

REDD+ PROJECT FOR CARIBBEAN GUATEMALA: THE CONSERVATION COAST MONITORING & IMPLEMENTATION REPORT



Karen Aguilar, Development Director
k.aguilar@FUNDAECO.org.gt

Document Prepared By



Paz Lozano, Manager of Development Services
plozano@ecopartnersllc.com

Kyle Holland, Managing Director
kholland@ecopartnersllc.com

Project Title	REDD+ Project for Caribbean Guatemala: The Conservation Coast
Project ID	1622
Version	v 1.17
Report ID	
Date of Issue	19 July 2019
Project Location	Izabal Department of Izabal, Guatemala
Project Proponent(s)	Fundación para el Ecodesarrollo y la Conservación –FUNDAECO- Phone: (502) 23141900 Address: 25 calle 2-39 zona 1, Guatemala City, Guatemala Contact: Karen Aguilar Email: k.aguilar@fundaeco.org.gt Website: www.fundaeco.org.gt
Prepared By	Ecological Carbon Offsets Partners, LLC (ecoPartners) Phone: +1 (415) 634-4650 Address: 2930 Shattuck Ave, Suite 304, Berkeley, CA 94705 Email: plozano@ecopartnersllc.com Website: www.epcarbon.com;
Validation/Verification Body	S&A Carbon, LLC Phone: 971-235-7835 Contact: Kyle Silon Email: kyle.silon@saacarbon.com Website: www.saacarbon.com
GHG Accounting/ Crediting Period	01 April 2012 31 March 2042; 30-year total period
Monitoring Period of this Report	01 January 2017 – 31 December 2018
History of CCB Status	Validation Received 29 March 2017
Gold Level Criteria	Biodiversity Gold Preserves 2,480 hectares of habitat for 6 critically endangered amphibian species and implements procedures to avoid fungal contamination in this area. Both habitat loss and disease have been identified as the greatest risks to trigger species found here.

Table of Contents

1 Summary of Project Benefits 4

 1.1 Unique Project Benefits..... 4

 1.2 Standardized Benefit Metrics 6

2 General 9

 2.1 Project Description 9

 2.2 Project Implementation Status 21

 2.3 Stakeholder Engagement 42

 2.4 Management Capacity 49

 2.5 Legal Status and Property Rights 54

3. Climate.....60

 3.1 Monitoring GHG Emission Reductions and Removals 60

 3.2 Quantification of GHG Emission Reductions and Removals 200

 3.3 Optional Criterion: Climate Change Adaptation Benefits 212

4. Community213

 4.1 Net Positive Community Impacts 213

 4.2 Other Stakeholder Impacts 220

 4.3 Community Impact Monitoring 221

 4.4 Optional Criterion: Exceptional Community Benefits 226

5. Biodiversity227

 5.1 Net Positive Biodiversity Impacts 227

 5.2 Offsite Biodiversity Impacts..... 239

 5.3 Biodiversity Impact Monitoring 239

 5.4 Optional Criterion: Exceptional Biodiversity Benefits 243

6. Additional Project Implementation Information245

7. Additonal project Impact Information.....245

1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Table 1: Unique Project Benefits

Outcome or Impact	Achievements during the Monitoring Period	Section Reference	Achievements during the Project Lifetime
1) Increased Awareness of Ecosystem and Habitat Importance for Native Species	Educational initiatives are being implemented in coordination with public schools so that schoolchildren will be taught Climate Change, Nature values of Caribbean Guatemala, endangered species, and environmental stewardship. The project has enrolled 29 schools and 987 students to participate in environmental education, and other 1881 students visited FUNDAECO Ecotourism sites and learned about the Conservation Coast importance for Biodiversity and Communities. By teaching these fundamental concepts to children and youths, the project cultivates a better understanding and better relationships with the natural world.	4.1.1	9064 students from 45 school participated in environmental education activities or visited FUNDAECO Ecotourism sites
2) Widespread protection of forest in the project zone	FUNDAECO has designed a number of activities within the Resource Protection technology (Section 2.2 of the PD) that addresses the lack of law enforcement. These activities include the implementation of forest patrols, governance enhancement and interinstitutional coordination. Forest patrols and the enforcement of local laws would help to curb deforestation agents whose activities are possible due to weak law enforcement. 2761 regular and interinstitutional forest patrols, in coordination with government agencies CONAP, MP and BIM etc.	4.1.4	3432 forest patrols
3) Widespread awareness among women and families on sexual and reproductive rights and health	Satisfying women basic needs will strengthen their participation in the economy and the decision making process of the community; the project includes a specific program	4.1.1	3274 people participated in talks on sexual and reproductive rights and health

	<p>on Access to sexual and reproductive health. Access to sexual and reproductive health services and family planning will also provide families a tool to plan their economy and the education of their children, though expanding the impacts of the program in the medium and long term. Besides contributing directly to Health metrics, this program gives access to information and education so women are more aware on the importance and impacts of sexual and reproductive health and rights. 1843 people participated in talks on sexual and reproductive rights and health</p>		
<p>4) Sufficient household income and Widespread protection</p>	<p>Several project activities are aimed at addressing the Lack of Economic and Employment Opportunities. Namely, the Sustainable Enterprises, Access the Resource, and Education project activities are aimed at diversifying the income sources of families and individuals beyond traditional products and activities. Additional income can also be derived from forest protection through the government forest incentive programs PINFOR/PINPEP/PROBOSQUE; incentivizing landowners to maintain forested areas. Application to these programs, however, involves several technical steps and the support of forestry technicians is required. The project covers all expenses related to the preparation of the files required by forestry incentives programs, so forest owners that are part of the project can be benefited.</p> <p>183 families are receiving forestry incentives (112 forest protection, 71 agroforestry and reforestation)</p>	<p>4.1.1</p>	<p>371 families are receiving forestry incentives</p>

1.2 Standardized Benefit Metrics

Table 2: Standardized Benefit Metrics

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
GHG emission reductions & removals	Net estimated emission removals in the project area, measured against the without-project scenario	0 tCO ₂ e		0 tCO ₂ e
	Net estimated emission reductions in the project area, measured against the without-project scenario	1,975,402 tCO ₂ e	3.2.4	4,423,325 tCO ₂ e
Forest ¹ cover	For REDD ² projects: Number of hectares of reduced forest loss in the project area measured against the without-project scenario	4,172 ha	5.1.3	10,904 ha
	For ARR ³ projects: Number of hectares of forest cover increased in the project area measured against the without-project scenario	Not Applicable	-	Not Applicable
Improved land management	Number of hectares of existing production forest land in which IFM ⁴ practices have occurred as a result of the project's activities, measured against the without-project scenario	Not Applicable		Not Applicable
	Number of hectares of non-forest land in which improved land management has occurred as a result of the project's activities, measured against the without-project scenario	113.74	5.1.1	2,449.42

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	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
Training	Total number of community members who have improved skills and/or knowledge resulting from training provided as part of project activities	2179	2.1.10 2.2.6 2.2.7 2.3.13 4.1.1	2636
	Number of female community members who have improved skills and/or knowledge resulting from training provided as part of project activities of project activities	547	2.1.10 2.2.6 2.2.7 2.3.13 4.1.1	547* *Additional women were trained during the first monitoring period however data was not segregated by gender, so the additional number of trained women is unknown
Employment	Total number of people employed in of project activities, ⁵ expressed as number of full time employees ⁶	97	2.3.13	97
	Number of women employed in project activities, expressed as number of full time employees	26	2.3.13	26
Livelihoods	Total number of people with improved livelihoods ⁷ or income generated as a result of project activities	171	4.1.1	778
	Number of women with improved	60	4.1.1	224

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 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	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	livelihoods or income generated as a result of project activities			
Health	Total number of people for whom health services were improved as a result of project activities, measured against the without-project scenario	12,022	4.1.1	44363
	Number of women for whom health services were improved as a result of project activities, measured against the without-project scenario	8,303	4.1.1	14,329
Education	Total number of people for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario (this metric include access to scholarships and special training programs)	97	4.1.1	134
	Number of women and girls for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario (this metric include access to scholarships and special training programs)	62	4.1.1	100
Water	Total number of people who experienced increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	not applicable		not applicable
	Number of women who experienced increased water quality and/or improved access to drinking water as a result of project activities, measured	not applicable		not applicable

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	against the without-project scenario			
Well-being	Total number of community members whose well-being ⁸ was improved as a result of project activities	14,952	4.1.1	48529
	Number of women whose well-being was improved as a result of project activities	9014	4.1.1	24000
Biodiversity conservation	Change in the number of hectares significantly better managed by the project for biodiversity conservation, ⁹ measured against the without-project scenario	899 ha	2.1.7	52,528 ha
	Number of globally Critically Endangered or Endangered species ¹⁰ benefiting from reduced threats as a result of project activities, ¹¹ measured against the without-project scenario	30	5.4.1	30

2 GENERAL

2.1 Project Description

2.1.1 Implementation Description

This project is an Agriculture, Forestry and Other Land Use (AFOLU) project under the Reducing Emissions from Deforestation and Degradation (REDD) project category. Specifically, the project is of the “Avoided Unplanned Deforestation & Degradation” (AUDD) project category.

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, Health, Education, Water, etc.), but could also include other benefits such as empowerment of community groups, strengthened legal rights to resources, conservation of access to areas of cultural significance, etc.

⁹ 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.

¹⁰ Per IUCN’s Red List of Threatened Species

¹¹ In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit

The project is estimated to generate approximately 24,445,681 tCO₂e of GHG Emissions Reductions over 30 years. During this verification, the project has generated a total of 1,975,402 tCO₂e in net emissions reductions. The project area is located in Department of Izabal in the Caribbean coast region of Guatemala in the Sarstun-Motagua reference region proposed by the national level REDD+ program. Belonging to the biologically diverse Mesoamerican Biological Corridor, forests in the project area are important nationally and internationally for the ecosystem services they provide. The project area forests, however, have experienced a continued reduction in biomass due largely to small-scale farmers and weak law enforcement.

In 2013 Guatemala passed the Framework for the Regulation of the Reduction of Vulnerability, the Mandatory Adaptation to the effects of Climate Change and the Mitigation of the effects of Greenhouse Gases (Decree 07-2013) which gave landowners the rights to emission reductions generated in either voluntary or compliance markets. This law allowed the REDD+ Project for Caribbean Guatemala to pursue a Grouped Project design where the project proponent, FUNDAECO, could represent small landowners and manage the development of a REDD+ project on their behalf through legal contracts that transfer Rights of Use to FUNDAECO.

The project aims to alleviate these pressures on the forests through the support of governance capacity (including individual property titling, land-use planning and conservation zone demarcation), the generation of alternative economic activities and income sources, and through capacity building in administration and management. These project activities, beyond protecting local forests and biodiversity, contribute to social and economic development in one of the poorest areas of Guatemala. The effectiveness of these activities is partially dependent on their long-term economic success and widespread adoption. Project Objectives and activities are organized to benefit Climate, Communities and Biodiversity, project Objectives are:

- *Climate Objectives*
 - Reduce CO₂ emissions that result from the conversion of intact forest to agricultural and pastoral land
- *Community Objectives*
 - Empower marginalized and vulnerable communities through the legalization of land, promotion of reproductive rights and participation in resource management.
 - Improve quality of life in the project zone by creating access to new markets, promoting sustainable production and improving public health and education opportunities.
 - Promote landowner and community self-sufficiency in the project zone through diversified economies and sustainable land uses.
 - Preserve awareness and respect for traditional, cultural, spiritual and religious identities of communities within the project area.
- *Biodiversity Objectives*
 - Maintain habitat for viable, abundant and diverse natural populations.
 - Reduce threats to rare, threatened and endangered species.
 - Maintain the function of the natural ecosystems.
 - Support local and global knowledge of biodiversity in the project zone.

Throughout this monitoring period, the project has continued to implement project activities that contribute to the creation of GHG emissions reductions. The project's main goals during this monitoring period have been to improve forest protection through forest patrols and law enforcement, but also the strengthening of protected area governance, and supporting forest owners to possessors to access the government forest incentive program, PROBOSQUE and PINPEP.

As lack of opportunities was identified as lack of economic and employment opportunities was identified as the strongest factor for deforestation in the region where the REDD+ Project is located. The project

FUNDAECO has been tackling these underlying drivers by improving two basic conditions that will then trigger positive long-term impacts: a) Access to Resources and Economic Opportunities, and b) Education. The project is supporting local producers in access to technical assistance and training for agroforestry projects with value crops such as black pepper, rambutan and cardamom, as well as in access to improved health services especially for women.

During this period the FUNDAECO project was also focused on creating conditions to contribute to project financial sustainability; FUNDAECO created 6 agroforestry production centers “biocenters” that will generate revenues from the sale of crops and are also being used as training centers for local producers. Additionally FUNDAECO continues the creation and improvement of ecotourism sites that besides generating revenues for project implement create benefits for biodiversity and community by increasing population and visitors’ awareness on Caribbean Guatemala biodiversity values.

FUNDAECO has implemented specific methodologies and/or protocols to monitor Climate, Community and biodiversity impacts, as well as leakage. The project has defined a leakage belt and FUNDAECO implements project activities within the project zone and leakage belt to mitigate potential leakage. The leakage belt was monitored using remote sensing, and no leakage was reported for this monitoring period. The project also mitigates non-permanence risk factors such as internal, external, and natural risk by conducting risk evaluations at every verification. The project mitigates internal and external risk by continuing to maintain strong relationships with communities, government officials, and other organizations within the project zone in addition to running FUNDAECO as a non-profit and ensuring that high levels of organization of project documentation are collected and maintained.

2.1.2 Project Category and Activity Type

This project is an Agriculture, Forestry and Other Land Use (AFOLU) project under the Reducing Emissions from Deforestation and Degradation (REDD) project category, sectoral scope 14. Specifically, the project is of the “Avoided Unplanned Deforestation & Degradation” (AUDD) project category. The project will not pursue IFM nor ANR activities in any of the project areas. Some of the project activities do occur on wetlands; however the specific carbon pools and GHG sources have not been accounted for as their exclusion leads to conservative estimates of the total GHG emission reductions. Specifically, peat soils have been removed from the project. The methodology VM0015 establishes that both below ground biomass and soil organic carbon are optional carbon pools and may be conservatively excluded. The project is a grouped project.

2.1.3 Project Proponent(s)

Fundacion para el Ecodesarrollo y la Conservacion (FUNDAECO) is a non-profit organization dedicated to conservation and community development based in Guatemala City, Guatemala with field offices in the Department of Izabal. FUNDAECO is the project proponent and is solely responsible for all aspects of project design, implementation, and management. FUNDAECO has full project ownership for all emissions reductions from the REDD+ Project for Caribbean Guatemala.

Table 3: Project proponent details.

Organization name	Fundación para el Ecodesarrollo y la Conservación FUNDAECO
Contact person	Karen Aguilar Ponce
Title	Director of Development

Address	25 calle 2-39 zona 1
Telephone	(502)23141900
Email	k.aguilar@fundaeco.org.gt

2.1.4 Other Entities Involved in the Project

Ecological Carbon Offset Partners, LLC (ecoPartners) is a consulting firm based out of Berkeley, California, USA. As a leader of carbon-financed conservation, [ecoPartners](#) works with project developers, forest owners and verification bodies to build successful carbon offset projects. They are experts in the technical aspects of project design, planning and development including biometrics, accounting methodologies and remote sensing. ecoPartners has extensive experience validating and verifying projects under the California Air Resources Board (ARB), Climate Action Reserve (CAR) Standard, Verified Carbon Standard (VCS), and Climate Community & Biodiversity (CCB) Standard.

Organization name	Ecological Carbon Offset Partners, LLC (ecoPartners)
Role in the project	EcoPartners has provided technical consulting services to FUNDAECO on project design, documentation, carbon accounting, validation, and remote sensing, as well as in drafting the Project Description Document.
Contact person	Kyle Holland, Managing
Title	Director
Address	2930 Shattuck Ave, Suite 305, Berkeley, CA, 94795, USA
Telephone	+1 415-634-4650
Email	kholland@ecopartnersllc.com mailto:adam.gibbon@althelia.com

Althelia Ecosphere is a fund dedicated to funding innovative models that lead to long term transitions to sustainable land use and mitigate greenhouse gas emissions whilst providing sustainable livelihoods. Their model aims to address the drivers of deforestation and unsustainable land-use and release additional value from standing forests from payments for environmental services. Through a focus on blended value investments that deliver the highest caliber social, environmental and economic performance, they aim to demonstrate that financial performance can be fully aligned with sound environmental stewardship and social development.

Organization name	Althelia Ecosphere
Role in the project	In the context of the REDD+ Project for Caribbean Guatemala, Althelia has provided financing for project development costs.
Contact person	Adam Gibbon,

Title	Chief Technical Officer
Address	Ecosphere Capital Partners LLP (advisors), 7 Chalcot Road, Primrose Hill, London NW1 8LH
Telephone	
Email	adam.gibbon@althelia.com

2.1.5 Project Start Date (G1.9)

The project start date is April 1, 2012. This is the date of the first Project Activity Instance (PAI) that occurred after additionality was established using expected carbon revenues (see Section 1.6.2 from the PD) and funding strategies by FUNDAECO were based on debt-finance with anticipation of REDD+ carbon credit payments. FUNDAECO began a transition from grant and philanthropic funding to results based payments mechanisms found in REDD+ as early as 2010. The start of this transition was marked by a Memorandum of Understanding (MOU) signed in August 2010 between BNP Paribas/ Althelia Ecosphere and FUNDAECO to reduce emissions through a REDD+ project (see MOU BNP PARIBAS_Complete.pdf). In addition to increasing the focus on a finance strategy based on REDD+ the funding from grant and philanthropic sources was ramped down as early as 2011. In 2011 the contract between FUNDAECO and the Jade Project, supported by the Netherlands, the supported conservation activities in the network of protected area in Izabal was terminated with the last disbursement schedule in April 2011 (see Finalizacion CONTRATO JADE 2010-2011.pdf). This last payment covered operational costs for the remainder of the 2011 annum and FUNDAECO thereafter sought debt-financing to support a REDD+ project starting in 2012.

FUNDAECO demonstrated its intent to develop a REDD+ program in the Izabal region by following the five phases set out within the scope of the MOU including Project Identification, Commercial Structuring, Development, Implementation, and Monetization. Important milestones within the MOU were achieved including completion of a feasibility study September 14th, 2012, commercial structuring of a REDD+ program with Althelia with a contract reach in early 2015, and the contracting of ecoPartners in early 2015 to assist with the development and implantation implementation of REDD+ project activities.

This timeline demonstrates FUNDAECO's intentional transition between conservation finance strategies that, in terms of financial cash-flows, transitioned at the start of 2012. The project start date is reflected as the first PAI that resulted in emission reductions as a result of project activities funded through FUNDAECO's new financial strategy based on REDD+. The first PAI occurred on April 1, 2012 and created emission reductions from the project activities. See the Fundaeco VM0015 Accounting Model.xlsm for a list of all PAI start dates on April 1, 2012 and the activities that correspond to those dates.

2.1.6 Project Crediting Period (G1.9)

The project crediting period is 30-years starting on April 1, 2012 and ending on March 31st, 2042. The results presented in this document occurred during the second monitoring and implementation period spanning from January 1, 2017 to December 31, 2018.

2.1.7 Project Location

The REDD+ Project for Caribbean Guatemala is located along the Caribbean coast of Guatemala, in the department of Izabal, and has the potential to conserve up to 128,448 hectares of tropical forest that make up part of the Mesoamerican Biological Corridor. The climate in the region is classified as Tropical Rainforest Climate (Af, according to the Koppen-Geiger classification) and has an average of roughly

3,000 mm of rainfall per year (climate-data.org). The northernmost boundary of the project area is the Sarstun river, which marks the border between Guatemala and Belize, and the southernmost boundary of the project area shares a border with Honduras. All areas that have the potential to be affected by the project are included in the figures below.

Project Zone

The delineation of the Project Zone was defined in section 1.2.4 of the PDD, and has not changed during this monitoring period. The Project Zone was defined as the service area of the project activities implemented and provided by the project proponent. Following CCB Standard Third Edition, the Project Zone was also defined as the area encompassing the Project Area in which project activities that directly affect land and associated resources, including activities such as those related to provision of alternative livelihoods and community development, are implemented. From the array of project activities implemented by FUNDAECO those that have spatial characteristics as well as provision alternative livelihoods, community development, and affect natural resources include:

1. Protected areas (Areas Protegidas)
2. Ecotourism sites
3. Health clinics (Clinicas)
4. Fisheries (Refugios)
5. Nurseries (Viverios)

Spatial datasets of these five areas were used to determine the service area of the FUNDAECO project activities and thus the Project Zone. Results from participatory rural appraisals that indicated how far individuals would travel to use resources such as nurseries, clinics, and fisheries were used to create a 10-km buffer around these. Following the requirements of the CCB Standard 3rd Edition, the project zone includes all the individual parcels and potential future parcels in the Project Area and Grouped Project Area according to the programmatic approach.

All communities that were encompassed within the Project Zone are shown in Figure 1.

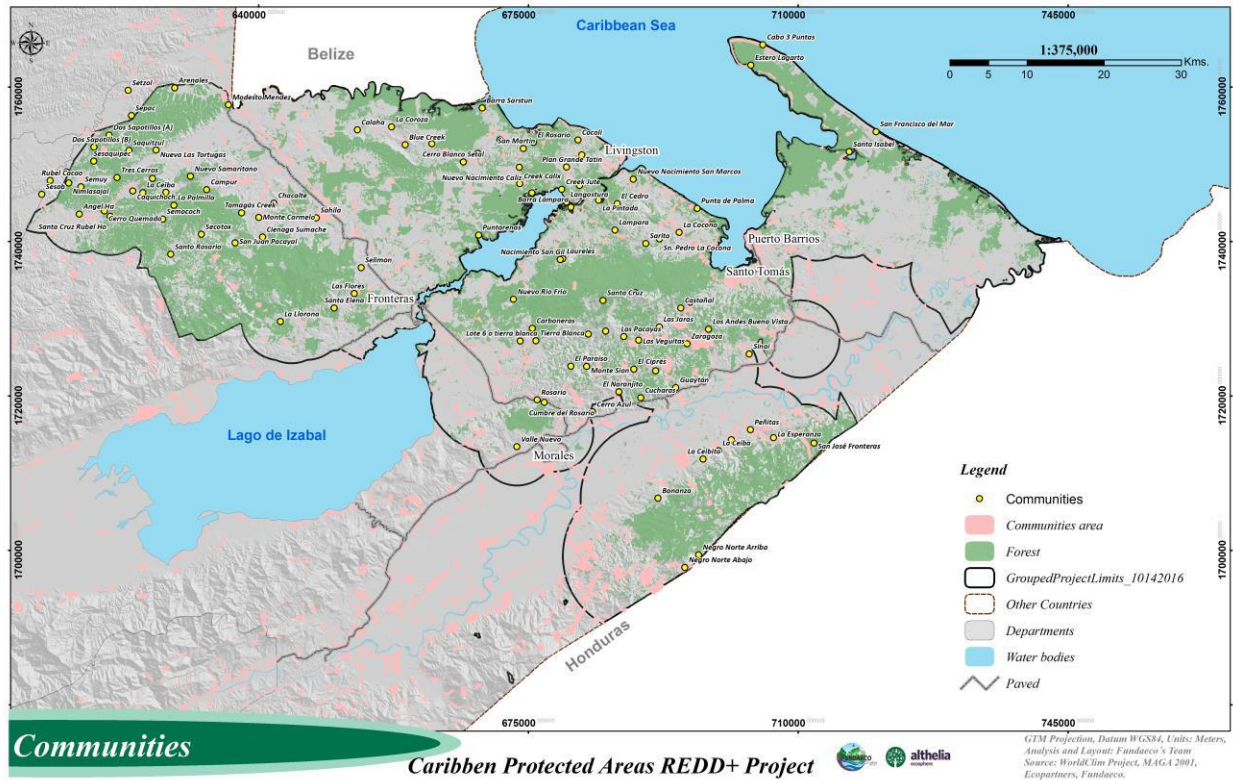


Figure 1: Map of communities identified inside project zone.

Grouped Project Area

This project is a grouped project and also uses the programmatic approach. The Grouped Project Area is shown in Figure 2 below (see GroupedProjectArea_11032016.shp in the provided annexes). The grouped project area has been designed to display a single baseline scenario and demonstration of additionality. The Grouped Project Area is defined as forest area found at the project start date within the Project Zone (see Section 2.2.1) that has been forested for at least 10-years.

These areas further define where forest in additional parcels that meet the eligibility criteria (see Section 1.3.1 and Section 2.1.8 of the PDD) can be added in the future as Project Activity Instances to the Project Area (section 2.2.4 for a list of new Project Activity Instances). In order to define the Grouped Project Area, first, the parcels that met the eligibility criteria and were likely to be added to the project at some point in the future were collated into one shapefile. From this larger area, the areas that met the nationally recognized definition of forest for at least 10 years were extracted in order to create the final Grouped Project Area. See Figure 2 for a map of the Grouped Project Area.

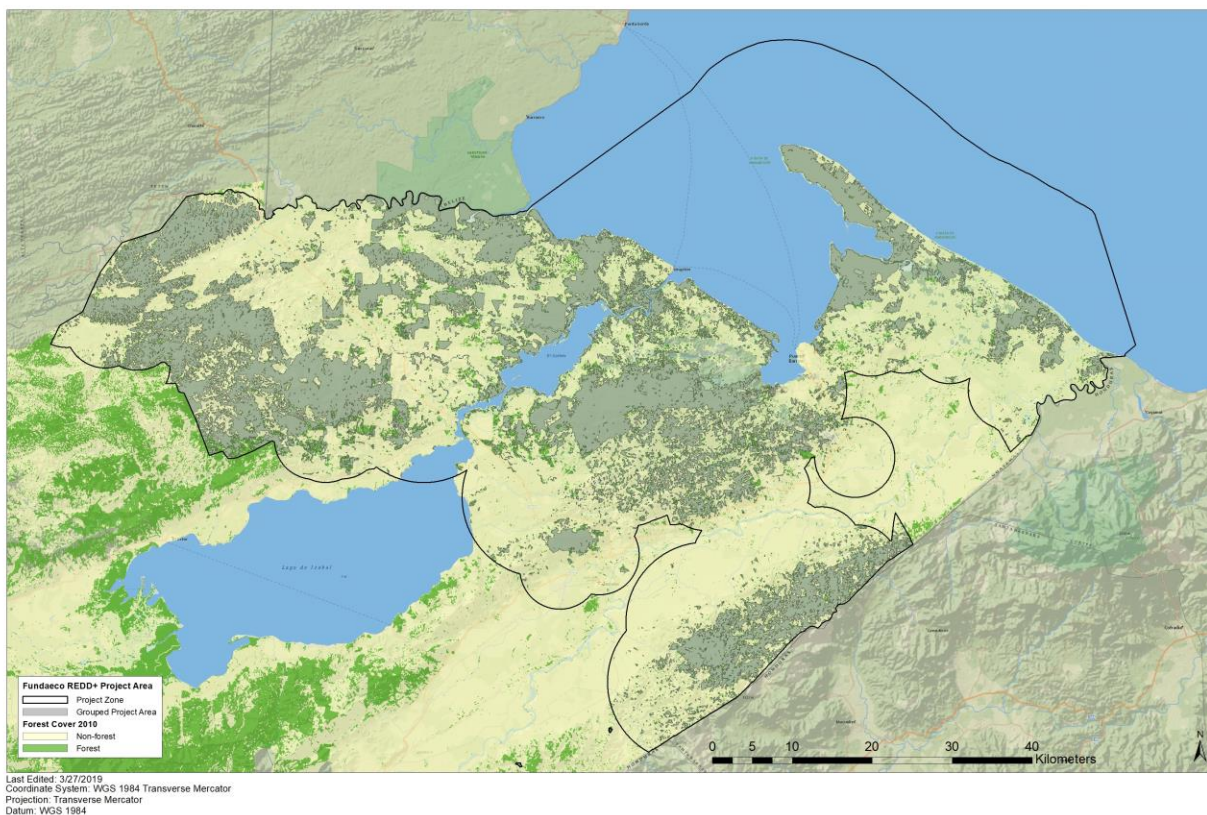


Figure 2: Grouped Project Area and Project Zone.

Project Area

The Project Area was defined as forested parcels within the Grouped Project Area where the project proponent has demonstrated clear project ownership at the time of verification. A FUNDAECO REDD+ Database has been provided (see Fundaeco VM0015 Accounting Model.xlsm) that describes the name, physical boundary, description of current land-tenure and ownership, and a list of project participants for

each individual parcel. As of this monitoring period, there are 743 different parcels that make up the 55,341 hectares of the Project Area, where project ownership has been transferred to FUNDAECO. Since the previous monitoring period, 77 new parcels have been added to the Project Area to comprise a total of 743 parcels. All new parcels meet the eligibility criteria outlined in section 2.1.8 of the Project Description. Section 2.2.5 below describes in detail how each new project activity instance meets the eligibility criteria for their inclusion in the project. Figure 3 below provides a map of the Project Area that includes both previously validated project activity instances, and all new Project Activity Instances. The size of the Project Area is expected to increase over time as new Project Activity Instances are established.

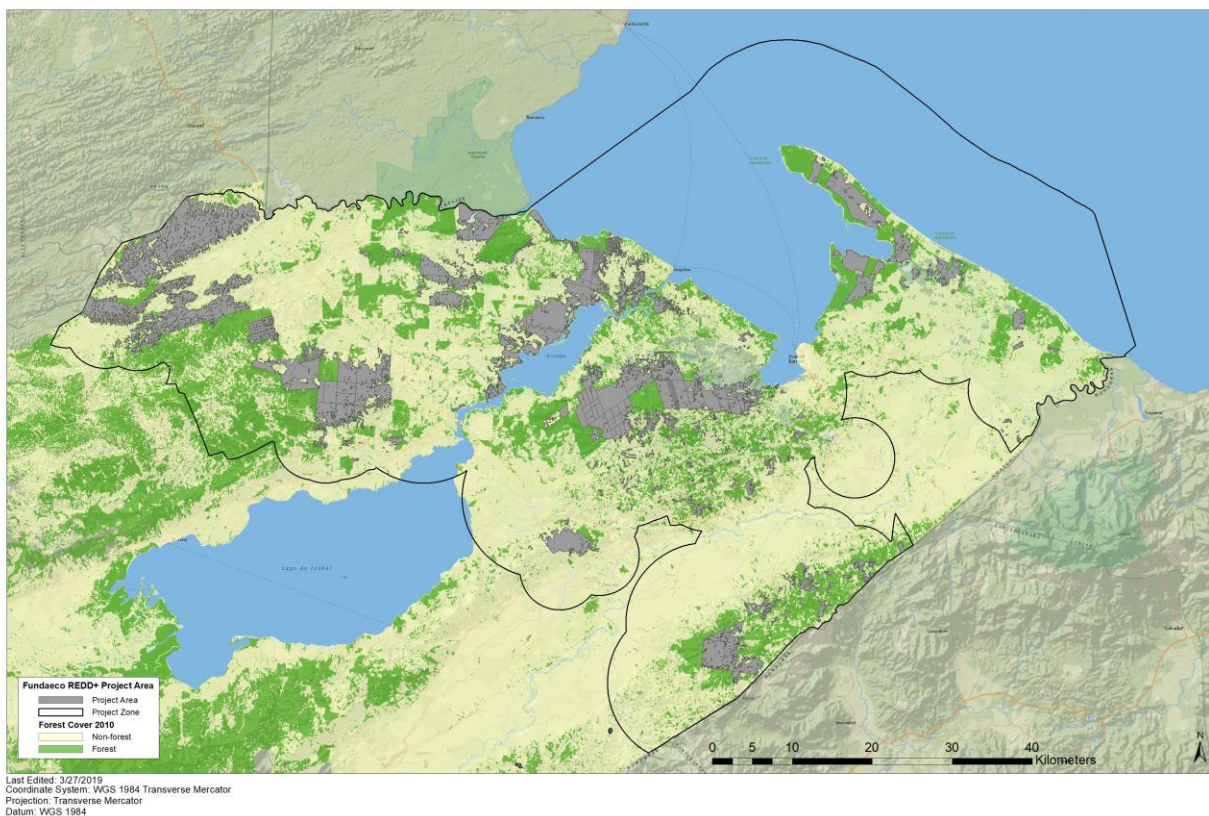


Figure 3: Project Area and Project Zone.

2.1.8 Title and Reference of Methodology

The project used the VCS-approved methodology VM0015, v1.1, “Methodology for Avoided Unplanned Deforestation” for quantification of GHG emission reductions and removals generated from avoided unplanned mosaic deforestation. In combination with the methodology, the latest version of the following approved tools and modules were used by the project:

- CDM A/R Methodological Tool Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities.
- CDM A/R Methodological Tool 03 Calculation of the number of sample plots for measurements within A/R CDM project activities.

- CDM A/R Methodological Tool 06 Procedure to determine when accounting of the soil organic carbon pool may be conservatively neglected.
- CDM A/R Methodological Tool 09 Estimation of GHG emissions related to displacement of grazing activities in A/R CDM project activity.
- CDM Tool for testing significance of GHG emissions in A/R CDM project activities.
- VM0003 Methodology for Improved Forest Management Through Extension Rotation Age (IFM ERA), v1.2
- VCS Tool VT0001 Tool for the demonstration and assessment of additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) project activities.
- VCS Tool for calculating deforestation rates using incomplete remote sensing images.
- VCS Module VMD0033 Estimation of emissions from market leakage.

Finally, the project meets all of the requirements for models and default factors set forth in the VCS Standard v3.7, issued October 19th, 2016, and the VCS AFOLU Requirements v3.5, issued October 19th, 2016.

2.1.9 Other Programs (G5.9)

- Emission Trading Programs and Other Binding Limits: The emissions reductions and removals generated by the project are not used for compliance with any emissions trading program or to meet any binding GHG emissions limit. Guatemala has presented a subnational ERPD to the FCPF, however this ERPD is limited just to some areas around Guatemala, and the project zone is not included. To avoid double counting, emissions reductions will only be issued as Verified Carbon Units (VCUs).
- Other Forms of Environmental Credit: The project has not and does not intend to generate any related environmental credit for GHG emissions reductions or removals other than those claimed under the VCS Program. No other forms of environmental credit will be sought by the project proponent.
- Participation under Other GHG Programs: The project has not been, and will not be, seeking registration under any other GHG programs other than VCS and CCB. CCB verification will demonstrate positive climate, community and biodiversity impacts, but does not produce any registered emissions reductions or credits.

Currently, there is no national or jurisdictional REDD+ program. Therefore, the project is not located within a jurisdiction covered by a REDD+ jurisdictional program in Guatemala and not required to follow the VCS jurisdictional REDD+ requirements.

However, the Guatemalan government led by the Ministry of Environment and Natural Resources (MARN) as the REDD+ focal point is in the process of developing a national REDD+ strategy. The Guatemala National REDD+ Strategy actually under development has followed a jurisdictional nested approach and has delineated five regions that will independently establish reference emission levels (RELs). See Documento del Paquete de Preparación REDD+. The REDD+ Project for Caribbean Guatemala falls within the Sarstun-Motagua region which has initiated the collection of data for determining a REL. The REDD+ Project for Caribbean Guatemala is moving faster than the national

strategy, however, it recognizes the importance and need to harmonize with programmatic details that have been established. FUNDAECO is participating in the national REDD+ strategy discussions, and is also coordinating with Universidad Valle (UVG) to ensure that all information produced on deforestation and degradation, carbon estimates, and land use classification can be used in the development of the REDD+ Project for Caribbean Guatemala.

2.1.10 Sustainable Development

One of the three primary objectives of this project is to foster sustainable development of local communities in ways that support broader national goals for sustainable development. This has been achieved in various ways, including the following. First, local technicians committed to both sustainable community development and nature conservation within the project zone were included on the project team. They have been trained to remain open to listening to community grievances and to implement an adaptive management approach that remains flexible to making changes based on these grievances. This directly supports the Katun 2032 National Development Plan launched by Guatemala in 2014. Some fundamental goals of this plan are welfare for the people, wealth for all, natural resources for today and tomorrow, and that citizen participation is a fundamental element of long-term development. This project activity has also supported various other policies adopted by Guatemala’s government, including their Forestry and Agricultural policies, alongside the National Policy for Integrated Rural Development (see Table 14 of PDD).

Guatemala has also made various commitments to biodiversity in its Policy for Biological Diversity and the National Strategy and Action Plan for Biodiversity 2012-2022, which both emphasize conservation, protection, and improvement of the country’s natural resources as critical for sustainable development. The project has made strong commitment to protecting biodiversity, especially the HCVs identified (see PD Section 2.4), and has implemented various activities to support this commitment. The primary activity protecting biodiversity has been through the reduction of deforestation and forest degradation and facilitating forest regeneration, since changes in forest cover are closely correlated to changes in biodiversity. This has primarily been achieved through the enforcement of protected area laws and forest patrols, improved land use management by supporting agroforestry and reforestation projects, supporting access to the forestry incentive programs PROBOSQUE, PINFOR and PINPEP, and improving economic opportunities. FUNDAECO has also prohibited the use of invasive species and GMOs within the project area. In order to monitor changes in biodiversity due to project activities, a baseline scenario was developed during the project development stage and as the project moves forward, forest inventories will be conducted so that comparisons can be made to this baseline. This will help serve as an indicator of biodiversity protection. See FUNDAECO Bird Monitoring Program 2017-2018.

Regarding the Sustainable Development Goals, Guatemala has prioritized specific targets for each goal. FUNDAECO has identified that the project will contribute to several targets prioritized in the document Informe de la Estrategia de Articulación de los Objetivos de Desarrollo Sostenible al Plan y la Política Nacional de Desarrollo K’atun: Nuestra Guatemala al 2032. Table 4 below shows the SDG targets that the Project is aiming to address, as well as the project activity related.

Table 4: Sustainable development goals for the REDD+ Project for Caribbean Guatemala.

SDG	Identified SDG indicator	Project Activity	Related Indicator
2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers,	2.3.2 Average income of small-scale food producers, by sex and indigenous status	Creation of agroforestry plots (18)	# farmers participating in agroforestry projects *This indicator will be complemented to monitor incomes in

including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.			year 2021, when yields starts
3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes	3.7.1 Proportion of women of reproductive age (aged 15-49 years) who have their need for family planning satisfied with modern methods	Provision of health services (47)	# of workshops held
		Provision of health services (76)	# of patients treated # of women using contraceptive methods
13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions	Environmental education for schools (50)	# of schools participating
		Environmental education for interested communities (51)	# of communities participating in environmental education
14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information	14.5.1 Coverage of protected areas in relation to marine areas	Implementation of fishing restriction zones (8)	# of fishing restriction zones
15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type	Purchase of land for protection (9)	# of hectares purchased
		Creation of protected areas (11)	Records for creation of protected areas
		Protection and management of community water resources (12)	# hectares of watersheds protected
15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	15.2.1 Progress towards sustainable forest management	Manage protected areas (10)	# of hectares managed
		Registered land into PINFOR or PINPEP, PROBOSQUE (3)	# hectares of land FUNDAECO helped to register within PINFOR or PINPEP, PROBOSQUE
15.5 Take urgent and significant action to reduce the degradation	15.5.1 Red List Index	Train park guards to prevent transfer	# of guards trained # of trainings held

of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species		of amphibian fungus to amphibian conservation areas (66)	
---	--	--	--

2.2 Project Implementation Status

2.2.1 Implementation Schedule (G1.9)

FUNDAECO started the early design and finance of a REDD+ Project in Caribbean Guatemala in 2010, through a MOU signed with BNP-Paribas, a feasibility study was produced in 2012 and the project was finally validated in 2017, table 5 below shows the key dates and milestones in the project development and implementation:

Table 5: Project Milestones

Date	Milestone(s) in the project's development and implementation
08/05/2010	Signature and start of the implementation of a Memorandum of Understanding between FUNDAECO and BNP Paribas to explore REDD+ as an strategy to protect forest in Caribbean Guatemala
04/01/2012	Start of project activities
09/14/2012	Production of the Feasibility Study for a REDD+ Project in Caribbean Guatemala
04/30/2015	Hiring of ecoPartners as our principal adviser for the project validation and verification
05/05/2015	Signature of agreement with Althelia Ecosphere for the financing of project development costs and early activities
03/29/2017	Validation Report Issued
11/12/2017	First Verification Report Issued
03/06/2019	Signature of contracts to include new project activities instances in the Monitoring Period 2017-2019

2.2.2 Methodology Deviations

Table 6: First Methodology Deviations

First Deviation	
Source:	VM0015 v1.1 Section 6.1.1 and Appendix III – Estimate of carbon stocks in the harvest wood products carbon pool
Criteria and Procedures:	The criteria and procedures described in Appendix III for the Estimation of carbon stocks in the harvest of wood products under Method 2: Commercial inventory estimation.
Relation to Monitoring or	This procedure is related to measurement. To estimate the wood

Measurement:	products at the time of deforestation an estimate of extracted biomass using an indirect measure of commercial volume, medium-term wood products, and long-term wood products are required following VM0015 v1.1.
Requested Deviation:	A modified version of the VM0003 Methodology for Improved Forest Management Through Extension Rotation Age (IFM ERA), v1.2 was applied for the estimation of wood products only if it provides a conservative and/or more accurate estimate of wood products.
Justification:	The modified version of the VM0003 Methodology for Improved Forest Management Through Extension Rotation Age (IFM ERA), v1.2 is provided in section 5.3.6.1 of the Project Description. The estimate for extracted biomass carbon in VM0003 (EXCWP) is more accurate than the estimate in VM0015 (CXBicl). This latter estimate of extracted biomass carbon uses an indirect measurement of commercial volume relying on multiple estimators including above-ground biomass and commercial volume regressions. Whereas the estimate of EXCWP relies only upon volume regressions for commercial species to estimate extracted biomass carbon reducing the uncertainty. Additionally, the modified version of the VM0003 v1.2 omits medium-term wood products. This leads to a more conservative estimate of wood products in the baseline as the release of emissions to the atmosphere as a result of wood products decay over the specified 20-year decay period are not accounted for.
Quantification Impact:	This methodology deviation meets the VCS Standard v3 principles of accuracy and conservativeness. Because the medium-term wood products are omitted from the overall wood products estimate resulting in a lower estimate of the forest carbon stocks, the impact on GHG emissions reductions and removals is conservative.

Table 7: Second Methodology Deviation

Second Deviation	
Source:	VM0015 v1.1 Section 6.1.1(e)
Criteria and Procedures:	Calculate the long-term (20 years) average carbon stocks of post deforestation classes.
Relation to Monitoring or Measurement:	This procedure is related to measurement and conflicts with the measurement methods for the decay of below-ground and deadwood biomass in Section 6.1.2.
Requested Deviation:	The project proponent has randomly sampled initial and final LULC classes to arrive unbiased estimates of carbon stocks. The project proponent applies the unbiased estimates of carbon stocks in accounting and uses a linear decay model per the requirement of Section 6.1.2 rather than a 20-year average.

Justification:	<p>The carbon stocks estimates for each selected carbon pool are unbiased because the carbon stock samples for each LULC classes were randomly selected. The project proponent conservatively accounts for the uncertainty in the carbon stock estimates according to the requirements of Section 6.1.1(f). Because the deviation is unbiased, it is more accurate than using (potentially) bias models to predict the flux within each carbon pools over a twenty-year prediction period.</p> <p>Relative to the VCS AFLOU Requirements for the decay of carbon over time, it is more accurate to account for the decay of biomass in below-ground and deadwood using a linear 10-year decay model rather than a 20-year average. By taking an average over time, the methodology allows for non-conservative “forward crediting” in the baseline scenario where emissions reductions for decay are accounted for before they otherwise would have occurred. This deviation is more accurate and conservative than the prescribed methodology methods.</p>
Quantification Impact:	<p>This methodology deviation meets the VCS Standard v3 principles of accuracy and conservativeness. Because the deviation avoids instances of forward crediting, emissions in the baseline are conservatively estimated and meet the AFOLU Requirements.</p>

2.2.3 Minor Changes to Project Description (Rules 3.5.6)

Table 8: Minor Change to Project Description

Minor change	
Source:	Project Description Section 7.3
Criteria and Procedures:	Updating the Community Impact Indicators
Relation to Monitoring or Measurement:	<p>This procedure is related to community monitoring. Indicators were established for the monitoring of community impacts, which have been added to the Project Description. These indicators were monitored during this monitoring period and results can be found in Section 4</p>
Requested change:	<p>Originally the project presented a series of indicators that were suitable for the first monitoring period and included “first stage activities” in the route to community impacts; specifically the establishment of community nurseries to supply community plantations as a first stage activity. Therefore the Monitoring Matrix 2017-2017 V1, is updated by eliminating activity 82 Nursery establishment, and by removing indicators: # nurseries established for activity 27.</p>
Justification:	<p>During the second monitoring period the route for community impact didn’t required new nurseries but only to support local farmers with</p>

	technical assistance and minor inputs.
Quantification Impact:	This change has no impact on carbon quantification since it relates to community monitoring, not forest and carbon monitoring.

2.2.4 Project Description Deviations (Rules 3.5.7 – 3.5.10)

Three project deviations were presented in the Monitoring Report dated on February 2016, these project deviations are detailed in the tables below, along with a fourth deviation added during this monitoring period:

Table 9: First Project Description Deviation (Monitoring Period 2012-2016)

First Deviation	
Source:	Project Description Section 4.4.1 and 8.1.2.1
Criteria and Procedures:	The inclusion of the litter pool as part of the project boundary of the proposed AUD project activity
Relation to Monitoring or Measurement:	This procedure is related to monitoring. The inclusion of the litter carbon pool in the project boundary is recommended only when significant, and is to be decided (TBD) by the project proponent (VM0015 Section 4.4.1).
Requested Deviation:	Originally the litter carbon pool was included as part of the carbon pools included in the project boundary as part of the Project Description. The requested Project Description deviation would be the exclusion of the litter pool as part of the project boundary.
Justification:	<p>The project proponent determined that the litter carbon pool was not a significant pool, and that the exclusion of this pool would be conservative in the estimate of baseline emissions, as the carbon stocks in the baseline scenario are lower than those in the project scenario.</p> <p>The average carbon stocks in the forest classes were determined to be 2.86 tC/ha as compared to 0.81 tC/ha in the non-forest classes. The litter carbon pool is not a required pool under VM0015, and the exclusion of this pool would be conservative.</p> <p>The exclusion of the litter carbon pool does not impact the applicability of the methodology, additionality, or the appropriateness of the baseline scenario. The baseline scenario for the project is the conversion of primary forest to subsistence</p>

	agriculture and pastureland. The inclusion of the litter carbon pool is not required by the methodology, and it is lower in the baseline scenario than the project scenario, so its exclusion is conservative.
Quantification Impact:	This Project Description deviation meets the VCS Standard v3 principle of conservativeness. Because the carbon stocks in the litter pool are expected to decrease in the baseline case, the impact of dropping the litter carbon pool on GHG emissions reductions and removals is conservative.

Table 10: Second Project Description Deviation (Monitoring Period 2012-2016)

Second Deviation	
Source:	Project Description Section 5.3.6
Criteria and Procedures:	Adding new plots to improve the precision of carbon stock estimates.
Relation to Monitoring or Measurement:	This procedure is related to measurement and monitoring. Increasing the precision of carbon stock estimates is analogous to improving the measurement of carbon stocks. Additional plots relates to monitoring of carbon stocks during the reporting period.
Requested Deviation:	The requested Project Description deviation would be to add 35 plots allocated in non-forest classes and 6 plots allocated in the Humid forest class in order to reduce measurement uncertainty. Improved estimates of carbon stocks would be used symmetrically in the baseline and project scenarios.
Justification:	The addition of plots reduces uncertainty and therefore should be allowed.
Quantification Impact:	The carbon stock estimate for above-ground non-tree in Humid forest decreases from 128.7 to 126.26 tC/ha while in Non forest classes zero.

Table 11: Third Project Description Deviation (Monitoring Period 2012-2016)

Third Deviation	
Source:	Project Description Section 7.3
Criteria and Procedures:	Updating the Project Description to qualify the project as providing Exceptional Biodiversity Benefits.

Relation to Monitoring or Measurement:	This procedure is related to biodiversity monitoring. Indicators were established for the monitoring of biodiversity, which have been added to the Project Description. These indicators were monitored during this monitoring period and results can be found in Section 5.4
Requested Deviation:	Originally this project was not validated for providing Exceptional Biodiversity Benefits. However, since many endangered species are present within the project area, project activities were implemented to provide these biodiversity benefits within the project area. Therefore, this project is seeking verification for providing Exceptional Community Benefits under CCB Standards V3.1.
Justification:	The project area qualifies as a 'Key Biodiversity Area' according to the CCB Standards v3.1, under the vulnerability criteria, which requires the occurrence of at least a single individual critically endangered or endangered species. Part of the project area is a known habitat for 6 such species, mostly amphibians. Since the project has implemented activities such as the establishment of an amphibian preserve and educational programs to protect these species from disease, this is an acceptable deviation under Section 3.5.7, Rule 3 of CCB Program Rules v3.1, since this is a substantial change in the positive biodiversity impacts. Section 7.3 of the Project Description and relevant supporting sections and tables have been updated to account for these changes, as required by these rules.
Quantification Impact:	This deviation has no impact on carbon quantification since it relates to biodiversity monitoring, not forest and carbon monitoring.

Table 12: Third Project Description Deviation (Monitoring Period 2017-2018)

Fourth Deviation	
Source:	Project Description Section 5.5.3
Criteria and Procedures:	Updating Market Leakage deduction to more accurately reflect actual market leakage effects by eliminating this deduction
Relation to Monitoring or Measurement:	While market leakage is not monitored it is accounted for each monitoring period.
Requested Deviation:	This project was validated with the default market leakage deduction of 20%. Additional research in the region and a new analysis of the market impacts of the baseline scenario has demonstrated that the market leakage impact of the project is in fact <i>de minimis</i> . Therefore the project is adjusting the calculation

	of NERs to no longer include this deduction.
Justification:	In section 5.5.3 of the PD it is written, "While it is expected that these (market leakage) impacts will be small, it is very difficult to estimate the significance of the potential for market impacts as a result of restrictions on this market commodity due to a lack of literature on the supply chains and markets for timber in Izabal." However, since project validation, additional documentation and research has been identified within Guatemala that demonstrates that project impacts on commodities associated with logging and cattle ranching are very unlikely to result in significant deforestation or emissions elsewhere in Guatemala. Section 3.2.3.2 provides further justification for this deviation.
Quantification Impact:	The leakage deduction when calculating final VCUs will only include activity shifting leakage and the market leakage deduction will be reduced from 20% of NERs to 0%.

2.2.5 Grouped Projects

1) New Project Areas and Communities (G1.13)

Under this monitoring period 77 new project activity instances (PAIs) were incorporated into the project for quantification of GHG emissions credits. All of the parcels are located within the grouped project area. All new parcels meet the eligibility criteria outlined in section 2.1.8 of the Project Description, per VCS Standard v3.7 as well as the VM0015 Methodology v1.1 applicability conditions (Part 1 Section 2). This section demonstrates the eligibility of the new PAIs, and Table 13 below describes in detail how each new project activity instance meets the eligibility criteria for their inclusion in the project. Figure 4 below provides a map of the Project Area

Table 13: List of project activity instances (PAI) and the supporting documentation to establish eligibility

Parcel No.	Overall relevance to the project	Eligibility Criteria (G1.14)							
		Socialization and Engagement			Rights and Project ownership	Project technology	PAI Start document	PAI Start Date	Crediting Period Start Date
604		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-604	Parcels protected by forest patrols	ficha	06/01/2017	06/01/2017
849		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-849	Parcel protected by PROBOSQUE/PINPEP	ficha	21/12/2016	01/01/2017
851	watershed		Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-851	Parcels protected by forest patrols	ficha	01/04/2017	01/04/2017
853	watershed		Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-853	Parcels protected by forest patrols	ficha	01/04/2017	01/04/2017
854	watershed		Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-854	Parcels protected by forest patrols	ficha	01/04/2017	01/04/2017
857			Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-857	Parcels protected by forest patrols	ficha	01/04/2017	01/04/2017
859			Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-859	Parcels protected by forest patrols	ficha	01/04/2017	01/04/2017
860			Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-860	Parcels protected by forest patrols	ficha	01/04/2017	01/04/2017
861	watershed		Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-861	Parcels protected by forest patrols	ficha	14/04/2014	01/01/2017
862	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-862	Parcels protected by forest patrols	ficha	10/01/2017	10/01/2017
867		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-867	Parcels protected by forest patrols	ficha	01/02/2017	01/02/2017
868	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-868	Parcels protected by forest patrols	ficha	21/02/2017	21/02/2017
871		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-871	Parcels protected by forest patrols	ficha	17/03/2017	17/03/2017

874	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-874	Parcels protected by forest patrols	ficha	10/01/2017	10/01/2017
883	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-883	Parcels protected by forest patrols	Patrol report	04/05/2017	04/05/2017
884	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-884	Parcels protected by forest patrols	Patrol report	19/07/2018	19/07/2018
888		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-888	Parcels protected by forest patrols	ficha	04/07/2017	04/07/2017
889	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-889	Parcels protected by forest patrols	ficha	22/05/2017	22/05/2017
890	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-890	Parcels protected by forest patrols	ficha	22/05/2017	22/05/2017
891	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-891	Parcel protected after environmental training	Training report	22/05/2017	22/05/2017
892	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-892	Parcel protected after environmental training	Training report	22/05/2017	22/05/2017
893	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-893	Parcels protected by forest patrols	ficha	22/05/2017	22/05/2017
894	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-894	Parcel protected after environmental training	Training report	22/05/2017	22/05/2017
895	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-895	Parcel protected after environmental training	Training report	22/05/2017	22/05/2017
896	Watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-896	Parcels protected by forest patrols	ficha	04/07/2017	04/07/2017
897		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-897	Parcels protected by forest patrols	ficha	07/06/2017	07/06/2017
898		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-898	Parcels protected by forest patrols	ficha	24/02/2017	24/02/2017
899		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-899	Parcels protected by forest patrols	ficha	01/03/2017	01/03/2017
900		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-900	Parcels protected by forest patrols	ficha	01/03/2017	01/03/2017
901		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-901	Parcels protected by forest patrols	ficha	01/03/2017	01/03/2017
903		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-904	Parcels protected by forest patrols	ficha	04/04/2017	04/04/2017
904		Individual	Clause 25 of the		REDD	Parcels protected by	ficha	04/07/2017	04/07/2017

		meeting	REDD+ contract		contract-905	forest patrols			
905	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-905	Parcels protected by forest patrols	ficha	02/06/2017	02/06/2017
906			Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-906	Parcels protected by forest patrols	Patrol report	02/01/2017	02/01/2017
907	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-907	Parcels protected by forest patrols	ficha	06/01/2017	06/01/2017
908	Watershed	Individual meeting	Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-908	Parcels protected by forest patrols	ficha	14/03/2017	14/03/2017
909		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-909	Parcels protected by forest patrols	ficha	02/06/2017	02/06/2017
910	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-910	Parcels protected by forest patrols	ficha	10/01/2017	10/01/2017
911		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-911	Parcels protected by forest patrols	Patrol report	04/07/2017	04/07/2017
912		Individual meeting	Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-912	Parcels protected by forest patrols	ficha	01/04/2017	01/04/2017
914	watershed	Individual meeting	Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-914	Parcels protected by forest patrols	ficha	02/06/2017	02/06/2017
917	watershed	Individual meeting	Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-917	Parcels protected by forest patrols	ficha	02/06/2017	02/06/2017
918	Watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-918	Parcels protected by forest patrols	Ficha	20/01/2017	20/01/2017
919		Individual meeting	Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-919	Parcels protected by forest patrols	Ficha	10/01/2017	10/01/2017
920	Watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-920	Parcels protected by forest patrols	ficha	20/01/2017	20/01/2017
921	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-921	Parcel protected after environmental training	Training report	10/04/2017	10/04/2017
922		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-922	Parcels protected by forest patrols	Patrol report	04/05/2017	04/05/2017
923	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-923	Parcels protected by forest patrols	ficha reporte patrullaje	04/05/2017	04/05/2017

924	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-926	Parcels protected by forest patrols	Patrol report	04/05/2017	04/05/2017
926	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-928	Parcels protected by forest patrols	Patrol report	04/05/2017	04/05/2017
928	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-929	Parcels protected by forest patrols	ficha	05/05/2017	05/05/2017
929	Biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-930	Parcels protected by forest patrols	ficha	05/05/2017	05/05/2017
930	Watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-931	Parcels protected by forest patrols	ficha	05/05/2017	05/05/2017
931	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-932	Parcels protected by forest patrols	ficha	20/05/2018	20/05/2018
932	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-933	Parcels protected by forest patrols	ficha	05/05/2017	05/05/2017
933	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-934	Parcels protected by forest patrols	ficha	05/07/2017	05/07/2017
934		0	Clause 25 of the REDD+ contract	Asamblea Marvin Sosa Sector B	REDD contract-936	Parcels protected by forest patrols	ficha	03/01/2017	03/01/2017
936	Watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-937	Parcels protected by forest patrols	ficha	10/01/2017	10/01/2017
937	Watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-938	Parcels protected by forest patrols	ficha	10/01/2017	10/01/2017
938		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-939	Parcels protected by forest patrols	ficha	03/01/2017	03/01/2017
939		Individual meeting	Clause 25 of the REDD+ contract		REDD contract-940	Parcels protected by forest patrols	ficha reportaje patrullaje	04/05/2017	04/05/2017
940	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-941	Parcels protected by forest patrols	ficha	04/05/2017	04/05/2017
941	Watershed/biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-942	Parcels protected by forest patrols	ficha	05/05/2017	05/05/2017
942	Watershed/biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-943	Parcels protected by forest patrols Parcels protected by forest patrols	ficha	20/07/2017	20/07/2017
943	Biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-944	Parcels protected by forest patrols	ficha	05/05/2017	05/05/2017
944	Watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-945	Parcel protected after environmental training	Training report	20/05/2017	20/05/2017

945	Watershed/biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-946	Parcels protected by forest patrols	Ficha	25/06/2017	25/06/2017
946	Watershed/biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-947	Parcels protected by forest patrols	Ficha	12/05/2017	12/05/2017
947	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-948	Parcels protected by forest patrols	Ficha	12/05/2017	12/05/2017
948	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-949	Parcels protected by forest patrols	Ficha	12/05/2017	12/05/2017
949	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-950	Parcel protected after environmental training	Training report	15/05/2017	15/05/2017
950	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-951	Parcels protected by forest patrols	Ficha	12/05/2017	12/05/2017
951	Biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-952	Parcels protected by forest patrols	Ficha	12/05/2017	12/05/2017
952	biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-953	Parcels protected by forest patrols	Ficha	12/05/2017	12/05/2017
953	Biodiversity/biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-953	Parcels protected by forest patrols	Ficha	05/05/2017	05/05/2017
954	Watershed/biodiversity	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-953	Parcels protected by forest patrols	Ficha	20/05/2018	20/05/2018
955	watershed	Individual meeting	Clause 25 of the REDD+ contract		REDD contract-604	Parcels protected by forest patrols	ficha	11/01/2017	11/01/2017

2) Removed Project Areas and Communities (G1.13)

No parcels were removed since the last validation or verification.

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

- i. All new project activity instances included must be located within the Grouped Project Area, which is one of the designated geographic areas specified in Section 1.2.5 of the PD. Because the Grouped Project Area is delineated in such a way to meet the similarity criteria to the Reference Region described in Section 1.1.1 of the VM0015 Methodology v1.1 and Section 5.3.1 of the PD, the requirement that all new project activity instances be contained within the Grouped Project Area means that new PAIs will automatically meet the geographic criteria outlined in the PD and methodology.

Figure 4 below highlights the PAIs and their location within the Grouped Project Area. All the parcels for new PAIs are contained within the Grouped Project Area.

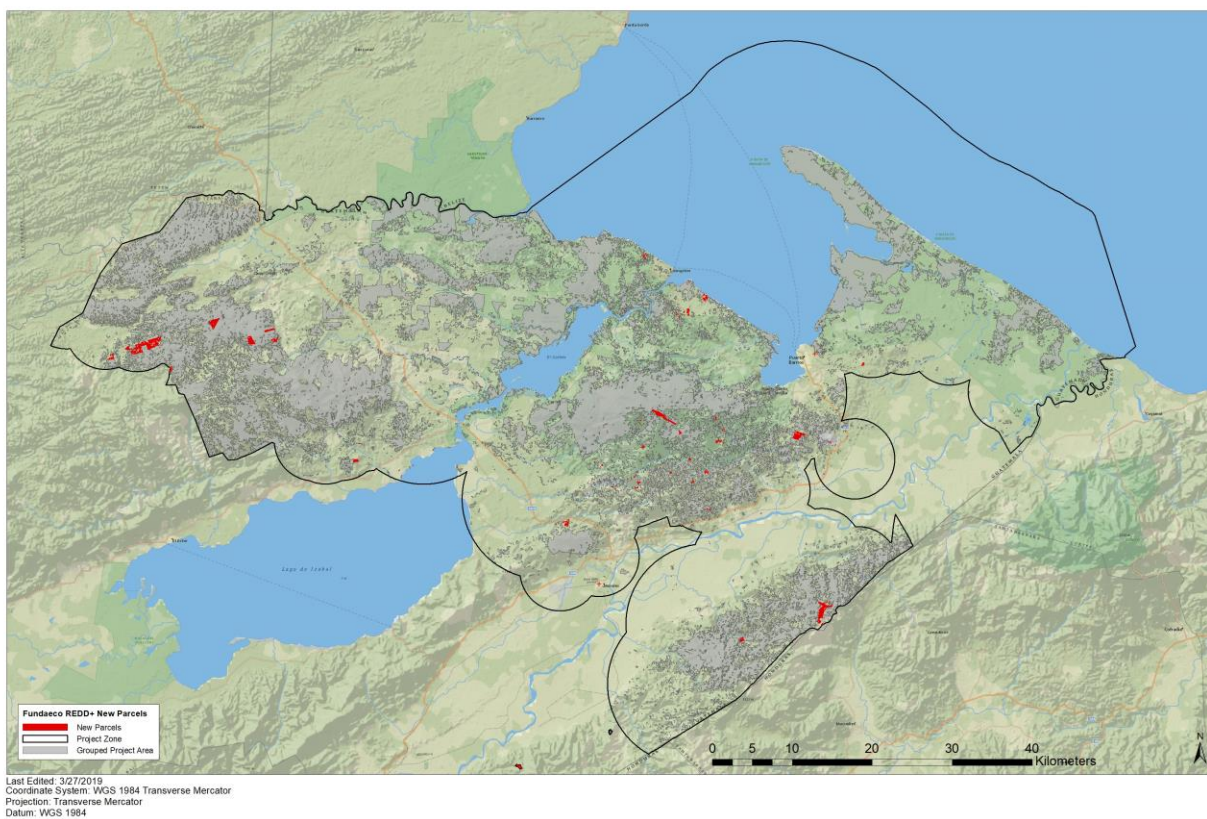


Figure 4: Map of new project activity instances superimposed over the grouped project area.

- ii. All new parcels comply with the eligibility criteria delineated in section 4.2.4 of the PD. Every new PAI meets all 16 eligibility requirements required by the VCS Standard and VM0015 methodology. This is demonstrated throughout this section and the supporting tables, figures, and documents.

- iii. All new project activity instances will be included in the monitoring report with sufficient necessary information to demonstrate compliance and enable sampling by the validation/verification body.

All new PAIs have been added to the Project Area shapefile in order to facilitate sampling, which has been made available to auditors (see ProjectArea_MP2_YMD20190315.shp) and has been included in the Project Area KMZ file (see ProjectArea_MP2.kmz) uploaded to the projects database. All relevant information to demonstrate compliance with the eligibility criteria has been provided to auditors and the relevant documents are listed in Table 13 above.

- iv. All new project activity instances will be validated at the time of verification against the applicable eligibility criteria described in this section.

The eligibility of new PAI has been confirmed and documentation made available to auditors so that they are able to be validated at the time of verification against these criteria. They've been included in the baseline emissions calculations (see section 6.1 and 5.3 of the PD) and the relevant eligibility documentation has been provided to the auditors, including signed contracts with FUNDAECO, documents establishing project start date, and established project technologies supported by FUNDAECO.

- v. All new PAIs will have evidence of project ownership for each project activity instance starting at least at the respective start date of each project activity instance provided.

The documentation listed in the Rights and Project Ownership column of Table 13 provides documentation for each parcel demonstrating the transfer of carbon rights for each parcel to FUNDAECO before the PAI start date. This documentation can be found in and has been provided to auditors.

- vi. All new project activity instances will be eligible for crediting only from the start date to that project activity instance through to the end of the project crediting period. As established in the REDD+ Database in the accounting model (see Fundaeco VM0015 Accounting Model.xlsm), these newly added parcels have start dates occurring after April 1, 2012, which is the Project Start Date, and will only be credited through the 30 year crediting period from April 1, 2012 to March 31, 2042.

All new PAIs also meet the specific project criteria and applicability conditions specific to the VM0015 Methodology. The eligibility criteria for all parcels are established as follows:

- vii. Each new PAI must demonstrate that the project ownership has been transferred to the FUNDAECO through a legal contract. Proof of transfer of this ownership from the landowner to FUNDAECO is found in the file listed in the Rights and Project Ownership column of Table 13. These documents have been provided to auditors.
- viii. Communities or private landowners of new PAIs have been engaged in the FPIC process according to section 3.7.1 of the PD.

The column Socialization and Engagement in Table 13 lists the type of meeting that was completed with each forest owner of every parcel. Every forest owner was met with individually to be informed of the project and signed documents that confirmed their engagement in the FPIC process and their voluntary participation in the project. These documents have been provided to auditors.

- ix. Baseline activities only include planned or unplanned logging for timber, fuel-wood collection, charcoal production, agricultural and grazing activities as is permitted in the most recent VCS AFOLU requirements.

All baseline activities for the new parcels are the same as for the Grouped Project Area. These baseline activities can be found in Section 4.2 of the PD, under the Condition (a) heading. As listed there:

The primary drivers of deforestation in the baseline are the conversion of forest land to annual agriculture, permanent agriculture, and pasture by small-scale farmers and large to medium scale cattle ranchers who are displaced due to agro-industrial development in the reference region.

- x. Project activities include at least one of the eligible categories defined in the VM0015 methodology.

Project activities include protection of forest without logging activities and thus meets eligible category A as defined by the scope of the VM0015 Methodology, v1.1. See Section 2.2.1 of the Project Description for all project technologies used in this project. The project activities for the new PAIs were forest patrols and the establishment of PINFOR/PINPEP programs (as is listed in the Project Technologies column of Table 13).

- xi. The project area can include different types of forest, such as, but not limited to, old-growth forest, degraded forest, secondary forests, planted forests and agro-forestry systems meeting the national definition of "forest".

All new PAIs meet the definition of forest, as the previously validated Grouped Project Area was defined to include only areas meeting the definition of forest for a minimum of 10 years prior to the project start date. Thus, as all new PAIs were confined to the limits of the Grouped Project Area (see Figure 4), they meet the nationally established definition of forest.

- xii. Area only includes land qualifying as forest for at least the last 10 years.

Figure 5 below shows the new parcels compared to the map of 10 year forest cover preceding the project start date. The entire Grouped Project Area was contained to only land qualifying as forest, with the new PAIs following these same guidelines.

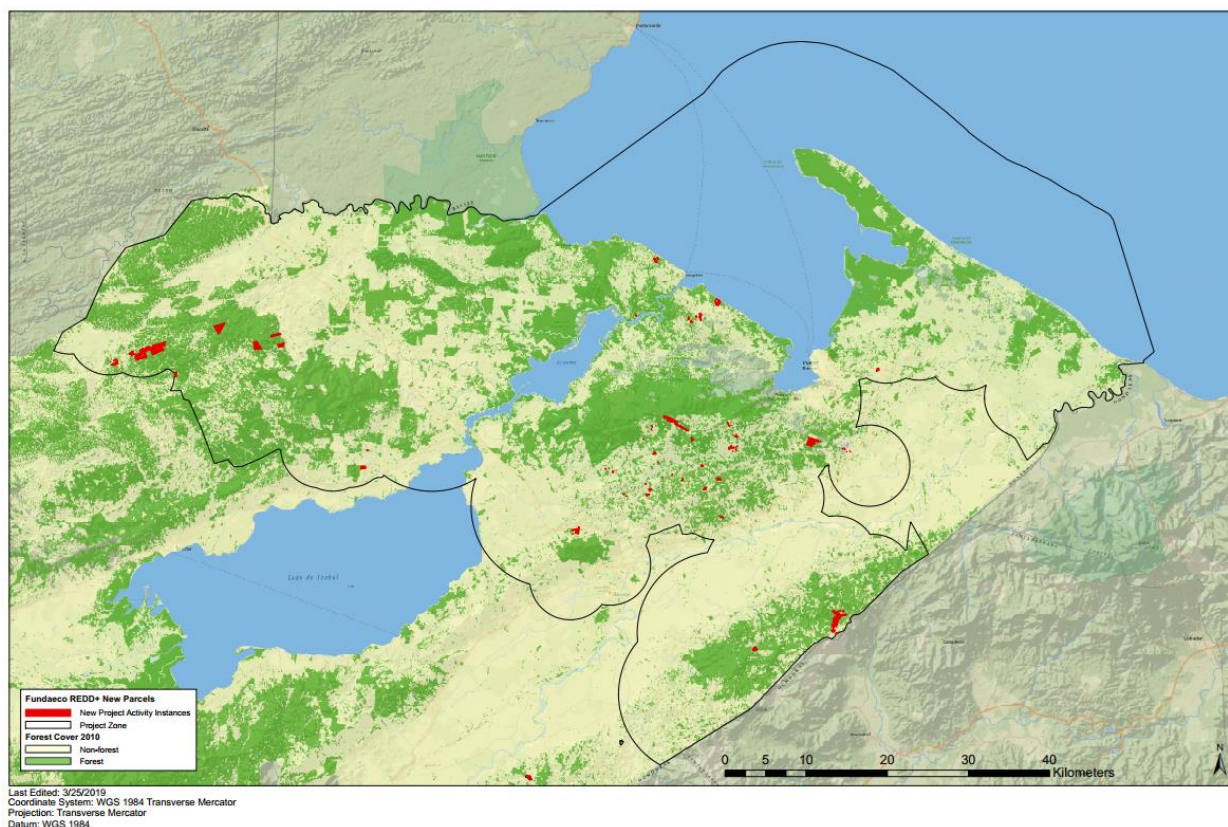


Figure 5: Map of new project activity instances superimposed over the 10-year forest area

- xiii. Area doesn't include any forested area grown on peat soils as per VM0015 definitions. For original validation, all mangrove forests on soil with organic matter exceeding 65% were removed from the Grouped Project Area and Reference Region (see Condition (e) of Section 2.4 of the PD). None of the parcels added to the project overlap with these areas that were excluded for original validation.
- xiv. New project activity instances use technologies specified below and in section 2.2.1 of the Project Description, and applies these technologies in the same manner as is described in section 2.2.1 of the Project Description. Project technologies will be enabled by the financial or technical assistance of the project proponent. The Project Technology column of Table 13, lists the technologies that have been provided by FUNDAECO to protect the forest within these parcels. For these new parcels, the technologies provided were increased forest patrols and the establishment of PINFOR/PINPEP programs, which are both pre-defined project technologies in section 2.2.1 of the Project Description.
- xv. All new project activity instances are subject to the single baseline that has been established for the Grouped Project area new project activity instances must also fall under a baseline scenario of unplanned deforestation by known agents and drivers of deforestation.

All new parcels are included within the validated Grouped Project Area boundaries (see Figure 4), thus meet the baseline scenario that has been established and validated for the project.

- xvi. New project activity instances must have characteristics with respect to additionality that are consistent with those demonstrated in Section 4.6 of the PD for the specified project activity (AUD) within the Grouped Project Area. As a result, new PAIs must demonstrate that they received financial or technical support from the project proponent that resulted in emission reductions. Project activities can be those described in Section 2.2 of the PD.

Additionality has been demonstrated for the entire validated Grouped Project Area. As all new PAIs fall within the boundaries of the validated Grouped Project Area, these additional PAIs are automatically deemed additional. The landowners of the added parcels received support from FUNDAECO to implement forest patrols or PINFOR/PINPEP programs, as is shown in supporting documentation for each PAI (see Table 13).

4) Scalability Limits for Grouped Projects (G1.15)

All parcels in Table 13 above meet the criteria specific to the VCS Standards v3.7. The following criteria establish eligibility:

All new project activity instances included must be located within the Grouped Project Area, which is one of the designated geographic areas specified in Section 2.2.2. Because the Grouped Project Area is delineated in such a way to meet the similarity criteria to the Reference Region described in Section 1.1.1 of the VM0015 Methodology v1.1 and Section 5.3.1 of the PD, the requirement that all new project activity instances be contained within the Grouped Project Area means that new PAIs will automatically meet the geographic criteria outlined in the PD and methodology.

Figure 4 above highlights the PAIs and their location within the Grouped Project Area. All the parcels for new PAIs are contained within the Grouped Project Area.

5) Risk Mitigation for Grouped Projects (G1.15)

Not Applicable.

6) Project Zone Map (G1.13)

No new communities have been added during this monitoring period. For updated project area with parcels added this verification, please see Figure 4 and Figure 5.

7) Changes to Management (G4.1)

The addition of new landowners to the project area has not resulted in a need for any change in management.

2.2.6 Risks to the Project (G1.10)

The project area, as defined in Section 2.1.7, has been divided into 2 separate risk areas distinguished based on differing land tenure and conservation commitments. The total risk rating for each risk area is summarized in Table 14 and individual non-permanence risk reports have been provided separately to

validators (see Fundaeco REDD+ Non-Permanence Risk Report_Risk Area A.pdf and Fundaeco REDD+ Non-Permanence Risk Report_Risk Area B.pdf). The risk rating for the second monitoring period has been reduced from 14% in the first monitoring period to 10%. This change is mostly attributable to changes in the financial viability and opportunity cost scores. More information on these changes can be found within the Risk Reports. Descriptions of the different risk areas are also provided below.

Risk Area A

Risk Area A is defined by properties that are owned through clear title by FUNDAECO.

Risk Area B

Risk Area B is defined by properties that are owned through clear title by national entities, municipal entities, private owners, and poseedores.

*Table 14: Non-Permanence risk rating for each defined risk area within the Grouped Project Area. *Overall risk rating cannot be below 10.*

Risk Category	Risk Area A Rating	Risk Area B Rating
a) Internal Risk	3	3
b) External Risk	0	0
c) Natural Risk	0	0
Overall Risk Rating (a + b + c)	10*	10*

2.2.6.1 Climate Risks

Institutional weakness is one the risks that can affect both climate and biodiversity benefits, especially due to lack of resources and lack of continuity of public servants, which results in a slow and interrupted implementation of public policies and strategies. This can affect the project coordination with authorities in charge of law enforcement. To manage these risks FUNDAECO has included in the project an Environmental Litigation, Lobbying and Advocacy Program. At the National level, FUNDAECO is also part of ASOREMA. ASOREMA is the national association for environmental NGOs that holds a chair at INAB Board of Directors, CONAP Council, and the Climate Change Council. At the local level (Izabal Department) FUNDAECO is part of the CODEDE, the MICAI, and Izabal Competitiveness Work Group. From these mechanisms, FUNDAECO is constantly guaranteeing coordination and support to project strategies and activities. The project was presented and obtained endorsement form PRONACOM, Izabal Government, MARN and SEGEPLAN. See Project endorsement.

Lack of governance in areas surrounding project zone can indirectly affect the project. To reduce this risks the project team is integrated by local technicians and community promoters that keep a constant and close communication with communities and landowners to understand their situation and demands. FUNDAECO participates actively in the MICAI to identify and avoid potential conflicts.

The potential lack of carbon market to cover opportunity costs is also a risk that can affect benefits to climate, communities and biodiversity benefits. To manage this risk FUNDAECO has obtained the initial support of Althelia Climate Fund as carbon investors, ACF and FUNDAECO are creating a joint carbon marketing unit, and initial VCUs buyers' portfolio is prepared.

2.2.6.2 Community Risks

FUNDAECO considers that the political risks to the project are low, based on the fact that the country have integrated REDD+ as a national strategy to fight climate change and deforestation, and has included the REDD+ Project for Caribbean Guatemala as part of the National REDD+ Strategy, and the country NDCs presented 2015. Progress made towards land conflict resolution in the region (see section 2.8.3) and the signature of a letter of understanding -between FUNDAECO and Guatemala Public Prosecutor Office (“Ministerio Público”) -, to fight environmental crimes in the framework of the REDD+ Project, gives the project an institutional backstop and reduces political risks.

In order to inform on the project and to reduce potential conflicts the FPIC activities were deployed within the project zone and not exclusively in the project area. All forest owners or their representatives included as project instances up to 2016 participated in the FPIC activities and gave their voluntary consent through the contract signed with FUNDAECO. However, FUNDAECO has identified some community risks and is already implementing actions to prevent or reduce these conflicts:

- Lack of access to markets is a risk for agroforestry, artisans, ecotourism and VCU beneficiaries: FUNDAECO is closely working with AGEXPORT in order to increase market opportunities for vendors and producers supported by the project. AGEXPORT has been assessing FUNDAECO in market identification and contacts, value chains, and commercial image. FUNDAECO has registered the “Conservation Coast” as the trademark that will support project products image and marketing; based on a value differentiation.

FUNDAECO is also training local producers and vendors to implement BPAs, improve productivity and in the case of artisans to improve and update handicrafts designs.

The lack of carbon markets to cover opportunity costs is also a notable a risk. FUNDAECO is managing these risks in the carbon market unit, but also supporting communities and individual landowners to diversify their household economy, through supporting; resources for alternative economic activities, access to markets, and technical support to forest incentives such as PROBOSQIES, PINPEP and PINFOR.

- Backing commitments under REDD+ project is a challenge since expectations may change over the years. FUNDAECO anticipated this challenge through a broad consultation process including the discussion of the carbon contract with each beneficiary. The project team is integrated by local technicians that are committed to sustainable development and nature conservation in the project zone, and that have a close communication with communities and individual landowners. The grievance and redress mechanism, and the adoption of an adaptive management approach will timely implement solutions. An annual social survey is carried on to know about beneficiaries’ satisfaction level with FUNDAECO work.

2.2.6.3 Biodiversity Risks

The Project has used the theory of change to determine the most effective methods for bringing about benefits to biodiversity. However, there are still several natural and human induced risks to biodiversity benefits that underlie assumptions in the theory of change model. Some of these threats may be outside of the project’s control, but others may have concrete mitigation measures that can be implemented by the project.

Specific risks to biodiversity that may be out of the project’s control include the risk of continued habitat degradation outside of the project area, as well as the socio-political stability of Guatemala, which could impact economic drivers of deforestation as well as FUNDAECO’s influence over the project area. There is also the risk that income generated from agroforestry systems and ecosystem services payments may

not be enough to compete with income derived from activities such as the clearing of forest for agriculture or cattle grazing, resulting in less reductions in deforestation than anticipated. Additional human-induced risks include changes in local economic conditions, the lack of capacity and governance in local communities, the potential use of environmentally harmful practices as part of project activities, and the lack of a functional land tenure system. Natural risks to the project have been evaluated using the Non-Permanence Risk Tool (see Fundaeco REDD+ Non-Permanence Risk Report_Risk Area A.pdf and Fundaeco REDD+ Non-Permanence Risk Report_Risk Area B.pdf), and have been found to pose insignificant threats to the project area, and consequently pose little threat to the project's biodiversity benefits.

FUNDAECO has implemented several strategies for mitigating many of these risks to the project's biodiversity benefits. Targeted project activities as well as organization policy both will serve to strengthen biodiversity benefits and reduce any potential risks (see Section 8 for more details on project activities tied to biodiversity benefits). Although several risks are outside of the project's control, including local governance, changes in local economies, and land tenure systems, FUNDAECO is working to minimize these through project activities geared at empowering communities and providing land tenure access to vulnerable populations. Any biodiversity threats caused by the degradation or fragmentation of forest outside of the current project area also have the potential to be minimized through educational initiatives and the incorporation of these properties into the project area over time.

FUNDAECO's policy documents also outline the measures that the organization will take to ensure that project activities do not cause environmental harm. For example, in the FUNDAECO Policy documents (see Plan General de BPA 2016.docx), the use of GMOs and invasive species are prohibited, and environmentally friendly waste management measures are to be implemented as part of any project activity. All agroforestry and sustainable agricultural programs through FUNDAECO also abide by USAID guidelines for safe pesticide use (EG-PERSUAP-Final_Oct2012.docx), and an internal best agricultural practices policy that outlines and justifies safe and appropriate pesticide and fertilizer use (Plan General de BPA 2016.docx). FUNDAECO agroforestry programs do use non-native and non-invasive species such as rubber in small-scale plantations within a larger mixed-use sustainable agriculture system. By using naturalized non-native and non-invasive species in sustainable and mixed-use agroforestry systems, FUNDAECO can enable farmers to access markets that provide them with better economic opportunities, thus preventing them from further clearing forest. For a detailed justification for the use of non-native species in small-scale agroforestry plantations see Consultoria Estudio Viabilidad agroforesteria 10062014.docx. Overall with a combination of targeted project activities and organization policies, FUNDAECO is continuously taking steps to identify and mitigate threats to biodiversity within the project area and project zone.

2.2.7 Benefit Permanence (G1.11)

➤ Climate:

Seventy % of the actual project area is declared as protected area according to Guatemala Protected Areas Law Decreto 4-89. Also according to FUNDAECO bylaws and to the statement from the Assembly, FUNDAECO land is to be considered for conservation purposes under perpetuity. Besides FUNDAECO have a permanent coordination with government institutions in order to enhance and ensure the application of the protected areas law and the implementation of project activities? FUNDAECO is also supporting legal and administrative mechanisms to guarantee reduction of GHG emission from deforestation beyond the project lifetime. During the Monitoring period the project supported the creation of two participative governance mechanism

considered in the Protected areas Law “Consejos Ejecutivos Locales” -CEL- and continued supporting a previously created CEL. In order to increase legal protection within the grouped project area, FUNDAECO is also promoting the creation of a new protected area, more than 80 meetings were held to design this new protected area, and the Technical Study for its presentation to Guatemala Congress has been finalized.

➤ Community:

FUNDAECO considers that the political risks to the project are low based on the fact that the country is progressing towards the Consolidation of a National REDD+ Strategy, a consultancy has been hired for this purposes, and it includes as one of the sub-components to support and strengthen the alignment of the REDD+ for Caribbean Guatemala; with the National REDD+ Strategy; this consultancy is planned to end by the end middle of 2020.

Backing commitments under REDD+ project is a challenge since expectations may change over the years. FUNDAECO anticipated this challenge through a broad consultation process including the discussion of the carbon contract with each beneficiary. The project team is integrated by local technicians that are committed to sustainable development and nature conservation in the project zone, and that have a close communication with communities and individual landowners. The grievance and redress mechanism, and the adoption of an adaptive management approach will timely implement solutions. An annual social survey is carried on to know about beneficiaries' satisfaction level with FUNDAECO work.

In order to inform on the project and to reduce potential conflicts the FPIC activities were deployed within the project zone and not exclusively in the project area. All forest owners or their representatives included as project instances up to 2018 have been participating in different FPIC activities since 2015, in some cases individual meeting in other cases group assemblies, and gave their voluntary consent through the contract signed with FUNDAECO. However, FUNDAECO has identified some risks and is already implementing actions to prevent them:

- Lack of access to markets is a risk for agroforestry, artisans, and ecotourism and VCUs beneficiaries: As part of the project implementation structure FUNDAECO has a team specialized in marketing; 1 senior expert in agroforestry marketing, and 3 marketing assistants, 1 of them specialized in tourism. These teams are supporting the development of value chains following the markets and chains already identified with the support of AGEXPORT. AGEXPORT supported FUNDAECO in market identification and contacts, value chains, and commercial image during the first 4 years of the project. FUNDAECO has registered the “Conservation Coast” as the trademark that will support project products image and marketing; based on a value differentiation.

FUNDAECO is also training local producers and vendors to implement BPAs, improve productivity and in the case of artisans to improve and update handicrafts designs. See Monitoring and Indicator Results Matrix 2017-2018 V1.2.

- The lack of carbon markets to cover opportunity costs is also a notable risk. FUNDAECO has managed this risk by partnering Ecosphere+ which is a climate solutions company that has supported FUNDAECO in the promotion, marketing and negotiation for the VCUs sales. During two years Althelia Climate Fund and Ecosphere supported the VCUs marketing activities by preparing and disseminating project reports, brochures and videos. At the date FUNDAECO and Althelia have entered into negotiations for VCUs sales with several companies.

Following the study of deforestation drivers over the region and the Theory of change Model, the Project was designed to address direct and underlying causes of deforestation. Underlying causes are usually related to local socioeconomic situations; project technologies include activities that will change in the medium long term community situation regarding access to resources and economic opportunities, and education. It is expected that project activities to improve and diversify livelihoods, access to reproductive health, education for opportunities and education for life presented in section 6 of the PD, will impact local socioeconomic dynamics and generate impacts beyond the project lifetime.

➤ Biodiversity:

As stated before FUNDAECO is supporting all legal and administrative mechanism to extend project benefits beyond the project lifetimes, this include the enhancement of protected areas governance and the creation of a new protected area, so existing forest remain still and can sustain the biodiversity within these ecosystems. Another important strategy is environmental education, as it is expected not only that it increases awareness on forest and biodiversity importance but also to result as a change factor towards the adoption of positive actions for its conservation and sustainable management. FUNDAECO is engaged in the promotion, organization and implementation of environmental education activities with schools, communities and visitors.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

Access to project information and project documents for stakeholder engagement is provided though FUNDAECO project web site, email communication, social media and different meetings with community associations and other groups, these meetings ensures the active engagement and participation of all stakeholders throughout the project implementation period. Communities in particular, participated not only as Forest owners and Carbon right holders, but also as members of protected area management bodies, as project beneficiaries and as direct participants in the implementation of project activities. Along the monitoring period 138 meeting were held to inform or inform on different project activities.

Additionally, several individuals of local associations, women's groups, and other local organized groups were informed and engaged as part of the continuous FPIC process during the reporting period; 38 events. See Informe de Proceso FPIC 2017-2018.docx.

2.3.2 Dissemination of Summary Project Documents (G3.1)

FUNDAECO prepared Spanish summary versions for the Project Design Document and the Monitoring Report 2012-2016 and Monitoring Report 2017-2018. A copy of these documents was available at the 5 project local offices, FUNDAECO headquarters and the 13 women clinics within the project zone. See annexes: PD Summary, MIR 2012-2016 Summary, MIR 2017-2018 Summary, and annual Bulletins.

2.3.3 Informational Meetings with Stakeholders (G3.1)

Different participatory governance structures explained in Section 2.3.1 have been engaged during project preparation and consultation, and have been actively engaged in project implementation by FUNDAECO's local field teams, deployed across the region in five field offices and three Field Stations. In each office, a Technical Coordinator and a team of environmental educators, social workers,

agronomists, naturalists, and field workers have ensured a close, intensive and active engagement of communities, forest owners, agroforestry producers, women and youth in the implementation of all project activities. All project implementation activities have been closely coordinated in each level with the appropriate participatory bodies, and a Regional Project Coordinator has ensured regional coordination with the Governor of Izabal, and the Regional Coordinator of the National Council of Protected Areas. FUNDAECO, as project proponent, has ensured administrative support, operational planning, oversight, coordination with all relevant partners and stakeholders for project activities implementation, and Auditing and MRV requirements for the project.

FUNDAECO organized meetings with community associations and other groups, these meetings ensure the active engagement and participation of all stakeholders throughout the project implementation period. Communities in particular, participated not only as Forest owners and Carbon right holders, but also as members of protected area management bodies, as project beneficiaries and as direct participants in the implementation of project activities. Along the monitoring period 138 meetings were held to inform or inform on different project activities.

Additionally, several individuals of local associations, women's groups, and other local organized groups were informed and engaged as part of the continuous FPIC process during the reporting period; 38 events. See Informe de proceso FPIC 2017-2018.

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

As part of the FPIC process FUNDAECO used Banners and Power Points in order to explain the project costs, risks and benefits. Information was presented in different levels; at early stages general information was presented finalizing with the discussion of carbon contracts where detailed information on financial costs, the monetary benefits and risks was presented, meaning that all engaged forest owners received information before signing the carbon contracts. In several cases forest owners asked for additional meetings to discuss specific elements of the project contract, this meeting were held with coordinators or FUNDAECO lawyer.

Also the PD Summary contains section 1.8 where community risks and benefits are explained.

2.3.5 Information to Stakeholder on Verification Process (G3.3)

Before the validation/verification body site visit, the Project opened a Public comment period which is disseminated by the local technicians and the social and gender assistants. Specific information about the verification process and the VVB is contained in the Project Status schema 2019 and the MIR Summary 2017-2018. This allowed all stakeholders to reach the VVB before the site visit, during the site visit or present their comments through the suggestion box located in each one of the project office as well as FUNDAECO headquarters. Site Visit Information and Opportunities to Communicate with Auditor (G3.3)

2.3.6 Stakeholder Consultation (G3.4)

During the 25 years of working in Izabal, FUNDAECO has succeeded in maintaining a strong relationship with several groups and local associations involved in all the programs implemented in the region. Through these connection efforts FUNDAECO has acknowledged the needs of the local communities. In addition, the Deforestation Agents and Drivers Analysis, developed for the project, has identified the activities of community interest to tackle drivers and threats related to deforestation, including those referred to community needs. (See document "*Brief on agents and drivers V2*" and "*CNCG SM Drivers of Deforestation_final_1.pdf*"). According to both analyses, communities identified lack of access to economic opportunities and lack of employment opportunities, between the main factors for deforestation

in the project region. In response, the project includes direct actions to support local communities to cover these needs.

FUNDAECO has implemented different actions such as meetings and assemblies with the organized and unorganized groups, individuals, Departmental Development Councils (CODEDE), Municipal Development Councils (COMUDES), Community Development Councils (COCODES), Women Rights Groups and governmental institutions. These community structures have been used to implement Free Prior and Informed Consent activities.

The “Social and Gender Participation Assistants” (APSG in Spanish) are the social figure responsible of strengthen the capacities of the organized community groups and accompany the conformation of community groups when needed. For the project design, APSG had helped to identify possible beneficiaries and to socialize the project. (See document “*Base socioeconomic - Althelia.pdf*”).

The Free Prior and Informed Consent process implementation initiated before PD validation FUNDAECO with the participation of identified stakeholders mentioned in point 2.7.2 of the PD and the document Plan de Socialización, CPLI y Comunicación.doc. Between 2015 and 2018The project team and field technicians developed 150 meetings, workshops and assemblies to present the project to the communities and institutions involved in the project, and to discuss their support or consent.

The information presented and discussed during the FPIC process explained: the fundamental knowledge about Climate Change and the environmental services of the forest; the deforestation rates of the Caribbean Guatemala; the concepts and elements related to REDD+, and the objectives, strategies and benefits of the REDD+ Project.

With the purpose of performing a FPIC process that meets the criteria of the international conventions, the project was launched by the Department Governor, through a meeting request with the main institutions and coordination groups, including interinstitutional coordination groups, development Councils, and regional associations. The launching call and invited institutions and groups are presented in the document *Informe de Proceso FPIC 2017-2018.docx*.

The strategy followed during the implementation of the FPIC process (detailed in document Plan de Socialización, CPLI y Comunicación.do) looked to cover all the coordination and organization levels within the project region starting with: the Governor presentation; then meetings with governmental institutions, interinstitutional coordination groups, and development Councils; meetings with key community groups and leaders and finalized with workshops with private forest owners and other stakeholders.

2.3.7 Continued Consultation and Adaptive Management (G3.4)

Along this monitoring period FUNDAECO continued systematic communication and consultation with project beneficiaries and stakeholders through the channels explained in section 2.3.8. Consultation for project implementation and adaptive management included more than 180 meetings, workshops and assemblies. Non major changes were made and project design strategic lines contained in the PD and the Project Implementation Plan V6.doc, however minor changes were made considering necessary timelines to measure impacts and to improve financial efficiency; these changes are managerial and do not affect expected project benefits. For minor changes refer to section 2.2.3 and Project Implementation Plan V7.doc

2.3.8 Stakeholder Consultation Channels (G3.5)

From the local to the regional level, the following structures have been involved in project consultation and planning prior to and during the reporting period, ensuring project implementation, follow-up and oversight:

- **COCODEs (Comités Comunitarios de Desarrollo)**, or Community Development Councils, are the basic unit for consultation, planning and implementation; The General Assembly of each COCODE – in which all community members (both men and women) participate- elects a Board of Directors and a President, who in turn represents his/her community in regional bodies.
- **Local Regional Indigenous and Community Associations and Protected Area Community Assemblies (Asambleas o Consejos Intercomunitarios de Áreas Protegidas)**: Local Associations representing a group of communities, usually associated with the management of land and natural resources in a particular region or protected area, are also an important mechanism for community stakeholders engagement. The Associations Aj Rihonel Re li Ch’och in Río Sarstún, Aj Ilol Quiché in Chocón Nacional, San Antonio Aj Awinel in Jalauté, have been key partners during the FPIC activities , and will also participate in the protection and community development activities throughout project implementation. These Associations also represent the communities within a particular protected area, and are consulted and engaged in all field activities and key management decisions, including the consultation and implementation of the REDD+ project.
- **Protected Area Executive Councils or Boards of Directors (“Consejos Ejecutivos Locales de Áreas Protegidas”)** are a key participatory body for the active engagement of all stakeholders in project implementation. These Councils, which preside over the management of specific protected area, integrate key stakeholders at the local level, including the National Council of Protected Areas, Municipalities, Private Landowners and/or Private Sector representatives, Governor, relevant government agencies, and Local Community Representatives.
- **COMUDEs (Comités Municipales de Desarrollo)** or Municipal Development Councils, are participatory bodies at the Municipal level; Presided by local Mayors, they also incorporate private landowners, community representatives, local representatives of Government Agencies, and NGOs. The REDD+ Project has been extensively socialized with COMUDEs, as a key administrative body that ensures wide engagement of all stakeholders in a particular Municipality.
- **Consejo Departamental de Desarrollo (CODEDE)**, the Development Council for the Department of Izabal, presided by the local Governor, is the regional body that ensures the engagement of stakeholders at the regional level. The REDD+ project has been submitted for its review during the FPIC process, and the CODEDE will ensure regional level support to project implementation.

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

Stakeholders participate through meetings called by project technicians and coordinators in Community assemblies and workgroups promoted and supported by the project, specifically: meetings with Community Councils COCODES and meetings with the three Protected Area Executive Councils (Sierra Caral, Rio Sarstun and Cerro San Gil). During this monitoring period 150 meeting were held to coordinate activities and decision making with stakeholders.

2.3.10 Anti-Discrimination Assurance (G3.7)

FUNDAECO implements this project under all its Code of Ethics and the Gender and Non Discrimination Policy in order to ensure compliance with CCB Standards and in order to avoid discrimination or harassment based on gender, race, religion, and sexual orientation, these policies, specific activities adopted are:

- Training for women and girl focal groups, on climate change, REDD+ and project implementation
- Adoption of the Code of Ethics as part of contractual policies for project collaborators
- Support for girl education opportunities through the girls scholarship program
- Support for women training in opportunities in productive activities
- Support to specific women projects

- Hiring of Queqchi' spoken collaborator in Queqchi' spoken area
- Respect for cultural practices through a special clause in the carbon contract, and the protection of cultural HCV.
- Permanent task force on gender and non-discrimination; Social and Gender Participation Assistants.
- Inclusion of the Code of Ethics and Gender and Non Discrimination Policy as part of the Grievance Mechanism.

2.3.11 Grievances (G3.8)

The project redress procedure establish a chain to guarantee access to resolution to local stakeholders, as stated in the PD section, first channel for expressing grievances is through local technicians and social and gender assistants. During this project monitoring period 3 grievances were received and all of them were solved within established periods. Grievances and resolutions are compiled in a database managed by the Social and Gender National Coordinator and the REDD+ Manager. For a description on attended grievances see annex Grievances LogBook.

2.3.12 Worker Training (G3.9)

FUNDAECO trains all the staff in different aspects of the project components. For new employees, training period (induction process) will be provided in a 4 week term, immediately after beginning employment. The Induction process starts with identifying relevant topics to train the new employee. This process included field visits looking to integrate the technician in ongoing efforts with project stakeholders and communitarian leaders during the reporting period. Directors and Coordinators ensured that additional training is provided to staff, where needed, with efforts from FUNDAECO or from external support; during the monitoring period 15 training activities were held covering subjects according identified needs.

Table 15: Workers' Training Summary

Training	Charges involved	Number of training events	Number of participants
Xate agricultural practices	Agroforestry technicians	1	15
Forestry pruning	Agroforestry Technicians and park guards	1	18
Forestry Inventories	Agroforestry Technicians and park guards	2	23
Biodiversity and Amphibians	park guards	1	9
Environmental education	park guards	1	16
The park guard functions and responsibilities	park guards	1	10
Reporting Control and Surveillance actions	park guards	1	9
Use of GPS and SMART Program	park guards	2	18
Forest Fire prevention	park guards	1	18
Photography	park guards	1	15
Biodiversity Monitoring and Acoustic Technology	park guards	1	10
How to prepare conservation projects	coordinators and technicians: social, environmental educators	1	12

Snakes identification and first aid	Ecotourism guides and administration	1	10
-------------------------------------	--------------------------------------	---	----

The project also supports community partners by organizing and facilitating access to trainings relevant to the project benefits, during the monitoring period 56 people participated in handicraft trainings, 79 people participated in organization and business training, and 190 people participated in agroforestry trainings

2.3.13 Community Employment Opportunities (G3.10)

The project give opportunities to local technicians and communities through three different mechanisms; by direct hiring, by supporting productive projects from individual entrepreneurs or producers, or by supporting community productive projects.

Most of the employees hired by the project -86%- are local technicians or professional born in the zone or that have been living there for more than 20 years. See table 16 below. The dissemination of project positions is made locally and one of the requirements is to be from the project region. Additionally in Queqchi areas speaking Queqchi is one of the requirements.

Table 16: Summary of Employees' Local Engagement

Time living in the area	# of employees	% of the total
less than five years	2	2%
between 5-10 years	4	4%
between 10 - 20 years	5	5%
more than 20 years	32	33%
native to the project zone	55	56%

Support to individuals is given to entrepreneurs located in prioritized areas due to land use and land cover change dynamics. Individual producers are informed about these support opportunities during community assemblies or meetings with local groups, and there´s equal access to anybody that is committed to productive activities; 279 producers are being supported under this mechanism. Community or group projects are supported specifically in cases where communities are in extreme conditions of poverty and lack of opportunities. Both individuals and communities supported by the project have access to resources and training. During this monitoring period the project supported 10 community projects with the participations of local women and man as: agroforestry producers, community promoters and park guards, fisher producers and artisans.

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

The rights and obligations of workers were observed and enforced in accordance with Labor Code of Guatemala. These provisions were developed in FUNDAECOs manual of Internal Working Regulation and Procedure which was presented to the Ministry of Labor and Social Security for review and approval by a representative of the employer and two representatives of the workers, having been approved by the Ministry through the 179-2002 resolution, regulating the conditions of working hours, salary payments, holidays, requests and claims, obligations of the employer and employees, safety and health.

In compliance with the established regulations, this manual was made available to workers at each office in printed form and in digital form. Besides these regulations when hired, the employee receives the institutional Code of Ethics and Values, which contained general and mission related values to be

observed by our staff. More recently FUNDAECO has developed its Policy on Gender, No Discrimination and Violations against Fundamental Human Rights (see Gender, No Discrimination, and Human Rights PolicyV2.docx). All manual and regulations were implemented under the concepts and criteria stated along this Policy. Since this Policy is new, at this point the document is provided to each new employee during the induction meeting. At the end of 2017, workshops are planned to present and explain the Policy principles and implementation. Each year a refreshment workshop will be done for the Policy on Gender, No Discrimination and Violations against Fundamental Human Rights, the Code of Ethics and Values, and other documents regarding internal procedures and vision in support of the REDD+ project. The commitment to the accomplishment of these policies will be renewed by each employee every year.

On Non-Discrimination:

Every employee has the right not to be discriminated directly or indirectly for employment, or once employed, for reasons of gender, marital status, age within the law limits, racial or ethnic origin, social status, religion or belief, political ideas, sexual orientation, membership or not to a labor union.

Employment benefits to personal during the reporting period:

- All employees were entitled to benefits prescribed by Guatemalans labor laws.
- FUNDAECO recognized as institutional policy the payment of a universal indemnity after 4 years of working with the institution when the employee has accumulated a favorable record of conduct and performance; the termination is on friendly terms and under no circumstances for reasons of serious faults against the rules of the institution or the existing labor law in Guatemala. If any employee resigns before the four years, it will be the Technical Administrative Council (CTA), who will assess whether or not the universal compensation takes place.
- Health Suspension by the Guatemalan institute of Social Security: Any worker can be temporally suspended from his job duties because of illness or accident, remuneration shall be in accordance with the provisions of the organic law of IGSS. A copy of the suspension certificate is sent to the employee's personnel file and payroll manager.
- Life and health insurance.
- FUNDAECO recognized the concept of a "performance bonus", up to a maximum of 25% of the base salary. For the worker to enjoy this benefit, it must be stated in the employment contract.
- Field expenses: allocation of funds will be made for personnel who need to travel outside their workplace as part of their job functions.

2.3.15 Occupational Safety Assessment (G3.12)

FUNDAECO in fulfillment of Guatemalan law is registered with a patronal number and complied with the established benefits covering registered employees with the following social security programs:

- Common disease
- Accidents

- Maternity
- Age Disability

In addition to the benefits of the Guatemalan Social Security Institute, FUNDAECO in a common agreement with employees hires a collective life and medical expenses insurance coverage prior to the reporting period and maintained throughout the reporting period. During the reporting period, the medical expense coverage was extended at the request of employees to their families.

Within the regulations of the Guatemalan Social Security Institute conducted in coordination with the Ministry of Labor, FUNDAECO applied the following regulations during the reporting period:

- The Regulation on Health and Safety at Work, contained in the Government Agreement No. 229-2014 and its amendments contained in No.33-2016, which contains regulations regarding work environment, vehicle driving, handling and operation of machinery, infrastructure and facilities, hazardous substances, infectious diseases and first aid kits.
- Regulation on Accident Protection, published by the Guatemalan Social Security Institute board (Agreement no. 1002) that regulates issues relating to accident prevention and first aid measures.

Specific procedures related to FUNDAECO field work were included in the institutional Policy and Plan for Health and Safety. FUNDAECO has also adopted the Security and Risk Manual at the Herpetarium, from the Guadalajara Zoo Herpetarium in order to manage its local Herpetarium at Cerro San Gil. This herpetarium is registered at CONAP, and personnel have been trained by the Director of the National History Museum Herpetarium.

The body responsible for ensuring compliance with all laws and regulations is the Operations Directive Committee or CDO, and at the same time operates as the Health and Safety Committee supplying security protocols and issued several tools for each employee, among some of this tools we can mention the instructive for Safety on Emergency Situations, instructional use of water and land vehicles; Chapter XIII of the Internal Work Regulations containing the Hygiene and Safety at Work guidelines.

2.4 Management Capacity

2.4.1 Required Technical Skills (G4.2)

FUNDAECO's organizational structure for project management and implementation consists of four levels: First level is National Directive Level where Board of directors, and Project Directive Committee are involved, this level also includes legal assessment and communications assessment. The Directive level also includes a REDD+ Manager in charge of standards implementation, planning and monitoring. In order to guarantee that monitoring procedures are effective for the size of the project a Monitoring Coordinator will be working with the REDD+ Manager. The second level includes thematic coordination with units that respond to each of project components. The third level is the Regional coordination Level where the Regional Project Director coordinate directly with field level or the fourth level; the Geographic Coordination or Protected Area Coordination. Each Geographic Coordination has a Coordinator as well as staff who manage teams that implement project activities under the climate, community, or biodiversity categories. This structure guarantees not only geographical coverage, but adequate management. See Figure 6 for a detailed organizational structure.

The project team is composed by technicians and professional with relevant experience in the different components of the project, as shown in Figure 7 below, there is a Unit specifically dedicated to community engagement and social monitoring (Dirección de Participación Social y Genero/Programa Niña y Mujer Sana y Empoderadas), and the REDD+ Management Unit that integrates GIS technicians, and biodiversity technicians and experts coordinating general project monitoring as well as biodiversity monitoring. Table 17 below lists part of team positions and experience that guarantee the necessary skills for project implementation.

Table 17: Team Positions and Relevant Skills

Position	Name	Profession, experience and skills	Years of experience
FUNDAECO General Director	Marco Cerezo	Development Economist and PA Management specialist	30
Technical Director	Byron Villeda	Natural Resources Engineer specialized in Project Implementation	30
Commercial Director	Rafael Mejía	Agronomy engineer specialized in marketing and comments	20
Monitoring Director	Walter Chavez	Forest Engineer specialized in environmental economy	30
Land Planning Director and REDD+ Manager	Karen Aguilar	Natural Resources Engineer specialized in Sustainable Development and trained in REDD+ mechanism and CCB/VCS standards	14
Regional Director	Oswaldo Calderon	Agronomist specialized in PA management	25
National Social and Gender Director	Karen Dubois	Social and gender expert	15
Subnational Social and Gender Director	Sandra Portela	Social worker	8
Biological Research Director	Alexis Cerezo	Biologist PhD Population Ecology	20
Amphibians and AZE sites specialist	Carlos Vasquez	Biologist PhD Amphibians	20
Communications Coordinator	Griselda Pacheco	Social Communications	10
Sierra Caral Coordinator	Elder Perez	Agroforestry Technician trained in forest and carbon measurement	20
Coordinator	Ingrid Pelico	Natural resources Engineer trained in forest and carbon measurement	8
Protection and Surveillance Coordinator	Otto Palencia	Natural resources Engineer trained in forest and carbon measurement	10
GIS Coordinator	Kathya Mejía	Natural Resources Engineer and GIS	10
Rio Sarstun Coordinator	Emilio Pitan	Social promotor trained in community relations	12
Regional GIS Technician	Isaac Bo	Environmental Engineer and GIS	8

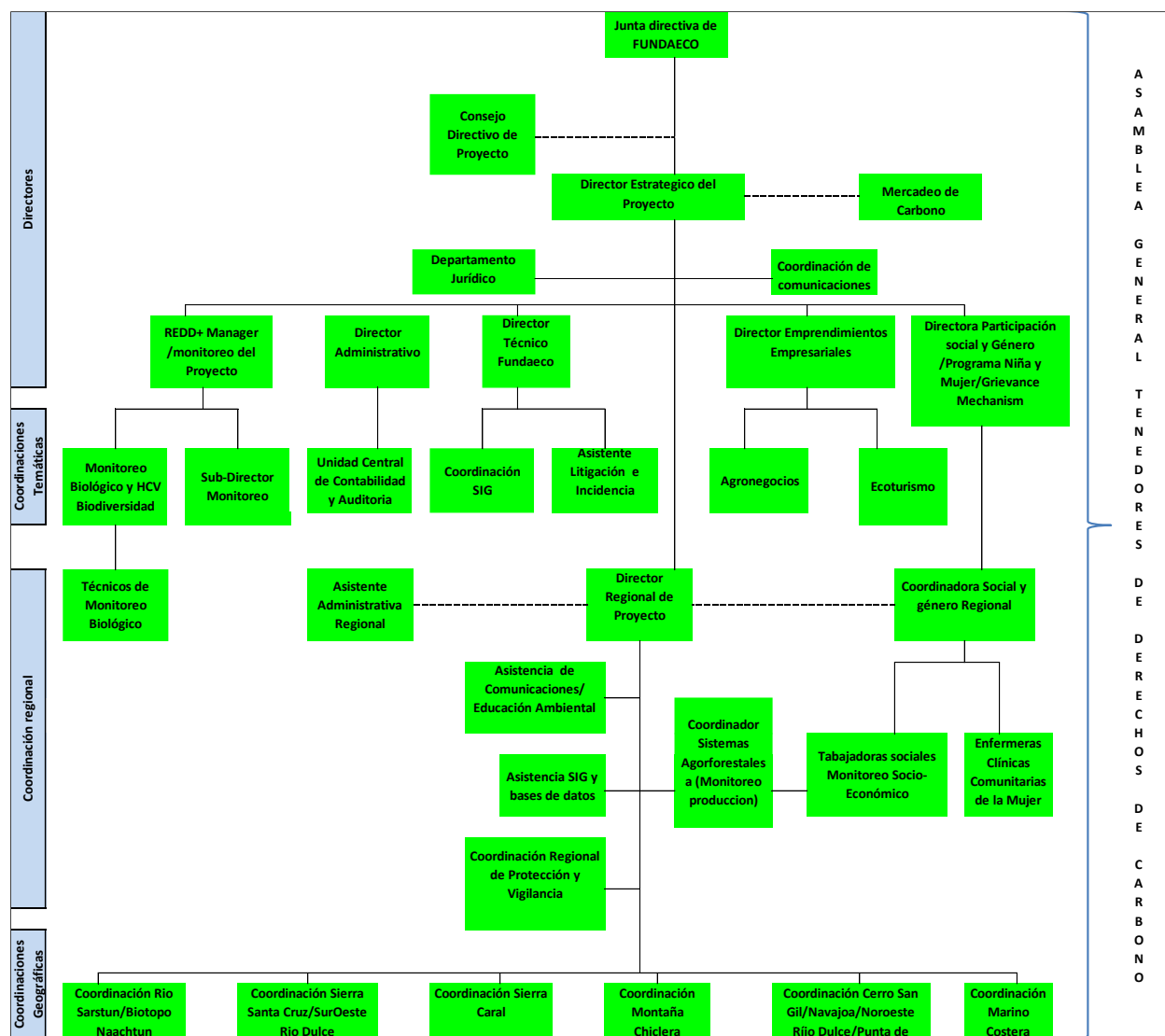


Figure 6: FUNDAECO's organizational structure.

2.4.2 Management Team Experience (G4.2)

Created in 1990, the FUNDAECO leadership team and the REDD+ Project team has extensive experience in community engagement, biodiversity assessment, land management and forest measurement in Guatemala.

During the past 20 years, FUNDAECO has successfully designed and promoted the establishment of a regional “cluster” of protected areas in Caribbean Guatemala. The institution has successfully designed and obtained the legal Declaration of two protected areas (Rio Sarstun and Sierra Caral); it has established one Municipal Protected Area in a vital ecological corridor (Parque Montaña Chiclera, covering 1,700 hectares); it has implemented an land acquisition Program for Cerro San Gil, in order to protect highly threatened forests and to secure land rights in key habitat within the protected areas and has successfully promoted the establishment of private reserves by local private land owners and

communities (over 8,000 hectares protected). In the project zone FUNDAECO is the government partner for the management of 4 protected areas and one special protection area.

For the past fifteen years, FUNDAECO has operated a GIS department that is part of the Carbon and Land Management Direction. To monitor its interventions, FUNDAECO uses geo-referenced information generated in the field, combining and overlaying it on the national geographic bases, especially the digital database for the Republic of Guatemala (the most complete and updated).

FUNDAECO also uses as input statistics generated by the National Statistics Institute, the Environmental Statistics Annuals, the Annual Environmental Profiles for Guatemala, the National Forest Inventory, and the local forest inventories. FUNDAECO technical team has been trained for forest carbon inventories and biomass and carbon field measurements across the project region. FUNDAECO also runs the longest bird Monitoring Program in Latin America, and has been monitoring amphibian sites and population since 2008.

Over the past six years, FUNDAECO has been developing the necessary technical and institutional capacities to successfully design and implement a REDD+ project in Guatemala. As part of this effort, FUNDAECO has actively participated in all Forest Carbon and REDD working groups in the country. Currently, FUNDAECO is part of the following technical groups:

- Workgroup to generate the Subnational Baseline for Sarstun-Motagua (workgroup leader: Universidad del Valle, with the technical support of Winrock International)
- National Committee for the preparation of land cover and land use Maps (Committee leader: Ministerio de Agricultura Ganaderia y Alimentacion)

FUNDAECO is also part of the following consultation groups:

- Guatemalan group of REDD+ project implementers (GIREDD+)
- Platform on Forest, Biodiversity Climate Change Group (GBBCC)
- National Climate Change Round Table
- National Environmental and Social Safeguards Committee (CNSAS)

The organizational structure for the REDD+ Project for Caribbean Guatemala as well as the team's experience is detailed in the Implementation Plan (see Plan de Implementación REDD V6.docx).

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

FUNDAECO has been strengthening the project team skills and creating local capacities for the project implementation, and is also partnering three organizations in order to have a high quality project:

- ecoPartners: FUNDAECO partner this organization in order to guarantee the good implementation of the VCS and CCB standards and methodologies, as well as to develop carbon accounting for the project. During June 2017 ecoPartners and FUNDAECO developed a training workshop to increase the GIS team and the REDD+ Manager skills, as well as the Directors comprehension on the CCB and VCS standards.
- AME Guatemala: AME Guatemala is a Guatemalan NGO specialized in women rights a gender. FUNDAECO partner this organization in order to have an external observer for the gender policy implementation, and for the development and implementation of gender protocols for the women health clinics.
- Althelia /Ecosphere: Besides supporting project investments this partnership supports VCUs marketing and sales.

- Panthera: FUNDAECO has partner with Panthera specifically to implement new methodologies for mammals monitoring, specially jaguars and other felines that are subject to illegal poaching.

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

As a grouped project, the budget and financial cashflow was designed to scale up in surface and activities, therefore resources are planned to cover new project instances. FUNDAECO is committed to cover project operation costs, initially through an investment from the Althelia Climate Fund that covers development expenses, and project activities and scaling-up until 2021. Currently, and for the remaining lifetime of the project, FUNDAECO is also committed to selling carbon credits with support from the ACF and Ecosphere+. However, because of uncertainty in voluntary carbon markets, FUNDAECO continues to seek funds from international agencies to guarantee project cashflow. FUNDAECO is working with recognized sustainable development agencies and conservation funds to cover costs for the different project components.

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

FUNDAECO is one of the main conservation organizations in Guatemala, and is a certified NGO under the International “NGO Benchmarking Standards” of the Swiss firm SGS. Winner of the 2006 Edition of the “Fundación BBVA Award for Best Biodiversity Conservation Project in Latin America”, FUNDAECO is legally accredited in the Civil Registry of Guatemala, the Tax Administration Authority (SAT), the Social Security Institute (IGSS), the Labor Ministry and the Accounting Authority Office (Contraloría General de Cuentas). FUNDAECO is registered as a co-managing partner in the National Protected Areas Council (CONAP), the National Forests Institute (INAB), the National Agrarian Institution and Land Fund (FONTIERRA), the National Institute of Tourism (INGUAT) and the National Council of Science and Technology (CONCYT). FUNDAECO is a Member of the World Union for Nature (IUCN) since 1993, and is a Founding Member of the National Association of Environmental NGO’s (ASOREMA), and the Trinational Alliance for the Conservation of the Gulf of Honduras (TRIGOH).

FUNDAECO Accounting Systems and financial controls have been verified and certified by USAID-Guatemala, and are based on a series of institutional manuals and procedures. See Institutional documents. Through the implementation of internal manual and procedures, annual audits, the Code of Ethics and the Policy against corruption and bribery, FUNDAECO implements best management practices to avoid the involvement of its team and collaborators in in any form of corruption such as bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, and collusion.

2.4.6 Commercially Sensitive Information (Rules 3.5.13 – 3.5.14)

The following document and information are commercially sensitive and not publically available. This information will be presented to the validator:

- Project budget
- Financial projections
- FUNDAECO Manuals, Policies and regulations
- Contracts between FUNDAECO and forest owners
- Any other agreements or contacts related to the project

2.5 Legal Status and Property Rights

2.5.1 Recognition of Property Rights (G5.1)

Based on the VCS Standard Section 3.11.1, the project demonstrates that the proponents have project ownership over the emission reductions under subsection 4:

“Project ownership arising by virtue of a statutory, property or contractual right in the land, vegetation or conservational or management process that generates GHG emission reductions and/or removals (where such right includes the right of use of such reductions or removals and the project proponent has not been divested of such project ownership)”

As a grouped project the REDD+ Project for Caribbean Guatemala has a number of landholders with different land tenure arrangements where project activities are implemented and emission reductions can be claimed. Different tenure arrangements include private property, private property holders without formal title termed possessors, community lands, State lands administered by CONAP, State lands given in concession to communities and industries and other users. With the exception of possessors, all of the tenure arrangements present in the grouped project area arises from either formal titles or formal management agreements with the State. These formal agreements are catalogued by the Cadastral Information Registry (RIC) following the Cadastral Information Registry Act of 2005 (Decree 41-2005).

In the case of possessors, land titles are recognized by the State through municipal certificates. A possessor is defined as a land holder who without being land owner exercises some or all of the usual property rights over a piece of land (Article 23 of Decree 41-2005). PINPEP furthers the definition of a possessor in the context of forests and delineates clear statutes of property rights and required documentation. PINPEP rules hold that to be recognized as a land holder without title (i.e. possessor) a certificate provided by the mayor of the relevant municipality is required declaring that the person concerned is known as the local occupier of the land in a way that is peaceful, public, permanent and in good faith and that no competing claim on the land is known.

With established rights to property Article 22 of the Framework for the Regulation of the Reduction of Vulnerability, the Mandatory Adaptation to the effects of Climate Change and the Mitigation of the effects of Greenhouse Gases (Decree 07-2013) further the Rights of Use of legal owners or possessors of lands to emission reductions generated in either voluntary or compliance markets. For the REDD+ Project for Caribbean Guatemala, all participating properties have transferred their emissions reductions Rights of Use to FUNDAECO. Contracts with each land owner are confidential, but will be provided to auditors as part of the Project Description annexes. Each contract transferred project ownership for a minimum of 30 years. Where project activities have been implemented since the project start date carbon rights are transferred retroactively and land owners have declared to not participate in any other emissions trading programs.

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

FUNDAECO is implementing a continuous Free Prior and Informed Consent process. Since 2015, the project team and field technicians developed more than a 138 meetings (38 during the monitoring period), workshops and assemblies to present the project to the communities and institutions involved in the project, and to discuss their support or consent; 4206 people participated, 1944 women and 2362 men. See Informe de Proceso FPIC 2015-2016 and Informe de Proceso FPIC 2017-2018.

The information presented and discussed during the FPIC process explained: the fundamental knowledge about Climate Change and the environmental services of the forest; the deforestation rates of the Caribbean Guatemala; the concepts and elements related to REDD+, and the objectives, strategies and benefits of the REDD+ Project.

With the purpose of performing a FPIC process that meets the criteria of the international conventions, the project was launched by the Department Governor, through a meeting request with the main institutions and coordination groups, including interinstitutional coordination groups, development Councils, and regional associations. The launching call and invited institutions and groups are presented in the Plan de Socialización, CPLI y Comunicación.doc and Informe de Proceso FPIC 2015-2016.

The strategy followed during the implementation of the FPIC process looked to cover all the coordination and organization levels within the project region starting with: the Governor presentation; then meetings with governmental institutions, interinstitutional coordination groups, and development Councils; meetings with key community groups and leaders and finalized with workshops with private forest owners and other stakeholders. During these meeting forest owners and possessors indicated their intention to participate in the REDD+ Project for Caribbean Guatemala, the individual meeting were carried on to present the Carbon Contract and give more detailed information as required by each community or individual. Carbon contracts signed contains clauses respecting Guatemalan Laws regarding property and carbon rights.

2.5.3 Property Right Protection (G5.3)

The free and previous consultation process developed with the communities involved in the REDD+ project was made in order to obtain the community participation and validation of the proposed project, it also helped –in an indirect way- to obtain the communities' main concerns regarding the implementation of the project and the activities that FUNDAECO should develop to support the REDD+ project (see Informe de Proceso FPIC 2015-2016.docx).

The project does not require or involve the involuntary relocation of people or of activities important for their livelihoods or culture. The project is designed respecting and supporting people rights, in this sense the project includes land legalization actions that allow interested communities, with historical rights but without land titles, to include their forest in the grouped project area.

Based on the VCS Standard Section 3.11.1, the project demonstrates that the proponents have project ownership over the emission reductions under subsection 4:

“Project ownership arising by virtue of a statutory, property or contractual right in the land, vegetation or conservational or management process that generates GHG emission reductions and/or removals (where such right includes the right of use of such reductions or removals and the project proponent has not been divested of such project ownership)”

As a grouped project, the **Error! Unknown document property name.** project has a number of landholders with different land tenure arrangements where project activities are implemented and emission reductions can be claimed. Different tenure arrangements include private property, private property holders without formal title termed possessors, community lands, State lands administered by CONAP, State lands given in concession to communities and industries and other users. With the exception of possessors, all of the tenure arrangements present in the grouped project area arises from either formal titles or formal management agreements with the State. These formal agreements are catalogued by the Cadastral Information Registry (RIC) following the Cadastral Information Registry Act of 2005 (Decree 41-2005).

In the case of possessors, land titles are recognized by the State through municipal certificates. A possessor is defined as a land holder who without being land owner exercises some or all of the usual property rights over a piece of land (Article 23 of Decree 41-2005). PINPEP furthers the definition of a possessor in the context of forests and delineates clear statutes of property rights and required documentation. PINPEP rules hold that to be recognized as a land holder without title (i.e. possessor) a

certificate provided by the mayor of the relevant municipality is required declaring that the person concerned is known as the local occupier of the land in a way that is peaceful, public, permanent and in good faith and that no competing claim on the land is known.

With established rights to property Article 22 of the Framework for the Regulation of the Reduction of Vulnerability, the Mandatory Adaptation to the effects of Climate Change and the Mitigation of the effects of Greenhouse Gases (Decree 07-2013) further the Rights of Use of legal owners or possessors of lands to emission reductions generated in either voluntary or compliance markets. For the project **Error! Unknown document property name.**, all participating properties have transferred their emissions reductions Rights of Use to FUNDAECO. Contracts with each land owner are confidential, but will be provided to auditors as part of the Project Description annexes. Each contract transferred project ownership for a minimum of 30 years. Where project activities have been implemented since the project start date carbon rights are transferred retroactively and land owners have declared to not participate in any other emissions trading programs.

2.5.4 Identification of Illegal Activity (G5.4)

Illegal activities that have historically occurred within the project area include deforestation for land use change purposes, and illegal logging. These activities result in negative impacts to project benefits, and as a result the project has several ways of minimizing illegal activities with in the area, as shown in table 18 below.

Table 18: Illegal activities which may negatively affect the Project.

Illegal activity	Action	Description
Illegal logging	Support to law enforcement	Support to Guatemalan institutions in charge of law enforcement, especially CONAP, INAB and MP.
		Support to communities or individual forest owners in legal following in case of illegal activities committed by a third part.
		Support in forest patrols especially to communities or individual forest owners that do not have the resources to deploy this action.
	Forestry plantations	Access to resources
	Law enforcement	Support to Guatemalan institutions in charge of law enforcement, especially CONAP, INAB and MP.
	Forest patrols	Support to communities or individual forest owners in legal following in case of illegal activities committed by a third part.
	Support for access to forestry incentives program PINFOR and	Access to resources as they will not have to pay for a professional to prepare files to be presented to incentives Programs PINFOR

Deforestation	PINPEP, and incomes from VCUs	and PINPEP, alternative incomes from incentives and VCUs
	Support for agroforestry plantations and access to markets	Access to resources (plantations supplies, technical assistance, marketing support) and alternative incomes

2.5.5 Ongoing Disputes (G5.5)

If disputes over lands and resources are identified, FUNDAECO inform to the Interinstitutional Group for Land Conflict Resolution Izabal -MICAI-, in order to find a positive resolution for all parts involved. FUNDAECO actively participation in MICAI, seeks for pacific resolution respecting Guatemalan Laws regarding land and protected areas; in this sense FUNDAECO will not prejudice the outcome of a conflict that is directly related to the project's implementation, instead FUNDAECO.

Additionally, a Grievance mechanism and a system for the reception, registration, response, resolution and/or referral of grievances has been implemented at different geographical and organizational levels, according to their gravity and urgency, ranging from requests of access to information, operational and administrative complaints, grievances and disputes over rights of access, collective conflicts, and potential violations of Legislation and Fundamental Rights. Different and specific channels of communication and complaint have been used, based on current practices, in order to ensure that all stakeholders, particularly vulnerable populations – such as indigenous women- have rapid access to complaints and grievance redress.

According to MICAI, the Conflict Map for Izabal Department during the monitoring period showed 8 cases in process, from these 6 were located within the project and all of them are still in process.

Tables 19 and 20 below present the cases addressed by MICAI inside the Project Zone, between 2012-2016 and between 2017 and 2018.

Table 19: Conflicts addressed in the Project Zone between 2012-2016

No.	2012-2016 Cases	Location	Status
1	Comunidad Creek Monte Verde/Familia Milian	Inside Project Zone	Solved
2	Creek Agua Caliente/ Tamejas	Inside Project Zone	Solved
3	Vista Hermosa (San Carlos EL Porvenir)/Alejandra	Inside Project Zone	Solved (initial agreements)
4	Creek Maya/Alejandra	Inside Project Zone	Solved
5	El Cedro/La Pintada	Inside Project Zone	Solved
6	Gilberto Reyes/Creek Blanco	Zone	Solved
7	Punta de Palma/San Andres	Inside Project Zone	Solved
8	San Miguelito/Finca 1842	Inside Project Zone	Solved
9	El Rosario y San Martin/Finca Tapon Creek	Inside Project Zone	Solved
10	Barra Lampara/ La Angostura	Inside Project Zone	Solved
11	La Pintada/Barra Lampara	Inside Project Zone	Solved
12	Creeke Gallo II/Nuevo Nacimiento La Arca	Inside Project Zone	Solved
13	Playa Sarstun Creek/fincas varias	Inside Project Zone	In process
14	Peñitas	Inside Project Zone	In process
15	Sarita/Finca Laboratorios Piersen	Inside Project Zone	In process

16	Comunidad Puerto Modesto Mendez/Finca Chocon	Inside Project Zone	In process
17	Comunidad Baltimore/Yojoa (Finca Juan Maegli)	Inside Project Zone	In process
18	Quebradas	Inside Project Zone	In process

Table 20: Conflicts addressed in the Project Zone during the monitoring period.

No.	2017-2017 Cases	Location	Status
1	Grupo Vista Hermosa, Finca Alejandra	Inside Project Zone	in process
2	Problemática en Áreas Protegidas, nuevos asentamientos	Inside Project Zone	in process
3	Comunidad Río Nacimiento Los Espinos	Inside Project Zone	in process
4	Asociación Cerro 1,019 (Chacalte II, San Lucas Tierra Colorada)	Inside Project Zone	in process
5	Área Protegida Cerro San Gil, (Consejo Superior Comunitario)	Inside Project Zone	in process
6	Instalaciones ICTA, Aldea Cristina	Inside Project Zone	in process
7	Finca Chachahualilla/FEGUA, Pro. Barrios	Inside Project Zone	in process
8	Instalaciones de DIGESA/MAGA, Finca Navajoa, Morales	Inside Project zone	in process

2.5.6 National and Local Laws (G5.6)

FUNDAECO and the REDD+ Project are compliant with all valid relevant local and national laws, including those listed in table 21 below. No new regulations were approved during this monitoring period.

Table 21: Laws, their relevance, and project compliance.

Law	Summary and Relevance to Project
Decree 07-2013. Framework for the Regulation of the Reduction of Vulnerability, the Mandatory Adaptation to the effects of Climate Change and the Mitigation of the effects of Greenhouse Gases.	This law establishes right of use for landowners.
Law for Forestry Incentives for Possessors of Small Extensions of Land for Forestry or Agroforestry Use (PINPEP). Decree 51-2010	This law creates economic incentives for possessors of small parcels to participate in agroforestry or forest conservation activities.
Draft of the Law for Promoting the Establishment, Recovery, Restoration, Management, Production, and Protection of Forests in Guatemala (PROBOSQUE)	This law is the continuation of PINFOR law for the forestry incentive program in Guatemala from 2017 for another 30 years. PROBOSQUE also extends the scope of the original PINFOR to be more socially inclusive.
Protected Areas Act	The National Commission for Protected Areas and the Guatemalan System for Protected Areas (SIGAP) were created to ensure the optimal functioning of essential

	ecological processes and of vital natural ecosystems for the benefit of all Guatemalans. This act designates specific areas of Guatemala as protected areas with specific land use restrictions.
Forestry Law	The law deems reforestation and forest conservation as matters of national urgency and of social importance. It also promotes the idea of sustainable management for forest development and is the law that first established the National Forestry Institute and the Program for Forestry Incentives (PINFOR).
Law on Land Registry	Established the registry for cadastral data on the national level. The law also defines different types of property and land ownership such as community lands, and possessors.
Law for the Public Access to Information	The objective of this law is to guarantee that all interested parties, free from discrimination, have the right to request and access public information in the possession of the central authorities and local government. This is a key tool for the dissemination process of both the project and the national ER program.
Forestry Policy	The objective of this policy is to increase the socioeconomic benefits derived from the goods and services produced in forest ecosystems and to contribute to land management in rural areas through productive management and the conservation of natural resources.
Agricultural Policy	The agricultural policy aims to transform the agrarian situation of Guatemala by promoting legal possession and land tenure, as well as the resolution of land conflicts so that together with the use of other productive assets, conditions are improved of the population lives in rural areas and integrated rural development is fostered, in a multicultural society
National Policy for Integral Rural Development (PNDR)	This policy's objective is to achieve improvements in the quality of life for people in rural areas through equitable access and sustainable use of productive resources, means of production, and natural and environmental goods and services.
Policy for Biological Diversity	It aims to promote effective management of biodiversity in Guatemala by emphasizing conservation and sustainable resource use as a crucial factor in sustainable development.
National Policy for Climate Change	The Climate Change policy's objective is to have Guatemala adopt risk prevention measures on a national

	and municipal level in order to reduce vulnerability and improve adaptation to climate change. It also aims to reduce GHG emissions in order to improve the quality of life of Guatemala's citizens and to strengthen Guatemala's influence in international climate change discussions.
National Strategy and Action Plan for Biodiversity 2012-2022	This is a tool developed to implement the national Policy for Biological Diversity and to complement article 64 of the Constitution, which declares that conservation, protection and improvement of the country's natural resources are topics of national concern.
National Development Plan Katun 2032	A national development plan with goals for sustainable development throughout Guatemala by 2023.
Plan of Action for the Prevention and Reduction of Illegal Logging in Guatemala	This plan aims to strengthen institutional actions to prevent and reduce illegal logging, while fostering responsible participation of related stakeholders to design and implement a long term strategy
National Strategy for the Sustainable Production and Efficient Use of Firewood	The strategy aims to develop tools and skills that guarantee availability of fuel wood by sustainable production, and adoption of efficient technologies. Allowing the prevention of health problems related to smoke and forest conservation

3. CLIMATE

3.1 Monitoring GHG Emission Reductions and Removals

3.1.1 Data and Parameters Available at Validation

Data / Parameter	%LKB
Data unit	%
Description	Percentage of the overlapping leakage belts area to be assigned to project, A, B.....N
Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	A
Data unit	ha
Description	Area of error due to observed change predicted as persistence
Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	a
Data unit	ha yr-1
Description	Estimated intercept of the regression line
Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	a1 and a2
Data unit	ha
Description	sample plot areas
Source of data	calculated
Value applied	N/A

Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Aaverage i
Data unit	ha
Description	Area of "average" forest land suitable for conversion to non-forest land within stratum
Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	ABSLLK
Data unit	ha
Description	Cumulative area of baseline deforestation within the leakage belt at year t
Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A

Comments	N/A
----------	-----

Data / Parameter	ABSLLKct,t
Data unit	ha
Description	Area of category ct deforested at time t within the leakage belt in the baseline case
Source of data	
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	ABSLLKfcl,t
Data unit	ha
Description	Area of final (post-deforestation) forest class fcl deforested at time t within the leakage belt in the baseline case
Source of data	
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	ABSLLKi,t
Data unit	ha
Description	Annual area of baseline deforestation in stratum i within the leakage belt at year t;

Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	ABSLLK _{icl,t}
Data unit	ha
Description	Area of initial (pre-deforestation) forest class icl deforested at time t within the leakage belt in the baseline case
Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	ABSLLK _t
Data unit	ha
Description	Annual area of baseline deforestation within the leakage belt at year t;
Source of data	calculated
Value applied	N/A

Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	ABSLPA
Data unit	ha
Description	Cumulative area of baseline deforestation in the project area at year t
Source of data	calculated
Value applied	See Accounting Model, PD Template, Table M
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of baseline emissions
Comments	ABSLPA

Data / Parameter	ABSLPAct,t
Data unit	ha
Description	Area of category ct deforested at time t within the project area in the baseline case
Source of data	measured or estimated from literature
Value applied	See Accounting Model, PD Template, Table AE
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of baseline emissions

Comments	ABSLPAct,t
----------	------------

Data / Parameter	ABSLPAct,t
Data unit	ha
Description	Area of category ct deforested at time t within the project area in the baseline case
Source of data	calculated
Value applied	See Accounting Model, PD Template, Table AE
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of baseline emissions
Comments	ABSLPAct,t

Data / Parameter	ABSLPAi,t
Data unit	ha
Description	Annual area of baseline deforestation in stratum i within the project area at year t;
Source of data	calculated
Value applied	See Accounting Model, PD Template, Table I
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of baseline emissions
Comments	ABSLPAi,t

Data / Parameter	ABSLPAicl,t
Data unit	ha
Description	Area of initial (pre-deforestation) forest class icl deforested at time t within the project area in the baseline case

Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	ABSLPA _t
Data unit	ha
Description	Annual area of baseline deforestation in the project area at year t
Source of data	calculated
Value applied	See Accounting Model, PD Template, Table I
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of baseline emissions
Comments	ABSLPA _t

Data / Parameter	ABSLPA _{z,t}
Data unit	ha
Description	Area of the zone z “deforested” at time t within the project area in the baseline case; ha
Source of data	calculated
Value applied	N/A

Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	ABSLRR
Data unit	ha
Description	cumulative area of baseline deforestation in the reference region at year t
Source of data	calculated
Value applied	See Accounting Model, PD Template, Table L
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of baseline emissions
Comments	ABSLRR

Data / Parameter	ABSLRR _{ct,t}
Data unit	ha
Description	Area of category ct deforested at time t within the reference region in the baseline case
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A

Comments	N/A
----------	-----

Data / Parameter	ABSLRR _{i,t}
Data unit	ha
Description	Annual area of baseline deforestation in stratum i within the reference region at year t
Source of data	calculated
Value applied	See Accounting Model, PD Template, Table H
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of baseline emissions
Comments	ABSLRR _{i,t}

Data / Parameter	ABSLRR _t
Data unit	ha
Description	Annual area of baseline deforestation in the reference region at year t
Source of data	calculated
Value applied	See Accounting Model, PD Template, Table L
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of baseline emissions
Comments	ABSLRR _t

Data / Parameter	ABSLRR _{taverage,i}
Data unit	ha
Description	Annual area of baseline deforestation in stratum i within the Reference region at a year taverage _i

Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Aforaget
Data unit	ha
Description	Area under forage above the baseline in leakage management areas
Source of data	calculated ex ante, measured ex post
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Aoptimali
Data unit	ha
Description	Area of "optimal" forest land suitable for conversion to non-forest land within stratum i
Source of data	calculated
Value applied	N/A

Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	AP
Data unit	m ²
Description	Plot area
Source of data	measured or estimated from literature
Value applied	See section 5.3.5.1 of the Project Description
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of baseline emissions
Comments	Varies depending on carbon pool measured and LULC type

Data / Parameter	APDPA _{icl,t}
Data unit	ha
Description	Areas of planned deforestation in forest class <i>icl</i> at year <i>t</i> in the project area
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	APFPA icl,t
Data unit	ha
Description	Annual area of planned fuel-wood and charcoal activities in forest class icl at year t in the project area
Source of data	calculated ex ante, measured ex post
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	APLPAicl,t
Data unit	ha
Description	Areas of planned logging activities in forest class icl at year t in the project area
Source of data	calculated ex ante, measured ex post
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	APNiPAicl,t
Data unit	ha
Description	Annual area of forest class icl with increasing carbon stock without harvest at year t in the project area
Source of data	calculated ex ante, measured ex post

Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	APSLKfcl,t
Data unit	ha
Description	Annual area of class fcl with decreasing carbon stock in leakage management areas in the project case at year t
Source of data	measured ex post
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	ARRi
Data unit	ha
Description	Total forest area in stratum i within the reference region at the project start date
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	

Purpose of the data	N/A
Comments	N/A

Data / Parameter	ARR _{i,t-1}
Data unit	ha
Description	Area with forest cover in stratum i within the reference region a year t-1
Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	AUFPA _{icl,t}
Data unit	ha
Description	Areas affected by forest fires in class icl in which carbon stock recovery occurs at year t
Source of data	measured ex post
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	B
Data unit	ha

Description	Area correct due to observed change predicted as change
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	b
Data unit	dimensionless
Description	Estimated coefficient of the time variable (or slope of the linear regression)
Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	BCEF
Data unit	dimensionless
Description	Biomass conversion and expansion factor for conversion of merchantable volume to total aboveground tree biomass
Source of data	measured or estimated from literature
Value applied	N/A

Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	BEFpl
Data unit	dimensionless
Description	Biomass expansion factor for converting volumes of extracted round wood to total above-ground biomass (including bark), applicable to tree tr, in plot pl
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	BLDA, BLDB, ... BLDN
Data unit	ha
Description	Total area of projected baseline deforestation during the fixed baseline period of Project A
Source of data	PD of project A; PD of project B, ... PD of Project N;
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A

Comments	N/A
----------	-----

Data / Parameter	C
Data unit	ha
Description	Area of error due to observed persistence predicted as change
Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Cabcl
Data unit	t CO ₂ e ha ⁻¹
Description	Average carbon stock per hectare in the above-ground biomass carbon pool of LU/LC class cl
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Cabfcl
Data unit	t CO ₂ e ha ⁻¹
Description	Average carbon stock per hectare in the above-ground biomass carbon pool of final post-deforestation class fcl

Source of data	measured or estimated from literature
Value applied	See Accounting Model, PD Template, Tables X, Y, Z, AA, AB, AC, AD
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of project emissions
Comments	Cabfcl

Data / Parameter	Cabicl
Data unit	t CO ₂ e ha ⁻¹
Description	Average carbon stock per hectare in the above-ground biomass carbon pool of initial forest class icl
Source of data	measured or estimated from literature
Value applied	See Accounting Model, PD Template, Table V
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of project emissions
Comments	Cabicl

Data / Parameter	Cabntcl
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the above-ground non-tree biomass carbon pool of LU/LC class cl
Source of data	measured or estimated from literature
Value applied	N/A

Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Cabtcl
Data unit	t CO2-e ha-1
Description	Average carbon stock per hectare in the above-ground tree biomass carbon pool of LU/LC class cl
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Cabz
Data unit	t CO2-e ha-1
Description	Average carbon stock per hectare in the above-ground biomass carbon pool per zone z
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A

Comments	N/A
----------	-----

Data / Parameter	Cacl
Data unit	tCO ₂ -eha-1
Description	Average carbon stock per hectare in above-ground biomass in LU/LC class cl
Source of data	
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Cbbcl
Data unit	t CO ₂ -e ha-1
Description	Average carbon stock per hectare below-ground biomass carbon pool of LU/LC class cl
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Cbbfcl
Data unit	t CO ₂ -e ha-1
Description	Average carbon stock per hectare below-ground biomass carbon pool of final post-deforestation class fcl

Source of data	measured or estimated from literature
Value applied	See Accounting Model, PD Template, Tables X, Y, Z, AA, AB, AC, AD
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of project emissions
Comments	Cbbfcl

Data / Parameter	Cbbicl
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare below-ground biomass carbon pool of initial forest class icl
Source of data	measured or estimated from literature
Value applied	See Accounting Model, PD Template, Table V
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of project emissions
Comments	Cbbicl

Data / Parameter	Cbbntcl
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare below-ground non-tree biomass carbon pool of LU/LC class cl
Source of data	measured or estimated from literature
Value applied	N/A

Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Cbbtcl
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare below-ground tree biomass carbon pool of LU/LC class cl
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Cbbz
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare below-ground tree biomass carbon pool per zone z
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A

Comments	N/A
----------	-----

Data / Parameter	Cdwcl
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the in the dead wood biomass carbon pool of LU/LC class cl
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Cdwfcl
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the in the dead wood biomass carbon pool of final post-deforestation class fcl
Source of data	measured or estimated from literature
Value applied	See Accounting Model, PD Template, Tables X, Y, Z, AA, AB, AC, AD
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of project emissions
Comments	Cdwfcl

Data / Parameter	Cdwicl
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the in the dead wood

	biomass carbon pool of initial forest class icl
Source of data	measured or estimated from literature
Value applied	See Accounting Model, PD Template, Table V
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of project emissions
Comments	Cdwicl

Data / Parameter	Cdwz
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the in the dead wood biomass carbon pool per zone z
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	CE _{p,icl}
Data unit	dimensionless
Description	Average combustion efficiency of the carbon pool p in the forest class
Source of data	measured or estimated from literature
Value applied	N/A

Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	CFdc
Data unit	tonnes C (tonne d. m.)-1
Description	Carbon fraction of the density class dc
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	CFj
Data unit	tonnes C (tonne d. m.) -1
Description	Carbon fraction for tree tr, of species, group of species or forest type j
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	CFpl
Data unit	tonnes C (tonne d. m.) -1
Description	Carbon fraction of sample pl
Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Ci
Data unit	
Description	Cost to select and measure a plot of the LU/LC class ci
Source of data	estimated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	cl
Data unit	dimensionless
Description	1, 2, 3 ... Ci LU/LC classes
Source of data	measured or estimated from literature
Value applied	N/A

Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	C1cl
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the litter carbon pool of LU/LC class cl
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	C1dwcl
Data unit	t CO ₂ -e
Description	Average carbon stock per hectare in the lying dead wood carbon pool of the LU/LC class cl
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A

Comments	N/A
----------	-----

Data / Parameter	Cldwfcl
Data unit	t CO2-e
Description	Average carbon stock per hectare in the lying dead wood carbon pool of final post-deforestation class fcl
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Cldwicl
Data unit	t CO2-e
Description	Average carbon stock per hectare in the lying dead wood carbon pool of initial forest class icl
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Clfcl
Data unit	t CO2-e ha-1
Description	Average carbon stock per hectare in the litter carbon pool of LU/LC class fcl

Source of data	measured or estimated from literature
Value applied	See Accounting Model, PD Template, Tables X, Y, Z, AA, AB, AC, AD
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of baseline emissions
Comments	Cifcl

Data / Parameter	Clicl
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the litter carbon pool of LU/LC class icl
Source of data	measured or estimated from literature
Value applied	See Accounting Model, PD Template, Table V
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	Calculation of baseline emissions
Comments	Clicl

Data / Parameter	Ciz
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the litter carbon pool per zone z
Source of data	measured or estimated from literature
Value applied	N/A

Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Cp
Data unit	t CO2-e ha-1
Description	Average carbon stock per hectare in the carbon pool p
Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Cp,icl,t
Data unit	t CO2-e ha-1
Description	Average carbon stock per hectare in the carbon pool p burnt at year t in the forest class icl;
Source of data	calculated
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Csdwcl
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the standing dead wood carbon pool of the LU/LC class cl
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Csoccl
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the soil organic carbon pool of LU/LC class cl
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Csofccl
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the soil organic carbon pool of final post-deforestation class fcl
Source of data	measured or estimated from literature

Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Csocio1
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the soil organic carbon pool of initial forest class ic1
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	Csocio1
Data unit	t CO ₂ -e ha ⁻¹
Description	Carbon stock per hectare in the soil organic carbon pool estimated for the plot pl1;
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	

Purpose of the data	N/A
Comments	N/A

Data / Parameter	Csocz
Data unit	t CO ₂ -e ha ⁻¹
Description	Average carbon stock per hectare in the soil organic carbon pool per zone z
Source of data	measured or estimated from literature
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data / Parameter	ct
Data unit	dimensionless
Description	1, 2, 3 ... Ct categories of LU/LC change (from initial forest classes icl to final post-deforestation classes fcl)
Source of data	each renewal of fixed baseline period
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	
Purpose of the data	N/A
Comments	N/A

Data Unit / Parameter:	Ctotcl
Data unit:	t CO ₂ -e ha ⁻¹

Description:	Average carbon stock per hectare in all accounted carbon pools of LU/LC class cl
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Ctotfcl,t
Data unit:	CO ₂ -e ha-1
Description:	Average carbon stock of all accounted carbon pools in non-forest class fcl at time t;
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Ctoticl
Data unit:	t CO ₂ -e ha-1
Description:	Average carbon stock of all accounted carbon pools in forest class icl
Source of data:	calculated
Value applied:	N/A
Justification of choice	

of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Ctoticl,t
Data unit:	t CO2-e ha-1
Description:	Average carbon stock of all accounted carbon pools in forest class icl at time t
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Ctotz
Data unit:	t CO2-e ha-1
Description:	Average carbon stock of all accounted carbon pools per zone z
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	ctz
Data unit:	dimensionless
Description:	1, 2, 3 ... Ctz categories of LU/LC change (from initial forest classes icl to post deforestation zones z)
Source of data:	each renewal of fixed baseline period
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	CV%
Data unit:	%
Description:	The highest coefficient of variation (%) reported in the literature from different volume or biomass forest inventories in forest plantations, natural forests, agro-forestry and/or silvo-pastoral systems
Source of data:	literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Cwpcl
Data unit:	t CO2-e ha-1

Description:	Average carbon stock per hectare in the harvested wood products carbon pool of LU/LC class cl
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Cwpcfcl
Data unit:	t CO2-e ha-1
Description:	Average carbon stock per hectare in the harvested wood products carbon pool of final post-deforestation class fcl
Source of data:	only once at project start and when mandatory
Value applied:	See Accounting Model, PD Template, Tables X, Y, Z, AA, AB, AC, AD
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	Cwpicl
Data unit:	t CO2-e ha-1
Description:	Average carbon stock per hectare in the harvested wood products carbon pool of initial forest class icl
Source of data:	
Value applied:	See Accounting Model, PD Template, Table V

Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	Cwplt,icl,t
Data unit:	
Description:	Carbon stock in the long-term wood products carbon pool at the time of deforestation t of the initial forest class icl
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Cwpmt,icl,t
Data unit:	
Description:	Carbon stock in the medium-term wood products carbon pool at the time of deforestation t of the initial forest class icl
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A

Comments:	N/A
-----------	-----

Data Unit / Parameter:	Cwpz
Data unit:	t CO2-e ha-1
Description:	Average carbon stock per hectare in the harvested wood products carbon pool per zone z
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	CXBw,icl,t
Data unit:	t CO2-e ha-1
Description:	Mean carbon stock per hectare of extracted biomass carbon by class of wood product w from forest class icl at time t
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	d1, d2, ..., dn
Data unit:	cm

Description:	Diameters of intersecting pieces of dead wood
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	DBH
Data unit:	cm
Description:	Diameter at Breast Height
Source of data:	measured or estimated from literature
Value applied:	See Forest Carbon Stock Inventory workbook
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	DBI
Data unit:	kg d.m. head-1 day-1
Description:	Daily biomass intake
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	dc
Data unit:	dimensionless
Description:	1, 2, 3 dead wood density classes
Source of data:	defined
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	DC
Data unit:	dimensionless
Description:	Total number of density classes (3)
Source of data:	defined
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Ddc
Data unit:	tonnes d. m. m-3
Description:	Dead wood density of class dc
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of	

measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Dj
Data unit:	t d.m.m-3
Description:	Mean wood density of species j
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	DLF
Data unit:	%
Description:	Displacement Leakage Factor
Source of data:	defined
Value applied:	0.163
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of leakage
Comments:	

Data Unit / Parameter:	Dm
Data unit:	g cm-3

Description:	Deadwood density
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	DMpl
Data unit:	tonnes of d.m.
Description:	Dry mass of sample pl;
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	e
Data unit:	dimensionless
Description:	Euler number (2,71828)
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	E
Data unit:	%
Description:	allowable error (□10% of the mean)
Source of data:	
Value applied:	See Uncertainty Estimates for Forest and Non-forest carbon stocks in carbon stock workbooks
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	E%
Data unit:	%
Description:	allowable sample error in percentage (□10%)
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EADLK
Data unit:	t CO2-e
Description:	Cumulative total increase in GHG emissions due to displaced forest fires
Source of data:	calculated
Value applied:	N/A

Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EADLk _t
Data unit:	t CO ₂ -e
Description:	Total ex ante increase in GHG emissions due to displaced forest fires at year t
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EBBBSLPA _t
Data unit:	t CO ₂ -e
Description:	Sum of (or total) baseline non-CO ₂ emissions from forest fire at year t in the project area
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EBBBSLtoticl
Data unit:	t CO2-e
Description:	Sum of (or total) actual non-CO2 emissions from forest fire at year t in strata i in forest class icl
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EBBBSPA
Data unit:	t CO2-e
Description:	Cumulative baseline non-CO2 emissions from forest fire at year t in the project area
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EBBCH4icl
Data unit:	t CO2-e
Description:	CH4 emission from biomass burning in forest class icl
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of	

measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EBBCO2icl
Data unit:	t CO2-e ha-1
Description:	Per hectare CO2 emission from biomass burning in slash and burn in forest class icl
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EBBN2Oicl
Data unit:	t CO2-e
Description:	N2O emission from biomass burning in forest class icl
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EBBPSPA
Data unit:	t CO2-e

Description:	Cumulative (or total) actual non-CO2 emissions from forest fire at year t in the project area
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EBBPSPAt
Data unit:	t CO2-e
Description:	Sum of (or total) actual non-CO2 emissions from forest fire at year t in the project area
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EBBtoticl
Data unit:	t CO2-e
Description:	Total GHG emission from biomass burning in forest class icl
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	

Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	ECH4fermt
Data unit:	t CO2-e
Description:	CH4 emissions from enteric fermentation at year t
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	ECH4mant
Data unit:	t CO2-e
Description:	CH4 emissions from manure management at year t
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EdirN2Omant
Data unit:	t CO2-e
Description:	Direct N2O emissions from manure management at year t
Source of data:	calculated

Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EF1
Data unit:	kg CH4 head-1 yr-1
Description:	Enteric CH4 emission factor for the livestock group
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EF2
Data unit:	kg CH4 head-1 yr-1
Description:	Manure management CH4 emission factor for the livestock group
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EF3
Data unit:	kg N2O-N (kg N-1) head-1 yr-1
Description:	Emission factor for N2O emissions from manure management for the livestock group
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EF4
Data unit:	kg N2O-N (kg NH3-N and NOx-N emitted)-1 head-1 yr-1
Description:	Emission factor for N2O emissions from atmospheric deposition of forage-sourced nitrogen on soils and water surfaces
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EgLK
Data unit:	t CO2-e
Description:	Cumulative Emissions from grazing animals in leakage management areas at year t
Source of data:	calculated

Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EgLKt
Data unit:	t CO2-e
Description:	Emissions from grazing animals in leakage management areas at year t
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	EI
Data unit:	%
Description:	Ex ante estimated Effectiveness Index
Source of data:	defined
Value applied:	0.71
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	EindNOmant
Data unit:	t CO2-e
Description:	Indirect N2O emissions from manure management at year t
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	ELK
Data unit:	t CO2-e
Description:	Cumulative sum of ex ante estimated leakage emissions at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template, Table AO
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	ELKt
Data unit:	t CO2-e
Description:	Sum of ex ante estimated leakage emissions at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template, Table AO
Justification of choice of data or description of	

measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	ELPMLK
Data unit:	t CO2-e
Description:	Cumulative total ex increase in GHG emissions due to leakage prevention measures
Source of data:	calculated
Value applied:	See Accounting Model, PD Template, Table AO
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of leakage
Comments:	

Data Unit / Parameter:	ELPMLKt
Data unit:	t CO2-e
Description:	Annual total increase in GHG emissions due to leakage prevention measures at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template, Table AO
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of leakage
Comments:	

Data Unit / Parameter:	EN2Omant
------------------------	----------

Data unit:	t CO2-e
Description:	N2O emissions from manure management at year t
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	ERCH4
Data unit:	dimensionless
Description:	Emission ratio for CH4 (IPCC default value = 0.012)
Source of data:	defined
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	ERN2O
Data unit:	dimensionless
Description:	Emission ratio for N2O (IPCC default value = 0.007)
Source of data:	defined
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A

Comments:	N/A
-----------	-----

Data Unit / Parameter:	f(t)
Data unit:	
Description:	A function of time
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Fburnticl
Data unit:	%
Description:	Proportion of forest area burned during the historical reference period in the forest class icl
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	fcl
Data unit:	dimensionless
Description:	1, 2, 3 ... Fcl final (post-deforestation) non-forest classes
Source of data:	measured or estimated from literature

Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	fj(DBH,H)ab
Data unit:	A3-10
Description:	an allometric equation for species, or group of species, or forest type j, linking above-ground tree biomass (in kg tree-1) to diameter at breast height (DBH) and possibly tree height (H).
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	fj(DBH,H)V
Data unit:	
Description:	a commercial volume equation for species or species group j, linking commercial volume to diameter at breast height (DBH) and possibly tree height (H)
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	

Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Fracgas
Data unit:	kg NH3-N and NOx-N emitted (Kg N)-1
Description:	Fraction of managed livestock manure nitrogen that volatilizes as NH3 and NOx in the manure management phase
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	GWpch4
Data unit:	dimensionless
Description:	Global Warming Potential for CH4 (IPCC default value = 21 for the first commitment period)
Source of data:	defined
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	GWpN2O
Data unit:	dimensionless

Description:	Global Warming Potential for N2O (IPCC default value = 310 for the first commitment period)
Source of data:	defined
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	H
Data unit:	meters
Description:	Height of the tree
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	L
Data unit:	m
Description:	Length of the line
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A

Comments:	N/A
-----------	-----

Data Unit / Parameter:	LTFw
Data unit:	
Description:	Fraction of wood products that are considered permanent (i.e. carbon is stored for 100 years or more); it may be assumed no carbon is released
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	MTFw
Data unit:	
Description:	Fraction of wood products that are retired between 3 and 100 years
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	NCR
Data unit:	dimensionless
Description:	Nitrogen/Carbon ratio (IPCC default value = 0.01)

Source of data:	defined
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Nex
Data unit:	kg N head-1 yr- 1
Description:	Annual average N excretion per livestock head
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	ni
Data unit:	
Description:	Number of samples units to be measured in LU/LC class cl that is allocated proportional to the size of the class. If estimated $ncl < 3$, set $ncl = 3$
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A

Comments:	N/A
-----------	-----

Data Unit / Parameter:	Ni
Data unit:	
Description:	Maximum number of possible sample units for LU/LC class cl, calculated by dividing the area of class cl by the measurement plot area
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	OFw
Data unit:	dimensionless
Description:	Fraction of wood products that will be emitted to the atmosphere between 5 and 100 years of timber harvest
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	p
Data unit:	dimensionless
Description:	Carbon pool that could burn (above-ground biomass, dead

	wood, litter)
Source of data:	defined
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Pburntp,icl
Data unit:	%
Description:	Average proportion of mass burnt in the carbon pool p in the forest class icl;
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	PCabpl
Data unit:	tC ha-1
Description:	Carbon stock in above-ground biomass in plot pl
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A

Comments:	N/A
-----------	-----

Data Unit / Parameter:	PCbbpl
Data unit:	tC ha-1
Description:	Carbon stock in below-ground biomass in plot pl
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	PCxi
Data unit:	\$/t
Description:	Average in situ production costs for one ton of product Px in stratum i
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	This variable may have different values within different strata of the reference region

Data Unit / Parameter:	Pforaget
Data unit:	kg d. m. yr-1
Description:	Production of forage at year t
Source of data:	calculated ex ante, measured ex post

Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Po
Data unit:	g
Description:	Anhydrous weight of sample
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Population _t
Data unit:	number of heads
Description:	Equivalent number of forage-fed livestock at year t
Source of data:	calculated ex ante, measured ex post
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	PP _{i,t}
Data unit:	%
Description:	Proportion of stratum i that is within the project area at time t
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	PP _{xl}
Data unit:	\$/t
Description:	Potential profitability of product P _x at the location l (pixel or polygon)
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	P _s
Data unit:	g
Description:	Saturated weight of sample
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods	

and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Px
Data unit:	dimensionless
Description:	Product x produced in the reference region
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	r1
Data unit:	meters
Description:	Radius at the base of the tree
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	r2
Data unit:	meters
Description:	Radius at the top of the tree

Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	RBSLRR _{i,t}
Data unit:	%
Description:	Percentage of remaining forest area at year t -1 in stratum i to be deforested at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template, Table H
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	Used as an alternative to ABSLRR _{i,t} in baseline approach "c"

Data Unit / Parameter:	RF _t
Data unit:	%
Description:	Risk factor used to calculate VCS buffer credits
Source of data:	estimated
Value applied:	See Accounting Model, Ex Post Reporting Parameters
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions

Comments:	
-----------	--

Data Unit / Parameter:	Rj
Data unit:	dimensionless
Description:	Root-shoot ratio appropriate for species, group of species or forest type j
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Rj,pl,tr
Data unit:	dimensionless
Description:	Root-shoot ratio, applicable to tree tr of species j in plot pl
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	S\$x
Data unit:	\$/t
Description:	Selling price of product Px
Source of data:	measured or estimated from literature

Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Scl
Data unit:	
Description:	standard deviation of LU/LC class cl
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	SLFw
Data unit:	dimensionless
Description:	Fraction of wood products that will be emitted to the atmosphere within 5 years of timber harvest
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	SPxl
Data unit:	map
Description:	Selling point l of product Px
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	STFw
Data unit:	
Description:	Fraction of wood products and waste that will be emitted to the atmosphere within 3 years; all carbon shall be assumed to be lost immediately; dimensionless
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	t
Data unit:	dimensionless
Description:	1, 2, 3 ... T a year of the proposed project crediting period
Source of data:	defined
Value applied:	N/A
Justification of choice of	

data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	t*
Data unit:	dimensionless
Description:	the year at which the area ABSLPAicl,t is deforested in the baseline case
Source of data:	defined
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	t1
Data unit:	dimensionless
Description:	Start date of the historical reference period
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	t2
------------------------	----

Data unit:	dimensionless
Description:	End date of the historical reference period
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Taveragei
Data unit:	yr
Description:	Number of years in which Aaveragei is deforested in the baseline case
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	taveragei
Data unit:	yr
Description:	Year at which Taveragei ends
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	

Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	TBabj
Data unit:	kg tree-1 or t tree-1
Description:	above-ground biomass of a tree of species, or species group, or forest type j
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	TBabtr
Data unit:	kg tree-1 or t tree-1
Description:	Above-ground biomass of tree tr
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	TCabtr
Data unit:	kg C tree-1 or t C tree-1
Description:	Carbon stock in above-ground biomass of tree tr

Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	TCbbtr
Data unit:	kg C tree-1
Description:	Carbon stock in below-ground biomass of tree tr
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	TCv
Data unit:	\$/t/km
Description:	Average Transport Cost per kilometer for one ton of product Px on land, river or road of type v
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	TDv
Data unit:	\$/t/km
Description:	Transport Distance on land, river or road of type v
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Thrp
Data unit:	yr
Description:	Duration of the historical reference period
Source of data:	defined
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Toptimali
Data unit:	yr
Description:	Number of years since the start of the AUD project activity in which Aoptimal in stratum i is deforested in the baseline case
Source of data:	calculated
Value applied:	N/A

Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	toptimali
Data unit:	yr
Description:	Year at which Toptimali ends
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	tr
Data unit:	dimensionless
Description:	1, 2, 3, ... TRpl number of trees in plot pl
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	tst
------------------------	-----

Data unit:	dimensionless
Description:	t-student value for a 95% confidence level (initial value t = 2)
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Tsub-optimali
Data unit:	yr
Description:	Number of years in which Asub-optimali is deforested in the baseline case
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	v
Data unit:	dimensionless
Description:	1,2,3, ...V type of surface on which transport occurs
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods	

and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	V1i,t; V2i,t; ...;Vni,t
Data unit:	
Description:	Variables included in a deforestation model
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	Unit of each variable to be specified by the project proponent

Data Unit / Parameter:	VBCt
Data unit:	t CO2-e
Description:	Number of Buffer Credits deposited in the VCS Buffer at time t;
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions
Comments:	

Data Unit / Parameter:	VCUt
Data unit:	t CO2-e

Description:	Number of Verified Carbon Units (VCUs) to be made available for trade at time t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions
Comments:	

Data Unit / Parameter:	VEF
Data unit:	dimensionless
Description:	Volume Expansion Factor
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	VEX _{w,j,fcl,t}
Data unit:	m ³
Description:	Volume of timber for product class w, of species j, extracted from within forest class fcl at time t
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	

Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	VOB10
Data unit:	m3
Description:	Volume Over Bark above 10 cm DBH
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	VOB30
Data unit:	m3
Description:	Volume Over Bark above 30 cm DBH
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Volumedc
Data unit:	m3
Description:	Volume of lying dead wood in the density class dc
Source of data:	measured or estimated from literature

Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Vpl
Data unit:	m3 plot-1
Description:	Commercial volume of plot pl
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Vtr
Data unit:	m3
Description:	Commercial volume of tree tr
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	w
Data unit:	dimensionless
Description:	1, 2, 3 ... W Wood product class (sawn-wood, wood-based panels, other industrial round-wood, paper and paper board, and other);
Source of data:	defined
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	Wcl
Data unit:	
Description:	Ncl/N
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	WWw
Data unit:	dimensionless
Description:	Wood waste for wood product class w. The fraction immediately emitted through mill inefficiency
Source of data:	measured or estimated from literature
Value applied:	N/A
Justification of choice of	

data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	XF
Data unit:	dimensionless
Description:	Plot expansion factor from per plot values to per hectare values
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	z
Data unit:	
Description:	1, 2, 3, ... Z post deforestation zones having a characteristic mixture of final post-deforestation classes (fcl)
Source of data:	
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	$\Delta CabBSLLKt$
Data unit:	t CO ₂ -e
Description:	Total baseline carbon stock changes for the above-ground biomass pool in the leakage belt
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AI
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	$\Delta CabBSLLKt$
Data unit:	t CO ₂ -e
Description:	Cumulative baseline carbon stock changes for the above-ground biomass pool in the leakage belt
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AI
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	$\Delta CabBSLPA$
Data unit:	t CO ₂ -e
Description:	Cumulative baseline carbon stock changes for the above-ground biomass pool in the project area
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AE
Justification of choice of	

data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	$\Delta C_{abBSLPAt}$
Data unit:	t CO ₂ -e
Description:	Total baseline carbon stock changes for the above-ground biomass pool in the project area
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AE
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	$\Delta C_{abBSLRR}$
Data unit:	t CO ₂ -e
Description:	Cumulative baseline carbon stock changes for the above-ground biomass pool in the reference region
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	

Data Unit / Parameter:	$\Delta C_{abBSLRRT}$
Data unit:	t CO ₂ -e
Description:	Total baseline carbon stock changes for the above-ground biomass pool in the reference region
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	

Data Unit / Parameter:	ΔC_{abct}
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Average carbon stock change factor in the above-ground biomass carbon pool of category ct
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	

Data Unit / Parameter:	$\Delta CADLK$
Data unit:	t CO ₂ -e
Description:	Cumulative total decrease in carbon stocks due to displaced deforestation
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Tables AN and AO
Justification of choice of	

data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of leakage
Comments:	

Data Unit / Parameter:	$\Delta CADL_k t$
Data unit:	t CO ₂ -e
Description:	Total decrease in carbon stocks due to displaced deforestation at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Tables AN and AO
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of leakage
Comments:	

Data Unit / Parameter:	ΔC_{bbct}
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Average carbon stock change factor in the below-ground biomass carbon pool of category ct
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	

Data Unit / Parameter:	ΔCBSLLK
Data unit:	t CO ₂ -e
Description:	Cumulative carbon stock changes in leakage management areas in the baseline case
Source of data:	calculated
Value applied:	See Accounting Model, MR Template Table BG
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	$\Delta\text{CBSLLKt}$
Data unit:	t CO ₂ -e
Description:	Annual carbon stock changes in leakage management areas in the baseline case at year t
Source of data:	calculated
Value applied:	See Accounting Model, MR Template Table BG
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	ΔCBSLPA
Data unit:	t CO ₂ -e
Description:	Total baseline carbon stock changes in the project area
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of	

measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	ΔCBSLPA
Data unit:	t CO ₂ -e
Description:	Total net cumulative baseline carbon stock change in final classes within the project area at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	$\Delta\text{CBSLPAf}$
Data unit:	t CO ₂ -e
Description:	Total cumulative baseline carbon stock change in final classes within the project area at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	$\Delta\text{CBSLPAft}$
------------------------	-------------------------

Data unit:	t CO2-e
Description:	Total baseline carbon stock change in final classes within the project area at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	Δ CBSLPAft
Data unit:	t CO2-e
Description:	Total annual baseline carbon stock change in final classes within the project area at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	Δ CBSLPAi
Data unit:	t CO2-e
Description:	Total cumulative baseline carbon stock change in initial forest classes within the project area at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of	

measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	$\Delta\text{CBSLPAit}$
Data unit:	t CO ₂ -e
Description:	Total baseline carbon stock change in initial forest classes within the project area at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	$\Delta\text{CBSLPAt}$
Data unit:	t CO ₂ -e
Description:	Total baseline carbon stock change within the project area at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	ΔCBSLt
------------------------	----------------------

Data unit:	tCO ₂ -e
Description:	Total baseline carbon stock change at year t in the project area
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	ΔC_{dwct}
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Average carbon stock change factor in the dead wood biomass carbon pool of category ct
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	ΔC_{lct}
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Average carbon stock change factor in the litter carbon pool of category ct
Source of data:	calculated
Value applied:	See Accounting Model, PD Template
Justification of choice of data or description of	

measurement methods and procedures applied:	
Purpose of the data:	Calculation of baseline emissions
Comments:	

Data Unit / Parameter:	Δ CLK
Data unit:	t CO ₂ -e
Description:	Total cumulative decrease in carbon stocks within the leakage belt at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Tables AO and AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of leakage
Comments:	

Data Unit / Parameter:	Δ CLKt
Data unit:	t CO ₂ -e
Description:	Total decrease in carbon stocks within the leakage belt at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Tables AO and AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of leakage
Comments:	

Data Unit / Parameter:	Δ CLPMLK
------------------------	-----------------

Data unit:	
Description:	Cumulative carbon stock decrease due to leakage prevention measures
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AO
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of leakage
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CLPMLKt
Data unit:	
Description:	Carbon stock decrease due to leakage prevention measures at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AO
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of leakage
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CPAdPA
Data unit:	t CO ₂ -e
Description:	Cumulative decrease in carbon stock due to all planned activities at year t in the project area
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AM
Justification of choice of data or description of	

measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPAdPA_t
Data unit:	t CO ₂ -e
Description:	Total decrease in carbon stock due to all planned activities at year t in the project area
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AM
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPAiPA
Data unit:	t CO ₂ -e
Description:	Cumulative increase in carbon stock due to all planned activities at year t in the project area
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AM
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPAiPA_t
------------------------	-------------------------

Data unit:	t CO2-e
Description:	Total increase in carbon stock due to all planned activities at year t in the project area
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CPDdPA
Data unit:	t CO2-e
Description:	Cumulative decrease in carbon stock due to planned deforestation at year t in the project area
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CPDdPA _t
Data unit:	t CO2-e
Description:	Total decrease in carbon stock due to planned deforestation at year t in the project area
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of	

measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPFdPA
Data unit:	t CO ₂ -e
Description:	Cumulative decrease in carbon stock due to planned fuel-wood and charcoal activities at year t in the project area
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPFdPA_t
Data unit:	t CO ₂ -e
Description:	Total decrease in carbon stock due to planned fuel-wood and charcoal activities at year t in the project area
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPFiPA
------------------------	-----------------------

Data unit:	t CO2-e
Description:	Cumulative increase in carbon stock due to planned fuel-wood and charcoal activities at year t in the project area
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	$\Delta\text{CPFIPAt}$
Data unit:	t CO2-e
Description:	Total increase in carbon stock due to planned fuel-wood and charcoal activities at year t in the project area
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	$\Delta\text{Cpicl,t=t}^*$
Data unit:	tCO2-e ha-1
Description:	Average carbon stock change factor for carbon pool p in the initial forest class icl applicable at time t
Source of data:	
Value applied:	N/A
Justification of choice of data or description of	

measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	ΔCPLdPA
Data unit:	t CO ₂ -e
Description:	Cumulative decrease in carbon stock due to planned logging activities at year t in the project area
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPLdPA_t
Data unit:	t CO ₂ -e
Description:	Total decrease in carbon stock due to planned logging activities at year t in the project area
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPLiPA
------------------------	-----------------------

Data unit:	t CO2-e
Description:	Cumulative increase in carbon stock due to planned logging activities at year t in the project area
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPLiPA_t
Data unit:	t CO2-e
Description:	Total increase in carbon stock due to planned logging activities at year t in the project area
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPNiPA
Data unit:	t CO2-e
Description:	Cumulative increase in carbon stock due to planned protection of growing forest classes in the project area at year t
Source of data:	calculated
Value applied:	NA
Justification of choice of	

data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	$\Delta\text{CPNiPat}$
Data unit:	t CO ₂ -e
Description:	Total increase in carbon stock due to planned protection of growing forest classes in the project area at year t
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPSLK
Data unit:	t CO ₂ -e
Description:	Total cumulative carbon stock change in leakage management areas in the project case
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPSLk_t
Data unit:	t CO ₂ -e
Description:	Total annual carbon stock change in leakage management areas in the project case
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPSPA
Data unit:	t CO ₂ -e
Description:	Cumulative project carbon stock change within the project area at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPSPAt
Data unit:	t CO ₂ -e
Description:	Total project carbon stock change within the project area at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of	

data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔC_{pt}
Data unit:	t CO ₂ -e
Description:	Carbon stock change factor applicable to pool p at time t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AM
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions
Comments:	

Data Unit / Parameter:	$\Delta C_{pz,t=t^*}$
Data unit:	tCO ₂ -e ha ⁻¹
Description:	Average carbon stock change factor for carbon pool p in zone z applicable at time t = t*
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	N/A

Data Unit / Parameter:	ΔC_{socct}
------------------------	--------------------

Data unit:	t CO2-e ha-1
Description:	Average carbon stock change factor in the soil organic carbon pool of category ct
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	

Data Unit / Parameter:	ΔC_{totct}
Data unit:	t CO2-e ha-1
Description:	Average carbon stock change factor in all accounted carbon pools of category ct
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	

Data Unit / Parameter:	$\Delta C_{totct,t}$
Data unit:	t CO2-e ha-1
Description:	Carbon stock change factor (also called emission factor) for all accounted carbon pools in category ct at time t
Source of data:	calculated
Value applied:	N/A
Justification of choice of data or description of	

measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	

Data Unit / Parameter:	$\Delta C_{total,t}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Average carbon stock change of all accounted carbon pools in forest class icl at time t
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	

Data Unit / Parameter:	$\Delta CUDdPA$
Data unit:	t CO ₂ -e
Description:	Cumulative actual carbon stock change due to unavoided unplanned deforestation at year t in the project area
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AM
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions
Comments:	ex ante and ex post

Data Unit / Parameter:	$\Delta CUDdPA_t$
------------------------	-------------------

Data unit:	t CO2-e
Description:	Total actual carbon stock change due to unavoided unplanned deforestation at year t in the project area
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AM
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔC_{wpct}
Data unit:	t CO2-e ha-1
Description:	Average carbon stock change factor in the harvested wood products carbon pool of category ct
Source of data:	calculated
Value applied:	NA
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	N/A
Comments:	

Data Unit / Parameter:	$\Delta REDD$
Data unit:	t CO2-e
Description:	Cumulative met anthropogenic greenhouse gas emission reduction attributable to the AUD project activity
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of	

measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ REDDt
Data unit:	t CO2-e
Description:	Net anthropogenic greenhouse gas emission reduction attributable to the AUD project activity at year t
Source of data:	calculated
Value applied:	See Accounting Model, PD Template Table AP
Justification of choice of data or description of measurement methods and procedures applied:	
Purpose of the data:	Calculation of project emissions
Comments:	ex ante and ex post

3.1.2 Data and Parameters Monitored

Data Unit / Parameter:	APDPAicl,t
Data unit:	ha
Description:	Areas of planned deforestation in forest class icl at year t in the project area
Source of data:	measured or estimated from literature
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25a
Comments:	ex ante and ex post

Data Unit / Parameter:	APFPA icl,t
------------------------	-------------

Data unit:	ha
Description:	Annual area of planned fuel-wood and charcoal activities in forest class icl at year t in the project area
Source of data:	calculated ex ante, measured ex post
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25, Table 26c
Comments:	ex ante and ex post

Data Unit / Parameter:	APLPAicl,t
Data unit:	ha
Description:	Areas of planned logging activities in forest class icl at year t in the project area
Source of data:	calculated ex ante, measured ex post
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25b, Table 26b
Comments:	ex ante and ex post

Data Unit / Parameter:	APNiPAicl,t
Data unit:	ha
Description:	Annual area of forest class icl with increasing carbon stock without harvest at year t in the project area
Source of data:	calculated ex ante, measured ex post
Description of measurement methods and	

procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 26a
Comments:	ex ante and ex post

Data Unit / Parameter:	CUCdPAt
Data unit:	t CO2-e
Description:	Total decrease in carbon stock due to catastrophic events at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25f, Table 25g
Comments:	ex post

Data Unit / Parameter:	EADLK
Data unit:	t CO2-e
Description:	Cumulative total increase in GHG emissions due to displaced forest fires
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BI
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to	Data is to be entered into internal archive. Archive is

be applied:	accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of leakage
Calculation method:	See Table 34, Table 35
Comments:	ex ante and ex post

Data Unit / Parameter:	EADLk _t
Data unit:	t CO ₂ -e
Description:	Total ex ante increase in GHG emissions due to displaced forest fires at year t
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BI
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of leakage
Calculation method:	See Table 34, Table 35
Comments:	ex ante and ex post

Data Unit / Parameter:	EBBBSLP _t
Data unit:	t CO ₂ -e
Description:	Sum of (or total) baseline non-CO ₂ emissions from forest fire at year t in the project area
Source of data:	calculated
Description of measurement	

methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BJ
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of baseline emissions
Calculation method:	See equation 19, Table 24, Table 36
Comments:	ex ante and ex post

Data Unit / Parameter:	EBBBSLtotal
Data unit:	t CO ₂ -e
Description:	Sum of (or total) actual non-CO ₂ emissions from forest fire at year t in strata i in forest class icl
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 24
Comments:	ex ante and ex post

Data Unit / Parameter:	EBBBSPA
Data unit:	t CO ₂ -e
Description:	Cumulative baseline non-CO ₂ emissions from forest fire at year t in the project area
Source of data:	calculated
Description of measurement	

methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BJ
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of baseline emissions
Calculation method:	See equations 17, 19, Table 24, Table 36
Comments:	ex ante and ex post

Data Unit / Parameter:	EBBCH4icl
Data unit:	t CO2-e
Description:	CH4 emission from biomass burning in forest class icl
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See equations 11, 13
Comments:	ex ante and ex post

Data Unit / Parameter:	EBBN2Oicl
Data unit:	t CO2-e
Description:	N2O emission from biomass burning in forest class icl
Source of data:	calculated
Description of measurement methods and procedures to be applied:	

applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See equations 11, 12
Comments:	ex ante and ex post

Data Unit / Parameter:	EBBPSPA
Data unit:	t CO2-e
Description:	Cumulative (or total) actual non-CO2 emissions from forest fire at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BJ
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of project emissions
Calculation method:	See Table 28, Table 29, Table 36
Comments:	ex ante and ex post

Data Unit / Parameter:	EBBPSPAt
Data unit:	t CO2-e
Description:	Sum of (or total) actual non-CO2 emissions from forest fire at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	

applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BJ
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of project emissions
Calculation method:	See equations 17,19, Table 28, Table 29, Table 36
Comments:	ex ante and ex post

Data Unit / Parameter:	EBBtoticl
Data unit:	t CO2-e
Description:	Total GHG emission from biomass burning in forest class icl
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See equation 11
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CFCdPA
Data unit:	t CO2-e
Description:	Cumulative decrease in carbon stock due to forest fires and catastrophic events at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	

Frequency of monitoring/recording:	CFCdPA
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25g, Table 27
Comments:	ex post

Data Unit / Parameter:	Δ CFCdPA _t
Data unit:	t CO ₂ -e
Description:	Total decrease in carbon stock due to forest fires and catastrophic events at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25g, Table 27
Comments:	ex post

Data Unit / Parameter:	Δ CFCiPA
Data unit:	t CO ₂ -e
Description:	Cumulative increase in carbon stock due to forest fires and catastrophic events at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A

Calculation method:	See Table 26g, Table 27
Comments:	ex post

Data Unit / Parameter:	Δ CFCiPat
Data unit:	t CO ₂ -e
Description:	Total increase in carbon stock due to forest fires and catastrophic events at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 26g, Table 27
Comments:	ex post

Data Unit / Parameter:	Δ CLPMLK
Data unit:	
Description:	Cumulative carbon stock decrease due to leakage prevention measures
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BI
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of leakage

Calculation method:	See Table 30c, Table 31, Table 32
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CLPMLKt
Data unit:	
Description:	Carbon stock decrease due to leakage prevention measures at year t
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BI
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of leakage
Calculation method:	See Table 30c, Table 31, Table 32
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CPAdPA
Data unit:	t CO ₂ -e
Description:	Cumulative decrease in carbon stock due to all planned activities at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BH
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and

	certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of project emissions
Calculation method:	See Table 25d, Table 27, Table 29
Comments:	ex ante and ex post

Data Unit / Parameter:	$\Delta\text{CPAdPat}$
Data unit:	t CO ₂ -e
Description:	Total decrease in carbon stock due to all planned activities at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BH
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of project emissions
Calculation method:	See Table 26d, Table 27, Table 29
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPAiPA
Data unit:	t CO ₂ -e
Description:	Cumulative increase in carbon stock due to all planned activities at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	

applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BH
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of project emissions
Calculation method:	See Table 26d, Table 27, Table 29
Comments:	ex ante and ex post

Data Unit / Parameter:	$\Delta CPAiPat$
Data unit:	t CO ₂ -e
Description:	Total increase in carbon stock due to all planned activities at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25a
Comments:	ex ante and ex post

Data Unit / Parameter:	$\Delta CPDdPA$
Data unit:	t CO ₂ -e
Description:	Cumulative decrease in carbon stock due to planned deforestation at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	

applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25a
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPDdPA_t
Data unit:	t CO ₂ -e
Description:	Total decrease in carbon stock due to planned deforestation at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25c, Table 25d
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPFdPA
Data unit:	t CO ₂ -e
Description:	Cumulative decrease in carbon stock due to planned fuel-wood and charcoal activities at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA

Purpose of the data:	N/A
Calculation method:	
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPFdPA_t
Data unit:	t CO ₂ -e
Description:	Total decrease in carbon stock due to planned fuel-wood and charcoal activities at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25c, Table 25d
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPFiPA
Data unit:	t CO ₂ -e
Description:	Cumulative increase in carbon stock due to planned fuel-wood and charcoal activities at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 26c, Table 26d
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPFiPA_t
Data unit:	t CO ₂ -e

Description:	Total increase in carbon stock due to planned fuel-wood and charcoal activities at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 26c, Table 26d
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CPLdPA
Data unit:	t CO ₂ -e
Description:	Cumulative decrease in carbon stock due to planned logging activities at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25b, Table 25d
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CPLdPA _t
Data unit:	t CO ₂ -e
Description:	Total decrease in carbon stock due to planned logging activities at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	

Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25b, Table 25d
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPLiPA
Data unit:	t CO ₂ -e
Description:	Cumulative increase in carbon stock due to planned logging activities at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 26b, Table 26d
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPLiPA_t
Data unit:	t CO ₂ -e
Description:	Total increase in carbon stock due to planned logging activities at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A

Calculation method:	See Table 26b, Table 26d
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CPNiPA
Data unit:	t CO ₂ -e
Description:	Cumulative increase in carbon stock due to planned protection of growing forest classes in the project area at year t
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 26a, Table 26d
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CPNiPA _T
Data unit:	t CO ₂ -e
Description:	Total increase in carbon stock due to planned protection of growing forest classes in the project area at year t
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 26a, Table 26d
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CPSLK
Data unit:	t CO ₂ -e

Description:	Total cumulative carbon stock change in leakage management areas in the project case
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 30b, Table 30c
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPSLKt
Data unit:	t CO ₂ -e
Description:	Total annual carbon stock change in leakage management areas in the project case
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 30b, Table 30c
Comments:	ex ante and ex post

Data Unit / Parameter:	ΔCPSPA
Data unit:	t CO ₂ -e
Description:	Cumulative project carbon stock change within the project area at year t
Source of data:	calculated
Description of measurement methods and procedures to be applied:	

Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Tables BH and BJ
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of project emissions
Calculation method:	See Table 27, Table 29, Table 36
Comments:	ex ante and ex post

Data Unit / Parameter:	$\Delta CPSPat$
Data unit:	t CO ₂ -e
Description:	Total project carbon stock change within the project area at year t
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Tables BH and BJ
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of project emissions
Calculation method:	See equations 19, 21, Table 27, Table 29, Table 36
Comments:	ex ante and ex post

Data Unit / Parameter:	$\Delta CUCdPA$
Data unit:	t CO ₂ -e

Description:	Cumulative decrease in carbon stock due to catastrophic events at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25f, Table 25g
Comments:	ex post

Data Unit / Parameter:	ΔCUCiPA
Data unit:	t CO ₂ -e
Description:	Cumulative increase in carbon stock in areas affected by catastrophic events (after such events) at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 26f, Table 26g
Comments:	ex post

Data Unit / Parameter:	ΔCUCiPA_T
Data unit:	t CO ₂ -e
Description:	Total increase in carbon stock in areas affected by catastrophic events (after such events) at year t in the project area
Source of data:	calculated
Description of measurement methods and	

procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 26f, Table 26g
Comments:	ex post

Data Unit / Parameter:	Δ CUDdPA
Data unit:	t CO ₂ -e
Description:	Cumulative actual carbon stock change due to unavoided unplanned deforestation at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BH
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of project emissions
Calculation method:	See Table 27, Table 29
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CUDdPA _t
Data unit:	t CO ₂ -e
Description:	Total actual carbon stock change due to unavoided unplanned deforestation at year t in the project area
Source of data:	calculated
Description of measurement methods and	

procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BH
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of project emissions
Calculation method:	See equation 16, Table 27 Table 29
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ CUFdPA
Data unit:	t CO ₂ -e
Description:	Cumulative total decrease in carbon stock due to unplanned (and planned – where applicable) forest fires in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25e, Table 25g
Comments:	ex post

Data Unit / Parameter:	Δ CUFdPA _t
Data unit:	t CO ₂ -e
Description:	Total decrease in carbon stock due to unplanned (and planned – where applicable) forest fires at year t in the project area
Source of data:	calculated
Description of	

measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 25e, Table 25g
Comments:	ex post

Data Unit / Parameter:	ΔCUFiPA
Data unit:	t CO ₂ -e
Description:	Cumulative increase in carbon stock in areas affected by forest fires (after such events) in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 26e, Table 26g
Comments:	ex post

Data Unit / Parameter:	ΔCUFiPA_t
Data unit:	t CO ₂ -e
Description:	Total increase in carbon stock in areas affected by forest fires (after such events) at year t in the project area
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	NA

Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Purpose of the data:	N/A
Calculation method:	See Table 26e, Table 26g
Comments:	ex post

Data Unit / Parameter:	Δ REDD
Data unit:	t CO ₂ -e
Description:	Cumulative net anthropogenic greenhouse gas emission reduction attributable to the AUD project activity
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BG
Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of project emissions
Calculation method:	See equation 21
Comments:	ex ante and ex post

Data Unit / Parameter:	Δ REDDt
Data unit:	t CO ₂ -e
Description:	Net anthropogenic greenhouse gas emission reduction attributable to the AUD project activity at year t
Source of data:	calculated
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	annually
Value monitored:	See Accounting Model, MR Template Table BJ

Monitoring equipment:	GIS software, Landsat imagery
QA/QC procedures to be applied:	Data is to be entered into internal archive. Archive is accessed by qualified, authorized technical experts. All documents for monitoring, validation, verification and certification are reviewed and signed off by several team members. Data will be reported to project proponents and stakeholders. Discrepancies or disagreements will be justified by explanation or by visitation of the activities in question. All available satellite data for monitoring, validation, verification and certification will be archived and made available to auditors.
Purpose of the data:	Calculation of project emissions
Calculation method:	See equations 19, 20, 23, Table 36
Comments:	ex ante and ex post

3.1.3 Monitoring Plan

In the context of FUNDAECO’s VCS/CCBA REDD+ project in Guatemala, the purpose of the monitoring plan is to measure and record data and indicators used to measure the climate, community, and biodiversity effect of the project compared to the baseline, without project, scenario. In accordance with project verification standards, FUNDAECO has set up the necessary follow-up mechanisms in order to ensure monitoring of all relevant variables and indicators, including: forest cover; forest degradation; socio-economic data; average family income evolution; reproductive health indicators; employment creation; average agricultural yields; biodiversity monitoring (indicator species); etc. Methodologies used to estimate and model values correspond to those proscribed by VM0015 v1.1, and are detailed in sections 4, 5, 6, and 7 of the Joint VCS-CCB Project Description. Periodicity of monitoring is enumerated for each parameter in Sections 3.1 and 3.2. Roles and responsibilities for monitoring as well as GHG information management systems are in Section 5.1.1.

The climate impact on the project and other areas was monitored using remote sensing and a suite of monitoring strategies to climate-related activities within the leakage belt and the project area itself. While models of carbon savings will be created to predict the impacts, empirical evidence from the project area and similar control areas outside of the project will be used at verification to confirm the carbon savings generated.

All project activities within the Project Area and Project Zone monitored during this reporting period were consistent with the project activities discussed in the Project Description Document. If any project activities are to be phased out or incorporated at a later date due to adaptive management, the monitoring and implementation plans for the REDD+ Project for Caribbean Guatemala will be updated accordingly.

Each parameter measured will have an associated measurement SOP for each monitoring period, created by the Director for each sector. If an SOP is adapted from one monitoring period to the next, the documents shall be versioned and archived and the monitoring report reference the version and title of the SOP used for that monitoring period. All updates to SOPs shall be approved by the sector director in the national office. The sector directors are responsible for ensuring that all relevant SOPs are adhered to by the regional directors and staff.

FUNDAECO quantified the net climate benefit of the REDD+ Project for Caribbean Guatemala through monitoring according to the methodology prescribed by VM0015 v1.1, including monitoring the required areas using remote sensing techniques and permanent forest plots installed and maintained in the project area.

Selected pools included and excluded in the project scenario and a justification for that decision are as follows:

Table 22: Selected Carbon Pools in the Project Scenario

Carbon Pool	Included?	Justification/ Explanation of Choice
Aboveground tree biomass	Yes	Major carbon pool affected by project activities.
Aboveground non-tree biomass	No	May be conservatively excluded as it expected to decrease under the baseline scenario.
Belowground biomass	Yes	Major carbon pool affected by project activities.
Dead wood	No	May be conservatively excluded as it expected to decrease under the baseline scenario.
Litter	No	May be conservatively excluded as it expected to decrease under the baseline scenario.
Soil organic carbon	No	May be conservatively excluded as it expected to decrease under the baseline scenario.
Wood products	Yes	Major carbon pool affected by project activities

3.1.3.1 Project Implementation

All climate-related project activities have associated indicators that are monitored at specified frequencies. Project activities implemented in this monitoring period are consistent with the project activities outlined in the TOC Matrix (see TOC Activity Matrix v1.14.xlsm) and the Project Description. For a list of all monitored climate indicators, see TOC Activity Matrix v1.14.xlsm.

3.1.3.2 Stocks and Emissions

The project and leakage areas were monitored for LULC changes using remote sensing techniques approved per the requirements of VM0015 v1.1 as described in Section 5 of the Joint VCS-CCB Project Description and in the previous monitoring report.

3.1.3.2.1 Data

The primary source of data used during the production of this final map was spectral satellite imagery collected by the Sentinel-2 satellite. This imagery has 20m resolution and is freely available through the European Space Agency (ESA), allowing for reduced monitoring costs.

The final map product consists of 12 Sentinel-2 scenes covering the entire grouped project and leakage area (Table 23:). These 12 Sentinel-2 scenes were selected based on image quality and low rates of cloud cover in the areas of interest, allowing for the production of a product with optimized coverage of the project and leakage areas. Each image was classified independently, but the final map product consisted of the classified images mosaicked in order of image date starting with the most recent imagery on top with a final cloud cover of less than 10% in the final mosaic. All images had the same parameters listed in Table 24.

Table 23: Data used for historical LULC analysis.

Image Name	Acquisition Date
S2A_MSIL2A_20180313T153611_N0206_R068_T17NQB_20180313T203447.SAFE	13/03/2018
S2A_MSIL2A_20180221T153621_N0206_R068_T17NQC_20180221T185521.SAFE	21/02/2018
S2A_MSIL2A_20170417T154241_N0204_R068_T17NQB_20170417T154241.SAFE	17/04/2017
S2A_MSIL2A_20170226T153611_N0204_R068_T17NQC_20170226T153612.SAFE	26/02/2017

Image Name	Acquisition Date
S2B_MSIL1C_20180805T153619_N0206_R068_T18NTJ_20180805T205024.SAFE	05/08/2018
S2A_MSIL1C_20180701T153621_N0206_R068_T18NTJ_20180701T202318.SAFE	01/07/2018
S2B_MSIL2A_20180427T153619_N0206_R068_T18NTK_20180427T190042.SAFE	27/04/2018
S2B_MSIL2A_20180427T153619_N0206_R068_T17NRE_20180427T190042.SAFE	27/04/2018
S2B_MSIL1C_20180427T153619_N0206_R068_T18NTJ_20180427T190042.SAFE	27/04/2018
S2B_MSIL2A_20180206T153609_N0206_R068_T18NTP_20180206T202638.SAFE	06/02/2018
S2B_MSIL2A_20170820T153619_N0205_R068_T18NTK_20170820T154056.SAFE	20/08/2017
S2A_MSIL2A_20170805T153621_N0205_R068_T18NTJ_20170805T153620.SAFE	05/08/2017

Table 24: Parameters of data used for LULC analysis.

Sensor	Data Product	Spatial Resolution	Spectral Resolution (bands)	Coverage (km2)
Sentinel-2	Level-2A	10m/20m/60m	13 bands (4/6/3)	10,000

The generated LULC map has been assigned the date of 1 January 2019 since all imagery was acquired in December 2018 or January 2019. Each scene was classified separately and they were then mosaicked with the most recent image on top, so a significant majority of the classification map is using data from January 2019.

Classification Methods

The procedure for classifying the imagery improved on the methods used in the previous reporting period as detailed below.

Pre-Processing

Sentinel 2 Level 1-C data products were downloaded from the ESA data hub Copernicus and transformed to Sentinel 2 Level 2-A data products using the Sen2Cor atmospheric processor available through the Sentinel Application Platform (SNAP Desktop). The Level 2-A data products were then exported from the Sentinel 2 .SAFE format to individual .tif files at 20 meter resolution. A single mask file was created for each satellite image, and this mask was used to standardize all image bands and classification layers created from that image. The mask was also used to extract the 2017 LULC data matching the extent of that satellite image.

Secondly, the Level 2-A data scene classifications for each image were extracted into individual layers. The bands comprising the image were also extracted into individual layers. These individual layers generated from each Sentinel image were then all standardized to identical extent and resolution settings using the mask image.

Processing

The Sentinel 2 data were classified using a Bayesian MAP classifier. This classifier is concerned with estimating the parameters of a posterior distribution conditional on observed data and prior distributions. Using conventional statistical notation in the context of the present classification problem, we define the posterior distribution $p(\omega_i|x, y, \hat{\theta}_i) \propto p(x|\omega_i, \hat{\theta}_i) \times p(\omega_i|y)$ where ω_i indicates the prior detection of degraded forest for a particular pixel, $\hat{\theta}_i$ are the estimated class parameters by training, x are the pixel elements of an image at a particular pixel and y is an indicator vector on prior class labels of the benchmark map in the neighborhood of a particular pixel for the i^{th} class. We assume x are normally

distributed while ω_i follow a binomial (two classes, not degraded and degraded) distribution conditional on the values of a $m \times m$ spatial window centered at the pixel coordinate of x in the benchmark map. Following from the selected model, its discriminant function is

$$g_i(x) = -\frac{1}{2} \ln |\hat{\Sigma}_i| - \frac{1}{2} (x - \hat{\mu}_i)^T \hat{\Sigma}_i^{-1} (x - \hat{\mu}_i) - \ln w^T y$$

where $\hat{\theta}_i = (\hat{\mu}_i, \hat{\Sigma}_i)$, $\hat{\mu}_i$ is the estimated class mean, $\hat{\Sigma}_i^{-1}$ is the estimates class variance-covariance matrix and w_i is the neighborhood weight vector whose elements sum to one (see Figure 7).

Discriminant functions as they relate to classification models are thoroughly described in Richards 2013

As g_i is a function $\hat{\theta}_i$, these parameters must be estimated by training prior to pixel discrimination.

0.05	0.1	0.05
0.1	0.4	0.1
0.05	0.1	0.05

Figure 7: The $m \times m = 3 \times 3$ neighborhood weight vector w arranged in a spatial window.

Training

Prior to pixel discrimination, class parameters $\hat{\theta}_i$ were estimated using standard maximum likelihood techniques conditional on training data. Training data were obtained by labeling a subset of the pixels in a scene as observed in the 2017 classification map produced for the first monitoring period (2017 LULC). A generative k-means process was applied to each subset to automatically segment pixel elements into similar classes each sharing the label of the training subset.

This generative process minimizes the risk of violating the normality assumption of x by using the subset as a Gaussian mixture. Each subclass comprising the mixture was tested for divergence from the whole subset using a chi-squared test on the likelihood ratio of $\hat{\theta}_i$ and its equivalent for the subset (Richards 2013). Where the test was statistically significant, inference was that the subclass was not of the same class as the subset and was therefore dropped from the training process. Depending on the result of the test and presence of available, labeled subsets in a scene, a total of 25 possible subclasses could be trained for each scene.

Implementation

The discriminant function was applied to all pixel elements in each scene for up to 25 times per pixel corresponding to the number of trained subclasses for each scene. The label associated with that particular subclass giving the highest value of g_i was assigned to each pixel in the scene to produce the updated LULC map for that particular scene. In the cases of cloud and cloud shadow where no prior information existed, the term $\ln w^T y$ in the discriminant function was simply set to zero. The training process and discriminant function were implemented using custom software written in a combination of C#, C++ and CUDA. Compiled CUDA implementations ran on a Quadro GPU to accelerate classification as compared to CPU-based software (approximately 10 minutes per scene versus 10 hours per scene).

All parameterized classes were checked for sufficient sample size, singularity in $\hat{\Sigma}_i$ and rationality of $|\hat{\Sigma}_i|$. Insufficient class distributions were dropped from the classification processes. Each pixel was assigned one of the 10 classes found in Table 25 below.

Table 25: List of LULC Classes included in 2019 LULC Classification

Pixel Value	Class Name
1	Very Humid Forest
2	Humid Forest
4	Water
5	Urban
6	Wetlands
7	Permanent Agriculture

Pixel Value	Class Name
8	Annual Agriculture
9	Pasture
10	Shrubs
11	Other Non-Forest

Post-Processing

The statistical classification process described above produced 12 raster files indicating LULC classification. These 12 rasters were processed to standardize reference extents and set pixel alignment before being mosaicked together in chronological order (with the most recent image on top) into a single raster file.

A final set of post-processing adjustments were made to the classified 2019 image to generate a final map product that conservatively excludes any areas of regeneration from non-forest to forest observed in the project or leakage areas from 2017 to 2019. This was done by applying a raster calculator equation with the logic shown in Table 26 such that all areas of deforestation observed in 2017 were retained and any areas of regeneration were conservatively removed prior to accounting. The final result of this post-processing can be seen in Figure 8 below.

Table 26: Conservative Post-Processing Adjustments to final LULC map

2017 Classification	2019 Initial Classification	2019 Final Adjusted Classification
Either Forest Class	Either Forest Class	Either Forest Class
Either Forest Class	Any Non-Forest Class	Any Non-Forest Class
Permanent Agriculture	Either Forest Class	Permanent Agriculture
Annual Agriculture	Either Forest Class	Annual Agriculture
Pasture	Either Forest Class	Pasture
Wetlands	Either Forest Class	Wetlands
Urban	Either Forest Class	Urban
Shrubs	Either Forest Class	Shrubs
Other Non-Forest	Either Forest Class	Other Non-Forest
Water	Any Class	Water

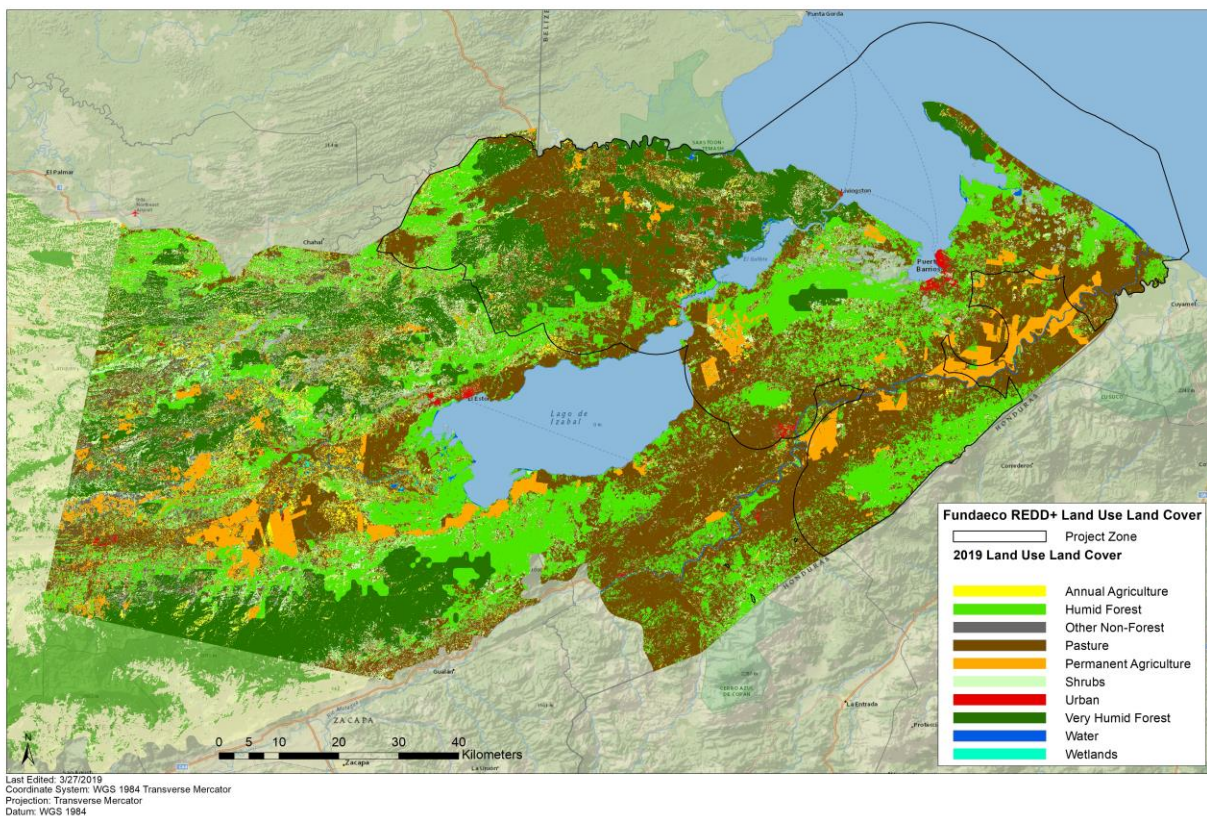


Figure 8: Final LULC Map

Thematic Accuracy Assessment

To ensure that the 2019 LULC classification map produced for this monitoring period met the accuracy thresholds of VM0015, a thematic accuracy assessment was conducted by comparing the results of the classification against reference data. The accuracy assessment completed used similar methods as those utilized for the project’s validation.

A total of 590 accuracy assessment points were randomly assigned to each class (see Figure 9) within the reference region, following similar accuracy assessment procedures used in the previous monitoring period. In keeping with the VM0015 methodology requirements, a minimum of 50 points were allocated to each class. Each point was then buffered by 50m and then clipped down again to the respective class so that only the pixels of the class of interest were assigned classifications. Each of these points was manually assigned one of the 10 LULC classes listed in Table 25 using reference remote sensing imagery, including Sentinel-2, Landsat-8, or Google Earth. Very Humid Forest and Humid Forest were combined into one Forest class for the accuracy assessment since this is not a classification distinction but is instead based on stratification completed at project validation, as stated in section 5.3.2 of the Project Description. After assigning a class to each grid point, a confusion matrix was created in order to assess the accuracy for each class. The overall accuracy achieved across the 2019 LULC map was 87% with each class achieving greater than 80% accuracy, exceeding the requirements of the VM0015 methodology (see Table 27).

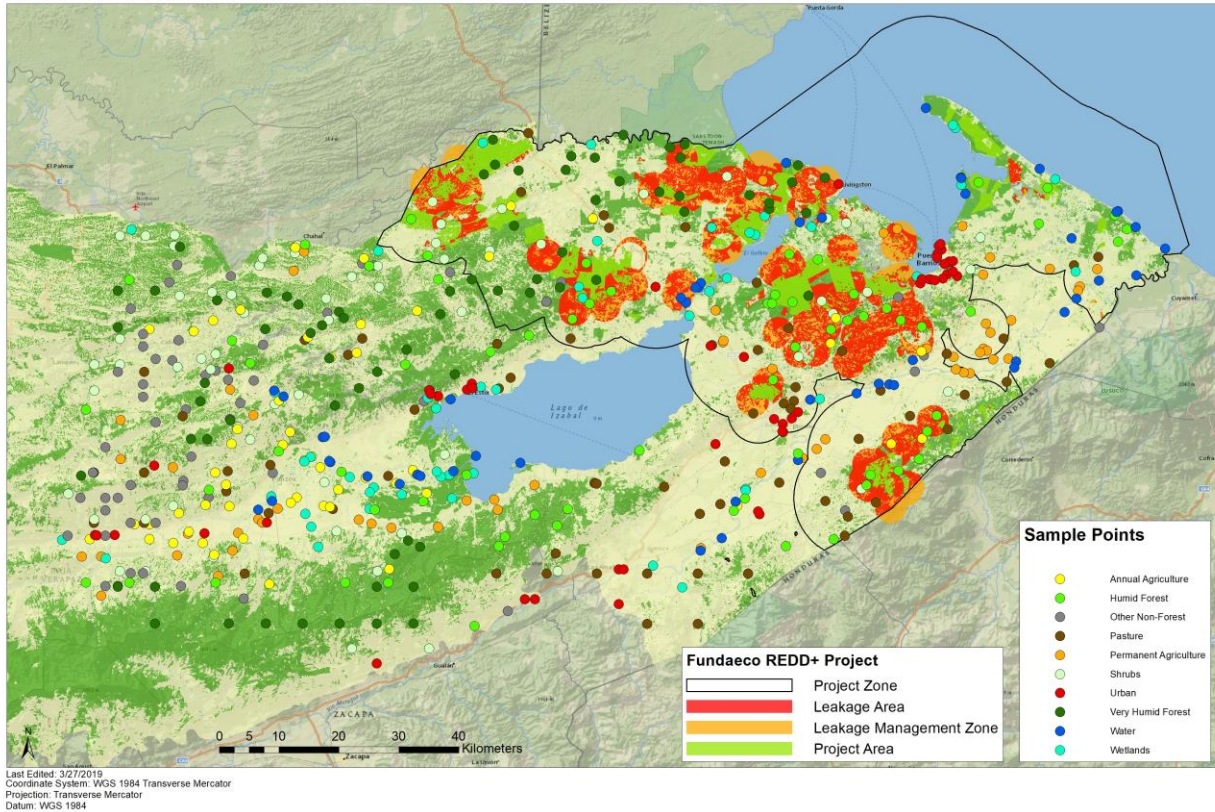


Figure 9: Thematic Accuracy Assessment Sample Points

Table 27: Confusion Matrix for Thematic Accuracy Assessment

	Observed									Total Classified Points	Classified Correctly
	Annual Agriculture	Forest	Other Non-Forest	Pasture	Permanent Agriculture	Shrubs	Urban	Water	Wetlands		
Annual Agriculture	43	3	0	0	4	1	1	0	0	52	82.7%
Forest	3	124	5	1	2	5	0	0	3	143	86.7%
Other Non-Forest	0	0	50	0	0	0	0	0	0	50	100.00%
Pasture	3	4	0	63	1	2	3	0	1	77	81.8%
Permanent Agriculture	2	1	0	0	49	0	4	0	0	56	87.5%
Shrubs	1	6	0	2	2	56	0	0	0	67	83.6%
Urban	0	0	2	1	0	0	41	1	1	46	89.1%

Water	0	0	1	0	0	0	1	44	2	48	91.7%
Wetlands	1	2	0	0	0	0	0	5	43	51	84.3%
Total Reference Points	53	140	58	67	58	64	50	50	50	513/590	Total Accuracy (%)
Classified Correctly (%)	81.1%	88.6%	86.2%	94.0%	84.5%	87.5%	82.0%	88.0%	86.0%	Total Accuracy (%)	86.9%

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

Along the monitoring period, FUNDAECO informed on the project progress during meetings organized with different communities and stakeholders, almost 40 meeting were organized to inform on project progress as well as to invite new forest owners to participate in the project. The monitoring results are disseminated through summary reports informing on the project activities and results along the period, the summaries contains a quick remain on project objectives, carbon contracts, project status, activities and achieved results. These are disseminated during meetings and are also available in the project offices and women health clinics across the project zone. During assemblies or group meetings and are also available with PD summary and the Monitoring reports summaries, in each project office and health facilities. Per the CCBA rules, this monitoring report is available in the project offices and women health clinics one month before the audit visit for the public comments period.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

Baseline emissions changed slightly from the previous monitoring period for the project and leakage areas due to this being a grouped project and these areas changed with the addition of new PAIs. The spatial model itself remains unchanged from validation. Ex-post baseline estimates of activity data within the project and leakage areas were calculated by applying the baseline model estimates of end land use to the defined boundaries for the project and leakage areas. The project area is comprised of smaller parcels with different land owners and Project Activity Instance start dates. The baseline data were extracted on a parcel-level and the deforestation estimates were adjusted based off of the PAI start dates. For the baseline estimates of end-land use in the leakage area, the estimates were calculated across the entire area. Where needed for partial years between LULC change predictions or observations, LULC change was interpolated as described in the PD.

3.2.2 Project Emissions

In order to calculate the emissions released in the project area, a 2019 LULC map was created, as described in section 3.1.3.2. Sentinel-2 data was pre-processed for use in the 2019 LULC map and was classified using the same classes used in the 2001-2010 LULC maps and the prior monitoring period.

Emissions from the project area are quantified using the LULC transitions in the project area, 2019 LULC relative to the 2017 map. The LULC transitions that occurred within this time period were assumed to be distributed linearly from 2017-2019 and were interpolated based off of each Project Activity Instance start date to the end of the first monitoring period so as to accurately account for the project's emissions reductions. The monitoring results of activity data in the project area are summarized below for this time period and are calculated in Fundaeco VM0015 Accounting Model.xlsm. As shown in table 28, the total amount of forest converted to pasture and cropland in the project area adjusted by the PAI start dates

during MP2 was 475 hectares for a total of 2,813 hectares across both monitoring periods. There were no emissions associated with any of the implemented project activities.

Table 28: Ex-Post Activity Data for LULC Change categories (ct) within the project area

Activity data per LU/LC category ct within the project area									Total ex post deforestation in the project area	
ID _{ct}	4	5	6	7	8	9	10	11	ABSLPA _t	ABSLPA
Name	Water	Urban	Wetland	Permanent agriculture	Annual agriculture	Pasture	Shrubs	Other non-forest	annual	cumulative
Project year t	ha	ha	ha	ha	ha	ha	ha	ha	ha	Ha
1	1	0	5	15	55	136	105	2	318	318
2	1	1	7	23	86	219	159	4	500	818
3	1	1	7	23	87	222	160	4	506	1,324
4	1	1	7	23	87	223	160	4	506	1,830
5	1	1	7	23	87	223	160	4	507	2,337
6	3	1	13	30	25	98	73	2	245	2,583
7	3	1	13	31	21	91	68	2	230	2,813
8									0	2,813
9									0	2,813
10									0	2,813
11									0	2,813
12									0	2,813
13									0	2,813
14									0	2,813
15									0	2,813
16									0	2,813
17									0	2,813
18									0	2,813
19									0	2,813
20									0	2,813
21									0	2,813
22									0	2,813
23									0	2,813
24									0	2,813
25									0	2,813
26									0	2,813
27									0	2,813
28									0	2,813
29									0	2,813
30									0	2,813

Table 29: Ex-Post Estimated Net Carbon Stock Change in the project area under the project scenario

Project year t	Total carbon stock decrease due to unplanned activities		Total carbon stock increase due to planned activities		Total carbon stock decrease due to unavaoided unplanned deforestation		Total carbon stock change in the project scenario	
	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative
	ΔCPAdPA_t	ΔCPAdPA	ΔCPAiPA_t	ΔCPAiPA	ΔCUDdPA_t	ΔCUDdPA	ΔCPSPA_t	ΔCPSPA
	tCO _{2e}	tCO _{2e}	tCO _{2e}	tCO _{2e}	tCO _{2e}	tCO _{2e}	tCO _{2e}	tCO _{2e}
1	138,691	138,691	0	0	424,077	424,077	0	0
2	221,817	360,508	0	0	786,259	1,210,336		0
3	229,972	590,480	0	0	863,669	2,074,005		0
4	235,740	826,220	0	0	976,595	3,050,600		0
5	242,173	1,068,393	0	0	1,077,695	4,128,296		0
6	132,937	1,201,330	0	0	1,099,539	5,227,835		0
7	129,059	1,330,389	0	0	1,137,860	6,365,695		0
8		1,330,389	0	0		6,365,695		0
9		1,330,389	0	0		6,365,695		0
10		1,330,389	0	0		6,365,695		0
11		1,330,389	0	0		6,365,695		0
12		1,330,389	0	0		6,365,695		0
13		1,330,389	0	0		6,365,695		0
14		1,330,389	0	0		6,365,695		0
15		1,330,389	0	0		6,365,695		0
16		1,330,389	0	0		6,365,695		0
17		1,330,389	0	0		6,365,695		0
18		1,330,389	0	0		6,365,695		0
19		1,330,389	0	0		6,365,695		0
20		1,330,389	0	0		6,365,695		0
21		1,330,389	0	0		6,365,695		0
22		1,330,389	0	0		6,365,695		0
23		1,330,389	0	0		6,365,695		0
24		1,330,389	0	0		6,365,695		0
25		1,330,389	0	0		6,365,695		0
26		1,330,389	0	0		6,365,695		0
27		1,330,389	0	0		6,365,695		0
28		1,330,389	0	0		6,365,695		0
29		1,330,389	0	0		6,365,695		0
30		1,330,389	0	0		6,365,695		0

3.2.3 Leakage

3.2.3.1 Activity Shifting Leakage

Leakage from activity displacement was monitored within the leakage belt. Ex-post emissions were quantified using the LULC transitions in the leakage area, for the 2019 LULC map relative to the 2017 benchmark map. The LULC transitions that occurred within this time period were assumed to be distributed linearly from 2017-2019 and were interpolated based off of the end of the previous monitoring period to the end of this second monitoring period so as to accurately account for activity-shifting leakage emissions.

As specified by section 1.1.3 of the applicable methodology, VM0015 version 1.1 Methodology for Avoided Unplanned Deforestation, the creation of a leakage belt is required and subject to monitoring,

reporting and verification, especially if there is not a jurisdictional system already in place. The leakage area is defined within VM0015 version 1.1 as consisting of the forested land areas surrounding the project area in which baseline activities could be displaced due to project activities implemented in the project area.

To define the boundaries of the leakage belt, the mobility analysis (Option II) was selected from the possibilities outlined in the methodology. A participatory rural appraisal was carried out by FUNDAECO in the form of a socioeconomic baseline study (see Base socioeconómica - Altelia.pdf). Within this study, a variety of questions were asked in interviews with local community members throughout the Project Zone. Two questions which concerned direct deforestation by community agents were used to carry out the mobility analysis. These questions asked the interviewees how far they would be willing to walk in order to obtain wood (i.e. for building etc.) and how far they would be willing to walk in order to obtain firewood. Responses for these two questions were collected and then averaged separately (see Fundaeco Leakage Data.docx and Leakage - Agents Mobility v1.1.xlsx). According to the results, community agents would be willing to walk an average of approximately 2.6 kilometers for wood and 1.6 kilometers for firewood. To exercise conservatism, the greater of the two averages (2.6 kilometers) was used as the maximum distance one would be willing to walk for wood resources and thus, the maximum distance for the leakage belt boundaries. Roads, trails and pathways were considered the routes on which agents would travel in order to reach wood resources.

A 2.6 kilometer buffer was created around all roads, trails and pathways that existed within the Project Area. In this buffering process, an area was created where any part of a road, trail or pathway existing inside the project area acted as a central point from which 2.6 kilometers extended outward. In many instances, these buffered areas overlapped the Project Area and thus would be subject to the project activities which inhibited deforestation by agents for purposes of wood collection. These buffered areas which overlapped the project area were not considered part of the leakage area.

The buffered area, also known as the Leakage Management Zone (see Figure 10) includes both the forest and non-forest areas within the buffer extending outward from the Project Area boundaries. The forested areas within the buffer are not subject to project activity implementation and thus would be susceptible to leakage. Therefore, the forest areas falling within the 2.6 kilometer buffer outside of the project area boundaries were uniquely exported and designated as the Leakage Area.

Figure 11 below shows the Leakage Area, which consists of the forest area within the 2.6 km buffer around any roads that cross through the Project Area.

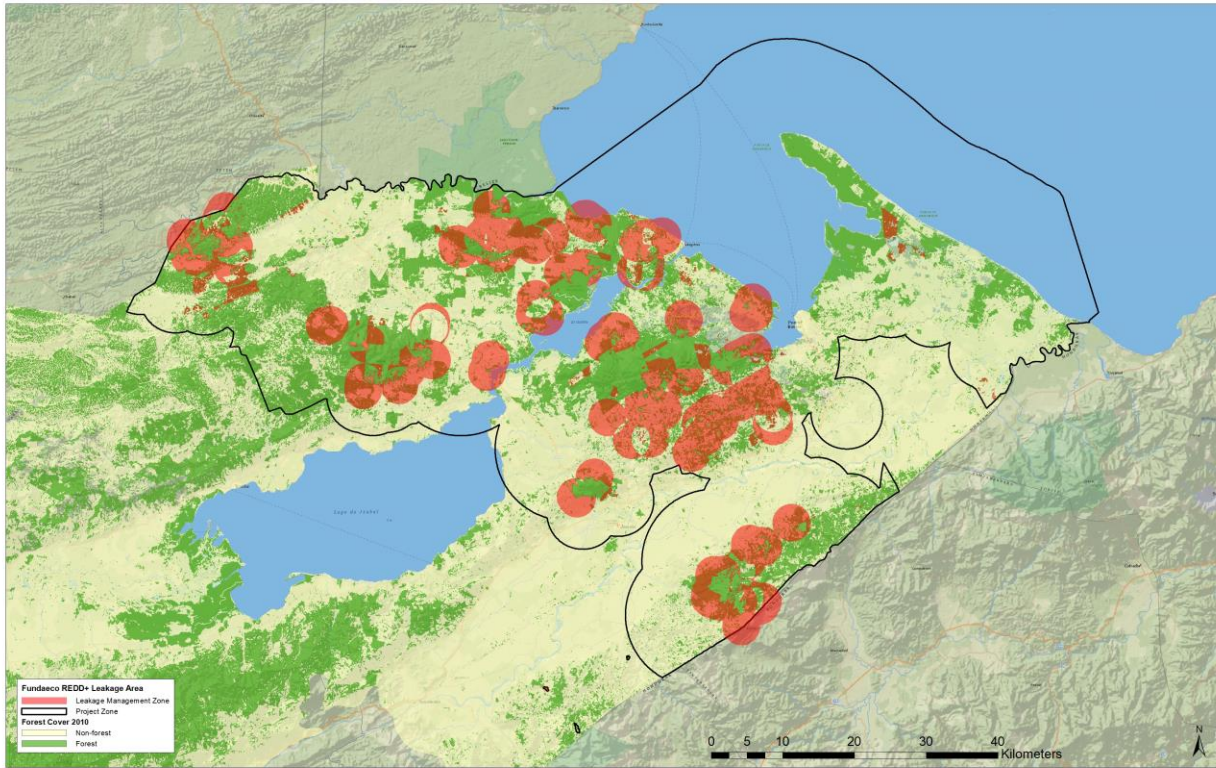


Figure 10: Leakage Management Zone and Project Zone

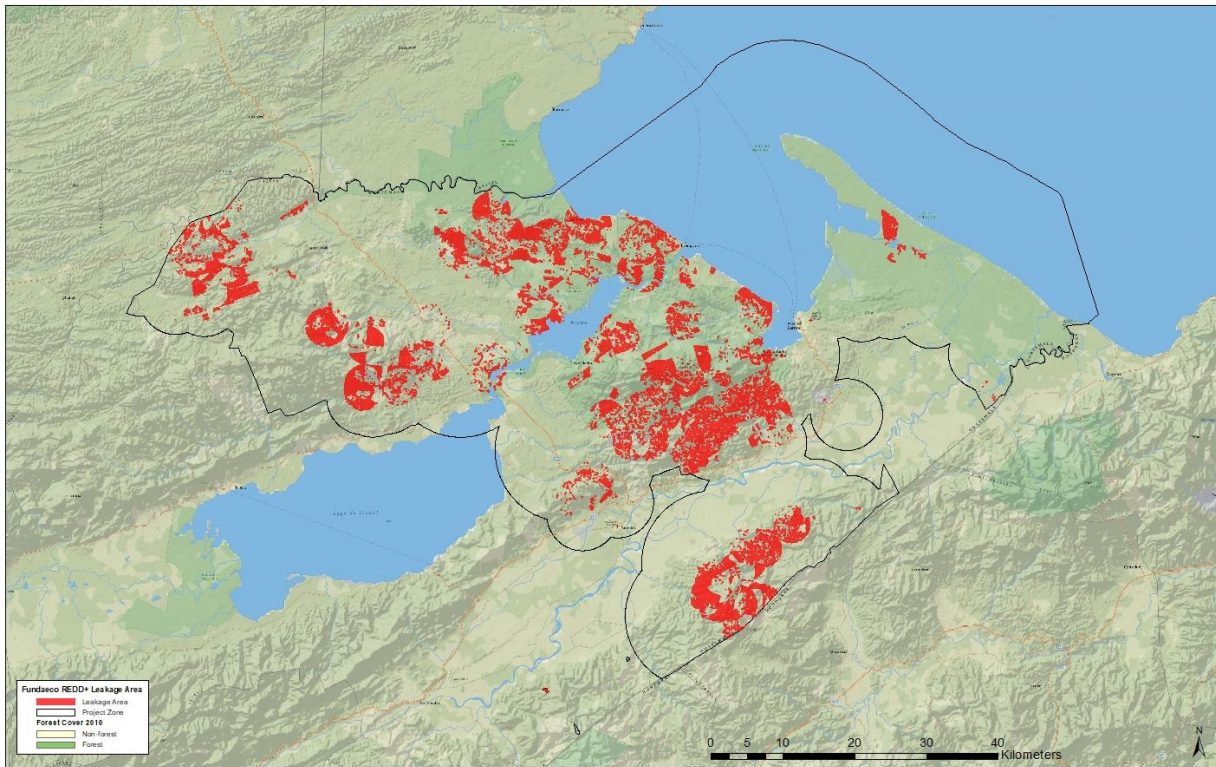


Figure 11: Map of the Leakage Area, consisting of only forest area.

Any ex-post emissions in the leakage belt that were found to exceed the baseline estimate were considered to be a result of leakage due to activity displacement. The results of carbon stock and emissions monitoring within the leakage belt are summarized in the tables below. It is estimated that during this monitoring period there were 907 additional hectares deforested within the leakage area for a total of 2,488 hectares across the project lifetime. However, this was less deforestation than estimated in the baseline scenario, thus the total emissions from activity-shifting leakage was 0 tons.

Table 30: Ex-Post Activity Data for LULC Change Categories (ct) within the Leakage Belt

Activity data per LU/LC category ct within the leakage belt									Total ex post deforestation in the leakage belt	
ID _{ct}	4	5	6	7	8	9	10	11	ABSLK _i	ABSLK
Name	Water	Urban	Wetland	Permanent agriculture	Annual agriculture	Pasture	Shrubs	Other non-forest	annual	cumulative
Project year t	ha	ha	ha	Ha	Ha	ha	ha	ha	ha	ha
1	1	0	2	10	53	118	65	2	250	250
2	1	0	3	13	71	156	86	3	333	583
3	1	0	3	13	71	156	86	3	333	916
4	1	0	3	13	71	156	86	3	333	1,248
5	1	0	3	13	71	157	86	3	333	1,582
6	2	1	8	62	34	246	95	3	450	2,032
7	3	1	8	65	32	251	95	3	457	2,489
8									0	2,489
9									0	2,489
10									0	2,489
11									0	2,489
12									0	2,489
13									0	2,489
14									0	2,489
15									0	2,489
16									0	2,489
17									0	2,489
18									0	2,489
19									0	2,489
20									0	2,489
21									0	2,489
22									0	2,489
23									0	2,489
24									0	2,489
25									0	2,489

26									0	2,488
27									0	2,489
28									0	2,489
29									0	2,489
30									0	2,489

3.2.3.2 Market Effects Leakage

The project had initially claimed a conservative market leakage deduction of 20% during the first monitoring period due to small-scale illegal logging occurring within the project zone, as well as an unknown potential of market leakage due to cattle ranching. However, at this monitoring period, the project has gathered sufficient evidence to support the fact that market leakage from this project would be de minimis or likely nonexistent both in terms of timber extraction and cattle ranching as commodities tied to deforestation or degradation.

First, with respect to timber extraction, the region of Izabal is not one of the major timber producing regions in Guatemala, and the FUNDAECO project activities do not have any impact on industrial scale logging. This is not a major driver of deforestation in the region and not a specific threat to the project as a whole. The only logging that does occur in the project region and at times the project area is small-scale illegal selective logging for high-value tropical hardwood species, specifically the Rosul tree. The project implementation team practices surveillance and patrols of the project area along with other local law enforcement authorities to catch any unauthorized forest disturbances or illegal logging within the region or project area. A log of such incidents where forest clearing or illegal logging was found during the monitoring period has been provided (see Datos de Illicitos Denunciados Periodo 2017-2018 v1.1), with only 6 incidents of illegal timber extraction found. The volume of timber extracted as part of these illegal operations was estimated and averaged 2.8 cubic meters, with an estimated total emissions potential of 29 tCO2e. As is evident from this assessment, the illegal timber extraction within the project region or project area is de-minimis in comparison to the estimated baseline emissions from deforestation due to subsistence agriculture and cattle ranching. There is no evidence to support that the prevention of illegal timber extraction from the project area would have any kind of market leakage impact that would have any substantial associated emissions.

Although cattle ranching and subsistence agriculture are the primary drivers of deforestation in the project area, there is also no evidence to support any potential market leakage impacts from the prevention of the expansion of cattle ranching within the project area. This conclusion has been derived based on the following information:

1. Encroachment from cattle ranching in the project area is primarily driven by subsistence farmers and small-scale cattle ranchers who are using livestock as a way to secure and claim land. The average size of properties with pasture areas in the project region surveyed in 2006 was 0.21 hectares. (IndicadoresSocioeconomicos_Linea base.pdf)
2. Cattle production has been declining on a national level in Guatemala since 2012 (see Datos de Destace de Ganado Bovino.xlsx). This means that any small reduction in potential cattle expansion due to project activities would not be restricting supply in a strong market.
3. The predicted annual increase in pasturelands in project area in the baseline scenario would comprise on average about 0.3% of the total pasture land for the Sarstun Motagua reference region, totaling a combined 10% of the pastureland in the region after 30 years. (see FUNDAECO Cattle Market Impact Analysis.xlsx)
4. The Izabal department as a whole provides about 9.8% of cattle derived products nationally, as compared to Petén’s 19.5% (El Agro en Cifras 2015 - MAGA Guatemala.pdf). If the impact of the expansion of cattle ranching in the project area is conservatively estimated based on its overall area of impact in Sarstun Motagua (Izabal department), then the total impact of the project area on the national cattle industry over 30 years could be calculated at roughly 1% (see FUNDAECO

Cattle Market Impact Analysis.xlsx). A conservative estimate of the annual impact of the project's forest protection activities on a national scale was calculated at 0.03%. Realistically, this impact would be even smaller due to the fact that the majority of agents would be small-scale ranchers with little access to national level markets.

5. As the agents of deforestation are primarily practicing small-scale livestock farming, the economic benefit of this practice has been shown to be marginal at best, likely with small net losses in profit of 350Q per month per hectare of area grazed (see Cattle Ranching in Guatemala_Markus_Zander_and_Jochen_Durr 2011.pdf).

It is important to note that an assessment of the average property size of landowners surveyed in the project region that grazed cattle was roughly 7 hectares. Many of the landowners in the project region are small-scale ranchers, not industrial cattle operations, and the motives behind raising cattle in these small-scale operations are primarily as a way to lay claim to areas of land. A large driver of this deforestation is related to population expansion and the desire for new families or communities to lay claim to their own areas of land. In a region where land tenure laws and governance is weak, illegal expansion of agriculture is common.

The economic viability and impact of cattle ranching was assessed based on detailed economic studies done in the Petén region of Guatemala (Zander and Durr, 2011) which deals with much more pressure from industrial and small-scale cattle ranching expansion, and it was found that small-scale cattle ranching ultimately turns a small net loss in profit on a monthly basis. An excerpt from Zander and Durr (2011) states:

“According to the 2003 Agricultural Census, stocking rates were only 0.6-1.6 head of cattle per hectare, small farms generally having fewer animals on a given area than large cattle ranches... For small scale farmers, even with higher density stocking rates of 1.4 cattle/ha found in our study, there is very little profit to be made from this kind of livestock farming. According to our calculations, it is even achieving minor losses. This was also shown in a study carried out by the University of San Carlos (USAC). With increasing farm and herd size, input and labor costs per hectare are diminishing, meaning that large farms can achieve a better profit margin than small holdings... Distribution of land within the livestock sector is very unequal as well. Of the 2,171 farms with livestock production in 2003, 71% had less than 50 cattle. These small and medium farms occupied 48% of the land, whereas 52% of the land was held by 29% of the landowners comprising large scale farms”

Additionally, the same paper found that:

“Land productivity of cattle breeding and fattening is very low. The sector only creates a regional Value Added of US\$156/ha, much less than corn (US\$ 244/ha) and beans (US\$ 265/ha). This means that converting 63,495 ha into pastures causes a loss of US\$5.44 million of Value Added for the regional economy. The livestock sector is dominated by a small number of big landowners who concentrate much more wealth than the grain sector. On average, farms with more than 50 head of cattle have an income ten times higher than the average small and medium size cattle farmers.”

Even with conservative estimates of market impacts from the project activities on the national cattle industry, the calculations support an argument for a de-minimis effect of project activities on cattle related commodities. With slowing market strength in Guatemala's cattle industry over time, it can be further inferred that the project's impacts would have no meaningful effect on market dynamics. As shown by Zander and Durr (2011), the economic viability of livestock is marginal at best unless done on a large scale, which is not the type of ranching that poses an active threat to the project area. Therefore, it is very unlikely that the prevention of cattle ranching expansion into the project area over the project lifetime would have any kind of market impact that would result in the expansion of cattle ranching elsewhere in Guatemala.

Additionally, it is important to understand that any hypothetical displacement of cattle ranching activities due to market dynamics would not necessarily translate to an increase in deforestation in other parts of Guatemala. The current stocking density of cattle in Guatemala is incredibly low (1.4 cattle/ha on average for Petén), meaning that if any demand for cattle increased on a national level, there is the potential for stocking levels to be increased on existing pastureland to meet such demand. It is important to note that

the real forces behind the expansion of pastureland for cattle grazing is not a purely economic force, but rather a result of population pressure and weak land tenure laws that allow land invasion and illegal land clearing to go unchecked. Thus, the project proponents have concluded that any market impacts of the project are de-minimis and the 20% default that was applied at first verification was overly conservative. Therefore, the total leakage calculated for this monitoring period can be found in Tables 31 and 32 below.

Project year t	Total <i>ex ante</i> net baseline carbon stock change in the leakage area		Total <i>ex post</i> net actual carbon stock change in the leakage area		Total <i>ex post</i> market effects leakage		Total <i>ex post</i> leakage	
	annual	cumulative	Annual	cumulative	annual	cumulative	annual	cumulative
	ΔCBSLLK_t	ΔCBSLLK	ΔCBSLLK_t	ΔCBSLLK			ΔCBSLLK_t	ΔCBSLLK
	tCO _{2e}	tCO _{2e}	tCO _{2e}	tCO _{2e}	tCO _{2e}	tCO _{2e}	tCO _{2e}	tCO _{2e}
1	566,106	566,106	111,405	111,405	57,077	57,077	57,077	57,077
2	723,885	1,289,990	151,883	263,287	112,888	169,966	112,888	169,966
3	596,917	1,886,907	155,768	419,055	126,739	296,705	126,739	296,705
4	558,158	2,445,065	159,653	578,708	148,171	444,876	148,171	444,876
5	576,979	3,022,044	163,998	742,707	167,105	611,981	167,105	611,981
6	1,240,201	4,262,245	219,243	961,950	0	611,981	0	611,981
7	1,181,524	5,443,769	227,615	1,189,565	0	611,981	0	611,981
8		5,443,769		1,189,565	0	611,981	0	611,981
9		5,443,769		1,189,565	0	611,981	0	611,981
10		5,443,769		1,189,565	0	611,981	0	611,981
11		5,443,769		1,189,565	0	611,981	0	611,981
12		5,443,769		1,189,565	0	611,981	0	611,981
13		5,443,769		1,189,565	0	611,981	0	611,981
14		5,443,769		1,189,565	0	611,981	0	611,981
15		5,443,769		1,189,565	0	611,981	0	611,981
16		5,443,769		1,189,565	0	611,981	0	611,981
17		5,443,769		1,189,565	0	611,981	0	611,981
18		5,443,769		1,189,565	0	611,981	0	611,981
19		5,443,769		1,189,565	0	611,981	0	611,981
20		5,443,769		1,189,565	0	611,981	0	611,981
21		5,443,769		1,189,565	0	611,981	0	611,981
22		5,443,769		1,189,565	0	611,981	0	611,981
23		5,443,769		1,189,565	0	611,981	0	611,981

24		5,443,114		1,188,853	0	611,981	0	611,981
25		5,443,769		1,189,565	0	611,981	0	611,981
26		5,443,769		1,189,565	0	611,981	0	611,981
27		5,443,769		1,189,565	0	611,981	0	611,981
28		5,443,769		1,189,565	0	611,981	0	611,981
29		5,443,769		1,189,565	0	611,981	0	611,981
30		5,443,769		1,189,565	0	611,981	0	611,981

Table 31: Total Net Baseline Carbon Stock Change in the Leakage Belt

Table 32: Ex-Post Estimated Total Leakage

Project year t	Total ex post estimated increase in GHG emissions due to market leakage		Total net carbon stock change due to leakage		Total net increase in emissions due to activity displacement leakage	
	annual	cumulative	annual	cumulative	annual	cumulative
			ΔCLK_t	ΔCLK	ELK_t	ELK
	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e
1	57,077	57,077	0	0	0	0
2	112,888	169,966	0	0	0	0
3	126,739	296,705	0	0	0	0
4	148,171	444,876	0	0	0	0
5	167,105	611,981	0	0	0	0
6	0	611,981	0	0	0	0
7	0	611,981	0	0	0	0
8	0	611,981	0	0	0	0
9	0	611,981	0	0	0	0
10	0	611,981	0	0	0	0
11	0	611,981	0	0	0	0
12	0	611,981	0	0	0	0
13	0	611,981	0	0	0	0
14	0	611,981	0	0	0	0
15	0	611,981	0	0	0	0
16	0	611,981	0	0	0	0
17	0	611,981	0	0	0	0
18	0	611,981	0	0	0	0
19	0	611,981	0	0	0	0
20	0	611,981	0	0	0	0
21	0	611,981	0	0	0	0
22	0	611,981	0	0	0	0
23	0	611,981	0	0	0	0
24	0	611,981	0	0	0	0
25	0	611,981	0	0	0	0
26	0	611,981	0	0	0	0
27	0	611,981	0	0	0	0
28	0	611,981	0	0	0	0
29	0	611,981	0	0	0	0
30	0	611,981	0	0	0	0

3.2.4 Net GHG Emission Reductions and Removals

Net GHG emission reductions were quantified using equation 19 of the methodology and calculated in the Accounting model (Fundaeo VM0015 Accounting Model.xlsm). The full calculation of net emissions reductions, taking into account the differences between the baseline scenario, the ex-post project emissions and the leakage emissions is shown in MR tables section of the accounting model, Table BJ. Vintages were established by year although no years required any proration since the monitoring period runs two full years, from 1 January 2017 to 31 December 2018. Net GHG emissions reductions are presented in Table 33 and VCUs are shown in Table 34 per equations 20 and 21 of the methodology. The risk rating has been updated to 10% for both risk areas A and B (Table 14), an improvement from 14% during the previous monitoring period. VCU credit generation during this monitoring period is estimated at 1,777,862 tCO₂e, bringing total VCUs across the project lifetime to 3,797,398 tCO₂e.

Table 33: Net GHG Emissions Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Total Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2012	424,077	138,691	57,077	228,309
2013	786,259	221,817	112,888	451,553
2014	863,669	229,972	126,739	506,958
2015	976,595	235,740	148,171	592,684
2016	1,077,695	242,173	167,105	668,418
2017	1,099,539	132,937	0	966,602
2018	1,137,860	129,059	0	1,008,800
Total	6,365,695	1,330,389	611,981	4,423,325

Table 34: Total Buffer Allocation and VCU generation across Project Lifetime

Years	Estimated net GHG emission reductions or removals (tCO ₂ e)	Buffer Allocation (tCO ₂ e)	Estimated VCU Credit Generation (tCO ₂ e)
2012	228,309	39,954	188,355
2013	451,553	79,022	372,531
2014	506,958	88,718	418,240
2015	592,684	103,720	488,965
2016	668,418	116,973	551,445
2017	966,602	96,660	869,942
2018	1,008,800	100,880	907,920
Total	4,423,325	625,927	3,797,398

3.3 Optional Criterion: Climate Change Adaptation Benefits

This project is not seeking Gold Level verification for climate change adaption benefits this monitoring period.

4. COMMUNITY

4.1 Net Positive Community Impacts

4.1.1 Community Impacts (CM3.2)

Community Group	Forest owners and possessor within the grouped project area
Impact	72.46 new ha of forest are under the forest incentives program
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Resource protection and improved access to resources

Community Group	All community groups and individuals within the project zone
Impact	14982 ha of watershed under increased protection
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Resource protection and improved governance

Community Group	Communities affected by land conflict within the project zone
Impact	8 meetings to support conflict resolution
Type of Benefit/Cost/Risk	Benefit/predicted and indirect
Change in Well-being	Improved governance

Community Group	All community groups and individuals within the project zone
Impact	360 local producer participating in agroforestry projects
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Improved access to resources and opportunities, and support to sustainable enterprises

Community Group	Individuals with reforestation or agroforestry projects
Impact	82 landowners participating in the reforestation of agroforestry incentives program
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Improved access to resources and opportunities and support to sustainable enterprises

Community Group	Individuals with forest, reforestation or agroforestry projects under the Incentive Program
Impact	224 families are receiving incentives from the national incentives program PROBOSQUE and PINPEP, thanks to the project

	support in the preparation of the technical and legal files. Incentives received on annual basis: Agroforestry Q8,500.00- Q9,157.00 and for forest Q13,760.0- Q18,313.00
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Improved access to resources and opportunities, and support to sustainable enterprises

Community Group	Individuals with reforestation or agroforestry projects
Impact	405 local farmers with access to a agroforestry technician
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Access to resources and opportunities, and support to sustainable enterprises

Community Group	Individuals with reforestation or agroforestry projects
Impact	190 farmers participated in agroforestry training activities
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Access to resources and opportunities, and support to sustainable enterprises

Community Group	Local producers and Entrepreneurs
Impact	79 people trained on how to manage a business (organizational skills) (6 training events)
Type of Benefit/Cost/Risk	Benefit/predicted and direct,
Change in Well-being	Access to opportunities, and support to sustainable enterprises

Community Group	Girls and youngsters
Impact	A total of 97 youngsters benefitted: 28 girls have participated in the scholarship program to finish elementary and/or high school, and 69 youngsters (34 girls and 35 boys) have participated in the special training program "Eco Club nautico", were they learn skill such as boat mechanics, sailing, carpentry, basic electric and electronics and others
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Education

Community Group	School students
Impact	987 students participated in environmental education talks

Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Education

Community Group	School and university students
Impact	1818 students visited FUNDAECO Ecotourism sites and learned about the Conservation Coast importance for Biodiversity and Communities
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Education

Community Group	All community groups
Impact	129 environmental education events with communities
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Access to opportunities

Community Group	Women artisans
Impact	56 women supported with trainings for new handcrafts designs
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Access to opportunities

Community Group	Women from All community groups
Impact	29 talks and 18 outreach events on sexual and reproductive rights and health
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Education and community empowerment and inclusiveness

Community Group	All community groups
Impact	10 volunteers girls trained and supported for peer to peer promotion of sexual and reproductive health, sustainable livelihoods and nature conservation
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Education and community empowerment and inclusiveness

Community Group	Midwives
Impact	6 midwives engaged in the clinics with increased training
Type of Benefit/Cost/Risk	Benefit/predicted and direct

Change in Well-being	community empowerment and inclusiveness, Creation and working of women health clinics
----------------------	---

Community Group	All community groups and individuals within the project zone
Impact	2 women new clinics and community first-aid cabinets clinics established
Type of Benefit/Cost/Risk	Actual/predicted and direct
Change in Well-being	Improved access to resources and community empowerment and inclusiveness

Community Group	All community groups and individuals within the project zone
Impact	2 women new clinics and community first-aid cabinets clinics established
Type of Benefit/Cost/Risk	Actual/predicted and direct
Change in Well-being	Improved access to resources and community empowerment and inclusiveness

Community Group	All community groups and individuals within the project zone
Impact	147 communities benefitted from health services
Type of Benefit/Cost/Risk	Actual/predicted and direct
Change in Well-being	Improved access to resources and community empowerment and inclusiveness

Community Group	All community groups and individuals within the project zone
Impact	12022 people provided with health services
Type of Benefit/Cost/Risk	Actual/predicted and direct
Change in Well-being	Improved access to resources and community empowerment and inclusiveness

Community Group	Women
Impact	639 women received access to family planning methods
Type of Benefit/Cost/Risk	Actual/predicted and direct
Change in Well-being	Improved access to resources and community empowerment and inclusiveness

Community Group	All community groups and individuals in the jurisdiction of these 5 health community commissions
Impact	5 health community commissions (community management bodies)
Type of Benefit/Cost/Risk	Benefit/predicted and indirect
Change in Well-being	community empowerment and inclusiveness

Community Group	Community groups from: Rio Sarton, Cerro San Gil and Sierra Caral
Impact	2 second level associations and 3 protected areas councils supported
Type of Benefit/Cost/Risk	Benefit/predicted and indirect
Change in Well-being	community empowerment and inclusiveness

Community Group	Fishermen
Impact	10 community fishermen attended to marine and coastal monitoring
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	community empowerment and inclusiveness

Community Group	Forest owners and possessors
Impact	3 landowners /communities FUNDAECO assisted with legal services
Type of Benefit/Cost/Risk	Benefit/predicted and indirect
Change in Well-being	Improved access to resources

Community Group	All community groups within the project zone
Impact	14 patrols across sacred sites and support to 2 cultural activities in these sites
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	community empowerment and inclusiveness, support to the protection of cultural values

Community Group	Historical communities without legal land rights
Impact	3 communities FUNDAECO assisted with social and legal

	support and logistics for land legalization
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	community empowerment and inclusiveness, improved access to resources, improved governance

Community Group	Individuals with reforestation or agroforestry projects
Impact	68,000 seedling/plants provided to local producers for agroforestry plots
Type of Benefit/Cost/Risk	Benefit/predicted and direct
Change in Well-being	Improved access to resources

4.1.2 Negative Community Impact Mitigation (CM2.2)

While the REDD+ Project has had an overall positive impact on communities and stakeholders within the project region, before project implementation some community members expressed concerns of livelihood threats during the Free, Prior, and Informed Consent process. The project team identified potential negative impacts listed below and took measures to mitigate these impacts so that the project has had a net positive impact on communities.

One major concern mentioned by stakeholders was their fear that the REDD+ project would impact their ownership rights to the land, which could lead to nonconformity in the project and contract cancellation. However, since carbon contracts do not result in a loss of land titles, project members worked to mitigate this fear during FPIC meetings through repeated reminders that ownership will continue to be honored. Additionally, during the past monitoring period the project has helped legalize private and community land in local and national land registries. During this monitoring period the project supported land legalization process for 3 communities, process are ongoing and FUNDAECO will continue supporting during the next years.

Another concern was that without adequate monitoring, leakage would occur, either through project members cutting down trees outside the project area or by non-participating community members logging within the project area. This leakage has been mitigated through the successful implementation of a more rigorous control and surveillance plan and through educational outreach that reinforced penalties for such actions.

Community members also identified the reduced access to timber and firewood extraction as a livelihood risk, especially to the most vulnerable community members. As a response, the project has strengthened the educational and awareness programs that focus on reducing cutting trees for firewood by promoting the use of Licenses for Family Consumption authorized in the National Forest and Protected Area Laws. Additionally, the project has promoted the planting of fast-growing trees and the adoption of alternative cooking methods to firewood. Since some access to forests for firewood continues to occur and alternative methods have reduced the need for this firewood, the positive impacts on these community members have outweighed any negative impacts.

4.1.3 Protection of High Conservation Values (CM2.4)

The project was design to address agents and drivers of deforestation mentioned in the drivers of deforestation study¹², and to contribute to trigger a socio-economic dynamics that result in the reduction of deforestation. In this sense the project activities are designed to work with a wide array of communities group are impacted positively in their wellbeing, this in a scalability design and prioritizing communities located in the areas with more deforestation and also considering different communities interests. People of more than 100 communities are visiting the 19 Women health clinics and health facilities within the project zone; 360 farmers from 52 communities are being supported with agroforestry and timber plantations; and 748 families, forest owners and farmers, from 40 communities are being supported to access to the forest incentives programs PROBOSQUE and PINPEP. The forest protection and reduced deforestation is contributing to water supply for 70 communities and 3 big towns.

Fifty two that the net well-being impacts of the project are positive for all identified community groups compared with their well-being conditions under the without-project land use scenario.

4.1.4 Protection of High Conservation Values (CM2.4)

According to Richards and Panfil, Social or Community HCVs are those that provide critical ecosystem services or are of cultural importance. In the project region both of them are founded. A network of sacred sites where Queqchi and Garifuna communities practice religious rituals have been identified; each site is composed by several points, specially caves or small mountains called “cerros”:

- Tameja River and caves
- Rio Quehueche River and Caves
- Cerro Sarstun and Sarstun River
- Rio Cocoli
- Siete altares
- Caves and cerros at the north of Sierra Santa Cruz (Rubel Ho, Rubel Cacao, Sesaquiepc and Sesaquisuib)

During this monitoring period 14 surveillance patrols were done along theses sacred sites.

Ten watersheds were identified as HCVs that provide critical ecosystem services; Las Escobas, Tamejá, San Marcos, Juan Vicente, Sumaché, Cienega, Chahal, Bobos, Negro and Chiquito. The project is dedicated to maintaining these community HCVs through several targeted project activities. HCV management areas have been identified (see Figure 12) in order to focus HCV conservation efforts within the project area. The primary measure taken to maintain HCVs is the reduction of deforestation within the sites identified as HCVs, through the voluntary integration of some of these forests to the project area and the implementation of protection activities. By reducing deforestation and degradation, the project has avoided threats within these areas, and their environmental services and cultural uses can be guarantee.

FUNDAECO has implemented forest protection measures through the deployment of 2761 forest patrols during this monitoring period, the enrollment of landowners along watersheds in PROBOSQUE and PINPEP programs, conservation education initiatives, and support to preserve awareness and respect for traditional, cultural, spiritual and religious identities of communities within the project area.

¹² CNCG SM Drivers of Deforestation_final_1.pdf

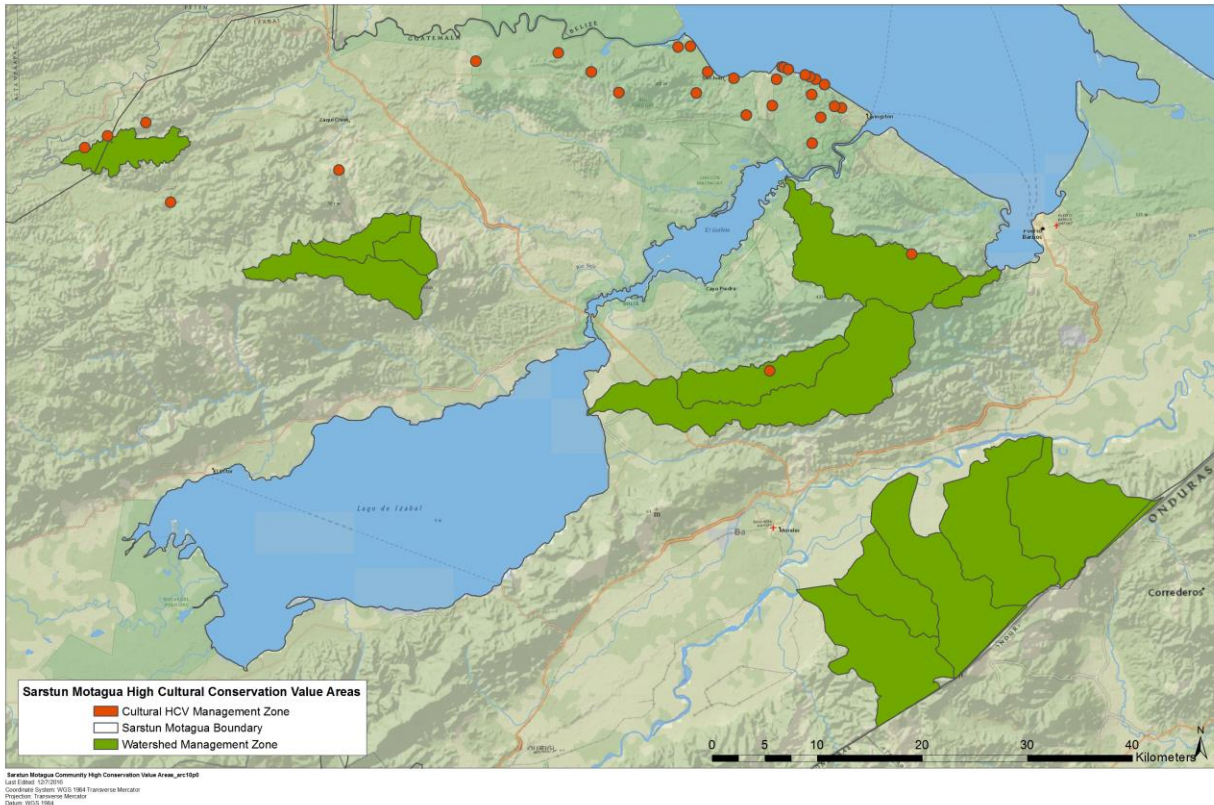


Figure 12: Map of community HCV management areas.

4.2 Other Stakeholder Impacts

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

Cattle ranchers were identified as a group of stakeholders at low risk of being negatively impacted by the project due to reduced land for pasture expansion. However, most of existing cattle ranchers are small producers and according to official statistics, cattle ranches are underused and still have the possibility to increase livestock.

4.2.2 Net Impacts on Other Stakeholders (CM3.3)

According to patrol reports and denunciations presented along this monitoring period, there were no cattle activity related to denunciations; so there is no evidence of any cattle rancher being harmed by the project.

4.3 Community Impact Monitoring

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

The monitoring plan and methods used are detailed in the Project Implementation Plan. Table 35 below presents the monitoring results for the period; it is based on the Theory of Change Developed for the Project and it covers all the benefited community groups.

Table 35: Community Monitoring Plan Group Activities

Project Activity Group	Number	Project Activity	Indicator	Frequency	Data Source/ Reference	Monitoring Result
Resource Protection, Governance, and Monitoring	3	Registered land into PINFOR or PINPEP	# hectares of lands FUNDAECO helped to register with PINFOR/PINPEP	Annually	PINFOR/PI NPEP database	1031.86
Resource Protection, Governance, and Monitoring	12	Protection and management of community water sources	# hectares of water source protected	Annually	conservation agreements, watershed protection database	14982.52
Resource Protection, Governance, and Monitoring	14	Conflict resolution roundtable	# meetings participated in on roundtable	Annually	meeting records/ reports/ minutes	8
Resource Protection, Governance, and Monitoring	14	Conflict resolution roundtable	Records of meetings	Annually	records	8
Sustainable Enterprises	27	Community nurseries	# nurseries hired (supported)	Annually	Administrative logbook	2
Sustainable Enterprises	30	Hire agroforestry promoters/technician from the project region	# agroforestry promoters hired from the project region	Annually	invoices/ agreements	21
Sustainable Enterprises	18	Creation of agroforestry plots	# farmers participating in agroforestry projects	Annually	agroforestry database	360
Sustainable Enterprises	22	Reforestation and Agroforestry PINFOR or PINPEP	# landowners participating in program	Annually		82
Sustainable Enterprises	30	Hire agroforestry	# agroforestry promoters hired	Annually	payrolls (planillas)	19

		promoters from project region	from project region			
Sustainable Enterprises	27	Community nurseries	# community entrepreneurs	Annually	invoices/agreements	2
Sustainable Enterprises	23	Construction of ecotourism sites	# of ecotourism sites established	Annually	ecotourism infrastructure investments inventory	1
Sustainable Enterprises		Support to women in sustainable enterprises productive projects	# of women supported	Annually	records	56
Sustainable Enterprises	22	Reforestation and Agroforestry PINFOR or PINPEP	\$ per hectare of benefits per period for landowners in program	Annually	PINFOR/PINPEP database	Agroforestry Q8,500.00-Q9,157.00 and for forest Q13,760.0-Q18,313.00
Community Empowerment & Inclusiveness	33	Legalized private and community land	# hectares newly registered in both local and national land registry	Annually	database for land legalization	256.56 ha are in process
Community Empowerment & Inclusiveness	39	Creation of health facilities: women clinics and community first-aid cabinets clinics	# of women clinics and community first-aid cabinets clinics established	Annually	database for sexual and reproductive health services	2
Community Empowerment & Inclusiveness	39	community management of health facilities	# of health community commissions (community management bodies)	Annually	community health commissions minutes	5
Community Empowerment & Inclusiveness		Community participation in protected area management	# of communities participating in second level associations and protected areas councils	Annually	CEL minutes	4 associations, 3 CEL
Community Empowerment & Inclusiveness	37	Engage fishermen in reef monitoring	# of community fishermen attended	Annually	monitoring reports	10
Community Empowerment	42	support to cultural	# of events supported	Annually	event minutes,	2

nt & Inclusiveness		religious activities			pictures, etc.	
Community Empowerment & Inclusiveness	39	Creation and working of women health clinics	# of midwives engaged in the clinics	Annually	engagement inform consents (consetimien tos informados)	16
Community Empowerment & Inclusiveness	42	Protection of sacred sites	# of patrols	Annually	patrol reports	14
Education	45	Train community members on marine biodiversity and monitoring	# of community members attended	Annually	training reports	11
Education	47	Provision of health services	# of workshops held	Annually	workshops reports	29
Education	47	Provision of health services	# outreach events held within communities	Annually	event reports	18
Education	47	Provision of health services	# peer-to-peer health educators	Annually	volunteering agreements	10
Education	48	Training and workshops on agroforestry production and care	# farmers attended	Annually	logbook, workshops reports/participants lists	190
Education	55	Provide access to FUNDAECO agronomist	# of landowners/communities attended	Annually	logbooks	405
Education	56	Teaching new designs for handicrafts	# of people attended	Annually	workshop reports/participants lists	56
Education	56	Teaching new designs for handicrafts	# of workshops held	Annually	workshop reports/participants lists	8
Education	59	Training on how to manage a business (organizational skills)	# of people participated	Annually	workshop reports/participants lists	79
Education	59	Training on	# of trainings held	Annually	workshop	6

		how to manage a business (organizational skills)			reports/participants lists	
Education	62	General community training	# of people participated	Annually	workshop reports/participants lists	1
Education	62	General community training	# of trainings held	Annually	workshop reports/participants lists	1
Education	45	Train community members on marine biodiversity and monitoring	# of community members attended	Annually	training reports	21
Education	47	Provision of health services	# of workshops held	Annually	training report/participants lists	29
Education	47	Provision of health services	# outreach events held within communities	Annually	training report/participants lists	18
Education	47	Provision of health services	# peer-to-peer health educators	Annually	volunteering agreements	10
Education	48	Training and workshops on agroforestry production and care	# of people attended	Annually	training reports/participants list	190
Education	48	Training and workshops on agroforestry production and care	# of workshops held	Annually	training reports/participants list	10
Education	50	Environmental education for schools	# schools participating with FUNDAECO	Annually	event reports/participants list	29 schools, 987 students
Education	50	Environmental education for schools	# students visiting ecotourism centers	Annually	event reports/participants list	1818
Education	51	Environmental education for interested communities	# workshops or events held	Annually	event reports/participants list	129
Education	56	Teaching new designs for handicrafts	# of people attended	Annually	training reports/participants list	56
Education	56	Teaching new designs	# of workshops held	Annually	training reports/parti	8

		for handicrafts			participants list	
Education	59	Training on how to manage a business (organizational skills)	# trainings held	Annually	training reports/participants list	6
Education	62	General community training	# trainings held	Annually	training reports/participants list	1
Improved Access to Resources	70	PINFOR or PINPEP payments	# families receiving PINFOR/PINPEP payments	Annually	PINFOR/PINPEP database	241
Improved Access to Resources	71	support to management plan implementation for PINFOR or PINPEP	# landowners FUNDAECO helped with management plans devised	Annually	PINPEP/PINFOR files with forestry regent	636
Improved Access to Resources	72	Legal services	# landowners/communities FUNDAECO assisted with legal services	Annually	denunciation records	3
Improved Access to Resources	73	Process and travel logistics for land legalization	# landowners, individuals, communities FUNDAECO assisted with transportation and logistics for land legalization	Annually	activity report	3 communities are being support for land legalization
Improved Access to Resources	76	Provision of health services	# of patients treated	Annually	sexual and reproductive health database	12022
Improved Access to Resources	76	Provision of health services	# of women using contraceptive methods	Annually	sexual and reproductive health database	639
Improved Access to Resources	76	Provision of health services	# of communities with access to services	Annually	sexual and reproductive health database	147
Improved Access to Resources	78	Agroforestry stock for new and existing plots	# seedlings/plants provided for new plots	Annually	Administrative logbook	68000
Improved Access to Resources	82	Nursery establishment	# nurseries hired (supported)	Annually	nurseries contracts	2

Improved Access to Resources	84	Protection and management of community water sources	# hectares of water source protected	Annually	conservation agreements, patrol reports	14,982.52
Improved Access to Resources	86	Provide access to FUNDEACO agronomist	# of communities/landowners receiving access to agronomist	Annually	logbooks, agroforestry contracts	405

4.3.2 Monitoring Plan Dissemination (CM4.3)

Along the monitoring period, FUNDAECO informed on the project progress during meetings organized with different communities and stakeholders, almost 40 meetings were organized to inform on project progress as well as to invite new forest owners to participate in the project. The monitoring results are disseminated through summary reports informing on the project activities and results along the period, the summaries contains a quick remain on project objectives, carbon contracts, project status, activities and achieved results. These are disseminated during meetings and are also available in the project offices and women health clinics across the project zone. During assemblies or group meetings and are also available with PD summary and the Monitoring reports summaries, in each project office and health facilities. Per the CCBA rules, this monitoring report is available in the project offices and women health clinics one month before the audit visit for the public comments period.

4.4 Optional Criterion: Exceptional Community Benefits

The project is not seeking Gold Level verification for exceptional community benefits this monitoring period.

4.4.1 Short-term and Long-term Community Benefits (GL2.2)

Not applicable

4.4.2 Marginalized and/or Vulnerable Community Groups (GL2.4)

Not applicable

4.4.3 Net Impacts on Women (GL2.5)

Not applicable

4.4.4 Benefit Sharing Mechanisms (GL2.6)

Not applicable

4.4.5 Governance and Implementation Structures (GL2.8)

Not applicable

4.4.6 Smallholders/Community Members Capacity Development (GL2.9)

Not applicable

5. BIODIVERSITY

5.1 Net Positive Biodiversity Impacts

5.1.1 Biodiversity Changes (B2.1)

Change in Biodiversity	Increased forest protection
Monitored Change	899.4 ha of new intact forest are adding to previous Project area (54157 hectares)
Justification of Change	New forest owners were incorporated into the project area.

Change in Biodiversity	Increased forest protection
Monitored Change	1031.86 hectares of lands FUNDAECO helped to register with PINFOR/PINPEP
Justification of Change	FUNDAECO supported forest owners and possessors in the preparation and presentation of technical and legal files required by the national forest incentives PROBOSQUE and PINPEP, without this support forest owners will not have the chance to participate in the incentives program as they do not have the technical knowledge or the financial resources to prepare the files by their own. In fact most of the forest owners are not even aware about this program.

Change in Biodiversity	Birds are monitored as Key taxa
Monitored Change	15 monitoring events to cover two season for bird monitoring
Justification of Change	The project considers that besides monitoring LULC it is necessary to monitor taxa that can demonstrate ecosystem integrity. Bird monitoring is part of the project implementation plan, and it allow us to analyze in medium term periods the health of the remaining forest, as well as the contribution of agroforestry areas to biodiversity.

Change in Biodiversity	Increased resource and ecosystem protection
Monitored Change	254 ha and 43 km of coastline surveyed

Justification of Change	To support livelihoods for different populations within the project zone is a main concern of the project. Fisheries are key livelihood for the coastal population within the project zone, if coastal and marine ecosystems decay, fisheries will be reduced and coastal population could become deforestation agents.
-------------------------	---

Change in Biodiversity	Increased forest protection
Monitored Change	949 of hectares purchased for the creation of nature reserves and have perpetuity protection
Justification of Change	FUNDAECO bylaws states that land acquired by the NGO for nature reserves are to be dedicated to nature protection under perpetuity; even if the NGO closes all properties have this legal protection.

Change in Biodiversity	Increased resource and ecosystem protection
Monitored Change	4 fishing restriction zones are supported by the project
Justification of Change	To support livelihoods for different populations within the project zone is a main concern of the project. Fisheries are key livelihood for the coastal population within the project zone, if coastal and marine ecosystems decay, fisheries will be reduced and coastal population could become deforestation agents. FUNDAECO has promoted and supported fishing restriction zones for a sustainable management of this resource. FUNDAECO supports local communities in their autoregulation and monitoring for this fishing restriction zones.

Change in Biodiversity	Increased forest protection
Monitored Change	2761 patrols to prevent deforestation and/or to follow denunciations
Justification of Change	Protection, control and surveillance are some of the main project activities to avoid deforestation. FUNDAECO hires park guards, but also support government agencies in the supervision of institutional park guards and with resources (food, fuel and vehicles) to the execution of interinstitutional patrols

Change in Biodiversity	Increased forest protection and governance
Monitored Change	3 protected areas executive councils CELs are functioning (12 meetings during the monitoring period)
Justification of Change	As presented in the theory of change lack of participation in resource management and protection affects governance. The

	project promotes the creation and functioning of protected area councils with the participation of key stakeholders (as stated in the protected areas law), the project coordinators organize, call and follow council “CEL” meeting
Change in Biodiversity	Improved land management in non-forested land
Monitored Change	113.74 ha were planted with agroforestry systems and timber over non forested land
Justification of Change	In order to reduce pressure over forest, but also to improved land management and biodiversity connectivity, the project is supporting and implementing agroforestry and timber plantation over non forested land (considered as non-forested land in the project baseline). Surface planted during this monitoring period belong to FUNDAECO as part of the financial sustainability strategy. Besides planting local forest trees the agroforestry systems are combining market value crops to generate revenue, see section 5.1.6 on used species.

5.1.2 Mitigation Actions (B2.3)

All project activities have been analyzed for any potential negative effects on biodiversity within the project area and project zone. FUNDAECO has taken steps to mitigate all potential harmful impacts on biodiversity benefits as a direct and indirect result of project activities. Agroforestry project activities adhere to standard USAID protocols on the safe and judicious use and disposal of pesticides and fertilizers in addition to banning the use of GMO’s and invasive species as part of project activities (see Plan General de BPA 2016.docx, EG-PERSUAP-Final_Oct2012.docx, Consultoria Estudio Viabilidad agroforesteria 10062014.docx). Due to existing agricultural markets and increased economic incentives for small-scale farmers, FUNDAECO does use several non-native species in its agroforestry programs, including rubber, cardamom, rambutan, and pepper. However, these species are non-invasive and were introduced into Guatemala as agricultural species over 50 years ago. The Guatemalan government considers these species to be “naturalized” and to pose no threats to biodiversity within the country. A detailed justification and analysis of non-native species use in FUNDAECO agroforestry programs can be found in Consultoria Estudio Viabilidad agroforesteria 10062014.docx. In order to further reduce any risks to biodiversity benefits through the use of non-native species in agroforestry programs, FUNDAECO engages landowners in land-management and planning activities to diversify agricultural commodities across an ownership and to avoid monoculture plantations. Farmers are encouraged to promote a more structurally diverse and natural agroforestry system that is able to support native flora and fauna as opposed to structurally and biologically homogenous plantations (see Consultoria Estudio Viabilidad agroforesteria 10062014.docx).

Any potential indirect negative impacts on biodiversity caused by project activities are also being minimized and mitigated through FUNDAECO programs. In order to avoid possible activity-shifting deforestation from the project area into the project zone as a result of project activities, FUNDAECO is engaging with landowners throughout the project zone to support land legalization efforts, enroll landowners into PROBOSQUE and PINPEP programs, and eventually incorporate additional landowners

with forest area into the grouped project over time. This serves and will continue to serve to minimize deforestation pressures that could result in further biodiversity loss.

FUNDAECO has also taken steps to ensure that biodiversity HCVs are not negatively impacted by project activities. By preventing deforestation within the project area, FUNDAECO is effectively protecting the majority of biodiversity HCVs identified in Section 2.4.2 of the PD. Finally, FUNDAECO is constantly training the park guards to improve their skills in nature and species conservation, PA management, as well as in the application of special protocols to prevent the spread of any harmful amphibian diseases throughout the project sensitive sites across the project area.

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

In evaluating the net benefits to biodiversity as a result of project activities, the theory of change framework consisting of the problem flow analysis and impact assessment was considered in addition to the historical LULC analysis and the results of LULC modeling. All these factors combined to provide us with quantitative and qualitative assessments of biodiversity benefits across the project's lifetime. In evaluating the net benefits to biodiversity as a result of project activities, the theory of change framework consisting of the problem flow analysis and impact assessment was considered in addition to the historical LULC analysis and the results of LULC modeling. All these factors combined to provide us with quantitative and qualitative assessments of biodiversity benefits across the project's lifetime.

Through a historical analysis of land cover change within the reference region, over the past decade, roughly 55,800 hectares of forest have been lost annually, and the modeled baseline scenario predicts that 4,250 hectares of forest will be lost annually over the next 30 years in the project area without project intervention. Conversely, project activities are expected to substantially reduce deforestation within the project area over this same time frame. As discussed earlier, the reduction in deforestation and forest degradation is the most effective method to reduce threats to biodiversity and improve ecosystem function across the project area. The project has and will continue to increase forest connectivity, protect existing forest ecosystems, and promote the sustainable use of forest and marine species within local communities. Figure 13 shows a comparison of the ex-post deforestation rates estimated for the baseline and project scenarios, and Figure 14 shows a comparison of ex-post deforestation over time between the project and baseline scenarios. These figures show a dramatic reduction in deforestation in the project scenario, which results in net positive benefits to biodiversity through sustained wildlife populations and greater ecosystem integrity.

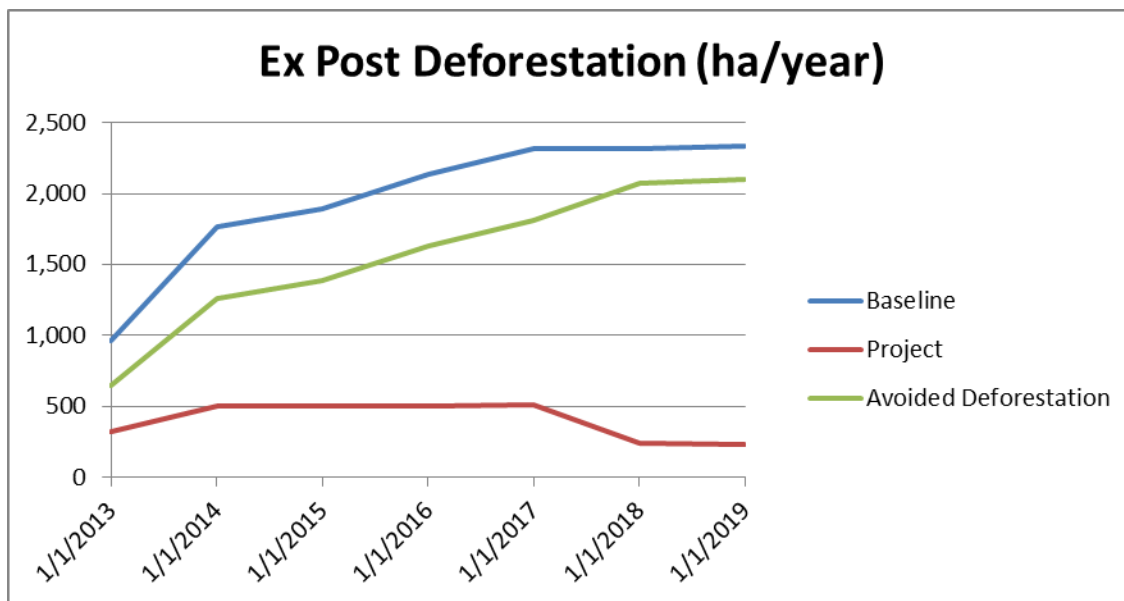


Figure 13: Comparison of baseline and project scenario deforestation (hectares/year) over the first monitoring period.

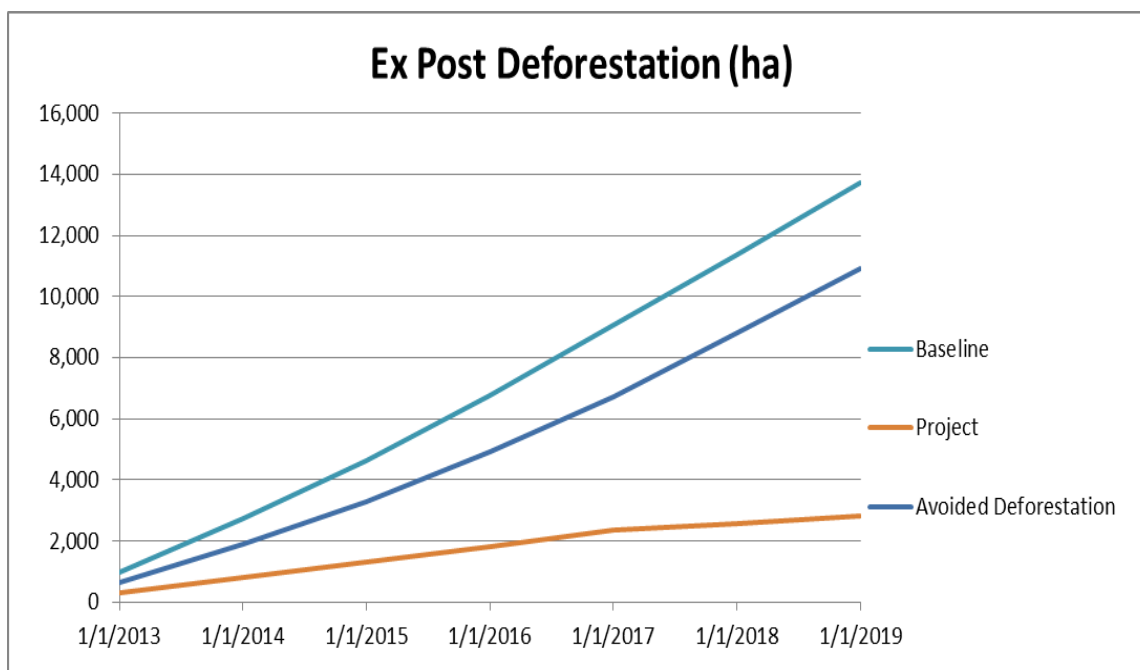


Figure 14: Comparison of baseline and project scenario deforestation (hectares) over the first monitoring period.

➤ **Resource Protection**

In the without project scenario, the exploitation of forests, water sources, and fisheries would continue un-checked, which would create severe negative impacts on biodiversity within the project zone. In order to address these threats, the project is implementing activities such as the

patrolling and enforcement of protected area laws, the management of water sources, and implementation of fish restoration zones. The project has deployed 2761 forest patrols annually and has implemented 4 fishing restricted zones; protection and enforcement of laws in these marine zones prevent fisheries depletion which can become a deforestation driver.

As shown in the Theory of Change matrix (TOC Activity Matrix.xlsm), these project activities are designed to protect these valuable resources through legal enforcement, and by increasing community awareness and respect for resource integrity and land titles. In particular, the patrolling of protected area core zones serves to enhance biodiversity throughout the project area in addition to maintaining critical project biodiversity HCVs.

Activities regarding governance have been designed to fill an existing void in the local and national governments capacity to enact meaningful land use management and land tenure systems throughout the region. In the without-project scenario, this lack of governance capacity would create further stress on biodiversity through the expansion of illegal settlements, an increase in land disputes, and a lack of political willpower to promote conservation measures. FUNDAECO has designed activities that enable historically established and vulnerable populations to receive land tenure rights while discouraging the establishment of new illegal settlements within forested areas. During the past Monitoring period the project supported the legalization of approximately 7,535 hectares of private community land. During this monitoring period the project has supported three communities in their legalization and will continue to support them in the next period. This allows well-established communities and individuals who previously had no legal rights to their land to invest in their land and forests without the fear of being displaced. In the previous FUNDAECO has purchased roughly 2575.64 hectares with the direct intent of forest protection, during this period FUNDAECO acquired 450 more hectares.

Additionally, FUNDAECO is an active participant in environmental litigation on a national level and serves on the boards of numerous protected areas in order to advocate for further environmental protection at the local and national level. FUNDAECO has attended and/or participated in 14 environmental litigation advocacy events in the past two years. All of these actions serve to strengthen local capacity and reduce deforestation and degradation pressures within the project area, which result in positive benefits for biodiversity within the project area and project zone.

➤ **Empowerment and Inclusiveness**

The engagement of local communities in project activities is an important factor in creating biodiversity benefits. By encouraging local participation in biodiversity monitoring activities, community members can gain a greater appreciation and awareness of the importance of biodiversity within the project zone. Additionally, participants in monitoring activities may be able to come away from this work feeling invested in the survival and health of different ecosystems and species.

The project's biodiversity goals centered on community empowerment and inclusiveness focused on the engagement of fishermen to monitor and protect vulnerable marine shoreline. The project engaged 21 fishermen to participate in communal reef monitoring. Through increased participation and investment in project activities, community members support and understand the project's biodiversity initiatives and goals in addition to gaining a broader understanding of the importance of biodiversity in a local, regional, and global context.

➤ **Education**

Project activities that are of an educational nature are essential to maintaining and protecting biodiversity within the project zone. FUNDAECO is implementing activities that are aimed at biodiversity and environmental education on local, national, and global scales. FUNDAECO has developed ecotourism sites in several locations along the coast and plans to further enhance the facilities at these sites in order to draw in local and foreign visitors who are interested in learning about the unique ecosystems and species in this region of Guatemala. The ecotourism sites established by the project drew 12068 visitors for the period, reaching other stakeholders than community members.

Educational initiatives are also being implemented in coordination with public schools so that schoolchildren will be taught the importance of conservation, endangered species, and environmental stewardship. The project has enrolled 29 schools and to participate in environmental education programs (Table 35). By teaching these fundamental concepts to young children, the project cultivates a better understanding of and relationship with the natural world in the next generation. Project activities also support the university research and study of biodiversity within the project area; 4 marine biodiversity research trips have been conducted involving 49 university students (Table 35). By deepening the knowledge of species and ecosystem dynamics within the Caribbean coast of Guatemala, FUNDAECO contributes to the global scientific community and brings awareness to the importance of this region's biodiversity on a global level.

Additionally, FUNDAECO has taken steps to protect and enhance the populations of endangered amphibian populations within the project area through educational initiatives. Forest patrols are trained in techniques to prevent the possible introduction or spread of a fungus that can wreak havoc on amphibian species. Training sessions were held with park guards to prevent quitrid fungus. By taking conservative measures to protect endangered species, FUNDAECO is ensuring that no project activities have unintended negative impacts on HCVs. Park guards have also participate in mangrove monitoring as part of activities to protect HCVs - Guatemalan mangroves are listed as an endangered species in the Lista de Especies Amenazadas from CONAP, and are included in the two RAMSAR sites located in the project region-. Monitoring results for this project activity group are presented in table 35 below.

➤ **Access to Resources**

Through the analysis of agents and drivers of deforestation (see CNCG SM drivers of deforestation_final_1.pdf and Brief on Agents and Drivers v2.docx) FUNDAECO has been able to identify that a large contributing factor to land use change and forest loss is due to a lack of economic opportunities and resources for people within the project zone. As discussed previously, most communities within the project zone live in extreme poverty with limited access to water, electricity, education, and healthcare. Many of these families survive through subsistence agriculture and will turn to illegal logging or agriculture expansion in order to take advantage of any economic opportunities available. Many subsistence farmers do not have the technical knowledge or financial means to improve the systems of agricultural production on their existing property, and may resort to clearing more land to increase their agricultural outputs.

During the reporting period, FUNDAECO worked to provide these farmers with the resources needed to create improved and diversified agroforestry systems with their existing cropland. Farmers that participated in these programs received free or subsidized nursery stock to establish their agroforestry plots, in addition to land use planning guidance from FUNDAECO staff.

Land use planning has been aimed at creating diversified income for farmers (i.e. growing rubber and pepper), while also providing basic needs such as food, timber and fuelwood, 305 farmers are being supported and 117 hectares of agroforestry and timber plots are added to previous 2450 hectares. These agroforestry plots have also been designed to create a structurally and biologically diverse farming system, so as to provide a more habitable environment for native flora and fauna.

5.1.4 High Conservation Values Protected (B2.4)

Biodiversity High Conservation Values for the Project are:

HCV 1: Concentrations of biological diversity:

- Protected areas
- Threatened species: numerous IUCN Red List threatened species
- Endemic species: high endemism in the region
- Migratory corridors

HCV 2: Landscape level ecosystems and mosaics

- Intact and partially intact forest area sufficient to support naturally occurring species in natural patterns of distribution and abundance

HCV 3: Rare, threatened or endangered ecosystems

- Lowland forests
- Mangroves

The Project is dedicated to maintaining these biodiversity HCVs through numerous targeted project activities. Several HCV management areas have been identified (see Figure 15) in order to focus HCV conservation efforts within the project area. As biodiversity is highly correlated with forest cover (Richards and Panfil, 2011), and many of the identified biodiversity HCVs consist of forested areas within the project area and project zone, including protected areas, migratory corridors, landscape level ecosystems, and threatened ecosystems; the primary measure taken to maintain biodiversity HCVs is through the reduction of deforestation within the project areas. By reducing deforestation and degradation threats within these areas, both the ecosystems and the threatened species within those ecosystems have been protected and maintained. FUNDAECO has implemented forest protection measures through the deployment of forest patrols, the enrollment of forest owners into the project as well as into the PINFOR and PINPEP programs, conservation education initiatives, and agroforestry systems.

Finally, FUNDAECO is constantly training the park guards to improve their skills in nature and species conservation; PA management; and to prevent the spread of deadly amphibian fungal diseases throughout the sensitive sites across the project area, park guards have been instructed in appropriate decontamination methods for shoes.

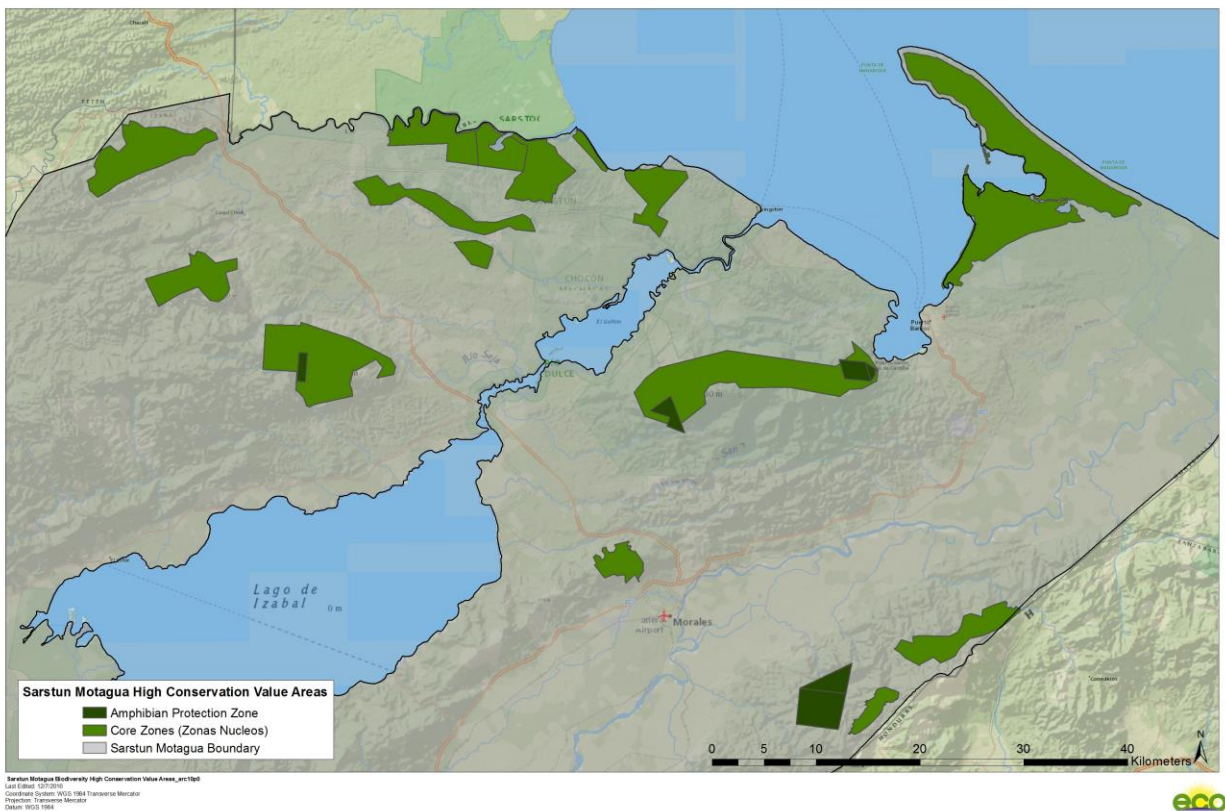


Figure 15: Map of biodiversity HCV management areas.

5.1.5 Invasive Species (B2.5)

FUNDAECO has taken steps to mitigate all potential harmful impacts on biodiversity benefits as a direct and indirect result of project activities. Agroforestry project activities adhere to standard USAID protocols on the safe and judicious use and disposal of pesticides and fertilizers in addition to banning the use of GMO's and invasive species as part of project activities (see Plan General de BPA 2016.docx, EG-PERSUAP-Final_Oct2012.docx, Consultoria Estudio Viabilidad agroforesteria 10062014.docx).

5.1.6 Impacts of Non-native Species (B2.6)

Due to existing agricultural markets and increased economic incentives for small-scale farmers, FUNDAECO does use non-native species in its agroforestry programs: rubber, cardamom and rambutan. However, these species are non-invasive and were introduced into Guatemala as agricultural species over 50 years ago. The Guatemalan government considers these species to be “naturalized” and to pose no threats to biodiversity within the country. A detailed justification and analysis of non-native species use in FUNDAECO agroforestry programs can be found in Consultoria Estudio Viabilidad agroforesteria 10062014.docx. In order to further reduce any risks to biodiversity benefits through the use of non-native species in agroforestry programs, FUNDAECO engages landowners in best agricultural practices (BAPs), land-management and planning activities to diversify agricultural commodities across an ownership and to avoid monoculture plantations (See BAP Manuals). Farmers are encouraged to promote a more structurally diverse and natural agroforestry system that is able to support native flora and fauna as opposed to structurally and biologically homogenous plantations (see Consultoria Estudio Viabilidad agroforesteria 10062014.docx).

Species	<i>Elettaria cardamomun</i> Cardamom
Justification of Use	Original from the tropical forest at India, Sri Lanka, Malaysia and Sumatra. Cardamom has been cultivated in Guatemala since the beginning of the 20th century. Today Guatemala is the first worldwide cardamom producer and exporter. The crops not invasive and is well adapted to project region natural conditions. Cardamom can reach very good prices depending on the world supply, but also on quality and processing. Since the very beginning the project visualized a value chain for this product; by supporting technical assistance to local producers, the construction of drying installations (horno de secado), and access to an essential oils company that pays an stable premium price.
Adverse Effect	There is no evidence that cardamom have adverse effects over the project region environment. Instead the cardamom can grow under shadow and is a good source for nectar to several insect, and bird species. Indirect adverse effects could be: i. deforestation for crop expansion due to the good prices that cardamom can reach, however local producers are aware that price is fluctuant according to world supply. The project promotes this crop only on non-forested areas and in combination with trees; ii. the use of harmful agrochemical to avoid pests. The project promotes and implements this crop with BAP and the use of PERSUAP list (see EG-PERSUAP-Final_Oct2012.docx).

Species	<i>Nephelium lappaceum</i> Rambutan
Justification of Use	Original from southeast Asia, according to MAGA-PROFRUTA, this crop is in the project zone since 1986. The crop is well adapted to the project zone conditions and is highly productive because the local soils. It can be sold in the local or in the international market and because it's a short cycle fruit crop -it starts production at two to four years with annual harvest of at least 4 month-, it is a good source of cash for local producers. Due to the promotion made by the national program PROFUTA the crop is well known in the project zone. The crop can be combined in Agroforestry systems.
Adverse Effect	There is no evidence that cardamom have adverse effects over the project region environment. Indirect adverse effects could be: the use of harmful agrochemical to avoid pests and diseases, however the project promotes and implement this crop with BAP and the use of PERSUAP list (see EG-PERSUAP-Final_Oct2012.docx).

Species	<i>Hevea brasiliensis</i> Rubber
Justification of Use	This crop is reported for Guatemala since 1940. It starts the resin initial production (“ensayo”) at 4 years and can last up to 25, at which point the trees can be used as wood. The resin extraction is easy and besides the care of the first years the crop is highly resistant to pest and diseases.
Adverse Effect	There is no evidence that cardamom have adverse effects over the project region environment. Instead there is a report that demonstrates that Hevea plantations are good regarding key bird species and others. Indirect adverse effects could be: i. deforestation for crop expansion due to the good prices. The project promotes this crop only on non-forested areas and in combination with trees.

5.1.7 GMO Exclusion (B2.7)

It is interdicted that project activities use invasive species and GMOs within the project area.

3.2.4 Inputs Justification (B2.8)

Name	Urea
Justification of Use	Fertilizer
Adverse Effect	After its assimilation by plants only leaves TRASAS carbon dioxide in the soil, meaning through the interaction of nitrifying bacteria. This carbon dioxide is not harmful to the soil.

Name	Triple 15
Justification of Use	Fertilizer
Adverse Effect	After its assimilation by plants leaves only not harmful residual effects on soil.

Name	Fertilizante foliar Complelal Super
Justification of Use	Fertilizer
Adverse Effect	No major impacts to soil and wildlife in general.

Name	Abono Orgánico Gallinasa
Justification of Use	Fertilizer

Adverse Effect	The use of manure is a clean way of getting rid of bird droppings within the same production sites, which is one of the major health problems facing today's poultry industry.
----------------	--

Name	Cal para enmiendas de suelo
Justification of Use	Improves the cation exchange capacity of soils and their texture and structure.
Adverse Effect	No major impacts to soil and wildlife in general.

Name	Raizal
Justification of Use	Fertilizer
Adverse Effect	No major impacts to soil and wildlife in general.

Name	Roundup
Justification of Use	Herbicide
Adverse Effect	Are minimal if protocols and regulations for pesticide management, especially waste management, surplus and washing containers and utensils product application apply.

Name	Amistar
Justification of Use	Fungicide
Adverse Effect	Are minimal if protocols and regulations for pesticide management, especially waste management, surplus and washing containers and utensils product application apply.

Name	Karben
Justification of Use	Fungicide
Adverse Effect	Are minimal if protocols and regulations for pesticide management, especially waste management, surplus and washing containers and utensils product application apply.

Name	Prevalor
Justification of Use	Fungicide
Adverse Effect	Are minimal if protocols and regulations for pesticide management, especially waste management, surplus and washing containers and utensils product application apply.

Name	Fusilade
Justification of Use	Herbicide
Adverse Effect	Are minimal if protocols and regulations for pesticide management, especially waste management, surplus and washing containers and utensils product application apply.

5.2 Offsite Biodiversity Impacts

5.2.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Actions (B3.2)

All project activities have been analyzed for any potential negative effects on biodiversity within the project area and project zone. Negative biodiversity impacts for the project but can come about from the misuse of pesticides and fertilizers as well as ineffective waste management techniques. FUNDAECO has taken steps to mitigate all potential harmful impacts on biodiversity benefits as a direct and indirect result of project activities. Agroforestry project activities adhere to standard USAID protocols on the safe and judicious use and disposal of pesticides and fertilizers in addition to banning the use of GMO's and invasive species as part of project activities (see Plan General de BPA 2016.docx, EG-PERSUAP-Final_Oct2012.docx, Consultoria Estudio Viabilidad agroforesteria 10062014.docx).

Table 36: Negative offsite Impacts

Negative Offsite Impact	Mitigation Measure(s)
Biodiversity toxicity	Implementation Best Agricultural Practices, including adequate doses according to fabric instructions and good waste management and disposal. All used products have key toxicity levels between practically not (PNT) to moderate (MT). (See EG-PERSUAP)
Water contamination	Implementation Best Agricultural Practices, including adequate doses according to fabric instructions and good waste management and disposal

5.3 Biodiversity Impact Monitoring

5.3.1 Biodiversity Monitoring Plan (B4.1, B4.2, GL1.4, GL3.4)

Table 37: Biodiversity Monitoring Activities

Project Activity Group	Number	Project Activity	Indicator	Frequency	Data Source/Reference	Monitoring Result
Resource Protection, Governance, and Monitoring	1	Legalized private and community land	# hectares newly registered in both local and national land registry	Annually	land legalization database	256.56 ha are in process
Resource Protection, Governance, and Monitoring	3	Registered land into PINFOR or PINPEP	# hectares of lands FUNDAECO helped to register with PINFOR/PINPEP	Annually	PINFOR/PINPEP database	1031.86
Resource Protection, Governance, and Monitoring	7	Engage fishermen to reef monitoring	# of workshops held	Annually	monitoring reports	22
Resource Protection, Governance, and Monitoring	7	Engage fishermen to reef monitoring	amount of coastline surveyed	Annually	monitoring reports	124.62
Resource Protection, Governance, and Monitoring	8	Implementation of fishing restriction zones	# of fishing restriction zones	Annually	community agreements/technical reports	4
Resource Protection, Governance, and Monitoring	9	Purchase land for protection	# of hectares purchased	Annually	land acquisition files	450
Resource Protection, Governance, and Monitoring	10	Manage protected areas	# of hectares managed, # of patrols	Annually	patrol reports, logbooks	2761 patrols
Resource Protection, Governance, and Monitoring	11	Creation of protected areas	Records of FUNDAECO's input/assistance in creation of protected areas	Annually	meetings records	69 meetings

Resource Protection, Governance, and Monitoring	12	Protection and management of community water sources	# hectares of water source protected	Annually	conservation agreements, patrol reports, logbooks	14982 hectares
Resource Protection, Governance, and Monitoring	13	Forest patrols	forest patrol logs including reports of any incidents requiring higher forms of enforcement (police, military, etc.)	Annually	patrol reports, logbooks	2761 patrols
Resource Protection, Governance, and Monitoring	17	Environmental litigation and advocacy	# advocacy events attended/participated in	Annually	Reports	14
Resource Protection, Governance, and Monitoring	17	Environmental litigation and advocacy	records of any litigation with FUNDAECO involvement	Annually	Reports	61
Resource Protection, Governance, and Monitoring	38	Participate on CEL for protected areas	Records of CEL meetings	Annually	minutes	12
Community Empowerment & Inclusiveness	37	Engage fishermen in reef monitoring	# of community fishermen attended	Annually	monitoring reports	10
Education	43	Biodiversity Monitoring	# of monitoring events	Annually	logbooks, reports	15
Education	45	Engage community members on marine biodiversity and monitoring	# of community members attended	Annually	reports, participants lists	21
Education	45	Marine biodiversity monitoring	# of monitoring events	Annually	reports, participants lists	28
Education	46	Support	# of	Annually	reports,	4

		university research on marine sciences	research expeditions conducted		participants lists	
Education	46	Support university research on marine sciences	# of students participating in research with FUNDAECO	Annually	reports, participants lists	49
Education	46	Support university research on marine sciences	types of research activities conducted	Annually	support letters, research reports	6
Education	50	Environmental education for schools	# schools participating with FUNDAECO	Annually	reports, participants lists	29 schools, 987 participants
Education	50	Environmental education for schools	# students visiting ecotourism centers	Annually	reports, participants lists	1818
Education	51	Environmental education for interested communities	# communities participating in environmental education opportunities	Annually	reports, participants lists	44
Education	51	Environmental education for interested communities	# workshops or educational events held	Annually	reports, participants lists	129
Education	57	Ecotourism site establishment	# visitors	Annually	visitors records	12,068
Education	66	Train park guards to improve their skills in PA management and nature conservation	# of guards trained	Annually	reports, participants lists	31
Education	66	Train park guards to improve their skills in PA management and nature	# of trainings held	Annually	reports, participants lists	5

		conservation				
Improved Access to Resources	84	Protection and management of community water sources	# hectares of water source protected	Annually	conservation agreements, patrol reports	14982 hectares

5.3.2 Biodiversity Monitoring Plan Dissemination (B4.3)

Along the monitoring period, FUNDAECO informed on the project progress during meetings organized with different communities and stakeholders, almost 40 meeting were organized to inform on project progress as well as to invite new forest owners to participate in the project. The monitoring results are disseminated through summary reports informing on the project activities and results along the period, the summaries contains a quick remain on project objectives, carbon contracts, project status, activities and achieved results. These are disseminated during meetings and are also available in the project offices and women health clinics across the project zone. During assemblies or group meetings and are also available with PD summary and the Monitoring reports summaries, in each project office and health facilities. Per the CCBA rules, this monitoring report is available in the project offices and women health clinics one month before the audit visit for the public comments period.

5.4 Optional Criterion: Exceptional Biodiversity Benefits

The project area and project zone has a number of endangered and critically endangered trigger species within it that qualify this project for exceptional biodiversity benefits under the CCB Standard version 3. The project area qualifies as providing exceptional biodiversity benefits by meeting the vulnerability criteria (a), which requires the regular occurrence of at least a single individual critically endangered or endangered species. The Sierra Caral protected area is a known habitat for 6 critically endangered species *Cryptotriton wakei*, *Nototriton brodiei*, *Agalychnis moreletii*, *Bromelohyla bromeliacia*, *Duellmanohyla soralia*, *Ptychohyla hypomykter*. The IUCN Red List notes that this species is at great risk due to habitat loss and the fungus chytridiomycosis. (See Protocol to avoid Chytrid fungus)

Since its beginning FUNDAECO is focus on protecting lands for these species, by acquiring land to create conservation reserves, or by promoting the creation of protected areas. As a result the Amphibian Conservation Reserva La Firmeza was created in 2012, encompassing 2480 hectares of private land specifically for amphibian conservation, and the whole Sierra Caral was declared as National Protected area through the Guatemalan Congress in 2014. FUNDAECO is seeking to create other reserves and a protected area in amphibian AZE site Sierra Santa Cruz; two lands encompassing 957 hectares were recently acquired for this purpose and 69 meetings were held to discuss the protected area design.

The project was unable to establish a baseline for the number of individuals for the trigger species. Amphibian populations are difficult to estimate, so the use of other indicators, such as presence/absence of related species and habitat are more suitable assessments of their conservation status. During species monitoring activities, it was possible to find individuals for key amphibian species including: *Duellmanohyla soralia*, *Ptychohyla hypomykter*, and *Agalychnis moreletii*. (See Amphibian monitoring reports and logbooks)

The fact that the trigger species such as, *Cryptotriton nasalis*, *Cryptotriton wakei*, *Nototriton brodiei*, *Duellmanohyla soralia* (all critically endangered and endemic to Sierra El Merendon) as well as

Craugastor Nefrens (endemic to Sierra Caral) and *Ptychohyla sanctaerucis* (endemic to Santa Cruz) have been located in the project area at the start of the project shows that the existing forest area is providing critical habitat for this species. It is expected that if the project were not in place today, that this endangered amphibian species would experience habitat loss and fragmentation, in addition to increased risks of disease, which would likely decimate its existing population. As is discussed in Section 4.3.2 of the monitoring report, biodiversity is highly correlated with forest cover (Richards and Panfil, 2011). Habitat loss has been identified as the primary threat to *Duellmanohyla soralia*, and is a known threat to other endangered species in the area. These forests are threatened by being converted primarily to subsistence agriculture or pasture. The project is taking measures to reduce deforestation and degradation threats within these areas, to ensure that both the ecosystems and the threatened species within those ecosystems will be protected and maintained.

To promote conservation of amphibians and their habitat, FUNDAECO has deployed a series of promotion and education activities using education materials for adults and children that are distributed during environmental talks and fairs. (See Amphibian Conservation Promotion and Education Materials)

The Theory of Change framework, shows how project activities are designed to achieve positive benefits for threatened and endangered species within the project zone. Several project activities have been implemented to protect endangered amphibians within the project zone, ensuring that the project is maintaining or enhancing the population of the trigger species. Specifically, the government recognition of Sierra Caral as a National Protected Area during this monitoring period, and the enforced protection of this forest area, has worked as the first measure taken to effectively maintain and enhance the population species.

Additionally, all park guards in Sierra Caral Amphibian Reserve are trained to employ measures to prevent the spread of deadly amphibian fungal diseases. Forest patrols use techniques, such as through the bleaching of boots when entering and leaving forests, to prevent the possible introduction or spread of a fungus that can wreak havoc on amphibian species. For this monitoring period, five training sessions with 31 park guards were held to enhance knowledge on species conservation, amphibian loss and fungus prevention and protected areas management. (See Protocol to avoid Chytrid fungus)

5.4.1 Trigger Species Population Trends (GL3.3)

Trigger Species	Bird Species with population declinations; highest concern by NFWS and ABC: Woodthrush (<i>Hylocichla mustelina</i>), Kentucky Warbler (<i>Geothlypis formosa</i>) and Worm-eating Warbler (<i>Helmitheros vermivorum</i>)
With-project Scenario	Forest protection specially in Sierra Caral and Cerro San Gil forests, and Bird Monitoring, See Bird Monitoring Report 2017-2018

Trigger Species	Bird species listed as vulnerable by UICN: : Vulnerable”, the Keel-billed Motmot (<i>Electron carinatum</i>)
With-project Scenario	Forest protection especially in Sierra Caral and Cerro San Gil forests, and Bird Monitoring. See Bird Monitoring Report 2017-2018

Trigger Species	Critically endangered amphibians according to UICN list: Cryptotriton wakei, Nototriton brodiei, Agalychnis moreletii, Bromeliohyla bromeliacia, Duellmanohyla soralia, Ptychohyla hypomykter, Ptychohyla sanctaecrucis, Craugastor trachydermus
With-project Scenario	Forest protection especially in Sierra Caral and protocol to prevent chitidromicosis, and land acquisition in Sierra Santa Cruz (957ha). See Sierra Santa Cruz Amphibians, Amphibians Monitoring report 2017-2018

Trigger Species	Endangered amphibians according to UICN list: Bolitoglossa odonnelli, Bolitoglossa dunni,, Craugastor charadra, Craugastor sabrinus, Ecnomiohyla minera, Craugastor sandersoni
With-project Scenario	Forest protection, amphibian monitoring and protocol to prevent chitidromicosis, and land acquisition in Sierra Santa Cruz (957ha). See Sierra Santa Cruz Amphibians, Amphibians Monitoring report 2017-2018

Trigger Species	Nearly threatened according to UICN list and is critically endangered according to the Endangered Species List from CONAP: Herpailurus yaguarondi, Leopardus pardalis, Leopardus wiedii, Panthera onca, Puma concolor
With-project Scenario	Forest protection across the project zone and monitoring to detect presence and to detect illegal poaching. See Jaguar Coeectivity Report and Binational Jaguar Connectivity preliminary results.

6. ADDITIONAL PROJECT IMPLEMENTATION INFORMATION

Not Applicable.

7. ADDITONAL PROJECT IMPACT INFORMATION

Not Applicable