	Bureaucracy can delay the process.	Design programs to be implemented and monitored by local governments.
Community forest monitoring system.	Slowing down forest management due to lack of local consensus.	Establish spaces for dialogue and participation to promote consensus on the use of forest resources.
Organization and training to reduce illegal activities related to the forest.	Development of illicit activities linked to the forest.	Design programs to be implemented and monitored by local governments.
Design and implementation of a sustainable land use management plan.	Do not allow other economic activities to generate economic income	Align forestry activities with municipal and national development agendas.

Project activity	Identify risk	Actions needed and designed to mitigate the risk
	opportunities at the territorial level.	
Strengthen the Municipal forestry offices to promote legal forest activities.	Bureaucratization of processes and forest authorizations required.	Design programs to be implemented and monitored by local governments.
Design of an environmental compensation mechanism at the municipal level.	Social conflicts due to the implementation of compensation mechanisms	Establish spaces for dialogue and participation to promote consensus on the use of forest resources
Improve the forest fire equipment of the municipal forest offices.	Locally forest fires are caused.	Develop environmental awareness and active programs for forest fires control.
Training for municipal / community forest brigades on forest management and prevention of forest fires.	Local forest fires.	Develop environmental awareness and active programs for forest fires control.
Provide technical and legal support to the implementation of Forest Incentive Programs.	Change of land use due to agricultural activities.	Manage technical and financial support to promote incentive programs.
Strengthen the production capacities of timber and non-timber forest products.	Closure of forestry activities for not complying with formal market standards.	Manage technical and financial support to promote productive capacities.

2.1.19 Benefit Permanence (G1.11)

The project expects that the climate, community, and biodiversity benefits remain beyond the project's lifetime. The following measures are taken:

- Strengthening of capacities, transfer of technical skills, and training workshops will remain in the project beneficiaries after the project lifetime. Nonetheless, the municipalities will continue to provide technical support through the Municipal Forestry Office.
- Diversification of forest products and value chains under the guidelines of a sustainable management plan. This will allow the diversification of livelihood incomes and reduce the dependence on unsustainable practices.
- Land tenure will be strengthened which will have a positive impact on the landowners or project beneficiaries.
- Forest incentives are under the PINPEP and PROBOSQUE national program which aims to increase the country's forest cover through the Establishment, Recovery, Restoration, Management, Production and Forest Protection. Even though, its lifetime is 30 years, the benefits will remain due to all the project activities' benefits.

2.1.20 Financial Sustainability (G1.12)

Calmecac has extensive experience in international cooperation managing the design and implementation of regional projects with external funds. The initial funds for the PD development were provided by the Inter-American Development Bank. The project activities are carried out in partnership with the local municipalities through Governmental funds (PINPEP and PROBOSQUE forest incentives) which assure the project activities for the first years are secure. In addition, the Reddes Locales REDD+ project is considered in the National Emission Reduction Program supported by the Forest Carbon

Partnership Facility. The FCPF carbon fund will directly buy a determined percentage of the achieved emission reduction and removals for the first 10 years starting in 2020. This agreement gives leverage to the project, allowing them to have funds for the project activities implementation. Furthermore, the project revenues from the voluntary market will be essential for adding potential new instances, continue the project's activities, and achieve the project's climate, community and biodiversity benefits.

A project cash flow is available to the auditor as supporting documentation.

2.1.21 Grouped Projects

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

New project areas to be included in the long-term should be located within the reference region. The eligibility criteria for project expansion are:

- Have the same baseline scenario (section 3.1.4): deforested or degraded land by previous activities (pre-project land use): e.g. agriculture.
- Legitimate land tenure: landowners should demonstrate property titles or any certificate of land use right emitted by a legal authority.
- Registration in the project: the landowners should demonstrate the voluntary enrollment in the project through the admission certificate (boleta de participación in Spanish) registered in the Municipal Forestry Office.
- Adoption of the project activities: new instances should implement the project activities technologies and measures described in Section 2.1.11 in their areas.
- Prove of stakeholder consultation: new instances should have been consulted and informed prior to inclusion in the project.
- Not be included in other GHG programs.
- Demonstration of additionality: the new instances should demonstrate that the project activities are not a common practice.
- Technical land eligibility criteria for forest carbon projects: new instances must comply with the methodology tools described in section 3.1.2.

It is expected that the expansion of the grouped project occurs during the monitoring and verification of the previously validated instances. The new eligible areas shall meet the eligibility criteria.

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

The scalability of the project is limited to the Alta Verapaz, Quiché and Huehuetenango departments in Guatemala. The primary project proponent is responsible for the implementation of the project activities and the sustainable use and monitoring of forest resources. The potential limits to project scalability could be financial resources and stakeholder articulation.

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

The addition of new instances to the project should have a financial plan and a communication channel that allows the effective implementation of the project activities, ensuring the achievement of the climate, social, and biodiversity benefits.

Risks associated with the non-continuation of benefits will be minimized by involving landowners with the voluntary admission certificate, that meet the eligibility criteria and that are committed to achieving the project objective.

2.2 Without-project Land Use Scenario and Additionality

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

The baseline scenario is the same as the conditions existing prior to the project initiation. Expansion of the agriculture frontier (farming subsistence) and cattle ranching for deforestation, and forest fires and illegal logging for degradation, are the most likely scenarios to occur without the implementation of the project.

Refer to section 3.1.4 for a complete description.

2.2.2 Most-Likely Scenario Justification (G2.1)

In the absence of the project, the most-likely scenario is the continuation of subsistence farming and livestock activities under traditional managements (low investment, low productivity, low management). The agriculture practices are constrained by weak market conditions and prices, poor agricultural services, low levels of farmer organization, and poverty (Refer to section 3.1.5 for a complete description).

For small producers, maize production is the main mean to generate income for the family. Some farmers manage to produce two to three crops per year, depending on the fertility of the soil and agricultural practices (slash and burn or milpa). Due to the high cost and scarcity of fertilizers, the family plots do not maintain their fertility and productivity for many years, so new areas must be found for the families' subsistence. The regrowth of the forest vegetation during this period leads to a restoration of the soil's fertility, and hence the site is eventually re-used by the farmer for crop production (Shriar, 2008). Further, few farmers rely on credit, even those who have a legal title (escrituras or título) and thus are eligible for commercial credit. In general, severe poverty (section 4.1.1) is common in the communities, and the level of community and farmer organization is very low (IARNA & URL, 2012). Regarding extensive livestock farming, it is dispersed throughout the territory. The main causes are the lack of territorial planning and economic dependence on it.

Moreover, in the absence of the project, the drivers of deforestation will continue to reduce the forest cover releasing CO₂ to the atmosphere; therefore, reduction and removals of carbon emission would not happen.

2.2.3 Community and Biodiversity Additionality (G2.2)

Biodiversity

Guatemala has the highest rate (13%) of species endemism in Central America. But land occupation and unsustainable land uses are threatening biodiversity. The rate of degradation and loss of natural habitats has not been halted and there has been no improvement in the status of threatened species. In fact, the number of species included on the list of threatened species has increased, implying that more species may be at risk of extinction. Biodiversity loss is primarily due to the lack of management of biodiversity components; insecurity about property rights and land use; lack of awareness, including regarding the goods and services provided by biodiversity; lack of policy/legislation and institutional enforcement; high population growth, poverty and unemployment; and prevailing agrarian structure¹⁹.

In addition, Guatemala has established its National Biodiversity Policy in 2011. Nevertheless, the Executive Secretary of CONAP is the National Focal Point, and the institution depends on Governmental budget and external funds for the implementation of the policy. Also, the weak

¹⁹ Convention on Biological Diversity. Available at <https://www.cbd.int/countries/profile/?country=gt>

governance, territorial organization, and incomplete integration of actors (indigenous groups, NGOs) restrain the biodiversity conservation actions (Perez, 2013).

The change in land use, illegal activities, illegal settlements, and trafficking of flora and fauna, even in protected areas, produces a high pressure on ecosystems and results in biodiversity loss (Ibid.). Barriers related to traditional land-use practices, social-economic conditions, and technology have a direct influence on deforestation and forest degradation. Therefore, this scenario would continue in the project area if the project activities are not implemented, hence; impeding the potential biodiversity benefits.

Community

Agricultural activities (farming and livestock), whether for commercial purposes or for self-production, are not regulated and/or controlled in the country. The main constraints related to deforestation and forest degradation (GCI, 2018a) are:

- Operational weakness of institutions related to agricultural and forestry activities, and conservation of natural resources (MAGA, MARN, INAB, CONAP) and municipalities, which limit the performance of their functions, and do not allow the enforcement of forest-environmental regulations.
- Reduced institutional and government supervisory presence and control of illegal land-use change to agricultural activities.
- Limit or reduced budget designed for forest conservation (e.g. PINPEP and PROBOSQUE programs are national initiatives with a lifetime of 30 years and a limited budget for the country).
- Lack of employment or economic opportunities, primarily non-agricultural activities in rural areas.
- Lack of municipal land policies and plans, which establish land use and management regulations of the associated natural resources.
- Weak participation of government and municipal authorities in the processes of local dialogue.
- The high cost of management to obtain the permits and licenses for the management and use of forest products, mainly small producers, local communities and indigenous peoples.

On the other hand, the project activities promote the strengthening of municipalities' governance, workshops and technical training to communities and project beneficiaries, sustainable management plans for the conservation and legal use of natural resources, and the strengthening of the commercial value chain and new development of forest products (direct impact on communities' livelihood). All these additional community benefits would not occur without the project's activities.

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

No distinct community and biodiversity benefits are intended to be used as offsets.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

The project documentation has been given to all stakeholders via their legitimate representatives, local meetings, and formal and informal meetings. Socialization of the PD was made first at a technical level with the COMUDE and COCODE bodies, and then socialized to the communities and project participants. The consultation process at all levels made possible to share the project stage and progress. Furthermore, under the Emission Reduction National Strategy, Calmecac has created three manuals with project information: eligibility criteria, community monitoring forest, and verification process. These materials are available for all communities and other stakeholders.

Complete PD and future monitoring reports will be available on the website of Verra, where all stakeholders can access freely through the project lifetime.

2.3.2 Dissemination of Summary Project Documents (G3.1)

Different stakeholder consultations were made at rural and urban level. Calmecac shared information about the project concept, project area, entities involved, project governance structure, benefits distribution, and all relevant information for the actors. An example is shown in Figure 19 which is part of the project dissemination information in the local language (Spanish).

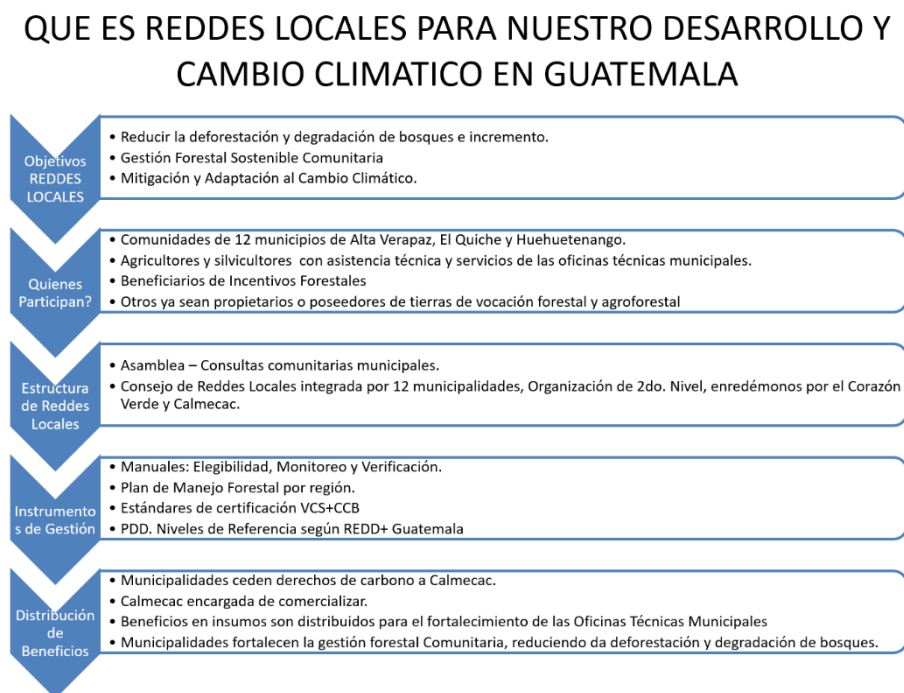


Figure 19. Summary information presented in the stakeholder consultations.

Moreover, as mentioned before, Calmecac has created three manuals with project information: eligibility criteria, community forest monitoring, and verification process, which are the or management instruments. These materials are available for all communities and other stakeholders.

Project documentation and monitoring reports will be available to stakeholders through their municipal or communal council representatives. Further, since the municipalities are also the project co-proponents, project information is expected to be consulted with the Forestry unit or Environmental Management unit; as well as in the Calmecac regional offices. In addition, complete PD and future monitoring reports will be available as well on the website of Verra, where all stakeholders can access freely through the project lifetime.

Communities are informed about the different options where to find project information. For new project instances, they will also be informed about the sources where to find project documentation.

2.3.3 Informational Meetings with Stakeholders (G3.1)

Information meetings with stakeholders are constant. Since the project's start date, Calmecac has held different meetings regarding the conservation of natural resources in the regions. Furthermore, as being part of the environmental network, it contributes to disseminating project information to other potential stakeholders. In general, meetings are agreed through formal invitation, and could be physical or via e-

mail. During institutional meetings, there is an agreed agenda to be discussed, which can include reforestation activities or campaigns, budget, agreements for the forest conservation, and others. In the end, a report is written with the meeting's discussions and final agreements.

Meetings with communities and local stakeholders about the project design and implementation were held in the different localities to inform about the project and to address potential doubts or questions the participants could have. Meetings were published and promoted via their legitimate representative who summons the community about the meetings, as well as radio channels and press releases. Physical information is also issued when possible.

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

Throughout the different workshops the potential costs, risks, and benefits to communities from the implementation of the project were explained. The project's activities are designed to fulfill the participant necessities and conserve natural resources. Calmecac experience in the project region, as well as, working in different environmental networks and with the municipalities and government, contribute to reducing potential risks and costs of the project implementation.

The participants are informed that the project registration is voluntary, and they need to register at the Municipal Forestry Office where later a technician will evaluate their land according to the eligibility criteria. It was clearly mentioned that the project will not buy or own the land at any moment, but the land will always be of the landowner; only the emissions reductions and removals generated in their land will be transferred to the municipalities.

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

The validation and verification processes are described in the eligibility, community forest monitoring and verification handbooks. Communities and other stakeholders are informed about the CCB validation and verification. In addition, in the stakeholders' consultations, the cycle of the project was mentioned, and that it will be validated and verified under VCS and CCB standards.

By using the handbooks, it is ensured the project participants receive the same information concerning the project development.

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

Community participants are informed about an external entity -auditor- going to the field to evaluate the project. The first communication is made to the COMUDE and COCODE, and they will transmit the information to the communities and project participants. In addition, Calmecac will be in charge of supervising that the information reaches everyone through their regional team in each department.

Other governmental and non-governmental entities will be informed via e-mail or physical letter about the auditor's site visit in a timely manner before it takes place. Moreover, Calmecac in cooperation with the municipal forestry's technicians will facilitate to the auditor any information required, potential communication with communities and other stakeholders, arrange any meeting in case needed, and all local support for the validation and verification events.

2.3.7 Stakeholder Consultations (G3.4)

National workshops

In Guatemala, the ENREDD+ readiness process is under the FCPF's Guidance on Stakeholder Engagement (2012), which focuses on social inclusion and provision of rights and establishes guidelines to develop the national REDD+ strategy.

The Dialogue and Engagement Plan was developed and designed in mid-2017 during the preparation of the R-Package. The methodology proposed in the plan takes into account FCPF's social and environmental sustainability standards, in line with the country's international and legal framework, and seeks to generate active involvement and feedback from the country's main stakeholders and participants. This methodology is operated in eight steps aimed at ensuring citizens' right to participation:

- a) Definition of the desired outcomes of the consultation.
- b) Identification of stakeholders.
- c) Definition of the aspects to be consulted.
- d) Definition of the consultation terms.
- e) Selection of methods of consultation and social dissemination.
- f) Ensure that stakeholders have sufficient capacity to engage fully and effectively in consultations.
- g) Development of consultation.
- h) Analysis and dissemination of results.

At the national level, Article 65 of the Municipal Code and the Law on Councils (Decree 11-2002), provide mechanisms for the exercise of the right to participation and consultation. On one hand, Article 65 of the Municipal Code (Urban and Rural Development Councils Act, Decree 11-2002), concerning consultations with the municipality's indigenous communities or authorities, provides that "when the nature of an issue particularly affects the rights and interests of the municipality's indigenous communities or their authorities, the Municipal Council shall hold consultations at the request of the indigenous communities or authorities, including by applying criteria that are specific to the customs and traditions of the indigenous communities"

The National REDD+ Strategy team performed workshops at a national level (Figure 20) in local language (Spanish). For the Huehuetenango and Quiché department workshops were held in April 2019 and representatives from different sectors (public, private, academic, indigenous peoples) attended. The municipality forestry technicians and gender equality office technicians (oficina de la mujer) from the municipalities of Nentón, Jacaltenango, and Santa Ana Huista participated as well. A complete list of national stakeholder consultations is available to the auditor if requested.

Figure 20 shown the National project activities proposed for the Emission Reduction Program in Guatemala, which are: (1) strengthening forest governance, (2) conservation, protection and sustainable management of forests in protected areas, (3) landscape restoration and forest cover recovery, (4) reducing unsustainable use of wood, and (5) promotion of competitiveness and legality in forest value chains. Reddes Locales project activities described in section 2.1.11 are completely aligned to the National general activities, which ensure their compatibility and coherence with the ERP.



Figure 20. Workshop presentation (PowerPoint slide) of the Emission Reduction Program at the sub-national level.
Source: FCPF (2019).

All workshops allowed to obtain different perspectives and beliefs of people who may be affected by or have an interest in the project and the national REDD+ program. Further, all comments are considered as inputs for improving the project design and implementation, thus avoiding or reducing adverse impacts and increasing benefits.

Moreover, the participation activities carried out were an important source for data validation and verification, which helps to improve the quality of the environmental and social impact assessments, allowing people to understand their rights and responsibilities in relation to the Emission Reduction Program, contributing to promoting transparency and participation of the interested parties.

Regional level

The PD design was first consulted in 2019 at a technical level (Figure 21). Participants included forest technicians of the 12 municipalities involved in the project, technical personnel from the municipal women's offices, technical personnel from the Ministry of the Environment and Natural Resources, MAGA watershed delegate, and collaborators from Calmecac. One of the outcomes was the identification of stakeholders and potential risks, as well as future stakeholders to be consulted.



Figure 21. PD design workshop.
Source: Calmecac (2019).

Furthermore, feedback was given for improving the handbooks on the eligibility criteria, community forest monitoring, and verification process for the REDD+ project. These handbooks will be shared with the project's participants at all scales. Moreover, the workshops' agreement also included integrating SEGEPLAN (Secretariat of planning and programming of the presidency), which is the state planning entity; socialize all information with COMUDE, CODEMARN, CODEDE; present and share the PD with the municipal councils and evaluate with each municipality the approach and commitment based on the region characteristics.

In June 2019, there were the Guatemalan general elections for the period 2020-2024; which means that since beginning of 2020, new municipal councils and city mayors will be in the Municipal government. Therefore, the stakeholder consultation started in early 2020. Nevertheless, early actions were carried out with other stakeholders.

At a regional level, Calmecac has worked with different municipalities to implement natural resources sustainable management plans, to reduce vulnerability to climate change, and to conserve the biological corridors, among others. For example, the agreement to reduce deforestation and forest degradation with Nebaj municipality (Quiché), the agreement with Lanquín municipality (Alta Verapaz) to establish a forest nursery for reforestation and afforestation activities and to increase the forest coverage, or the participation in the conservation and protection of natural resources and to promote a biological corridor in the dry forest within the municipalities of Nentón, Santa Ana Huista, and Jacaltenango (Huehuetenango). All the previous activities show the involvement of different stakeholders in the conservation of natural resources (supporting documents available to the auditor).

The proposed project activities have been shared through different workshops concerning to the topic. For example, in Huehuetenango, the thematic about forest fires prevention and control was discussed with the municipal mayors of Nentón, Santa Ana Huista and Jacaltenango (Huehuetenango), regional environmental leaders, representatives of governmental and non-governmental institutions, and the technical team for the conservation of the biological corridor of the dry forest. In the workshop, agents and drivers of deforestation and forest degradation were identified.

In Huehuetenango, information on environmental and forestry issues is shared on radio and television on Saturdays from 8:20 to 8:45 and Tuesdays from 19:30 to 20:30 in Radio Creativa. The radio is the most fitting communication channel since information can reach more interested actors or project beneficiaries, especially in remote areas.

Local level

At a project level, municipalities and technicians participated in the review of the eligibility, verification and monitoring manuals, which corresponds to the "Design and Planning workshop for the Reddes Locales Project".

At the local level, there have been different socialization events. In Huehuetenango, the project was discussed in the Inter-institutional Committee for the prevention and reduction of illegal logging (MIPRETIH) in June 2019. A Calmecac representative shared the project concept and activities, and the potential involvement and support of the partner institutions (ACODIHUE, FUNDAECO, MINEDUC, CONRED, OMARN, INFOM, CONAP).

In Alta Verapaz, socializations took place in the Cobán, San Pedro Carcha, San Juan Chamelco, San Agustín Lanquín, Santa María Cahabón and San Pablo Tamahú municipalities.

With the previous municipal councils, during 2018, the project concept was socialized with coordinators of the Environmental Management Unit and municipal forestry technicians. The project approach was explained, as well as what is a REDD+ project, and the stage of the Reddes Locales project design. Physical information about the concept project was shared. Participants were also invited to attend the

Monitoring, Reporting and Verification handbooks, which took place in Guatemala City from June 25 to 27, 2019.

At the beginning of 2020, information about the project was shared with the new local government representatives and working teams. But this time, final agreements are expected to close the full participation and involvement of the municipalities in the project. The process was:

- Tamahú: presentation of the project and proposal for signing an agreement between Calmecac and the municipality for project collaboration.
- Lanquín: former implemented projects within the municipal area with the previous government were presented. There was an agreement signed between Calmecac and the previous government to participate in the project. The new municipal mayor is willing to re-sign the joint work agreement.
- Cahabón: the project concept was presented with the municipal forestry technicians and the municipal council, where they agreed on working together on forestry and environmental issues.
- Chamelco: the project was presented to the Environmental Management Unit, and they shared the information with the municipal mayor. They agreed to participate and to sign a cooperation agreement to implement the Reddes Locales project.
- Carchá: the project's concept was presented to the Municipal Forestry Office, which agreed to develop a meeting with the Municipal Council by the end of March 2020. However, due to COVID-19, the process was put on hold.
- Cobán: The staff and technical team of the Municipal Environmental Management Unit have not changed; therefore, they are aware of the project's concept and development. A meeting was proposed with the Municipal Council to share the information with the new government body, but the process was stopped due to the worldwide COVID-19 pandemic. Nevertheless, telephone communication was held, and the municipality is interested in participate and support the project implementation.

Stakeholder participation plan

The project is aligned with the National Stakeholder Participation Plan. Reddes Locales project has developed a dialogue and participation plan. The document is the guideline used for the participatory process with different stakeholders, which ensures an inclusive process, safeguarding the rights and knowledge of the indigenous people and leaders of the prioritized communities.

The stakeholders who participate in the process have an active, informed, free, and timely role. Inter-institutional coordination is transparent through mechanisms proven within the Reddes Locales project. The socialization workshops also include a feedback workshop, where all the municipal participants can comment and assess the project.

After the first project socialization within the municipalities' councils, the next steps are to develop participatory dialogues with the COMUDE (Municipal Development Councils) of the 12 municipalities involved in the project since they have a close link to all other stakeholders. The COMUDE is formed by the Community Development Councils - COCODES. COCODES regularly have community assemblies (convening all members of the community) to publish the projects approved in the COMUDE (such as roads, schools, health centers). This communal communication space is used to publish and inform about the project to all the members of the community.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

The communication plan will be through the Municipal Office, especially the municipal forestry and the environmental management offices. The project participants are aware that they can contact these offices to ask about participation in the project, project stage and progress, implementation schedule,

and any other potential question that may arise. In addition, the technicians could also be consulted while being on the field. The technicians will be in charge to reply to any doubt regarding the development and implementation of the project, in a joint manner with the technical Calmecac team.

Every year is expected that the project will be reviewed and in case needed, the communication channels will be adapted, and the participants will be informed about the new changes.

2.3.9 Stakeholder Consultation Channels (G3.5)

The project communication is directed to the legitimate representative or the leader of the community. This action is ensured through a first approach to the municipalities and the COCODES (Community Development Councils). Community meetings are held by the district or sector, which is eased by the COCODES since they are an entity that represents and brings together various representatives of different sectors of the population. COCODES promote the effective participation of the local population and the economic, social, and cultural development of their community. Working in the first round with the COCODES made possible the spreading of the information to other members of the communities, social groups, or sector. In the Reddes Locales project, the aim is to set up a link between municipalities, interested parties and Calmecac (project coordinator).

The Municipal Development Councils (COMUDE) are integrated by:

- a) The municipal mayor, who coordinates it.
- b) The trustees and councilors determined by the municipal corporation.
- c) The representatives of the Community Development Councils, up to twenty (20), appointed by the coordinators of the Community Development Councils.
- d) The representatives of the public entities with a presence in the locality; and
- (e) The representatives of local civil entities that are summoned.

Stakeholder report, invitation letters and digital documentation is available to the auditor to prove the stakeholder consultation involved the legitimate representatives of the identified actors.

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

The communities are integrated into the Municipal Development Council (COMUDE, formed by the representative of the second level COCODES). They promote and facilitate the organization and effective participation of communities and their organizations in the prioritization of needs, problems and their solutions for the comprehensive development of the municipality. Further, COMUDEs are included in the evaluation of the execution of municipal development policies, plans, programs, and projects. They can propose corrective measures for the achievement of the objectives and goals for the benefits of their communities. In this way, effective participation is enabled, and communities will have the opportunity to evaluate and publicize the implementation of the Reddes Locales project.

Moreover, since Calmecac has experience working in the region, is familiarized with the communities, community groups and other stakeholders based on cultural aspects, interest, socio-economic development, and others. This enables Calmecac to enhance effective participation and take measures that guarantee a gender balance participation when needed. For example, the use of radio to disseminate information in the rural sector, but the use of formal letters to the authorities.

At last, the communication channel at a first level can be through the municipal forest technicians who are working on the field, or through the Municipal Forest Unit. The participants can expect direct communication during the project lifetime.

2.3.11 Anti-Discrimination Assurance (G3.7)

The project proponent is not involved in, or complicit in, any form of discrimination. On the contrary, the project proponent has been actively involved in the creation of national laws that emphasize the mandate of the UN Universal Declaration of Human Rights to recognize that access to water supply and sanitation is a human right. It also actively participates in training and educating the population about their rights and obligations as citizens; as well as, in regulations, laws and policies that promote the nature conservation and strengthening of livelihoods for the improvement of socio-environmental conditions of the Guatemalan population.

Further, since the project is aligned with the National REDD+ Strategy, it also follows and implements the Social Safeguards. Guatemala has identified the set of laws, policies and regulations, as well as relevant plans and programs, conventions and international treaties to guide and guarantee the safeguards approach, which includes, at an international level: United Nations Framework Convention on Climate Change, the Convention on the Elimination of All Forms of Discrimination against Women, United Nations Conference on Environment and Development, United Nations Conference on Sustainable Development, Johannesburg World Summit on Sustainable Development, Universal Declaration of Human Rights, Declaration of the United Nations on the Rights of Indigenous Peoples (UN 1994), Convention 169 of the International Labor Organization, Convention on Biological Diversity, and World Bank's Environmental and Social Framework (FCPF, 2019).

At a national level, the Political Constitution of the Republic of Guatemala: (1) Law on the Prevention, Punishment and Eradication of Domestic Violence, and (2) The Social Development Act. Further, the Governmental Agreement 390-2002 - Presidential Commission against Discrimination and Racism against Indigenous Peoples in Guatemala; and the Decree No. 81-2002 on the Law for the Promotion of Education against Discrimination.

Lastly, in the REDD+ strategy formulation framework, Guatemala has developed the Social and Environmental Strategic Assessment (SESA) and the Environmental and Social Management Framework (ESMF), both guidelines are taken into account in the project implementation.

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

Within the FCPF framework, Guatemala defined a "Feedback and grievance national mechanisms" document where actions for REDD+ projects are indicated. The guideline has identified the potential complaints be regarding participation and consultation, land tenure and forest resources, rights of indigenous peoples and communities, distribution of benefits, others.

The Reddes Locales project is aligned with the national guidelines, therefore; the procedure (Figure 22) is:

- Communities, stakeholders, and other project participants reach in the first instance to the project proponent or co-proponent in case any conflict arises from the implementation of the REDD+ project. The project proponent or co-proponent provides direct attention, and if necessary, provide advice for the second instance at the government level.
- If the conflict cannot be resolved by the project proponents, the recipient of the complaint shall report to MARN, CONAP, MAGA, and INAB.
- From the time the complaint is received until a resolution is issued on the dispute, 30 working days are considered. The systematic process consists of five steps: (i) Reception and registration, (ii) Research, (iii) Selection of approach, (iv) Evaluation and Response, and v) Monitoring.

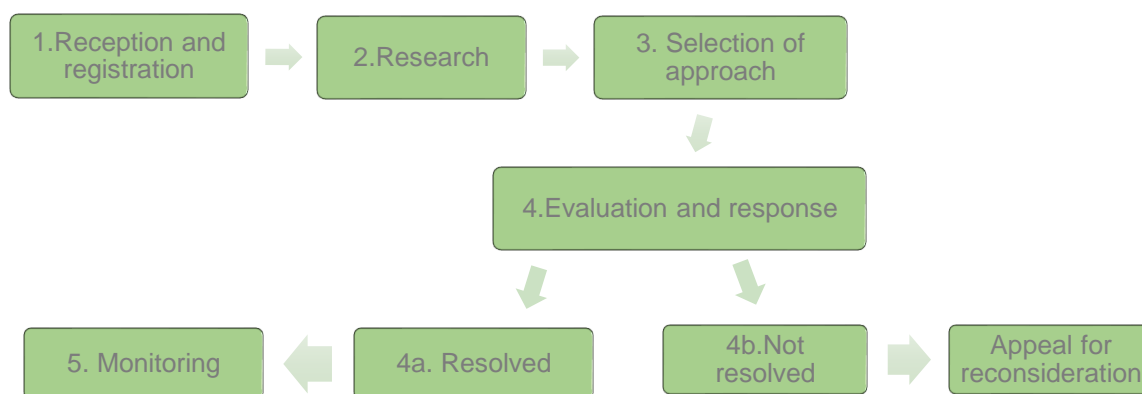


Figure 22. Steps for Feedback and Grievance redress procedures.

Source: GCI (2017)

According to GCI (2017) the description of the process is:

- (1) Reception and registration: the reception can be through direct communication with a technician in the field, e-mail, the website of REDD+ (SIREDD+), suggestion/complaint box, and oral communication through a free number called and SMS mode, social media, e-mail, or personally in any office of the GCI. It is highlighted that to ensure cultural relevance the different modalities for register a complaint recognize the local language. There is a template for the registration of complaints. Refer to GCI (2017). The total registration would take up to 5 working days.
- (2) Once the complaint has been registered, the technician of the relevant institution (INAB, CONAP, MAGA or MARN) will proceed to identify the key issues to help determine if and how the complaint can be resolved. This will be implemented with accompaniment from community structures (if relevant). There will be an “Expert List” available, where an expert on the topic can be called to help to resolve the complaint. The expert is chosen based on their field of expertise, background and relevant skills to the complaint.
- (3) There are three approaches to resolve the complaint: (a) initial proposal and meeting with the institution’s technician where both parts can reach a consensus; (b) mediation by the institution’s technician where the technician act as a mediator between the parties; and (c) mediation by an external expert. The selection of the approach would take up to 5 working days.
- (4) The evaluation is done according to the selected approach and resolution is proposed. The result will be an agreement between the parties. The parties will sign this agreement and will be obliged to comply with its stipulations. If an acceptable solution is not found, the institution’s technician or external mediator issues a report on the results of the session. The report is transmitted to the complainant and all the other parts. The claimant can choose to file an appeal for replacement. If an appeal for replacement is filed, the complaint raised to the second level and will be resolved by the institutional regional coordinator. If there is also no acceptable solution, the complaint may be submitted to the third level and will be of knowledge of the territorial GCI for final mediation.
- (5) The MARN will be responsible for the monitoring of the implementation of the feedback and grievance procedures.

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

The mechanism is designed to promote discussions between different actors (especially between forest users and government) and jointly develop a viable resolution to the complaint filed. It is expected that the applicant may turn to the field technicians in charge of the project to obtain the necessary support in sending and following up on their complaint or request using the national complaint procedures. It should also be noted that the applicant may also seek for support (if relevant) to traditional and community structures, associations, groups and non-governmental organizations, and institutions with local presence (GCI, 2017).

Regarding feedback and grievances documentation, the respective office (MARN, INAB, CONAP or MAGA) communicates with the complainant via the selected communication channel(s) (telephone, letter, e-mail) to confirm that the complaint has been officially registered. In the case of anonymous complaints, the confirmation of the complaint registration is sent to the contact provided in the complaint form.

The following information will be transmitted: (i) acknowledgment of receipt of the complaint, (ii) overview of the steps in the complaint handling process, (iii) code number to know the region or location, and (iv) the contact person for handling complaints in case more information is needed.

In addition, the information will be publicly available through a database on the website of the SIREDD+, so that interested parties can see the process status of their complaint. Further, the complaint number (not the name of the complainant or parties), the category of the complaint and the region/area will be public.

Lastly, the Feedback and Grievance Redress procedure guideline will be socialized at the national level, so every participant is aware of the steps it needs to follow. In addition, the relevant and participant institutions (such as Calmecac and municipalities) will be trained in the procedure.

2.3.14 Worker Training (G3.9)

The project follows Guatemala's guidelines on work and working conditions (document support available to the auditor). The document covers (i) health and safety at work, (ii) fair treatment, non-discrimination and equal opportunities for project workers, (iii) protection to project workers, including vulnerable workers such as women, people with disabilities, children (of working age) and migrant workers, contractor workers, community workers and primary suppliers, as appropriate, (iv) prevention of the use of all forms of forced labor and child labor, (v) support to the principles of freedom of association and collective bargaining for project workers in accordance with national laws, and (vi) the information to project workers about with accessible means to raise concerns about working conditions and employment.

Furthermore, all project activities have been designed to transfer knowledge and capacity building to the participants, workers, and other stakeholders. The implementation of the project contributes to enhance local management capacities. It is expected that it will create useful skills in the workers and project participants that remain after the project's lifetime. Moreover, project activities include permanent training to reinforce or enhance new abilities.

2.3.15 Community Employment Opportunities (G3.10)

In Guatemala, the Civil Service Law (Decree 1748) and its regulations govern the processes for contracting within the public administration, specifically for centralized entities. In the case of autonomous entities, they are governed by their specific internal regulations.

In the case of workers, it applies the Labor Code, the Political Constitution of the Republic, and the international conventions and treaties to both, the public administration and autonomous entities.

The project proponent and co-proponents ensure that all individuals will be given equal opportunities to fill all work positions (including management) if the job requirements are met. All entities follow national and international labor laws. Furthermore, workers are selected based on the work description and applicant profile. Women and vulnerable and/or marginalized people are encouraged to apply and they will be given a fair chance to fill positions for which they can be trained. No discrimination based on age, sex, marital status, ethnicity, social status or religious convictions, political ideas and/or sexual orientation will be made.

At a national level, this is monitored through the indicators: Number of hires made by projects under the ERP, disaggregated by gender; and a number of complaints associated with labor and working conditions, disaggregated by gender.

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

Calmecac complies with all relevant laws and regulations, including those listed in Table 14. In terms civil society participation, it is worth highlighting ILO Convention 169, the Municipal Code, the Decentralization Law and the Urban and Rural Development Law, which establish broad participation of civil society at all levels, including Community Councils for Urban and Rural Development (COCODE), the Municipal Council (COMUDE), Departmental Councils (CODEDE) and the National Council for Urban and Rural Development (CONADUR), as well as the preponderant role of women in these levels of participation (FCPF, 2019).

Before the signature of the contract and the work begins, the employee is informed about their rights and working terms and conditions. All hiring processes within the project development and implementation will follow the national and international regulations.

The measures adopted by the project proponent to inform all its workers about the minimum guarantees and safety standards in their work area are:

- There is a Human Resources Unit that can provide support and guidance to workers when they have doubts regarding labor issues.
- Training is provided on the current legal labor framework so that all workers are fully aware of their rights and obligations.
- Training is provided by the Human Resources area on the rights and obligations of workers, including working hours, use of furniture, work permits and license, and sanctions, among others.
- The project proponent complies with the minimum wage in force, adjusting salaries and considering the bonuses provided for by national legislation, such as the Aguinaldo and Bono 14²⁰.
- Compliance with the enjoyment of the paid vacation period in accordance with current legislation.

²⁰ The 14th Bonus (Bono 14) is an annual bonus that every employer must pay to their workers. It is equivalent to 100% of the ordinary salary earned monthly, as long as you have worked a full year. The payment must be made in the first fortnight of the month of July and must be a full payment, not divided. Source: <https://www.mintrabajo.gob.gt/images/Documentacion/Leyes Ordinarias/Decretos/Ley de Bonificacin Anual Para Trabajadores del Sector Privado y Pblico Decreto 42-92.pdf>

Table 14. Relevant laws and regulation related to Worker's Rights in the host country

Law and Regulation	Summary and Relevance to the Project
Political Constitution of the Republic of Guatemala	Freedom of work and to have a satisfactory economic remuneration.
Labor Code, Decree 1441	Prohibition on discrimination based on sex, race, religion, political beliefs, economic situation, schooling, or any other cause, which may have a detrimental effect on access to employment.
ILO Convention 169	Convention 169 of the International Labor Organization (ILO) is significant for being the first recognition of indigenous people as a collective subject of law. Recognizes the aspirations of indigenous populations to manage their institutions and ways of life, their economic development and the maintenance of their identities, languages, and religions, within the legal framework of the States where they live.
Law on the Annual Bonus for Workers in the Private and Public Sectors, Decree 42-92 of the Congress of the Republic of Guatemala	An extra monthly salary for workers shall be paid in July every year.
Organic Law of the Guatemalan Social Security Institute, Decree 295	The Decree 295 led to the creation of an autonomous institution, under public law, with the status of full legal capacity to acquire rights and obligations, whose purpose is to apply for the benefit of the People of Guatemala and based on the Article 63 of the Political Constitution of the Republic, a National regime, unitary and obligatory social security in accordance with the system of minimum protection. This institution is called the "Guatemalan Institute of Social Security" (IGSS). The headquarter is in Guatemala City.
Decree creating the Incentive Bonus, Decree number 37-2001 of the Congress of the Republic of Guatemala.	The increase in salaries should be constituted as a four percent (4%) increase to the Incentive Bonus, so that its impact on the benefit of the country's workers is direct, constituting a relief to their economic situation, and that this benefit translates into the acquisition of goods and services necessary to raise their standard of living
Wage Consolidation Law, Decree number 59-95 of the Congress of the Republic of Guatemala	The consolidation of the initial salary, the emergency bonus and any other form of remuneration or bonus, a benefit received by the State worker, to achieve clarity and transparency in the initial salary, as well as a fairer criterion for the calculation of vacations, bonuses, compensation and retirement pensions to which public servants are entitled.
Law of the Program of Economic Contribution of the Elderly, Decree number 85-2005 of the Congress of the Republic of Guatemala	Economic support program for persons aged 65 and over, so that the State guarantees this sector

Law and Regulation	Summary and Relevance to the Project
	of the population the provision of their minimum basic needs
Law for Healthy Maternity, Decree number 32-2010 of the Congress of the Republic of Guatemala	Creation of a legal framework to implement the necessary mechanisms to improve the health and quality of life of women and newborns, and to promote human development by ensuring women's maternity through universal, timely and free access to timely, accurate and comprehensive information and quality services before and during pregnancy, delivery and postpartum, for the prevention and progressive eradication of maternal and neonatal mortality.
Law that Promotes Internal Tourism, Decree number 19-2018 of the Congress of the Republic of Guatemala	In order to promote national tourism, when the national holiday (bank holiday) coincides with Tuesday or Wednesday, it will be enjoyed on a Monday immediately preceding, if it occurs on Thursday, Friday, Saturday or Sunday, it will be enjoyed on the following Monday
Occupational Health and Safety Regulations, Governmental Agreement 229-2014	The guidelines of the Occupational Health and Safety Regulations have been applied, for the benefit and dignity of all the company's employees.
Regulations for the enjoyment of the breastfeeding period	It determines that every mother in the period of breastfeeding can have in the places where she works, half an hour of rest twice a day to feed her child unless by agreement or custom a greater rest is required ²¹ .
Individual employment contract	Before starting an employment relationship, the Individual Employment Contract is signed between the parties, establishing the rights and obligations to guarantee a harmonious working relationship.
Internal working rules	There are internal work rules that regulate the rules to be respected by both workers and employers within the framework of the existing employment relationship.
Collective bargaining agreement on working conditions	Guatemala has ratified the C098 - Right to Organize and Collective Bargaining Convention, 1949 (No. 98) the 13 th of February 1952 ²² . Also, the C154 – Collective Bargaining Convention, 1981 (No.154) ²³ .

²¹ See Articles 102(k), second paragraph of the Constitution; and, 153 of the Labour Code, reformed by Decree 64-97 of the Congress of the Republic of Guatemala. Source: <https://www.ilo.org/dyn/travail/docs/2060/lactancia.pdf>

²² Source: https://www.ilo.org/dyn/normlex/es/f?p=NORMLEXPUB:12100:0::NO:12100:P12100_INSTRUMENT_ID:312243:NO

²³ Source: https://www.ilo.org/dyn/normlex/es/f?p=NORMLEXPUB:12100:0::NO:12100:P12100_INSTRUMENT_ID:312299:NO

2.3.17 Occupational Safety Assessment (G3.12)

The main risks identified in the forestry or agroforestry management and project implementation are:

- Personnel may be injured and/or have accidents due to improper working environment or conditions, such as injuries resulting from tripping and falling, injuries caused by sharp objects, injuries caused by adverse weather conditions.
- The equipment and machinery used in the activities can have impacts such as: collisions with other machinery, overturning, running over, mechanical breakdowns, fall of personnel from heights, injuries caused by the movement of vehicles, tree felling accidents, injuries due to the use of new technology.
- The entry of unauthorized personnel who could suffer accidents, or commit theft or vandalism.
- Workers may be exposed to dust, fungus and mold during operations, as well as hazardous products, including pesticides.
- Risks due to natural causes: winds, storms, hurricanes, cyclones, floods, earthquakes, and rockfalls.
- Damage to health due to the excessive physical effort (dehydration, damage to the spine).
- Risks of exclusion (discrimination and equal opportunities): measures not adequate for protection and assistance to women workers.
- Risk of gender-based violence.
- Risk associated with damage to occupational health and safety (non-use of helmets, vests, specific boots, glasses, masks)
- Risk associated with wildlife attacks on workers due to the lack of adequate infrastructure for rest, communal canteen.
- Risk associated with diseases or health effects on workers due to consumption of non-potable water, especially in pristine areas, exposure to toxic plants, or poisonous agents.

There will be a Social specialist coordinating the occupation health and safety at national level for all REDD+ projects. This person will work closely with INAB and the project proponent to minimize all risk associated with the project implementation.

Guatemala is working with national instruments to minimize the risks. These are:

Instruments	Measures taken to minimize the risks
Occupational Risk Prevention Plan	Identification and classification of occupational risks Security measures Equipment to be used Actions to be taken in the event of a claim Appropriate technical studies of risk factors present in the working environment that may affect workers Establish and implement the necessary measures for the prevention of accidents and occupational diseases Periodic evaluations of the working environment Training to promote individual and joint work on occupational health and service, occupational risks, gender violence.
Procedure according to the classification of occupational hazard occurred	First Aid Actions Immediate reporting or notifications to the responsible parties Investigation of accidents at work and diseases that have occurred Identify, evaluate and control the causes Corresponding administrative labor actions Record of accidents, illnesses occurred Impact monitoring

Instruments	Measures taken to minimize the risks
To develop internal regulations for forest, forestry and agricultural companies	<p>This regulation should be carried out under Law 168 and per international standards (ILO)</p> <p>This should include:</p> <ul style="list-style-type: none"> - Objective - Field of application - References - Definitions - Obligations of the employer - Obligations of employees - Risk analysis - Type of timber, non-timber, agricultural and/or livestock forest use - Personal protective equipment - Worker health surveillance - Emergency Care Plan - Training - Verification units - Conformity assessment procedure - Surveillance - Bibliography

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

The current internal project structures are presented in Figure 23, and the roles and responsibilities are described in Table 15.

Table 15. Role and responsibilities of the entities involved in the project design.

Project participant	Roles and responsibilities
Calmecac	To design, coordinate and implement the project activities, management of project financial resources, responsible for the monitoring reports.
Municipalities of Huehuetenango, Quiché, and Alta Verapaz	Provide technical assistance, register project beneficiaries, implement the project activities.
Landowners	Voluntary participating in the project, owners of the areas where the project activities will be implemented through sustainable forest management.
INAB	Responsible for the monitoring of forest cover, and the implementation of forest incentives.
ForestFinest Consulting GmbH	Project developer. It elaborates and oversees the project design based on the VCS and CCB guidelines.

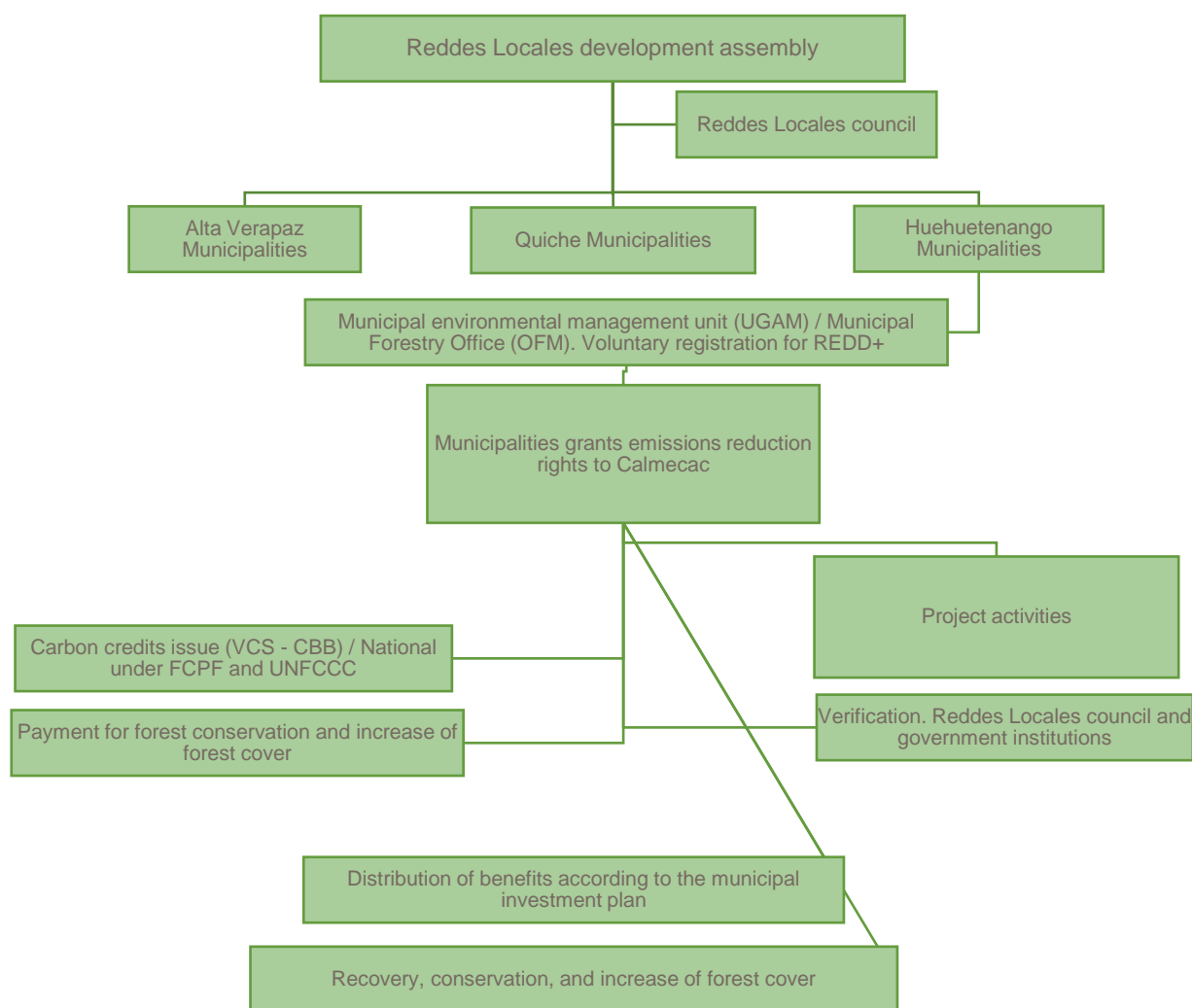


Figure 23. Internal structure of the Reddes Locales REDD+ project.

Source: Calmecac (2020)

Moreover, the project has designed a simpler diagram (Figure 24) to be shared with communities and other stakeholders, making it easier to socialize and understand by the project beneficiaries.

The Assembly's main function is to strengthen the implementation of project activities. It is composed of 3 main organizations: Calmecac, Enredémonos por el Corazón Verde Platform and the Municipalities (project co-proponent). The Assembly will keep a register of the participants, it can suggest actions and recommendations for the benefit of all project stakeholders. Further, it will also suggest potential actions and recommendations for the benefits of all stakeholders; and it will ensure that the actions in the annual operational plans are carried out. It also has the functions of activities' coordination, promotes participatory dialogues and acts as a link between beneficiaries and proponents.

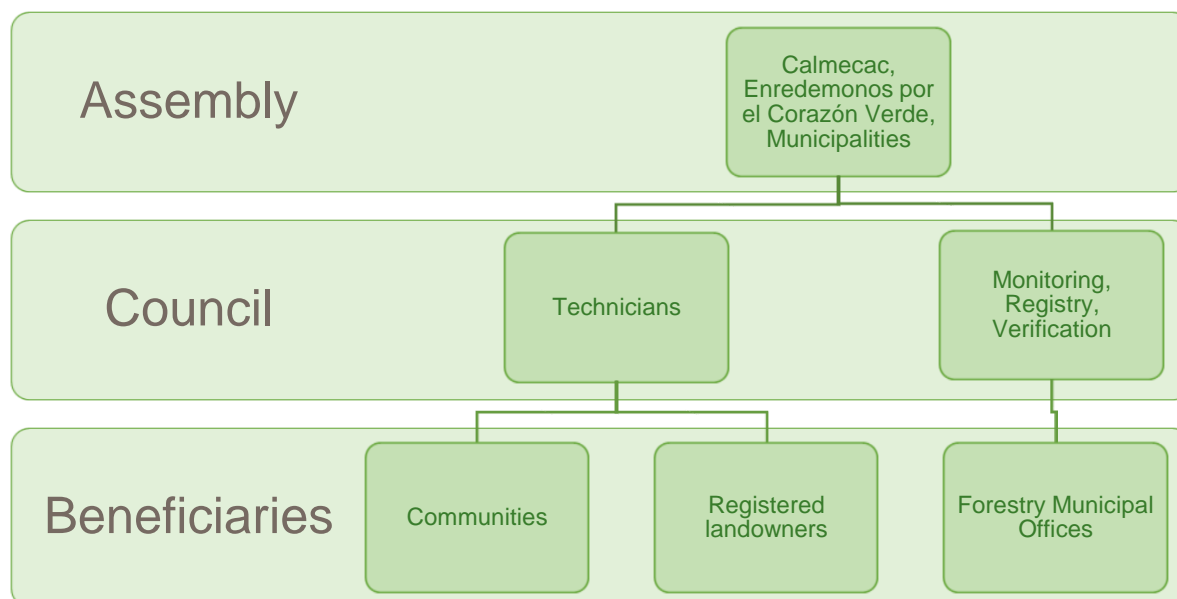


Figure 24. Project Governance structure.
Source: Calmecac (2020)

The Technical Council is composed by the coordinators and the technical team of each project region. They are in charge of the guidance, support, supervision, and monitoring of the project beneficiaries. Further, they will supervise that the project activities indicators established in the terms of reference are achieved. Moreover, the Technical Council will manage the hiring of personnel, and it will be responsible for the preparation of technical studies required by the Emissions Reduction Program.

The MRV Council will be in charge of the project monitoring (carbon and non-carbon), and benefit distribution to the municipal forestry offices. They are in charge of managing the sale and marketing of VCUs. It will have direct technical advice from consultants and coordinators.

2.4.2 Required Technical Skills (G4.2)

Project proponent

Calmecac as the project proponent has been actively engaged in the REDD – GIRED Implementation Group. This group is comprised of national and international non-governmental organizations, community associations, or groups with the capacity to support the implementation of actions to reduce deforestation and greenhouse gas emissions. During the year 2018, Calmecac actively participated in the development and design of three national planning instruments: (1) The National Strategy for Addressing Deforestation and Forest Degradation, (2) the Forest Investment Program – FIP- and (3) the Emissions Reduction Program Document in Guatemala – ERPDP-. The Reddes Locales for Development project has been included within the national processes of REDD+ projects in Guatemala, allowing Calmecac to pursue a Grouped Project aligned closely with national government regulatory frameworks and commitments, and international pledges under the UNFCCC, the Convention on Biological Diversity (CBD), among others.

Calmecac as project proponent works under two lines:

(1) Policy

Calmecac work with community organizations, the private sector and the public sector in Guatemala. This sectoral participation is strengthened through the support and accompaniment of international cooperation.

At the national level, it has cooperation agreements with the Ministry of Agriculture, Livestock and Food (MAGA), the National Forest Institute (INAB), the National Council of Protected Areas (CONAP), the Ministry of Environment and Natural Resources (MARN) and the Secretariat of Agrarian Affairs of the Presidency (SAA). These cooperation agreements strengthen the social and environmental public institutions.

At the regional level, Calmecac creates alliances with associations, municipalities, Departmental Environmental Commissions (CODEMA), Departmental Development Councils (CODEDES) and Municipal Development Councils (COMUDE). Through this participation, Calmecac has a direct approach with the regional populations to plan the environmental and social territorial management for the conservation and management of natural resources and the improvement of communities' quality of life.

At a local level, Calmecac works together with local and sectorial alliances such as the Network Red Enredémonos por el Corazón Verde, the Sa'komonil Alliance, the Alliance for Integral Rural Development (ADRI), the National Committee of IUCN, the Social Council of the IDB, the Community Forestry Alliance, the National Council of PINPEP, the Board of Directors of INAB, the Advisor to the Climate Change Council, the National Restoration Committee, the Forest Group Committee, the Eastern Region Coadministrators Committee, the Alta Verapaz Concertation Committee, the Committee against Illegal Logging, the Probosque Committee, the Climate Change Committee and the Huehuetenango Economic Development, Tourism and Natural Resources Committee, and other local institutions.

(2) Sustainable development.

Calmecac accompanies the construction of forest management plans and forest incentives to secure community, national and private forests in Guatemala. Its experience involved working with indigenous people, promote gender equality, increase youth participation, reduce climate change risks, and secure food for the communities (especially the children).

For the monitoring, the project activities consider the implementation of a community monitoring system, where people will be trained according to the MRV national report. It is expected local communities are actively involved since their involvement is important for the project.

For carbon accounting, INAB contributes directly employing tools to tackle deforestation and forest degradation and allows for the recovery of lands without forests. INAB is the competent State authority for forestry issues. They are in nine regional offices and 33 sub-regional offices that cover the entire national territory. It is a decentralized legal entity, with institutional autonomy, sufficient resources and administrative independence. INAB direct activities are:

- Forest cover maps (in collaboration with CONAP).
- National Forest Inventory.
- List with information and maps/polygons on the areas incentivized by PINPEP, PINFOR, and PROBOSQUE.
- Data, maps and/or polygons linked to the use of firewood and legal and illegal selective logging.

- Estimation of mean annual increments (MAI), and removals by the increase of carbon stocks at a national level, through forest management and reforestation (management of natural forest, plantations, Agroforestry systems, forest incentives) and natural regeneration.
- Removal factors for increases in carbon stocks
- Emission factors from degradation linked to wood extraction and selective logging.

Calmecac is the main entity responsible for the project's MRV. The reporting monitories report will be verified by INAB, ensuring a quality assessment and control.

Project co-proponents

Fundación Calmecac socialized first the project activities with the Municipal Council, and from there, the activities are coordinated through:

- a) Municipal Planning Department (DMP), according to Article 95 of the Municipal code (Decree 12-2002), the Municipal Council will have a municipal planning office, which will coordinate and consolidate the diagnosis, plans, programs and development projects of the municipality. The DMP is responsible for producing accurate and quality information required for the formulation and management of municipal public policies.
- b) The Municipal Forestry Office (OFM), is responsible for the elaboration of plans and programs for the protection and conservation of the flora and fauna of the municipality. It is in charge of managing the municipal forests, it provides technical assistance and training to interested parties and prioritized groups. It is also in charge managing the incentive forestry programs (PINPEP and PROBOSQUES) promoted by INAB. It supports the municipal mayor in the coordination and supervision of disaster risk management.

The OFM is the main link to Calmecac for implementing the project activities.

2.4.3 Management Team Experience (G4.2)

Calmecac has developed natural resource management models with organized groups at the local level. In the last years, it has implemented forest nurseries for the production of native species, commercial species and fruit trees, as well as the development of good farming practices plans, and the register and management of forest under forest incentives at local and regional level. Further, it works based on 4 sectors: sustainable agroforestry, forest conservation and forest products, tourism, and handicraft and textiles²⁴.

Municipal forestry technicians are trained in forest conservation and are the main contact with communities. They provide technical advice, support activities aimed to land management, support the development of administrative procedures, promote and strengthen community organization, plan, manage and execute forest incentives plans, provide technical assistance on forestry and agroforestry issues to the communities; and other²⁵.

Complementary information is in Section 2.4.3.

²⁴ Calmecac website: <https://www.fundacioncalmecac.org/>

²⁵ INAB, 2000. Guía para el establecimiento de oficinas municipales de Administración de Recursos Naturales / Forestales en Guatemala. Available at http://www.fao.org/tempref/GI/Reserved/FTP_FaoRlc/old/paises/guatemala/guiaoafm.pdf

Other entity involved in the project

ForestFinest Consulting GmbH supports companies, investors and cooperatives in the development of sustainable agricultural and forestry projects. Our core activities are the development, management and certification of land use projects as well as carbon trading and CSR consulting for companies. With our highly qualified team and its 20 years track-record in developing, managing and certifying forest, agro-forest and carbon forest projects worldwide, we assist project developers, development organizations and investors to create long term value for their assets.

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

It is not reported a lack of relevant experience for the development of the project. Conversely, the project proponent is working in line with the national emission reduction program and with governmental actors, the project management team counts with professional advice to fulfill the climate, community and biodiversity objectives.

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

Calmecac has extensive experience in international cooperation managing the design and implementation of regional projects with external funds. The initial funds for the PD development were provided by the Inter-American Development Bank. The project activities are carried out in partnership with the local municipalities with Governmental funds (PINPEP and PROBOSQUE forest incentives) which assure the project activities for the first years are secure. In addition, the Reddes Locales REDD+ project is considered in the National Emission Reduction Program supported by the Forest Carbon Partnership Facility. The FCPF carbon fund will directly buy a determined percentage of the achieved emission reduction and removals for the first 10 years starting in 2020. This agreement gives leverage to the project, allowing them to have funds for the project activities implementation. Furthermore, the project revenues from the voluntary market will be essential for adding potential new instances, to continue the project's activities and achieve the project's climate, community and biodiversity benefits.

A project cash flow is available to the auditor.

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

The project proponents and its associates/partners involved since the project inception promote and follow internal guidelines to avoid any activity related to corruption or any action related to unethical behaviors that might affect in any kind the project and all its participants. The following steps are part of the assurance procedure:

- Transparency in the election of the organization's authorities.
- Active participation of the whole team.
- The mission, vision and values of the organization are aimed at objective and transparent governance.
- Principles and values are promoted within the organization
- Annual training is generated to strengthen principles and values.
- The culture of denunciation is promoted when identifying acts that are considered contrary to ethics and the values and principles promoted by the organization.

In addition, the project proponent and municipalities involved in the project design must comply with the legal measures that meet the safeguards related to information access, accountability, prevention of corruption, participation in decision-making and integration of environmental and social aspects in decision-making processes. Especially the Anti-Corruption Law (Decree 31-2012, issued by the Congress of the Republic of Guatemala), Law on the Integrity and Responsibility of Civil Servants and Public Employees (Decree 89- 2002, issued by the Congress of the Republic of Guatemala); and the

Organic Law on the Accounts Comptroller Office (Decree 31- 2002, issued by the Congress of the Republic of Guatemala).

Lastly, a comprehensive online search was performed for any unethical behavior, and there are no reports that demonstrate the project proponent is involved or conflict in any form of corruption.

2.4.7 Commercially Sensitive Information (Rules 3.5.13 – 3.5.14)

No commercially sensitive information has been excluded from the public version of the project description.

2.5 Legal Status and Property Rights

2.5.1 Statutory and Customary Property Rights (G5.1)

The Guatemalan Civil Code recognizes two types of property: private property (property of an individual, company or group of persons) and State property (Article 456), which may be owned by the central government or by a municipality (Article 457). Guatemala does not recognize the indigenous property as a land tenure category (an indigenous community can own land only if it is formalized as one of the legal structures mentioned before).

According to the FCPF (2019) in the ERPD description, there are four types of land tenure:

1. **State property:** The State (Article 456 of the Civil Code) has registered properties and exercises constitutional control over the so-called Territorial State Reserves (Article 122 of the Guatemalan Constitution). In the case of Protected Areas, these are public or individual property areas managed by the State given their special interest and value to the nation. State property includes underground assets, hydrocarbons and minerals (Article 121 of the Constitution).
2. **Municipal property:** (Recognized in Article 457 of the Civil Code). These municipal lands are originally communal. Thus, many communal lands have been registered in the name of municipalities because communities were looking for a way to protect their lands and, at the time of registration, there was little difference between the municipality and the community.
3. **Private property:** Article 460 of the Civil Code defines private property assets as those that belong to individuals and legal entities with a legal title. The 1985 Constitution protects private property as an inherent human right (Article 39) and although it allows expropriation under certain circumstances (including social benefits and idle land), compensation must always be paid affected parties (Article 40).
4. **Community property:** This category includes communal property of local communities and also of indigenous peoples since there is no category of indigenous forest tenure as such. The 1985 Constitution includes a formal recognition of indigenous culture and their right to land but does not recognize their particular legal systems.

The land tenure also depends on whether the right holders are owners, holders or tenants.

Owners: they have a registered title to the land. This includes the right to use and exploit, defend, claim, and benefit from the fruits or products that the land is capable of yielding.

Holders: the holder has a just title, which is not registered in the Land Registry. This ownership category is important for it represents a large number of small farmers and communities in Guatemala. According to the Civil Code, a holder is someone who exercises some or all of the powers inherent to the property.

Tenants of land that belong to others: It is the person who, by any circumstance, has possession over a property, registered or not in the Land Registry, without being the owner or legitimate holder of the property, and whose condition does not imply any right regarding this Law. Those who rent a property fall within this category.

Moreover, according to Article 22 of the "framework law to regulate the reduction of vulnerability, mandatory adaptation to the effects of climate change and the mitigation of greenhouse gases" the rights, possession and negotiation of units of reduction of carbon emissions or other greenhouse gases, as well as the certificates will belong to the owners of the projects, being these the owners and/or legitimate holders of the lands where the projects are implemented. The project zone is characterized by small plots (less than 1 ha; and between 1 to 5 ha) owned by farmers who work the land for subsistence farming and cattle ranching.

In that sense, individual or collective holders and owners properly accredited by the municipalities can be beneficiaries. The project will only involve properties that can demonstrate land tenure through a land title, land tenure certificate, or equivalent documents certified by the corresponding institution.

2.5.2 Recognition of Property Rights (G5.1)

To ensure that property and possession rights are respected in the territory where the project is being implemented, supporting legal documentation is attached as an annex.

Further, a field verification was carried out to verify that the area to be considered within the project does not encroach on land owned by third parties that are not part of this project, for which a georeferenced map was drawn up. In addition, the areas included in the project are private properties managed by the landowners who can demonstrate property rights or equivalent documentation.

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

The project does not expect to involve land areas with conflict or to affect any property rights. The project involves landowners who voluntarily access to participate, and they can enroll in the project through an admission certificate (boleta de participación) at the Municipal Forestry Office. In this certificate, the project beneficiaries express their interest to participate in the project and contribute to the achievement of the climate, community, and biodiversity objectives.

The project will not encroach uninvited on private property, community property, or government property. Also, there is no need for compensation since the project will only work in areas with appropriate permission obtained from the landowner through the free, prior, and informed consent.

For stakeholder consultation, refer to Section 2.3.7.

2.5.4 Property Rights Protection (G5.3)

Meetings were held with all the owners and/or possessors legally established on the lands where the project is being implemented. The project concept and the carbon emissions reduction were explained, where it was highlighted that the negotiations on the carbon reduction units do not imply negotiations on the title or tenure of the land, so their tenancy rights (ownership and/or possession) will not be subject to modification from any point of view and at any time. Further, the project participants have freely and voluntarily agreed to participate in the project development; and the project beneficiary can freely choose the project activities to implement in their land, following the principles of forest conservation and sustainable land use.

Legal instruments are set for the protection of property and/or possession over the property, which are part of the documents attached to this document. The project does not lead to any type of involuntary relocation process since it is implemented in private land.

2.5.5 Illegal Activity Identification (G5.4)

A mapping of common activities in the area was made, for which activities were classified according to the impact they can generate in the project (Figure 25).

Activities that could potentially threaten the project were identified within the activities carried out in the region, and an emergency protocol was developed, which is summarized in the following steps:

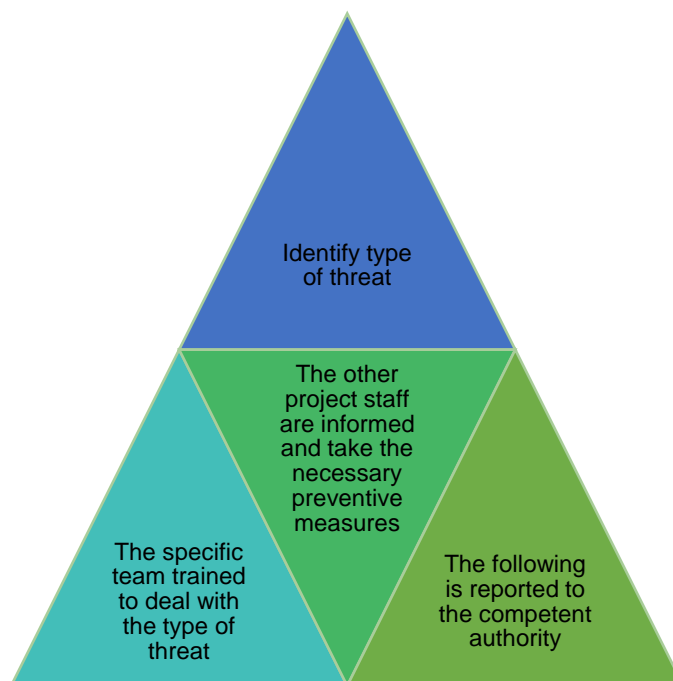


Figure 25. Emergency protocol to identify illegal activities.

Source: Own elaboration.

Further, the main illegal activities in the project area are illegal logging (for timber and firewood). According to INAB, IARNA-URL & FAO (2012) the average firewood consumption per capita for the rural area of Huehuetenango, Quiché, and Alta Verapaz is 4.6, 3.5, and 2 m³/person/year. In addition, the same authors mentioned that the relationship between illegally harvested and authorized wood, is of 1:391, i.e. for every m³ of authorized wood, 391 m³ are illegally harvested. This illegal wood comes from communal, municipal or private forests. The illegal extraction is usually caused by:

- Distance between the rural community and the municipality to manage family consumption licensing permits. This adds transportation cost to the license fee.
- Lack of enforcement of the applicable laws and regulations.
- Lack of interest of the landowner or user of the forest resources. It is not economically profitable to ask for a license use for 0.1 to 1 m³ firewood.
- Additional payments to the municipality for forest management.

The project benefits will not be derived from illegal activities. The project activities have been designed to reduce the illegal extraction of wood, for example, the forest incentive program which promotes reforestation for energy uses and agroforestry systems, training and workshops about sustainable forest management, and the promotion of sustainable diversification of forest products.

2.5.6 Ongoing Disputes (G5.5)

The project activities are carried out in the landowners' private lands. They hold or can prove legal title or right over the area. No project activities will be implemented in areas where land tenure cannot be demonstrated. The municipality will require a possession or land tenure certificate from any potential beneficiary who wishes to participate in the project or will issue a Land Ownership Certificate²⁶ for owners who do not have it yet. Therefore, it is not expected any dispute or unresolved conflict over the territory.

Moreover, the project has proposed mitigation measures such as: (1) Municipalities that participate in the project shall certify land ownership and/or require title deeds from project beneficiaries; (2) In case of uncertified holders, municipalities will issue a Land Ownership Certificate; (3) The Land Ownership Certificate includes a statement by the landholder confirming that there are no land claims regarding their property.

2.5.7 National and Local Laws (G5.6)

Calmecac complies with all relevant laws and regulations, including those listed in Table 16.

Table 16. National and Local Laws

National and Local Laws	Summary and Relevance to the Project
Political Constitution of the Republic of Guatemala, 1985	<p>The dogmatic part of the Constitution establishes the fundamental rights and guarantees that the State must provide to all Guatemalans, and the articles that should be discussed in the specific case are cited.</p> <p>Articles 1 "Protection of the individual" and 2 "Duties of the State" establish that the State of Guatemala is organized to protect the individual and the family, its supreme aim being the realization of the common good and the comprehensive development of the individual.</p> <p>"ARTICLE 39. Private property.</p> <p>Private property is guaranteed as an inherent right of the human person. Every person may freely dispose of his property in accordance with the law.</p> <p>The State guarantees the exercise of this right and shall create the conditions that facilitate the use and enjoyment of its property by the owner, to achieve individual progress and national development for the benefit of all Guatemalans".</p> <p>It is important to emphasize in this article that the right to property is an inherent right of all persons, and the free and full exercise of this right must be guaranteed. However, historically the state has not had control over the equitable administration of land, and there is no regulation regarding fair and equitable access to land.</p> <p>"ARTICLE 44. Rights inherent to the human person.</p> <p>The rights and guarantees granted by the Constitution do not exclude others which, although not expressly stated in it, are inherent to the human person.</p>

²⁶ The Land Ownership Certificate is issued by the Mayor of the corresponding municipality in a stamped sheet, and states that the interested party owns the land in a peaceful, publicly known and sustained manner and in good faith, and that there is no claim over said land by another person.

	<p>The social interest prevails over the particular interest.</p> <p>Laws and governmental or other provisions that diminish, restrict or distort the rights guaranteed by the Constitution shall be ipso jure null and void.</p> <p>"Preeminence of international law.</p> <p>The general principle is established that in matters of human rights, the treaties and conventions accepted and ratified by Guatemala take precedence over domestic law".</p> <p>Concerning articles 44 and 46, the Constitution recognizes rights and guarantees that, although not developed in this instrument, are inherent to the human person.</p> <p>"ARTICLE 64. Natural heritage.</p> <p>It is declared of national interest the conservation, protection and improvement of the natural heritage of the Nation. The State shall promote the creation of national parks, reserves and natural refuges, which are inalienable. A law will guarantee their protection and that of the fauna and flora that exist in them".</p> <p>The need to regulate the conservation, protection and improvement of the natural patrimony of the Nation is conceived, using the promotion and creation of inalienable areas regulated by a specific law, is created by means of the Decree 4-89 of the Congress of the Republic of Guatemala, Law of Protected Areas.</p> <p>"ARTICLE 67. Protection of land and indigenous agricultural cooperatives.</p> <p>The lands of cooperatives, indigenous communities or any other form of communal or collective tenure of agrarian property, as well as family patrimony and popular housing, shall enjoy special protection from the State, credit assistance and preferential techniques, which guarantee their possession and development, in order to ensure a better quality of life for all inhabitants.</p> <p>The indigenous communities and others that have lands that historically belong to them and that they have traditionally administered particularly shall maintain this system".</p> <p>"ARTICLE 68. Land for indigenous communities.</p> <p>Through special programs and appropriate legislation, the State shall provide state lands to indigenous communities that need them for their development.</p> <p>Although the importance of recognizing the traditional use and administration of land in terms of the customs of indigenous communities is constitutionally recognized, and although it is established that mechanisms will be sought to provide state lands to indigenous communities for their development, it is understood that the land problem in Guatemala has a strong tint of complexity in the historical formation of the state, creating a social struggle for years, which has been unsuccessful and invisible by sectors that manage much of the territory, resulting in unequal conditions and lack of development especially in rural areas of the country.</p> <p>"ARTICLE 97. Environment and ecological balance.</p> <p>The State, the municipalities and the inhabitants of the national territory are obliged to promote social, economic and technological development that prevents environmental pollution and maintains ecological balance. All necessary regulations shall be issued to ensure that the use and development of the fauna, flora, land and water are carried out rationally, avoiding their depredation".</p>
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	<p>It cannot be denied that civil society has intensely sought the support of the State and the municipalities for the common purpose, however, the issue of conservation and protection of the environment is a taboo for some because of the little interest in defining regulations such as access and use of resources such as water, land, creating ungovernability in much of the territory.</p> <p>"ARTICLE 126. Reforestation</p> <p>The reforestation of the country and the conservation of the forests is declared a national emergency and of social interest. The Law shall determine the form and requirements for the rational exploitation of forest resources and their renewal, including resins, gums, uncultivated wild plant products and other similar products, and shall encourage their industrialization. The exploitation of all these resources shall be the exclusive responsibility of Guatemalan individuals or legal entities.</p> <p>The forests and vegetation on the banks of rivers and lakes and in the vicinity of water sources shall enjoy special protection.</p>
United Nations Framework Convention on Climate Change (UNFCCC)	<p>Through the Decree of the Congress of the Republic number 15-95, issued on March 28, 1995, the approval of the United Nations Framework Convention on Climate Change was given, made in New York on May 9, 1992, and signed by Guatemala on June 13, 1992. In its preamble, the Convention recognizes that changes in the Earth's climate and their adverse effects are a common concern of all humankind. It also states the concern that "human activities have been substantially increasing concentrations of greenhouse gases in the atmosphere, and that this increase intensifies the natural greenhouse effect, which will result, on average, in an additional warming of the Earth's surface and atmosphere and may adversely affect natural ecosystems and humankind,".</p> <p>"As it raises awareness and considers the importance of natural sinks and reservoirs of greenhouse gases for terrestrial and marine ecosystems, ...</p> <p>Recognizing that measures required to understand and address climate change will be most effective at environmental, social and economic levels, are based on relevant scientific, technical and economic considerations and are continually re-evaluated in the light of discoveries in the field</p> <p>Recognizing further that low-lying and other small island countries, countries with low-lying coastal, arid and semi-arid areas or areas liable to floods, drought and desertification, and developing countries with fragile mountainous ecosystems are particularly vulnerable to the adverse effects of climate change</p> <p>Despite the fact that Guatemala is not considered a country that negatively impacts climate change, it is one of the ten most vulnerable countries to the effects of climate change, so it must define mitigation strategies to these impacts, highlighting in this Convention Article 6, in terms of awareness of the issue, and government agencies should seek to bring information to the population.</p> <p>"ARTICLE 6. EDUCATION, TRAINING AND PUBLIC AWARENESS</p> <p>(a) promote and facilitate, at the national level and, as appropriate, at the sub-regional and regional levels, in accordance with national laws and regulations and under their respective capacities:</p> <p>(i) The development and implementation of education and public awareness programs on climate change and its impacts</p> <p>(ii) Public access to information on climate change and its impacts.</p> <p>(iii) Public participation in addressing climate change and its impacts and in developing appropriate responses; and</p> <p>(iv) Training of scientific, technical and managerial personnel</p>

	(c)-(ii) The development and implementation of education and training programs, including the strengthening of national institutions and the exchange or secondment of personnel to train experts in this field, in particular for developing countries
CAFTA-DR Chapter 17, Environment²⁷	<p>In CAFTA-DR Chapter 17, Environment, the CAFTA-DR countries agreed to ensure that their laws and policies provide and encourage high levels of environmental protection, that improvements to those laws and policies are continued, and that there is no failure to effectively enforce them.</p> <p>Chapter 17 addresses procedural issues related to effective enforcement, voluntary mechanisms to improve environmental performance, the establishment of an Environmental Affairs Council, opportunities for public participation, compliance-related presentations, and other issues.</p> <p>Annex 17.9 provides an overview of the value of environmental cooperation in achieving shared economic and social development goals and identifies priorities for environmental cooperation.</p> <p>Analyzing the content of Chapter 17, as applied to the specific case, Article 17.4 establishes and develops the content of " Voluntary Mechanisms to Enhance Environmental Performance", for which the article is cited as the most important.</p> <p>"Article 17.4: Voluntary Mechanisms to Enhance Environmental Performance. 1. The Parties recognize that incentives and other flexible and voluntary mechanisms can contribute to the achievement and maintenance of environmental protection, complementing the procedures set out in Article 17.3. As appropriate and in accordance with its law, each Party shall encourage the development and use of such mechanisms, which may include: (a) mechanisms that facilitate voluntary action to protect or enhance the environment, such as: (i) partnerships involving businesses, local communities, non-governmental organizations, government agencies, or scientific organizations; (ii) voluntary guidelines for environmental performance; or (iii) sharing of information and expertise among authorities, interested parties, and the public concerning methods for achieving high levels of environmental protection, voluntary environmental auditing and reporting, ways to use resources more efficiently or reduce environmental impacts, environmental monitoring, and collection of baseline data; or (b) incentives, including market-based incentives where appropriate, to encourage conservation, restoration, and protection of natural resources and the environment, such as public recognition of facilities or enterprises that are superior environmental performers, or programs for exchanging permits or other instruments to help achieve environmental goals</p> <p>2. As appropriate and feasible and in accordance with its laws, each Party shall encourage (a) the maintenance, development, or improvement of performance goals and indicators used in measuring environmental performance; and (b) flexibility in the means to achieve such goals and meet such standards, including through mechanisms identified in paragraph 1.</p> <p>In this regard, Guatemala joined the process that contemplates actions aimed at mitigating climate change and reducing forest degradation and deforestation through the REDD+ mechanism.</p>
Regional Agreement for the Management and	<p>On October 29, 1993, the Regional Agreement for the Management and Conservation of Natural and Forest Ecosystems and the Development of Forest Plantations was signed in Guatemala City by the Governments of the Republics of El Salvador, Honduras, Guatemala, Nicaragua, Costa Rica and Panama.</p>

²⁷ Source: http://www.caftadr-environment.org/wp-content/uploads/2015/04/Chapter_17_CAFTA_-_DR.pdf

<p>Conservation of Natural Forest Ecosystems and the Development of Forest Plantations ²⁸</p>	<p>The justification of this agreement at the country level from Central America is "that the potential for forestry development is based on 19 million hectares of existing forests and 13 million hectares of forestland which currently have no forests; That the richness and diversity of the different life zones and species found in the tropical forests of the region, together with their isthmian character, as a bridge between the continental masses of North and South America, make this Central American region the most important deposit of genetic richness and biological diversity in the world; That in contrast to this richness, another reality exists; at present, more than 20 million Central Americans live in poverty and in particular, 14 million of these live in conditions of extreme poverty, since they do not manage to continue satisfying their basic food needs. It is important to note that almost two-thirds of the poor live in rural areas;</p> <p>Taking this into account according to the reference contained in the aforementioned instrument for the year it was signed (1993), it was estimated that around 416,000 hectares are deforested annually in Central America (48 hectares per hour), a rate that is increasing over time; a situation that to date has been seen with great concern due to the massive destruction of forests for various reasons.</p> <p>In addition, it is established that the deforestation of the upper parts of the hydrographic basins has caused erosion, floods, droughts, loss of forest and agricultural productive potential and loss of biodiversity, effects that together limit development opportunities and accentuate rural poverty, reducing the quality of life of Central Americans; having as a consequence a high factor of human losses and extreme poverty in the rural area mainly.</p> <p>Another important issue that is taken as part of the exposition of the recital is that the high levels of external indebtedness and the consequent debt service reduces the possibility of long term investment, particularly that associated with the sustainable development of natural resources, and rather increase the pressure on them and on the soil resource that is in danger of being overexploited in the production of short term and intensive crops that generate the foreign exchange required for the service of this debt; being the reality after more than 10 years since the Agreement was signed, that Guatemala as a State has not had the capacity nor the interest to look for mechanisms of conservation and repair of the ecosystems, being REDD+ a quite friendly alternative that could support with the reduction of the forest cover, providing aid to the communities of the rural area of the country.</p> <p>In many cases, the legal instruments contain a high content of reality compartmentalized with the search for solutions, many times the wording becomes a purely romantic expression without reaching the operational, as indicated that the potential of Central American forests to generate goods and services is not being valued in its fair dimension, nor is being used in a rational and sustained. Genetic diversity, scenic value, and the productive potential of timber and non-timber goods can be the basis on which forest resources are not only conserved but also contribute decisively and sustainably to the reduction of underdevelopment in Central America.</p> <p>The vision embodied in this Agreement concludes that forest resources must contribute to improving the quality of life of the Central American population, by encouraging and promoting national and regional actions to reduce the loss of these resources, ensuring their rational use and establishing mechanisms to reverse the process of destruction, establishing in Article 2 "The objective of this</p>
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²⁸ Source: <https://www3.nd.edu/~ggoertz/rei/rei720/rei720.021tt1.pdf>

	<p>Convention is to promote national and regional mechanisms to prevent the change of use of forest cover areas located on lands suitable for forestry and to recover deforested areas, to establish a homogeneous system of soil classification, by reorienting policies for colonization on forest lands, discouraging actions that lead to the destruction of forest on lands suitable for forestry, and promoting a process of land management and sustainable options".</p> <p>This agreement gave rise to the Central American Council on Forests (CCAB), which was later unified to form the Central American Council on Forests and Protected Areas (CCAB-AP), which became the regional group for technical and political protection of regional natural resource programs and projects.</p>
Regional Convention on Climate Change	<p>That the Congress of the Republic of Guatemala in Decree 30-95, issued on April 26, 1995, approved the Regional Agreement on Climate Change, signed in Guatemala City on October 29, 1993.</p> <p>This agreement establishes some definitions such as "Climate Change," "Emissions," and "Greenhouse Gases," definitions that are a fundamental part of knowing the REDD+ mechanism in depth. From this account in relation to the subject matter, the articles that should be related follow:</p> <p>ARTICLE 1. Objective.</p> <p>States shall protect the climate system for the benefit of present and future generations, based on equity and in accordance with their responsibilities and capabilities, in order to ensure that food production is not threatened and to enable the economic development of States to continue.</p> <p>ARTICLE 13.</p> <p>Each State of the region shall develop its conservation and development strategies among which climate conservation shall be a priority.</p> <p>ARTICLE 20.</p> <p>Appropriate techniques and procedures should be introduced in the region to evaluate greenhouse gas emissions.</p> <p>ARTICLE 21.</p> <p>The development and dissemination of new technologies for the conservation and sustainable use of natural resources, and the correct use of soils and management of water basins, should be promoted and encouraged in order to create and consolidate options for sustainable agriculture and regional food security that do not conflict with the conservation of the climate system.</p>
Indigenous and Tribal Peoples Convention, 1989 (ILO Convention 169)²⁹	<p>The Congress of the Republic, in Decree 9-96, issued on 5 March 1996, approved Convention 169 on indigenous and tribal peoples, on the understanding that the provisions of the Political Constitution of the Republic take precedence over that Convention and do not affect acquired rights or have retroactive effect.</p> <p>This instrument undoubtedly constitutes substantial progress in the recognition and protection of the rights of indigenous peoples, such as the recognition of their character as peoples, of their right to assume control of their institutions, of their ways of life and their development, and the rights to their lands and territories. In this regard, and for the specific analysis of the case in terms of land and recognition of rights, the articles to be considered are those cited below.</p> <p>ARTICLE 1.</p> <p>1. This Convention applies to:</p> <p>(a) tribal peoples in independent countries whose social, cultural and economic conditions distinguish them from other sections of the national community, and whose status is regulated wholly or partially by their customs or traditions or by special laws or regulations;</p>

²⁹ Source: https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C169

(b) peoples in independent countries who are regarded as indigenous on account of their descent from the populations which inhabited the country, or a geographical region to which the country belongs, at the time of conquest or colonization or the establishment of present state boundaries and who, irrespective of their legal status, retain some or all of their own social, economic, cultural and political institutions.

2. Self-identification as indigenous or tribal shall be regarded as a fundamental criterion for determining the groups to which the provisions of this Convention apply.

3. The use of the term peoples in this Convention shall not be construed as having any implications as regards the rights which may attach to the term under international law.

ARTICLE 4

1. Special measures shall be adopted as appropriate for safeguarding the persons, institutions, property, labor, cultures and environment of the peoples concerned.

2. Such special measures shall not be contrary to the freely-expressed wishes of the peoples concerned.

3. Enjoyment of the general rights of citizenship, without discrimination, shall not be prejudiced in any way by such special measures

ARTICLE 7

priorities for the process of development as it affects their lives, beliefs, institutions and spiritual well-being and the lands they occupy or otherwise use, and to exercise control, to the extent possible, over their own economic, social and cultural development. In addition, they shall participate in the formulation, implementation and evaluation of plans and programs for national and regional development which may affect them directly.

2. The improvement of the conditions of life and work and levels of health and education of the peoples concerned, with their participation and co-operation, shall be a matter of priority in plans for the overall economic development of the areas they inhabit. Special projects for the development of the areas in question shall also be so designed as to promote such improvement.

3. Governments shall ensure that, whenever appropriate, studies are carried out, in co-operation with the peoples concerned, to assess the social, spiritual, cultural and environmental impact on them of planned development activities. The results of these studies shall be considered as fundamental criteria for the implementation of these activities.

4. Governments shall take measures, in co-operation with the peoples concerned, to protect and preserve the environment of the territories they inhabit.

PART II. LAND

ARTICLE 13.

1. In applying the provisions of this Part of the Convention governments shall respect the special importance for the cultures and spiritual values of the peoples concerned of their relationship with the lands or territories, or both as applicable, which they occupy or otherwise use, and in particular the collective aspects of this relationship.

2. The use of the term lands in Articles 15 and 16 shall include the concept of territories, which covers the total environment of the areas which the peoples concerned occupy or otherwise use.

ARTICLE 14

1. The rights of ownership and possession of the peoples concerned over the lands which they traditionally occupy shall be recognized. In addition, measures

shall be taken in appropriate cases to safeguard the right of the peoples concerned to use lands not exclusively occupied by them, but to which they have traditionally had access for their subsistence and traditional activities. Particular attention shall be paid to the situation of nomadic peoples and shifting cultivators in this respect.

2. Governments shall take steps as necessary to identify the lands which the peoples concerned traditionally occupy and to guarantee effective protection of their rights of ownership and possession.

3. Adequate procedures shall be established within the national legal system to resolve land claims by the peoples concerned.

ARTICLE 15.

1. The rights of the peoples concerned to the natural resources pertaining to their lands shall be specially safeguarded. These rights include the right of these peoples to participate in the use, management and conservation of these resources.

2. In cases in which the State retains the ownership of mineral or sub-surface resources or rights to other resources about lands, governments shall establish or maintain procedures through which they shall consult these peoples, to ascertain whether and to what degree their interests would be prejudiced, before undertaking or permitting any programs for the exploration or exploitation of such resources of their lands. The peoples concerned shall wherever possible participate in the benefits of such activities, and shall receive fair compensation for any damages which they may sustain as a result of such activities.

ARTICLE 16.

1. Subject to the following paragraphs of this Article, the peoples concerned shall not be removed from the lands which they occupy.

2. Where the relocation of these peoples is considered necessary as an exceptional measure, such relocation shall take place only with their free and informed consent. Where their consent cannot be obtained, such relocation shall take place only following appropriate procedures established by national laws and regulations, including public inquiries where appropriate, which provide the opportunity for the effective representation of the peoples concerned.

3. Whenever possible, these peoples shall have the right to return to their traditional lands, as soon as the grounds for relocation cease to exist.

4. When such return is not possible, as determined by agreement or, in the absence of such agreement, through appropriate procedures, these peoples shall be provided in all possible cases with lands of quality and legal status at least equal to that of the lands previously occupied by them, suitable to provide for their present needs and future development. Where the peoples concerned express a preference for compensation in money or kind, they shall be so compensated under appropriate guarantees.

5. Persons, thus relocated, shall be fully compensated for any resulting loss or injury.

ARTICLE 17

1. Procedures established by the peoples concerned for the transmission of land rights among members of these peoples shall be respected.

2. The peoples concerned shall be consulted whenever consideration is being given to their capacity to alienate their lands or otherwise transmit their rights outside their community.

3. Persons not belonging to these peoples shall be prevented from taking advantage of their customs or of lack of understanding of the laws on the part of

	<p>their members to secure the ownership, possession, or use of land belonging to them.</p> <p>ARTICLE 19.</p> <p>National agrarian programs shall secure to the peoples concerned treatment equivalent to that accorded to other sectors of the population about:</p> <p>(a) the provision of more land for these peoples when they have not the area necessary for providing the essentials of a normal existence, or for any possible increase in their numbers;</p> <p>(b) the provision of the means required to promote the development of the lands which these peoples already possess.</p>
<p>Framework</p> <p>Law to regulate the reduction of Vulnerability, Mandatory Adaptation to the effects of Climate Change and the Mitigation of Greenhouse Gases. Decree 7-2013 of the Congress of the Republic of Guatemala</p>	<p>Approved by Decree 7-2013 of the Congress of the Republic of Guatemala, an instrument has been created to "establish the necessary regulations to prevent, plan and respond in an urgent, adequate, coordinated and sustained manner to the impacts of climate change in the country".</p> <p>When entering in the content of the law, key institutional actors are identified, the Ministry of Environment and Natural Resources who assumes the ownership in matters of climate change; the Ministry of Agriculture, Livestock and Food who has as part of its functions to "promote and watch over the application of clear and stable norms in matters of agricultural, livestock, hydrobiological, forest and phytozoosanitary activities, taking into account the conservation and protection of the environment"; It also recognizes the constant participation of the governing body in forest matters in Guatemala, the National Institute of Forests and the body of direction and coordination in matters of Protected Areas and Biological Diversity, the National Council of Protected Areas.</p> <p>In that order of ideas, it is regulated in the article 12 the need that the governing Ministries support in conjunction with the Secretariat of Planning and Programming of the Presidency, to the municipalities to adapt their plans of territorial ordering. The articles that should be considered in the analysis of legislation on forestry and land-use change are also cited below.</p> <p>Article 15. Institutional Strategic Plans for Vulnerability Reduction, Adaptation and Mitigation to Climate Change Based on the National Action Plan for Adaptation and Mitigation to Climate Change, the corresponding public institutions should have institutional strategic plans, which should be periodically reviewed and updated. The Ministry of the Environment and Natural Resources (MARN), the Secretariat of Planning and Programming of the Presidency (SEGEPLAN) and the Ministry of Public Finance (INFIN) may support the preparation of these plans.</p> <p>b. Forest Resources, Ecosystems and Protected Areas. The National Institute of Forests -INAB-, the National Council of Protected Areas -CONAP-, the National System for the Prevention and Control of Forest Fires -SIPECIF- and the Ministry of Environment and Natural Resources -MARN-, as far as they are concerned, will develop local, regional and national plans for the prevention and combat of forest fires, of efficient management of the units that make up the Guatemalan System of Protected Areas -SIGAP- the ecological corridors and forest ecosystems to increase their resilience to climate variability and change and ensure the maintenance of ecological processes and natural goods and services.</p> <p>Article 17. Soil protection. The Ministry of Agriculture, Livestock and Food -MAGA- and the Ministry of Environment and Natural Resources -MARN-, shall establish policies and programs to prevent degradation, improve soil conservation and establish recommendations for its productive use.</p>

	<p>Article 20. Reduction of Emissions from Land Use Change. The National Institute of Forests (INAB), the National Council of Protected Areas (CONAP), the Ministry of Agriculture, Livestock and Food (MAGA), in coordination with the Ministry of the Environment and Natural Resources (MARN), shall adjust and design, in accordance with the objectives and principles of this law, policies, strategies, programs, plans and projects for the development and sustainable use and management of forest resources, including the promotion of environmental services that reduce greenhouse gas emissions and the conservation of forest ecosystems.</p> <p>Article 22. Carbon market projects. The activities and projects that generate certificates of removals or reduction of greenhouse gas emissions may have access to voluntary and regulated carbon markets, as well as other bilateral and multilateral mechanisms for compensation and payment for environmental services. The rights, possession and negotiation of units of reduction of carbon emissions or other greenhouse gases, as well as the certificates, shall belong to the owners of the generating projects referred to in the previous paragraph, which for this purpose shall be registered in the Registry created by the Ministry of the Environment and Natural Resources. Individuals or legal entities and the State, which are owners or legal holders of the lands or properties where the projects are carried out, may be owners of the projects.</p>
Environmental Protection and Improvement Act. Decree 68-86.	<p>Approved by Decree 68-86 of the Congress of the Republic of Guatemala, it establishes the obligation of all Guatemalans, municipalities and the State to protect and generate the integral development of the country, respecting the environment and making adequate use of natural resources.</p> <p>The article that intrinsically refers with the analyzed topics, is the article 8, which indicates that for every project, work, industry or any other activity that for its characteristics can produce deterioration to the renewable or not renewable natural resources, to the environment, or introduce harmful or notorious modifications to the landscape and the cultural resources of the national patrimony, it will be necessary previous to its development a study of evaluation of the environmental impact, carried out by technicians in the matter and approved by the Commission of the Environment.</p> <p>In addition to the above-mentioned article, article 12 establishes in its literal e) that one of the main objectives of the law is "The creation of all kinds of incentives and stimuli to promote programs and initiatives aimed at the protection, improvement and restoration of the environment".</p>
Law for the Promotion of the Establishment, Recovery, Restoration, Management, Production and Protection of Forests in Guatemala - PROBOSQUE.	<p>Approved by Decree 5-2015 of the Congress of the Republic of Guatemala, its purpose, according to Article 1, is to increase the country's forest coverage with the creation and application of the Incentive Program for the Establishment, Recovery, Restoration, Management, Production and Protection of Forests called PROBOSQUE.</p> <p>In addition to the creation of the PROBOSQUE forest incentive, the law establishes that the State will provide this service for 30 years from the date of entry into force of the present law and that the entity with competence to implement the content of the decree is the National Institute of Forests.</p>
Forestry Law	<p>Approved by Decree 101-96 of the Congress of the Republic of Guatemala, it establishes in its article 1 that reforestation and forest conservation are of national urgency and social interest, for which purpose forest development and sustainable management will be promoted</p>

	<p>(a) To reduce the deforestation of land suitable for forestry and the advance of the agricultural frontier, by increasing the use of land in accordance with its purpose and without omitting the characteristics of the soil, topography and climate</p> <p>b) Promote the reforestation of forest areas currently without forest, to provide the country with the forest products it requires;</p> <p>c) To increase the productivity of existing forests, subjecting them to rational and sustained management by their biological and economic potential, promoting the use of industrial systems and equipment which achieve the greatest added value for forest products;</p> <p>d) Support, promote and encourage public and private investment in forest activities to increase production, marketing, diversification, industrialization and conservation of forest resources;</p> <p>e) Conserve the country's forest ecosystems, through the development of programs and strategies that promote compliance with the respective legislation; and</p> <p>f) To promote the improvement of the standard of living of the communities by increasing the provision of goods and services from the forest to satisfy the needs for firewood, housing, rural infrastructure and food.</p> <p>Article 3 establishes the granting of forest concessions on national and municipal lands, except protected areas that are regulated by their law, in addition to creating the National Forest Institute.</p>
Protected Areas Law	<p>Through Decree 4-89 of the Congress of the Republic of Guatemala, the Protected Areas Law was approved, in which the first article declared the conservation of biological diversity through the declaration and administration of protected areas to be of national interest, establishing the definition of a protected area in Article 7 of the same normative body.</p> <p>Likewise, the Guatemalan System of Protected Areas (SIGAP) was created, integrated by all the protected areas and entities that administer them, whose organization and characteristics are established by this law, in order to achieve its objectives in favor of the conservation, rehabilitation, improvement and protection of the country's natural resources and biological diversity.</p> <p>Article 9 establishes that territorial reserves and registered farms owned by the Nation, which have adequate characteristics, should preferably be dedicated to conservation objectives under management. The National Reserves Control Office "OCREN" will give priority to the conservationist administration of the lake and marine coasts and river banks. However, in reality there is very little coordination between the National Council of Protected Areas and the Office of State Territorial Reserves.</p> <p>Article 19 states that CONAP may lease or grant exploitation concessions in the protected areas under its administration, as long as the respective master plan establishes it and allows it. The corresponding concession contracts must be signed, and there are currently forestry concessions established in the Multiple Use Zone of the Maya Biosphere Reserve.</p>
Urban and Rural Development Councils Act.	<p>Decree No. 11-2002 of the Congress of the Republic of Guatemala approved the Urban and Rural Development Councils Act, stating in article 1 that the System of Development Councils is the main means of participation by the Maya, Xinca and Garifuna and non-indigenous populations in public management to carry out the democratic development planning process, taking into account the principles of national, multi-ethnic, multicultural and multilingual unity of the Guatemalan nation.</p>

	<p>One of the principles regulated for the Development System is that of "Conservation and maintenance of environmental balance and human development, based on the world views of the Maya, Xinca and Garifuna peoples and the non-indigenous population", and it also recognizes gender equity.</p> <p>This decree establishes the National Urban and Rural Development Council, which has several functions, including that of land use, in the formulation of urban and rural development and land-use policies.</p>
The Land Fund	<p>The Congress of the Republic of Guatemala, through Decree 24-99, approved the Law of the Land Fund, which in its article 1 establishes "The Land Fund is created, which may be abbreviated FONTIERRAS, as a decentralized State entity, which has competence and jurisdiction throughout the national territory for the fulfillment of its objectives, and the powers and functions assigned to it by this law. It shall enjoy functional autonomy, with legal personality, assets and resources of its own. It shall have its domicile in the Department of Guatemala, its headquarters in Guatemala City and may establish sub-offices in any other place in the country". In that sense, Article 3 regulates the objectives of FONTIERRAS, which are the following:</p> <ol style="list-style-type: none"> To define and implement a public policy related to access to land, in coordination with the State's rural development policy. To administer public financing programs aimed at facilitating access to productive land for individual or organized peasants, whether landless or landless, in various forms. Facilitate access to land ownership for individual or organized peasants through appropriate financial mechanisms, as well as the use of natural resources on such land, under criteria of economic and environmental sustainability. Promote the accessibility of resources for financing the purchase of land by beneficiary groups, ensuring that this allows for the financial sustainability of the Land Fund and the beneficiaries' productive projects. To coordinate with other State institutions the development of investments complementary to those of access to land, in order to guarantee the achievement of integral projects of agricultural, forestry and hydrobiological development. To define the policy and promote programs to facilitate women's access to credit for the purchase of land and related productive projects. <p>In response to the historical problem of obtaining and equitable distribution of land, this autonomous entity was created to provide facilities and define a public policy related to access to land, despite providing a public service of granting land to communities and indigenous peoples, in many cases the transfer of these property rights have not established locks that allow people to retain their right, in many cases have generated external pressures on communities or indigenous peoples to give up their spaces and sell what the State has granted them.</p> <p>Another latent situation is the bad distribution and lack of territorial organization. To date, the landowners who located and appropriated the lands since the time of the conquest have left their heirs forging their territorial empire, taking into account that under this base and the premise of the pressures suffered by the indigenous peoples, there are no options that support integral development by providing lands to dignify the lifestyle of people with scarce resources, mainly in rural areas.</p>
Law of the Registry of	<p>Approved by Decree 41-2005 of the Congress of the Republic of Guatemala, the law that creates the Registry of Cadastral Information of Guatemala was approved (RIC), as an autonomous and service institution of the State, with legal character,</p>

Cadastral Information	<p>assets and own resources. It will act in coordination with the General Property Registry without prejudice to its specific powers.</p> <p>The Cadastral Information Registry has within its functions the Establishment, maintenance and updating of the national cadaster, in accordance with Article 24 indicates that the cadaster is a technical instrument of development with information available for multiple purposes. It is a basic, graphic and descriptive register of the property type, oriented towards the certainty and legal security of ownership, possession and use of land.</p> <p>An important article regarding the recognition of communal lands is article 65, which establishes that "If during the process of cadastral establishment the communal property, possession or tenure of land is determined, the RIC will recognize and make the administrative declaration of communal land and will issue the certifications for what is conducive and, if necessary, order the registry. The procedure for the declaration of communal lands will be carried out based on the definition of these, contained in the present Law and the procedure to declare regular or irregular cadaster land, for which the RIC will issue specific regulations. In these lands, the RIC will make the complete cadastral survey of the polygon, from which its extension will be calculated, and at the request of the communal farmers, the survey of the property information will be made, to plan the development of the community. In any case, the RIC shall be subject to the regulations of the Political Constitution of the Republic and Convention 169 of the International Labor Organization". It is emphasized that the declaration of communal land is solely administrative power according to this article.</p> <p>For titling, the Cadastral Information Registry Law establishes in Article 68 "The titling and registration of those properties that after legal analysis has as the only irregularity that they are not registered in the Property Registry are declared to be of national interest. Exceptions to this process are the territory of the department of El Petén and the Northern Transversal Strip, real estate located within the State Reserves, within the Protected Areas, and the excesses of rural and urban properties".</p>
Supplementary Titling Law	<p>Through Decree 49-79 of the Congress of the Republic, the Law of Supplementary Titling is approved, which establishes the procedure for the supplementary titling of a property to an individual or a legal entity, for which article 1 of said law is quoted verbatim: "The owner of the property that lacks a title that can be registered in the Property Registry may request supplementary titling before a First Instance Civil Judge. The interested party must prove legitimate, continuous, peaceful, public possession in good faith and his name, for not less than ten years, and may add that of his predecessors, provided he meets the same requirements". Likewise, Article 2 makes the analysis that only natural Guatemalan citizens can obtain Supplementary Title to Real Estate; in the case of legal entities, these must be composed mainly or totally of Guatemalans, a circumstance that must be proven when making the respective application. In addition, exceptions are established for owners of real estate, which are regulated in Article 3. "It is expressly forbidden to grant Supplementary Title to a) Real estate over 45,125 Ha. (one cavalry); b) Real estate located in the Northern Transversal Strip and any of the agricultural development areas referred to in Decree 60-70 of Congress. According to its regulations and private standards, the National Institute of Agrarian Transformation will resolve the granting of titles in the areas referred to in this subparagraph. Exceptions to this provision are fractions not exceeding five thousand square meters that are within the urban limits of a population, provided that they do not affect the areas of agrarian development; c)</p>

	<p>Real estate located within the reserves of the State; and d) The excesses of rustic or urban properties".</p> <p>This law, passed in 1979, establishes a judicial procedure that can recognize property rights to all those who can prove that they have owned a property for more than 10 years, but in many cases have misused this legal figure to appropriate land in an improper way.</p>
Municipal Code	<p>The Municipal Code was created by Decree 12-2002 of the Congress of the Republic, which in its article 1 establishes the object of the same, indicating that "its purpose is to develop the constitutional principles regarding the organization, government, administration, and operation of municipalities and other local entities determined in this Code and the content of the competencies that correspond to the municipalities with respect to the matters that these regulate".</p> <p>In accordance with article 8, the following are identified as elements of the municipality: the population, the territory, the authority exercised on behalf of the inhabitants, both by the Municipal Council and by the traditional authorities of the communities in its district, the organized community, the economic capacity, the municipal legal system and the customary law of the place, and the heritage of the municipality.</p> <p>Article 55 recognizes indigenous municipalities, respecting and promoting them when they exist, including their forms of administrative operation. Likewise, the promotion and environmental management of the natural resources of the municipality is among the competences of a municipality.</p> <p>Article 109 establishes community lands, indicating that "The municipal government shall establish, after consultation with the community authorities, mechanisms to guarantee to community members the use, conservation and administration of community lands whose administration has traditionally been entrusted to the municipal government; in any case, the mechanisms must be based on the provisions of Title IV, Chapter I of this Code.</p> <p>Starting from the premise that if the territorial ordering started from the municipalities, the territory of Guatemala would be organized and therefore there could be juridical certainty of the land, however for questions that do not correspond to analyze in the present, there does not exist a territorial ordering in Guatemala that can offer with total certainty the use of the land, property, use and possession, being wise to indicate by some that the information that is distributed in the Institutions with competence in these topics is biased and not very reliable.</p>
Civil Code	<p>The Civil Code is a decree-law approved by the then Head of Government, Enrique Peralta Azurdia, which regulates relations between individuals and establishes the recognition of civil personality.</p> <p>Article 442 defines real estate as property, and therefore the Code further develops the right of ownership on the basis of how the ownership of such property is regulated.</p> <p>With regard to the right of ownership, the Civil Code regulates, as indicated above, the relations of individuals among themselves and between them and the State, so that, according to article 464, "ownership is the right to enjoy and dispose of the property within the limits and with the observance of the obligations established by law". Likewise, article 465 provides that "The owner, in the exercise of his right, may not carry out acts that cause prejudice to other persons and especially in his industrial exploitation work, is obliged to abstain from any excess that could damage the property of his neighbor". In addition, article 468 states that "The owner has the right to defend his property by legal means and not to be disturbed in it if he has not first been summoned, heard and brought to justice".</p>

<p>National Climate Change Policy</p>	<p>Through Governmental Agreement 329-2009, the President of the Republic of Guatemala approved the National Climate Change Policy.</p> <p>As a general objective, the State of Guatemala, through the Central Government, the municipalities, the organized civil society and the citizens in general, should adopt practices for risk prevention, reduction of vulnerability and improvement of adaptation to Climate Change, and contribute to the reduction of greenhouse gas emissions in its territory, contribute to the improvement of the quality of life of its inhabitants and strengthen its capacity to influence international negotiations on Climate Change.</p> <p>Chapter V establishes the following as areas for policy impact: national capacities and technology transfer; "(e) Indigenous peoples. Those conditions have generated that favor, promote and strengthen the participation of indigenous peoples in the implementation of this policy and its strategy".</p> <p>"2. Vulnerability Reduction, Adaptation Improvement and Risk Management</p> <p>a. Land Use Planning for Climate Change Adaptation and Mitigation. That in Guatemala there are plans of Environmental Territorial Ordering with an emphasis in the Adaptation to the Climatic Change and that they consider the integrated handling of basins, the productive landscape and the biological corridors, so much for the zones already identified as of bigger vulnerability, as for those in which they can be generated increases. These plans are based on this policy and serve as the main support for guiding the formulation and execution of policies, programs, projects and actions developed by the various government authorities, municipalities, different development agents and the population in general, in both rural and urban areas.</p> <p>c. Reducing Vulnerability and Improving Adaptation to Climate Change in Key Sectors of Society.</p> <p>Agriculture, Livestock and Food Security That the Guatemalan Agricultural Sector adapts to climate variability taking into account the scenarios and effects of Climate Change in its activities. New practices are adopted -including those coming from traditional and ancestral knowledge- that allow a production such that it is not affected by the Climate Change, guarantees that the population of our country has the basic food and minimizes the processes of soil degradation.</p> <p>Forest Resources. That there are national plans for the prevention and combat of forest fires and sustainable forest management that reduce the negative impacts of climate variability and climate change. That within the areas of forest vocation and the main forest ecosystems, sustainable forest management is promoted for conservation, protection, as well as serving as carbon sinks, at the local and national level.</p> <p>3. Mitigation of Greenhouse Gas Emissions</p> <p>c. The exploitation of Forest Resources. Forests provide benefits at local, national and global levels in terms of the provision of natural goods and services considering water capture and storage, soil protection, wind protection and carbon stocks, among others. Actions are promoted so that the general population identifies with the forest not only because it is their main landscape, but also because they understand it as the primary source of security and collective benefits and know how to protect and maintain it.</p> <p>A portfolio of prioritized projects to access carbon markets is promoted and developed. The conditions for the use of forest carbon are created, based on an adequate legal and technical framework, including the promotion of investments, to achieve conservation and increase forest masses as a mechanism for mitigating Climate Change.</p>
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	e. Carbon Markets. The different carbon markets are investigated and promoted, identifying and valuing the natural goods and services that Guatemala, based on its forest and energy resources as well as other components, can contribute to the reduction of greenhouse gas emissions.
Institutional Strategic Plan 2017-2021, of the Ministry of Environment and Natural Resources	Through Ministerial Agreement number 195-2017 dated July 3, 2017; the Institutional Strategic Plan 2017-2021 was approved. Greenhouse Gas Inventories -Guatemala Guatemala contributes less than 0.1% of the world's greenhouse gas emissions. Four inventories have been prepared in the country for the years 1990, 1994, 2000 and 2005. The main sources of GHG emissions are, in order of contribution: 1. Energy, 2. Land use, Land-use Change and Forestry (LULUCF), 3. Agriculture 4. Industrial processes, and 5. Waste and residues.
Framework Policy for Environmental Management in Guatemala (Governmental Agreement 791-2003 issued by the President of the Republic of Guatemala)	Relevant aspects of the lithic and soil system - Globally, every year soil degradation causes the abandonment of areas, favors migration, increases the risk of food insecurity of the population and increases the pressure on scarce natural resources to sustain the activities of more than 6 billion people. - In Guatemala, 25% of the country's land (soils), which represents a little more than 27,000 Km ² , is in overuse, which has implied modification of the ecosystem, its exposure to erosion and consequently to the degradation of the same. - Change in the use of the soil: Considering that the formation of the soil takes 100 years or more, the loss of the same one represents for the rural families and the country an irreparable decrease and that it should be avoided to the maximum, with pertinent actions of conservation of the same one. - The data for the six regions into which the country was subdivided showed that a total of 66.1 million tons of soil surface erosion occurs per year, caused by human intervention on the land, mainly due to change of use (from natural vegetation with forest to another type of use where agricultural activity is relevant); this loss of soil yields a value of Q66,098 million (US\$ 8,584 million). Promote actions to improve environmental quality and the conservation of the nation's natural heritage, as well as the safeguarding of the ecological balance necessary for all forms of life to guarantee access to its benefits for the economic, social and cultural well-being of current and future generations".
National Action Plan for Climate Change - PANCC³⁰-. MARN- SEGEPLAN	The Plan contemplates 6 lines of adaptation and 5 sectors of mitigation. The 6 lines of adaptation have a total of 9 results and 28 goals to be achieved during the next ten years, through the implementation of 153 actions. The 5 sectors of mitigation as a whole have 15 results and 18 goals to be achieved through the implementation of 93 actions. The lines of the adaptation chapter are: human health; marine coastal areas; agriculture, livestock and food security; forests, ecosystems and protected areas; water resources management and infrastructure. And the 5 strategic sectors: energy; industrial processes; agricultural sector; land use, land-use change and forestry; and waste.
Forestry Policy	Guatemala's Forest Policy was developed jointly by the Ministry of Agriculture, Livestock and Food, the National Institute of Forests, the National Council of Protected Areas and the Forest Action Plan for Guatemala. It is worth noting that this Forestry Policy dates from 1998, so in some aspects it is outdated, however, it is one of the most important reference instruments in the Guatemalan forestry sector.

³⁰ Source: <http://sgccc.org.gt/wp-content/uploads/2016/10/Plan-de-Accio%CC%81n-Nacional-de-Cambio-Clima%CC%81tico-ver-oct-2016-aprobado-1.pdf>

	<p>In that order of ideas, according to the Policy, it establishes that the most relevant problems of the forest sector are "(i) advance of the agricultural frontier and loss of natural forest; (ii) little competitive capacity in the face of trade opening and globalization; (iii) change of land use towards activities different from those supported by its capacity of use, which leads to the unsustainability of agricultural, forest and hydrobiological production; (iv) harvesting of firewood to solve energy problems above the capacity of natural regeneration and reforestation, causing loss of forest resources; and, (v) little coordination of the administrative processes of the state forest institutions."</p> <p>Additionally, it is established that "Land use change and its impact on the sustainability of agricultural, forestry and hydrobiological production is a problem that concerns the entire sector, since biodiversity, favorable conditions for water recharge, timber and non-timber resources, soil and landscape are being lost. While it is true that these effects are due to the influence of agricultural and sectoral policies, they are also due to the signals that the market sends to economic actors, favoring activities that are highly profitable in the short term but unsustainable in the long term. Reversing this process requires a land management policy for rural lands. In the case of Guatemala, this policy means, among other actions, the impulse to the forest sector paying for the positive externalities that it generates, and trying to adapt the market to act in its favor, and not against it".</p>
Integrated Rural Development Policy	<p>It is through Governmental Agreement number 196-2009 issued by the President of the Republic of Guatemala, that the Policy for Integral Rural Development is approved, which in accordance with the first paragraph of the introduction to the National Policy for Integral Rural Development presented here, is the result of the work of dialogue, as well as the formulation and discussion of proposals between the government and social organizations, within the framework of the process established on April 30, 2008, with the officialization and installation of the DIALOGUE FOR INTEGRAL RURAL DEVELOPMENT AND THE RESOLUTION OF AGRICULTURAL, LABOR AND ENVIRONMENTAL CONFLICTIVITY, by the President of the Republic.</p> <p>The Policy also establishes the absence of integrated rural development, quoting "Although the rural area contributes significantly to the national economy, through income and employment generated in the areas of agriculture and natural resource use, socio-economic indicators in the rural area place Guatemala among the countries with the lowest human development in Latin America. The policy refers to poverty, malnutrition and social exclusion in rural areas, and it has been more than five years since this instrument was approved.</p> <p>Concerning land tenure, it is established that "The lack of access to land and the scarcity of other economic and employment opportunities in rural areas have forced important segments of the rural population to consider migration as the only alternative for overcoming poverty and exclusion. Migration abroad has increased from 1,237,162 people in 2002 to 1,482,247 in 2007 (Family Remittance Survey 2007, International Organization for Migration -IOM-).</p> <p>About forest cover, it was indicated at that time that it covered 42% of the national territory and that its loss at that time was accelerating. "According to the National Forestry Institute (INAB, 2005), 73,148 hectares are lost annually, of which 28,517 are in protected areas (1991/93-2001). The lack of regulation for the use and exploitation of water means that rural communities do not have sufficient access for consumption and the development of their productive activities; and that the use of this good is destined for intensive agricultural production and other extractive activities, to the point of limiting it or making it inaccessible, in some</p>

	<p>cases, to the rural, indigenous and peasant population. - The rural population affected by these natural resource use projects requires: legislation, policies and plans that allow them to exercise their rights within their territories, and to carry out community consultations to make decisions about the use of their resources, in accordance with the provisions of Convention 169 of the International Labor Organization - ILO, ratified by the State of Guatemala".</p> <p>Despite the fact that the Political Constitution of Guatemala regulates social justice and after the signing of the Peace Accords, the problem of equitable development is invisible in rural areas. To date, there is no law or policy on fair and equitable access to land and an agrarian policy that develops the economic growth of indigenous and non-indigenous groups that subsist in that environment.</p>
<p>National Policy for the Promotion and Integral Development of Women and Equal Opportunity Plan 2008-2023</p>	<p>Approved by Governmental Agreement 302-2009 issued by the President of the Republic of Guatemala,</p> <p>The National Policy for the Advancement and Integral Development of Women (PNPDIM) is the result of the Government of Guatemala's commitment to the development of women, which has a direct impact on the national progress. Another important aspect is the political maturity achieved by the women's movement in terms of accepting the importance and impact of women's public policy as a mechanism for transforming their development situation and living conditions.</p> <p>The axis of Natural Resources, Land and Housing; contains five political axes</p> <ol style="list-style-type: none"> 1. Guaranteeing Mayan, Garifuna, Xinka and Mestizo women's access to property, tenure, natural resource use, land use and rural development. 2. Guarantee the right of Mayan, Garifuna, Xinka and mestizo women to be consulted on any action affecting the use of natural resources in their territory, based on Convention 169 on Indigenous and Tribal Peoples. 3. Guarantee Mayan, Garifuna, Xinka and Mestizo women full access to the ownership, co-ownership, possession, use and usufruct of land 4. Guarantee full access for Mayan, Garifuna, Xinka and mestizo women to property and/or co-ownership of housing, with cultural relevance, particularly for low-income women and female heads of household. 5. Ensure that Mayan, Garifuna, Xinka and mestizo women have comprehensive security, assistance, advice and humanitarian, psychological, legal and social support in cases of emergency and disaster. <p>The specific objective of the Natural Resources, Land and Housing axis is to "guarantee women's access to land ownership, decent housing and appropriate information, and to the adequate use of natural resources with the inclusion of a gender and ethnic-cultural approach".</p>
<p>National Strategy for Sustainable Production and Efficient Use of Firewood 2013-2024</p>	<p>To implement and promote national forest policies and facilitate access to technical assistance, technology and forest services for foresters, municipalities, universities, groups of investors - national and international - and other actors in the forest sector, by designing and promoting strategies and actions that generate greater economic, ecological and social development in the country.</p> <p>The history of firewood consumption in Guatemala between the years 1964 and 2006 indicates that the percentage of the population that uses firewood has decreased. However, the magnitude of consumption (cubic meters used) is increasing due to population growth and worsening poverty conditions in the country. Currently, 64% of the population depends on wood as an energy source, 67% of it in rural areas and 33% in urban areas. BANGUAT- URL, IARNA. 2009</p> <p>The structural factors that influence the consumption of firewood in Guatemala are:</p>

	<p>a. Population growth linked to the expansion of the agricultural frontier. On one hand increases the demand for land for crops and on the other hand requires more forest products (wood and firewood as an energy source), without there being a culture of forest replacement.</p> <p>b. The increase in areas for agricultural use has a direct impact on natural forests, reducing them and increasing their fragmentation, making it more difficult to supply firewood.</p> <p>c. Poverty and lack of economic opportunities force farmers to participate in simple, low-value-added production chains, such as subsistence agriculture.</p> <p>d. Tradition and worldview also play an important role in the use of fuelwood as a factor of family cohesion around the home after working in the fields.</p> <p>e. The relatively low cost and free access to firewood to satisfy their energy needs added to the versatility of the use of different species, are also important factors.</p> <p>f. The high cost of possible substitutes such as oil derivatives and the difficulties of supplying them due to distance or access. INAB-FAO, 2004. IARNA/URL, 2009.</p> <p>The general objective is to guarantee the supply of firewood for the population, developing tools, means and capacities at the local level that allow for the sustainable production of firewood and facilitate the adoption of appropriate technology for the efficient use of firewood; generating sources of rural non-farm employment, reducing the adverse effects of smoke on people's health and promoting the conservation of forests.</p>
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2.5.8 Approvals (G5.7)

Before starting the project, it was socialized to all the landholders and landowners where the project is located. In that sense they had access to all the documents, having full knowledge about the content of the project.

All legal actions were taken to sign contracts for the assignment of rights, and it was also clearly established in the document that there will be no transfer of land ownership, covering only the issue of negotiating carbon rights. Since the project activities are located in private areas, the approval needed is from the landowners, who voluntarily consent through a signed participation certificate. In addition, the municipalities within the project area are directly involved in the project implementation ensuring compliance with environmental and community regulations.

Furthermore, the socialization process also invited and involved governmental and non-governmental organizations in the region to participate in the project design and implementation.

2.5.9 Project Ownership (G5.8)

The landowners involved in the project can demonstrate property rights over their land through property titles or legal equivalent documents to certify and assure clarity over the land. Calmecac will only consider as beneficiaries individual or collective holders and owners properly accredited by the municipalities. The municipality will require a possession or land tenure certificate from any potential beneficiary who wishes to participate in the project or will issue a Land Ownership Certificate³¹ for owners who do not have it yet.

³¹ The Land Ownership Certificate is issued by the Mayor of the corresponding municipality in a stamped sheet, and states that the interested party owns the land in a peaceful, publicly known and sustained manner and in good faith, and that there is no claim over said land by another person.

Calmecac Foundation will act as the owner of the project to whom the ERs will be transferred by the participating municipalities. It is the entity in charge of trading the ERs and will transfer the ERs to the Government of Guatemala in order to allow the transaction of ERs to the World Bank Trust Fund. The 12 municipalities participating in the Project will transfer the ERs to Calmecac under a contract where the general terms of participation are described. In the case of the landowner, these are mostly PINPEP and PROBOSQUE beneficiaries and are already part of the organization Enredémonos por el Corazón Verde. The landowners who decide to join the project will sign a simple contract with the municipality in which the conditions of participation are established and will agree to transfer ERs to the municipal government.

The climate benefits by the reduction of GHG emissions will be used to give continuity to the project and implementation of the project activities. The project benefits will be distributed through the municipalities. Calmecac will require each municipality to submit a Municipal Investment Plan for the Recovery, Conservation and Increase of Forest Cover. After, the beneficiaries will register their activities for reducing deforestation and forest degradation (e.g. silvicultural activities, agroforestry) through a registration form in the municipal forestry office.

Available for the auditor are the documents that support the ownership of the project, which consist of: (list the supporting documents such as contracts of assignment either by lease, concessions, usufruct, among others).

2.5.10 Management of Double Counting Risk (G5.9)

The emissions reduction or removal as a result of this project's implementation will not be used for compliance under any other trading program or mechanism. Carbon credits are currently the only environmental credit being generated from this project. No other environmental credits will be generated or sold.

For further information, see Section 2.5.13.

2.5.11 Emissions Trading Programs and Other Binding Limits

The project does not participate in any emission trading program, therefore, the GHG emission reductions and removals generated will not be used to meet binding limits on GHG emissions. Guatemala does not have any international commitment under any compliance scheme, and the project is not involved in any allowance trading. In addition, the country is listed as a country with low GHG emissions, where it only contributes to 0.08% of global emissions.

2.5.12 Other Forms of Environmental Credit

Carbon credits are currently the only GHG-related environmental credit that will be generated by the project. No other environmental credits have been sought or will be generated.

2.5.13 Participation under Other GHG Programs

Guatemala's NDC establishes the following: "Considering 2005 as the base year, the country pledges to reduce its total GHG emissions projected to 2030 by 11.2% with its resources and by up to 22.6% with the technical and financial support of the international community" (FCPF, 2019). Further, Guatemala has designed its Emission Reduction Program with the Forest Carbon Partnership Facility. To be part of the Guatemalan ERP, REDD+ Projects that voluntarily decide to participate in it must be methodologically harmonized with the ERP to prevent double-counting and to this end, Guatemala has prepared a nesting strategy to integrate REDD+ projects. This Guatemala nesting strategy consists of

distributing the National Reference Level of Emissions and Removals in quotas, according to criteria defined by the Government of Guatemala.

For the project, a percentage of the emission reductions generated from 2020 to 2024 will be transferred to the FCPF Carbon Fund as agreed in the ERP. Calmecac will join and sign a contract with MINFIN (Finance Ministry), agreeing to avoid double counting, and that they will be transferred to MINFIN for the ERP.

2.5.14 Projects Rejected by Other GHG Programs

Not applicable. The project has not been rejected by any other GHG program.

2.5.15 Double Counting (G5.9)

No double counting issues apply to this case. To ensure this, Verra Registry is used as well as a National Registry. For the period 2020-2024, around 70% of the emissions reduction will be transferred to the MINFIN and the other percentage of the VCU's will be destined to the voluntary market.

3 CLIMATE

3.1 Application of Methodology

3.1.1 Title and Reference of Methodology

- Tool for the demonstration and assessment of additionality in VCS Agriculture, forestry and Other Land Use (AFOLU) project activities (VT0001 v3.0)
- VCS AFOLU Non-permanence Risk Tool (VCS v4.0)
- Carbon Fund Methodological Framework

3.1.2 Applicability of Methodology

The methodology applied is in line with the National baseline methodology, which is consistent with UNFCCC/IPCC guidance and guidelines.

The project follows the Carbon Fund Methodological Framework, with the IPCC guidelines (2006) on changes in carbon stocks at a level 2, with country-specific information at a national scale regarding activity data and emission factors, in combination with default values.

The activity data is obtained from a statistical sampling of a grid of 11,369 plots nationwide, of which 10,414 are in the emission reduction program area, assessed by a visual interpretation of remote sensors to determine the change of forest cover in the selected period (GIMBUT, 2018a); and the emission factors are derived from a carbon strata map, obtained from national forest inventories plots. Increases of carbon contents by forest plantations data were obtained by re-measuring permanent sampling plots (FCPF, 2019).

Applicability

The land in the project area meets the applicable definition of forest for Guatemala that considers a single minimum tree crown cover value of 30%, a single minimum land area value of 0.5 ha and a single minimum tree height value of 5 meters. The project area has remained as forest for at least 10 years. Furthermore, the project area does not have peatlands as can be demonstrated by existing land cover layers.

3.1.3 Project Boundary

Deforestation is included as the main consequence of anthropogenic pressure on forests due to livestock activities (land change to pastures and areas of predominantly herbaceous vegetation) and agricultural production (crops). Degradation is also within the project boundary, occurring areas that remain as forests. It is the partial removal of trees due to forest fires, illegal logging, and firewood extraction. And lastly, the increase in forest cover and carbon stocks through forest plantations is included. This activity has the potential to reduce net emissions balance, with positive effects for the conservation and sustainable management of forest resources.

The relevant GHG sources and project boundaries for the baseline and project scenarios are presented in Table 17.

Table 17. GHG carbon pools

Source		Gas	Included?	Justification/Explanation
Baseline	Aboveground tree biomass	CO ₂	Yes	Mandatory. Major carbon pool affected by project activities.
		CH ₄	No	Excluded based on a conservative approach
		N ₂ O	No	Excluded based on a conservative approach
	Aboveground non-tree biomass	CO ₂	Yes	Must be included when the land cover under baseline scenario is perennial tree crop (cacao and palm oil)
		CH ₄	No	Excluded based on a conservative approach
		N ₂ O	No	Excluded based on a conservative approach
	Belowground biomass	CO ₂	Yes	Major carbon pool affected by project activities.
		CH ₄	No	Excluded based on a conservative approach
		N ₂ O	No	Excluded based on a conservative approach
	Dead wood	CO ₂	No	Insignificant carbon pool. Excluded based on a conservative approach.
		CH ₄	No	Excluded based on a conservative approach
		N ₂ O	No	Excluded based on a conservative approach
	Litter	CO ₂	No	Excluded as per VCS AFOLU Requirements
		CH ₄	No	Excluded as per VCS AFOLU Requirements
		N ₂ O	No	Excluded as per VCS AFOLU Requirements
	Soil organic carbon	CO ₂	No	Excluded based on a conservative approach.
		CH ₄	No	Excluded based on a conservative approach.
		N ₂ O	No	Excluded based on a conservative approach.
	Wood products	CO ₂	Yes	Major carbon pool affected by project activities. Included under the assumption that they are long life timber products.
		CH ₄	No	Excluded based on a conservative approach
		N ₂ O	No	Excluded based on a conservative approach
Project	Aboveground tree biomass	CO ₂	Yes	Mandatory. Major carbon pool affected by project activities.

Source		Gas	Included?	Justification/Explanation
		CH ₄	No	Excluded based on a conservative approach
		N ₂ O	No	Excluded based on a conservative approach
	Aboveground non-tree biomass	CO ₂	Yes	Must be included when the land cover under baseline scenario is perennial tree crop (cacao and palm oil)
		CH ₄	No	Excluded based on a conservative approach
		N ₂ O	No	Excluded based on a conservative approach
	Belowground biomass	CO ₂	Yes	Major carbon pool affected by project activities.
		CH ₄	No	Excluded based on a conservative approach
		N ₂ O	No	Excluded based on a conservative approach
	Dead wood	CO ₂	No	Insignificant carbon pool. Excluded based on a conservative approach.
		CH ₄	No	Excluded based on a conservative approach
		N ₂ O	No	Excluded based on a conservative approach
	Litter	CO ₂	No	Excluded as per VCS AFOLU Requirements
		CH ₄	No	Excluded as per VCS AFOLU Requirements
		N ₂ O	No	Excluded as per VCS AFOLU Requirements
	Soil organic carbon	CO ₂	No	Excluded based on a conservative approach.
		CH ₄	No	Excluded based on a conservative approach.
		N ₂ O	No	Excluded based on a conservative approach.
	Wood products	CO ₂	Yes	Major carbon pool affected by project activities. Included under the assumption that they are long life timber products.
		CH ₄	No	Excluded based on a conservative approach
		N ₂ O	No	Excluded based on a conservative approach

3.1.4 Baseline Scenario

The most likely land-use scenario in the absence of the project is agriculture and livestock activities (Figure 27). Deforestation occurs because of the increase of the agriculture frontier. The low productive alternative opportunities lead to the population to adopt agriculture activities that require little labor force (low productivity and low capital investment).

Further, degradation is related to forest fires caused mainly by human intervention (Figure 26). Clearing of the land is made by the slash-and-burn method, which prepares the ground for sowing. Burning activities are also used for the expansion of pastures and further development of cattle ranching activities. The threat increases due to the topography and terrain slope, and strong winds, expanding the forest fires. Forest fires are more frequent in areas where temperatures are mostly elevated. Another direct cause of degradation is illegal logging and firewood extraction which is constant in rural areas. Especially since there is little or no technical assistance from the municipal forestry technicians. Illegal logging is associated with poor governance that exists in remote areas far from the town center.

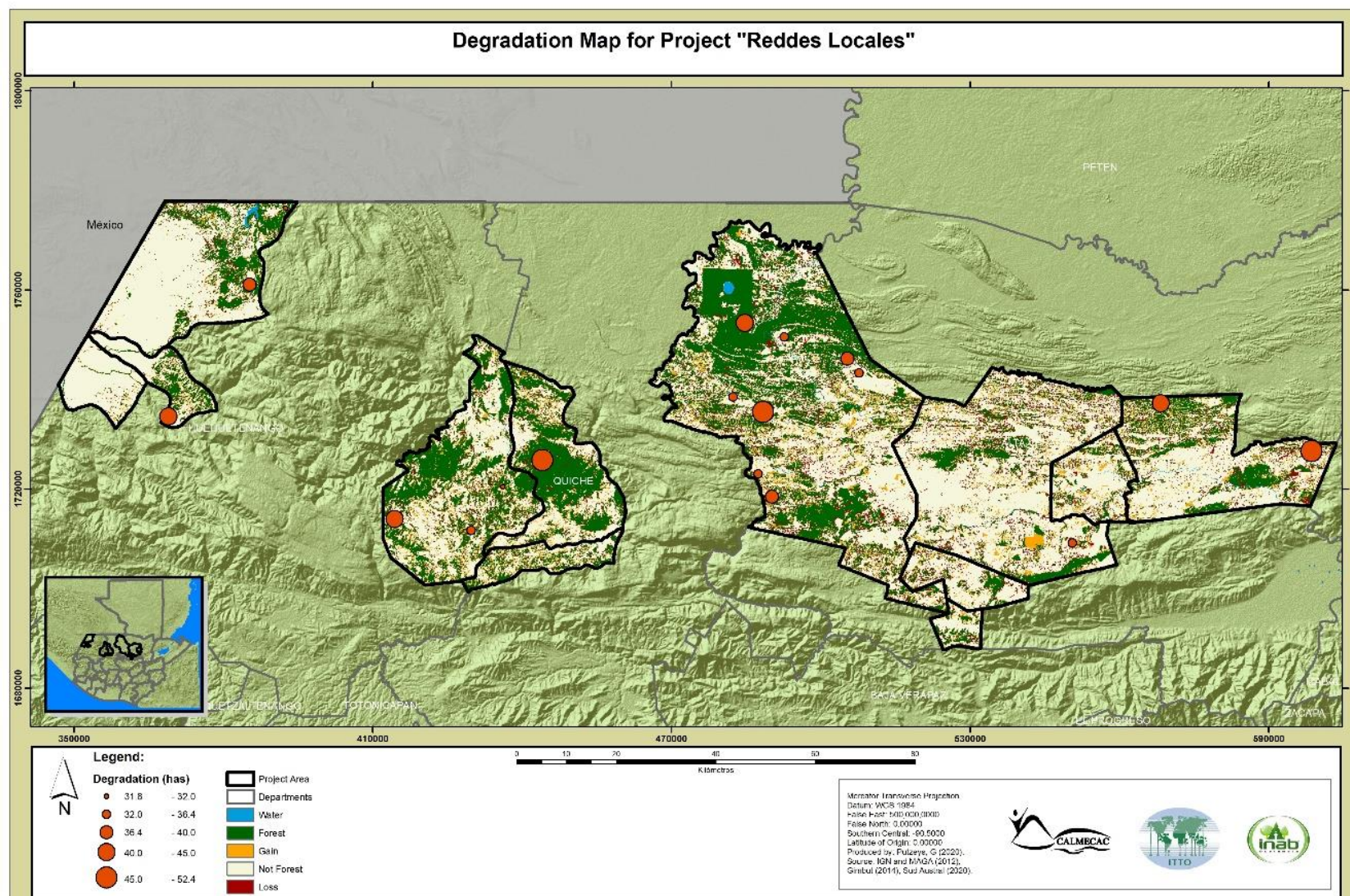


Figure 26. Degradation map.
Source: Calmecac (2020)

Agriculture as a deforestation driver can be further classified as commercial agriculture and subsistence agriculture (Figure 28). The first is associated with large-area lands for producing coffee, oil palm, cardamom, cocoa, achiote; while the second is linked to small pieces of land producing mainly basic grains and annual crops. In this context, the underlying causes that reinforce forest loss by agriculture differ by type. Commercial agriculture drives deforestation in all regions and is associated with large monoculture areas associated with world high demand together with the low-value given to forests. Self-consumption and subsistence agriculture are linked to extreme poverty, which translates into very small farm plots, land invasion and migrating agricultural production (FCPF, 2019).

In the Tierras Bajas del Norte region, where several protected areas are located, deforestation and forest degradation are related to the expansion of livestock farming, in many cases, associated with illegal land invasions, with the participation of peasants' groups. Internal migration waves often converge in this region, increasing the pressure on forests and lands. Invasions of peasant groups in protected areas are frequent. Forest areas are changing into extensive farming areas, with crops such as African oil palm, pineapple, rubber, among others. In the Sarstún-Motagua region, forests have suffered due to the expansion of the agricultural frontier, both for subsistence farming as well as export agriculture and livestock farming. The African oil palm is the crop that affects most forest areas. As in the Tierras Bajas del Norte region, livestock is associated with illegal activities occupying large pieces of land and there are several protected areas invaded by communities. In the Verapaces region, African oil palm, coffee and cardamom crops lead the expansion of the agricultural frontier. The region also suffers from constant fires and pests. The Occidental region, characterized by smallholdings and significant population growth, is going through a process of conversion of forests into subsistence farms. Forest degradation is further accentuated by forest fires and firewood harvesting, despite being an area where there has been a remarkable recovery of forest cover (FCPF, 2019).

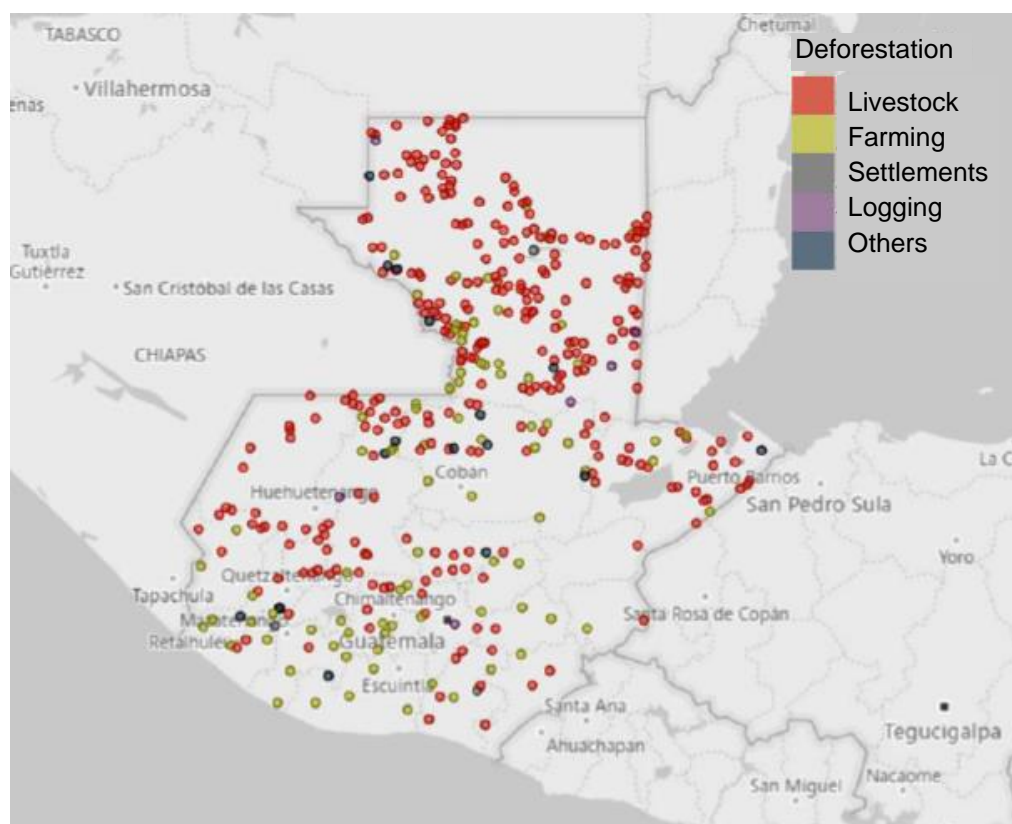


Figure 27. Deforestation causes in Guatemala

Source: Estrategia REDD+ Guatemala – Entregable N°3. 2019. Análisis de causales de deforestación y degradación de bosques y no aumento de existencias y barreras que limitan el abordaje de estos causales.

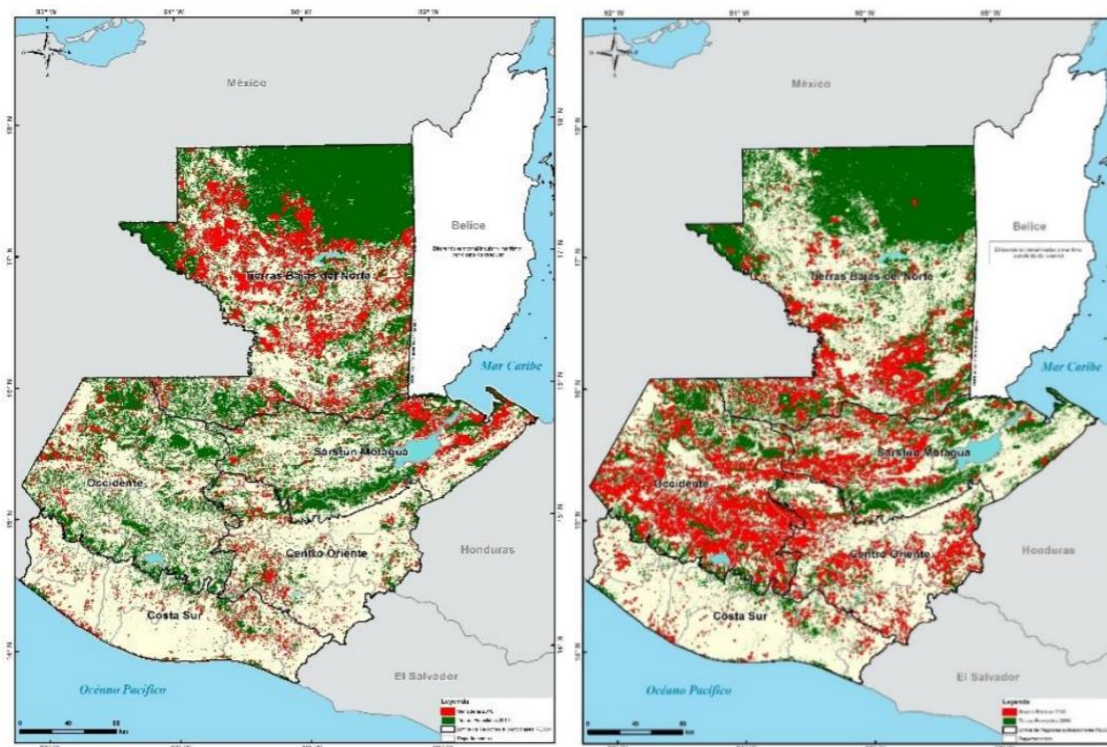


Figure 28. National map (left) livestock coverage area, (right) basic grains coverage area.
Source: MARN (2018).

3.1.5 Additionality

For the additionality analysis, the “Tool for the demonstration and assessment of additionality in VCS Agriculture, Forestry, and Other Land Use (AFOLU) project activities – VT0001: v3.0” was used.

Applicability conditions

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;

All project activities are legal and do not lead to a violation of any applicable law. Calmecac is compliant with all relevant Guatemalan laws and regulations for natural resources and forestry activities as it can be seen in Section 2.5.7.

- 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 the additionality of project activity.

The most plausible baseline scenario is determined following the stepwise approach of the VCS “Tool for the demonstration and assessment of additionality”. Hence, the baseline scenario was determined based on the literature review, direct field observation, GIS information, and scientific research available for the project area.

Step 1. Identification of alternative land use scenarios to the proposed AFOLU project activity.

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

- i) Continuation of the pre-project land use

The Northern Transversal Strip Region (FTN - Región Transversal del Norte in Spanish) includes Huehuetenango, Quiché, Baja Verapaz, Alta Verapaz and the Izabal departments. The population practices subsistence agriculture and it depends on the natural resources for survival. Poverty and deforestation may be associated with each other. Around 77% of the regional population lives in the rural areas, while 23% in urban areas. The FTN region presents the lowest poverty index in the country; Quiché, Alta Verapaz and Huehuetenango present 81.01%, 78.83%, and 71% poverty index; and 25.6%, 43.5%, and 22% extreme poverty index correspondingly (SEGEPLAN, 2010b; SEGEPLAN, 2011a; SEGEPLAN, 2011b).

Figure 29 shows the tree loss in the last 20 years (left). It also can be noted that the main deforestation driver in the project area is caused by shifting agriculture (right). Figure 30 represent the main drivers for the entire country. Both driver at national and project scale are dominated by shifting agriculture (small and medium scale agriculture), wildfires, and commodity-driven deforestation.

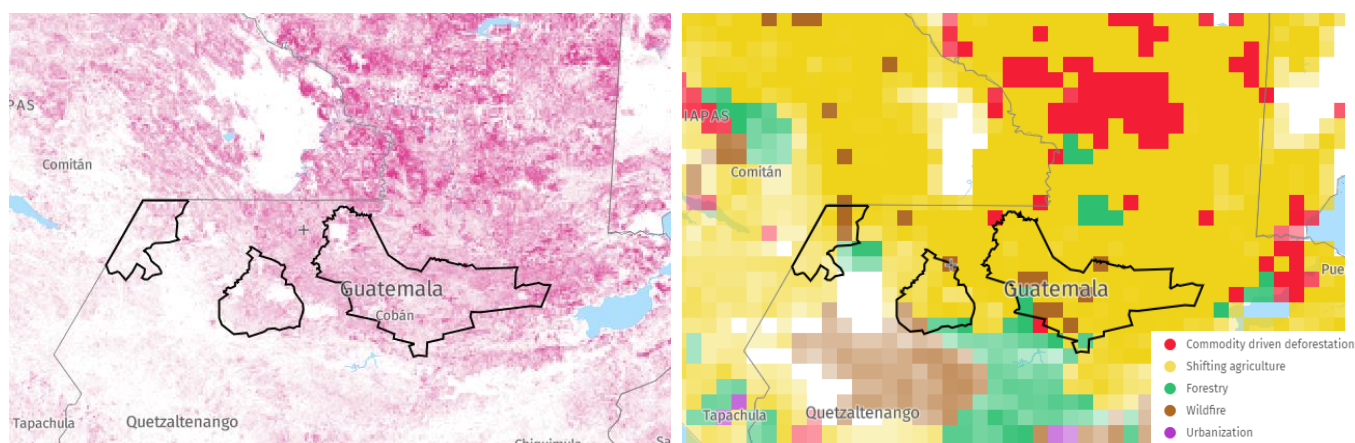


Figure 29. Tree cover loss 2001 – 2019 considering 30% canopy (left). Tree cover loss 2001 - 2018 by dominant driver (right)³².
Source: Global Forest Watch³³.

³² The five drivers are defined as follows:

Commodity-driven deforestation: Large-scale deforestation linked primarily to commercial agricultural expansion.

Shifting agriculture: Temporary loss or permanent deforestation due to small- and medium-scale agriculture.

Forestry: Temporary loss from plantation and natural forest harvesting, with some deforestation of primary forests.

Wildfire: Temporary loss, does not include fire clearing for agriculture.

Urbanization: Deforestation for expansion of urban centers.

The commodity-driven deforestation and urbanization categories represent permanent deforestation, while tree cover affected by the other categories often regrows. The data set does not indicate the stability or condition of land cover after the tree cover loss occurs, or distinguish between natural and anthropogenic wildfires.

Global Forest Watch. Available at <https://gfw.global/2Zmgzul>

³³ Global Forest Watch. Available at <https://www.globalforestwatch.org/>.

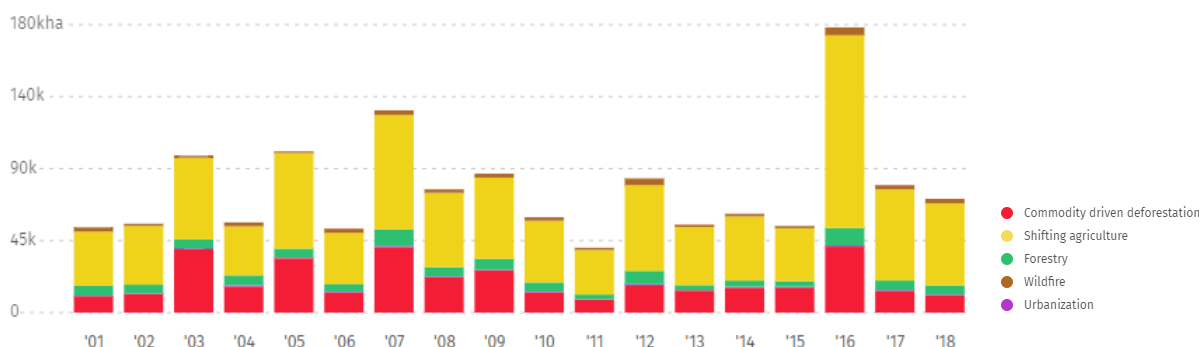


Figure 30. Annual tree cover loss by dominant driver in Guatemala. Estimation do not take tree cover gain into account.

Source: Global Forest Watch.

Based on historical land-use trends in the region, the following scenarios will continue in the absence of the REDD+ project implementation:

a. Deforestation for expansion of agriculture frontier

Through the agrarian reform created in 1952, the government intended to promote the capitalist-agricultural and industrial economy in the northern lands. In 1960, the Guatemalan Civil War started which ended formally in 1996 with the signing of Peace Agreements. It generated over a million displaced people along its 36 years of duration³⁴. After, displaced communities returned to their lands or negotiated access to new lands (Loras Castillo, 2006)³⁵. During 1996-1998, more than 70% of the returned population settled in Huehuetenango and El Quiché looking for land to cultivate their subsistence economic activities (SEGEPLAN, 2010b).

Nowadays, almost 26% of Guatemala's territory is dedicated to agricultural production. Annual crops (corn, beans, rice and vegetables among others) and permanent and semi-permanent crops (coffee, sugar cane, rubber, African palm and cardamom among others) are mainly produced. Although during the last 20 years the agricultural sector increased its diversification, maize and beans occupy the largest cultivated areas. Both crops represent the basis of Guatemala's nutritional food security³⁶ for subsistence and small farmers developed with low-value-added production chains. Furthermore, coffee and sugar cane also stand out due to their importance regarding the number of jobs generated and the volume of exports³⁷.

Poliquit (2006) mentions about 60% of the country's population is rural and two-thirds of these depend on farming for their livelihood. The increase of the agriculture frontier is related to population growth and needs. On one hand, increase the demand for cropland and on the other hand, population requires more forest products without there being a culture of forest replacement (SEGEPLAN, 2011a). Usually, subsistence farming is established in small plots (less than five hectares of land) with extremely basic tools (hoes, machetes, hatchets and wooden planting sticks). The increase in areas for agricultural use

³⁴ Archibald, J. Human rights in Guatemala. Available at <http://www.du.edu/korbel/hrhw/researchdigest/latinamerica/guatemala.pdf> <http://www.du.edu/korbel/hrhw/researchdigest/latinamerica/guatemala.pdf>

³⁵ Loras, E. 2006. Las mujeres retornadas en el conflicto y proceso de pacificación en Guatemala (1980-2005): ¡Lucha para retornar, retornar para luchar! Available at <https://core.ac.uk/download/pdf/19711179.pdf>

³⁶ Programa Mundial de Alimentos (2018). Plan Estratégico Para Guatemala (2018-2021). Available in <https://docs.wfp.org/api/documents/WFP-0000050568/download/>.

³⁷ Ministerio de Agricultura, Ganadería y Alimentación (2012). Plan Estratégico Institucional Del MAGA 2012-2016. Available in <http://extwprlegs1.fao.org/docs/pdf/gua146529.pdf>. Accessed 19 February 2020.

has a direct impact on natural forests, reducing them and increasing their fragmentation (INAB & ICC, 2019).

Further, coffee is also produced in the project zone. Huehuetenango department is one of the main coffee producers in the country. The department produces 13% of the total national coffee in an area corresponding to 11% of the country's area. Lack of working capital and access to credit are the main obstacles for associations to be able to harvest and process coffee. Regarding farming, subsistence agriculture predominates as 73% of the production is consumed locally (DEMUCA, 2015). On the other hand, 57% of the surface area of the country for cardamom production takes place in Alta Verapaz, according to studies performed by ENA, carried out during the 2005-2009 period (MARN, 2018).

In addition, communities do not count on technical capacities, equipment, and information about the sustainable management of natural resources. Moreover, low participation and education, low citizen engagement, weak coordination between organizations (regional and local), and the lack of direct communication channels influence the high deforestation rate (1.09% average annual natural forest loss rate) (Calmecac, 2012)³⁸.

According to the historical baseline from 2001 – 2006, the deforestation (forest land converted to croplands) in Alta Verapaz was 19 000 ha, with an annual deforestation of 3 800 ha. For Huehuetenango, the annual deforestation in the same period was 2 280 ha, with a total deforestation of 11 400 ha. And for Quiché, the period deforestation accounted for 7 600 ha, with an annual deforestation of 1 520 ha.

For the period 2006 – 2016, the deforestation trend remains. In the department of Alta Verapaz the total deforestation was 15 200 ha (8 550 ha were converted for grains, 2 850 into African palm oil, 950 ha to agroforestry systems, and 2 850 to other uses) for the period before mentioned, and for Quiché 6 650 ha were converted to croplands (2850 ha for grains cultivation, 1900 ha for agroforestry systems, and 1 900 ha to other uses)³⁹.

b. Deforestation for the expansion of livestock activities

An important commercial activity in the project zone is cattle ranching, mainly for breeding and fattening of cattle for sale. It is done under extensive grazing, the workforce is family-based and technical assistance is very limited (SEGEPLAN, 2010c).

In the 1960s, the government promoted the colonization of the FTN (Fanja Transversal del Norte) to reduce pressure on land reform. After the Mitch storm in 1998, this activity intensified moving livestock from the south coast to the north of the country, due to the supply of cheaper land available in the north, the better opportunity cost of land on the south coast for growing sugarcane, and later, the feasibility of road infrastructure for the installation of large livestock farms in the departments of Alta Verapaz, Izabal and Petén, starting in 2000⁴⁰. The construction of the FTN road from Huehuetenango (West) to the Caribbean has generated a sharp rise in land prices (up to 1000%) and has encouraged small producers with legal titles to sell their plots, allowing the expansion of livestock activities (Kuper, 2014).

³⁸ Informe técnico: Mapa de cobertura forestal de los municipios de la Franja Transversal del Norte para los departamentos de El Quiché y Huehuetenango y dinámica de la cobertura forestal 1991-2010.

³⁹ Consolidación de la Estrategia Nacional REDD+ de Guatemala. Available at <https://app.powerbi.com/view?r=eyJrJoiZWU5YTlhOGEtNWYyMS00OTU1LWFjMmMtMjlkOWI4MGUzOTE1IiwidCI6IjhmYmFhNWJmLTJiY2MtNGRjOC1iINTZiLTmOTJIMzA3ZjA3NiIsImMiOiR9>

⁴⁰ Sandoval, C. (2015). Diagnóstico y Análisis sobre la ilegalidad en el aprovechamiento y comercialización de productos forestales en Guatemala. Proyecto "Fortalecimiento de la gobernanza en función al Plan de Acción Interinstitucional para la prevención y reducción de la tala ilegal en Guatemala. INAB. Available at https://www.academia.edu/15233258/Diagn%C3%B3stico_de_tala_ilegal_en_Guatemala

According to the land-use change for the period 2001 – 2006, there were 7 600 ha converted from forest lands to grasslands in Alta Verapaz, 950 ha in Huehuetenango and Quiché in 3 800 ha. For the period 2006-2016 in the project zone, the main deforestation for cattle ranching occurs in Alta Verapaz, with a loss of 3,836 ha⁴¹, which means an annual conversion from forest lands to grassland of 384 ha. This department represents 6.48% of the total country grazing area (MARN, 2018).

Nevertheless, this activity has low farm productivity rates, especially for small and medium-sized producers who lack the technological means to produce with the resources available to them on their farms. Livestock production models are extensive and do not consider elements of environmental conservation (MAGA, 2016).

c. Forest fires associated with slash and burn processes

The cultivation of basic grains through the process of slash and burn is causing the conversion of forest into subsistence farming lands. Especially uncontrolled fires that affect areas that were not intended to be converted into agriculture lands. The main driver of deforestation is the landowner seeking more land to cultivate.

d. Forest degradation due to firewood extraction and illegal logging

Degradation processes are the result of greater pressure from the non-sustainable extraction of firewood for domestic, commercial and industrial use. It is estimated that 70% of households in Guatemala use firewood for their needs. Illegal extraction activities are also the results of weak governance since 95% of traded forest products are illegally extracted, with no control (FCPF, 2019). For example, there are reports that 50% of the wood that is sold in the local markets of Quetzaltenango and Huehuetenango is illegal (MARN, 2018).

The communities in the project zone use regional natural forest as the main source of firewood supply. Between 80 – 90% of the regional population depends on the harvest of branches, fallen trees, or illegal logging. Firewood extraction in the project area is mainly used for cooking purposes where the monthly average consumption is one “tarea” (equivalent to 3 m x 1 m or 1.4 m³)⁴². Since rural families do not have a specific place for cooking, they cook on the ground consuming more firewood than they need. Further, tradition plays an important role in the use of fuelwood as a factor of family cohesion around the home after working in the fields (Calmecac, 2001).

The relatively low cost and free access to firewood to satisfy their energy needs added to the versatility of the use of different species, are also important factors. Some people sell the surplus to other municipality areas, or small merchants buy the standing trees and then they cut them down to sell them as wood and firewood. The genus *Pinus*, *Cupressus*, *Quercus* and *Alnus* are mainly used. It is estimated that the departments of Huehuetenango and Quiché consume 1,482,892 m³ of firewood annually (Calmecac, 2011). On the other hand, timber extraction is used for construction and furniture. The average family consumption is 2.35 m³.

⁴¹ NRED Reddes Locales. Available at <https://app.powerbi.com/view?r=eyJrJoiYjdIMWNhN2QtZml4ZS00ZGM5LTliZjktZTRmNDczY2M0ZWFlIiwidCI6IjhmYmFhNWJmLTJiY2MtNGRjOC1iNTZiLTNmOTJIMzA3ZjA3NiIsImMiOiR9>

⁴² Calmecac. (2011). Informe técnico: Diagnóstico sobre el uso y manejo colectivo de los recursos forestales – “Causas de la deforestación e intereses locales sobre el manejo del bosque”

- ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project

The Forest Incentive Program (PINFOR) is a tool of the National Forestry Law created in 1996 and it was valid until 2006. PINFOR achieved the protection of 211,233 ha of natural forest, 126,000 ha of forest plantations, and 21,000 ha of land under productive forest management, which represents better protection of water and soil, benefiting more than 3.9 million people⁴³. After that, INAB launched the continuation of a forest incentive program now called PROBOSQUE available since 2007. PROBOSQUE seeks to expand incentives over 30 years for projects such as: a) protection of natural forests against climate change, b) natural forests for forest production, c) industrial and energy plantations, d) forest systems in agricultural and livestock landscapes, e) forest restoration and, f) watersheds, river areas and water sources.

The project zone is suitable for access to this forest incentive program. Natural forest conservation and reforestation project have occurred during the validity of PINFOR and now, the PROBOSQUE mechanism. For example, Alta Verapaz reforested during the 1998-2010 period a total of 34,979.23 ha, and the natural forest under sustainable land management plans amount to 17,105.18 ha benefiting 38,359 users. This program supports community groups and individual landowners to access forest incentives, which, for reasons of land area and tenure, were not eligible under the previous program PINFOR (GCI, 2018a).

Regarding similar projects in the region, there are two VCS projects: 1) Promoting sustainable development through Natural Rubber tree plantations in Guatemala - Izabal, and 2) ECO2 Rubber forest Guatemala -North and South Guatemala. The first one is validated and verified under VCS and CCB, the second one is validated under VCS.

Outcome of Sub-step 1a.

- Continuation of the pre-project land use:
 - (a) deforestation for the expansion of agriculture frontier,
 - (b) deforestation due to livestock activities,
 - (c) forest fires associated with slash and burn processes, and
 - (d) forest degradation due to firewood extraction and illegal logging.
- Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project.
 - (a) reforestation and natural forest conservation.

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

Both identified scenarios, the pre-project land use and the project activity, are legal and enforced in compliance with applicable legal and regulatory requirements.

- Continuation of pre-project land use:
 - **General Government Policy 2016-2020:** Establishes priorities and directives on food and nutritional security, the environment and natural resources. The Policy promotes irrigation

⁴³ Ley Probosque, un avance para el desarrollo del país (31.03.2016). Available at: <https://www.gt.undp.org/content/guatemala/es/home/presscenter/articles/2016/03/31/ley-probosque-un-avance-para-el-desarrollo-del-pa-s.html>

systems to contribute to the economic revitalization of agriculture of small and medium producers and guarantee food production and nutritional standards⁴⁴.

- **The Agricultural Policy 2016-2020:** The Policy includes four axes or strategic management areas that complement each other with the aim of an integral and sustainable rural development, promoting the increase of production and productivity, under the responsible use of renewable natural resources. The policy strengthens public institutions to respond efficiently and effectively to the demands and needs of family and commercial agriculture. **The Family Farming Program for the Strengthening of Farming Agriculture (PAFFEC)** is the instrument through which the Ministry of Agriculture, Livestock and Food implements the policy⁴⁵.
 - **Agrarian Policy** promotes the support to rural producers and cooperates for improving the legal certainty of ownership, possession and tenure of land, and the resolution of agrarian conflict to improve the living conditions of the population in rural areas⁴⁶.
 - **Strategic Plan for Food and Nutrition Security (2016-2020):** The plan seeks to improve the access, availability and consumption of food and its biological use. It promotes the income of small food producers and strengthens family farming and peasant economy to attend their strategic needs⁴⁷.
 - **Framework Law to Regulate the Reduction of Vulnerability, Adaptation to the Effects of Climate Change and Mitigation of Greenhouse Gases (LMCC in Spanish):** Approved in 2013, the Government of Guatemala defined an important instrument for the participation and joint work of the government and public sector to reduce vulnerability to climate change, including the agricultural sector⁴⁸.
 - **National Action Plan for Climate Change -PANCC- MARN-SEGEPLAN** contemplates 6 lines of adaptation and 5 sectors of mitigation. The lines of the adaptation chapter are human health; marine coastal areas; agriculture, livestock and food security; forests, ecosystems and protected areas; water resources management and infrastructure. And the 5 strategic sectors: energy; industrial processes; agricultural sector; land use, land-use change and forestry; and waste⁴⁹.
- Project Scenario without being registered as the A/R CDM project activity
- **Forestry Policy (No. 101-96):** With this law, reforestation and forest conservation are declared of national urgency and of social interest, for which forestry development and its sustainable management will be promoted. The law aims to reduce deforestation, promote reforestation, increase the productivity of existing forests and conserve the country's forest ecosystems⁵⁰.
 - **Law for the Promotion of Establishment, Recovery, Restoration, Management, Production and Protection of Forests in Guatemala – PROBOSQUE (Decree No. 2-2015):** The Law aims to increase the country's forest cover through the promotion of public and private

⁴⁴ Gobierno de Guatemala (2016). Política General de Gobierno 2016-2020. Available in <http://extwprlegs1.fao.org/docs/pdf/gua169771.pdf>. Accessed 19 February 2020.

⁴⁵ Ministerio de Agricultura, Ganadería y Alimentación. (2016). Política Agropecuaria 2016-2020. Available in <http://www.maga.gob.gt> accessed 19 February 2020.

⁴⁶ SEGEPLAN. (2006). Política Agraria. Available in http://www.segeplan.gob.gt/downloads/clearinghouse/politicas_publicas/Desarrollo%20Agropecuario/Pol%C3%ADtica%20Agraria.pdf

⁴⁷ Programa Mundial de Alimentos (2018). Plan Estratégico Para Guatemala (2018-2021). Available in <https://docs.wfp.org/api/documents/WFP-0000050568/download/>

⁴⁸ Claudia Bouroncle et al. (2015). La Agricultura de Guatemala y El Cambio Climático: ¿Dónde Están Las Prioridades Para La Adaptación? Available in https://www.researchgate.net/publication/306458513_La_agricultura_de_Guatemala_y_el_cambio_climatico_Donde_estan_las_prioridades_para_la_adaptacion.

⁴⁹ Source: <http://sgccc.org.gt/wp-content/uploads/2016/10/Plan-de-Accio%CC%81n-Nacional-de-Cambio-Clima%CC%81tico-ver-oct-2016-aprobado-1.pdf>

⁵⁰ Instituto Nacional de Bosques (1996). Ley Forestal Decreto No. 101- 96. Available in <http://extwprlegs1.fao.org/docs/pdf/gua10056.pdf>. Accessed 19 February 2020.

investments. Over 30 years the State grants incentives to projects related to agroforestry systems, plantations, restoration, and natural forest management for production purposes. The law seeks to dynamize rural economies, increase forest productivity, guarantee livelihoods, food security and mitigate the impacts of natural disasters⁵¹.

- **PINPEP (decree 51-2010)** is aimed at people who own land below 15 hectares, paying them to plant trees or manage natural forests⁵².
- **National Climate Change Policy. Government Agreement No. 329-2009** mentioned that the State of Guatemala, through the central government, the municipalities, organized civil society and citizens should adopt risk prevention practices, reduce the number of vulnerability, improve adaptation to climate change and contribute to the reduction of greenhouse gas emissions on its territory, as well as contributing to the improvement of the quality of life of its inhabitants⁵³.
- **Institutional Strategic Plan 2017-2021, of the Ministry of Environment and Natural Resources.** Through Ministerial Agreement number 195-2017 dated July 3, 2017; the Institutional Strategic Plan 2017-2021 was approved. Guatemala contributes less than 0.1% of the world's greenhouse gas emissions. Four inventories have been prepared in the country for the years 1990, 1994, 2000 and 2005. The main sources of GHG emissions are, in order of contribution: 1. Energy, 2. Land use, Land-use Change and Forestry (LULUCF), 3. Agriculture 4. Industrial processes, and 5. Waste and residues⁵⁴.

The Guatemalan agricultural sector seeks new practices to adapt to climate variability taking into account the scenarios and effects of climate change in its activities. New practices are adopted - including those coming from traditional and ancestral knowledge - that allow a production that guarantees the population basic food needs and minimizes the processes of soil degradation. Further, the forest sector applies national plans for the prevention and combat of forest fires and sustainable forest management. For more detailed information on national and regional laws refer to section 2.5.7.

The National Strategy to address deforestation and forest degradation mentioned that there are four policies which are inconsistent with the National REDD+ Strategy: a) Agricultural Policy 2011 - 2015, b) Irrigation Promotion Policies 2013 - 2023, c) Agrarian Policy and d) Framework Law for the Regulation of the Reduction of Vulnerability and Obligatory Adaptation to the impacts of Climate Change and the Mitigation of Greenhouse Gases, Decree 07-2013, of the Congress of the Republic of Guatemala.

In addition, the municipalities through their Municipal Development Plan (support documents available) promote forest conservation, reforestation activities, food security, livestock and agricultural productive organizations, as well as, alternative production systems. And in the case of land use zoning, this is addressed in the section "Future Territorial Development Model" within the plan. At a national level, in 2018 the Forest Landscape Restoration Board identified the following potential actions: a) agroforestry systems, combining forest species, annual crops and/or vegetables; b) cocoa, banana, mahogany agroforestry system; c) forest plantations; d) silvopastoral systems; and e) riparian and protected forests.

Even though the local development plans should be aligned with the national development plans, local authorities find it difficult to enforce the regulatory requirements, which can be seen in the maps of land use versus potential land use (Section 2.2).

⁵¹ El Congreso de la República de Guatemala (2015). Decreto No. 2-2015. Ley de Fomento al Establecimiento, Recuperación, Restauración, Manejo, Producción y Protección de Bosques En Guatemala - PROBOSQUE. Available in https://www.undp.org/content/dam/guatemala/docs/prodocs/undp_gt_probosque.pdf. Accessed 19 February 2020.

⁵² INAB. (2010). Sistema Información Forestal de Guatemala Available in <http://www.sifgua.org.gt/Documentos/Reglamentos/REGLAMENTO%20PINPEP.pdf>

⁵³ MARN. (2017). Plan estratégico institucional 2017-2021. Available at <http://www.marn.gob.gt/Multimedios/8367.pdf>

⁵⁴ MARN. (2017). Plan estratégico institucional 2017-2021. Available at <http://www.marn.gob.gt/Multimedios/8367.pdf>

Outcome of Sub-step 1b.

- Continuation of the pre-project land use:
 - (a) deforestation for the expansion of agriculture frontier,
 - (b) deforestation due to livestock activities,
 - (c) forest fires associated with slash and burn processes, and
 - (d) forest degradation due to firewood extraction and illegal logging.
- Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project.
 - (a) reforestation and natural forest conservation.

Step 2. Investment analysis

The investment analysis was not carried out.

Step 3. Barrier analysis

Sub-step 3a: Identify barriers that would prevent the implementation of the type of proposed project activity

- Investment barriers

For the small landowners, the high cost of establishing agroforestry and silvopastoral systems in poor and extremely poor areas, where the soils are mainly for forestry activities, is a limitation. In addition, the high management cost for small agricultural producers and local communities to access forestry incentive programs to incorporate trees into traditional production systems act as a barrier.

Between the main barriers are the lack of adequate financial instruments for the forestry sector, related to terms, guarantees, conditions and interest rates linked to the forest value chain. Also, the limited budget allocation for incentive programs that allow promoting on a larger scale the protection and restoration of forests. Further, the lack of strategies to ensure the sustainability of the investment after the termination of the forest incentive programs is a limitation (SEGEPLAN, 2010b, 2011a, 2011b). Access to agricultural credits, insurance and payments for environmental services (PSA), with emphasis on small producers, is limited because of very low community organization. There are also high-interest rates for agricultural activities since banks and insurers are not involved with the topic and there is high insecurity regarding land tenure⁵⁵.

Financial services in support of the productive sector are scarce (SEGEPLAN, 2010i). In the country there are no specific rules for microfinance entities, the absence of a law that regulates the sector, implies that these entities operate with disadvantages as it is directed to a sector that is generally lacking of real guarantees (difficulties to pay, access to sources of financing); little technological development at work and less trained personnel (González & Prado, 2014). Between the main difficulties is the inflation that influences the standard of living of people, mobilization of funds and loans. As the rate of inflation increases, there is a reduction in the real value of money. In addition, the impact on people with static incomes is higher since the prices of goods and services increase.

⁵⁵Caludia Bouroncle et al. (2015). La Agricultura de Guatemala y El Cambio Climático: ¿Dónde Están Las Prioridades Para La Adaptación?. Available in https://www.researchgate.net/publication/306458513_La_agricultura_de_Guatemala_y_el_cambio_climatico_Donde_estan_las_prioridades_para_la_adaptacion

At the INAB level, and despite being an institution with wide technical capacity, one of its main weaknesses is its financial limitation for the PROBOSQUE and PINPEP forest incentives, reflected in insufficient staff and technical equipment to carry out forest incentives initiatives (FCPF, 2019). Regarding forest degradation, the barriers are the lack of financial and credit mechanisms to promote efficient firewood use systems at the household level (Ibid.).

- Institutional barriers

The weak presence of forestry authority in the project zone reduces the possibility to address causes such as: i) illegal logging and trade of precious wood, ii) unsustainable extraction of firewood, iii) usurpation and burning of forests, and iv) livestock expansion. At the same time, the weakness of the judicial sector and of enforcement authorities is another barrier to deal with deforestation and degradation cases.

Further, the weakness of the State in the articulation of institutional policies and programs to address deforestation and forest degradation in the medium and long-term threatens the forest cover. Poor territorial management allows forests to be used for agriculture and/or livestock. Municipalities have a key role in forest governance, but their current resources and capacities are insufficient (FCPF, 2019). In addition, the lack of law enforcement to forest offenders leads that the agriculture frontier and livestock increase without any penalty to the agents of deforestation (BID & FCPF, 2019).

Nevertheless, the government funded different agriculture instruments to boost the agricultural sector (GCI, 2018a):

- Agricultural policy: strengthen the land leasing program for farming, and establishment of programs to promote aquaculture and artisanal fishing, especially to benefit low-income populations. Both mechanisms require for their execution the existence or availability of lands, however, it does not clarify or present mitigation measures to not contribute to the process of deforestation in the country.
- Agrarian policy: it supports rural subsistence producers, which normally have access to the marginal, degraded lands, in strong slopes and atomized (patches) lands. However, it does not explain how potential deforestation will be avoided.

For forest degradation, the weak institutional framing and organization, low state investment, and the lack of communication between states and local stakeholders have influenced in the degradation rate. The main factor influencing the illegal firewood extraction and logging are the:

- Distance between the rural community and the municipality to manage family consumption licensing permits. This adds transportation costs to the license fee.
- Lack of enforcement of the applicable laws and regulations.
- Lack of interest of the landowner or user of the forest resources. It is not economically profitable to ask for a license use for 0.1 to 1 m³ firewood.
- Additional payments to the municipality for forest management.

Other institutions barriers are the lack of extension systems at the household level to promote efficient systems for the use of firewood or other energy resources; the lack of policies and regulations to promote the incorporation of trees in traditional agricultural production systems, low participation of government and local authorities in controlling the extraction and use of forest products from the forest, and the low community participation in the control of extraction and use of wood from forests (Ibid.)

- Barriers related to local tradition

Agricultural activities are not regulated and/or controlled in the country, so the landowner (small or big) is the one deciding on which crops, areas, and dates is going to plant. These activities are carried out in all the departments and municipalities of the country, in some with greater intensity than others.

Farming subsistence is based on manual labor and low productivity. Livestock activities are developed under low levels of competitiveness and production, low nutritional pasture quality, low levels of domestic consumption of dairy and meat products, and lack of technical and professional education (MAGA, 2016). Landowners without technical support will decide for increasing the hectares for production in order to compensate for their incomes.

Shifting “slash and burn” cultivation is the most common form of agriculture. Under this system, a small forest patch is cleared and subsequently burned and cropped for a few cycles before being abandoned due to weed invasion and fertility decline. The site is left fallow for some years while other patches are cleared and cultivated elsewhere (Shriar, 2008).

The lack of regulations and control in the use of fire in agricultural and livestock activities, the lack of preventive forestry to reduce the scattering and spread of forest fires, and the lack of support in the regional or community organizations for fire prevention and control are the main barriers (GCI, 2018b).

- Technological barriers

There are deficiencies in the organization of the supply of timber products, which lead to the lack of a competitive supply of wood in terms of volume, quality and price. Further, the low yields of basic grains are due to the low technological level because they are cultivated in soils with a forestry vocation and where soil conservation practices are not used. On the other hand, El Niño phenomenon negatively impacted yields and the availability of food when occurring (SEGEPLAN, 2010c). Regarding degradation, the lack of alternatives for sustainable production and efficient use of firewood.

Moreover, the investment barrier is also linked to the technologic barriers, since the landowners have low access to credits, they cannot invest in tools and equipment to improve their productivity.

- Social barriers

Guatemala is characterized by deep inequality in land distribution. Conflicts over land are one of the oldest structural problems in the country, mainly characterized by the exclusion of women from land rights, the opposition between national legislation and customary law, different views on private and communal property, claims and struggles for land, among others. The last Agricultural Census, in 2003, shows that inequality in access to land has been maintained and portions of land are concentrated on a few persons for extensive agriculture, while the vast majority of the population is displaced to small pieces of land for subsistence farming. Such concentration implies that the vast majority of families only have access to land with limited productive capacity and that is often overexploited (FCPF, 2019).

Moreover, the under development of rural areas translates into a high dependence on firewood and unsustainable subsistence farming and livestock activities. In addition, the significant differences in the opportunity cost of agricultural activities versus forest conservation impact on land use. The low valuation of the forest generates the change of land use to other land uses that allow the population to generate incomes to subsist. The lack of other working choices and the lack of land for agriculture force the rural population to exercise low paid activities or to transform rainforests into non-sustainable agricultural systems for farming. In addition, the lack of legal certainty regarding land tenure in local communities and indigenous peoples do not allow sustainable forest management. Further, poverty and extreme poverty (as can be seen in Section 4.1) is associated with high birth rates (population growth), internal migration and land invasion (MARN, 2008).

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternative land use scenarios

The most likely scenario in the absence of the Reddes Locales REDD+ project will be the continuation of the pre-project land-use activities (i). Even with the barriers mentioned above, agriculture and

livestock can be developed by the landowners. In addition, the productive activities are supported by governmental policies, at national, regional, and local levels. Furthermore, agriculture and livestock do not require skilled or trained labor (knowledge is traditionally passed through generations using conventional tools). Meanwhile, the scenario (ii) is prevented by institutional barriers and investment barriers.

Step 4. Common practice analysis

Deforestation in the project area is likely to increase in the absence of the project being registered and supported as a VCS AFOLU. Financial revenues from carbon sequestration will contribute to the project proponent to offset the cost of land-use changes.

Subsistence producers are often located in remote, highly vulnerable areas facing multiples limitations such as poverty, low levels of education, poor access to health, limited institutional support, exposure to pests and diseases, and seasonal food insecurity⁵⁶. Further, landowners use traditional knowledge, and due to climate change impacts, production and quality is affected⁵⁷. Moreover, degraded soils, soil erosion, low sales prices, and no organizational structure that can effectively articulate their needs affect the economy of small owners⁵⁸.

Regarding PROBOSQUE and PINPEP programs, they have a limited budget and time horizon, focus mainly on forest conservation and sustainable land management but not on the low governability, communication channels, land tenure, capacity building and other problems mentioned above. For this, the financial support from carbon credits can be decisive.

Several studies focus on livelihood strategies such as forest or environmental dependence, non-timber forest products, or conservation topics. Angelsen et al. (2014) published a PEN (Poverty Environment Network) study where pointed out that while forest income is a primary contributor (nearly 22%) to total environmental income, the non-forest environmental income also plays an important role in rural livelihood (approximately 6.5%). The project activities linked to value-added forest chain and promotion of forest product diversification can contribute to improving the livelihood of the project participants. Further, at a microeconomic level, value chain strengthening can generate benefits such as productivity gains from greater innovation in process and products, employment growth, the inclusion of micro and small enterprises producing goods and services (ECLAC-GIZ, 2014).

Lastly, there is a need to establish cooperation networks between organizations with common objectives, to achieve greater efficiency and effectiveness at the municipal level, without losing their organizational autonomy. This can be achieved through the proposed project activities.

Therefore, the proposed VCS AFOLU project activity is not the baseline scenario and, hence, the project is additional.

3.1.6 Methodology Deviations

No methodology deviations were applied.

⁵⁶ Solano Garrido, A. L., & Ochoa, W. (2019). Agricultura y seguridad alimentaria. En E. J. Castellanos, A. Paiz-Estévez, J. Escribá, M. Rosales-Alconero, & A. Santizo (Eds.), Primer reporte de evaluación del conocimiento sobre cambio climático en Guatemala. (pp. 108–141). Guatemala: Editorial Universitaria UVG. Available at <https://sqccc.org.gt/wp-content/uploads/2019/06/1erRepCCGuaCap6.pdf>

⁵⁷ Kinomé (2019). Social Impact Baseline of 12Tree Chimelb/Sepacay Farms in Guatemala.

⁵⁸ Peláez, A., Juárez, H. Lineamientos estratégicos para el fortalecimiento de la agricultura familiar y la inclusión en Guatemala. IICA. Available at <https://repositorio.iica.int/bitstream/handle/11324/2741/BVE17048772e.pdf;jsessionid=724DC281C22E93B12BAEA704D3AB33C6?sequence=1>

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

The Reddes Locales project baseline is aligned with the national baseline described in the Guatemala's Emission Reduction Program (ERP), which recognizes and allows the participation of early REDD+ action projects. The Guatemalan government sees the role of the private sector as a key element for the Program execution and has included three REDD+ projects, in different development stages, carried out by private entities, local communities, government agencies and NGOs that have spearheaded REDD+ actions in the country in the last few years. To be part of the Guatemalan ERP, REDD+ Projects that voluntarily decide to participate in it must be methodologically harmonized with the ERP to prevent double counting (FCPF, 2019).

The following summary description is based on the Forest Reference Emission Level (FREL) for Guatemala for the 2006-2016 period where the country set a baseline for emissions from deforestation and forest degradation, and removals from carbon stocks increase. The FREL is calculated at the subnational level for the REDD+ emission reduction program area following the Carbon Fund Methodological Framework. In this area, emissions and removals from deforestation, degradation and increase in carbon stocks were estimated. Emissions from conservation and sustainable management of forests are not included (FCPF, 2019). For a complete and detailed description, refer to [FCPF Guatemala ERPD](#).

a. Reference period

The data on land cover and dynamics is generated by a sampling grid distributed systematically throughout the country in a multi-temporal analysis for the 2006-2016 period using medium- and high-resolution satellite images.

In the grid analysis for the national area, during the FREL period, it is possible to verify the land-use change due to forest loss, degradation from the decrease of forest cover in areas that remain as forests and forest increases in areas with commercial forest plantations on lands that were not previously forests.

b. Forest definition

According to the national definition, a forest is a land surface with a predominant and continuous tree cover with a minimum canopy cover of 30%, forming a landmass of at least 0.5 ha and a minimum width of 60 meters.

c. Definition of land use change and land cover categories

Land classification in the FREL uses IPCC guidelines (2006). Forest lands, croplands, pastures, settlements, wetlands and other lands (IPCC 2006) were updated and consolidated based on 2001-2010 forest cover, land use and forest dynamics maps, as well as the 2012 high-resolution map of the forest and land use. For the classes and subclasses of forests and other non-forest lands, the CORINE land cover classification is used (Table 18), adapted to the conditions of the forests in Guatemala.

Table 18. Land categories (IPCC, 2006), national classes and subclasses hierarchically used in the dynamics of forest cover and land use.

Level 1 Categories (IPCC)	Level 2 National class	Level 3 National subclass
Forest lands	Forest	Coniferous forest
		Broadleaved forest
		Mangrove forest
		Mixed forest
	Forest plantations	Coniferous
		Broadleaved
Croplands	Annual crops	Sugarcane
		Rice
		Basic grains and vegetables
		Others
	Permanent crops	Rubber
		African oil palm
		Coffee
		Banana
		Others
	Agroforestry systems	
Pastures	Pastures	
	Silvopastoral systems	
	Scattered trees	
	Natural shrub vegetation	
	Scrub and/or guama forests	
Wetlands and water bodies	Lake, lagoon or pond	
	River	
	Sea and/or ocean	
	Wetland	
	Dam	
Settlements	Continuous urban fabric	
	Discontinued urban areas	
Other lands	Bare soil	
	No soil	Beaches and coastlines
		Lava flows
		Sand and volcanic ash
		Quarries
		Rocky outcrops
		Rocks
	Páramos	

d. Average annual historical emissions over the Reference Period

The emissions and increases of forest carbon stocks are estimated for the period between 2006 and 2016 and the emissions and removals are divided by the number of years included in that period (10 years).

CO₂ emissions and removals were obtained by multiplying the activity data (forest lands changed to other types by deforestation, forest lands that remain as forests but lose cover by degradation, and other lands converted to forest plantations to increase carbon stocks) by the emission and removal factors, and the difference in carbon pools before and after conversion (Equation 1).

Eq.1:

$$FREL_{(Def+Deg)-(Incr)} = AD \times EF / RF$$

Where,

$FREL_{(Def, Deg, Incr)}$ = emissions from deforestation and degradation and removals due to an increase in forest carbon stocks.

AD= activity data by conversion of forest lands to other types of lands (deforestation), forest lands that remain as forests (degradation) and other lands that are changed into forest lands (increases).

EF / RF = emission factors for deforestation and degradation and removal factors for carbon increases in forest biomass.

The information used in the construction of the FREL corresponds mostly to country data and is built specifically for the ER program (Level 2). Emission factors were obtained from plots distributed throughout the country and carbon stocks were quantified with the national carbon strata map. In the same way, results of the long-term measurement of permanent plots distributed in the country were used, in which the growth of carbon stocks is quantified to obtain the absorption factors (AF), for the estimation of stock increases.

The LULUCF estimation method takes the change in annual carbon stocks of a given pool, based on the difference in carbon stocks before and after the conversion, which includes annual changes in inventories and carbon increases in below-ground and above-ground biomass, which is represented by equation 2.15 of the IPCC guidelines and suitable for the FREL in Guatemala, in Equation 2.

Eq.2:

$$\Delta C_B = \Delta C_{GL,t} + \Delta C_{CONVERSION\ i,t} - \Delta C_L$$

Where:

ΔC_B = annual change in biomass carbon stocks due to land converted to other of land use categories and forest land areas that remain as such, in the reference period.

$\Delta C_{GL,t-incr}$ = annual increase in biomass carbon stocks due to biomass contained in other uses of type i land after conversion and to carbon removals, which remain as such, after conversion, during the reference period, expressed in tC (increase in forest reserves);

$\Delta C_{CONVERSION\ i,t-Def, Deg}$ = initial change in biomass carbon stocks due to the conversion of type i forest land to other type i land uses (deforestation) and forest lands remaining as such in degradation modality (forest cover loss) in the reference period, in tC;

$\Delta C_{Li,t}$ = annual decrease in biomass carbon stocks due to the removal of biomass, wood-fuel and other disturbances that occur before a deforestation event, during the reference period, in tC.

Guatemala does not consider the annual loss of biomass from forest removal (harvesting), the harvesting of wood fuel and other losses caused by disturbances, storms and insects, and forest diseases. Therefore, it is necessary to consider the variable $\Delta C_{Li,t}$ of Equation 2, as zero, given that there is not enough data to account for the losses in biomass carbon stocks from the removal of biomass, wood-fuel and other disturbances.

- e. Activity data and emission factors used for calculating the average annual historical emissions over the Reference Period

The estimation of activity data in the forest sector was done using a spatially explicit method, which consists of a statistical sample of multi-temporal assessment of land cover and land-use change obtained from satellite images and of high and medium resolution.

For the design of the sampling grid and activity data collection, the Open Foris open source software was used, which serves as a support for the monitoring of the land cover and land-use change in forests. The software was used in the Collect Earth module which is a Google Earth and HTML-format interface for collecting geographic data, which can be adapted to each country's reality and ensure consistency with IPCC's land classification guidelines. This module was sponsored by FAO-UNREDD in the National Monitoring and Information Systems project with the purpose of promoting transparent and reliable processes to build the REDD+ program.

For FREL historical analyses a 3.1 X 3.1 kilometers grid was developed covering the entire country and plots were randomly established within each quadrant, resulting in a sampling grid of 11,369 nationwide. Of these, 10,414 are in the emission reduction program area.

For the analysis of the activity data plots, at each point, any change in the use of forest lands (forests and forest plantations) is considered as deforestation. And any conversion of other lands to subcategories of forest plantations in forest lands is seen as an increase in the carbon stock area. Degradation happens in any of the subcategories of forest lands that remain as forests. The database of the updated grid for estimating deforestation and the protocol used for its development can be downloaded from the following address: [ERPD Guatemala](#).

The activity data of *NREFDef* for Guatemala (forest land converted to other land uses) was calculated from the matrices of forest dynamics (2001-2006 and 2006-2010) which are obtained from the combination of forest cover and land use maps (2001, 2006 and 2010). These maps are the result of a joint effort between GIMBUT institutions that initially produced forest dynamics maps from Landsat image classification (INAB 2010, UVG 2012), which contained 6 categories: Forest (Forest to Forest), No Forest (No Forest to Forest), Loss (Forest to No Forest), Gain (No Forest to Forest), Water and No Information. Subsequently, the area classified as No Forest was separated from other land use categories: Agricultural Land (AT), Rubber (HU), Coffee (CA), African Palm (PA), Other Land (OT), Settlement (AA) and Wetlands (Category not considered in activity data). The Forest category of forest dynamics is considered Forest Lands (TF) for the estimation of activity data. Regarding the emission factor, it was considered the national carbon strata map (Figure 31).

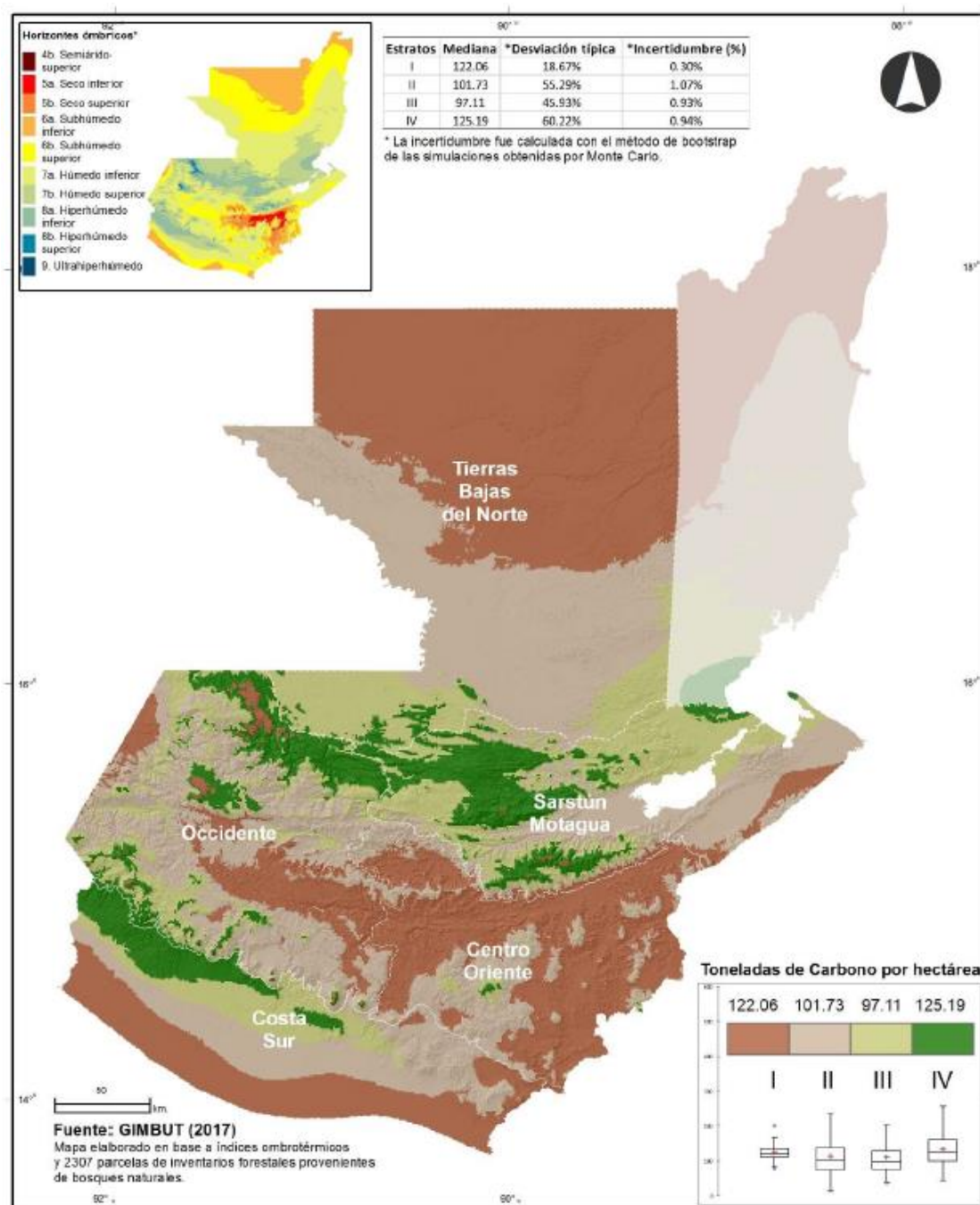


Figure 31. National carbon strata map (above and underground biomass).
Source: GIMBUT, 2017.

f. National reference levels

- Reference level of forest emissions due to deforestation:

In the estimation of emissions by deforestation, the activity data and the carbon strata map were combined with geographical reference data and the respective land cover and dynamics variables by interpreting biomass density estimators and their associated uncertainties respectively. This was done to determine the carbon density of each forest type before conversion and land use after conversion. The emission factor was also estimated with the carbon stock immediately after conversion (Table 19).

It is assumed that the carbon content of the final use remains constant for the entire period (without loss or gain). In the same way, forest lands that remain as forests and are not degraded are balanced and do not lose or gain carbon during the FREL period. Only conversion to coniferous and broadleaved forest plantations are considered other uses that increase carbon stocks.

Degradation was estimated for the FREL in its historical period as a proxy of the reduction in forest land cover in areas that remained as forests, using calculation methods similar to those related to deforestation. Degradation turns out to be quite significant, accounting for more than 10% of the total emissions, which indicates a great reduction potential due to various causes such as the unsustainable and uncontrolled use of the forest, illegal logging and forest fires.

Table 19. Summary of emissions from deforestation and degradation in the 2006-2016 period in the ERP.

Activity	Area (ha)	ha / year	tC	tCO ₂ e	tCO ₂ / year
Deforestation	325,065.32	32,506.53	33,520,265.67	122,907,640.79	12,290,764.08
Degradation	153,423.16	15,342.32	8,210,387.60	30,104,754.52	3,010,475.45

- Reference level of carbon stock increases

For degraded areas that restored: The FREL for carbon stock increase is composed of two activities that are accounted for separately, the first corresponds to degraded areas recovered, which are estimated in the same way as the degradation, by replacing emission factors with absorption factors (Table 20).

Table 20. Increase in recovered degraded forest land.

Activity	Area (ha)	ha/year	tC	tCO ₂ e	tCO ₂ /year
Increase in recovered degraded forest lands	96,848.37	9,684.84	-5,302,807.78	-19,443,628.54	-1,944,362.85

For forest plantations: Historical removals in the reference period were accounted for coniferous and broadleaved forest plantations assumed to have been established by the country's forest incentive programs. For this purpose, activity data regarding conversion from other uses to forest lands (coniferous and broadleaved subclasses) were identified in the sampling points. A removal factor was assigned to these areas to calculate the annual increase in carbon stocks due to the growth in land converted to forest plantations. It is assumed that the process of plantations eliminates all the biomass from initial uses and that its growth is sustained throughout the period (10 years). The average annual historical removals for forest plantation is -271,431.14 tCO₂/year.

- g. Reddes Locales baseline emissions

The data for baseline project area emissions was extracted from the FREL. The net emission reduction (deforestation, degradation, increased in degraded forest and increased in plantations areas) for the project area is 796,620.5 tCO₂/year (Table 21).

Table 21. Baseline emissions for the project area.

Land use change/activity	ha	ha/year	tC	tC/year	tCO2	tCO2/year
Forest lands to croplands	5,753.37	575.34	610,720.06	61,072.01	2,239,306.89	223,930.69
Forest lands to croplands (coffee)	-	-	-	-	-	-
Forest lands to croplands (African oil palm)	958.89	95.89	83,529.32	8,352.93	306,274.18	30,627.42
Forest lands to croplands (rubber)	-	-	-	-	-	-
Forest lands to agroforestry systems	958.89	95.89	92,811.42	9,281.14	340,308.55	34,030.85
Forest lands to pastures	10,547.84	1,054.78	1,088,124.99	108,812.50	3,989,791.61	398,979.16
Forest lands to settlements	-	-	-	-	-	-
Forest lands to other lands	958.89	95.89	97,548.36	9,754.84	357,677.33	35,767.73
Forest lands to wetlands and water bodies	-	-	-	-	-	-
Total deforestation	19,177.89	1,917.79	1,972,734.15	197,273.42	7,233,358.56	723,335.86
Forest lands (>70%) to degraded forest lands (70-30%)	17,260.11	1,726.01	941,164.78	94,116.48	3,450,937.52	345,093.75
Total degradation	17,260.11	1,726.01	941,164.78	94,116.48	3,450,937.52	345,093.75
Increase in degraded forest land that recovers	10,547.84	1,054.78	-568,217.05	-56,821.71	-2,083,462.52	-208,346.25
Increase of Forest lands by Coniferous plantations	4,794.47	479.45	-155,820.40	-15,582.04	-571,341.45	-57,134.15
Increase of Forest lands by Broadleaf plantations	958.89	95.89	-17,260.11	-1,726.01	-63,287.05	-6,328.71
Total plantation carbon stock increase	5,753.37	575.34	-173,080.50	-17,308.05	-634,628.50	-63,462.85
						796,620.50

Uncertainty

The sources of uncertainty identified during the estimation of GHG emissions are manifold and are associated with the origin of the information, the emission and removal factors originated by forest inventories data, which are combined with allometric models to go from data on diameters and heights to data on volume and biomass.

The Monte Carlo method, described in Chapter 3 of Uncertainties of the IPCC (2006), was applied to calculate the uncertainty of emission and capture estimates. In a Monte Carlo analysis, random values are simulated based on the probability density functions of the data of interest.

This random value simulation allows for the estimation of the probability of value as a function of input data distributions. To apply the Monte Carlo method, 10,000 simulations were run for each iteration of the model or estimated data. Once the final distributions of emissions/removals for each activity had been generated, the confidence intervals were calculated. For data with non-normal distributions, bootstrapping analyses (Efron, 1993) were performed, which is a method to determine the confidence interval (in this case 95%) of the central tendency metric for non-normal distributions. Half of the confidence interval was then divided by the mean or median and the result was multiplied by 100 to identify the uncertainty as a percentage.

Deforestation:

Sources of uncertainty in the estimation of emissions from deforestation include the following:

- 1) Activity data. Precision analysis in the mapping of land-use change from forest dynamics maps for the years 2001, 2006, and 2010.
- 2) Emission factors. Sampling errors of plots from the various forest inventories used to estimate carbon contents in the different forest strata.
- 3) Carbon contents of land use after deforestation. The range of error for carbon content in annual cropland biomass from IPCC Table 5.9 (2006) was used for agricultural land.
 - The range of error for the carbon content of the above biomass in cropping systems containing perennial species was used for African palm and rubber plantations.
 - The error range for coffee agroforestry systems was generated from the standard deviations of carbon contents of aerial biomass and underground biomass from the ANACAFE national study (1998).

Since the carbon content estimates were 0 for settlements and other lands, their uncertainty was not estimated.

Degradation

The sources of uncertainty in forest fire emission estimates are:

- 1) Activity data. Errors in maps of burned areas for the years 2001, 2003, 2005, 2007, 2009, 2010 generated with Landsat satellite images.
- 2) Emission and combustion factors. Sampling errors of the plots from the various forest inventories used to estimate the carbon contents in the different forest strata, and thus the biomass available for burning.
The sampling error of the study (Pinelo, 2001) used to calculate the degradation burning factor.

The standard deviations, available in Tables 2.5 and 2.6 of the IPCC, for the degradation burning factor and the CO₂ and CH₄ emission factors

Increases in carbon stock:

In the national level work, sources of uncertainty in estimates removal include:

1) Activity data. The error of the area reported under PINPEP and PINFOR, calculated through a validation exercise using Google Earth images and 2006 orthophotos.

2) Removal factors. With respect to the average annual increments, the source of uncertainty is the sampling errors of the permanent forest measurement plots monitored by INAB.

The uncertainty of the captures in agroforestry systems comes from the error of the equation developed by Winrock International (2014).

Value of 0 represents the original area reported since sometimes the verified area was smaller or larger than the area reported. Assuming they had normal distributions, the standard deviations of the reported areas were calculated for the different categories of increases, based on the national validation data.

3.2.2 Project Emissions

Information was collected through direct communication with relevant institutions and a review of published literature in the area or region. Future deforestation was projected for the expected duration of the project (30 years), taking into account the annual deforestation rate.

The inputs used to obtain the reference levels were the national forest dynamics maps, forest cover and land use maps and satellite images (GIMBUT, 2018). For the Reddes Locales project, the Consortium formed by Sud-Austral, Calmecac, GOPA, and ForestFinest developed a tool to calculate and visualize reference levels, based on information from the National Climate Change Information System (SNICC). This tool presents the reference levels of the project and is based on the analysis of the 774 Collect Earth (CE) points within the project boundaries that were used to prepare the FREL. The potentials for reducing emissions from deforestation and degradation, as well as removals from forest regeneration and plantations, were calculated following four main steps:

- 1) Design and creation of the surveys (fields, answer options)
- 2) Data collection (Multi-temporal visual analysis with high-resolution satellite images)
- 3) Development of a quality control procedure for the database
- 4) Analysis of the resulting database

For the visual interpretation of the sample points, a multi-temporal visual analysis of the 2016 land use was carried out. Change detection was performed with Collect Earth, Google Earth Engine, and Bing Maps tools to visualize high and medium resolution satellite images. National shapefiles (GIMBUT, 2019) were used to support the analysis of the sampling points.

When the information is entered into the templates for each of the plots included in the study sample, an activity database is obtained that can be used for the analysis of deforestation, degradation or regeneration, as the case may be. The reference level of forest emissions is accounted at the national level and extracted to the project area.

Deforestation:

The approach used to calculate emissions from deforestation is based on activity data. This approach consists of obtaining activity data through the analysis of satellite images and the estimation of emission factors. The estimate is made by calculating the difference between the average carbon stock in the forest biomass and the carbon stock in the new land-use biomass. The emission report is expressed in tons of carbon dioxide (GIMBUT, 2018).

It is used for the analysis information from plots that were forest land and were converted to other more intensive uses. At the national level, for agricultural coffee, African palm, rubber, and agroforestry systems were analyzed separately because they have specific emission factors. In addition, forest density according to tree element coverage was taken into account for a more precise calculation of the deforested area. The values for the project area are:

- 723,336 average tCO₂e/year
- 1,918 ha/year deforested
- Average emission factor: 383.6 tCO₂e/ha

Degradation:

For the calculation of emissions related to forest cover degradation, only those plots categorized as forest land that remain as forest land was used, according to multi-temporal visual analysis. The analysis strata were classified according to the percentage of tree cover in the plot (GIMBUT, 2019). The values for the project area are:

- 345,094 average tCO₂e/year
- 1,726 ha/year degraded
- Average emission factor: 187.2 tCO₂e/ha

For emissions from forest degradation, it should be noted that carbon modeling includes a degradation analysis and estimation based on firewood degradation, forest fires, and illegal logging.

Increases in carbon stock:

For the increase in existence or increase in carbon stock at the national level, historical carbon removals in plantations of the national incentive programs of the National Institute of Forests (INAB) are considered. Therefore, it is considered the conversion of non-forest land use to forest use, as well as the forest areas that remain as such. The methods used in the national reference levels are those of the IPCC Guidelines (2006) and Winrock International (2014). The values for the project area are:

- * Carbon sequestration by restoration
 - -208,346 tCO₂/year
- * Carbon sequestration by plantations
 - -63,463 tCO₂/year

* Net annual emissions

The annual net emissions of the Reddes Locales project were calculated as follows:

Emissions from deforestation - emissions from degradation + Absorption from restoration and plantations = total net emissions

corresponding to:

Annual net emissions: $723,335.86 \text{ tCO}_2 - 345,093.75 \text{ tCO}_2 + (-)208,346.25 \text{ tCO}_2 + (-)63,462.85 \text{ tCO}_2 = 796,620 \text{ annual tCO}_2$.

The effectiveness index for the project is established at 45% according to the primary project proponent based on the Forest Emission Reference Level. Therefore, the annual carbon stock change in the project case is **358,479.23 tCO₂**.

3.2.3 Leakage

Leakage may be not significant in the project. The project does not consider a decrease in carbon stocks and increased emissions resulting from leakage; since project activities are implemented in private properties or properties with land titles, and it is voluntary. Risk mitigation strategies are mentioned in Section 2.1.18. Furthermore, following the UNFCCC guidance on REDD+ mentioned in the FCPF Methodological Framework, potential international displacement should not have to be accounted for or deducted from the ERs credited to ER programs.

Nevertheless, the leakage belt is the reference region without the project area (municipalities areas) (Figure 32). The large area will be monitored at a national level.

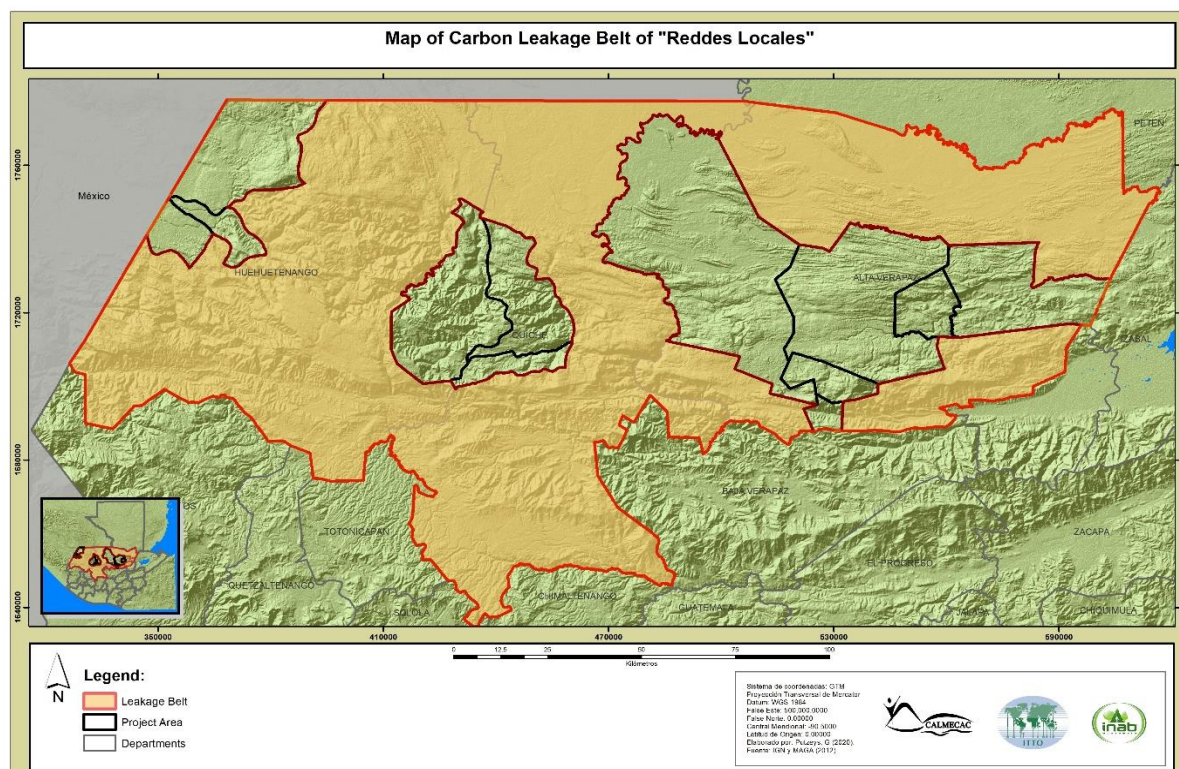


Figure 32. Leakage belt map.
Source: Calmecac (2020).

3.2.4 Net GHG Emission Reductions and Removals

The project followed the FCPF Carbon Methodology. Ex ante estimated net anthropogenic greenhouse gas emission reduction attributable to the project activities' reduction and removals is calculated as the baseline carbon stock in the project area minus the ex-ante estimated actual carbon stock changes in the project area minus ex-ante estimated leakage emissions; at a determined year (Table 22).

Table 22. Net GHG Emissions reductions for the Reddes Locales project.

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
1	796,620.5	438,141.28	n.a	358,479.23
2	796,620.5	438,141.28	n.a	358,479.23
3	796,620.5	438,141.28	n.a	358,479.23
4	796,620.5	438,141.28	n.a	358,479.23
5	796,620.5	438,141.28	n.a	358,479.23
6	796,620.5	438,141.28	n.a	358,479.23
7	796,620.5	438,141.28	n.a	358,479.23
8	796,620.5	438,141.28	n.a	358,479.23
9	796,620.5	438,141.28	n.a	358,479.23
10	796,620.5	438,141.28	n.a	358,479.23
11	796,620.5	438,141.28	n.a	358,479.23
12	796,620.5	438,141.28	n.a	358,479.23
13	796,620.5	438,141.28	n.a	358,479.23
14	796,620.5	438,141.28	n.a	358,479.23
15	796,620.5	438,141.28	n.a	358,479.23
16	796,620.5	438,141.28	n.a	358,479.23
17	796,620.5	438,141.28	n.a	358,479.23
18	796,620.5	438,141.28	n.a	358,479.23
19	796,620.5	438,141.28	n.a	358,479.23
20	796,620.5	438,141.28	n.a	358,479.23
21	796,620.5	438,141.28	n.a	358,479.23
22	796,620.5	438,141.28	n.a	358,479.23
23	796,620.5	438,141.28	n.a	358,479.23
24	796,620.5	438,141.28	n.a	358,479.23
25	796,620.5	438,141.28	n.a	358,479.23
26	796,620.5	438,141.28	n.a	358,479.23
27	796,620.5	438,141.28	n.a	358,479.23
28	796,620.5	438,141.28	n.a	358,479.23
29	796,620.5	438,141.28	n.a	358,479.23
30	796,620.5	438,141.28	n.a	358,479.23
Total	23,898,615.15	13,144,238.33	-	10,754,376.82

Calculation of ex ante Verified Carbon Units (VCUs)

The number of Verified Carbon Units (VCUs) to be generated through the proposed project activity is calculated according to the following formula: Ex-ante estimated net anthropogenic greenhouse gas emission reduction minus the number of Buffer Credits deposited in the VCS Buffer; at a determined year (Table 23).

The Risk factor is 12% as was determined in the VCS Non-Permanence Risk Report.

Table 23. Ex ante VCU for the Reddes Locales project.

Year	Estimated project emissions or removals (tCO ₂ e)		Ex ante buffer credits (tCO ₂ e)		Ex ante VCUs tradable (tCO ₂ e)	
	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
1	358,479.23	358,479.23	43,017.51	43,017.51	315,461.00	315,461.00
2	358,479.23	716,958.45	43,017.51	86,035.01	315,461.00	630,922.00
3	358,479.23	1,075,437.68	43,017.51	129,052.52	315,461.00	946,383.00
4	358,479.23	1,433,916.91	43,017.51	172,070.03	315,461.00	1,261,844.00
5	358,479.23	1,792,396.14	43,017.51	215,087.54	315,461.00	1,577,305.00
6	358,479.23	2,150,875.36	43,017.51	258,105.04	315,461.00	1,892,766.00
7	358,479.23	2,509,354.59	43,017.51	301,122.55	315,461.00	2,208,227.00
8	358,479.23	2,867,833.82	43,017.51	344,140.06	315,461.00	2,523,688.00
9	358,479.23	3,226,313.05	43,017.51	387,157.57	315,461.00	2,839,149.00
10	358,479.23	3,584,792.27	43,017.51	430,175.07	315,461.00	3,154,610.00
11	358,479.23	3,943,271.50	43,017.51	473,192.58	315,461.00	3,470,071.00
12	358,479.23	4,301,750.73	43,017.51	516,210.09	315,461.00	3,785,532.00
13	358,479.23	4,660,229.95	43,017.51	559,227.59	315,461.00	4,100,993.00
14	358,479.23	5,018,709.18	43,017.51	602,245.10	315,461.00	4,416,454.00
15	358,479.23	5,377,188.41	43,017.51	645,262.61	315,461.00	4,731,915.00
16	358,479.23	5,735,667.64	43,017.51	688,280.12	315,461.00	5,047,376.00
17	358,479.23	6,094,146.86	43,017.51	731,297.62	315,461.00	5,362,837.00
18	358,479.23	6,452,626.09	43,017.51	774,315.13	315,461.00	5,678,298.00
19	358,479.23	6,811,105.32	43,017.51	817,332.64	315,461.00	5,993,759.00
20	358,479.23	7,169,584.54	43,017.51	860,350.15	315,461.00	6,309,220.00
21	358,479.23	7,528,063.77	43,017.51	903,367.65	315,461.00	6,624,681.00
22	358,479.23	7,886,543.00	43,017.51	946,385.16	315,461.00	6,940,142.00
23	358,479.23	8,245,022.23	43,017.51	989,402.67	315,461.00	7,255,603.00
24	358,479.23	8,603,501.45	43,017.51	1,032,420.17	315,461.00	7,571,064.00
25	358,479.23	8,961,980.68	43,017.51	1,075,437.68	315,461.00	7,886,525.00
26	358,479.23	9,320,459.91	43,017.51	1,118,455.19	315,461.00	8,201,986.00
27	358,479.23	9,678,939.14	43,017.51	1,161,472.70	315,461.00	8,517,447.00
28	358,479.23	10,037,418.36	43,017.51	1,204,490.20	315,461.00	8,832,908.00
29	358,479.23	10,395,897.59	43,017.51	1,247,507.71	315,461.00	9,148,369.00
30	358,479.23	10,754,376.82	43,017.51	1,290,525.22	315,461.00	9,463,830.00

3.3 Monitoring

3.3.1 Data and Parameters Available at Validation

Data / Parameter	Total and annual change in cover area by class		
Data unit	ha, ha/year		
Description	The total and annual change in the coverage area by classes and subclasses of forest lands in a period of 10 years, from 2006 to 2016, at the subnational level in the emission reduction program area. And the change in forest lands that remain as forests and that have lost forest cover in a period of 10 years, from 2006 to 2016.		
Source of data	The activity data for deforestation, degradation and increases are the result of a sampling of points on a systematic national grid (3.1 X 3.1 km). Within each quadrant, a plot equivalent to 1 ha (3x3 Landsat pixels) was randomly established giving a total of 10,414 plots within the area of the emission reduction program where land cover and land-use changes were assessed by multi-temporal visual interpretation, for the 2006-2016 period, with medium and high-resolution images using the Collect Earth tool. In the analysis, inputs from the Landsat 5, 7 and 8 sensors were used as well as high-resolution sensors as orthophotos and others available on Google Earth.		
Value applied	Activity	Total area (ha) ha/year	
	DEFORESTATION	325,065.32	32,506.53
	DEGRADATION	153,423.16	15,342.32
	INCREASE OF FOREST AREA BY PLANTATIONS	28,766.84	2,876.68
	RESTORATION OF DEGRADED FOREST AREAS	96,848.37	9,684.84
Justification of choice of data or description of measurement methods and procedures applied	<p>Data and information obtained at national and regional level.</p> <p>Deforestation: The entire surface of the classes and subclasses of forest land that change to other non-forest lands.</p> <p>Degradation: The entire surface of the classes and subclasses of forest land that remain as forests and that loss or gain between 30 and 70% of forest cover.</p> <p>Carbon stock increases: The surface of non-forest lands converted to forest plantations.</p> <p>Restoration of degraded areas: Forest land surface that remains and gains between 30% and 70% forest cover.</p>		
Purpose of data	<ul style="list-style-type: none"> Calculation of baseline emissions 		
Comments	-		

Data / Parameter	Forest emission factors																	
Data unit	Ton C/ha																	
Description	Forest emission factors (biomass stocks prior to conversion): Above-ground and below-ground biomass carbon for four strata of georeferenced forests in a national carbon map, estimated for the point of the activity data where deforestation occurs. Emission factors of other land uses (biomass stocks after conversion to other land uses by deforestation): Above-ground and below-ground biomass carbon in the general categories of cropland, pastures, settlements, wetlands and other lands. And for the classes and subclasses of perennial crops of agroforestry systems, coffee, African palm and rubber.																	
Source of data	<p>Main sources of data</p> <p>-Adjusted and standardized database of 2,307 plots of forest inventories for different purposes developed by the National Forestry Institute, Universidad del Valle de Guatemala (UVG) and Forest Concessions (CEMEC and Association of Forest Engineers).</p> <p>-Allometric models developed for the country for warm humid and very humid forests, Petén (Arreaga 2002), broadleaved and coniferous forest communities (UVG 2005) and mangrove forests by species (Imbert and Rollet 1989 and Fromad et al. 1998). For the below-ground biomass, the Komiyama 2008 allometric model was used, which includes specific species variables. The default IPCC carbon fraction (2006) was applied to the calculated biomass. The total tree carbon was estimated for each plot (Gómez Xutuc 2016)</p> <p>-Carbon strata map developed by GIMBUT (2017) based on climatic (WorldClim) and carbon variables from the plots, collected at the national level (Gómez Xutuc 2017). Carbon strata were estimated with Monte Carlo iterations and the median carbon density was obtained.</p> <p>-Data from regions of shade-grown coffee agroforestry systems used to estimate biomass stocks after conversion to agroforestry systems (Castillo 2016, ANACAFÉ 1998). And IPCC (2006) default data for other identified uses.</p>																	
Value applied	<p>Forest emission factors</p> <table><thead><tr><th>Forest stratum</th><th>Ombric type</th><th>Median (Ton C/ha)</th></tr></thead><tbody><tr><td>I</td><td>Semiarid, Dry and subhumid, Hyperhumid, Ultra-hyperhumid</td><td>122.06</td></tr><tr><td>II</td><td>Lower subhumid</td><td>101.73</td></tr><tr><td>III</td><td>Upper humid</td><td>97.11</td></tr><tr><td>IV</td><td>Lower Hyperhumid</td><td>125.19</td></tr></tbody></table> <p>Emission factors in other uses</p>			Forest stratum	Ombric type	Median (Ton C/ha)	I	Semiarid, Dry and subhumid, Hyperhumid, Ultra-hyperhumid	122.06	II	Lower subhumid	101.73	III	Upper humid	97.11	IV	Lower Hyperhumid	125.19
Forest stratum	Ombric type	Median (Ton C/ha)																
I	Semiarid, Dry and subhumid, Hyperhumid, Ultra-hyperhumid	122.06																
II	Lower subhumid	101.73																
III	Upper humid	97.11																
IV	Lower Hyperhumid	125.19																

	<p>Other land uses</p> <p>Croplands (all unspecified classes) and pastures</p> <p>Cropland-Coffee (intensive)</p> <p>Cropland-African palm</p> <p>Cropland-Rubber</p> <p>Agroforestry systems (shade-grown coffee)</p> <p>Settlements</p> <p>Wetlands</p> <p>Other lands</p>	<p>Carbon tones/ha</p> <p>5.00</p> <p>10.00</p> <p>10.00</p> <p>10.00</p> <p>28.40</p> <p>0.00</p> <p>0.00</p> <p>0.00</p>
Justification of choice of data or description of measurement methods and procedures applied	<p>Forest emission factors:</p> <ul style="list-style-type: none"> -Plots sampling errors -Errors associated with applied allometric models -Lack of representation of all types of forest vegetation in the carbon estimation plots available to build the carbon strata map (e.g. dry forests) <p>Emission factors of other uses:</p> <ul style="list-style-type: none"> -Default data range of error of the values for annual crops and of perennial species reported by the IPCC (2006) -Range of error in coffee agroforestry systems obtained from standard deviations of the carbon contents of the above-ground and below-ground biomass 	
Purpose of data	<ul style="list-style-type: none"> • Calculation of baseline emissions 	
Comments	-	

Data / Parameter	Forest emission factors for degradation and degraded areas that are restored
Data unit	ton C/ha
Description	It is the loss or gain of carbon content for each carbon stratum at the national level in relation to the reduction or increase of the canopy cover detected in the activity data from 2006 to 2016 for the forest lands that remained as forests. They are the non-degraded forests in 2006 that had more than 70% cover and whose canopy cover was reduced by 30% to 70% or inversely for the case of recovered degraded areas.
Source of data	<p>Main sources of data</p> <ul style="list-style-type: none"> -Adjusted and standardized database of 2,307 plots of forest inventories for different purposes developed by the National Forestry Institute, Universidad del Valle de Guatemala (UVG) and Forest Concessions (CEMEC and Association of Forest Engineers). -Allometric models developed for the country for warm humid and very humid forests, Petén (Arreaga 2002), broadleaved and coniferous forest communities (UVG 2005) and mangrove forests

	<p>by species (Imbert and Rollet 1989 and Fromad et al. 1998). For the below-ground biomass, the Komiyama 2008 allometric model was used, which includes specific species variables. The default IPCC carbon fraction (2006) was applied to the calculated biomass. The total tree carbon was estimated for each plot (Gómez Xutuc 2016)</p> <p>-Carbon strata map developed by GIMBUT (2017) based on climatic (WorldClim) and carbon variables from the plots, collected at the national level (Gómez Xutuc 2017). Carbon strata were estimated with Monte Carlo iterations and the median carbon density was obtained.</p> <p>-Detection of forest cover reduction by type of degradation in forest lands that remained as forests (3,621 sampling points).</p>
Value applied	<p>Degradation emission factors by carbon stratum.</p> <p>Degraded forest: Lost between 30-70% of the original coverage.</p> <p>Carbon strata (TonC/ha)</p> <p>I - 61.03</p> <p>II - 50.87</p> <p>III - 48.56</p> <p>IV - 62.60</p>
Justification of choice of data or description of measurement methods and procedures applied	<p>-Plots sampling errors</p> <p>-Lack of representation of all types of forest vegetation in the carbon estimation plots available to build the carbon strata map (e.g. dry forests)</p> <p>-Errors in interpreting forest cover reduction and quality of remote sensor inputs.</p>
Purpose of data	<ul style="list-style-type: none"> • Calculation of baseline emissions
Comments	-

Data / Parameter	Forest removal factors
Data unit	m ³ /ha/year, tC/ha/year, tCO ₂ /ha/year
Description	Forest removal factors (biomass stocks prior to conversion): Carbon increases in stored biomass as a result of the increase coniferous and broadleaved forest plantations.
Source of data	<p>Main sources of data</p> <p>-Analysis of the Mean Annual Increments of 28 species of forest plantations, measured in INAB's permanent plots for the analysis of the increase in plantations. The plots are distributed in the 22 departments of Guatemala within areas supported by the forest incentive programs implemented in the country (INAB, 2015).</p> <p>-Grouping of species (28) in coniferous and broadleaved communities with their respective MAIs, and, for each group, an IMA value was estimated with the Monte Carlo simulation method.</p> <p>-To convert the biomass MAI, the average wood density for each</p>

	group was obtained from a species database used in the analysis (DATAFORG 2000, Reyes et al. 1992) - In the calculation of the final removal factor, the biomass was converted to carbon and CO2 with the IPCC (2006) default carbon fraction (0.47) and CO ₂ (44/12) values.														
Value applied	Forest emission factors <table><thead><tr><th></th><th>MAI (m³ha⁻¹yr⁻¹)</th><th>ton C ha⁻¹ yr⁻¹</th><th>tonCO₂ ha⁻¹ yr⁻¹</th></tr></thead><tbody><tr><td>Broadleaved</td><td>3.43</td><td>1.8</td><td>6.60</td></tr><tr><td>Coniferous</td><td>7.88</td><td>3.25</td><td>11.93</td></tr></tbody></table>				MAI (m ³ ha ⁻¹ yr ⁻¹)	ton C ha ⁻¹ yr ⁻¹	tonCO ₂ ha ⁻¹ yr ⁻¹	Broadleaved	3.43	1.8	6.60	Coniferous	7.88	3.25	11.93
	MAI (m ³ ha ⁻¹ yr ⁻¹)	ton C ha ⁻¹ yr ⁻¹	tonCO ₂ ha ⁻¹ yr ⁻¹												
Broadleaved	3.43	1.8	6.60												
Coniferous	7.88	3.25	11.93												
Justification of choice of data or description of measurement methods and procedures applied	-Sampling errors in the plots to obtain the MAIs -Lack of national wood density and carbon content data by species.														
Purpose of data	• Calculation of baseline emissions														
Comments	-														

Data / Parameter	Ex ante estimated effectiveness index
Data unit	-
Description	Value to calculate the generated emission by the project
Source of data	Estimated value generated for the project. Ratio of deforestation and degradation against the forest plantation and forest regeneration
Value applied	0.45
Justification of choice of data or description of measurement methods and procedures applied	<p>- Reference levels for deforestation and forest degradation rate (ha)</p> <p>- Reference levels for Forest regeneration and forest plantations rate (ha)</p>
Purpose of data	<ul style="list-style-type: none"> Calculation of project emissions
Comments	-

3.3.2 Data and Parameters Monitored

Data / Parameter	<p>AD: area (ha) where deforestation, degradation, restoration of degraded forest areas, or forest plantations occur.</p> <p>EF: carbon content and change in carbon content for each stratum of the carbon map or type of plantation.</p> <p>GHG emissions and reductions from deforestation, degradation, restoration of degraded forest areas and increases in carbon stocks.</p>
Data unit	Ha, tC/ha, tC/ha/year, tCO ₂
Description	<p>Quantification of the number of points of the 11,369 -point grid where deforestation, degradation, restoration of degraded forest areas or forest plantations occur.</p> <p>The EF data reported in the corresponding section will be used, methodological improvements can be included in the future by making the corresponding recalculations in the FREL.</p> <p>CO₂ emissions are monitored and reported for separate deforestation and degradation for each activity, as well as emissions reductions due to increases in carbon stocks in forest plantations and restoration of degraded forest areas</p>
Source of data	Data is used at national level with a combination of remote sensing of activity data with field data used to estimate emission and removal factors. Auxiliary data from national databases can be used to improve estimates.
Description of measurement methods and procedures to be applied	<p>For ADs, the different land forest cover and change maps, maps or polygons related to field activities or drivers of deforestation and degradation and the point sampling grid for forest monitoring will be used.</p> <p>For EF, field data, forest inventory plots, permanent sites and scientific research data are used. For data processing, the 2006 IPCC guidelines are followed.</p>
Frequency of monitoring/recording	Every year
Value applied	n.a.
Monitoring equipment	<p>AD gathers information from different medium and high-resolution remote sensors, computer equipment, specialized software for the processing of satellite images, and the survey of the sampling grid.</p> <p>Forestry inventory equipment, calculation equipment and statistical software are used for the EFs. For the estimation of emissions, Excel and statistical software databases are used.</p>

QA/QC procedures to be applied	<ul style="list-style-type: none"> -Adjustment and standardization of databases used for estimates. -Continuous approval of criteria for the interpretation of the different high and medium resolution remote sensors used for interpretation. -Cross-review of interpreters with the reinterpretation of 5% of the sampling plots in the grid. -Review of logical errors in changes interpreted in images analyzing the dynamics of deforestation, degradation and carbon stock increases. -Control of forest inventory data use. -Detection of atypical data and its exclusion from the analysis regarding variables that are used for the estimation of biomass by allometric equations in the databases of forest inventories
Purpose of data	Calculation of project emissions.
Calculation method	<ul style="list-style-type: none"> Increase of sampling intensity in the national grid to have better representation at the subnational level in areas of interest. -Implementation of a National Forest Inventory that will provide more information every 5 years of the most dynamic carbon pools and carbon densities and their dynamics in most of the diverse forest ecosystems in Guatemala. -Generation of cartographic wall-to-wall models of land cover and change for monitoring every two years with a cartographic assessment and validation process generated from the point sampling grid. -Studies for the investigation of carbon dynamics in non-forest land uses, such as crops, pastures and agroforestry systems.
Comments	-

Data / Parameter	Leakage belt
Data unit	Ha, tC/ha, tC/ha/year, tCO ₂
Description	<p>Annual and cumulative areas of deforestation within the leakage belt at year t and in each stratum</p> <p>CO₂ emissions are monitored and reported for separate deforestation and degradation for each activity, as well as emissions reductions due to increases in carbon stocks in forest plantations and restoration of degraded forest areas</p>
Source of data	Satellite images

Description of measurement methods and procedures to be applied	INAB will be in charge of the climate monitoring according to the FCPF Carbon Fund Methodological Framework
Frequency of monitoring/recording	Annually
Value applied	n.a
Monitoring equipment	GIS software
QA/QC procedures to be applied	Quality assurance and quality control (QA/QC) procedures will follow the FCPF Carbon Fund Methodological Framework. Reddes Locales, also, has designated a focal point within the organization responsible for the climate monitoring.
Purpose of data	<ul style="list-style-type: none"> Calculation of project emissions
Calculation method	Activity data for calculating GHG emissions
Comments	-

Data / Parameter	Leakage belt
Data unit	Ha, tC/ha, tC/ha/year, tCO ₂
Description	<p>Annual and cumulative areas of degradation within the leakage belt at year t and in each stratum</p> <p>CO₂ emissions are monitored and reported for separate deforestation and degradation for each activity, as well as emissions reductions due to increases in carbon stocks in forest plantations and restoration of degraded forest areas</p>
Source of data	Satellite images
Description of measurement methods and procedures to be applied	Calmecac will be in charge of the climate monitoring.
Frequency of monitoring/recording	Annually
Value applied	n.a
Monitoring equipment	GIS software

QA/QC procedures to be applied	Quality assurance and quality control (QA/QC) procedures will follow the FCPF Carbon Fund Methodological Framework. Reddes Locales, in addition, has designated a person in charge of the climate monitoring.
Purpose of data	<ul style="list-style-type: none"> Calculation of project emissions
Calculation method	Activity data for calculating GHG emissions
Comments	-

Data / Parameter	Project area deforestation
Data unit	Ha, tC/ha, tC/ha/year, tCO ₂
Description	Annual and cumulative areas of deforestation within the project area at year t and in each stratum
Source of data	Satellite images
Description of measurement methods and procedures to be applied	Calmecac will be in charge of the climate monitoring.
Frequency of monitoring/recording	Annually
Value applied	n.a
Monitoring equipment	GIS software
QA/QC procedures to be applied	Quality assurance and quality control (QA/QC) procedures will follow the FCPF Carbon Fund Methodological Framework. Reddes Locales, in addition, has designated a person in charge of the climate monitoring.
Purpose of data	<ul style="list-style-type: none"> Calculation of project emissions
Calculation method	Activity data for calculating GHG emissions
Comments	-

Data / Parameter	Project area degradation
Data unit	Ha, tC/ha, tC/ha/year, tCO ₂
Description	Annual and cumulative areas of degradation within the project area at year t and in each stratum
Source of data	Satellite images

Description of measurement methods and procedures to be applied	Calmecac will be in charge of the climate monitoring.
Frequency of monitoring/recording	Annually
Value applied	n.a
Monitoring equipment	GIS software
QA/QC procedures to be applied	Quality assurance and quality control (QA/QC) procedures will follow the FCPF Carbon Fund Methodological Framework. Reddes Locales, in addition, has designated a person in charge of the climate monitoring.
Purpose of data	<ul style="list-style-type: none"> Calculation of project emissions
Calculation method	Activity data for calculating GHG emissions
Comments	-

Data / Parameter	External events
Data unit	Ha, tCO ₂
Description	Cumulative decrease in carbon stock due to forest fires and catastrophic events in the project area
Source of data	Satellite images, CEMEC forest fires monitoring events
Description of measurement methods and procedures to be applied	Calmecac will be in charge of the climate monitoring.
Frequency of monitoring/recording	At each verification period
Value applied	n.a
Monitoring equipment	GIS software
QA/QC procedures to be applied	n.a
Purpose of data	<ul style="list-style-type: none"> Calculation of project emissions
Calculation method	Activity data for calculating GHG emissions
Comments	No large forest fires or catastrophic events were detected in the project area

Data / Parameter	Risk factor
Data unit	%
Description	Risk factor for calculating VCS buffer credits
Source of data	VCS Non permanence risk analysis
Description of measurement methods and procedures to be applied	AFOLU Non permanence risk tool (VCS v4.0) or the latest version of this tool available at the standard's website
Frequency of monitoring/recording	At each verification period
Value applied	n.a
Monitoring equipment	n.a.
QA/QC procedures to be applied	n.a
Purpose of data	n.a
Calculation method	n.a.
Comments	Buffer calculation

3.3.3 Monitoring Plan

The project is aligned to the National Measurement, Monitoring and Reporting approach for estimating emissions under the ER Program. The main objective of Guatemala's MRV system's monitoring component is to generate verifiable information on GHG emissions related to deforestation and forest degradation, as well as their removal as a result of the increase in carbon stocks in forest plantations. This information was developed with consistent methodologies, to be compared against the FREL and to determine if REDD+ activities are reducing GHG emissions (FCPF, 2019).

The implementation will be carried out by the ICG (Interinstitutional Coordination Group)⁵⁹ with the technical support of GIMBUT (Interinstitutional Group for the Monitoring of Forests and Land Use). The system will be responsible for the generation of activity data, emission factors, emissions estimation, reporting and technical support for verification, with inputs and robust methodological protocols well defined and documented and based on the national reality and capacities. These methods have also been used for the preparation of the FREL, to have transparency, coherence, consistency in methods and, when possible, reduce the uncertainty of the estimates.

⁵⁹ The group is composed of four institutions in charge of forests and natural resources: the Ministry of Environment and Natural Resources (MARN), the Ministry of Agriculture, Livestock and Food Supply (MAGA), the National Forestry Institute (INAB) and the National Council of Protected Areas (CONAP).

Its design and operation are done according to Guatemala's legal framework on forestry and environmental matters and to the guidelines and requirements of international agreements. The UNFCCC and FCPF guidelines are also used which ensures report's consistency and transparency. Verification will be carried out through the technical supervision of the government (MARN) and the verifying party, either technical evaluators FCPF or the UNFCCC.

- National Monitoring Plan based on ERPD document (FCPF, 2019)

As a main input of GIMBUT, the monitoring approach bases its activity data on a georeferenced statistical sampling of the territory by remote high and medium resolution sensors that have been previously mentioned for the preparation of the FREL. This is an integrated approach with a multi-temporal monitoring of forests and other land uses designed and implemented by GIMBUT, which will provide a timely and geographically explicit analysis of the changes in the areas caused by deforestation, degradation and increases in carbon stocks. This input is complementary to the different purposes of forest monitoring, and the objective is to know the current and historical state of national forests, with multipurpose assessments that are replicable and that provide strategic information to the country. The sampling can be intensified, if necessary, to analyze the subnational scales. Currently, the sample for monitoring is 11,369 points.

The grid is part of a comprehensive integrated monitoring system of forests and other land uses, which complements the cartography generated every five years and improves the cartographic models, the thematic accuracy and detection of land changes (reduces uncertainty) to provide national statistics and international reports such as the FCPF's.

In the ER program period, the data obtained from the sampling grid will be monitored and reported and will address activity data on deforestation, degradation and carbon stock increases. This will also ensure consistency with the FREL, for the calculation of the activity data using the multi-temporal analysis with the Collect Earth platform obtained with Landsat images of medium resolution and/or high-resolution images available (Digital Globe, Planet, Aster, Sentinel, etc.). To carry out the monitoring, the activity data of the last year of the FREL (2016) and the final year of the monitoring periods defined in the FCPF reports will be taken as reference (Table 24). The activity data on the sampling grid will be generated every two years because various reports issued by the country need updated data, which will also speed up the production of forest cover and land-use change maps.

Table 24. Inputs of activity data from the MRV system for deforestation, degradation, and carbon stock increases.

Source: ERPD (FCPF, 2019).

Inputs	Type of information	Scale / resolution / sampling unit	Frequency	Source / protocols
Main inputs				
Sampling grid of points for forest monitoring	Geodatabase with variables of forest cover and land use dynamics	3.1 X 3.1 km national grid for visual interpretation in medium and high-resolution images (11,369 sampling points)	Multi-temporal assessment of land cover and land-use change every 2 years	GIMBUT, 2018
	Collection of remote sensing images (Digital Globe, Airbus, INEGI, AfriGIS, CNES)	Medium resolution: 30 m (Landsat, 5,7 and 8) High resolution: 1.24 m to 5 m (Spot, WorldView, Rapid eye, Quick Bird, Sentinel, etc.)	Interval of 15 days, monthly, annual	Google Earth, Engine and Bing Maps with the use of the Collect Earth platform (FAO, 2015)
Complementary inputs				

Inputs	Type of information	Scale / resolution / sampling unit	Frequency	Source / protocols
Forest cover and land use map	Raster and Vector Geodatabases	1 ha (Landsat 5, 7 and 8, 30 m)	From 5 to 4 years (2001, 2006, 2010 and 2014)	UVG-INAB-CONAP, 2006; UVG-INAB-CONAP, 2011; MAGA, UVG-INAB-CONAP-URL, 2012
Forest dynamics map	Raster Geodatabases	1 ha (Landsat 5, 7 and 8, 30 m)	From 5 to 4 years (2001, 2006, 2006 and 2010)	GIMBUT, 2012
Fire scars	Geodatabases	1 ha (Landsat 5, 7 and 8, 30 m)	Annual	CONAP, 2018
Forestry incentives map (PINFOR, PINPEP and PROBOSQUE)	Vector Geodatabases	0.0035 ha, minimum mapped area (PINPEP) 0.25 ha, minimum mapped area (PINPEP)	Annual	INAB, 1999-2010; Samudio 2017;

As an improvement in the activity data monitoring, the grid will complement the development and assessment of the thematic accuracy of the wall-to-wall land cover maps that have been generated since 2001 (2001, 2006, 2010 and 2014) and maps of forest gain and loss dynamics (2001-2006 and 2006-2010). This is focused on meeting the requirements to prepare GHG inventory maps for the LULUCF sector according to IPCC guidelines and the FCPF methodological framework. Both methods are compatible and use the IPCC land classification criteria and will define, for each category, classes and subclasses, which could generate better wall-to-wall maps as of 2016. However, the monitoring report will continue to use the sampling grid to ensure consistency.

For activity data on degradation and deforestation, there are also inputs from forest fire areas that can be integrated into wall-to-wall maps and point grids using CONAP's SIGMAI (Geospatial Information System for Fire Management in the Republic of Guatemala) and making the data compatible. On the other hand, it will also be assessed if the areas mapped and supported by INAB are captured in the grid to have data for evaluating and validating forestry incentives programs as of 2016. Monitoring this detail could imply an increase in the sampling intensity of the grid to capture higher-resolution subnational data, not only on carbon increases but in the assessment of all REDD+ actions by regions. For this purpose, there is already a proposal by INAB to increase monitoring to a 1.55 x 1.55 km grid or quadrants with 45,426 sampling points. There are also national efforts by INAB and CONAP to monitor degradation areas where the use of uncontrolled firewood and illegal logging is carried out and to integrate annual statistics of these activities and provide more information to improve the estimation of degradation.

The emission factors used in the FREL are also the main input of the MRV system that is based on the carbon strata map, where the best national data on biomass carbon in forests is collected and analyzed, to systematize and analyze forest inventories for different purposes, allometric models and bioclimatic variables (Table 25). From this base information, emission factors for degradation were obtained as a proxy for degradation based on the loss of coverage. In conjunction with MAGA's data on land use factors after conversion to agroforestry crops, activity data regarding emissions from detected deforestation were estimated. The removal factors used for MRV are the same used for increases in carbon stocks from permanent forestry plantations in forest incentive programs (INAB) with growth models for different species and that are used for the estimation of emissions in areas where a change from other lands to planted forests is detected.

Table 25. Main MRV system inputs of emission and removal factors from deforestation, degradation, and carbon stock increases.

Source: ERPD (FCPF, 2019).

Inputs	Type of information	Resolution / sampling unit	Frequency	Protocols	Source /
Emission factors	Carbon strata map	Raster and Vector Geodatabases.	1 ha	Dependence inventory availability on	GIMBUT, 2017. Gómez Xutuc, 2017;
	Plots of inventories forest	Integrated and standardized databases	National	Variable availability	
	Allometric equations	Models	Species and plant communities	Availability based on analysis publication	UVG 2015; Arreaga 2002, Imbert and Rollet 1989 and Fromad et al. 1998
	Land use carbon density in agriculture, livestock use and agroforestry systems	Databases and estimation process in carbon quantification. Specific studies	Districts of crop producers and agroforestry systems	Availability based on analysis publication	ANACAFÉ, 1998; Castillo 2006
Removal factors	Permanent plots	Databases	Plots in forest plantations	Annual	INAB, 2012; Samudio 2017.
	Growth models	Annual average increases and removal factors	National (forest plantations)	Availability based on analysis publication	INAB, 2012; Samudio 2017.
Emission/removal factors	National Forest Inventory (in design phase)	Tabular georeferenced databases	National	Every 5 years	INAB, 2018

However, although carbon strata maps are an essential input, they are limited for not being dynamic and depend on the availability of updating new plots of forest measurement or re-measurements of the analyzed plots, which makes them very complex to use as a long-term input. Therefore, a substantial improvement in the MRV for emission and absorption factors in the medium term is the plan to start up a National Forest Inventory for multiple purposes where a network of 715 inventory sites will be established to collect variables related to the content of carbon from biomass above ground, below ground and dead organic matter, with a design of three secondary sampling units (Figure 33).

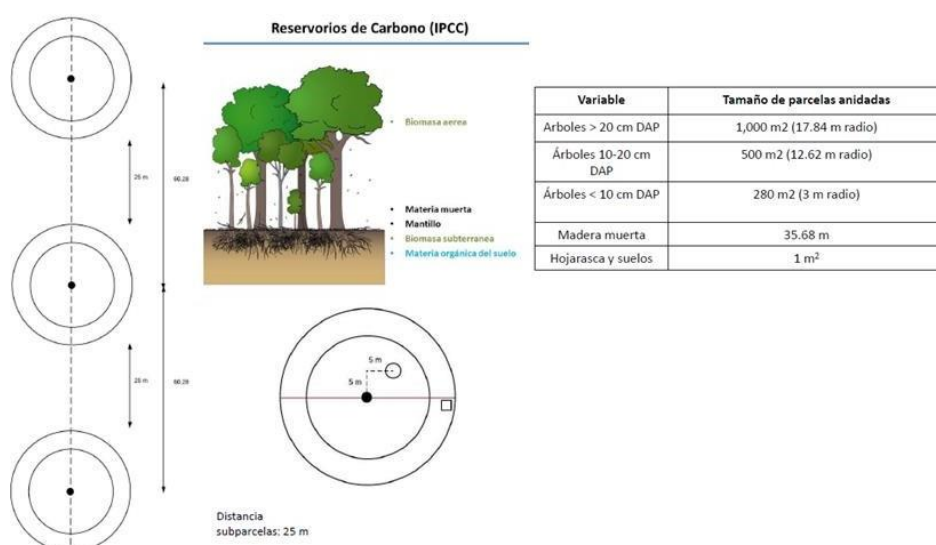


Figure 33. Design of sampling units of the National Forest Inventory and measurement of variables.

Source: ERPD (FCPF, 2019).

The National Forest Inventory will be measured with a frequency of 5 years with 1/5 of sample each year. This will provide more accurate estimates of the most dynamic carbon pools in the processes of deforestation, degradation and stock increases. The NFI plots are in the same points of the grid, which harmonizes carbon density with the activity data or the deforestation, degradation and increases areas.

Organization structure for measurement, monitoring and reporting

The MRV system has been built according to the country's capacities, and from existing platforms, studies, data and processes, taking into account a variety of governmental, non-governmental institutions, including academia, research centers and Civil society organizations. In addition, it is based on the current legal framework: Forestry Law (Decree 101-96), Protected Areas Law (Decree 4-89), Framework Law for the Regulation of Vulnerability Reduction, Compulsory Adaptation to Climate Change Impacts and Mitigation of Greenhouse Gases (Decree 7 -2013). These laws establish mandates for different governmental institutions to collect and process information according to their scope of action.

For the implementation of the MRV System, it is considered that it will be formed as an interinstitutional collaborative system that maintains close coordination with multiple stakeholders of the REDD+ process. For this, there is a steering committee, in charge of the Interinstitutional Coordination Group (ICG), which has a political and a technical component. The ICG is made up of the Ministry of Environment and Natural Resources (MARN), the National Forest Institute (INAB), the National Council of Protected Areas (CONAP) and the Ministry of Agriculture, Livestock and Food Supply (MAGA). This group was officially formed through a technical cooperation agreement for the conservation and sustainable management of natural resources. The agreement has the aim to establish a framework of interinstitutional and technical coordination for the generation and harmonization of digital national information on forest cover, other land uses and related topics (Table 26).

This group receives contributions from other non-governmental organizations, communities, indigenous peoples and others, which are considered supporting organizations. All the information of the MRV system is integrated and systematized by MARN, which serves as the integrating unit and reports generator; this ensures consistency between the information generated within the REDD+ framework and what is reported to other institutions such as the UNFCCC, including GHG inventories for the LULUCF sector.

Table 26. Roles and responsibilities of the groups and institutions implementing the MRV system.

Group	Roles / Responsibilities regarding the MRV system
Steering Committee - Political ICG	Direct, at the highest level, the activities of the system. Make management decisions regarding the system. Define the policies for its development, operation and financing. Establish and develop a long-term vision. Ensure the sustainability and institutionality of the system.
MRV system's integrating unit - MARN	Compile, integrate and systematize the information generated and already absorbed by the institutions. In charge of the MRV System reporting phase. Maintain methodological homogeneity. Define information exchange protocols. Ensure the consistency of the different national and international reports.

Group	Roles / Responsibilities regarding the MRV system
Information generating institutions group (Technical ICG, GIMBUT)	Generate technical information ensuring its quality. Document technical procedures. Generate methodologies and research. Image processing. Field verifications. Coordinate and implement data collection of forest and carbon inventories. Give continuity and credibility to the generated information.
Group of support organizations - communities, indigenous peoples, national and international NGOs, CNSAS and fund donors	These organizations can support the forest monitoring process, through financial and logistic support. Field verifications. Data collection of forest and carbon inventories. Community monitoring of variables in their territories.

Community Forest Monitoring

Calmecac is the main entity responsible for the project's MRV. The reporting monitories report will be verified by INAB, ensuring a quality assessment and control.

For the Reddes Locales project, forest monitoring will be performed at the community level. The MRV system will determine annually the evolution of forest cover, local dynamics, the status of natural forests, plantations for protection purposes, production, agroforestry and silvopastoral systems in the models used. In addition, qualitative data collection methods will be used, such as interviews or digital surveys. A system to collect data with remote sensing and local community-friendly technologies will be implemented. The community forest monitoring system should include as a priority the participation of women and youth.

Moreover, community monitoring brings a series of benefits such as social participation that allows covering local information needs, improves transparency in the management of natural resources, and identifies existing resources and their state of conservation. Community monitoring seeks to generate relevant information for communities, increase their technical knowledge and generate an exchange of experiences to improve the capacities of people who manage natural resources.

This system will be integrated with a series of indicators that will be fed from various sources and in the same way, will feed the compliance reports of other documents, such as the Forest Management Plan and the Stakeholder Participation Plan. The MRV Unit will update the indicator matrix with reports from community forest monitoring, satellite forest monitoring, national reports and project progress reports as often as necessary and will provide ongoing feedback through validation of the means of verification (Figure 34).

The municipal forestry technicians will be in charge of the municipal report. After, all the information collected will be the basis of the project report and will be provided annually to the Reddes Locales Council, for a general evaluation of the implementation. The result of the evaluation will be a series of recommendations and lessons learned, which should be systematized for replication and communication, or adaptation of the methodologies of implementation of activities and fulfill a cycle of continuous improvement for the project. The following diagram represents the operating structure of the system.

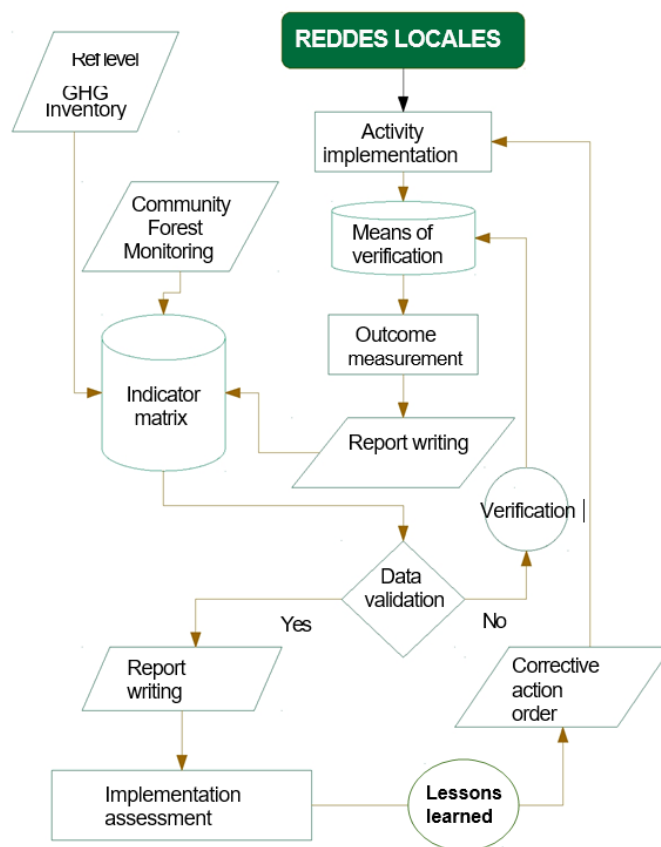


Figure 34. Diagram of the monitoring, reporting, and verification system for the Reddes Locales project.
Source: Calmecac (2020).

Monitoring team

The monitoring team will be formed by 4 to 5 persons of the community, and be supported by the Municipality Forestry Office (Calmecac, 2020b):

1. Community supervisors (according to the size of the territory):

They are the persons in charge of supporting the technical assistants in the fulfillment of the activities in each monitoring zone. In addition, they must make periodic routes trips, making measurements and verifications. They will also be in charge of the socialization and awareness process for each zone, and the preparation of zonal monitoring reports to be submitted to the technical forestry officer.

2. Community technical assistants (number according to the size of the territory):

They are the persons in charge of measuring, establishing the plots and recognizing the forest species. It is suggested to have at least two or three persons with extensive knowledge of the forest.

3. Administrative assistant:

This person must have basic administrative training. Their function will be the monitoring and reporting to the committee about the use of the administrative resources.

4. Representative of the organization or institution:

This person must accompany the monitoring team. In addition, they will provide technical support and facilitate the systematization process.

Monitoring activities

The forest monitoring will be following the monitoring guidelines develop by Calmecac (2020b) with support of governmental institutions such as MARN, MAGA, CONAP (support document available for auditor). The community forest monitoring will apply 60x50 m plots, dividing the plots in 10 m transects on each side. Besides the tree monitoring (diameter at breast height, tree height); it will also be monitored the qualitative variables such as the state of the tree, its degree of phytosanitary condition (the health of the tree), its phenological data (flowering and fruiting) and its community uses. The qualitative variables are described in Figure 35.

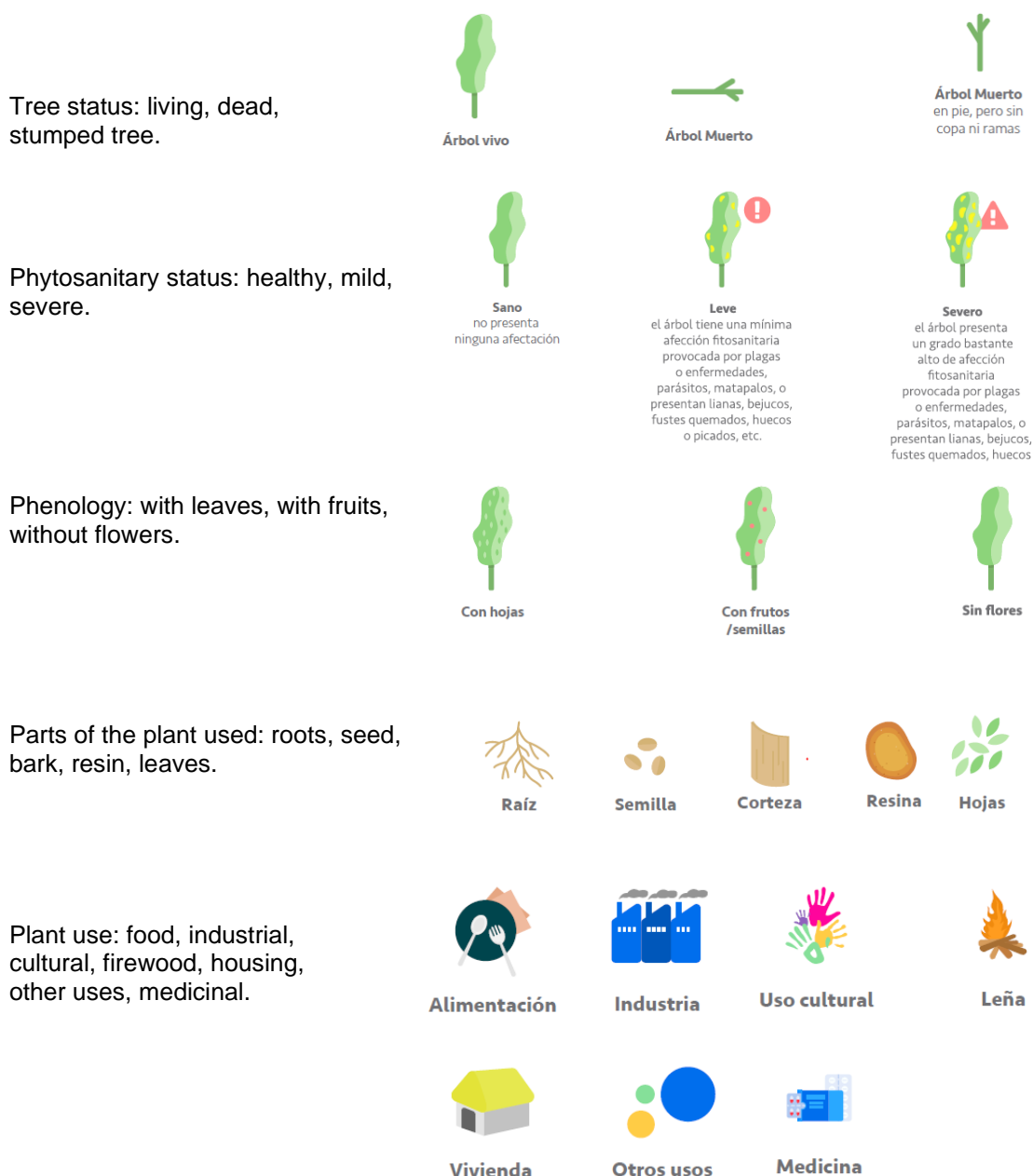


Figure 35. Qualitative variables for the climate project monitoring.
Source: Calmecac (2020).

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

In line with its ERPD, Guatemala will have a web platform with direct and visible access for interested parties. Nevertheless, a single means of information dissemination is not enough, therefore; it is considered other mechanisms for community outreach, which involve the use of alternative channels such as radio, television, social networks, and smart mobile phone applications.

3.4 Optional Criterion: Climate Change Adaptation Benefits

3.4.1 Regional Climate Change Scenarios (GL1.1)

The country is among the five most vulnerable nations in the world regarding climate change impacts. This is reflected in three or more threats to the country's gross domestic product (GDP). Around 83% of Guatemala's GDP is generated in risk areas. According to the 2011 Global Assessment Report on Disaster Risk Reduction (UNISDR, 2011), Guatemala is one of the countries with the highest "extensive risks", associated with many localized weather hazards and is directly influenced by factors such as poorly planned and poorly managed urban development, environmental degradation and poverty (FCPF, 2019). In addition, Guatemala is a mostly mountainous country. The climate varies with the topography, ranging from hot and dry to cool and humid. Currently, tropical storms, droughts, and extreme rainfall are the most significant climate hazards.

The Caribbean coast is extremely susceptible to hurricanes and other tropical storms. The main climate concerns in Guatemala revolve around agriculture and threats to natural resources. Drought and flooding could threaten the viability of critical crops. Additionally, Guatemala's key agricultural exports - including coffee, sugar, bananas, and vegetables- are climate-sensitive and production could be altered by changes in precipitation, temperature, and extreme events (USAID, 2012).

Figure 36 shows that the project zone is likely to increase temperature between 1.5 and 2.5 °C by 2050. The project zone is within the areas more affected by drought in the future, in special, the dry corridor which is already hit by frequent droughts.

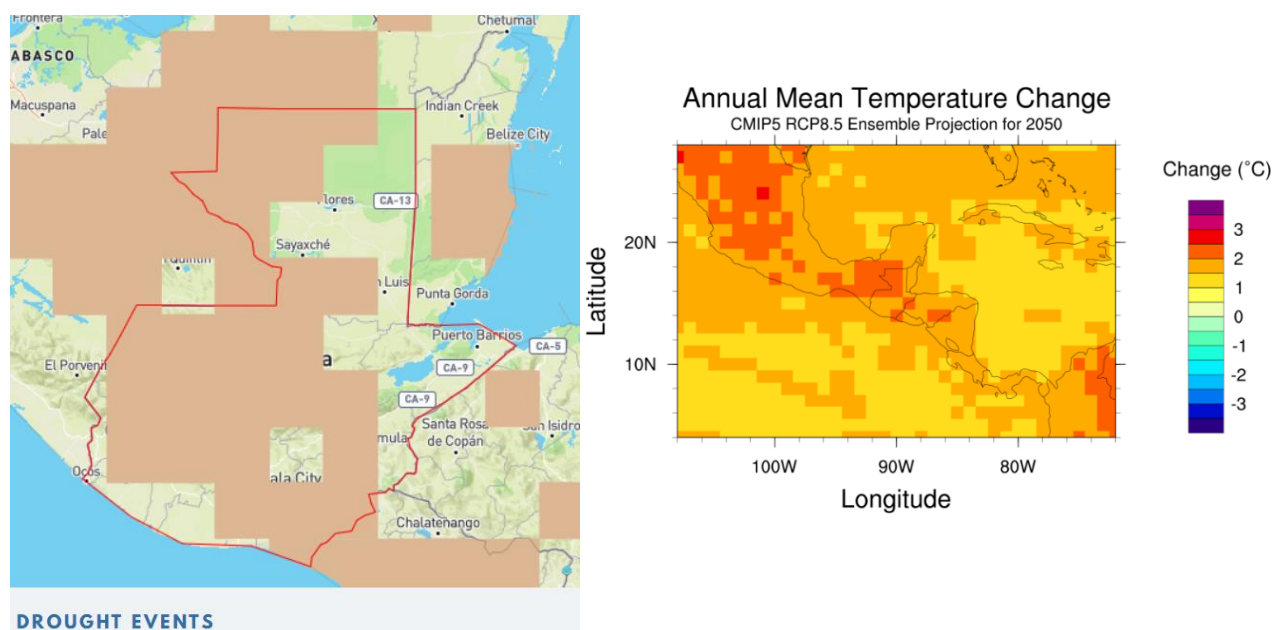


Figure 36. Future temperature increases and drought events in Guatemala.
Source: Climate Change Knowledge Portal.

USAID (2012) mentioned the following characteristics for Guatemala under the climate change events:

TEMPERATURE: According to the Climate Change Knowledge Portal (CCKP), climate models project increases in average monthly temperature between 1.5°C and 4.5°C above current levels by 2050. May is projected to be the hottest month by 2050, with temperatures exceeding 28°C.

PRECIPITATION: Model projections for changes in precipitation are less conclusive than those for temperature. Data suggest that under different emissions scenarios, precipitation could either increase or decrease. The CCKP points to results that project an average reduction in precipitation by 2050 for July-September, with August showing the biggest decrease.

EXTREME EVENTS: Droughts, tropical storms, hurricanes, and cyclones present a current threat to Guatemala. Projections lack clarity about whether these extreme events will increase or decrease in frequency and severity. Heat waves, however, are projected to intensify, due to the combined increase in temperature and decrease in summer precipitation.

3.4.2 Climate Change Impacts (GL1.2)

Climate change will impact the community's well-being, especially in food security. Climate variability and weather extremes (increased temperature outside of the adapted range of crops) adversely affect the duration and seasonality of crop cycles, often leading to crop failure. Water shortage and increased desertification due to droughts also inhibit crop productivity. Indirectly, climate change will affect the incidence of pests and diseases, the cycling and availability of nutrients in the soil, and will lead to an increased propensity for fires. In severe drought conditions, poor agricultural practices (deforestation, soil erosion, and excessive pesticide use) will also degrade the quality and quantity of surface and groundwater. Lastly, El Niño events, which typically last around 12 months, compound vulnerability by prolonging drought periods and causing crop failure due to a reduction in water availability (GFDRR, 2011).

For example, in the Central America drought in 2014-2015, Guatemala was affected in 70% of the territory and the poorest 54% of the population. Approximately 236,000 families faced situations of food insecurity. Up to 75% of maize and bean crops were lost, and thousands of head of cattle were lost (ECLAC, 2015).

Potential impacts on ecosystems would not only result from climate change, but also the reaction of the human population to it. For instance, if yields of basic grains and other products decrease, the pressure to increase the area of agricultural land at the expense of forests would increase (Ibid.). This action will impact directly the endemic species, which are sometimes considered to be indicator species, too. Indicator species are usually the most sensitive to perturbations, and drastic changes in their population raise a flag that something is happening (Anderson et al, 2008). Further, forest degradation and fauna diversity are linked. Martínez-Ramos et al. (2016) strongly suggest that fragmentation and defaunation are significantly correlated. According to Roth (2017), the amphibians are the most susceptible animals to disturbance (bad vision and hearing, hidden lifestyle), followed by reptiles (bad hearing, hidden lifestyle but sensitive to soil vibration), mammals (species with night and twilight activity) and in minor intensity birds.

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

Adaptation measures can help reduce vulnerability to climate risks. Reduce carbon emissions is part of the measure to halt the impacts of climate change. Other actions include clarification of land tenure, support forest management and governance, facilitate technology transfer, and enhance ecosystem-based adaptation programs.

The project activities are designed to adapt and mitigate climate change effects. Between the main activities are the protection of natural ecosystems and their biodiversity, which is essential for maintaining the multiple services that these provide to humans and other living creatures. Also, the implementation of land-use strategies and land management plans based on technical studies (especially forest management plans), recovery and rehabilitation of degraded lands, increment on the formalization of land ownership (PINPEP and PROBOSQUE programs), the promotion of sustainable and diversified production practices, including agroforestry and agrosilvopastoral systems. In addition, communities will be benefited from the diversification and strengthening of the value chain of timber and non-timber products which allows them to have different sources of income.

4 COMMUNITY

4.1 Without-Project Community Scenario

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

Guatemala ranks 133 out of 187 nations in the world by its Human Development Index (HDI), last in Central America and last among Latin American countries with an index of 0.581, with a life expectancy of 71 years (INAB & ICC, 2019). The country had an internal armed conflict that lasted 36 years (1960 to 1996); this situation had an impact on the means of agricultural production and forest dynamics.

Regarding the communities identified in the project zone, these are the communities, indigenous communities, villages, landowners, landholders, farmers, and other living within the project boundaries and basing their livelihood on the land utilization. Socio-culturally, the communities located in the project zone have similarities in the social organization, political structure and livelihood. The main agricultural activities are subsistence farming and cattle ranching, which is associated with the dynamics of forest degradation and changes in land use (increasing of the agricultural frontier). Concerning the population, it's mainly gender-balanced, municipalities present extreme poverty above 30%, and it is a multiethnic and multilingual indigenous territory.

A detailed description of the project zone is provided in the following tables. Information was taken from the Municipal Development Plan (support documents) for each of the municipalities involved in the project.

a) Demographic variables of the municipalities

Table 27 shows the cultural characteristics and population aspects of the project area⁶⁰.

Table 27. Characterization of the municipalities' demographic variables.

Department	Diversity within the community
Huehuetenango	<p>Jacaltenango: The gender population composition is 47% male and 53% female. The municipality inhabitants are relatively young, 56.60% under 20 years old. 98.7% of the population is indigenous, and 1.3% is ladina. The main language communities are: Popti' (94.2%), Akateco (2.7%), and Mam (1.2%). Poverty reaches 58.21% and 8.52% are in extreme poverty. Further, 36% of the population is economically active (EAP), of which 6.43% are women and 29.57% are men.</p> <p>Santa Ana Huista: The female population in the municipality is 52%. 75% of total inhabitants live in rural areas. 57% of the municipality inhabitants are</p>

⁶⁰All information is taken from the Municipal Development Plan for each of the municipalities involved in the project area.

Department	Diversity within the community
	<p>below 20 years old. Further, 72% of the population is Ladino and 28% is indigenous, mostly belonging to the Mam and Popti' ethnic group. Municipal poverty is 63.71%, and inhabitants living in extreme poverty are 13.6%. The 31.95% belong to the Economically Active Population, 9% of which are women.</p> <p>Nentón: The incidence of extreme poverty is 31.80%, and urban general poverty reaches 91.83%. Economically Active population in 79% for men and 21% for women. General poverty in the municipality is 83.90% and extreme poverty is 29.10%.</p>
Quiché	<p>Nebaj: In terms of the population by sex, women represent 51% and men 49%. The indigenous people represent 95% of the total population. The rural population predominates with 65%. The predominant language is Ixil. Spanish, Kiché and Kanjobal are also spoken, usually in the communities in the north of the municipality. The EAP is 21%, of which 17% are men and 4% are women.</p> <p>Chajul: The population sex rate is 49.60% for women and 50.40% for men. 50% of the population is under 15 years old. Also, 65.98% is located in a rural area. The population is mainly indigenous, 95% is identified as Ixil and Q'eqchi; and 5% ladina. General poverty is 92.8% and extreme poverty is 25.6%. The EAP is a balance between men and women, being 50.59% and 49.91% correspondingly.</p> <p>Cotzal: Population sex rate is 51% women and 49% men. 68% is located in the rural area, and 32% in the urban area. 99% is the indigenous population. General poverty is 83.40% and the extreme poverty population is 29.10%.</p>
Alta Verapaz	<p>Cobán: 99.8% of the population lives in urban areas, while 0.2% in the rural areas. 31% belong to the EAP. 85.3% of the population belongs to the Q'eqchi ethnic group.</p> <p>San Pedro Carchá: 92% of the population lives in rural areas. The majority of the population is indigenous of the Q'eqchi' language community (99.3%). Also, 88.04% of the population is under poverty, and 42.81% in extreme poverty. The EAP is 40%, but usually, it is related to unskilled labor, which means that families have a very poor quality of life.</p> <p>San Agustín Lanquín: Women's population is 50.37%, meanwhile men are 49.62%. The rural population is predominant in the area (89.60%). Urban areas are divided into social and cultural groups. 99% of the population is indigenous and it belongs to the Q'eqchi ethnic group. Extreme poverty reaches 57.93% and general poverty is 92.2%.</p> <p>Cahabón: The population is mainly located in rural areas (90%). 97.99% of the population is indigenous and it belongs to the Q'eqchi ethnic group. General poverty is 93.76% and extreme poverty in the municipality is 61.10%. There is a lack of employment sources, access to land for farming and educational opportunities to improve the quality of life in the medium and long term.</p> <p>San Juan Chamelco: The municipal population composition is 49% men and 51% women. 75.3% live in rural areas. Q'eqchi' ethnic group is the</p>

Department	Diversity within the community
	<p>majority with 98% of the population belonging to this group, the other 2% is conformed of non-indigenous people and the Poqomchi' ethnic group. 81.8% of the population lives in poverty and 38.2% in extreme poverty.</p> <p>Tamahú: Population sex rate is 50.23% men and 49.77% women. 92% of inhabitants live in rural areas. The 88.62% are categorized as living in general poverty and 38.03% in extreme poverty. The population belonging to the Poqomchi' language community represents 73.21%, the Q'eqchi' 26.62%, and Spanish 0.16%.</p>

b) Well-being of the communities

Table 28 shows the socio-economic information of the municipalities involved in the project⁶¹.

Table 28. Characterization of the municipalities' well-being.

Department	Well-being information
Huehuetenango	<p>Jacaltenango (SEGEPLAN, 2018b):</p> <ul style="list-style-type: none"> - Food security: Of a total of 27 characterized communities according to the risk of food and nutritional insecurity in Jacaltenango, 10 have been categorized as not at risk, 13 as medium risk and 4 as high risk. - Education: All villages and counties have pre-primary and primary schools. Due to the high indigenous population, 25 of the pre-primary schools are bilingual (Popti'-Spanish) and are located mainly in rural area. Jacaltenango is the only municipality in the region that has an Agricultural Training School, which provides scientific and practical knowledge for agricultural production. - Health: 95.4% of the population has household water, the rest is supplied by rivers, springs, or wells. Not all water distribution systems are treated for human consumption, only 13% of the population consumes drinking water. Further, there is no sewage treatment plant, all the drains go to the rivers (mainly the Rio Azul). Also, 99% of the populated places have electric power - Community organization: There are a total of 35 registered COCODEs (Community Development Councils and Municipal Development Council). - Productive activities: Productive organization provides marketing services, training, and technical and financial assistance for the production of coffee, honey, hibiscus rose, among others. The main cash crop is coffee. - Environmental dimension: 85% of the surface area of the municipality of Jacaltenango is forest land. However, the need for food production (especially basic grains) and the demand for forest

⁶¹ All information is taken from the Municipal Development Plan for each of the municipalities involved in the project area.

Department	Well-being information
	<p>resources is causing an advance in the agricultural frontier, loss of forest cover and biodiversity; this is reflected in the land-use conflict.</p> <p>Santa Ana Huista (SEGEPLAN, 2010i):</p> <ul style="list-style-type: none"> - Food security: There are 3 communities at low risk, and 13 communities at middle risk. The situation of food insecurity and chronic malnutrition is related to factors such as poverty, the production of basic grains in soils with a forestry vocation and without soil management, low yields of maize and beans, and a poor diet of the population. - Education: The municipality has the lowest percentage of illiteracy in the Huista Commonwealth. Its literacy rate is 84.7%. - Health: 94% of the population of Santa Ana Huista has domestic water service, 5.65% stores water in cans, and the rest is supplied by rivers, springs or wells. Also, 80% of the population has electricity service. - Community organization: There are 20 COCODEs, which is equal to 100% of the villages. - Productive activities: in the location exists the “teocinte” (<i>Zea mays L. var. Huehuetenanguensis</i>), which is wild maize with great genetic potential to improve other varieties. It is a unique species in the world and endemic to Huehuetenango. In Santa Ana Huista, this species is found in Mampil Hill. - Environmental dimension: the constant loss of scarce forest cover, is closely related to the advance of the agricultural frontier and the land use conflict, which indicates that 68% of the territory is overused (mainly in the Rancho Viejo River sub-basin). In addition, 80% of the population do agriculture activities (maize, beans, peanut, and coffee). <p>Nentón (SEGEPLAN, 2018a):</p> <ul style="list-style-type: none"> - Food security: It is related to the low production, availability and access to nutritious food, especially basic grains for self-consumption and sources of plant protein due to poor land tenure and soil depletion. - Education: the municipality suffers from a considerable dropout rate especially at the primary level, it is observed that children stop studying because of the need to work, emigrate to northern countries or simply lose interest in school achievement. - Health: The coverage of the public water distribution service is 23.21% in the rural area and 100% in the urban area. - Productive activities: The main seasonal crops in the region are maize, beans, tomatoes and some vegetables. The percentage for the use of pastures and grazing land is also relevant, which confirms the existence of livestock activity. The employment conditions are mostly self-employment, a large proportion of the population is

Department	Well-being information
	employed in agricultural work, and a lower percentage in trade and services.
Quiché	<p>Nebaj (SEGEPLAN, 2010d):</p> <ul style="list-style-type: none"> - Food security: The main causes of malnutrition in the municipality are low-income levels, lack of employment sources, food shortages, non-diversification of crops, lack of land and technical advice. - Education: The educational coverage of the municipality is 55% of the total school-age population, distributed as follows: urban area 19% and rural 36%. The illiteracy population reach 38%. - Health: Only 76% present health service (latrines) - Community organization: There are 3 cooperatives, and several local associations which promote agricultural and livestock technical assistance activities, cultivation and processing of medicinal plants, and credit and food safety. - Productive activities: Mainly maize production (subsistence), followed by coffee and beans. Agriculture represents 78% of the municipal economy. - Environmental dimension: The advance of the agricultural frontier, occurs in the middle of the municipality due to the concentration of population centers. In terms of potential land use, 80% is suitable for forestry, 15% for grazing and only 5% for agriculture. <p>Chajul (SEGEPLAN, 2010a):</p> <ul style="list-style-type: none"> - Food security: Only 3.17% of the communities do not present risk to food security. - Education: When parents are unable to cover the costs, choose to withdraw their children from school, leaving them to work the land and contribute to the family's support. Men usually dropout school after primary education. The illiteracy rate is 39.04%. - Health: 8.10% of the population does not have access to health services. - Community organization: It existed 60 COCODEs by 2009. - Productive activities: Maize and beans are the main products, where 9 out of 10 families cultivated these crops. 95% is for self-consumption, and 5% for sale. - Environmental dimension: 26% of the territory of Chajul is being over-utilized. Evidence of this situation is that the capacity of use of the soil has been exceeded, due to the high rates of erosion, which diminish the levels of annual production until they become unusable. <p>Cotzal (SEGEPLAN, 2010h):</p> <ul style="list-style-type: none"> - Food security: More than 50% of the communities present a high risk of food insecurity.

Department	Well-being information
	<ul style="list-style-type: none"> - Education: Not all people who start the primary education can finish school, due to usually parents needing to migrate for better opportunities or lack of financial means. - Health: Water tenure and quality is still a problem for most communities. Around 75% have piped water in the urban area, meanwhile, the communities use streams. - Community organization: there are 39 COCODEs. - Productive activities: More than 80% of the municipality populations do agriculture activities (farming and cattle ranching). Maize and beans are the main crops. Coffee is also produced in the region. - Environmental dimension: Every five years, between two and three new population centers emerge, due to the lack of planning and land management. This constitutes a risk for the natural resources thus increasing the agricultural pressure.
Alta Verapaz	<p>Cobán (Puluc, 2009):</p> <ul style="list-style-type: none"> - Education: 4 universities exist in the region, nevertheless, the basic education infrastructure needs investment. - Community organization: There are 321 COCODEs. - Productive activities: agriculture is the main activity. The producers use traditional systems to grow. The cleaning of the land is done through slashing (burning). The main crops are coffee, cardamom, maize, and bean. - Environmental dimension: Only 7% of the soils are suitable for agricultural production, 93% for forest production and ecosystem conservation <p>San Pedro Carchá (SEGEPLAN, 2010f):</p> <ul style="list-style-type: none"> - Food security: It is threatened by the lack of employment sources and access to land. - Education: There are differences in rural and urban education. After primary school, the urban population prefers to go to the municipal center because they expect it to be a better education system (if the financial means are covered). For the rural areas, the lack of economic resources of families is a limiting factor, since children have to work for their livelihood, which generates absence in schools. - Health: Around 19.56% counts with piped water - Community organization: The COCODE committees meet periodically with the Municipal Development Council to prioritize and decide upon the future development of the municipality. - Productive activities: The main products are maize, beans, coffee, and cardamom. The production is for subsistence, but some families decide to sell their entire production to obtain economic income.

Department	Well-being information
	<ul style="list-style-type: none"> - Environmental dimension: There is little environmental education, and it is reflected on the excessive use of fertilizers and insecticides. <p>San Agustín Lanquín (SEGEPLAN, 2010e):</p> <ul style="list-style-type: none"> - Food security: It is related to poverty levels, mainly by poor social capital and lack of opportunities for the employment market. - Education: Literacy in the municipality reaches 62.81% - Health: Around 31.3% of the population has access to potable water. The problem is focused on the collection and distribution of water. - Community organization: There are 9 COCODEs, one in each micro-region. - Productive activities: The majority of the population is dedicated to subsistence agriculture (production of basic grains) and on a smaller scale, to livestock production. - Environmental dimension: The municipality is covered mainly by forest, but agricultural activities are increasing (such as the planting of coffee and cardamom) generating a conflict in the use of the soil, which results in high rates of erosion, loss of nutrients, and low soil productivity. <p>Cahabón (SEGEPLAN, 2010j):</p> <ul style="list-style-type: none"> - Food security: Communities with medium to high levels of food risk engage in subsistence activities (production of basic grains); while communities with low levels of risk engage in larger agricultural activities that allow them to generate higher household incomes - Education: Literacy is 64.64%, where men present 74.06% and women 55.38%. - Health: 42.96% of the households have piped water, and 45.4% counts with potable water. - Community organization: every micro-region presents its COCODE. - Productive activities: Maize and beans are the main products, where around 87% of the population work in the agricultural sector. - Environmental dimension: Despite the vast water network, the problem of water scarcity is a major concern during the summer season, mainly in the northern region, where the rate of deforestation is high, and the tributaries and rivers are very scarce. <p>San Juan Chamelco (SEGEPLAN, 2010g):</p> <ul style="list-style-type: none"> - Food security: 7.47% of the population is under high risk of food security. The family diet consists mainly of maize, black beans and green beans. - Education: The pre-primary level is still insufficient, due to the lack of resources, the availability of human resources for care at this

Department	Well-being information
	<p>level, and the interest of parents to send their children to study. Literacy in the region is 71.6%.</p> <ul style="list-style-type: none"> - Health: Water distribution is unequal. There are a high demand and low administrative capacities. - Community organization: There are 4 COCODE at a micro-regional level. Women participation reached only 11.11% - Productive activities: Ecosystems are being threatened by the advance of the agricultural frontier, caused mainly by population growth, the practice of sedentary agriculture and the migration of farmers to forested areas. The main crops are tomato, potato, maize and beans. - Environmental dimension: Around 84% of the land is over land use rights dispute, in which communities demand and claim ownership of the land they have in use and possession. <p>Tamahú (SEGEPLAN, 2019):</p> <ul style="list-style-type: none"> - Food security: Families do not have the economic resources to access food, basic needs products and to have a varied diet. Most of the families are fed with maize, beans, pacayas and native herbs, affecting the children's nutrition. Around 24% of the municipality is categorized as high food risk. - Education: Literacy rates are 73.7%. The student assistance is 46.50% at the pre-primary level, 78.70% at primary education, 24.34% in basic, and 5.22% in diversified. - Health: It exists a deficiency of public services, especially the lack of drainage services. - Community organization: There are 6 COCODEs distributed in the micro-regions. - Productive activities: The agricultural production of pacaya, coffee, cardamom and broccoli - Environmental dimension: 73.64% of the soils are being underused, while the 17.09% are overused.

c) Traditional knowledge and culture of the communities

Table 29 shows the cultural and tradition knowledge of the communities in the project area.

Table 29. Characterization of the municipalities' traditional knowledge.

Department	Cultural characteristics
Huehuetenango	Jacaltenango: The Popti' language community use medicinal plants for feeding or for treating diseases (SEGEPLAN, 2010c).
Quiché	Nebaj: According to the SEGEPLAN (2010b), there is around 15 to 30 ceremonial centers from the Ixil Mayan culture which are sacred places for

Department	Cultural characteristics
	<p>worship and ceremonies. Other places are constituted as caves, which keep myths and legends that have been passed down from generation to generation.</p> <p>Chajul: There are more than 22 sacred places although it is considered that there should be more places, they have not been preserved.</p> <p>Cotzal: There were identified 13 sacred places for the Mayan ceremonies. They have spiritual value, some keep stories, myths and legends, which strengthen the Ixil cosmovision.</p>
Alta Verapaz	<p>San Pedro Carchá: There is a recognized sacred place called Cojaj, although it is known that there are more sacred places in the municipality without these being legally recognized, but they are frequented by families who make offerings from the Mayan worldview (SEGEPLAN, 2010f).</p> <p>San Agustín Lanquín: Within the municipality, there are two recognized Mayan altars, which are the Grottos of Lanquín and the altar located in Semuc Champey.</p> <p>Cahabón: The most important ceremonial centers (Mayan cosmovision) are the caves of Secanante, Sehuk hill, and the cave of Q'ana Itzam.</p> <p>San Juan Chamelco: The ceremonial places are Don Juan Cave in Chamil, Rey Marcos Caves in Santa Cecilia, Xaliha Hill, Sacquil Caves in the village of Sacquil, and the cave of San Marcos Chamil in the village of Cha il. The first two are of high importance as here ceremonies are performed.</p> <p>Tamahú: There is one sacred place called Panalmacen.</p>

4.1.2 Interactions between Communities and Community Groups (CM1.1)

Communities identified in the project area are the owner or holders of the land (private property). Community groups present in the project zone are related to grassroots social organizations such as COCODE (Community Councils for Urban and Rural Development), COMUDE (Municipal Councils for Urban and Rural Development); and agricultural cooperatives or organization (for commercial products such as coffee and cardamom). These groups are formed voluntarily.

Between the main tasks of COCODE and COMUDE are to encourage the organization and effective participation of rural and urban population and their organizations for decision-making, as well as, support coordination between authorities and other organizations. These are the most important organizations within the communities since they represent the population's interests.

The community groups have been involved and the project design and has provided information about their interests in the development of the project.

4.1.3 High Conservation Values (CM1.2)

The project zone is fundamental for meeting the basic needs of local communities and it is critical for the traditional cultural identity of communities since these areas present high cultural, ecological, economic and religious significance for the local communities.

Places of high conservation values in the project zone are related to Cultural values⁶² (sacred places) for the indigenous communities (Table 30, Table 31 and Table 32). Nevertheless, the conservation of these places is abandoned, and most sites have been destroyed over the years (time, internal conflict). However, it has potential for tourism activities and generate income for local people (Figure 37).

Table 30. HCV – Cultural values.

High Conservation Value	Cultural values (HCV6) Ceremonial Center - sacred sites
Qualifying Attribute	The inhabitants normally frequent the ceremonial centers as part of their spirituality to maintain the harmony and balance of the individual-family-community space.
Focal Area	<p>There are at least 97 sacred sites in the Huista region, but 10 are the most important: Q'anil Ceremonial Center, Aq'oma' Ceremonial Center, Yichkaje, Palewitz Hill, Yichk'uhatan, Wihoh, K'uha', Yichtenam, Pelio, Palewitz (mound). This reflects the richness and cultural importance of Jacaltenango. Nevertheless, the only site that has protection and maintenance is the Q'anil Ceremonial Center.</p> <p>For Santa Ana Huista, 4 sacred places were identified: El Cerro Mampil, El Pinal, Pueblo Viejo (Buena Vista village) and Pie de la Virgen (El Tabacal) according to the Municipal development plan (2010), but these places are abandoned.</p> <p>In Nebaj, Quiché, were identified the following sites (SEGEPLAN, 2010d): Vilabitz, Xonca, Vicalama, Chuatuj, Parramos Grande, Palop, Xe'vak, Vik'uyi', Chaapa Vitz and Xol Txaxb'azt, Ticay, Batz Ixal, Vi Saachum, Xol Chaxmalá, Tzi'oorno, Vicamna, Xolsalchil, Tzi Tala. These are places of worship and ceremony for the population.</p> <p>In Chajul 22 sacred places were identified (SEGEPLAN, 2010a), the most important is called Juil. Other sacred places are Cerro Ví Andrés, Vi Sanich, Tzi Txaulá, Vi Kuk, Oncap, Xé Nalo, Ví Maqobál, Xé Ixoquitz, Ví Bálamvitz, 12 Estaciones, Vi'Q'antxava', Xe'kurus vatz tzi'tzal, Xe'k'ajchib'al.</p> <p>For Cotzal, the most important are (SEGEPLAN, 2010h): Vi' Ak'an, Vi' Tz'ununkab', Visibankoo, Vik'achipamak', Vi'Xhaltasion, Vi' Mam K'ub' y Vi' Chaqala</p>

⁶² Based on the six high conservation values developed by HCV Resource Network. Available at <https://hcvnetwork.org/>

	<p>In San Pedro Carchá (SEGEPLAN, 2010f) exists the sacred place Cojaj. Meanwhile, in Lanquín exists the Grottos of Lanquín and the altar located in Semuc Champey.</p> <p>For Cahabón (SEGEPLAN, 2010j) the most important ceremonial centers (Mayan cosmovision) are the caves of Secanante, Sehuk hill, and the cave of Q'ana Itzam.</p> <p>In San Juan Chamelco, the most important sacred places are Don Juan Cave in Chamil and Rey Marcos Caves in Santa Cecilia.</p> <p>Lastly, in Tamahú there is a sacred place name Panalmacen.</p>
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Table 31. HCV – Community needs.

High Conservation Value	Community needs (HCV5) Medicinal plants, livelihood, basic needs.
Qualifying Attribute	Medicinal plants have been used by the local population over the years, and it is part of the communal traditional knowledge.
Focal Area	<p>The Popti' community in Jacaltenango use medicinal plants for feeding or for treating diseases such as apazote, cola de caballo, garlic, orange leaf, mint, morro, guayaba, chamomile.</p> <p>In addition, the local population needs to use the forest resources for meeting their basic need, e.g. firewood for cooking and non-timber products.</p>

Table 32. HCV – Ecosystem services.

High Conservation Value	Ecosystem services (HCV4) Protection of water catchment for water supply. Improve forest connectivity.
Qualifying Attribute	Water supply to the communities for performing their economic and social activities. It contributes directly to the rural and urban population regarding water quantity and quality. There are still communities depending on the lakes and rivers for their agricultural activities, as well as, for consumption. The biosphere area is the headwaters of nine main rivers for the reference region.
Focal Area	Biosphere Reserve Ixil Visís-Cabá,

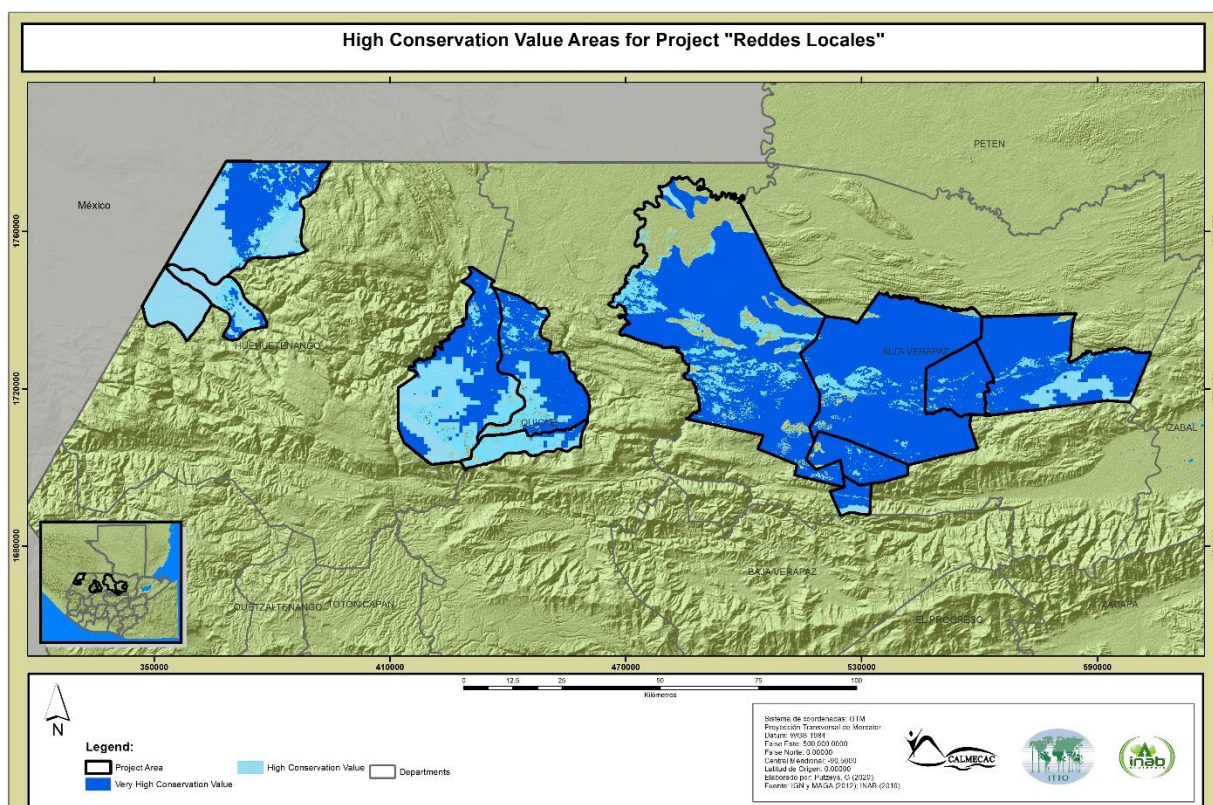


Figure 37. Community High Conservation value (HCV4 – water recharge) area map.
Source: Calmecac (2020)

4.1.4 Without-Project Scenario: Community (CM1.3)

The most likely land use in the without-project scenario is the continuity of the expansion of the agriculture frontiers and livestock farming. These activities will continue to be performed with conventional conditions (low technology generating low productivity). Regarding the well-being, there will not be any change according to the municipality's government dynamics. The levels of poverty, extreme poverty, and risk of food security will persist based on historical economic, social, and biophysical patterns. Even though there are national programs (such as PINPEP) targeting the sustainable management of forest conservation, the demand for firewood and land for subsistence farming is still high. Also, these programs do not aim specifically to improve the livelihood income, but rather to recover and conserve natural resources (Zander & Durr, 2011).

In addition, and according to the Municipal development plans (supporting documents), the municipalities in the project zone do not fully provide the population with their basic services of water supply and disposal, rural electricity, education, public health care, and land tenure. These conditions directly influence the livelihood of the inhabitants and the territorial development. Besides, after the civil war, the land tenure and land distribution were unequal, migration generated fragmentation at social, cultural, and environmental levels.

The project activities are designed to improve the quality of life and level of organization of both communities and community groups.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

The project activities are designed to improve the welfare of the communities and the sustainable management of natural resources (Table 33, Table 34 and Table 35). The project used the Participatory Rural Appraisal (PRA) in order to anticipate the potential impacts resulting from the project activities. Based on the Social and Biodiversity Impact Assessment Manual for REDD+ projects⁶³ (Social Impact Assessment Toolbox), the methodology chosen for the expected community impact evaluation is the Sustainable Livelihood Framework (SLF) due to its holistic and extensive used in the natural resources sector. The SLF includes two key components: understanding the complexities of poverty and principles to guide actions to overcome it. The guiding principles are focus on people-centered, responsive and participatory, multilevel, conducted in partnership with the public and private sectors, dynamic, and sustainable (M Richards, 2011).

Table 33. Potential impacts to communities.

Community Group	Impact(s)	Type of Benefit/Cost/Risk	Change in Well-being
Community formed by landowners, landholders, farmers, peasants	Increase life expectancy	Predicted, direct, and beneficial impact	Project activities contribute to generating additional incomes improving food security and allowing the communities to invest in health and education.
	Increase in well-being, health and safety	Predicted, direct, and beneficial impact	Project beneficiaries count with forest fires prevention systems and equipment.
	Employment	Predicted, direct, and beneficial impact	The project will generate permanent and temporal employments.
	Increase in skills and knowledge about sustainable management of natural resources	Actual, direct, and beneficial impact	Project beneficiaries receive technical training about the implementation of project activities, environmental education and sustainable management of natural resources.
	Increase in recognition of the value of forest resources	Actual, direct, and beneficial impact	Education activities, training and business plan will contribute to the valorization of the forest.
	Enhance gender equality approach	Predicted, direct, and beneficial impact	Women will have the same opportunities and participation in the design and implementation of the project. Empowering women within the family and community groups.
	Increase in social capital by	Actual, direct, and beneficial impact	Strengthening of “Enredémonos por el Corazón Verde” and other

⁶³ Available at <http://www.climate-standards.org/ccb-standards/>

Community Group	Impact(s)	Type of Benefit/Cost/Risk	Change in Well-being
	strengthening of institutions (cooperatives, associations)		community organizations for decision-making and participation in the project activities.
	Increase of forested areas and reduction of deforestation	Actual, direct, and beneficial impact	Recovery of the connectivity of forest and rehabilitation of habitats, contributing to the well-being of the beneficiaries.
	Reduction of forest degradation	Actual, direct, and beneficial impact	Beneficiaries will have firewood sources, reducing the carbon emissions associated with firewood collection.
	Diversification of productive activities and increase economic livelihood opportunities	Actual, direct, and beneficial impact	New sources of income contributing to the reduction of rural poverty levels and unsatisfied basic needs.
	Value-added to the market chain	Predicted, direct, and beneficial impact	Strengthening the value chain of products will contribute to technology transfer, as well as, to boost the local economy.

Table 34. Potential impacts to Community Groups.

Community Group	Impact(s)	Type of Benefit/Cost/Risk	Change in Well-being
Community groups	Increase in community participation and governance	Actual, direct, and beneficial impact	Project activities enhance the community leadership and strengthen local capacity, trust and mutual support.
	Development of value-added chain	Predicted, direct, and beneficial impact	Enhance access to market, boost the local economy, and improve the market products.
	Increased skills and knowledge about sustainable management of natural resources	Actual, direct, and beneficial impact	Project beneficiaries receive technical training about the implementation of project activities, environmental education and sustainable management of natural resources.
	Increase in recognition of the value of forest resources	Actual, direct, and beneficial impact	Educational activities, training and business plan will contribute to the valorization of the forest.
	Enhance gender equality approach	Predicted, direct, and beneficial impact	Women will have the same opportunities and participation in the design and implementation of the project. Empowering women within the family and community groups.

Community Group	Impact(s)	Type of Benefit/Cost/Risk	Change in Well-being
	Increase in social capital by strengthening of institutions (cooperatives, associations)	Actual, direct, and beneficial impact	Strengthening of “Enredémonos por el Corazón Verde” and other community organizations for decision-making and participation in the project activities.
	Increase of forested areas and reduction of deforestation	Actual, direct, and beneficial impact	Recovery of the connectivity of forest and rehabilitation of habitats, contributing to the well-being of the beneficiaries.
	Reduction of forest degradation	Actual, direct, and beneficial impact	Beneficiaries will have firewood sources, reducing the carbon emissions associated with firewood collection.
	Diversification of productive activities and increase economic livelihood opportunities	Actual, direct, and beneficial impact	New sources of income contributing to the reduction of rural poverty levels and unsatisfied basic needs.

Table 35. Potential impacts to Other stakeholders.

Community Group	Impact(s)	Type of Benefit/Cost/Risk	Change in Well-being
Other stakeholders	Enhance gender equality approach	Predicted, direct, and beneficial impact	Women will have the same opportunities and participation in the design and implementation of the project.
	Increase in social capital by strengthening of institutions	Actual, direct, and beneficial impact	Municipal, regional, and national institutions cooperating and working towards the same targets.
	Increase of forested areas and reduction of deforestation	Actual, direct, and beneficial impact	Recovery of the connectivity of forest and rehabilitation of habitats. Emission reduction from deforestation and forest degradation. Increase in carbon stocks.
	Reduction of forest degradation	Actual, direct, and beneficial impact	Emission reduction from deforestation and forest degradation.

4.2.2 Negative Community Impact Mitigation (CM2.2)

Project activities are designed for having a positive impact on the project beneficiaries, communities, and other stakeholders identified. It is expected that the implementation of the project activities does not generate negative impacts but improve the livelihood of the landowners and reduce deforestation and forest degradation. All the potential impacts identified have been described in section 2.1.18.

4.2.3 Net Positive Community Well-Being (CM2.3, GL1.4)

As mentioned in section 4.1, the poverty level is high especially in rural areas compared to urban areas. Due to the lack of employment opportunities and diversification of economic activities, the population is highly dependent on the forest resources. In this sense, it is necessary to take action and generate strategies to enhance the communities' livelihood. The project activities are designed to have positive changes in the communities (Table 36), providing alternative economic activities and sustainable use of forest resources.

Table 36. Identification of the project net impacts on the community, community groups, and other stakeholders.

Project strategy	Stakeholder	Without-project scenario	With-project scenario	Net effect
Natural resources and biological diversity for securing local population livelihood	Community, community groups, and other stakeholders.	Continuous deforestation and forest degradation, loss of forest habitat and ecosystem services related.	Control and surveillance plans at the municipal level, in joint with community forest monitoring system. Conservation of forest habitats and functions.	Positive
Institutional strengthening for effective governance	Community, community groups, and other stakeholders	Illegal activities such as deforestation and forest degradation (firewood and forest fires) will continue.	Capacity building, training workshops and programs will contribute to enhancing the environmental awareness, technical skills and knowledge in the communities. It will impact directly tackling the illegal activities, environmental justice, reduce and control forest fires and improving the community forestry practices in the long-term. Consolidation of forestry companies, social organization and leadership.	Positive
	Community, community groups, and other stakeholders	Municipal forest offices do not count on proper equipment to fight forest fires, which is reflected in forest degradation.	Forest fire prevention plans are put into effect. Forest brigades count with proper equipment to fight forest fires, impacting directly in the health and safety of the communities.	Positive
Economic and socio environmental sustainable development	Community, community groups, and other stakeholders	Increase in deforestation due to the expansion of agriculture frontier for subsistence farming extensive cattle ranching. Low production development under	Implementation of sustainable forest management plans linked to the strengthening of the value chain of forest products (timber and non-timber), which will generate diversification of economic alternative products. In addition, the implementation of technological packages and business plans will ensure the	Positive

Project strategy	Stakeholder	Without-project scenario	With-project scenario	Net effect
		conventional methods.	sustainability of the products. Further, it will contribute to the dynamization of the local economy and to the potential economic independence of women. Direct impact on the well-being of the project beneficiaries.	
	Community, community groups, and other stakeholders	No incentives for communities to conserve the forest, reduce deforestation and forest degradation.	Forest incentive programs reaching more landowners who will conserve the forest cover reducing the land-use change in the project area. Communities count with technical and legal support for the implementation of activities.	Positive

4.2.4 High Conservation Values Protected (CM2.4)

The main project objective is the reduction of deforestation and forest degradation, and the activities are linked to protect and enhance forest ecosystem services. Therefore, no HCV related to community well-being will be negatively affected. The positive impacts expected by the project translate into community benefits for enhancing their well-being. In addition, monitoring activities are taken in case of unforeseen events, especially in critical areas related to the water ecosystem services and community needs.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

No negative impacts are expected on other stakeholders. On the contrary, other stakeholders will benefit from the project activities. Even though the project activities are focused on the landowner property, the benefits are beyond the project area since it is expected to improve forest connectivity and ecosystem services, as well as, the diversification of products.

Agricultural producers, cooperative, organization groups (coffee, cardamom)

The activities may contribute to strengthening the social organization, productivity, value-added of the products, and marketplace positioning. This is a positive direct benefit.

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The project enhances forest conservation and sustainable use of natural resources, which is aligned with the objectives of INAB. The project activities will contribute to fulfilling the targets of INAB, contributing to the Forest Incentive Program. This is a positive indirect benefit.

4.3.2 Mitigation of Negative Impacts on Other Stakeholders (CM3.2)

No negative impacts have been identified on other stakeholders; therefore, no measures are needed. Nevertheless, even though the benefits of the project activities are also extended to other stakeholders and there is no negative impact identified, in case of need, it will be applied to the mitigation measures described in section 4.2.2.

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

Net negative impacts have not been identified by the implementation of project activities on the well-being of other stakeholders; therefore, there are no expected impacts.

4.4 Community Impact Monitoring

4.4.1 Community Monitoring Plan (CM4.1, CM4.2, GL1.4, GL2.2, GL2.3, GL2.5)

The community plan is designed for improving living conditions in communities towards a transformation of sustainable integrated management of natural resources. It will be possible based on sustainable forest management, increasing forest coverage on municipal, community and private lands that meet the minimum values of ecological connectivity, ecosystem conservation and protection of biodiversity, protection of species with some degree of threat or endangered, as well as reducing vulnerability and adaptation to the effects of climate change (Table 37).

All the information collected will be submitted annually to the Reddes Locales Council for an overall evaluation of the project activities implementation and the project report writing. The result of the evaluation is a series of recommendations and lessons learned, which will be systematized for replication and communication, or adaptation of the methodologies used for the implementation of the project activities. All the information will be used for updating the Municipal Forest Management Plan at least every 5 years. At the end of the 5 years or every verification period, the project proponent should reevaluate them or set new goals in relation to the results. The monitoring plan organization has been described in section 3.3.3 for climate monitoring, and it is the same structure for community monitoring. Further, regularly monitoring is undertaken by the municipal forest technicians, who are the ones constantly visiting the project area and interacting with the communities.

In addition, the communities through the community monitoring systems are involved and actively participating in the project execution. Monitoring results will be communicated in an appropriate format and language to the communities and stakeholders in the project zone. Feedback and verification of the results is possible through the field technicians.

Regarding the HCV, these are monitored and described in section 3 and section 4, since ecosystem services (water supply and forest connectivity) and community basic needs (medicinal plants, food, construction) are related to the forest cover and biodiversity. The cultural values will be benefited from the increase of forest cover and the strengthening of communal organizations. Nonetheless, in the monitoring plan, there will be added questions to cover the HCV monitoring:

- HCV 5 (community needs):

Have you or members of your household been restricted in access legally to the forest products (firewood, medicinal plants, non-timber products) as a consequence of the project development?

- HCV 6 (cultural values):

Have you or members of your household been restricted in using the ceremonial places to fulfill your cultural needs as a consequence of the project development?

Table 37. Community Monitoring Plan.

Objective	Indicator	Units	Method	Frequency	Stakeholder group
Reduce deforestation and forest degradation and raise awareness among the population about conservation of natural resources	By 2025, 12 planning, control, and monitoring tools exist for improving natural resources management at the community and municipal level.	Number of control and surveillance plans at the municipal level	Data record (technical report)	Annually	Community, community groups, and other stakeholders
	By 2025, 1 community monitoring system is set to be replicated in each municipality	Number of community monitoring system	Data record (technical report)	Annually	Community, community groups, and other stakeholders
		Number of monitoring reports	Data record (technical report)	Annually	Community, community groups, and other stakeholders
	By 2025, at least 1 regional and 6 municipal land use management plans for the project area linked to the municipalities, communities and Reddes Locales is established benefiting 130 communities	Number of sustainable forest management plan implemented in the project area	Data record (technical report)	Annually	Community, community groups, and other stakeholders
		Number of communities benefited	Data record (technical report)	Annually	Community, community groups, and other stakeholders
		Number of activities implemented according to the forest management plan	Data record (technical report)	Annually	Community, community groups, and other stakeholders
Implement actions with actors from all sectors involved in enhancing the national, regional and local portfolio of value-added projects strengthening the governance	By 2025, 1 program is established for promoting environmental justice	Number of programs implemented for municipalities	Data record (technical report)	Annually	Community, community groups, and other stakeholders
		Number of workshops	Data record (technical report)	Annually	Community, community groups, and other stakeholders

Objective	Indicator	Units	Method	Frequency	Stakeholder group
		Number of persons attending	Attendance list	Annually	Community, community groups, and other stakeholders
	By 2025, 6 organizations participated in an environmental justice program in Quiché and Huehuetenango involving 150 persons and 70 justice workers (judges, prosecutors).	Number of organizations participating in an environmental justice program	Data record (technical report)	Annually	Community, community groups, and other stakeholders
		Number of persons (leaders, institutions technicians, and justice workers)	Attendance list	Annually	Community, community groups, and other stakeholders
	By 2025, 11 training workshops related to environmental justice are performed directed to communities, social leader, governmental authorities and civil society	Number of workshops performed about environmental justice	Data record (technical report)	Annually	Community, community groups, and other stakeholders
		Number of persons attending	Attendance list	Annually	Community, community groups, and other stakeholders
	By 2025, 12 municipalities count with a program for reporting illegal activities	Number of municipalities with a program for reporting illegal activities	Data record (technical report)	Annually	Community, community groups, and other stakeholders
		Number of registered complaints about illegal activities	Data record (technical report)	Annually	Community, community groups, and other stakeholders
	By 2025, 12 municipalities improve their municipal forestry offices to promote legal forest activities	Number of beneficiaries registered in the Reddes Locales project	Data record (technical report)	Annually	Community, community groups, and other stakeholders

Objective	Indicator	Units	Method	Frequency	Stakeholder group
		Number of municipalities strengthened	Data record (technical report)	Annually	Community, community groups, and other stakeholders
		Number of legal forest activities promoted by the forest municipal office	Data record (technical report)	Annually	Community, community groups, and other stakeholders
	By 2025, 12 forest technical offices have access to proper fire prevention equipment and there are at least 6 working brigades	Number of municipal technical offices with proper equipment for prevention forest fires fighting	Data record (technical report)	Annually	Community, community groups, and other stakeholders
		Number of municipal forest brigades with the proper equipment	Data record (technical report)	Annually	Community, community groups, and other stakeholders
	By 2025, 12 workshops are implemented at municipal or community level in topics concerning prevention and forest fires fighting and best forest practices reaching 320 persons	Number of workshops on forest fires and best forest practices	Data record (technical report)	Annually	Community, community groups, and other stakeholders
		Number of persons attending the training program	Attendance list	Annually	Community, community groups, and other stakeholders
		Number of trained brigades	Data record (technical report)	Annually	Community, community groups, and other stakeholders
	By 2025, 42 workshops for capacity building on sustainable forestry practices to 1030 project beneficiaries	Number of workshops	Data record (technical report)	Annually	Community, community groups, and other stakeholders

Objective	Indicator	Units	Method	Frequency	Stakeholder group
		Number of persons attending	Attendance list	Annually	Community, community groups, and other stakeholders
Develop and promote sustainable projects for the development of regional and local communities	By 2025, 6 community forest companies or individual have been formalized for the sustainable use of forest resources	Number of formalized forest companies	Data record (technical report)	Annually	Community, community groups, and other stakeholders
	By 2025, 3 regional mechanisms for environmental compensation	Number of mechanisms for environmental compensation	Data record (technical report)	Annually	Community, community groups, and other stakeholders
	By 2025, at least 950 ha are implemented under forest incentives with technical and legal advice	Number of new forest incentives registered projects at INAB (PINPEP and PROBOSQUE)	Data record (technical report)	Annually	Community, community groups, and other stakeholders
		Number of hectares under the forest incentive program	Data record (technical report)	Annually	Community, community groups, and other stakeholders
	By 2025, at least 1 sector of the forest value chain (timber and non-timber products) is strengthened in the region	Number of sectors strengthened in the forest value chain	Data record (technical report)	Annually	Community, community groups, and other stakeholders
		Number of benefited persons (gender and language community)	Data record (technical report)	Annually	Community, community groups, and other stakeholders
	By 2025, 4 sector forest fairs or exhibitions are performed for strengthening the commercial capacities of the beneficiaries	Number of forest fairs or exhibitions	Data record (technical report)	Every two years	Community, community groups, and other stakeholders

Objective	Indicator	Units	Method	Frequency	Stakeholder group
		Number of organizations participating for timber and non-timber products	Attendance list	Every two years	Community, community groups, and other stakeholders

4.4.2 Monitoring Plan Dissemination (CM4.3)

Calmecac has extensive experience working with communities in the project zone and collaborating with other stakeholders. Therefore, the dissemination of the monitoring plan will be at local or municipal consultations with the actors involved. In this meeting, the complete monitoring plan and results will be presented. The stakeholders will validate the results, raise questions and give feedback on the results. The summary of the document will be available in the local language. Monitoring reports will be publicly available on the VERRA website.

For a complete description of project documents dissemination with communities, refer to section 2.3.2.

4.5 Optional Criterion: Exceptional Community Benefits

The project does not seek to be validated at the Gold Level for the exceptional benefits of the community.

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (B1.1)

The following description corresponds to the flora and fauna reported in the reference region. Local description is presented only for the municipalities with available information in the Municipal Development Plan. Secondary information, inventories, guides, and other publication were used for developing this section. Figure 38 shows the Key Biodiversity Areas (KBA) for the reference region. These areas are 'sites contributing significantly to the global persistence of biodiversity', in terrestrial, freshwater and marine ecosystems⁶⁴. The main threats are the expansion of agriculture frontier, livestock ranching, and fragmentation of habitats due to forest deforestation and degradation.

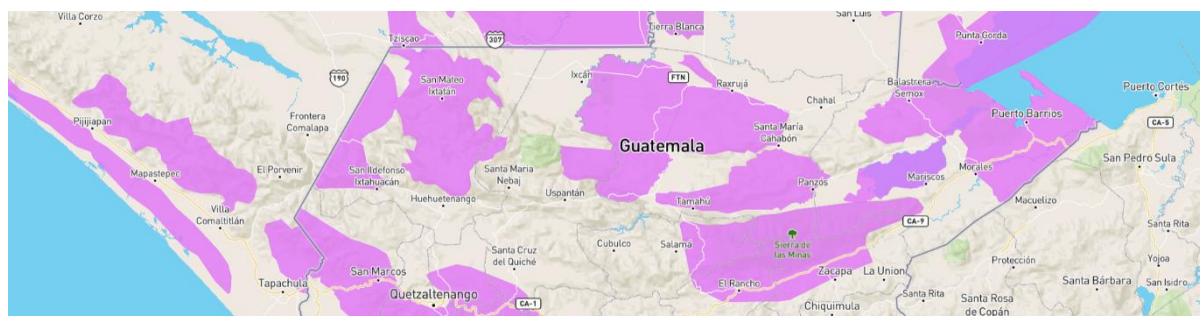


Figure 38. Important biodiversity areas for Guatemala based on IBAT.
Purple areas are key biodiversity areas. Source: IBAT-alliance

Huehuetenango

The department presents a great variety of vegetation and natural resources. The different microclimates allow the diversity of crops such as coffee, potatoes, garlic, onions and cardamom. Within the native, it can be found *Alnus* sp, Alder, *Arbutus xalapensis* (Chulube), *Dhaphysa rubinoides* (Guachipilín), *Eritrina berteorana* (Miche), *Eysenhardtia adenostilys* (Taray), *Quercus brachystachys* (Oak), *Quercus conspersa* (Zical), *Quercus peduncularis* (Palo Negro), *Quercus tristis* (Máchiche),

⁶⁴ IBAT alliance. Available at <https://www.ibat-alliance.org/visual-data-map>

Acacia pennatula (Espino), *Callistemo lanceolatus* (Calistemo), *Eugenia biflora* (Eugenia), *Fraxinus* sp. (Ash), *Pinus montezumae* (Pine macho), *Pinus oocarpa* (Red Pine), *Grevillea robusta* (Gravilea), *Salix* sp. (Willow) and *Populus alba* (Poplar).

Within the gallery forest is present the *Taxodium mucronatum* (Sabino or sad night tree) and *Salix chilensis* (Suce) (López Villatoro, 2004).

Among the shrubs are *Rhus terebenthifolia* (Deer Salt), *Tecoma stands* (Timboque), *Calliandra grandiflora* (Angel Hair), *Dismidium orbulare* Var. *Salvinii* (Escobilla).

Regarding the fauna, there are rodents (common squirrel, hare, rat, and field mouse), lizards, and batrachians. But the main species threatened is *Heloderma horridum* Alvarezi (Figure 39). This species is found in the municipality of Nentón. The so-called Mexican spotted lizard is a poisonous lizard typical of Mexican deserts, dry forests of Guatemala and the southwestern United States.

This lizard has poison glands. It can reach up to 90 centimeters in length and it can weigh up to 4 kilograms. Its skin is black with small yellow or orange spots and covered with scales. The species is cataloged in the IUCN list as LC – Least Concern.



Figure 39. *Heloderma horridum*.

Source: Huehuetenango Forest Management Plan

Concerning flora species, the commonly known population of "orejuela" (*Cymbopetalum penduliflorum*) is declining (Figure 40). This species is endemic to the municipality of Jacaltenango. The dried flowers were traditionally used to give a spicy flavor to chocolate before the arrival of cinnamon and other spices. The dried petals are still used to add them to atoles⁶⁵ and coffee.

It is native to the mountainous areas of Guatemala. It is still grown as a spice in the Guatemalan regions around Jacaltenango and is sold in local markets and exported to other Latin American countries.



Figure 40. *Cymbopetalum penduliflorum*.

Source: Huehuetenango Forest Management Plan

⁶⁵ Meal made of cooked corn.

In addition, in the municipality of Jacaltenango, there is a protected area called Aq'oma forest, under the category of Municipal Park, legally declared by municipal agreement. Also, there is a communal forest under protection named Nueva Catarina with the consensus of the communities; these two forests under protection can be a model for the few remaining communal and municipal forests, to have "Community Conservation Areas" where the local population itself decides the form of sustainable management of their natural resources, and where the institutions are elements of support and complement (SEGEPLAN, 2018b).

Quiché

The Ixil Visís Cabá Biosphere Reserve is part of the Sierra de Chamá, in the municipalities of Nebaj, Cotzal and mainly Chajul. It has 45,000 ha and it is the third-largest biosphere reserve in the country. It is formed by the rainy tropical forest, and it was declared a protected area in 1997. But the main threat is the urban development, illegal logging and land-use change for agriculture (Gómez, 2011). Nevertheless, still, around 90% of the area remains intact.

It is formed of three zones, whose objectives and management types are defined in the protected areas law. The Core Zone has 10,000 hectares, which should not cover any community, but now its forests are used for the extraction of materials for handicrafts and other uses for people. The Modifiable Zone with an approximate extension of 10,000 hectares, which should not have any community, according to the regulations, however, there are at least 12 adjacent villages which extract wood and firewood. The Multiple Use Zone covers approximately 25,000 hectares and includes 14 communities (SEGEPLAN, 2010a).

The main activities related to the use and control of wildlife in the municipality of Chajul, is closely related to the farming agriculture of Ixil families. If wildlife does some damage to their agriculture lands, the animals can be hunted down or chase away in order to secure food for the families (Girón, 2010). Therefore, the main threat for biodiversity is farming agriculture.

According to the IUCN, the area is Category VI⁶⁶: Protected area with sustainable use of natural resources. The characteristic of the protected area is that conserve ecosystems and habitats, together with associated cultural values and traditional natural resources management systems. They are generally large, with most of the area in a natural condition. The main important species in the area are (Ibid.) described in Table 38.

Table 38. Endangered species in the Biosphere Reserve Visís Cabá.

Family	Common name	Species	IUCN Red List
Felidae	Jaguar	<i>Panthera Onca</i>	Near Threatened
	Puma	<i>Puma Concolor</i>	Least Concern
	Ocelot	<i>Leopardus pardalis</i>	Least Concern
	Margay	<i>Leopardus wiedii</i>	Near Threatened
	Jaguarundi	<i>Herpailurus yagouarundi</i>	Least Concern
Tayassuidae	White-lipped peccary	<i>Tayassu pecari</i>	Vulnerable
	Collared peccary	<i>Tayassu tajacu</i>	Least Concern
Cervidae	White-tailed deer	<i>Odocoileus virginianus</i>	Least concern
	Red Brocket	<i>Mazama americana</i>	Unknown
Canidae	Coyote	<i>Canis latrans</i>	Least concern
	Grey Fox	<i>Urocyon cinereoargenteus</i>	Least concern

⁶⁶ Protected area categories. Available at: <https://www.iucn.org/theme/protected-areas/about/protected-areas-categories/category-vi-protected-area-sustainable-use-natural-resources>

Family	Common name	Species	IUCN Red List
Cebidae	Mantled Howler Monkey	<i>Alouatta palliata</i>	Least concern
	Yucatán Black Howler Monkey	<i>Alouatta pigra</i>	Endangered
	Heoffroy's spider Monkey	<i>Ateles geoffroyi</i>	Endangered
Tapiridae	Baird's Tapir	<i>Tapirus bairdii</i>	Endangered
Dasyopodidae	Nine-banded Armadillo	<i>Dasybus novemcinctus</i>	Least Concern

The presence of jaguar *Panthera onca* in the area is an indicator of the ecosystem's health since they are related to ecosystem productivity. Also, the species is vulnerable to habitat fragmentation and exploitation. They also provide an "umbrella protection" to the below species in the food chain. The decrease in the densities of jaguars and pumas, influence the increase of abundances of medium-sized mammals, which are seed predators.

Alta Verapaz

One of the aspects that concern the population in Alta Verapaz is the extinction of the National Bird "The Quetzal" (*Pharomachrus mocinno*). In previous years, the area was characterized for being the main habitat of the species, but nowadays there are very few and can hardly be observed in the department, specifically in the Sierra de Chama, Xucaneb, Samac and Seacte (Alta Verapaz Forest Management plan). The species is categorized as Near Threatened by the IUCN Red List.

Concerning the flora, in the department is also present the National Flower "Monja Blanca" (*Lycaste virginialis* or *Lycaste skinneri*), which is an orchid. The vegetations is rich in the department, and it is an indicator of the different life zones.

According to the List of Threatened Species of CONAP, the species can be classified as:

1. Species that are in danger of extinction.
2. Species with restricted distribution to only one type of habitat.
3. Species that are not currently in danger of extinction but could become so if their use is not regulated.

According to the Alta Verapaz Forest management plan (2019) the threatened forest species are described in Table 39.

Table 39. Threatened and endangered species according to CONAP's list of threatened species.

N°.	Species	Local common name	CONAP index
1	<i>Calathea lutea</i> (Aubl.) G.F.W. Meyer	Maxán, / Ox (q'eqchi')	3
2	<i>Agave angustifolia</i>	Maguey	2
3	<i>Calamus ssp</i>	Ratan / Kala' (q'eqchi')	3
4	<i>Chamaedorea sp</i>	Pacaya	2
5	<i>Heliconia grassa</i>	Bijague / Platanillo	3
6	<i>Beaucarnea petenensis</i> (Lundell) Lundell	Izote	2
7	<i>Epidendrum sp.</i>	Orquidea	3
8	<i>Astronium graveolens</i> Jacq	Jobillo	3
9	<i>Cordia sp.</i>	Canela	1
10	<i>Rheedia macrantha</i> Standl & Steyerm	Arrayan	2
11	<i>Symphonia globulifera</i> L.	Palo Sangre	3
12	<i>Dalbergia stevensonii</i> Standl	Rosul	2

N°.	Species	Local common name	CONAP index
13	<i>Erythrina guatemalensis</i> Krukoff.	Palo pito (tzinte' en Q'eqchi')	2
14	<i>Platymiscium dimorphandrum</i> (Donn. Sm.)	Hormigo	3
15	<i>Myroxylum balsamum</i> (L.) Harms	Balsamo	2
16	<i>Quercus</i> sp.	Encino	3,2
17	<i>Juglans guatemalensis</i> W. E. Manning	Nogal	2
18	<i>Ocotea bajapazensis</i> Lundell	Canoj	1
19	<i>Ocotea verapazensis</i> Standl. & Steyer	Canoj de Verapaz	2
20	<i>Persea perglauca</i> Lundell	Aguacate/ O' (q'eqchi')	1
21	<i>Persea schiedeana</i> Ness	Coyou	2
22	<i>Phoebe padiformis</i> Standl & Steyer	Aguacatillo O'che' (q'eqchi')	3
23	<i>Magnolia guatemalensis</i> Donn Sm	Magnolia	2
24	<i>Cedrela odorata</i> L.	Cedro	2
25	<i>Swietenia macrophylla</i> King	Caoba	3
26	<i>hyperbaena guatemalensis</i> standl.	Granadilla	2
27	<i>Albizzia caribea</i> (Urb.)Britton & Rose	Conacaste	3
28	<i>Calliandra carceea</i> (Standl. & Steyer.) Griseb.	Tamarindo de montaña/ wachiil (q'eqchi')	2
29	<i>Inga donell smithii</i> Pittier	Paterna	3
30	<i>Pithecolobium arboreum</i> (L.)Urban	Cola Coche	3
31	<i>Pithecolobium saman</i> (Jacq.) Benth	Cenicero	1
32	<i>Eugenia cervina</i> Standl. & Steyer	Cacho de Venado	2
33	<i>Eugenia savannarum</i> Standl. & Steyer	Eugenia	2
34	<i>Pimenta dioica</i> (L.) Merril	Pimienta Gorda	3
35	<i>Zanthoxylum</i> sps	Lagarto	3
36	<i>Manilkara achras</i> (Mill.) Fosberg	Chicozapote	3
37	<i>Pouteria</i> sps	Zapote	1, 2
38	<i>Chiranthodendron pentadactylon</i>	Mano de mico	1

In addition, in the municipality of Tamahú, it is located the Private Natural Reserve San Andrés Rocjá, with an area of 1.81 km², declared as a protected area in 2013. It is considered a local refuge for wildlife, so its conservation is of importance for the maintenance of conditions that favor the environmental balance of the region (SEGEPLAN, 2019).

5.1.2 High Conservation Values (B1.2)

The project zone contains the following High Conservation Values (HCV) related to biodiversity (Figure 41):

High Conservation Value	Species diversity (HCV1), Ecosystem services (HCV4) Endemic species, threatened or endangered species.
Qualifying Attribute	It is an area that has important life zones, water bodies, unique species of flora and fauna, as well as very humid warm subtropical forests and rainforests subtropical, which give it great importance for its conservation (Gómez, 2011). It is a little altered, which has favored the functions of soil production, as well as, the great landscape ecosystem.

Focal Area	<p>Biosphere Reserve Ixil Vísis Caba (Chajul) - Quiché.</p> <p>The area will be indirectly conserved through the project activities and the reduction of deforestation and forest degradation rates in the project zone.</p>
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High Conservation Value	<p>Species diversity (HCV1), Landscape-level ecosystem (HCV2), Ecosystem and habitats (HCV3)</p> <p>Endemic species, threatened or endangered species, landscape and ecosystems.</p>
Qualifying Attribute	<p>The Lachuá lagoon was declared a Ramsar site in 2006. The lake is transit route or final destination for migratory birds like cigüeñon (<i>Mycteria Americana</i>), pato real (<i>Cairina moschata</i>), pato azulejo (<i>Anas discors</i>). It is also a refuge for restricted-range species such as jaguar (<i>Panthera onca</i>), crocodile moreleti (<i>Crocodilus moreletti</i>), and saraguate monkey (<i>Alouatta pigra</i>). It was found 76 plant families comprising 220 species of which 99 are trees; 8 are shrubs; 37 are bushes; 33 are grasses, 31 are epiphytes; 9 are bushes; 2 parasite trees and parasitic grass; and 4 vine herbs. Of the 76 families, the more represented in number are: Orchidaceae (17), Arecaceae (13), Fabaceae (10), Rubiaceae (10), Moraceae (9) and Melastomataceae (8) (INAB, 2003).</p> <p>In addition, there are 130 species of mammals, equivalent to 50% of the reported species for the country, and between 15-20% of reptiles and amphibians (30-40 species, including the <i>Hyla ebreccata</i> tree and the swamp snake <i>Tretanorhinus nigroluteus</i>). Among the main species of mammals include the jaguar (<i>Panthera onca</i>), the white-tailed deer (<i>Odocoileus virginianus</i>), the tepezcuintle (<i>Agouti paca</i>) and the coche de monte (<i>Tayassu tajacu</i>) (Ibid.).</p> <p>The buffer zone is fragmented due to annual crops and cattle ranching.</p>
Focal Area	<p>National Park Lake Lachuá and National park Las Victorias (Cobán) - Alta Verapaz.</p> <p>The area will be indirectly conserved through the project activities and the reduction of deforestation and forest degradation rates in the project zone.</p>

High Conservation Value	<p>Species diversity (HCV1), Landscape level ecosystem (HCV2), Ecosystem and habitats (HCV3)</p> <p>Endemic species, threatened or endangered species, landscape and ecosystems.</p>
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Qualifying Attribute	Created in 1980 as a protected area, it has an extension of 82 ha. There have been registered 175 species of flora. Between the most abundant trees located in the reserve are <i>Pinus maximinoi</i> and <i>Liquidambar styraciflua</i> . The park is a habitat for mammals, the grey fox, squirrels and armadillos, and crocodiles. There are caves that are habitat for important bats populations. There are endemic and unique species like the fern (<i>Pteris pulchra</i>) which is only located in this protected area. Another endemic species is <i>Tillandsia lucida</i> (INAB, 2020) ⁶⁷ .
Focal Area	National Park Las Victorias (Cobán) - Alta Verapaz. The area will be indirectly conserved through the project activities and the reduction of deforestation and forest degradation rates in the project zone.

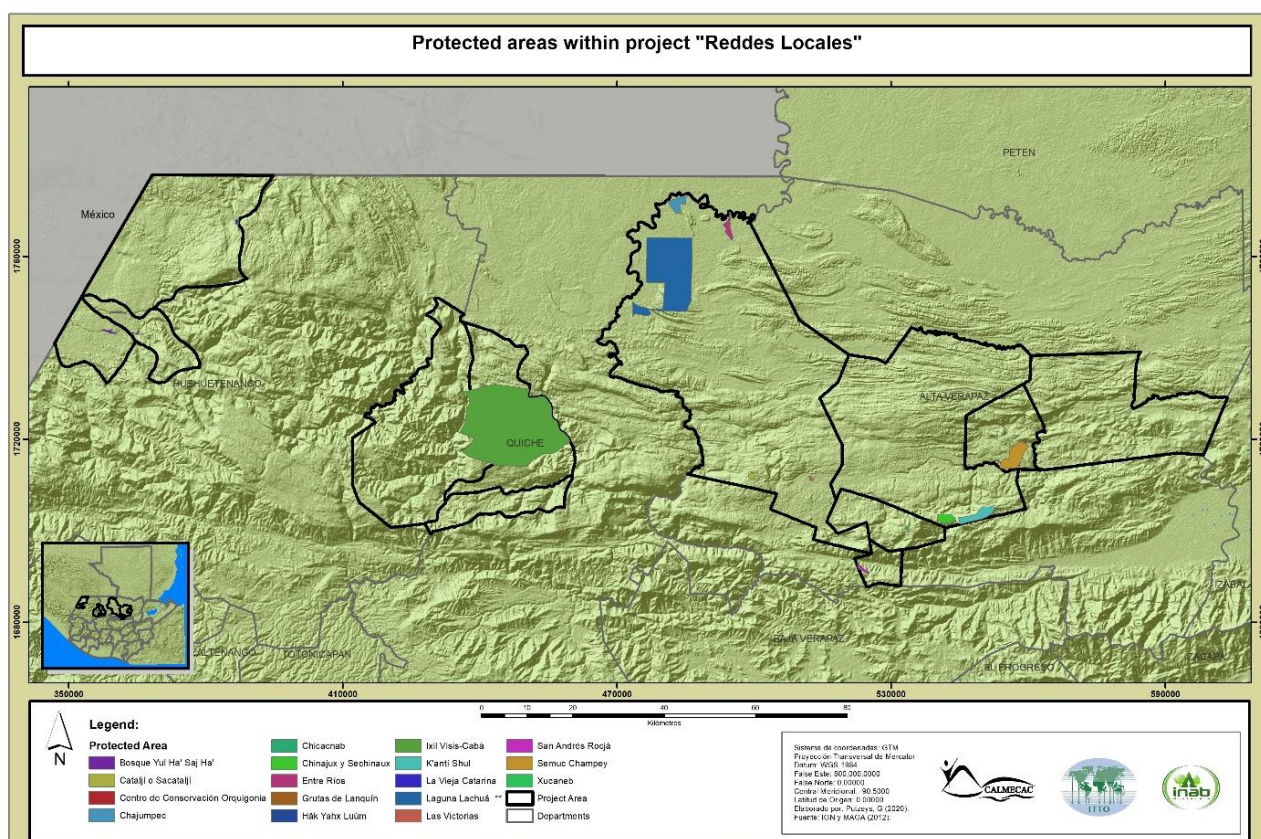


Figure 41. Biodiversity High Conservation value area map.
Source: Calmecac (2020)

⁶⁷ Access on 10 March 2020. Available at <http://portal.inab.gob.gt/index.php/component/content/article/111-secciondenoticias/219-un-poco-de-historia-del-parque-nacional-las-victorias-un-refugio-verde-en-la-ciudad-de-coban?Itemid=437>

5.1.3 Without-project Scenario: Biodiversity (B1.3)

The without project scenario would affect biodiversity in the project zone. The expansion of the agriculture frontier for subsistence farming and cattle ranching would continue reducing forest cover. In addition, forest fires, illegal logging, and firewood collection would continue affecting forest degradation. This scenario could even expand to protected areas, as mentioned in Additionality (Section 3.1.5) there is low enforcement of the law, which threatened the endemic and vulnerable species existing in the project zone. Forest conversion and degradation (land-use changes) consistently reduces biodiversity in tropical forest landscapes (Gibson et al., 2011). Agriculture is one of the main contributors to biodiversity loss, and even more when it's performed under conventional techniques (low productivity, low investment) as in the project zone. Without the project activities, the biodiversity would be impacted by the type, frequency, scale, and intensity influencing the forest structure (Figure 42).

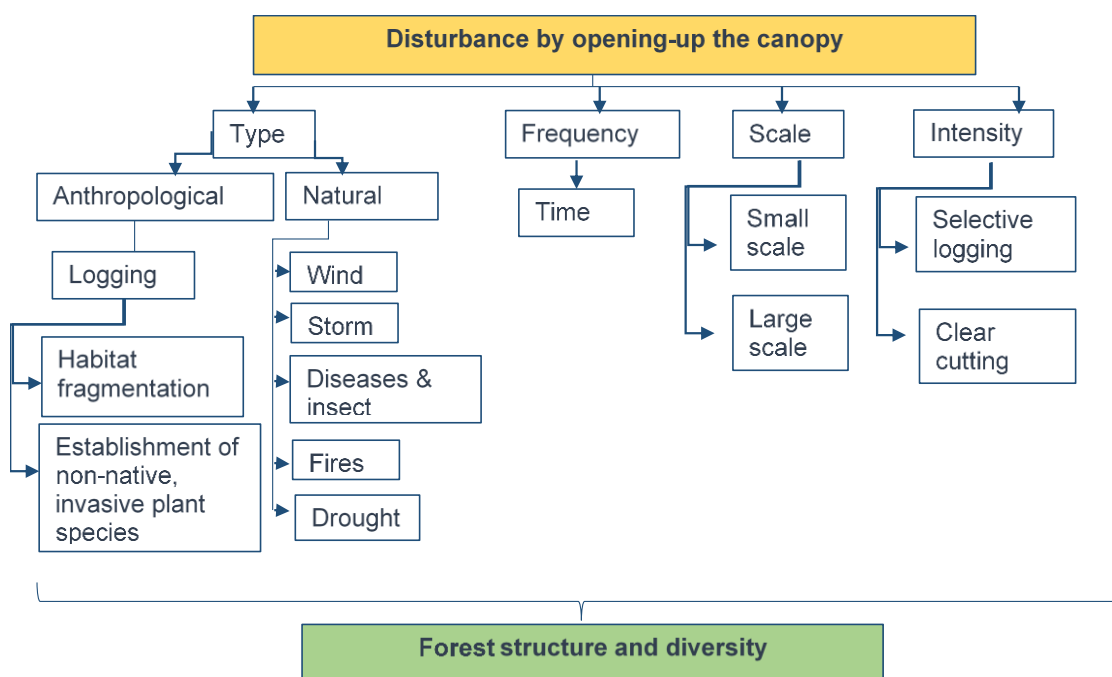


Figure 42. Activities influencing forest structure and diversity.

Source: own compilation.

Forest degradation, through forest fires (slash-and-burn) and illegal logging, in the project zone leads to a decrease in tree cover, variation in biodiversity and changes in forest structure. According to Thompson et al. (2013), it also declines the capacity of the forest to produce ecosystem products and services. Fauna is related to landscape architecture, habitat fragmentation, edge effect, and fauna loss are consequences as well as an anthropogenic disturbance.

Adum et al. (2013) mentioned that disturbance enables colonization of species not normally found in intact forests and decreases the evenness of communities. Also, Martínez-Ramos et al. (2016) stated that fragmentation reduces the area of habitat necessary for many vertebrates (herbivores, seed predators, or seed dispersers) to maintain a viable population and modify the canopy structure and diversity of the forest. Logging and subsistence agriculture may promote the establishment of nonnative, invasive plant species; which potentially could affect the forest structure (Brown & Gurevitch, 2004).

Martínez-Ramos et al. (2016) strongly suggest that fragmentation and defaunation are significantly correlated. The species have different responses to anthropogenic disturbance varying considerably by geographic region, taxonomic group, ecological metric and disturbance type (Gibson et al., 2011). According to Roth (2017), the amphibians are the most susceptible animals to disturbance (bad vision and hearing, hidden lifestyle), followed by the reptiles (bad hearing, hidden lifestyle but sensitive to soil vibration), mammals (species with night and twilight activity) and in minor intensity the birds. In another

study, Gibson et al. (2011) stated the responses vary by disturbance type. In his study, the birds constituted the group most sensitive to forest conversion into agriculture (active agriculture, abandoned agriculture and agroforestry systems), whereas plants constituted the group most sensitive to burned forests and shaded plantations. Further, biodiversity in the project zone is also threatened by hunting, since farmers would protect their farming crops and livestock from a potential attack of animals such as the jaguar, puma, and other animals.

To sum up, in a without-project scenario, the biodiversity in the project zone is affected by:

- Reduction of forest cover due to the expansion of agriculture frontier and livestock areas.
- Increase in forest degradation and habitat fragmentation (reduction of biological corridors and loss of the quality of habitats) leading to the potential extinction of native and migratory species.
- Simplification of the vertical structure and loss of biodiversity (fauna and flora).

Therefore, given the magnitude of the impacts on biodiversity and ecosystem services due to land conversion, the proposed project activities can improve the outcomes for species persistence, ecosystem retention, carbon sequestration, water provision and agricultural production value (Williams et al., 2020).

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

Biodiversity Element	Fauna and Flora
Estimated Change	Positive, indirect
Justification of Change	<p>Provision of ecosystem services in joint with economic and socio-ecological benefits are sought around the world, but maintaining biodiversity and economic profits balanced could be challenging since both are important for the well-being of societies. Forest biodiversity is closely related to the sustainable use of the forest due to resilience and habitat connectivity (Bollmann & Braunisch, 2013). For example, forests in late-successional stages are important due to their rich diversity of niches and species.</p> <p>The project activities aim to reduce deforestation and forest degradation. The control and surveillance plans will allow sustainable forest management at family and municipal level. Also, the community forest monitoring involves the communities and project beneficiaries in the implementation of the project, contributing to forest conservation.</p> <p>The strengthening of the value chain of timber and non-timber products will contribute to the diversification of forest use, reducing the overutilization of natural resources. All the activities will be implemented in joint with technical training and capacity building, which complements the effectiveness of the project objectives.</p> <p>Further, through the forest incentive programs and environmental compensation, the forest cover will be protected allowing forest regeneration, increase in habitat connectivity of the remaining forest patches, and allowing the exchange of flora and fauna (Williams et al., 2020).</p>

Biodiversity Element	Habitat connectivity
Estimated Change	Positive, indirect
Justification of Change	<p>The mosaic deforestation and forest degradation contribute to reducing the quality of habitats, threatening the fauna and flora population since they are secluded to forest patches (reduced mobility areas).</p> <p>Conservation of biodiversity in production forests can work if the specific and structural elements found in a natural development cycle are retained; such as old-growth forest elements, decaying wood in various stages, larger and smaller protected areas, and habitat trees. All of these elements require continuity and connectivity in time and space (Kraus, Krumm, Palahí, & Schuck, 2013). Losses of structural elements in forest biodiversity may harm essential ecosystem functions. Forest incentives are designed to protect and sustainably manage the forest with technical guidance. Brockerhoff et al. (2017) mention that maintaining the quantity and quality of natural or semi-natural forest ecosystems across the landscape is important to conserve and restore habitats for pollinators. Retaining habitats within a landscape helps to safeguard an essential level of pollination services for both agricultural and forest ecosystems.</p> <p>Lindenmayer & Franklin (2002) mentioned four interrelated actions and its benefits for biodiversity conservation to be considered:</p> <ul style="list-style-type: none"> (1) supporting population of species: lower risk of extinction, greater levels of genetic variation; (2) regulating the movement of organisms and genes: connectivity in forest landscapes, species recolonization, persistence of species, distribution and abundance (avoid habitat loss and habitat fragmentation); (3) buffering sensitive areas and reserves: reduce intensity and depth of edge effects; (4) maintaining the integrity of aquatic systems: terrestrial vegetation regulates the paths and rate of water movement (runoff), erosion, and sediment transportation. <p>Therefore, the project activities will indirectly benefit the landscape connectivity and protection of biological diversity.</p>

Biodiversity Element	Fauna and flora (threatened species)
Estimated Change	Positive, indirect
Justification of Change	<p>Decrease pressure on wildlife and preserving the vertical structure of vegetation, as well as, protect water sources.</p> <p>Species with poor dispersal abilities, such as epiphytic lichens or small arboreal rodents, suffering significant declines in fragmented landscapes (Brockerhoff et al., 2017).</p> <p>Threatened and endemic species such as the National bird Quetzal (<i>Pharomachrus mocinno</i>), the National Flower “Monja Blanca” (<i>Lycaste virginialis</i> or <i>Lycaste skinneri</i>), and main species of mammals such as jaguar (<i>Panthera onca</i>), the white-tailed deer (<i>Odocoileus virginianus</i>), the tepezcuintle (<i>Agouti paca</i>) and the coche de monte (<i>Tayassu tajacu</i>) are under constant threatened (hunting) (Girón, 2010; Gómez, 2011). The project activities will contribute to the indirect positive impact on biodiversity conservation.</p>

Biodiversity Element	Forest structure and habitat
Estimated Change	Negative, direct
Justification of Change	<p>The potential negative impact is the increase and migration of people to the project area, affecting the ecosystem services. Ecotourism activities without any sustainable management can also reduce the natural habitat (creation of infrastructure, noise and visual pollution, unsustainable waste management).</p>

Biodiversity Element	Fauna and Flora
Estimated Change	Negative, direct
Justification of Change	<p>The potential negative impact is the increase in agrochemicals to counteract pests and diseases of forest plantations. Potential contamination of superficial water and soil.</p>

5.2.2 Mitigation Measures (B2.3)

There is no potential negative impact expected on HCV attributes. On the contrary, the project activities are expected to reduce the pressure on forest contributing to habitat connectivity, conservation of endangered and vulnerable species, and the recovery of ecological functions. Also, the project proponent and other stakeholders work together with INAB, CONAP, and municipal offices in charge of protected areas, which will assure effective communication for the conservation of biodiversity. In addition, in the case of potentially negative impact due to illegal settlements leading to the deforestation of forest areas, the project activities include Municipal management program for reporting illegal activities and take immediate actions.

For the potential case of the use of agrochemicals, the PROBOSQUE program promotes the use of organic, biological, and ethological methods. In addition, every forest plantation counts with a management plan where all activities for pest and disease management are described according to the species used in the plantation for every farmer (INAB, 2016). The management plan will include

mitigation measures to avoid superficial water and soil contamination (e.g. do not apply near water bodies). The farmers are visited constantly for the Municipal forestry officer will be in charge of monitoring the development of the project activities. Further, within the program, INAB has implemented a warning system for forest pests, which is executed jointly with CONAP, MARN and MAGA, within the National Forest Sanitary System (SINAFOR) allowing to give notice of the plagues affecting the national territory.

5.2.3 Net Positive Biodiversity Impacts (B2.2, GL1.4)

Among the positive impacts identified for biodiversity is the interconnection of natural corridors, increase of endemic and endangered species and populations, increase in the biomass and the enhancement of habitat for fauna and flora communities (Table 40). The impacts will be reported in the monitoring report.

Table 40. Net positive impact on biodiversity.

Project strategy	Without-project scenario	With-project scenario	Net effect
Natural resources and biological diversity	Poor natural resources management (low productivity). Soil degradation, soil compaction, reduce water availability.	Soil conservation and enhancement of watersheds and water availability.	Positive, predicted, indirect. Reduction of CO ₂ emissions from deforestation and forest degradation.
	Simplification of the vertical vegetation structure, reduce sites for feeding and reproduction.	Protection of wildlife niches, ecosystem restoration, reforestation activities, and implementation of alternative sustainable activities. Monitoring of key species can contribute to better decision-making for biodiversity in the project zone.	Positive, predicted, indirect. Biodiversity conservation.
Institutional strengthening for effective governance	Illegal activities such as deforestation and forest degradation (firewood and forest fires) will continue.	Increase in forest cover, carbon sequestration.	Positive, real, direct. Reduction of CO ₂ emissions from deforestation and forest degradation
Economic and socio environment sustainable development	Increase in deforestation due to the expansion of agriculture frontier for subsistence farming and extensive cattle ranching.	Connectivity of fragmented forests, restoration of habitats functionality for fauna and flora (endemic, endangered, and migratory species), increase of biodiversity in comparison with the baseline, enhance of biological corridors and food availability.	Positive, predicted, indirect. Biodiversity conservation
	Forest fragmentation and reduction of biological corridors, reduction of forest cover.		

5.2.4 High Conservation Values Protected (B2.4)

All project activities are based on the sustainable management of the forest. The aim is to reduce deforestation and forest degradation in the project zone. The project activities have been designed for enhancing the forest governance and forest protection while reducing illegal activities related to the forest. The recovery of ecological niches for endemic, vulnerable, or threatened species is enhanced. Therefore, it is not expected that HCV related to biodiversity is affected by the project. Further, the community monitoring system and patrolling will serve as complement to protect the HCV.

5.2.5 Species Used (B2.5)

The species to be used are in accordance to the national forest incentive program called PINPEP and PROBOSQUE. The project activity is included under this program umbrella. Based on INAB (2016), the forest plantation species with commercial and energetic purposes are:

Common name	Species	Description
Candelillo pine	<i>Pinus maximinoii</i>	Mainly occurs in mountains but has a wide ecological amplitude that includes a gap-pioneer role in wet subtropical forest, canopy species in cloud forests, or as a member of drier pine-oak forests and woodlands. This species is native to Mexico; Guatemala; Honduras; El Salvador; and northwestern Nicaragua ⁶⁸ .
Scotch pine	<i>Pinus oocarpa</i>	This species is native to Mexico, Guatemala, Honduras, El Salvador and NW Nicaragua, forming pure stands or mixed with other species in open, fire-prone pine-oak woodlands, growing at elevations of 1,200 - 2,000 m above sea level ⁶⁹ .
Caribbean pine	<i>Pinus caribaea</i>	This species is native to the Caribbean — in western Cuba, Pinar del Rio and Isla de la Juventud; in Mexico, southern Quintana Roo; in northern Guatemala; in Belize; in Honduras including Islas de la Bahía; and in El Salvador. This is an important timber tree along with its native range and is widely exploited. Although the species is not necessarily threatened, this history has likely reduced genetic diversity within the taxon ⁷⁰ .
Pinabete	<i>Abies guatemalensis</i>	This specie has the most southerly distribution of any species in the genus. It is native to El Salvador, western Guatemala, the Santa Barbara Mountains Mexico. It is a mountain species growing between 1,800 to 4,100 masl ⁷¹ .
Cypress	<i>Cupressus lusitánica</i>	It often forms pure stands or may be scattered in mixed stands of mixed conifer, pine, pine-oak, or mixed woodland composition. It is located in Belize, Guatemala, Honduras, El Salvador and

⁶⁸ The Gymnosperm Database. Available at: https://www.conifers.org/pi/Pinus_maximinoi.php

⁶⁹ American Conifer Society. Available at <https://conifersociety.org/conifers/pinus-oocarpa/>

⁷⁰ American Conifer Society. Available at <https://conifersociety.org/conifers/pinus-caribaea/>

⁷¹ American Conifer Society. Available at <https://conifersociety.org/conifers/abies-guatemalensis/>

Common name	Species	Description
		Mexico. Typically, on nutrient-poor carbonate or volcanic soils, often on rocky slopes or canyon cliffs ⁷² .
Palo blanco	<i>Tabebuia donell-smithii</i>	Naturally distributed from Mexico to El Salvador, Honduras, Colombia, and Venezuela. It is known in the trade as white mahogany.
Teak	<i>Tectona grandis</i>	It survives and grows under a wide range of climatic and edaphic conditions. It grows best in a warm, moist, tropical climate with a significant difference between dry and wet seasons. It is a pioneer species, but with a long-life span. It occurs naturally in various types of tropical deciduous forests. In seasonal climate. It is native for India, Indonesia, Laos, Myanmar, Thailand ⁷³ .
Matilisqueate	<i>Tabebuia rosea</i>	This is one of the most important timber trees of Central America, being widely harvested from the wild and used for a great variety of purposes. Usually found in Northern South America - Colombia, Ecuador, Venezuela; north to the Caribbean and through Central America to Mexico. Common in moist or rather dry forest, often in open fields or along roadsides, most abundant on the Pacific plains, but often on steep hillsides, at elevations up to 1,200 m in Guatemala ⁷⁴ .
San Juan	<i>Vochysia guatemalensis</i>	Native of Belize, Colombia, Costa Rica, Guatemala, Honduras, Mexico, Nicaragua, Panama. It inhabits the humid tropical forest and the very humid forest of the coastal plains, where it often grows in monospecific stands or patches with other <i>Vochysia</i> spp. Moist or wet forests at elevations of 350 - 1,500 m in Guatemala ⁷⁵ .
Mahogany	<i>Swietenia macrophylla</i>	It is found in all forest types, from the edge of the pine savannah to the climax rainforest, but mostly in mixed hardwood forest belts, along riverbanks, on deep alluvial soils of considerable fertility. In tropical America, it is among the pioneer species reoccupying degraded agricultural land. Native for Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Venezuela ⁷⁶ .
Cedar	<i>Cedrela odorata</i>	A natural pioneer species that is also long-lived and supplies an excellent timber, it is an excellent choice for use in reforestation schemes. Widely distributed in wet, primary and secondary evergreen to semi-deciduous lowland or lower

⁷² The Gymnosperm Database. Available at https://www.conifers.org/cu/Cupressus_lusitanica.php

⁷³ World Agroforestry. Available at http://old.worldagroforestry.org/treedb/AFTPDFS/Tectona_grandis.PDF

⁷⁴ Useful Tropical Plants. Available at <http://tropical.theferns.info/viewtropical.php?id=Tabebuia+rosea>

⁷⁵ World Agroforestry. Available at http://old.worldagroforestry.org/treedb2/AFTPDFS/Vochysia_guatemalensis.PDF

⁷⁶ World Agroforestry. Available at http://old.worldagroforestry.org/treedb/AFTPDFS/Swietenia_macrophylla.PDF

Common name	Species	Description
		montane rainforest. Native for Argentina, Brazil, Cuba, Dominican Republic, Ecuador, French Guiana, Guatemala, Haiti, Honduras, Jamaica, Mexico, Peru, Trinidad and Tobago ⁷⁷ .
Santa María	<i>Calophyllum brasiliense</i>	It is distributed from Northern South America from Brazil northwards to Mexico and the West Indies. Found in subtropical moist forests, lowland evergreen rainforests and lower montane rainforests, where it forms part of the canopy. It has been used to stabilize soils and to relieve soil compaction in degraded pastures ⁷⁸
Melina	<i>Gmelina arborea</i>	Native from Asia: southern China, Indian subcontinent, Myanmar, Thailand, Laos, Vietnam, Malaysia, Indonesia, Philippines. This occurs in a variety of forest habitats, including tropical semi-evergreen, sub-montane, and low alluvial savannah woodlands. A highly light-demanding species, it is a pioneer plant that regenerates naturally only in the open and on the edge of forests. It is an ideal choice for large-scale reforestation programs ⁷⁹ .
Alder	<i>Alnus jorullensis</i>	Native from Honduras, Guatemala and Mexico It grows in moist soil habitats, such as stream and riverbanks, swamps and moist montane slopes, often in very dense stands, at moderate to high elevations ⁸⁰ .

5.2.6 Invasive Species (B2.5)

The project proponent promotes the use of native species and adapted species. For verification of invasiveness, it was used the Global Invasive species Database⁸¹. Even though *Cedrela odorata* (Cedar) is native from Guatemala, the specie is listed as invasive. But, the invasiveness of the specie was reported in Ecuador, in the Galapagos Island, and South Africa (CITES, 2007).

The country has promoted Cedar plantations under forestry or agroforestry systems. Between 1998-2014, there was 1,264 ha reforested with cedro under the PINFOR program, and between 2007-2014 there was 233 ha established with cedro in agroforestry system and reforestation under the PINPEP program. In addition, it is cataloged as protected species by CONAP (INAB, 2017) due to its illegal and fast exploitation for timber as precious wood. Therefore, no additional management activities are required since it is native and well adapted to the project zone.

⁷⁷ World Agroforestry. Available at http://old.worldagroforestry.org/treedb/AFTPDFS/Cedrela_odorata.PDF

⁷⁸ Useful Tropical Plants. Available at <http://tropical.theferns.info/viewtropical.php?id=Calophyllum+brasiliense>

⁷⁹ Useful Tropical Plants. Available at <http://tropical.theferns.info/viewtropical.php?id=Gmelina+arborea>

⁸⁰ Useful Tropical Plants. Available at <http://tropical.theferns.info/viewtropical.php?id=Alnus+jorullensis>

⁸¹ Global invasive species database. Available at: <http://www.iucngisd.org/gisd/>

5.2.7 Impacts of Non-native Species (B2.6)

Species	<i>Tectona grandis</i>
Justification of Use	Teak is the most widely exotic species planted through the Forest Incentive (PINFOR) in Guatemala and the Central American Region. From 1997 to 2013, there was 18,222.36 ha planted with teak. The demand for wood has increased over the years which makes the plantation very profitable. The establishment of the species allows the farmers to obtain positive economic results for improving their livelihood (INAB, 2015).
Potential Adverse Effect	There has not been reported any potential adverse effect for the species

Species	<i>Gmelina arborea</i>
Justification of Use	It is the fifth species planted under the PINFOR program for reforestation purposes. From 1998 to 2013, there was 7,920.41 ha planted with this species (INAB, 2014). It is a fast-growing species and uses worldwide for reforestation activities for wood and firewood. The use of this species will contribute to reducing the degradation of the forest for illegal firewood extraction.
Potential Adverse Effect	There has not been reported any potential adverse effect for the species

5.2.8 GMO Exclusion (B2.7)

No GMOs are used in the project to generate GHG emissions reductions or removals. Certified forest seeds come from areas registered as seed sources in compliance with requirements of the PROBOSQUE program.

5.2.9 Inputs Justification (B2.8)

INAB (2016) mentioned that all management plans for protection or production purposes should include measures of prevention and control, presenting within its structure, a detailed description of these activities (e.g. monitoring, evaluations, thinning and pruning). Sanitary actions within the management plan in case of use should include:

- Seed selection
- Site selection (adequate sites reduce pest problems)
- Preparation of the ground
- Plantation densities and spatial arrangement
- Forestry practices such as the use of lateral shade, sanitation and formation pruning.
- Mechanical control
- Biological control (parasitoids, predators, entomopathogens)
- Chemical control

- Ethological control (a combination of different methods using bio-ecological knowledge of the pest and using repellents)

Currently, the only use within the project is chemical control.

Name	Chemical control
Justification of Use	Forest plantations are susceptible to pests attacks as it has been reported by INAB & IARNA-URL (2012). The most attacked species are <i>Tectona grandis</i> , <i>Roseodendron donnell-smithii</i> , <i>Pinus</i> spp., <i>Cupressus</i> spp., <i>Abies guatemalensis</i> , <i>Swietenia</i> spp., and <i>Cedrela odorata</i> . Therefore, to avoid the spread into the national territory, the use of agrochemicals according to the identified pathogen is used.
Potential Adverse Effect	If not used correctly with technical assistance, the products can alter the soil balance (pH, salinity, nutrients, biological composition) and pollute water bodies accelerating the process of eutrophication in aquatic systems. It can also cause potential damage to the person applying the product if no proper equipment is used.

5.2.10 Waste Products (B2.9)

Waste management follows the following practices:

- For handling any chemical products, the recommendation of the Municipal forestry technicians should be followed. As well as, the technical data information of the product. Proper safety and health equipment for handling and applying chemical products will be used.
- The products' package will be tossed following the recommendation of the Municipal forestry technician. This should be thrown in specific waste containers for the final disposal of the product and they will not be reused.
- The products will not be stored near water bodies. It will be located in specific areas designated for that purpose.

5.3 Offsite Biodiversity Impacts

5.3.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Measures (B3.2)

No potential negative offside biodiversity impacts have been identified. On the contrary, it is expected to improve biodiversity in the project zone as described in section 5.2. Therefore, no mitigation measures are needed.

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

No negative impacts on biodiversity outside the project zone have been identified. It is expected that the project activities generate a positive impact on biodiversity beyond the project zone. Habitat connectivity increase in forest cover and landscape restoration are some of the biodiversity benefits expected in the area.

5.4 Biodiversity Impact Monitoring

5.4.1 Biodiversity Monitoring Plan (B4.1, B4.2, GL1.4, GL3.4)

Deforestation occurs in mosaic, which affects the connectivity of biodiversity and provokes forest fragmentation causing a direct impact on wildlife. By the implementation of the project activities, it is expected to increase the forest cover and connectivity between the forest patches and to enhance the habitat for flora and fauna, allowing the movement of biodiversity populations (ecological flows).

The main methods for monitoring are satellite image analysis, a local visit to the project zone, and local interviews. The effectiveness of measures to maintain the HCV identified will be evaluated through the forest cover monitoring (described in section 3.3) and connectivity of the forest patches in the project zone to the protected areas. Endemic, migratory, or endangered species will be monitoring by CONAP, who is in charge of the protected areas, and if it applies, by the designated municipal office. The main variables to be monitored to ensure biodiversity conservation are described in the table below.

Objective	Variables	Areas to be monitored	Units	Method	Frequency
Biodiversity conservation	Natural forest cover	Project zone	Hectares	Satellite images analysis (GIS)	At least every verification period. If possible, annually
	Forest plantations (reforestation)	Project area	Hectares	-Data record (forest plantations registered). -Satellite images analysis (GIS)	At least every verification period. If possible, annually
	Forest protected	Project area	Hectares	Satellite images analysis (GIS)	At least every verification period. If possible, annually
	Agroforestry systems	Project area	Hectares	Satellite images analysis (GIS)	At least every verification period. If possible, annually
	Connectivity of forested areas	Project zone	Hectares	Satellite images analysis (GIS)	At least every verification period. If possible, annually
	Native species used for plantation, restoration	Project area	-Hectares -Number of species	-Data record (forest plantations registered). -Satellite images analysis (GIS)	At least every verification period. If possible, annually
	Illegal settlements in the project area	Project area	-Hectares. -Number of illegal settlements	-Data record (field observations) -Satellite images analysis (GIS)	At least every verification period. If possible, annually
	Deforestation	Project area	-Hectares -Annual deforestation rate	Satellite images analysis (GIS)	At least every verification period. If possible, annually
	Forest fires	Project area	Hectares	Satellite images analysis (GIS)	At least every verification period. If possible, annually

5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

Calmecac has extensive experience working with communities in the project zone and collaborating with other stakeholders. Therefore, the dissemination of the monitoring plan will be at local or municipal consultations with the actors involved. In these meetings, the complete monitoring plan and results or summaries will be presented. The stakeholders will validate the results, raise questions and give feedback on the results. The summary of the document will be available in the local language. Monitoring reports will be publicly available on VERRA website.

For a complete description of project documents dissemination with communities, refer to section 2.3.2.

5.5 Optional Criterion: Exceptional Biodiversity Benefits

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

Within the project zone, there are 3 endangered species cataloged under the IUCN Red List. As mentioned in section 5.1 (please refer to this section for further details), the project zone contains threatened species from least concern until critically endangered. The main important species are *Alouatta pigra* (Endangered), *Ateles geoffroyi* (Endangered), *Tapirus bairdii* (Endangered), *Panthera Onca* (Near Threatened), and *Leopardus wiedii* (Near Threatened).

5.5.2 Trigger Species Population Trends (GL3.2, GL3.3)

Trigger Species	<i>Alouatta pigra</i> , <i>Ateles geoffroyi</i> , <i>Tapirus bairdii</i>
Population Trend at Start of Project	There have been registered in previous studies the presence of these species in the project zone and the threatened status has been recognized (Girón, 2010; Gómez, 2011). However, there are no numbers about the population and the status is yet unknown.
Without-project Scenario	Under the baseline scenario, deforestation will also affect this area. Fragmentation due to mosaic deforestation (agriculture frontier, cattle ranching activities) will reduce the habitat species need to threaten their conservation.
With-project Scenario	The project activities will contribute to an increase in forest cover, which will be reflected in the improvement in the connectivity of the forest patches. Diversification of forest products will help to reduce the pressure on natural forests. In addition, the forest incentives will indirectly contribute to protecting the remain natural forest and therefore, the habitat of the species.

APPENDICES

Appendix 1: Bibliography

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