SUSTAINABLE AGROFORESTRY CACAO META
MONITORING REPORT

Project title	Sustainable Agroforestry Cacao Meta, Colombia
Project ID	3450
Crediting period	06-07-2017 to 05-07-2057
Monitoring period	06-07-2017 to 05-07-2022
(CCB) GHG accounting period	06-07-2017 to 05-07-2057, 40 years total period
Original date of issue	21-07-2022
Most recent date of issue	01-05-2024
Version	V12-0
VCS Standard version	VCS 4.6
CCB Standards version	CCB 3.1
Project location	Colombia, Meta, Cabuyaro
Project proponent(s)	**BACAO SAS** Lina Marcela Guzman lguzman@bacao.com.co **Terra Global Capital, LLC** Leslie Durschinger info@terraglobalcapital.com
Validation/verification body	EPIC Sustainability Services Pvt. Ltd.
History of CCB Status	N/A
Gold Level criteria	Gold Level Climate Change Adaptation Benefits
Prepared by	Terra Global Capital

CONTENTS

Update the page numbers of the table of contents below upon completion of the project description.

Table of Tables

Table of Maps

Table of Figures

1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Outcome or Impact	Achievements during the Monitoring Period	Section Reference	Achievements during the Project Lifetime
1) Climate	880 hectares of land rehabilitation & soil restoration through sustainable agroforestry practices to restore degraded land	3	880 hectares of land rehabilitation & soil restoration through sustainable agroforestry practices to restore degraded land
2) Community	Increased income for 404 employees (community members, including women) through formal long term employment Improved livelihoods of 30 smallholder farmers (including women) through income diversification and improved cocoa production	4	Increased income for 404 employees (community members, including women) through formal long term employment Improved livelihoods of 30 smallholder farmers (including women) through income diversification and improved cocoa production
3) Biodiversity	Increase biodiversity and awareness of the importance of conservation of 2 vulnerable species in the Project Activity Instance	5	Increase biodiversity and awareness of the importance of conservation of 2 vulnerable species in the Project Activity Instance

1.2 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	The net removals for the initial crediting period are 56,103 tCO2e	3	The net removals for the initial crediting period are 56,103 tCO2e
GHG emission reductions & removals	Net estimated emission reductions in the project area, measured against the without-project scenario	N/A	N/A	N/A
Forest[1] cover	For REDD[2] projects: Number of hectares of reduced forest loss in the project area measured against the without-project scenario	N/A	N/A	N/A
Forest[1] cover	For ARR[3] projects: Number of hectares of forest cover increased in the project area measured against the without-project scenario	880 hectares of forest cover increased	3	880 hectares of land rehabilitation & soil restoration
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,	N/A	N/A	N/A

[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
	measured against the without-project scenario			
	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	880 hectares of non-forest land in which improved land management practices have occurred because of project activities	3	880 hectares of land rehabilitation & soil restoration
Training	Total number of community members who have improved skills and/or knowledge resulting from training provided as part of project activities	169 people (120 workers and 49 smallholder farmers) who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities	4	169 people (120 workers and 49 smallholder farmers) who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities
	Number of female community members who have improved skills and/or knowledge resulting from training provided as part of project activities	46 women (workers) who have improved skills and/or knowledge resulting from training provided as part of project activities	4	46 women (workers) who have improved skills and/or knowledge resulting from training provided as part of project activities
Employment	Total number of people employed in of project activities,[5] expressed as	404 people employed in project activities	4	404 people to be employed in project activities

[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.

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	number of full time employees[6]			
	Number of women employed in project activities, expressed as number of full time employees	155 women employed in project activities	4	155 women employed in project activities
Livelihoods	Total number of people with improved livelihoods[7] or income generated as a result of project activities	404 workers (direct/indirect) with improved livelihoods or income generated because of project activities	4	404 workers (direct and indirect) have improved livelihoods or income generated because of project activities
	Number of women with improved livelihoods or income generated as a result of project activities	155 women with improved livelihoods or income generated because of project activities	4	155 women (workers) have improved livelihoods or income generated because 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	404 people for whom health services were improved because of project activities	4	404 employees that have access to health services
	Number of women for whom health services were improved as a result of	155 women for whom health services were	4	155 women for whom health services were

[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
	project activities, measured against the without-project scenario	improved because of project activities		improved because of project activities
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	9 workers for whom access to, or quality of, education (Technical school, higher education) was improved because of project activities	4	9 workers are receiving higher education
	Number of women and girls for whom access to, or quality of, education was improved because of project activities, measured against the without-project scenario	4 (women-adults, youth) for whom access to, or quality of, education was improved because of project activities	4	4 (women-adults, youth) for whom access to, or quality of, education was improved because of project activities
Water	Total number of people who experienced increased water quality and/or improved access to drinking water because of project activities, measured against the without-project scenario	404 people who experienced increased water quality and/or improved access to drinking water because of project activities	4	404 people who experienced increased water quality and/or improved access to drinking water because of project activities
	Number of women who experienced increased water quality and/or improved access to drinking water because of project activities, measured against the without-project scenario	155 women who experienced increased water quality and/or improved access to drinking water because of project activities	4	155 women who experienced increased water quality and/or improved access to drinking water as a result of project activities

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
Well-being	Total number of community members whose well-being[8] was improved because of project activities	573 (404 workers and 169 smallholder farmers) community members whose well-being was improved because of project activities	4	573 (404 workers and 169 smallholder farmers) community members whose well-being was improved because of project activities
Well-being	Number of women whose well-being was improved as a result of project activities	242 (155 workers, 82 smallholder farmers) whose well-being was improved because of project activities	4	242 (155 workers, 82 smallholder farmers) whose well-being was improved because of project activities
Biodiversity conservation	Change in the number of hectares significantly better managed by the project for biodiversity conservation,[9] measured against the without-project scenario	2,253 ha number of hectares significantly better managed by the project for biodiversity conservation	5	2,253 hectares managed significantly better by the project for biodiversity conservation, measured against the without-project scenario
Biodiversity conservation	Number of globally Critically Endangered or Endangered species[10] benefiting from reduced threats as a result of project activities,[11]	0 Critically Endangered or Endangered species benefiting from reduced	5	0 IUNC listed as Critically Endangered (CR) or Endangered Species (EN) benefiting from reduced

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[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

10

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
	measured against the without-project scenario	threats because of project activities		threats because of project activities

2 PROJECT DETAILS

2.1 Summary Description of the Implementation Status of the Project

2.1.1   Summary Description of the Project (VCS, 2.1, 3.6; CCB, G1.2)

During this monitoring period the agroforestry system has been established in different phases as described in Table 1, totaling 880 hectares. In each of the phases, the process starts with the clearing of the land and preparing the soil for planting, and fertilizers are added based on the soil's needs (soil analysis). The temporary shade trees (*Glyricidia Sepium*) are planted one year ahead of the cacao to let the tree develop and have a certain height to provide shade to the cacao seedlings. The initial density in 2017 for planting *Glyricidia Sepium* was 1,450 plants/hectare and decreased to 850 plants per hectare from 2020 on. The temporary shade is managed so plant density is reduced to 90 plants per hectares in a progressive elimination where 50% is cut after two years, then at year 3 the density is reduced to 25% and finally in year 4 it is reduced to 10%. The progressive elimination of *Glyricidia Sepium* is done to maintain enough sunlight and space for the proper growth of the cocoa plants. The material that is pruned from the temporary shade is chopped into smaller pieces and left in the soil for further decomposition to build organic matter.

On the second year the cacao plants are established with a density of 1,450 plants per hectare, as well as the permanent windbreak (*Cariniana pyriformis)* with a density of 33 trees per hectare when planted in contours, while 105-108 when planted in between and across cocoa lines, respectively. The permanent windbreak is not pruned or managed which contributes to the aboveground biomass. In addition, these trees are planted in the contours as well as in between the cocoa plots to serve as a windbreak to protect the cocoa from wind damage.

Table 1. Planting schedule and number of hectares being established under the agroforestry system in the Project Activity Instance.

Year	Number of hectares planted
2017	120
2019	36
2020	248
2021	475
Total	880

Cover crops such as Kudzu (*Pueraria phaseoloides*), Desmodium (*Desmodium adscendens)* and Mucuna (*Mucuna pruriens*) are fast growing species that have been planted after the soil has been prepared to provide cover, increase the soil humidity, and prevent erosion. Once the covers are established, they are mowed every 260 days to incorporate the biomass to the soil.

Implementation of project activities directly effects GHG removal, as tree planting will have a direct removal of carbon from the atmosphere.

The total GHG emission reductions or removals generated in this monitoring period is 56,103 tCO2e.

The first Project Activity Instance has provided employment to 404 local individuals from the surrounding communities of the Project Activity Instance. Thus far, employees (full and part time) stated to have financial stability through a fixed income (monthly salary). Through the household survey, employees reported being aware of having access to legal benefits such as health insurance and pension for retirement. As well as additional benefits such as food assistance and access to clean water. Employees from this area (Cabuyaro) who were new to cocoa production, now feel that they have acquired new skills and field experience in this production system.

The project has promoted biodiversity conservation in the Project Activity Instance by conserving forest areas where species have made their habitats. Additionally, it established and reinforced a non-hunting policy, that so far has created awareness among the employees and increase the awareness about the importance of conserving these animal species. According to the biodiversity study conducted the numbers of present species are maintained and the conservation areas serve as corridors for these species. In addition, elementary schools in the nearby communities (Viso and Guayabal) have participated in training sessions to create awareness towards the importance of conserving the flora and fauna of the area (the majority, almost 80% of these students are the employees' children).

2.1.2   Audit History (VCS, 4.1)

Audit Type	Period	Program	VVB Name	Number of years
Validation/ Verification		VCS and CCB	EPIC Sustainability Services Pvt. Ltd	Five years

2.1.3   Sectoral Scope and Project Type (VCS, 3.2)

Sectoral Scope	14: Agriculture, forestry, and other land use
AFOLU Project Category	Afforestation, Reforestation and Revegetation (ARR)
Project Activity Type	Afforestation/Reforestation

2.1.4   Project Proponent (VCS, 3.7; CCB, G1.1)

The following are the project proponents:

Organization name	Bacao SAS
Contact person	Lina Guzman

Title	Director HSE
Address	Carrera 9 Number- 80-45, Office 301 Bogota, Colombia
Telephone	3183589678
Email	lguzman@bacao.com.co

Organization name	Terra Global Capital, LLC
Contact person	Leslie Durschinger
Title	Founder and CEO
Address	6114 La Salle Ave, Suite 441. Oakland CA 94611
Telephone	+1 415 400 4491
Email	info@terraglobalcapital.com

2.1.5   Other Entities Involved in the Project

Organization name	DyA
Contact person	Jose Gerardo Erazo
Title	Assessor DyA
Role	Local company hired to strengthen the link with the communities and provide support to Bacao workers.
Address	Cl. 66 #11 - 37, Bogotá
Telephone	3178951738
Email	josege@dya.com.co

2.1.6   Project Start Date (VCS, 3.8)

Project start date	06-07-2017
Justification	The start date of this AFOLU project is the date when planting activities initiated which led to the generation of removals.

2.1.7   Benefits Assessment and Project Crediting Period (VCS, 3.9; CCB, G1.9)

Crediting Period	The projects crediting period of 40 years, minimum number of years required by VCS

13

Start Date of First or Fixed Crediting Period	06-07-2017 to 05-07-2057
Total Number of Years of Crediting Period	40 years
CCB Benefits Assessment Period	40 years

2.1.8   Project Location (VCS, 3.11; CCB, G1.3)

☒ KML file has been provided

The initial Project Activity Instance of the grouped project is in the department of Meta, Colombia, in the municipality of Cabuyaro at coordinates 4°23'24"N 72°51'26"W, approximately 90 km east of Villavicencio, the capital of the department. The Municipality of Cabuyaro (Meta), is located at a height of 235 meters above sea level. The initial Project Activity Instance encompass a total area of 880 hectares as shown in Map 1. Map 1, shows all areas to be planted in 2022, this project only assess carbon on areas planted before the calendar year of 2022.
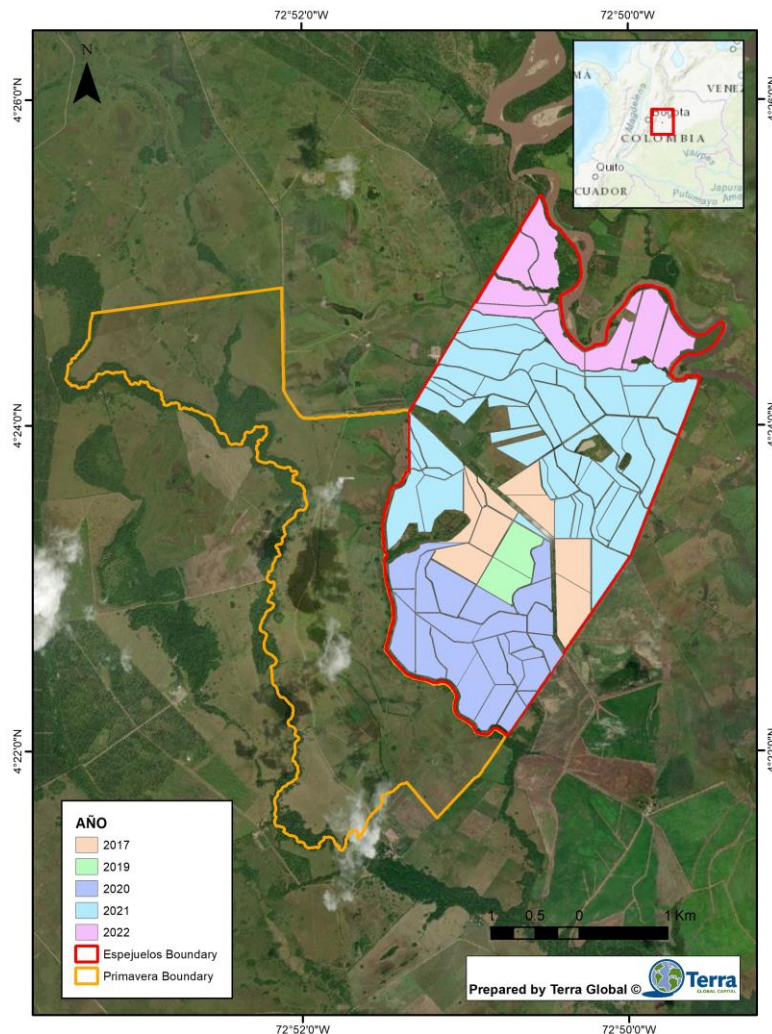
Map 1. Project Activity Instance showing the planting schedule for this monitoring period (2017-2022) for the agroforestry system.

2.1.9 Title and Reference of Methodology (VCS, 3.1)

Type (methodology, tool, module)	Reference ID (if applicable)	Title/Description	Version
Methodology	CDM AR-ACM0003	A/R Large-scale Consolidated Methodology: Afforestation and reforestation of lands except wetlands	2.0

15

Type (methodology, tool, module)	Reference ID (if applicable)	Title/Description	Version
Tool	CDM AR TOOL-2	Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities	1.0
Tool	AR-TOOL03	Calculation of the number of sample plots for measurements within A/R CDM project activities	2.1.0
Tool	CDM AR-TOOL14	Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities	4.2
Tool	CDM AR-TOOL12	Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities	3.1
Tool	CDM AR-TOOL08	Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity	4.0
Tool	CDM AR-TOOL15	Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity	2.0
Tool	CDM AR-TOOL16	Estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities	1.1
Tool	CDM AR-TOOL17	Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities (270 KB)	1.0
Tool	AFOLU Non-Permanence Risk Report Excel Calculation Tool	Tool to manually calculate an AFOLU project's risk rating	4.2

2.1.10 Double Counting and Participation under Other GHG Programs (VCS, 3.23; CCB, G5.9)

2.1.10.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program, or any other form of community, social, or biodiversity unit or credit?

☐ Yes   ☒ No

2.1.10.2 Registration in Other GHG Programs

Is the project registered or seeking registration under any other GHG programs?

☐ Yes   ☒ No

2.1.10.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes   ☒ No

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2.1.11 Sustainable Development Contributions (VCS, 3.17)

Table 2: Sustainable Development Contributions

SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1.1	1.1.1 Proportion of the population living below the international poverty line, disaggregated by sex, age, employment status, and geographic location (urban or rural)	Implemented activities to decrease	Living wage gap quantified for employees	Living wage gap quantified for employees
2.1	2.1.2 Prevalence of moderate or severe food insecurity in the population	Implemented activities to decrease	Support workers' nutrition: -45 employees (Adm and operational managers) received two meals (breakfast, lunch) per day; -339 farm workers who have received food vouchers (by merit) that are exchanged for food items(only items from the basic family food basket are admissible) at local stores	Support workers' nutrition: -45 employees (Adm and operational managers) received two meals (breakfast, lunch) per day; -339 farm workers who have received food vouchers (by merit) that are exchanged for food items(only items from the basic family food basket are admissible) at local stores
2.3	2.3.2 Average income of small-scale food producers, by sex and indigenous status	Implemented activities to decrease	49 smallholder farmers have received technical assistance on agroforestry systems towards a more sustainable and diversified agricultural production (income and production diversification)	49 smallholder farmers have received technical assistance on agroforestry systems towards a more sustainable and diversified agricultural production (income and production diversification)

SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
2.4	2.4.1 Proportion of agricultural area under productive and sustainable agriculture	Implemented activities to increase	Recovered 880 hectares degraded areas and convert them into sustainable agroforestry systems	Recovered 880 hectares degraded areas and convert them into sustainable agroforestry systems
3.8	3.8.1 Coverage of essential health services	Implemented activities to increase	Guarantee 100% Social insurance and access to healthcare for 404 employees hired.	Guarantee 100% Social insurance and access to healthcare for 404 employees hired.
4.3	4.3.1 Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex	Implemented activities to increase	49 small farmers and field employees have improved knowledge and skills on sustainable agricultural practices	49 small farmers and field employees have improved knowledge and skills on sustainable agricultural practices
5.1	5.1.1 Whether or not legal frameworks are in place to promote, enforce and monitor equality and non-discrimination on the basis of gender	Implemented activities to increase	Developed Code of conduct for employees where any form of discrimination and/or unethical behavior is prohibited in the workplace. 404 Job opportunities were provided on an equal basis to men and women, and salary bases in the different ranges were the same for both.	Developed Code of conduct for employees where any form of discrimination and/or unethical behavior is prohibited in the workplace. 404 Job opportunities were provided on an equal basis to men and women, and salary bases in the different ranges were the same for both.

| 6.6 | 6.6.1 Change in the extent of water related ecosystems over time | Implemented activities to increase | The project developed an irrigation manual which documents the operation and maintenance of the irrigation system used for the farm, which includes safety and environmental protection for the intake system (inlet), the irrigation system in general and protection zones for the water circuits. All activities are conducted under the parameters of conservation and environmental protection of the water circuits of the Upía River and main canal. The irrigation system does not present infrastructure or affect water circuits and the operation and maintenance guarantees that the environment is not negatively affected. Additionally the environmental authority, Cormacarena, who regulates the use of water, has defined the permissible volume of water to be used, 636 l/s for project activities (agroforestry-cacao) in 2018. The project monitors the use of water on a monthly basis and reports back to Cormacarena to demonstrate that the use stays under the permissible limits according to the national regulations. Environmental compensation will be done, if required. For this period reforestation with 6,000 native species in riverbanks was completed | Monitor the use of water taken from the river to be used in the Project Activity Instance and keep use under the permissible limits according to the national regulations. Environmental compensation will be done, if required

(reforestation with 6,000 native species in riverbanks) |

20

SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
8.2	8.2.1 Annual growth rate of real GDP per employed person	Implemented activities to increase	Living wage gap for field employees have been quantified	Living wage gap for field employees have been quantified
10.3.1	10.3.1 Proportion of population reporting having personally felt discriminated against or harassed in the previous 12 months on the basis of a ground of discrimination prohibited under international human right law	Implemented activities to decrease	Develop and apply an antidiscrimination policy in the workplace which has provide equal job opportunities to 404 workers	Develop and apply an antidiscrimination policy in the workplace which has provide equal job opportunities to 404 workers
12.2	12.2.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP	Implemented activities to increase	Protocols for the use of agricultural inputs and other goods established	Protocols for the use of agricultural inputs and other goods established

SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
12.4	12.4.2 (a) Hazardous waste generated per capita; and (b) proportion of hazardous waste treated, by type of treatment	Implemented activities to decrease	Protocols developed and adopted for the proper disposal of hazardous waste. All inputs used were approved by the OMS and ICA (*Instituto Colombiano Agropecuario*)	Protocols developed and adopted for the proper disposal of hazardous waste. All inputs used were approved by the OMS and ICA (*Instituto Colombiano Agropecuario*)
12.5	12.5.1 National recycling rate, tons of material recycled	Implemented activities to increase	Waste management plan in place to conduct classification at the source, have a collection process, type of treatment identified and proper disposal for the different wastes produced by the project activities. Total 6,900 kg of waste recycled	Waste management plan in place to conduct classification at the source, have a collection process, type of treatment identified and proper disposal for the different wastes produced by the project activities. Total 6,900 kg of waste recycled
12.6	12.6.1 Number of companies publishing sustainability reports	Implemented activities to increase	1 company-Bacao adopted 3 sustainability practices as project activities (Establishment of Agroforestry for cacao production on degraded pastures, residue management, cover crops) and encourage to integrate sustainability information into the reporting cycle	1 company-Bacao adopted 3 sustainability practices adopted as project activities (Establishment of Agroforestry for cacao production on degraded pastures, residue management, cover crops) and encourage to integrate sustainability information into the reporting cycle

SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
12.8	12.8.1 Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment	Implemented activities to increase	Increase education about relevant information regarding sustainability project activities	Increase education about relevant information regarding sustainability project activities
13.2	13.2.2 Total greenhouse gas emissions per year	Implemented activities to decrease	By the implementation of sustainable agroforestry systems that promote crop diversification, soil health and no deforestation, the Project has removed 56,103 tCO2e into the atmosphere during the reporting period	By the implementation of sustainable agroforestry systems that promote crop diversification, soil health and no deforestation, the Project has removed 56,103 tCO2e into the atmosphere during the reporting period

2.1.12 Double Claiming, Other Forms of Credit, and Scope 3 Emissions (VCS, 3.24)

2.1.12.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the VCS Program Definitions for definitions of emissions trading program and binding emission limit.

☐ Yes   ☒ No

2.1.12.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the VCS Program Definitions for definition of GHG-related environmental credit system.

☐ Yes   ☒ No

2.1.12.3 Supply Chain (Scope 3) Emissions

Do the project activities affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes   ☒ No

Is the project proponent(s) or authorized representative a buyer or seller of the product(s) (goods or services) that are part of a supply chain?

☐ Yes   ☒ No

Has the project proponent(s) or authorized representative posted a public statement on their website saying, "Carbon credits may be issued through Verified Carbon Standard project [project ID] for the greenhouse gas emission reductions or removals associated with [project proponent or authorized representative organization name(s)] [name of product(s) whose emissions footprint is changed by the project activities]."?

☐ Yes   ☒ No

2.2 Project Implementation Status

2.2.1 Implementation Schedule (VCS, 3.2; CCB, G1.9)

A comprehensive implementation workplan was developed and is included in Section Appendix 1: Commercially Sensitive Information and provides the timeline for the key milestones for initial implementation. Table 3 details the main activities conducted during this monitoring period.

24

Table 3. Implementation schedule for first monitoring period for Project Activity Instance.

Date	Milestone(s) in the project's development and implementation
2016	Socio-economic diagnosis of the area around the Project Activity Instance
Jul 2017	Project Start-Soil preparation and planting of first phase of agroforestry system (120 ha)
2018	Soil preparation and planting of second phase of agroforestry system (36 ha)
2019	Soil preparation and planting of third phase of agroforestry system (248 ha)
2020	Soil preparation and planting of fourth phase of agroforestry system (475 ha)
Mar 2020	Social Impact Baseline
2021	Soil preparation and planting of fifth phase of agroforestry system (141 ha)
Jun 2021	VCS/CCB certification started
Jan 2022	Confirmed VCS project eligibility and methodology identified
Jan 2022	Defined and reviewed long term implementation plan
Jan-April 2022	Gathered field data (Biodiversity, Biomass and Social data, HCVs)
July 2022	Establish procedures for on-going monitoring responsibilities
July 2022	Develop 1st VCS/CCB Monitoring Report
October 2022	Project Socialization
January 2023	Conduct and finalize VVB audit
April 2023	Issue VCUs
On-going	Monitor and report performance and impact

2.2.2   Baseline Reassessment (VCS, 3.2.6, 3.2.7)

Did the project undergo baseline reassessment during the monitoring period?

☐   Yes   ☒   No

2.2.3   Methodology Deviations (VCS, 3.20)
There are no methodology deviations at this time.

2.2.4   Minor Changes to Project Description (CCB Program Rules, 3.5.6)
No community or biodiversity changes to project design that require a project description deviation.

2.2.5   Project Description Deviations (VCS, 3.21; CCB Program Rules, 3.5.7 – 3.5.10)
No project description deviations applied during this monitoring period.

2.2.6   Grouped Projects (VCS, 3.6; CCB, G1.13-G1.15, G4.1)
This is grouped project, no new areas or communities are added or removed, no change of management for this monitoring report. Thus, this section is not applicable.

2.2.7 Risks to the Project (CCB, G1.10)

Identified Risk	Potential Impact of risk on climate, Community, Biodiversity benefits	Actions needed and designed to mitigate the risk
Fire	Uncontrolled fire can burn the agroforestry system area	• Established a protocol for fire prevention since 2019, which forbids burning any kind of vegetation or open fires for the establishment of crops. • Established a policy to refrain from smoking inside the plantation because cigarette butts can cause fires. • Planting shade trees and the use of the irrigation system
Longevity	The agroforestry system could be replaced for another crop if another more profitable option presents itself.	• Bacao has a 15-year offtake in place, and if the farm does not produce the predicted volumes, they will have to cover the deficiency by buying cacao on the market. • The project will establish a legally binding longevity agreement to continue Project Activities through the end of the crediting period. This agreement is currently being discussed in board meetings.
Cacao market Prices	Cacao sales drive a vast majority of the project's revenues. Therefore, the success of the project is closely tied to cacao market price. If that price drops significantly, the project will suffer and may have to cease activities altogether.	• Bacao has negotiated a floor price under the offtake, • Bacao has established a diversified revenue stream, such as that provided by the sale of verified emission reductions and removals.
Lack of national regulations on cacao production and marketing	No price regulation	Advocacy at the local, regional, and national level
Lack of skilled labor force to implement project activities	Lack of efficiency in the implementation of project activities	HR support, retain trained staff, provide support and constant training to new staff, establish alliances with other institutions for training

26

Identified Risk	Potential Impact of risk on climate, Community, Biodiversity benefits	Actions needed and designed to mitigate the risk
Lack of safety conditions to implement project activities	Safety issues with staff and plantation production	The company will maintain a low profile at the local and national level to avoid potential threats

2.2.8 Benefit Permanence (CCB, G1.11)

The project is at the 5-year mark from a total of 40 years. However, the project is designed to create benefits and impacts that are expected to last far beyond this time frame.

During the first five years of implementation climate smart farming practices have been established to rehabilitate degraded pastures. The benefits from the adoption of these practices are starting to have results on the soil's restoration, the increase in above and below ground biomass, the maintenance and conservation of remaining forested areas, and the efficient use and management of available resources. These practices will be maintained through the crediting period of the project, and they are expected to be kept through after.

This large-scale agroforestry set up is setting new ways and trends that are changing the way agriculture, commercialization and food-production are practiced in the region to finally bring about a much-needed long-term sustainable natural resource management approach.

Workers and smallholder farmers can observe the differences from traditional agricultural practices such as oil palm production, which focuses on maximizing short-term yields to the adoption of long-term carbon positive farming like the ones applied in the Project Activity Instance. The system is starting to show higher productivity as the trees grow and develop. The integrative carbon positive system being implemented and promoted in this landscape focus on such critical components as soil health and fertility, which are prioritized to then build and maintain the long-term productivity of the land. Local employees and farmers have practical experience and accessible knowledge, and technologies needed to measure, monitor, and observe the changes of carbon in the soil helping them to better understand the possible effects of these on their crops and their profits. Through the continued adoption of these sustainable carbon positive practices, future smallholder farmers and stakeholders in the region will be able to increase their long-yield and crop revenue while lowering their costs and reducing their risk.

These long-term practices and benefits are also all achieved by creating a more inclusive, modern, and sustainable supply chain where human rights are respected, existing biodiversity is protected and improved upon, and where local employees and farmers are given the opportunity to continue to improve upon their livelihoods. Achieving this goes beyond ensuring proper incomes and premiums are in place, and also involves supporting workers and neighboring farmers to increase their long-term productivity by helping them develop alternative farm models where communities can continue to find decent job opportunities and wages, and by building local capacity and providing on-going technical guidance and training for everyday farming decisions that will continue to reap benefits long after the project's crediting period is over. Through these longer-term capacity building and employment opportunities, local communities and stakeholders will continually be able to reduce their vulnerability through improved management and productivity approaches, will have more and better opportunities to access markets and commercialization systems, and will have access to more inclusive and beneficial sustainable development models for their hopes and aspirations.

27

To ensure the long-term preservation and enhancement of biodiversity benefits, the project implemented several critical measures designed to address potential impacts on High Conservation Values (HCVs), particularly those concerning species diversity (HCV1) and sensitive ecosystems (HCV3). Key activities included maintaining conservation areas such as morichales, enforcing a zero-deforestation policy across plantations and smallholder farms, and providing comprehensive biodiversity and conservation training to all workers. A management plan was developed for the careful selection and application of agricultural inputs, along with procedures for establishing and maintaining new crop systems.

Bacao, established strict policies to minimize biodiversity impacts and ensure compliance. These policies prohibit burning vegetation or setting open fires during crop establishment and mandate the proper disposal of plastic waste generated by agricultural activities. Cutting down trees in sensitive areas like riverbanks and swamps requires prior authorization. Hunting, fishing, and capturing animal species within the project area are strictly banned. Any fauna encountered must be treated with care, except when staff safety is threatened by potentially dangerous species. Smoking within the plantation is prohibited to prevent fire hazards and reduce environmental pollution. These measures collectively contribute to the sustainable management and enhancement of biodiversity well beyond the project's lifetime.

2.3 Stakeholder Engagement & Safeguards

2.3.1 Stakeholder Identification (VCS, 3.18, 3.19; CCB, G1.5)

This is not applicable since there was no stakeholder make up change since validation.

2.3.2 Stakeholder Access to Project Documents (VCS, 3.18, 3.19; CCB, G3.1)

The first 5 years (2017-2022) were focused on establishing the large-scale agroforestry system in the initial Project Activity Instance. Starting 2021, Bacao started the certification process under VCS and CCB. Since then, as soon as project documents have been available, they have worked to make the information fully accessible to the various stakeholders. This has included review of formats (print, digital), language and level of detail (full document, summary), and the channel of dissemination (direct, in-person by Bacao's staff or digitally through publicly available on-line). The table below provides a summary of how project documents and related information has been shared with different stakeholders.

Stakeholders (2.1.9)	Information Sharing, Document Dissemination (G3.1: 2.3.1, 2.3.2, 2.3.5)
Employees (2.1.9.10)	• Project summary presented in informational meeting. Summary materials distributed directly or upon request (print, digital) • Validation and Verification process and progress summary shared in informational meeting (relevant aspects). Summary materials distributed directly or upon request (print, digital) • Monitoring results shared in informational meetings (relevant aspects);
Impulsa Bacao Farmers (2.1.9.11)	• Project summary presented in informational meeting. Summary materials distributed directly or upon request (print, digital) • Validation and Verification process and progress summary shared in informational meeting (relevant aspects) • Monitoring results shared in informational meetings (relevant aspects)

Stakeholders (2.1.9)	Information Sharing, Document Dissemination (G3.1: 2.3.1, 2.3.2, 2.3.5)
Cabuyaro Mayor's Office, Cabuyaro Council, Cabuyaro, CORMACARENA (2.1.9.4, 5, 8)	• Project summary presented in informational meeting and distributed (print, digital) • Validation and Verification process and progress summary shared in informational meeting (relevant aspects) • Monitoring results shared in informational meetings (relevant aspects)
Community Action Boards for Guayabal, and Viso de Upía, Neighbours (2.1.9.1, 2, 9)	• Project summary upon request: print, digital • Validation and Verification process and progress information shared in periodic informational meeting (relevant aspects). • Monitoring results shared in periodic informational meetings (relevant aspects)
Cabuyaro, Cabuyaro Cocoa Farmers, (2.1.9.3, 6, 7)	• Project summary upon request: print, digital • Summary of monitoring results shared upon request (relevant aspects)

2.3.3   Dissemination of Summary Project Documents (VCS, 3.18, 3.19; CCB, G3.1)

The summary of the Monitoring Report, has been created and translated into Spanish and shared with employees and smallholder farmers from the communities in the Project Zone, using the established communication channels for all stakeholders, informational meetings for workers and small farmers. The document was readily available in print (in the Bacao offices (Guayabal-main plantation and Bogota-main office) and in digital format it was publicly available on the public website www.verra.org, when interest is expressed in seeing them. All stakeholders had been asked to comment on the monitoring report along with the summarized translated version, and if needed to send comments to CCBStandards@vcs.org.

2.3.4   Informational Meetings with Stakeholders (VCS, 3.18, 3.19; CCB, G3.1)

The project ensured that all stakeholders have access to necessary information conveyed in an appropriate and accessible manner. Along with access to the project documentation, informational meetings with stakeholders have also been conducted. Informational meetings consisted of three main forms: periodic (annual), reoccurring meetings; topic-specific meetings; and meetings incorporated into existing programs (training, community development). The descriptions below provide more details regarding the type, frequency, and personnel responsible for leading the informational meetings with various stakeholders.

2.3.4.1   Employees

• Communication Plan: Those aspects of the Project that have implications for employees (social, labor, community aspects) have initially been communicated with employees in general meetings, meetings with worker representatives at periodic intervals, and/or in topic-specific meetings concerning specific aspects of the program. Additionally, certain topics were introduced or reinforced during operational and human resource training programs. Documentation of meetings includes meeting minutes, attendance registrars, and copies of materials distributed.
• Monitoring and Reporting: Specific interventions undertaken as part of the Project were monitored using disclosed progress and impact indicators. Employees have been informed of results in periodic or topic-specific meetings.

- Specific Information: In addition, the Project has jointly developed a program with a local community development organization (DyA) that will provide constant and on-going support to employees and their families. DyA will provide both formal and informal support for communication flows and the exchange of information with employees and their families

2.3.4.2   Impulsa Bacao Farmers

- Communication Plan: The smallholder communication and engagement plan include periodic communication events (every 6 months) with participating farmers. When aspects of the project apply to Impulsa Bacao farmers, those aspects were presented openly to them at the periodic events, or in additional events held specifically for the relevant aspects.
- Any relevant aspects of the project that are communicated to smallholders, including monitoring results, will follow the standard smallholder communication and engagement procedure of open discussion, response to questions, discussion of next steps (timeline, procedure), documentation of event, and distribution of follow-up to the smallholder representatives.

2.3.5   Risks from the Project and No Net Harm (VCS, 3.18, 3.19)

Bacao developed a monitoring plan to register the progress on the social and environmental impacts over the long term of the project. Results and recommendations on activities to improve the implementation plan and monitoring reports will accommodate the stakeholders' needs. Impact indicators facilitate measuring the progress toward reaching the expected goals related to workers, small farmers and the local communities and its ecosystem.

Related to natural risk, fire has been identified as a potential risk from the project, so Bacao has established the following preventive measures and mitigation efforts:

- A protocol for fire prevention since 2019, which forbids burning any kind of vegetation or open fires for crop establishment, and
- Policy that refrains workers from smoking inside the plantation because cigarette butts can cause fires

Related to human risks, to maintain optimal working conditions for the staff, Bacao has developed and adopted a health and safety policy and has established processes to identify, report potential work relate risks and develop mitigation actions. Related to women and youth inclusion, Bacao is committed to provide a safe work environment, free of discrimination for all.

2.3.6   Community Costs, Risks, and Benefits (CCB, G3.2)

Several methods were used to assess risks or additional costs that the project might have to relevant stakeholders, including employees and smallholder farmers. While no significant risks or costs associated with the project have been identified, safeguards and procedures have been put in place to ensure that any emerging risks related to workers' safety in the workplace are identified and addressed.

In terms of benefits, the project has provided a range of benefits for employees, and smallholder farmers, which are describe in detail below.

2.3.6.1   Employees

- The costs and risks posed to employees in this Project Activity Instance are largely addressed by operational and human resource management assessments and safeguards. These are conveyed to workers though their contracts, on-boarding, internal procedures, and on-going trainings.
- Occupational Health and Safety Risk Assessment, Safeguards: In so far as the potential impact of the Project on employees can be considered in terms of Occupational Health and

30

Safety, a detailed risk analysis was carried out by a qualified team according to IFC standards and national legislation, and appropriate measures to properly manage and reduce risks were determined and adopted. Workers receive regular training so that they are aware of the risks and the ways to prevent accidents, and if they happen, the reporting protocol has been established and socialized (see 2.3.14-17).

- Labor Rights Risks, Safeguards: In so far as the potential impact of the Project on employees can be considered in terms of labor rights, procedures are in place to uphold national and internal laws and standards, and workers are informed and trained on those topics (see 2.3.11, 2.3.16).

- Benefits: Workers are guaranteed a minimum wage and all national benefits, plus an additional bonus structure and benefits. These benefits are communicated to workers at the time of employment and in on-going communications and trainings. Current benefits, which may be augmented and adapted over time, include:

  o Meals and beverages
  o Monthly food Bonus, based on economic incentive for attendance
  o Life insurance contributions
  o Daily provisions (panela, coffee, etc.)
  o Transportation from communities to workplace

In addition, a Living Wage Study was conducted in to help identify and target in-kind benefits aimed at closing the gap between worker's actual salary and a living income at the household level. The study helped identify which benefits employees are aware of and which require additional socialization: a plan is underway to re-enforce. Employment/Project benefits to workers. Likewise, interventions (benefits) designed to minimize the Living Wage Gap will be monitored and reported internally on an annual basis, including reporting and validation with employees.

2.3.6.2 Impulsa Bacao Farmers

- Risk Assessment, Mitigation: Proper screening of potential participants in smallholder programs will help to reduce the risk that could be incurred by farmers (e.g. time, effort, financial) that are not appropriate candidates for program.

- Communication: Communication is critical, and fully transparent, documented communication of the terms of the program and conditions of participation, including risks and benefits, are explicitly communicated to smallholders when they join and reiterated through on-going trainings.

- Benefits: In addition to the potential knowledge, skills and collaboration benefits, the explicit program benefits for participating smallholders include:
  o No transportation cost or labor involved on processing cocoa, as crop is bought at farm gate in wet condition.
  o Above market price paid by volume: 100 COP more per kilogram than the market price (which is reviewed, set).
  o Market Information and Support: Clearly communicated quality specifications as well as guidelines and on-going support for achieving them, along with improved productivity.

31
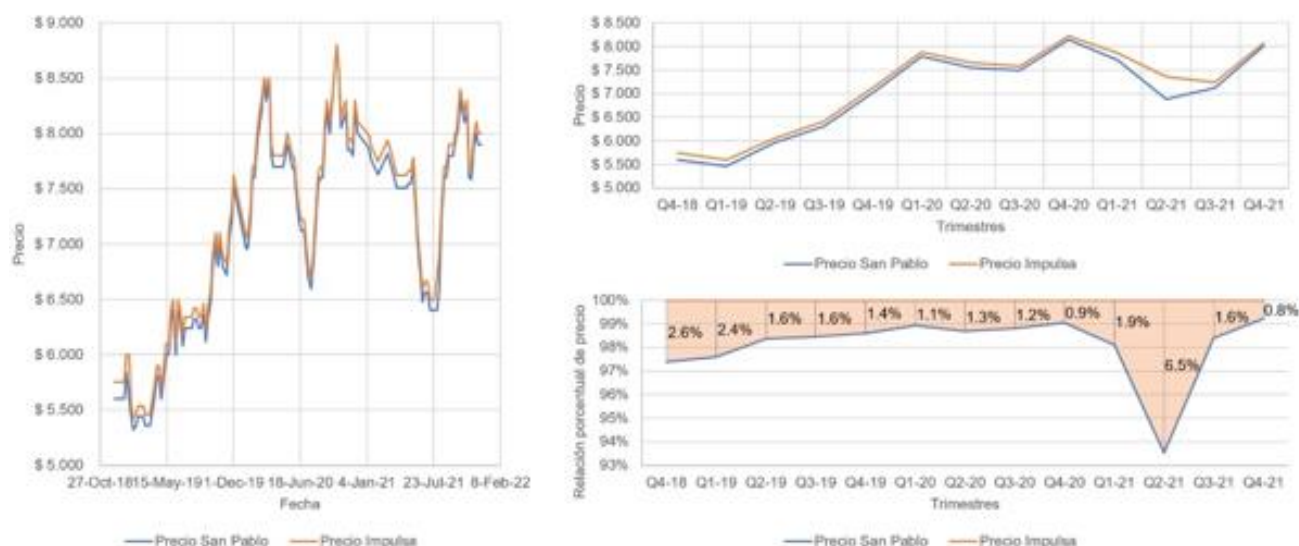
Figure 1. Graphs show paid price for cocoa by Impulsa is above the market price between October 2018- February, 2022.

2.3.7 Information to Stakeholder on Verification Process (VCS, 3.18.6, 3.19; CCB, G3.3)

Informational meetings had been held with workers and smallholder farmers to inform about the verification process. Group discussions were facilitated to review the VCS/CCB Monitoring Report; stakeholders were informed that a VVB was coming to visit some of the communities and Project Activity Instance at the validation time. Currently, stakeholders are free to communicate openly about their experience, they are welcome to communicate directly to the VVB. The following communication methods and measures were taken to inform each of the identified stakeholders of the process for CCB validation and verification.

2.3.7.1 Employees

- Communication Measures: Employees are considered the stakeholders with the most direct involvement in the project's validation and verification process. Employees had been informed of their role in validating the project through their participation in the assessment, and monitoring of the project's benefits to them. This was summarized in appropriate terminology and communicated publicly and in written form.
- As described in section 2.3.2 and 2.3.3, employees were informed of the Project's CCB certification process, including aspects of validation and verification, through meetings with employees. On-going updates on the process were ensured through periodic general meetings or meetings with employee representatives. Employees had access to summary documents regarding the CCB process and monitoring results in print or digitally.

Communication methods: The different approaches and methods that have been included:

Communication methods	Dates
General informational meetings	September 2022
Worker representative meetings	September 2022
Operational/HR training and capacity building events	Continual
Documentation of events and processes directly distributed, and/or made readily available at a disclosed, centralized location	September 2022

32

2.3.7.2   Impulsa Bacao Farmers

- Communication Measures: Farmers participating in Impulsa Bacao were informed of the CCB verification and validation process -and their role in it- through specific and on-going communication strategies.
- Information of the CCB process was shared in informational meetings. Moreover, farmers received training and be provided with opportunities to discuss the verification and validation process during their on-going training events.

Communication Methods: The different approaches and methods that have been include:

Communication methods	Dates
Leadership/farmer representative meetings	September 23
General informational meetings	September 23
Training and capacity building events (e.g. farmers´ schools)	4 per year: January 20-25 April 20-15 July 20-25 September 20-25
Documentation of events and processes directly distributed, and/or made readily available at a disclosed, centralized location	Surveys applied to farmers: May-June 2022

2.3.8   Site Visit Information and Opportunities to Communicate with Auditor (VCS, 3.18.6, 3.19; CCB, G3.3)

All stakeholders, including employees, Impulsa Bacao farmers, and community stakeholders, have been informed about the upcoming certification audits through meetings conducted prior to the auditors visit, as well as via follow-up meetings prior to the visit. Communities have been informed that the VVB is a neutral party and that they should feel free to communicate openly about their experience with the project. They are informed that they are welcomed to communicate directly to the VVB.

2.3.9   Stakeholder Consultation (VCS, 3.18; CCB, G3.4)

Ongoing consultation	During implementation, stakeholders including workers, small farmers and local authorities were consulted and informed on the following events: • Socioeconomic diagnosis • Social Impact Baseline • HH Surveys • PRAs • HCVs • Small holder survey • Inform about verification process.
Date(s) of stakeholder consultation	• Socioeconomic diagnosis 2016 • Social Impact Baseline- March 2020 • HH Surveys- Feb 12-22 2022 • PRAs- May 2022 • HCVs- June 2022

33

	• Small holder survey- 31 May-6 June 2022 • Verification: 21 to 24-September 2022-Impulsa small farmers 21 to 22 September 2022-Bacao farm workers 27 September 2022-Bacao admin workers
Communication of monitored results	Required reports (results) and summaries were shared during scheduled meetings with workers and small farmers, and spaces for open discussion were provided. Meetings occurred before the public comment period and VVB field visit.
Consultation records	The meetings included an explanation of the project activities, the goals and the results accomplished so far in the first monitoring period and an open space for questions and comments. Questions were answered verbally, and main feedback was written by the facilitators.
Stakeholder input	• Socioeconomic diagnosis • Social Impact Baseline • Living Wage Report • HCVs • Small *Producers Survey Report* • Validation and Verification process: Workers asked to learn about how the project activities they implement account for the emission reductions of the project. This topic was included as part of the training program. No other inputs were provided, thus no updates to the design were made.

2.3.10 Continued Consultation and Adaptive Management (VCS, 3.18; CCB, G3.4)

Adaptive management is necessary in any project where activities need to consider a changing set of social dynamics and climate factors that can greatly impact outcomes. Community needs have changed over time as we are all effected by climate change. Communities and those on the ground are best situated to address these issues. Communities were asked through focus groups to identify new and effective activities overtime to conserve the natural resources (HCVs).

During this monitoring period, communities have contributed to the implementation through different opportunities such as direct employment and focus groups (PRAs). The PRA process will continue throughout the life of the Project and associated activities will be updated at every verification event. For this period, meetings have been conducted and main feedback has been summarized in the table below.

Summary of comments received	Actions taken
Bacao workers Identification and description of HCVS	HCVs areas (outside of the Project Activity Instance) related to cultural significance were located.
Impulsa small farmers consultation	21% of the farmers confirmed having participated in the decision-making process; this low percentage is due to how consultation was done through representatives and not to all

Summary of comments received	Actions taken
	members of the organization. As feedback for this to change in the future is to support and facilitate more communication channels between representatives and members of the organizations. Additionally, from the total farmers that answered yes to participation level, 14% mentioned that have been part of the program design, while 85% mentioned that have been part of the decision making for the defining the topics for training and technical assistance.

2.3.11 Stakeholder Consultation Channels (CCB, G3.5)

The approaches and process developed for stakeholder communication and consultation in the project implementation phase are intended to serve as long term, on-going consultation channels. For that reason, the consultation channels put in place are presented to participating stakeholders in a transparent and comprehensive manner, including providing stakeholders with information regarding communication/consultation: frequency; personnel involved; documentation; monitoring and reporting; validation and verification.

The communication and consultation channels were developed with the various stakeholders tailored to their level of involvement in the project and based on the identified risks and benefits that the project confers to them. The most consulted stakeholders include employees and Impulsa Bacao farmers, for whom multiple channels of frequent consultation are developed. Although less directly involved and impacted, other stakeholders were included in aspects of the project that are relevant to them through appropriate communication channels. All stakeholders -both identified and yet unidentified- will have access to important summary documents upon request or on publicly available websites and have access to direct communication with the company through established questions and grievance mechanisms.

Meetings held with workers and their families are held periodically, at least twice a month, in person through DyA, and information has been provided on a per need basis.

As for smallholder farmers, meetings are held quarterly, with representatives. When decisions need to be reached there is a informal voting process and open discussion to reach common agreements.

2.3.12 Stakeholder Participation in Decision-Making and Implementation (VCS, 3.18, 3.19; CCB, G3.6)

To ensure the participation of stakeholders in the decision-making process, several spaces have been identified and meetings have been held as needed, as explained in Table 4.

Table 4. Stakeholder meetings and frequency

Stakeholder	Bacao staff Responsible	Frequency	Purpose
Local authorities (Mayor, local community boards)	Sustainability team, Operational team	Based on the need	Informative, alignment with local policies related to management of natural resources
Neighbors	Sustainability team, Operational team (Manager and Director)	Based on the need	Discussions on irrigation activities that may affect approved volumes of water to surrounding properties
Bacao workers	Management, Human Resources	Yearly	Discussions related to Bacao's policies
Small farmers	Impulsa	Yearly	Discussion on relevant agricultural practices, commercialising logistics, prices, volumes

2.3.13 Anti-Discrimination Assurance (VCS, 3.19; CCB, G3.7)

Bacao has implemented the Collaborators Policy (BCA-SC-OP-04), which states the company's commitment to the prevention of any type of discrimination and assumes the responsibility of treating all staff under the criteria of equality and equity to promote diversity and equal opportunities. All decisions concerning work performance are based on results and the potential shown by workers.

During project's implementation, Bacao through its Human Resources (HR) area have followed a detailed hiring process that starts with the creation of the position's profile, which describes the skills and experience required. The selection process is based on technical criteria obtained through psychotechnical tests (developed by personnel specialized in the subject) and an interview conducted by the hiring unit responsible for the position. HR is responsible for compliance with avoiding any type of discrimination related to ideology, race, sex, marital status, social class, religion, beliefs, sexual orientation, ancestry, philosophy, disability, membership in any type of association.

For Bacao, women's work, skills and high performance both in operational task such as plant propagation at the nursery, as well as administrative and accounting tasks is highly valued. Additionally, the company is aware that the general performance on all its action fronts depends directly on its internal and external collaborators, who conduct the business on a day-to-day basis. For this reason, the general well-being of the collaborators and the fulfillment of their expectations and needs are of great importance, therefore, it declares its commitment to the following:

- Comply with the constitutional and legal provisions in labor matters, individual and collective.
- Encourage employees to achieve the maximum potential of their talents, since the success of each employee depends on their skills and their contribution, while generating balance in their personal, family and professional development.
- Guarantees the protection of the life and personal integrity of its collaborators through contributions, policies and other types of guarantees that cover the main risks of its activity.
- Treat employees under criteria of equality and fairness.
- Promote equal opportunity and diversity, where all talent decisions are based on the performance and potential demonstrated by the person at work.
- Provide feedback and continuously improve the performance of its employees.

36

- Ensure adequate paid rest.
- Promote career plans within the organization.
- Promote constant training and professional development through education.
- Make the corresponding inductions and general training for the understanding of the organization, its goals and objectives and the development of each of its functions, creating awareness of the importance of each position and its contribution to the success of the business.
- Promote opportunities for family benefits for employees

2.3.14 Grievances (VCS, 3.18.4; CCB, G3.8)

Workers are free to make a request, complaint, or claim (PQR) anonymously through the communication channel designated for this purpose. This is openly informed to them at the time they begin their work and sign their contract or legal document that initiates the employment relationship.

Once the PQR is received via text message or call, the human resource department reports through a record to the COPASST interdisciplinary committee in charge of monitoring and resolving the situation in question. This committee is made up of trained personnel who know the dynamics of different roles and activities, which allows for effective support.

During this monitoring period no requests, complaints or formal claims have been registered through the system. Some minor complaints have been received, which have been resolved immediately and informally.

As for smallholder farmers involved in the Impulsa Program, the reception of the requests, complaint or claims can be made through a telephone line (+57) 321 233 45 26. Processing was handled by a person who will direct the request to the area or supervisor related to the complaint or request to provide a response. Then, the processing follows the same steps mentioned above.

2.3.15 Worker Training (VCS, 3.19; CCB, G3.9)

Bacao has established the Training, Induction, Participation and Consultation Program. This program aims to strengthen the knowledge, skills, and competence of the personnel to conduct the project's activities in terms of safety, quality, and efficiency. As part of the training program, Bacao has conducted internal trainings, which are facilitated by experts within the company to address various topics such as safety, occupational health, crop production and administration. In addition, certain topics are reinforced with training provided by external certified entities and experts in specific topics such as brigades for emergency care, safe work at heights, equipment management, and crop phytosanitary techniques. All hired personnel are required to complete on boarding (HSE) to start field work. Table 5 lists all topics covered under all categories in the Bacao Training program.

Table 5. List all training sessions under the different categories provided as part of the Training program provided to Bacao employees.

Environmental	Safety	Occupational Health	Crop production	Administration	Brigades
Waste Classification and Management	Agrochemical management	Proper health care	Phytosanitary Management	Bacao Policies	Forestry

Environmental	Safety	Occupational Health	Crop production	Administration	Brigades
Environmental training	Safety when working in heights	First Aid	Foliar Applications	Asertive communication	First Aid
Carbon stocks from cocoa production	Proper equipment use (small and medium machinery, tractors)	Physical care (hand, feet, face, skin)	Harvesting practices	Teamwork	Fire Manag.
Tree day Training	Use of protective equipment	Healthy lifestyles	Cacao Disease Management	Workplace behavior	
Biodiversity conservation	Proper tool management	Prevention of use of drugs and alcohol	Cacao Prunning	On boarding to Bacao	
No hunting or fishing policy	Risk Management (mechanical, natural-snakes, bees, climate-, chemical, biological, biomechanical)	Domestic violence Prevention	Planting/replanting	Sexual harassment at the workplace	
Rational use of water	Natural Disaster Prevention	COVID prevention	Herbicides for week control		
	Accident Prevention	Nutrition	Irrigation		
	Proper use of vehicles (cars, bicycles and motorcycles)		Post harvest for cacao		
	Proper use fire extinguisher		Nursery production (cacao, shade trees)		
			Grafting		

Over the monitoring period Bacao provided a total of 915 training sessions to a total of 165 Bacao direct employees from which 46 are women. Different topics and sessions are given to the same cohort of workers, thus the total number of participants mentioned in Table 6 refers to the same workers who have participated in the various training sessions.

Table 6. Number of training sessions delievered to Bacao's employees during the monitoring period.

Year	#Training Sessions completed	Total number of workers attending sessions
2018	134	
2019	35	1,019
2020	209	4,838
2021	93	2,836

Year	#Training Sessions completed	Total number of workers attending sessions
2022	444	10,943
Total	**915**	

Bacao's goal for the training program is to implement at least 80% of the planned training sessions per year. In terms, of Occupational Health and Safety, the goal is to have all employees trained (100%) in this topic. In term of effectiveness of the onboarding sessions, the goal is that 100% of the employees pass the evaluation form with a minimum score of 80 points. Figure 2 shows that Bacao have accomplished its implementation goal in most years of the monitoring period, but in 2020, performance was under 80% due to the Covid and the limitation of conducting group sessions/training. Additionally, the figure shows that most training session are facilitated by in house experts and the minority of the topics are facilitated by external experts.

All sessions provided as part of the Bacao training program are supported by a registration sheet (which includes training topic, objective of the training, date, name of facilitator, name of participants, identification number, position, and signature), a written/oral evaluation is completed at the end of the session and in some cases a certificate is provided. A yearly report is produced to report the number of training activities completed, topics covered, evidence compiled per session and the level of compliance per month (reports per year included as supporting documents).
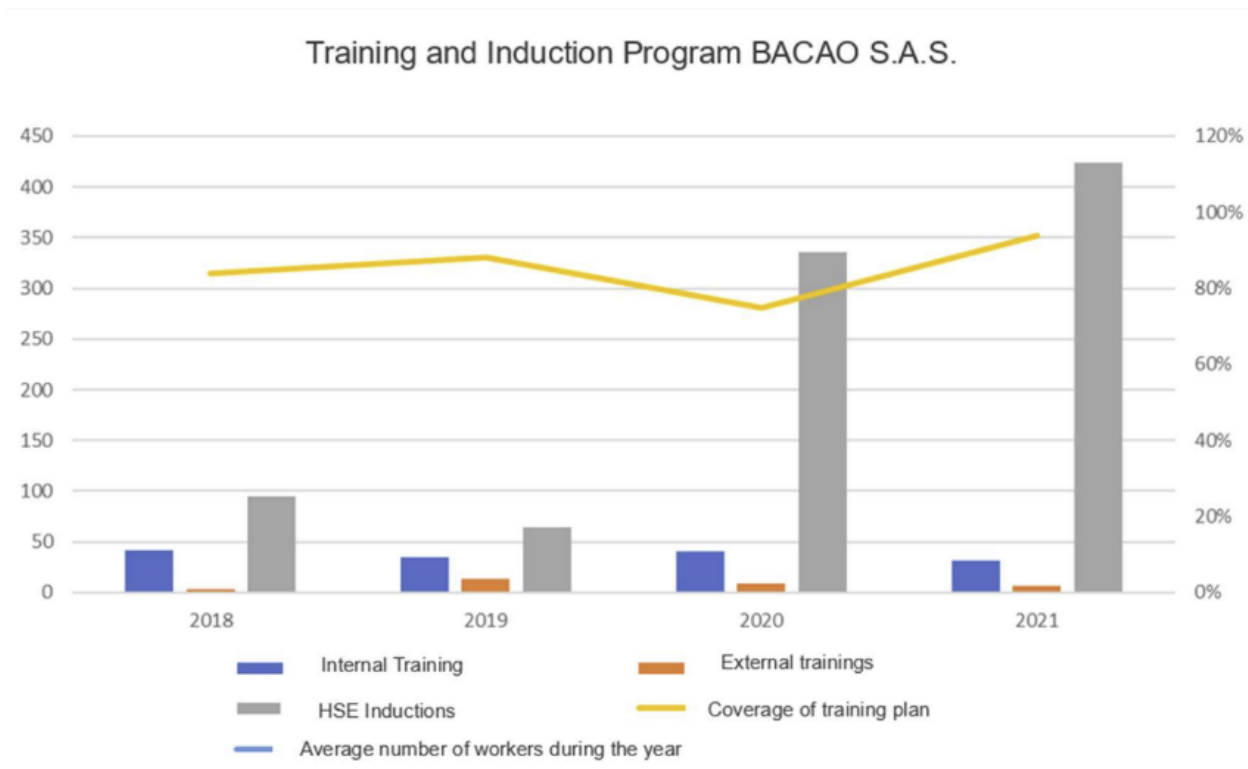

Figure 2. Internal and external trainings provided to Bacao's staff.

2.3.16 Community Employment Opportunities (VCS, 3.19.13; CCB, G3.10)

To guarantee a structured, equitable and egalitarian process, the recruitment, selection and hiring procedure for suitable personnel in the company has been defined and applied by the HR area. Part of the process involves the proper diffusion of job opportunities in the communities around the Project Activity Instance, thus HR follows the steps below:

1. Job descriptions are shared with local government offices (Department of Labor Competitiveness in the Municipal Mayor's Office, and the Regional Family Compensation Fund) to be announced through their websites, local billboards, and bulletins. Positions are also advertised through local media such as loudspeaker, local radio stations, and word of mouth.
2. The announcement includes the complete job description, emails, and hotlines for reception of resumes, and deadlines for application.
3. Once the application process is closed, HR reviews all applications and verifies the related work experience, as well as a security review of the candidate's profile in the national bases of risks and security.
4. Candidates that comply with the required minimum qualifications, that have passed the security filter, are called for interview and they have to complete psychotechnical tests.
5. Results from the interview process and test results are reviewed and final decision is done. Follow by negotiation and finalized with the hiring process.

In the recruitment, selection and hiring process, Human Resources policies are complied to avoid any type of discrimination related to ideology, race, sex, marital status, social class, religion, beliefs, sexual orientation, ancestry, philosophy, disability, membership in any type of association.

Thus, Bacao complies with current labor regulations and is governed by the rules on minimum working age established in the legislation and regulations applicable in Colombia and in international agreements, principles, and declarations.

Bacao hires employees through 3 different types of contract, direct employees to Bacao, employees hired by Nexarte (third party company), and contractors who have short term contracts based on required needs(construction, irrigation, soil preparation, etc).During this monitoring period a total of 465 people have been hired under the different modalities, from which 156 are women (40%), as shown in Table 7. All employees have contracts in place that comply with Colombian labor laws an states the roles and responsibilities.

Table 7. Number of employees hired by Bacao, specified by type of contract for the monitoring period

Employees	Total	Women	Men
Direct Employees	165	46	119
Third Party Employees hired by Nexarte	219	110	109
Contractors	81		
Total	465	156	228

2.3.17 Occupational Safety Assessment (VCS, 3.19; CCB, G3.12)

A procedure was developed for the identification of hazards, evaluation and assessment of risks associated with all processes, routine, and non-routine activities, internal and external, machinery, equipment and tools, workplaces both administrative and operational for all workers conducting project activities related to planting, harvesting, and processing of cocoa.

The hazard identification, evaluation, risk assessment and determination of controls is done prior to workers' risk exposure. Risk control is based on prevention rather than reaction; thus, risk prevention is considered on work areas' design, activities, processes considering human factors, technological and national legislation changes.

Regarding occupational risks, the main risks identified are: 1. Mechanical Risk (use of tools, equipment, agricultural machinery). 2. Biological Irrigation (presence of insects, plagues). 3. Chemical Risk (use of agrochemical substances). 4. Physical Risk (work in open areas with uneven surfaces, environmental conditions of outdoor work), 5. Biomechanical Risk: due to handling of loads and repeated activities. Once risks are identified, training is provided for prevention. Additionally, a yearly audit is conducted by a third party, and according to the 2022 report Bacao complies with the national safety requirements at a 95% (report available to VVB per request).

2.4   Management Capacity

2.4.1   Required Technical Skills (VCS, 3.19; CCB, G4.2)

Core Project Component	Bacao	Terra
Project authorization, design oversight and financing	√	
Project design and planning	√	√
Overall project implementation management and partner coordination	√	√
Community engagement and support for implementation of community program	√	
Field data collection and on-going monitoring	√	√
VCS/CCB program development and GHG quantification	√	√
Design and oversight of program's institutional arrangements (fiscal, legal and contractual)	√	√
Coordination with National GHG accounting and other government agencies		√
On-going funding of project management activities	√	√

2.4.2   Management Team Experience (VCS, 3.19; CCB, G4.2)

The organizational chart below

Figure 3) lists the names of the different areas involved in the operation for the project and describes the main tasks and roles that each team has.

The project is implemented by two registered companies, Bacao S.A.S, responsible for the design and implementation of the cocoa plantations and Impulsa Bacao, who oversees the post harvesting and commercialization of cocoa and the technical assistance program provided to smallholder farmers.

Figure 3. Most updated organizational chart for project implementation
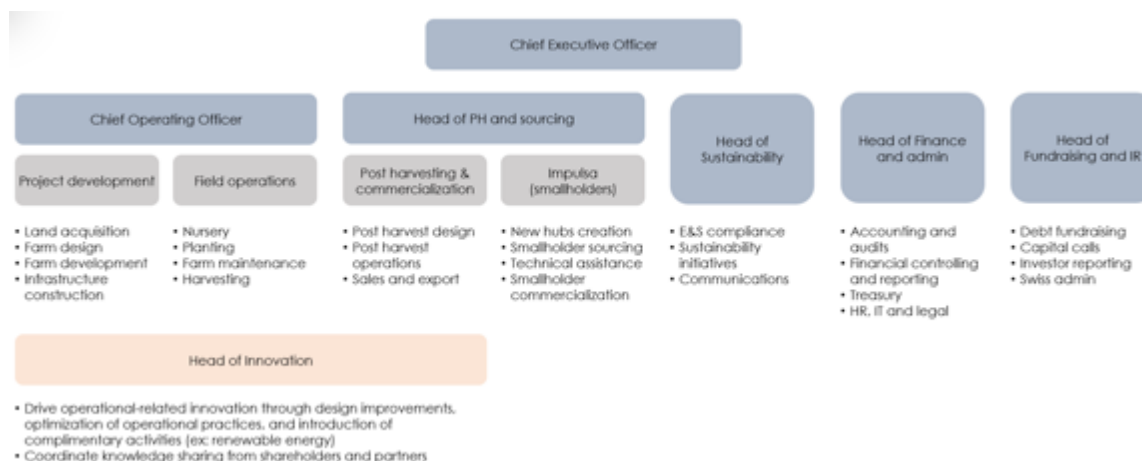
The structure has grown significantly as the company's operations increase. In 2021, three new areas have been created: 1) Sustainability, 2) Financial and Administrative, 3) Fundraising and International Relations. Likewise, in 2022 the Innovation area was created, which seeks to focus on research to optimize and improve the different activities throughout the life cycle of the project.

2.4.3   Project Management Partnerships/Team Development (VCS, 3.19; CCB, G4.2)

The Project Proponents have strong capacity for implementation for project activities. As the Project adds new Project Activity Instances (new plantations), it will be determined whether other partners are needed. The Project uses short-term technical experts as needed to supplement the core team and bring specialized expertise.

Andean Cacao established Bacao SAS and Impulsa Bacao (Colombian registered entities) to transform the way cacao is farmed by innovating to produce fully traceable, climate positive, and socially responsible cacao products at scale. Through the development of anchor farms and complementary smallholder farmer networks, Andean Cacao aims to drive lasting social and environmental impact and catalyze a shift towards sustainable cacao farming for all.

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

The project's implementing organizations are Bacao S.A.S. and Impulsa Bacao, both are successful companies with significant experience in managing sustainable agroforestry systems and commercialization of cocoa, respectively. The financial health of both implementing organizations is supported by Andean Cacao, who finances the project activities.

2.4.5   Avoidance of Corruption and Other Unethical Behavior (VCS, 3.19; CCB, G4.3)

The project implementor's employees engaged in the project will not be involved in, or complicit in, any form of corruption such as bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, and collusion. Bacao initially developed a disciplinary matrix, which states that workers cannot engage in any form of fraudulent, lack of honesty or abuse of power while conducting project activities. Additionally, the company has developed a transparency, ethics and anti-corruption program Section Appendix 1: Commercially Sensitive Information, that has been implemented since 2021 to assure that transparency and ethics are always applied in all decisions made in the project implementation.

2.4.6   Commercially Sensitive Information (VCS, 3.5.2-3.5.4; CCB Program Rules, 3.5.13 – 3.5.14)

The commercially sensitive information which has been prepared and provide to the VVB is listed in Appendix 1: Commercially Sensitive Information

2.5 Legal Status and Property Rights

2.5.1 National and Local Laws (VCS, 3.1, 3.6. 3.7, 3.14, 3.18, 3.19; CCB, G5.6)

Some of the most relevant laws concerning the agricultural and forestry sectors are the following:

Law 1753 of 2015, in its strategy of "transformation of the countryside" states as one of the objectives the "ordering of rural territory and access to land by settlers rural"

Decree 1076 of 2015, through which the Sole Regulatory Decree of the Environment and Sustainable Development Sector is issued."

Law 1776 of 2016 in article 4 establishes that "the Ministry of Agriculture and Rural Development will be responsible for leading and coordinating the formulation of the policy of rural development, based on criteria of productive and social ordering that allow to determine the priority areas of rural development". Also, it points out that "The Ministry of Agriculture and Rural Development will define the agricultural frontier taking into account the definitions of the environmental reserve zones and other restrictions on the use of land imposed by any governmental authority".

Law 99 of 1993, Environmental Policy, in article 5 numeral 1, establishes that it corresponds to the Ministry of Environment and Sustainable Development, among other functions, that of "Formulating the policy in relation to the environment and renewable natural resources, and establish the rules and criteria of environmental ordinance for the use of the territory and the adjacent seas, to ensure the sustainable use of resources renewable natural resources and the environment.

In terms of the laws related to the Project the following apply:

The Project complies with all the labor laws related to payment of decent salaries, and all benefits required by the law (medical, social security, and retirement), occupational risk, and sexual harassment prevention, with a policy in place. Employees are informed of all their rights and duties, as well as the employer's responsibilities, when signing the contract and also during the introductory training session they receive. The fulfillment of all laws and policies related to the workplace is continually monitored. The following are labor laws the project complies with:

- Law 2663/1950, Labour Code. In order to demonstrate compliance with this law, Bacao hires a 3rd. party audit per year which verifies that the project fully complies with it. Audits have been conducted since 2017 (project start date) to this day.
- Law 1072/2015, Sole Regulatory Decree of Labour Sector. The project conducts external audits to demonstrate compliance with what is required under this law. On the last audit conducted, the auditor confirmed that the project effectively complies with a 90% satisfaction.
- Law 1010/2016 through which measures are adopted to prevent, correct, and punish workplace harassment and other harassment within the framework of labour relations. In order to comply with this law, the project has established tools to prevent and intervene in workplace harassment and create safe work environments which are part of the Safety and Health Policy.

The Project also fulfils the environmental regulations defined by the Ministry of Environment related to sustainable development (Decree 1076/2015). This law identifies the national environmental corporations as the regulatory entities, defines their roles and responsibilities, as well as the guidelines

43

on forest conservation, management and fauna and flora preservation. The project receives a yearly monitoring visit from Cormacarena, the corporation for this area, who verifies that the project is following all regulations defined under the law. Yearly reports produced by Cormacarena are available for the VVB under request.

2.5.2   Relevant Laws and Regulations Related to Worker's Rights (VCS, 3.18, 3.19; CCB, G3.11)

The project complies with the national labor laws related to wages, social benefits included in the general schemes for pensions, health, occupational risks, family allowance and complementary social services defined by law.

The most relevant legal regulations that apply for the project are the following:

- Law 2663/1950, Labour Code. In order to demonstrate compliance with this law, Bacao hires a 3rd. party audit per year which verifies that the project fully complies with it. Audits have been conducted since 2017 (project start date) to this day.
- Law 1072/2015, Sole Regulatory Decree of Labour Sector. The project conducts external audits to demonstrate compliance with what is required under this law. On the last audit conducted, the auditor confirmed that the project effectively complies with a 90% satisfaction.
- Law 1010/2016 through which measures are adopted to prevent, correct, and punish workplace harassment and other harassment within the framework of labour relations. In order to comply with this law, the project has established tools to prevent and intervene in workplace harassment and create safe work environments which are part of the Safety and Health Policy.

For the project it is important that all workers know their rights, duties, and responsibilities within the legal framework, for this reason it is stipulated that on the first day of work, there is a full induction to explain all issues related to compliance with salary payments, social security, legal and extra-legal benefits, as well as communication channels.

2.5.3   Human Rights (VCS, 3.19)

Project activities were implemented on the First Project Activity Instance which is private land, no LPs, LCs or customary right holders' rights were involved in the transaction.

2.5.4   Indigenous Peoples and Cultural Heritage (VCS, 3.18, 3.19)

The Project Activity Instance is not in IP territory and no heritage was affected by project activities implemented during monitoring period.

2.5.5   Recognition of Property Rights (VCS, 3.7, 3.18, 3.19; CCB, G5.1)

Disputes over rights to territories and resources	N/A
Respect for property rights	The project is being carried out on private land

2.5.6   Benefit Sharing Mechanism (VCS, 3.18, 3.19)

The final benefits procured from the sale of the GHG removal credits had been utilized for the long-term sustainability of the implemented project activities and for community benefits of the

44

Bacao workers and enrolled farmers in the Impulsa Program. Impulsa farmers will continue to receive technical assistance and training workshops on topics such as improved agricultural practices, soil fertility and improved productivity, as well as Bacao workers will continue to improve their knowledge and skills on improved cacao production.

The project is implemented on private land, there will not be impacts on communities' property rights.

2.5.7   Free, Prior, and Informed Consent (VCS, 3.18, 3.19; CCB, G5.2)

Consent	Project activities for this monitoring period were implemented on private land (First Project Activity Instance). This land was purchased from a single owner, no LPs. LCs or customary right holder rights were involved, thus no FPIC consent process was conducted.
Outcome of FPIC	The Project has not encroached uninvited on private property, community property, or any other government property. The Project is operated on private land that was purchased by Bacao S.A.S who has all the legal permits and authorizations for use of land and water. The Project will follow the agreed guidelines for land use in all future Project Activity Instances and the Project Zone Instances without encroaching into any other properties.
	The Project Proponent has explicit and uncontested legal tenure and rights over the land, including the rights to benefit from income generating activities including carbon finance, and to oversee the benefits sharing available from the carbon finance.

2.5.8   Property Right Protection (VCS, 3.18, 3.19; CCB, G5.3)

The Project has not and will not involve the resettlement of any communities or households, since there are no communities living in the Project Activity Instance. Further, the Project goals involve maintaining and improving the livelihoods of communities that currently live within the Project Zone. Resettlement is not a component of the Project design or implementation.

Additionally, within the project's land search scheme, it establishes criteria for safe and adequate purchase of land, complying with national and international standards, such as the IFC performance standards, in which specific statutes are established in this regard. Therefore, the company carries out legal and environmental due diligence focused on identifying aspects related to land ownership, history of the land, deforestation, protected and conservation areas, nearby communities, including communities vulnerable, among others. Therefore, there have been no inconveniences related to property rights. Details on the due diligence report can be reviewed in Section Appendix 1: Commercially Sensitive Information. None of the Project Activities have required relocation, either voluntary or involuntary.

2.5.9   Identification of Illegal Activity (VCS, 3.19, CCB, G5.4)

The illegal activities that could impact the project results relate to illegal hunting and deforestation in the Project Activity Instance property. The project reduces this risk by implementing an environmental policy which includes the no hunting and non-trespassing item and a zero-deforestation item. These policies are reinforced through constant monitoring.

Additionally, Bacao has developed and implemented a Risk Management System that defines norms and regulations to prevent that the company, or any employee, could be involve or related to money laundering, anti-terrorist financing and financing of the production of weapons for mass destruction (SAGRILAFT). Details about this manual can be found in Appendix 1: Commercially Sensitive Information.

2.5.10 Ongoing Disputes (VCS, 3.18, 3.19; CCB, G5.5)

There are no unresolved legal disputes in the time in which the project has been developed.

Nevertheless, in February 2020, damage was identified by a neighbor, in approximately three (3) hectares, located in one side of the Upía riverbank in a conservation strip (boundary of lot 408 of the farm). The damage consisted of:

- Cut of native trees
- Use of machinery to carry fallen wood out
- Fire outbreak in the disturbed area

Since this trespass was done, Bacao reported the incident to the Regional Environmental Authority-Cormacarena though a written report (April 30, 2020) and a verification visit was done (May 20, 2020, report can be reviewed in Appendix 1: Commercially Sensitive Information. In addition, a complaint was filed with the police inspection of the Municipality of Cabuyaro in which there is an open legal process against the neighbor that generated environmental damage to the conservation area.

3 CLIMATE

3.1 Monitoring GHG Emission Reductions and Removals

3.1.1 Data and Parameters Available at Validation (VCS, 3.16)

The following tables give descriptions of each parameter used to compare baseline at project validation and remain fixed throughout the entire project crediting period. Parameter descriptions, including a data source and purpose of each metric are included. Data and parameters monitored over the course of the project operation are included in Section 3.1.2, entitled 'Data and Parameters Monitored' below.

Data / Parameter	Ai
Data unit	Ha
Description	Area of strata i
Source of data	Field measurement
Value applied	The total area for validation is 1,767 hectares.

Planting year	Area (ha)
2017	120
2019	36
2020	248
2021	475
2022	140
2024	432

2025	314	
Total	1,767	

Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of data	The parameter is used to calculate actual net GHG removals.
Comments	-

Data / Parameter	Carbon fraction of dry matter
Data unit	tC/tdm
Description	Total carbon in weight per ton of tree fresh matter
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	0.47
Justification of choice of data or description of measurement methods and procedures applied	Reference value
Purpose of data	Determination of baseline scenario and project removals
Comments	

Data / Parameter	CO2 fraction
Data unit	tCO2)/tC
Description	Total CO2 in weight per ton of C
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	44/12
Justification of choice of data or description of measurement methods and procedures applied	Reference value
Purpose of data	Determination of baseline scenario and project removals
Comments	

Data / Parameter	Root to shoot ratio
Data unit	Ton dry matter / ton dry matter
Description	Ratio between belowground and aboveground biomass
Source of data	"Root biomass variation of cocoa and implications for carbon stocks in agroforestry systems" by Borden et al. (2017), https://doi.org/10.1007/s10457-017-0122-5

47

Value applied	For the entire agroforestry system: 0.23
Justification of choice of data or description of measurement methods and procedures applied	Brief description of methodology behind the root-to-shoot ratio from Borden et al. (2019): The authors "bridge conventional methods of quantifying coarse root biomass with non-destructive application of ground penetrating radar to estimate cocoa belowground biomass (BGB) and C stocks in an agroforestry system in Ghana. BGB was measured for cocoa grown with shade trees (*Entandrophragma angolense* or *Terminalia ivorensis*) and in monoculture. BGB estimates showed good accuracy, with a relative root mean square error of 7% from excavated plants."
Purpose of data	Determination of baseline scenario and project removals
Comments	

Data / Parameter	$SOC_{REF,i}$
Data unit	t C ha-1
Description	Reference SOC stock corresponding to the reference condition in native lands (i.e. non-degraded, unimproved lands under native vegetation. normally forest) by climate region and soil type applicable to stratum i of the areas of land
Source of data	AR-AM-tool-16-V1.1.0 Table 3: Default reference SOC stocks for mineral soils
Value applied	HAC soils in Tropical, wet Climate region: 44
Justification of choice of data or description of measurement methods and procedures applied	Reference value
Purpose of data	Calculation of project removals
Comments	

Data / Parameter	$f_{LU,i}$
Data unit	Dimensionless.
Description	Relative stock change factor for baseline land-use in stratum i of the areas of land.
Source of data	AR-AM-tool-16-V1.1.0 Table 6: Relative stock change factors for different management activities on grasslands (net effect over a period of 20 years)
Value applied	All permanent grasslands: 1.0
Justification of choice of data or description of measurement methods and procedures applied	Reference value
Purpose of data	Calculation of project removals
Comments	

Data / Parameter	$f_{MG,i}$
Data unit	Dimensionless
Description	Relative stock change factor for baseline management regime in stratum i of the areas of land

48

Source of data	AR-AM-tool-16-V1.1.0 Table 6: Relative stock change factors for different management activities on grasslands (net effect over a period of 20 years)
Value applied	Severely degraded grasslands: 0.7
Justification of choice of data or description of measurement methods and procedures applied	Reference value
Purpose of data	Calculation of project removals
Comments	

Data / Parameter	$f_{IN,i}$
Data unit	Dimensionless
Description	Relative stock change factor for baseline input regime (e.g. crop residue returns, manure) in stratum i of the areas of land.
Source of data	AR-AM-tool-16-V1.1.0 Table 6: Relative stock change factors for different management activities on grasslands (net effect over a period of 20 years)
Value applied	Grassland without input of fertilizers: 1.0
Justification of choice of data or description of measurement methods and procedures applied	Reference value
Purpose of data	Calculation of project removals
Comments	

Data / Parameter	$SOC_{INITIAL,i}$
Data unit	t C ha-1.
Description	SOC stock at the beginning of the A/R CDM project activity in stratum i of the areas of land
Source of data	AR-AM-tool-16-V1.1.0 Table 3 and Table 6.
Value applied	$SOC_{INITIAL,i} = SOC_{REF,i} * f_{LU,i} * f_{MG,i} * f_{IN,i}$ $SOC_{INITIAL,i} = 44 * 1.0 * 0.7*1.0$ $SOC_{INITIAL,i} = 30.8$
Justification of choice of data or description of measurement methods and procedures applied	Reference value
Purpose of data	Calculation of project removals
Comments	

3.1.2 Data and Parameters Monitored (VCS, 3.16)

Data / Parameter	**Ai**
Data unit	Hectares
Description	Area planted under each model, in each plantation cycle
Source of data	Field measurement (GPS)
Description of measurement methods	Area planted is measured by project team's technicians after planting for true area.

and procedures to be applied	
Frequency of monitoring/recording	At each verification
Value monitored	For this first verification the verification area is 880 ha

Year	Number of hectares planted
2017	120
2019	36
2020	248
2021	475
Total	880

Monitoring equipment	GPS, Field form and registry
QA/QC procedures to be applied	Data is cross-checked in the field by Terra Global Capital during each visit and by other Entities' technical teams.
Purpose of data	Calculation of baseline emissions and project emissions.
Calculation method	N/A
Comments	Stored electronically. 100% of project area to be recorded.

Data / Parameter	Root to shoot ratio
Data unit	Ton dry matter / ton dry matter
Description	Ratio between belowground and aboveground biomass
Source of data	For *Glyricidia sepium*: "Allometric equations for biomass and carbon stock estimation of small diameter woody species from tropical dry deciduous forests: Support to REDD+" by Pati et al. (2022), https://doi.org/10.1016/j.tfp.2022.100289 For *Theobroma cacao* and other species: "Root biomass variation of cocoa and implications for carbon stocks in agroforestry systems" by Borden et al. (2017), https://doi.org/10.1007/s10457-017-0122-5
Value applied	For *Glyricidia sepium*: 0.39 For *Theobroma cacao* and other species: 0.23
Justification of choice of data or description of measurement methods and procedures applied	Brief description of methodology behind the root-to-shoot ratio for *Glyricidia sepium* from Pati et al. (2022): "We have harvested 589 individuals belonging to 23 woody species at the seedling and sapling stage from a tropical dry deciduous forest and developed species specific allometric equation and general allometric equation for aboveground biomass estimation. Further, the belowground biomass equation of 9 species were also developed using above ground biomass and root to shoot ratio as predictor variable." Brief description of methodology behind the root-to-shoot ratio for *Theobroma cacao* and other species from Borden et al. (2017): The authors "bridge conventional methods of quantifying coarse root biomass with non-destructive application of ground penetrating radar to estimate cocoa belowground biomass

50

	(BGB) and C stocks in an agroforestry system in Ghana. BGB was measured for cocoa grown with shade trees (*Entandrophragma angolense* or *Terminalia ivorensis*) and in monoculture. BGB estimates showed good accuracy, with a relative root mean square error of 7% from excavated plants."
Purpose of data	Determination of baseline scenario and project removals
Comments	NA

Data / Parameter	$\Delta C_{ACTUAL,t}$
Data unit	t CO_2-e
Description	Actual net GHG removals by sinks, in year t
Source of data	Biomass plot samples
Description of measurement methods and procedures to be applied	The sum of the verifiable changes in carbon stocks in the carbon pools within the project boundary, minus the increase in non-CO2 GHG emissions measured in CO2 equivalents by sources that are increased as a result of the implementation of an A/R CDM project activity.
Frequency of monitoring/recording	At each monitoring event
Value monitored	Result of Biomass plot samples
Monitoring equipment	Field form and registry
QA/QC procedures to be applied	Data is cross-checked in the field by Terra Global Capital during each visit and by other Entities' technical teams.
Purpose of data	Calculation of project removals
Calculation methods	Calculated as the average of sample measurements.
Comments	NA

Data / Parameter	$\Delta C_{P,t}$
Data unit	t CO_2-e
Description	Change in the carbon stocks in project, occurring in the selected carbon pools, in year t
Source of data	Biomass plot samples
Description of measurement methods and procedures to be applied	Carbon stocks in project area.
Frequency of monitoring/recording	At each verification
Value monitored	Result of Biomass plot samples
Monitoring equipment	Field form and registry
QA/QC procedures to be applied	Data is cross-checked in the field by Terra Global Capital during each visit and by other Entities' technical teams.
Purpose of data	Calculation of project removals
Calculation methods	Calculated as the average of sample measurements.
Comments	NA

Data / Parameter	$GHG_{E,t}$

51

Data unit	t CO_2-e
Description	Increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year t
Source of data	Field measurements
Description of measurement methods and procedures to be applied	Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; t CO_2e
Frequency of monitoring/recording	At each verification
Value monitored	Field measurements
Monitoring equipment	Field form and registry
QA/QC procedures to be applied	Data is cross-checked in the field by technical teams.
Purpose of data	Calculation of project removals.
Calculation methods	Calculated as the non-CO2 GHG emissions linked to the project area where biomass burning occurs.
Comments	NA.

Data / Parameter	ΔC_{TREE}
Data unit	t CO_2e
Description	Change in carbon stock in trees during the period between two points of time $t1$ and $t2$
Source of data	Biomass plots
Description of measurement methods and procedures to be applied	Carbon stock in trees during the period between two points of time
Frequency of monitoring/recording	At each verification
Value monitored	Result of biomass plots
Monitoring equipment	Field form and registry
QA/QC procedures to be applied	Data is cross-checked in the field by technical teams
Purpose of data	Calculation of project removals
Calculation methods	Calculated as the average of sample measurements.
Comments	NA

Data / Parameter	$u_{\Delta C}$
Data unit	%
Description	Uncertainty in ΔC_{TREE}
Source of data	Biomass plot samples
Description of measurement methods and procedures to be applied	Appendix 2. AR-AM-TOOL-14-v4.2
Frequency of monitoring/recording	At each monitoring event
Value monitored	Result of Biomass plot samples
Monitoring equipment	Field form and registry

QA/QC procedures to be applied	Data is cross-checked in the field by technical teams
Purpose of data	Calculation of project removals.
Calculation methods	Calculated as the uncertainty of the mean value of above-ground biomass
Comments	NA

Data / Parameter	*DBH*
Data unit	Centimeters
Description	Diameter at breast height. Diameter of trees planted measured at 1.3m height
Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	Diameter is measured at 1.30m height by technicians from the project team, for all trees planted in designated sample plots.
Frequency of monitoring/recording	At each monitoring event
Value monitored	Result of Biomass plot samples.
Monitoring equipment	Caliper or diameter tape
QA/QC procedures to be applied	Cross-checked verification on a sample basis
Purpose of data	Calculation of project removals
Calculation method	Direct measurement.
Comments	NA

Data / Parameter	**Tree height**
Data unit	Meters
Description	Height of the trees planted
Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	Tree height is measured by technicians from the project team, for all trees in designated sample plots.
Frequency of monitoring/recording	At each monitoring event
Value monitored	Result of Biomass plot samples
Monitoring equipment	Clinometer or measuring tape
QA/QC procedures to be applied	Cross-checked verification on a sample basis
Purpose of data	Calculation of carbon removals.
Calculation method	Direct measurement.
Comments	NA

Data / Parameter	$A_{DISP,t}$
Data unit	Ha
Description	Crop displaced that is not rice.
Source of data	Field measurements if found to be significant.
Description of measurement methods	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In the absence of these,

53

and procedures to be applied	SOPs from published handbooks, or from the IPCC 2006, are applied
Frequency of monitoring/recording	At every verification
Value applied	0
Monitoring equipment	N/A
QA/QC procedures to be applied	Quality control/quality assurance (QA/QC) procedures prescribed under national forest inventory are applied. In the absence of these, QA/QC procedures from published handbooks, or from the IPCC 2006, are applied
Purpose of data	Ex-post calculation of carbon removals
Calculation method	
Comments	Only to be assessed if for crop displacement that is not rice.

3.1.3   Monitoring Plan (VCS, 3.16, 3.20)

The monitoring plan for the project has been designed as part of this plan, the main studies were conducted by a third party for verification (as shown in
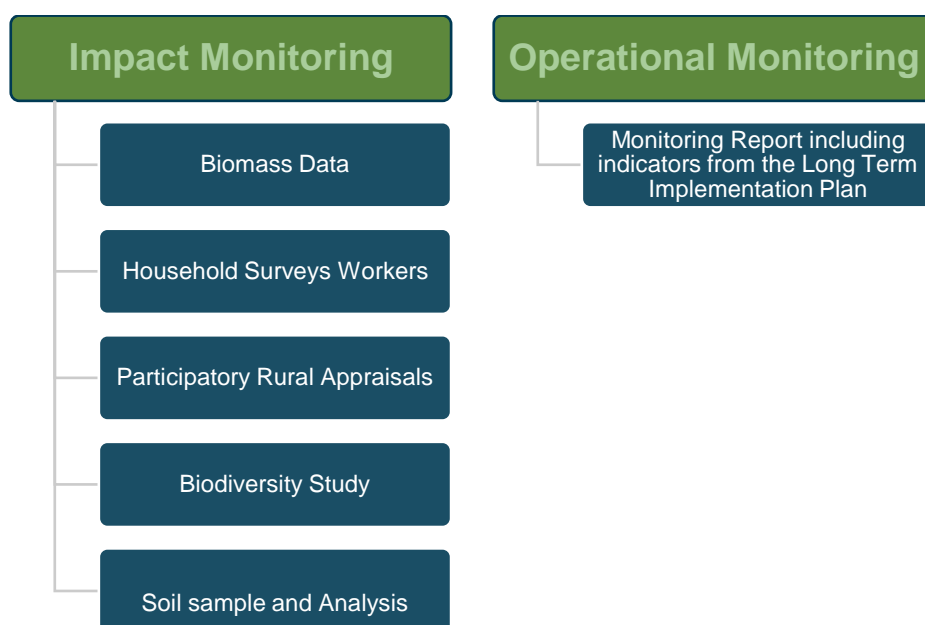
Figure 4) to gather data biomass data that contribute to the impact indicators of the project.

54

Impact Monitoring

- Biomass Data
- Household Surveys Workers
- Participatory Rural Appraisals
- Biodiversity Study
- Soil sample and Analysis

Operational Monitoring

- Monitoring Report including indicators from the Long Term Implementation Plan
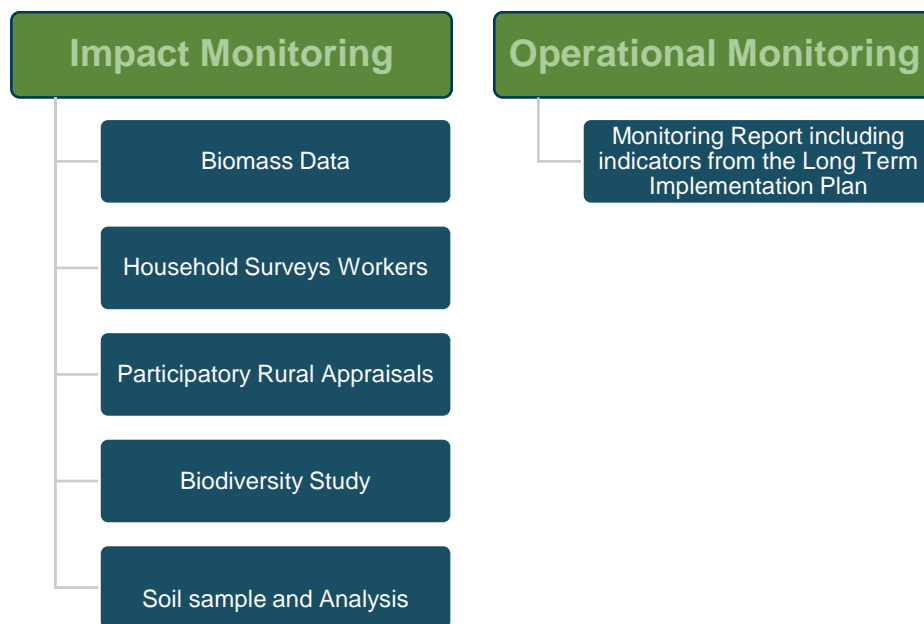
Figure 4. Operational and Impact monitoring reports required as part of the project's monitoring plan.

Climate Monitoring is assessed through biomass inventories and paired with remote sensing and spatial data. Biomass inventories follow a Standard Operation Procedure (SOP) that keeps measurement consistency between field crews and throughout the years of the project. The full SOP is available to the VVB. Carbon Pools included in the sampling include:

- Tree biomass greater than 1 cm DBH
- Standing Deadwood greater than 5 cm DBH
- Lying deadwood with a diameter greater than 5 cm at center
- Litter
- Soil Organic Carbon

To estimate carbon accumulating in live tree biomass, the diameter at breast height (DBH) measurements from all *live* trees >1cm in diameter were taken, all *standing dead* trees >5 cm in diameter, and every downed Deadwood > 5 cm in diameter along two 10m transects. DBH is represented by the diameter of a tree trunk consistently measured at 1.3 meters above the ground, in accordance with myriad peer-reviewed methodologies. Windbreaks were stratified by planting date and measured along transects. Destructive sampling was used to measure litter. Soil samples were continuously monitored from 2016. Baseline conditions had low organic carbon content throughout surface levels throughout the project boundary. Samples were taken every year throughout the last five years, with results included in the emission reductions calculations.

A clear and standard operating procedure was followed for recording, storing, and aggregating data for analysis. Field crew leaders ensured datasheets were properly filled out in the field, as well as numerous QA/QC procedures were followed. All raw data was compiled into one binder for data entry and stored that the Bacao Office. Scans of field datasheets and geotagged photos are stored digitally and will be for the life of the project.

Sampling activities were carried out in 61 biomass plots that include 55 plots in project area, and 6 plots in pasture areas outside the project area to monitor the baseline scenario. Additionally, 10 transects were randomly established across each stratum or planting year to estimate the biomass of windbreaks trees. Along with the carbon pools in the AR-ACM0003 methodology, soil organic carbon

55

(SOC) was also completed by Bacao SAS, contracted with *Estudios Agrilogico de America Latina SAS.*

3.1.4   Dissemination of Monitoring Plan and Results (VCS, 3.18; CCB, CL4.2)

The following meetings were held to disseminate the Monitoring results:

Participants	Purpose
Workers	Informational meeting, socialize MR summary and process for comments and feedback
Smallholder Farmers	Informational meeting, socialize MR summary and process for comments and feedback
Local authorities	Writing communication informing of the verification process

Results of the Monitoring Period were shared and reported to stakeholders, which has been done by Bacao and Impulsa.

3.2   Quantification of GHG Emission Reductions and Removals

3.2.1   Baseline Emissions (VCS, 3.15)

The baseline conditions in the Project Activities Instance include insignificant amounts of trees, or shrubs thus emissions are calculated to be zero over the crediting period. To verify these conditions a biomass inventory carried out in April 2022 in the areas in Primavera and Espejuelos that are part of Project Activity Instances that had yet to be prepared or planted, measured aboveground tree biomass, litter, and deadwood. These inventories found that biomass was negligible (See biomass inventory for details). In addition, there were soil samples taken in 2016 in the unprepped and unplanted areas, showing that the organic carbon content is low on the surface (0-30 cm) and very low in the deeper levels. The average bulk density throughout the area shows a value of 1.49 g/cm3 and the real density between 2.67 g/cm3, which indicates compaction. The average carbon stock was found to be 16.6 tC ha^{-1} from an estimated 0-30 cm (actual range 0-17 and 0-38cm). The report states that the soil presents good physical properties, with low content of macro pores which are indicative of degradation due to compaction and deterioration of the structure (Fino, 2016). Baseline carbon is considered to be 16.6 tC per hectare and is conservatively not determined to decrease overtime. Any increase in carbon above the baseline is considered a removal.

The non-forest area in the Project Activity Instance was confirmed to be non-forest ten years before project start and is degrading rangeland and cropland. In the baseline carbon is still continually lost from soil, but it is conservatively omitted. This follows the CDM AR TOOL14. According to section 5 of the tool conditions under which carbon stock and change in carbon stock may be estimated as zero. Carbon stock in trees in the baseline can be accounted as zero if all of the following conditions are met:

> (a) The pre-project trees are neither harvested, nor cleared, nor removed throughout the crediting period of the project activity.

3.2.2   Project Emissions (VCS, 3.15)

The current net estimate of carbon removals was made for the entire eligible plantation area, following Section 5.5 of the methodology AR-ACM0003 A/R "Large scale Consolidated Methodology: Afforestation and reforestation of lands except wetlands version 2.0". The actual net GHG removals in carbon sinks are calculated using the equation 2 of the AR-ACM0003 A/R Methodology:

$$\Delta C_{ACTUALt} = \Delta C_{P,t} - GHG_{E,t}$$

Where:

$\Delta C_{ACTUALt}$ Actual net GHG removals by sinks, in year t; tCO$_2$e.

$\Delta C_{P,t}$ Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; tCO$_2$e.

$GHG_{E,t}$ Increase in non-CO$_2$ GHG emissions within the project boundary as a result of the implementation of the project activities, in year t; tCO$_2$e

Fire from biomass burning was determined using the CDM tool "A/R Methodological Tool Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity" (Version 4.0.0). Following the tool, emissions from biomass burning is zero where slash-and-burn is a common practice in the baseline, and fire has been used in the area at least once during the period of ten years preceding the start of the A/R CDM project activity:

In Colombia the use of fire to prepare the land for crops and later pastures is a common practice. Fire has been used as a low-cost tool for land preparation in most regions (Lupi, 2020). It has been documented the traditional practice of land occupation were a family moves to a rural area and once the trees of commercial size have been extracted, the remaining forest mass, without any immediate commercial value, is considered more useful if it is felled and burned for the production of a few crops of corn or rice, followed by the establishment of grasses (Norberto Velez-Escobar, 2010)

The practice of controlled burning in agricultural activities is allowed by Colombian Law (Colombian Ministry of Enviroment, 2005). The National Ministry of Environment in the Act 532 of 2005 establishes the prohibition of the practice of open burning in rural areas, except controlled burning in agricultural and mining activities that are carried out for the preparation of the soil in agricultural activities, the stripping of the land in mining activities, the harvesting of crops or the disposal of organic residues.

On the other hand, the emissions generated by the activities of the project attributed to the removal of herbaceous vegetation, the use of fossil fuels, the application of fertilizers, the use of wood, the decomposition of leaf litter and fine roots, the construction of access roads within the project area, and transport are considered insignificant ($GHG_{E,t} = 0$). The actual project net GHG removals occurring in the selected carbon pools in year t are calculated as follows:

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta C_{LI\_PROJ,t} + \Delta SOC_{AL,t}$$

Where:

$\Delta C_{P,t}$:   Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; tCO$_2$e.

$\Delta C_{TREE\_PROJ,t}$:   Change in carbon stock in tree biomass in project in year t; tCO$_2$e.

$\Delta C_{SHRUB_{PROJ},t}$:   Change in carbon stock in shrub biomass in project in year t; tCO$_2$e.

$\Delta C_{DW\_PROJ,t}$:   Change in carbon stock in dead wood (DW) in project in year t; tCO$_2$e.

57

$\Delta C_{LI\_PROJ,t}$:   Change in carbon stock in litter (LI) in project in year t; tCO$_2$e.

$\Delta SOC_{AL,t}$:   Change in carbon stock in soil organic carbon (SOC) in project, in year t; tCO$_2$e.

3.2.2.1   Strata definition

According to the "AR-ACM0003 A/R Methodology", if biomass distribution over the project area is not homogeneous, stratification should be carried out to improve the precision of biomass estimation. For project removals estimations, the strata were defined by planting year: 2017, 2019, 2020, and 2021 (see Table 8). Note that no planting occurred in 2018, hence there is no 2018 stratum. Trees planted in 2022 were too small to measure during the inventories, so this year's planted areas are not included in this monitoring report.

For biomass estimation, 55 permanent plots of 100 m² (0.01 ha) were randomly established in the project area (see Table 8). In these plots, height and diameter at breast height (DBH) were measured for all individuals with a diameter greater than 1 cm.

Table 8. Strata definition

Strata (Planting year)	Area (ha)	N plots
2017	120	10
2019	36	7
2020	248	13
2021	475	25
Total	880	55

The number of required plots was calculated according to Tool 03 of the AR-ACM0003 methodology as follows:

$$n = \left(\frac{t_{Val}}{E}\right)^2 * \left(\sum_i w_i * s_i\right)^2$$

Where:

n	Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless
t_{Val}	Two-sided Student's t-value at infinite degrees of freedom for the required confidence level; dimensionless
E	Acceptable margin of error (i.e. one-half the confidence interval) in estimation of biomass stock within the project boundary; t d.m. ha-1
w_i	Relative weight of the area of stratum i (i.e. the area of the stratum i divided by the project area); dimensionless
s_i	Estimated standard deviation of biomass stock in stratum i; t d.m. ha-1

58

i *1, 2, 3, … biomass stock estimation strata within the project boundary*

For an acceptable error of 10% 24 plots would be required for the biomass estimation in the project area. 55 plots have been used; therefore, it is expected that the error would be minor than 10% (see Section 3.2.3.1

3.2.2.2 Carbon stocks in trees

The estimation of carbon stocks in trees was made based on Section 8.2 of the tool, "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (Version 04.2)" of the AR-ACM0003 methodology.

Change in carbon stock in trees is calculated as follows:

$$\Delta C_{TREE} = C_{TREE,t2} - C_{TREE,t1}$$

Where*:*

ΔC_{TREE} Change in carbon stock in trees during the period between two points of time *t1* and *t2*; t CO2e

$C_{TREE,t1}$ Carbon stock in trees as estimated at time t1; tCO_2e.

$C_{TREE,t2}$ Carbon stock in trees as estimated at time t2; tCO_2e

$C_{TREE,t1}$ is equal to zero, since as previously explained, the biomass of the trees in the area before the project was not considered for carbon estimates.

Carbon stock in trees is estimated as follows:

$$C_{TREE} = \frac{44}{12} * CF_{TREE} * A * b_{TREE}$$

$$b_{TREE} = AGB_{TREE} + BGB_{TREE}$$

Where*:*

C_{TREE} Carbon stock in tree biomass; tCO_2e.

CF_{TREE} Carbon fraction of tree biomass; tC/t d.m.

A Sum of areas of the strata; ha.

b_{TREE} Tree biomass strata per hectare; t d.m. ha^{-1}

AGB_{TREE} Tree above ground biomass per hectare; t d.m. ha^{-1}

BGB_{TREE} Tree below ground biomass per hectare; t d.m. ha^{-1}

Above-ground biomass in trees was estimated via allometric equations using height and DBH tree measurements on permanent sampling plots. As the trees measured for this program were recently planted, an allometric equation for small diameter trees was found to be most accurate. Equation used for all species was from van Breugel (2011) for secondary tropical forests with DBH between 1 cm and 26 cm as follows:

$$AGB_{TREE} = exp(-1.13 + 2.267 * Ln(DBH) + 1.186 * Ln(D_{WOOD}))$$

Where:

AGB_{TREE}	Above ground biomass per tree; kg
DBH	Diameter at breast height; cm
D_{WOOD}	Tree wood density factor. 0.42 for *Theobroma cacao,* 0.58 for *Gliricidia sepium*, and 0.54 for other species (IPCC, 2003).

The carbon stock in belowground biomass was determined using root-shoot ratios and aboveground carbon stock via the following equation:

$$BGB_{TREE} = AGB_{TREE} * R_j$$

Where:

BGB_{TREE}	Tree below ground biomass per tree; kg
AGB_{TREE}	Tree above ground biomass per tree; kg
R_j	Root-to-shoot ratio for trees; dimensionless.

The Root-to-shoot (R_j) value was determined to be 0.23 for *Theobroma cacao* (Borden et al., 2017). And 0.39 for *Glyricidia sepium* (Pati et al., 2022)

Total tree biomass was calculated as follows:

$$b_{TREE} = AGB_{TREE} + BGB_{TREE}$$

Where:

b_{TREE}	Total tree biomass; kg
AGB_{TREE}	Tree above ground biomass; kg
BGB_{TREE}	Tree below ground biomass; kg

Then tree biomass was summed to determine plot-level tree biomass. This is completed by (1) summing the biomass per tree species within each plot, (2) multiplying this number by the plot area (0.01 ha), and (3) multiplying by 0.001 to set units in ton d.m. ha-1. Then, the average biomass change (ton d.m. ha-1) for each stratum was calculated by averaging the biomass measurements from the plots within the corresponding stratum.

Finally, the carbon stock change in living biomass for each stratum, was calculated as follows:

$$C_{TREE} = \frac{44}{12} * CF_{TREE} * A * b_{TREE}$$

Where:

C_{TREE} Carbon stock in tree biomass; tCO$_2$e.

CF_{TREE} Carbon fraction of tree biomass; tC/t d.m.

A Sum of areas of the strata; ha.

b_{TREE} Tree biomass strata per hectare; t d.m. ha^{-1}

3.2.2.3 Carbon stocks in deadwood

The dead trees, both standing and lying, were identified in the biomass plots. For the standing dead trees, DBH and height were measured, and their state of decomposition was identified according to Table 9. For the fallen dead trees, the total length and the diameter at the midpoint were measured. The state of decomposition was classified according to Table 10.

Table 9. Descomposition class and densify factor for standing dead trees

Decomposition class	Description	Decomposition factor
Class 1	Tree with branches and twigs, but no leaves	0.97
Class 2	Tree without twigs, but with large and small branches	0.97
Class 3	Tree with only large branches	0.86
Class 4	Only trunk, no branches	0.53

Source: Adapted from Harmon et al., 2011. Differences Between Standing and Downed Dead Tree Wood Density Reduction Factors: A Comparison Across Decay Classes and Tree Species. Table 7, Recommended by VM0047 (https://www.nrs.fs.usda.gov/pubs/rp/rp_nrs15.pdf)

Table 10. Descomposition class and densify factor for lying dead trees

Decomposition class	Description	Decomposition factor
Class 1	Hardwood; a machete does not penetrate the wood with a single strike	0.94

Decomposition class	Description	Decomposition factor
Class 2	Intermediate wood; a machete partially penetrates the wood with a single strike	0.75
Class 3	Rotten/crumbly wood; a machete cuts through the wood with a single strike	0.33

Source: Adapted from Harmon et al., 2011. Differences Between Standing and Downed Dead Tree Wood Density Reduction Factors: A Comparison Across Decay Classes and Tree Species. Table 7, Recommended by VM0047 (https://www.nrs.fs.usda.gov/pubs/rp/rp_nrs15.pdf)

Standing biomass in standing dead trees was estimated based on the equation from Chave et al. (2005) as follows:

$$B_{DWS\_TREE} = DF * exp(-1.499 + 2.148 * Ln(DBH) + 0.207 * Ln(DBH)^2 + 0.028 * Ln(DBH)^3)$$

Where:

B_{DWS_TREE} Biomass of dead wood in standing dead trees; kg/tree

DBH   Diameter at breast height; cm

DF Decomposition factor according to Table 9.

Dead wood biomass in standing was determined at plot-level by (1) summing the dead wood biomass per tree within each plot, (2) multiplying this number by the plot area (0.01 ha), and (3) multiplying by 0.001 to set units in t d.m. ha-1. Then, the average deadwood change (t d.m. ha-1) for each stratum was calculated by averaging the biomass measurements from the plots within the corresponding stratum.

Biomass in lying dead trees was estimated using the equation from van Wagener (1968) as follows:

$$B_{DWL\_TREE} = WoodDens * \left(DCL^2 * {\pi^2}/{8L}\right) * DF$$

Where:

B_{DWL_TREE} Biomass of dead wood in lying dead trees; t d.m. ha-1

DCL   Diameter at center of length; cm

$WoodDens$ Wood density.

L   Transect length: 10 m

DF Decomposition factor according to Table 10

According to Global Wood Density Database by (Zanne, 2009), in South America, the wood density for *Theobroma cacao* is 0.46 gm cm^{-3}, and the wood density for *Gliricidia sepium* is 0.53 gm cm^{-3}, therefore a wood density for lying dead trees was assumed as 0.5 gm cm^{-3} in average.

The biomass of lying dead trees was summed at the transect level by adding the dead wood biomass per tree within each transect. Next, the average deadwood biomass (t d.m. ha^{-1}) for each stratum was calculated by averaging the biomass measurements from the transects within that stratum.

Next, the total dead wood biomass was calculated by summing the biomass of standing dead trees and lying dead trees as follows:

$$b_{DW} = B_{DWS\_TREE} + B_{DWL\_TREE}$$

Where*:*

b_{DW} — Dead wood biomass of the strata per hectare; t d.m. ha^{-1}

B_{DWS_TREE} — Deadwood biomass of the strata per hectare in standing trees; t d.m. ha^{-1}

B_{DWL_TREE} — Deadwood biomass of the strata per hectare in lying trees; t d.m. ha^{-1}

Finally, the carbon stock change in dead wood biomass for each stratum, was calculated as follows:

$$C_{DW} = \frac{44}{12} * CF_{TREE} * A * b_{DW}$$

Where*:*

C_{DW} — Carbon stock in tree biomass; tCO$_2$e.

CF_{TREE} — Carbon fraction of tree biomass; tC/t d.m.

A — Sum of areas of the strata; ha.

b_{DW} — Dead wood biomass of the strata per hectare; t d.m. ha^{-1}

3.2.2.4 Carbon stocks in litter

Litter corresponds to all dead and decomposing material less than 5cm in diameter after removing aboveground non-tree biomass. Litter is collected from three 0.5m radius subplots, inside each biomass plot. In the laboratory, the dry weight of the material is determined; the average value from the three subplots is considered representative of the plot. Then litter was summed to determine the value at plot-level. Then, the average change in Litter (t d.m. ha-1) for each stratum was calculated by averaging the biomass measurements from the plots within the corresponding stratum.

3.2.2.5 Carbon stocks in soils (SOC)

For estimating carbon stocks in soils (SOC) 12 samples in pastures outside the project were taken to determine the carbon content before the project start. On the other hand 95 samples were taken in

the project area (see Table 12) For more details, see the Annex file "1.5 Informe Tecnico Uso de Suelo Espejuelos.pdf"

Table 11. Number of samples for soil carbon estimates

Strata (Planting year)	N soil samples
2017	23
2019	2
2020	22
2021	48
Total	95

To determine the carbon content, the samples taken in field were processed in laboratory. The carbon stock change in soils per each stratum was estimated as the difference between the average in samples outside the project area (baseline) and the average of the samples taken in the corresponding stratum.

3.2.2.6   Total carbon stocks

Total carbon in pools including tree biomass, standing deadwood, lying deadwood, litter and soil organic matter is displayed as the SOM above the baseline. Table 12 displays each biomass pool.

Table 12. Biomass by pool

Planting Year [-]	Tree Biomass [MGDM ha-1]	Litter [MGDM ha-1]	Standing Dead Biomass [MGDM ha-1]	Down Dead Biomass [MGDM ha-1]	Soil Organic Matter [MGDM ha-1]	Total Biomass [MGDM ha-1]
2017	31.26	5.73	8.13	0.17	7.60	52.89
2019	14.80	3.09	15.59	0.04	4.95	38.47
2020	13.85	0.61	5.35	0.01	33.07	52.89
2021	5.11	0.15	0.00	0.01	11.96	17.24

In addition, tree biomass was identified by species and shown in Table 13. Note that other tree species identified in the field were not included here, as these trees can also be found in the baseline.

Table 13. Biomass by Tree Species

Planting Year	*Theobroma cacao*	*Gliricidia sepium*	*Cariniana pyriformis*	Total Tree Biomass
[-]	[MGDM ha-1]	[MGDM ha-1]	[MGDM ha-1]	[MGDM ha-1]
2017	23.93	6.81	0.52	31.26
2019	6.29	7.64	0.87	14.80
2020	0.32	12.53	0.99	13.85
2021	0.04	4.98	0.09	5.11

Table 14 shows the total carbon stock summarized per planting year.

Table 14. Total Carbon in Project Area at end of the Monitoring Period

Planting Year	Total Biomass	Total C	Total CO2e
[-]	[MGDM ha-1]	[tC ha-1]	[tCO2e ha-1]
2017	52.89	25.69	94.21
2019	38.47	18.62	68.29
2020	52.89	28.50	104.48
2021	17.24	9.42	34.53

3.2.3   Leakage Emissions (VCS, 2.5, 3.2, 3.6, 3.15, 4.3)

For the quantification of leakage, the methodology AR-ACM0003 version 2.0 was followed and the AR-TOOL15 A/R Methodological tool Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity was applied. Displacement of an agricultural activity by itself does not result in leakage emission. Leakage emissions occur when the displacement leads to an increase in GHG emissions relative to the GHG emissions attributable to the activity as it exists within the project boundary. The pre-project agricultural activities identified in the baseline were cattle grazing and rice crops cultivation.

Leakage emission attributable to the displacement of grazing activities is considered insignificant and hence accounted as zero as justified in Table 15.

65

Table 15. Leakage emission due to the displacement of grazing activities.

a) Animals are displaced to existing grazing land and the total number of animals in the receiving grazing land (displaced and existing) does not exceed the carrying capacity of the grazing land;	The estimated stock rates for the livestock in the project areas prior to the start of the project were less than 1 hectare.
	According to ANeIA (Agrobusiness, Food Supply Chain, and Nature Tourism, 2019), in the Meta Department, cattle occupancy is 0.6 animals per hectare, whereas the optimal capacity is 2 animals per hectare (ANeIA, 2019). The national average ranges from 1.5 to 1.8, indicating that the Meta Department is below both its optimal capacity and the national average (Contexto Ganadero, 2022).
	It is unlikely that the previous owners would move their livestock to an area over capacity.
	Farms around the project area commonly have grazing areas under carrying capacity, with fences installed prior to the project implementation. For that reason, the displacement of grazing activities is considered insignificant and accounted as zero.

Fuelwood collection activities were not present at the Project Activity Instance Area prior to the project start. The previous owner of the property reported that no fuelwood collection activities were carried out in the actual project area.

For these Project Activity Instances, the areas before the project start date were used as low-productivity rice crops. Farmers typically default to rice cultivation of unproductive areas in periodic or annual systems. Land deforested before 2017 was primarily used for cattle grazing, followed by rice, or left as a fallow because of soil degradation. Rice crop cultivation is a way for farmers to use as much low-productive and over-grazed land as possible and is for self-consumption often for the farmer's subsistence. Therefore, it is not likely that project activity would displace rice cultivation (or harm productivity), and any predicted displacement would likely be in other degraded grassland areas. Displacement of agriculture activities is considered insignificant, and leakage is considered nil.

When new instances of the project activity are included in the project, leakage will be reassessed.

3.2.3.1 Sampling Error and Uncertainty

The average and the standard deviations are calculated for each stratum with the total tree biomass per sample plot (m^3 ha^{-1}) (grouping the plots included in each stratum). Then, the sampling error is obtained using Tool 14 of the AR-ACM0003 methodology:

$$u_c = \frac{t_{val} * \sqrt{\sum_{i=1}^{m} w_i^2 * \frac{s_i^2}{n_i}}}{b_{TREE}}$$

$$b_{TREE} = \sum_{i=1}^{m} w_i * b_{TREE_i}$$

Where:

b_{TREE} Average tree biomass in total eligible area; ton d.m. ha^{-1}

66

w_i	Ratio of the area of stratum i to the sum of areas of tree biomass estimation strata
b_{TREE_i}	Average tree biomass in stratum i; ton d.m. ha^{-1}
u_c	Uncertainty (%)
t_{val}	Two-sided Student's t-value for a confidence level of 90% and degrees of freedom equal to $n - M$, where n is total number of sample plots within the tree biomass estimation strata and M is the total number of tree biomass estimation strata
s_i	Standard variance of mean tree biomass in stratum i
n_i	Number of sample plots in stratum i

Results of uncertainty calculations are presented in Table 16. Sampling error for the current monitoring period was estimated as 2.7%, according to the methodological tool there is no discount necessary (u_c<10%). These estimations can be found on the ex-post estimations spreadsheet.

Table 16 Monitoring sampling error

Sampling error	
Plot area (m²)	100
Total area (ha)	880
No. of plots established	55
t_{val} (0,05; n-1)	1.7
Uncertainty (U_c)	2.7%
Sampling error (E)	1.0%

3.2.4   GHG Emission Reductions and Carbon Dioxide Removals (VCS, 3.15, 4.1)

i) State the non-permanence risk rating (%)	*26%*
Has the non-permanence risk report been attached as either an appendix or a separate document?	☒ Yes ☐ No
For ARR and IFM projects with harvesting, state, in tCO2e, the Long-term Average (LTA).	200,936

Has the LTA been updated based on monitored data, if applicable?	☐ Yes ☒ No The Long-Term Average (LTA) hasn't been updated since it's the initial monitoring event. It will be revised during the second verification, after acquiring representative data on the project's carbon stock.
State, in tCO2e, the expected total GHG benefit to date.	56,103
If a loss occurred (including a loss event or reversal), state the amount of tCO2e lost:	*NA*

Estimated (ex-ante) GHG Emission Reductions and Removals for the entire project crediting period are presented in Table 17

Table 17. Estimated GHG Emission Reductions and Removals

Vintage period	Estimated baseline emissions (tCO2e)	Estimated project emissions (tCO2e)	Estimated leakage emissions (tCO2e)	Estimated reductions (tCO2e)	Estimated removals until LTA* (tCO2e)	Estimated buffer pool allocation (tCO2e)	Estimated total VCU issuance (tCO2e)
06-Jul-2017 to 05-Jul-2018	31	0	0	0	291	(76)	215
06-Jul-2018 to 05-Jul-2019	31	0	0	0	2,142	(557)	1,585
06-Jul-2019 to 05-Jul-2020	31	0	0	0	2,049	(533)	1,516
06-Jul-2020 to 05-Jul-2021	31	0	0	0	2,592	(674)	1,918
06-Jul-2021 to 05-Jul-2022	31	0	0	0	7,403	(1,925)	5,478
06-Jul-2022 to 05-Jul-2023	31	0	0	0	14,348	(3,730)	10,617
06-Jul-2023 to 05-Jul-2024	31	0	0	0	15,436	(4,013)	11,423
06-Jul-2024 to 05-Jul-2025	31	0	0	0	19,857	(5,163)	14,694
06-Jul-2025 to 05-Jul-2026	31	0	0	0	22,430	(5,832)	16,598
06-Jul-2026 to 05-Jul-2027	31	0	0	0	18,627	(4,843)	13,784
06-Jul-2027 to 05-Jul-2028	31	0	0	0	15,696	(4,081)	11,615
06-Jul-2028 to 05-Jul-2029	31	0	0	0	14,094	(3,664)	10,429
06-Jul-2029 to 05-Jul-2030	31	0	0	0	12,691	(3,300)	9,391
06-Jul-2030 to 05-Jul-2031	31	0	0	0	11,649	(3,029)	8,620
06-Jul-2031 to 05-Jul-2032	31	0	0	0	10,844	(2,819)	8,024
06-Jul-2032 to 05-Jul-2033	31	0	0	0	10,201	(2,652)	7,549
06-Jul-2033 to 05-Jul-2034	31	0	0	0	9,675	(2,516)	7,160
06-Jul-2034 to 05-Jul-2035	31	0	0	0	9,237	(2,402)	6,835

Vintage period	Estimated baseline emissions (tCO2e)	Estimated project emissions (tCO2e)	Estimated leakage emissions (tCO2e)	Estimated reductions (tCO2e)	Estimated removals until LTA* (tCO2e)	Estimated buffer pool allocation (tCO2e)	Estimated total VCU issuance (tCO2e)
06-Jul-2035 to 05-Jul-2036	31	0	0	0	1,676	(436)	1,240
06-Jul-2036 to 05-Jul-2037	31	0	0	0	-	-	-
06-Jul-2037 to 05-Jul-2038	0	0	0	0	-	-	-
06-Jul-2039 to 05-Jul-2040	0	0	0	0	-	-	-
06-Jul-2040 to 05-Jul-2041	0	0	0	0	-	-	-
06-Jul-2042 to 05-Jul-2043	0	0	0	0	-	-	-
06-Jul-2043 to 05-Jul-2044	0	0	0	0	-	-	-
06-Jul-2044 to 05-Jul-2045	0	0	0	0	-	-	-
06-Jul-2045 to 05-Jul-2046	0	0	0	0	-	-	-
06-Jul-2046 to 05-Jul-2047	0	0	0	0	-	-	-
06-Jul-2047 to 05-Jul-2048	0	0	0	0	-	-	-
06-Jul-2048 to 05-Jul-2049	0	0	0	0	-	-	-
06-Jul-2049 to 05-Jul-2050	0	0	0	0	-	-	-
06-Jul-2050 to 05-Jul-2051	0	0	0	0	-	-	-
06-Jul-2051 to 05-Jul-2052	0	0	0	0	-	-	-
06-Jul-2052 to 05-Jul-2053	0	0	0	0	-	-	-
06-Jul-2053 to 05-Jul-2054	0	0	0	0	-	-	-
06-Jul-2054 to 05-Jul-2055	0	0	0	0	-	-	-
06-Jul-2055 to 05-Jul-2056	0	0	0	0	-	-	-
06-Jul-2056 to 05-Jul-2057	0	0	0	0	-	-	-
06-Jul-2057 to 05-Jul-2058	0	0	0	0	-	-	-
06-Jul-2058 to 05-Jul-2059	0	0	0	0	-	-	-
Total	**620**	**0**	**0**	**0**	**200,936**	**(52,243)**	**148,693**

* Averaged over 68 years to include cacao stand replacements (2 production cycles).

Ex post net anthropogenic GHG removals by sinks is calculated by taking the actual net GHG removals by carbon sinks and subtracting both the baseline net GHG removals by sinks and total leakage. Thus:

$$C_{AR-CDM} = C_{ACTUAL} - C_{BSL} - LK$$

Where:

C_{AR-CDM} = Net anthropogenic GHG removals by sinks, in tonnes CO_{2-e}

C_{ACTUAL} = Actual net GHG removals by sinks, in tonnes CO_{2-e}

C_{BSL} = Baseline net GHG removals by sinks, in tonnes CO_{2-e}

69

LK = Leakage, in tonnes CO_{2*e}

As stated in above, both baseline emissions (C_{BSL}) and total leakage (LK) were determined to be zero. Therefore, we modify the above calculation, where net anthropogenic GHG removals by sinks are equal to the actual net GHG removals by sinks:

$$C_{AR-CDM} = C_{ACTUAL}$$

Table 18 shows the carbon removals of the project for the current monitoring period.

Table 18. Total and annual CO_2e for Monitoring Period

Planting year	Area (ha)	Total CO2e
2017	120	11,313
2018	0	0
2019	36	2,441
2020	248	25,936
2021	475	16,414
Total CO$_2$		56,103
Total annual CO$_2$e		11,221

Table 19 shows the total carbon credits (VCUs) of the project for the current monitoring period.

Table 19. Carbon credits of the project for the current monitoring period

Vintage period	Baseline emissions (tCO2e)	Project emissions (tCO2e)	Leakage emissions (tCO2e)	Buffer pool allocation (tCO2e)	Reductions VCUs (tCO2e)	Removals VCUs (tCO2e)
06-Jul-2017 to 31-Dec-2017				(339)		1,305
01-Jan-2018 to 31-Dec-2018				(598)		2,300
01-Jan-2019 to 31-Dec-2019				(721)		2,775
01-Jan-2020 to 31-Dec-2020				(2,815)		10,826
01-Jan-2021 to 31-Dec-2021				(6,982)		26,853
01-Jan-2022 to 05-Jul-2022				(3,132)		12,045
Total				(14,587)		56,103

Table 20 shows a comparison between the estimated removals vs the achieved removals of the project for the current monitoring period. Since the ex-ante estimates were for full years and the project started on July 6, 2017, the ex-ante values were adjusted proportionally to match the analyzed vintage periods for comparison.

70

Table 20 Estimated removals vs Achieved removals for the monitoring period

Vintage period	Ex-ante estimated removals (tCO2e)	Achieved removals (tCO2e)	Difference Expost - Exante (tCO2e)	Percent difference	Explanation for the difference
06-Jul-2017 to 31-Dec-2017	142	1,305	1,163	820%	
01-Jan-2018 to 31-Dec-2018	2,136	2,300	164	8%	The overall difference for the carbon pools is 160%. While the Tree Biomass pool showed only an 8% difference, indicating good model performance for woody biomass, the largest discrepancies were found in the Litter (993%), Deadwood (2,984%), and Soil Organic Carbon (528%) pools.
01-Jan-2019 to 31-Dec-2019	2,043	2,775	732	36%	
01-Jan-2020 to 31-Dec-2020	2,592	10,826	8,234	318%	
01-Jan-2021 to 31-Dec-2021	7,382	26,853	19,470	264%	
01-Jan-2022 to 05-Jul-2022	7,272	12,045	4,773	66%	
Total	**21,568**	**56,103**	**34,535**	**160%**	

Given the significant difference between the ex-ante estimated removals and the achieved removals (ex-post values) for this monitoring period, an analysis was conducted to determine which carbon pools contributed most to the discrepancy. The results are presented in Table 21.

Table 21. Estimated removals vs Achieved removals by Carbon Pools for the monitoring period

Carbon Pool	Ex-ante estimated removals (tCO2e)	Achieved removals (tCO2e)	Difference Expost - Exante (tCO2e)	Percent difference
Tree Biomass (AGB+ BGB)	16,169	17,470	1,301	8%
Litter	162	1,767	1,606	993%
Deadwood	162	4,986	4,824	2984%
SOC	5,075	31,879	26,804	528%
Total	**21,568**	**56,103**	**34,535**	**160%**

The observed difference for the tree Biomass pool is 8%, indicating that the model used to predict carbon changes in woody biomass performs well.

The differences observed in the litter and deadwood pools—993% and 2,984%, respectively—can be attributed to the default value of 1% of aboveground biomass used for ex-ante estimates, as suggested by the methodology. Field observations, however, indicate that litter represents an average of 9% of aboveground biomass, while deadwood accounts for 29%. The discrepancy is largely due to the project's management practices: herbaceous species are planted in the crop understory to reduce chemical fertilizer use and improve soil water retention, while *G. sepium* trees undergo extensive pruning, harvesting, and girdling to support *T. cacao* growth. These practices leave dead trees in the field and add pruning residues as mulch, enhancing the litter and deadwood carbon pools. Although non-tree herbaceous plants are not included as a carbon pool, their litter contributes significantly, resulting in higher carbon levels in these pools than captured by the methodology's default values.

The 528% difference in Soil Organic Carbon (SOC) reflects the ex-ante model's inability to predict the carbon stock increases observed during initial monitoring. This discrepancy is partly due to the decomposition of litter and deadwood from pruned and girdled *G. sepium* trees, as well as the nitrogen-fixing herbaceous plants added to the cacao understory to enhance soil water retention. These

71

practices enrich the humic layer and O-horizon, significantly boosting soil carbon stocks—an increase not captured by the methodology's default values.

3.3   Optional Criterion: Climate Change Adaptation Benefits

This project has Gold Level exceptional climate benefits. The project has positively impacted local land use scenarios in numerous ways.

Flooding: After flooding in 2017, there have been no major floods in the project area. Project Activities direct water into conservation areas and morichales which reduce flash-flooding conditions and allow for slow release of water into surrounding rivers. In addition, increased tree cover as well as improved soil conditions, though activities such as mulching, has helped increase water absorption as well as slow release of water, increasing soil water capacity and reducing erosion.

Fire: Most of the fires in the savannas of Los Llanos Orientales of Colombia area caused by humans, mainly farmers that use fire for slash-and-burn practices. Fires sometimes burn out of control and burn conservation areas and morichales. Since 2019, the Bacao farm has systems in place to reduce incidents of fire on the farm and has fire safety training for employees. During the monitoring period there were few fires within the PAI as show in Map 2. Through RS (Modis) and field reporting no loss in tree cover was detected during the monitoring period. Since the project activities have a direct reduction on fire, there has been less fire on the landscape reducing emissions.
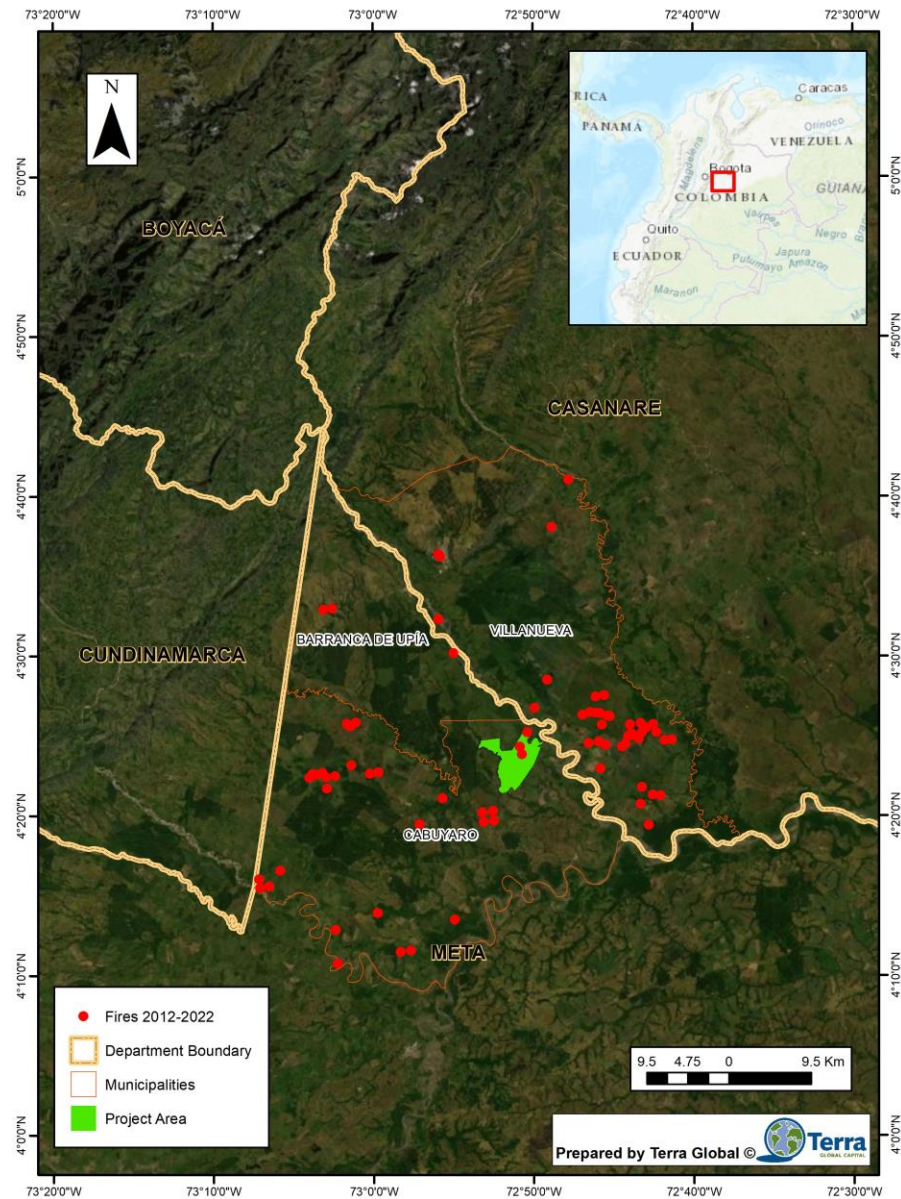
Map 2. Fire incidents between 2012-2022

Using satellite imagery from July 2022 in the project area, it is possible to observe the absence of affectation in the land cover due to the previous fires reported by MODIS data.

Figure 5 and Figure 6 show zoomed maps of the three reported fires in true color and in vegetation density amount. The vegetation density was obtained calculating the Normalized Difference Vegetation Index (NDVI) of a Sentinel 2 cloud-free image composite for July 2022, using bands NIR (B8) and Red (B4).

73
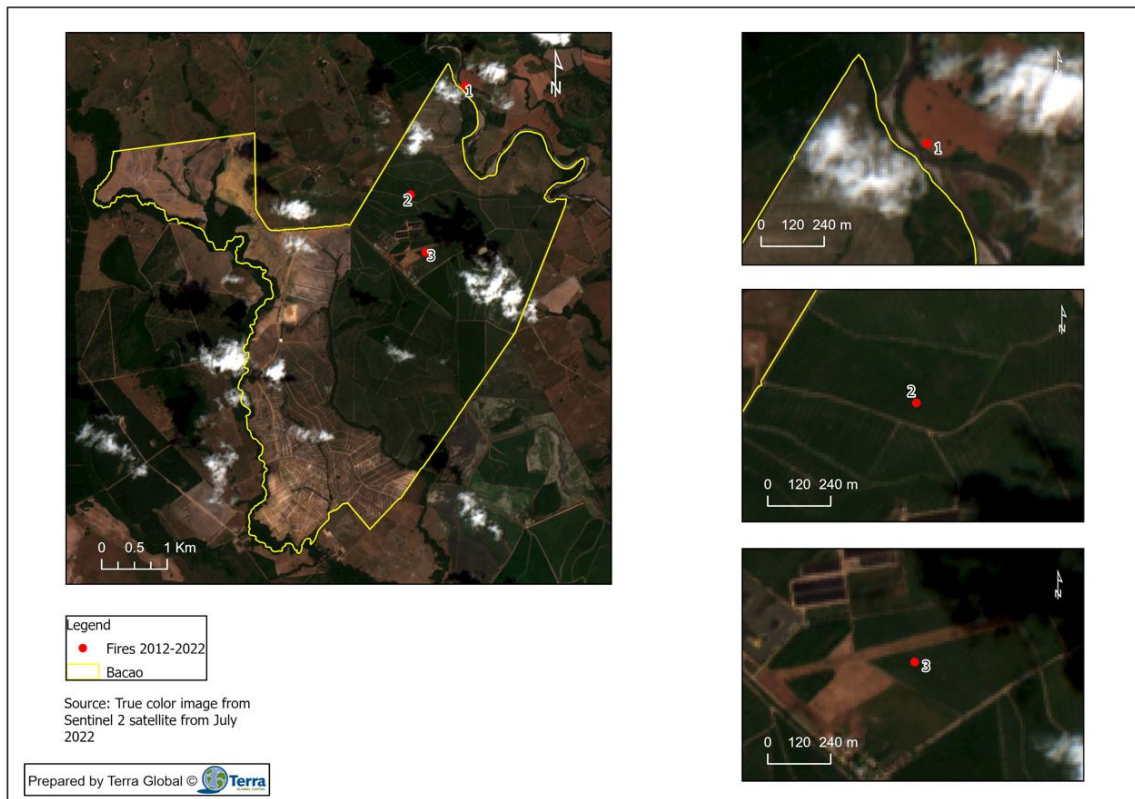
Figure 5. Zoomed maps of the tree reported fires, showing the condition of the land with satellite imagery from Sentinel 2 from July 2022
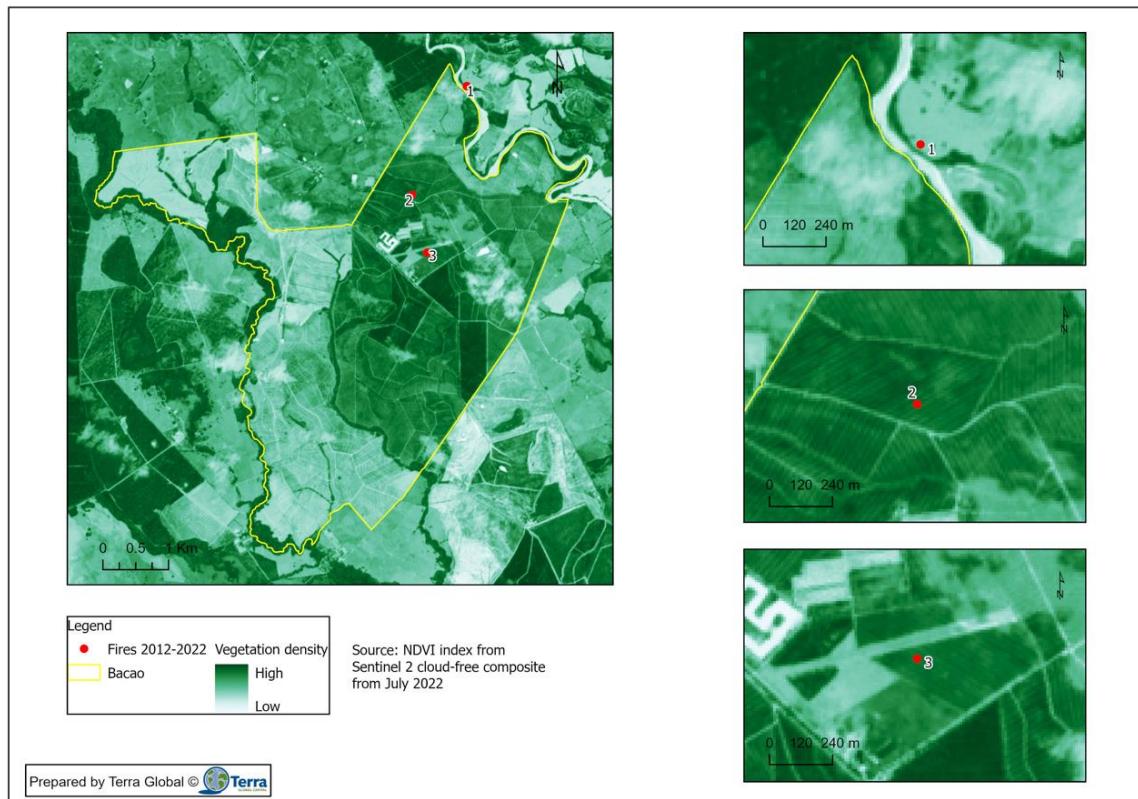
Figure 6. Zoomed maps of the three reported fires, showing vegetation density using NDVI from Sentinel 2 could-free composite from July 2022

In the absence of the project, flooding and fire would have significant impact on the land-use scenario of the Project Activity Instance as well as the surrounding area. Fire, and flooding would have rendered the surrounding agricultural land less productive.
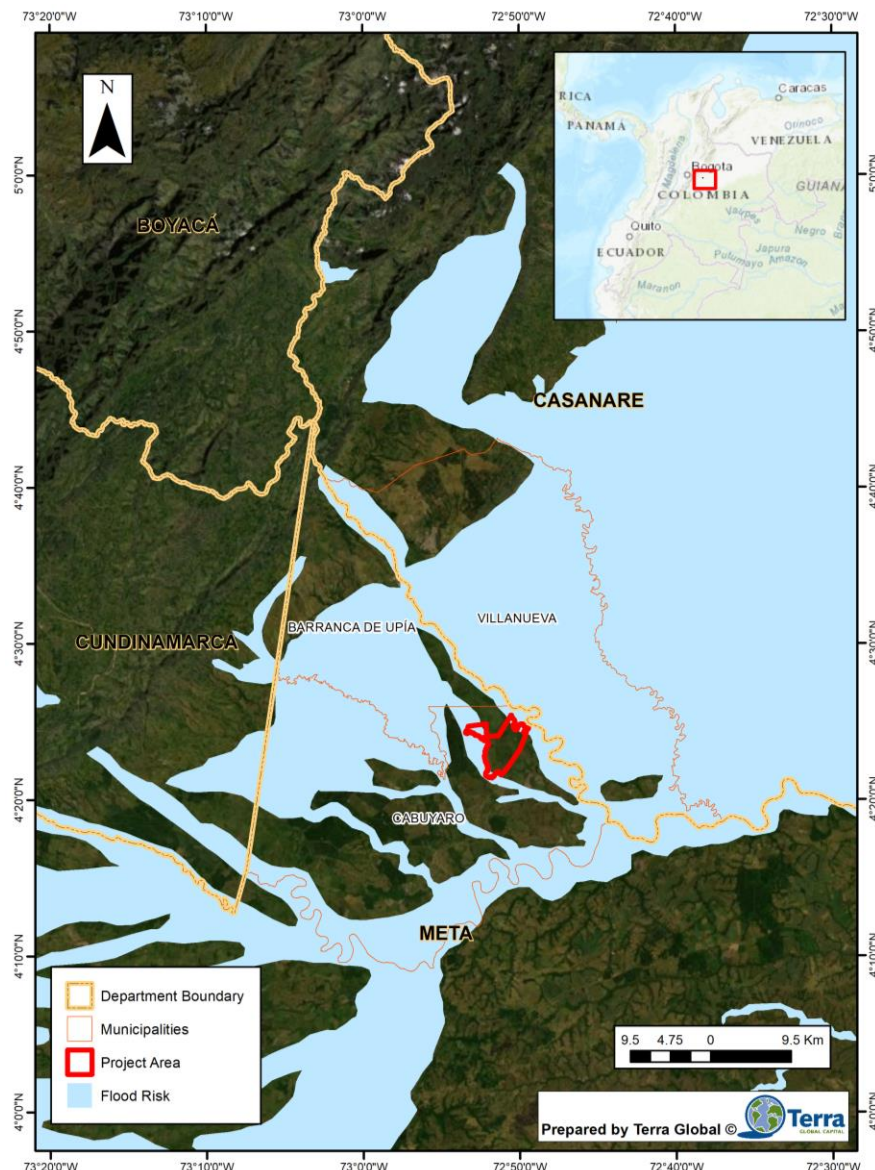
Map 3. Flood Risk, source IDEAM 2010.

3.3.1 Activities and/or processes implemented for Adaptation (CCB, GL1.3)

The project design helps to mitigate the impacts of climate change in several ways:

Conservation Farming: The Project Activity Instance has applied agricultural conservation practices such as cover cropping, improved soil fertility through incorporation of organic matter, and establishment of a diversified agroforestry system. Increase tree cover: Trees planted as part of the agroforestry system by Bacao have retained moisture and created microclimates; they also provide shade and contribute organic matter to restore soil health. Trees also prevent erosion and serve as windbreaks. The increased tree cover will become corridors to maintain and increase the biodiversity in the project activity instance.

Conservation of ecosystem services: No deforestation policy in place to prevent cutting of biomass, and the project is maintaining all the morichales areas in the project activity instance.

These activities will guarantee food and shelter for the existing biodiversity in the project activity instance.]

In order to prevent flooding of the project activity Instance, the project has maintained the strips of native vegetation along the rivers. As for fire prevention, the project has adopted fire protocols and training has been delivered to plantation workers.

4 COMMUNITY

4.1 Net Positive Community Impacts

4.1.1 Community Impacts (CCB, CM2.1)

Community Group	Bacao Employees
Impact	**Increased income for community members (including women), and improved job opportunities** • 404 job opportunities available in the Project Instance Zone • Steady monthly income for 404 employees • Increase knowledge and skills of 404 workers on agroforestry systems and other topics Evaluation of impact: Workers participated in the Living Wage survey (April 2022) were they provided their inputs in terms of their perception on how the income (wage) they receive cover or not their main needs (housing, education, food, health, other expenses)
Type of Benefit/Cost/Risk	Actual, direct, benefit
Change in Well-being	Long term jobs with steady monthly income for community members hired by Bacao (direct and indirect workers). Training opportunities are offered to employees to assure they have the required skills to perform the project's activities and build their capacity

Community Group	Smallholder Cocoa Farmers in the Project Instance Zone
Impact	**Improved livelihoods of small farmers (including women) through income diversification and improved cacao production** • Access to 68,935 improved cacao plants of varieties CCN51 FEAR5, FSA13, FTA2, LUKER 40, FSV-41) by farmers • 32.63 ton of cocoa produced in 283 hectares • 30 smallholder farmers with diversified income from direct sales of cocoa Evaluation of impacts:

77

	Smallholder farmers who belong to the Impulsa Program were asked through a survey how the income they get from the cocoa sales supports their wellbeing.
Type of Benefit/Cost/Risk	Actual, direct, benefit
Change in Well-being	Farmers are part of a direct commercialization system, in which they do direct sale in farm gate receiving on time payments (one day after collection). When cocoa is purchased wet, farmers don't invest time and resources in the processing of the product and no transportation is needed compared to previous sales to intermediaries when they had to take the final product to Villavicencio.

Technical assistance and training are provided to improve productivity through proper pruning and planting of improved cocoa varieties.

Cocoa production and other associated crops such as plantain, papaya, citrus diversifies the smallholder farmers' income. |

Employees have participated in various surveys and evaluations to provide Bacao with feedback on the working conditions and to ensure that social benefits received have an impact in their livelihoods.

Impulsa smallholder farmers have participated in an initial farm diagnosis conducted by field technicians, which provided information to characterize the farms' conditions. This input helped tailor the technical assistance model to the needs to each farm. Additionally, a survey was conducted in June, 2022 to understand farmers' socioeconomic conditions, and the role and impact of crop diversification in their income. More detailed results from this survey are explained in Section Appendix 1: Commercially Sensitive Information.

4.1.2 Negative Community Impact Mitigation (VCS, 3.19; CCB, CM2.2)

The participatory study conducted with community members revealed that no areas were identified to have a high conservation value for their members. However, according to the participatory mapping the following places are relevant to the community churches, cemeteries, and the river. The first two HCV areas are important on a spiritual level and are in urban centers, while parks (public park and boardwalk) and the rivers are important at a recreational level.

None of these areas which are relevant to the community are part of the Project Activity Instance thus they haven't been intervened by project activities, nor have they been negatively impacted. On the contrary, the Upia riverbanks around the Project Activity Instance are protected, as native trees have been planted as required by the regional authority, Cormacarena. Additionally, the project has defined the water requirements for the irrigation system based on the soil type, and the crop's requirements base on the age of the tree, also the project monitors the amount of water use from the river and complies with the quota allowed (636 litters/seg) and reports annually to Cormacarena. Regarding the use of fertilizers, the project has developed procedures that are in place to guarantee that application is efficient so there is no runover, the same with use of agrochemicals or hazardous substances, as the project has developed a procedure to safely manage and discharge containers and chemical substances. Workers, including women and youth are trained on these procedures and HR makes sure they are applied in the workplace.

The complete HCV study is in Section Appendix 1: Commercially Sensitive Information.

In terms of the wellbeing of the people employed by the project, work safety training has been provided and a policy "Safety and Health Policy at the workplace" has been developed and reinforced to prevent work related injuries and to foster work safety good practices.

4.1.3   Net Positive Community Well-Being (VCS 3.19; CCB, CM2.3, GL1.4)

4.1.3.1   Net Positive Community Well-Being Employees

The establishment of a large-scale agroforestry system has represented 404 job opportunities for the community members in Cabuyaro. Bacao as part of the project implementation complies with ESG (Environmental, Social and Governance) standards, creating a true cultural change in the area by formalizing the rural agricultural sector and improving the workers' skills and knowledge by providing technical and well being training. Bacao's standards are high and have created a cultural shift among community workers, where workers (full and part time) and temporary contractors must follow local and national health and safety standards at anytime in the workplace. In addition, all workers have all the benefits by law and additional extralegal benefits. The company has also supported the creation of bank accounts for all workers, which allows them to create bank records.

4.1.3.2   Net Positive Community Well-Being Smallholder Cocoa Farmers

To guarantee high quality cocoa beans and develop a long-term partnership with smallholder farmers, Impulsa Bacao, has established a direct commercialization system which collects and buys slime cocoa beans at the farm gate to be processed and sold in the international markets. This has enabled the company to establish a standardized fermentation and drying process and meet customer requirements and better prices for farmers.

In this way, Impulsa Bacao has established a working partnership with 102 small producers, providing technical assistance, training, and plants to establish and manage cocoa trees in a sustainable way. Which over time, has had an impact on the increase in crop productivity as well as income. This information was confirmed through surveys conducted to farmers to understand the impact that the program has.

4.1.4   Protection of High Conservation Values (CCB, CM2.4)

The categories of High Conservation Value related to the well-being of people are 4, 5, and 6; which refer to ecosystem services, community needs, and cultural values. To define the presence or absence of these HCVs, a participatory exercise was conducted. Through it, it was determined that the ecosystem services (HCV 4) will not be in critical situations due to the Project Activity Instance, as Bacao complies with national and international standards that ensure this declaration. Additionally, any management and control measure for the identified HCV (Ecosystems and Habitats), will positively impact ecosystem services and therefore the needs of the communities.

Regarding the needs of the communities (HCV 5), no specific spaces were identified where hunting or fishing is carried out on a regular basis. Hunting and fishing is done randomly and according to need, however, community members identified the places where this activity should not be done. Plus, they recognized the animals that must be protected, for which it is determined that there is no HCV area in the category 5.

Finally, when it comes to cultural values (HCV 6), hand crafts were identified, however, due to the type of crafts and the place where they are developed, it is not considered an HCV. In addition, it is considered that the activities carried out by the company do not affect this community activity.

4.2   Other Stakeholder Impacts

4.2.1   Mitigation of Negative Impacts on Other Stakeholders (VCS, 3.18, 3.19; CCB, CM3.2)

Bacao is committed to support sustainable livelihoods of the community members involved in the Project Activity Instance as well as community development. Thus, the project has an open communication policy with community leaders and neighbours around the project activity instance to discuss and resolve any potential issues related to their wellbeing. In addition, Bacao follows local development plans as well as national policies to assure stakeholders' wellbeing.

The project doesn't foresee possible negative impacts to other stakeholders.

4.2.2   Net Impacts on Other Stakeholders (VCS, 3.18, 3.19; CCB, CM3.3)

There are not negative impacts to other stakeholders.

4.3   Community Impact Monitoring

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

Social impacts of the Project have been monitored over the crediting period with Bacao's workers and Impulsa smallholder farmers. A detailed monitoring plan has been developed to quantify the social impacts and meet the requirements of the Climate, Community and Biodiversity Standard.

Bacao's Long-Term Plan details indicators that have been monitored since 2017 showing the progress of project's activities for the last 5 years. Data collected have been analyzed to adjust over the years for informed decision making. Implementation of the Impulsa Program (smallholder farmers and technical assistance) started in the second half of 2020, so its traceability is still recent, however useful to make relevant adjustments and verify the progress of the impacts generated.

During this monitoring period, the Project collected and analyzed workers' household survey data. The survey covered key metrics to measure the impact of employment in the worker's livelihoods. The survey contains over 59 multi-part questions covering key metrics that cover the following topics:

- Composition and sociodemographic characteristics of the household (used for monitoring and disaggregation by gender, age, education, and other demographic factors)
- Income: Identify the household income level considering the different sources of income.
- Food: Identify the most common foods, the quantities consumed and their price. A caloric standard of 2,100 calories must be met.
- Housing: Identify the minimum standards that housing must have, and the cost of such housing.
- Health: Identify access and cost of health services.
- Education: Identify access to basic levels of education (primary and secondary) and associated costs.
- Other expenses: Identify other necessary items, such as clothing, transportation, recreation.

This survey was done as part a Living Wage study conducted by Bacao to determine the living wage using the Anker methodology. Living wage defined by Global Living Wage Coalition (GLWC) as "the remuneration received for a standard working week by a worker in a given location that is sufficient to achieve a decent standard of living for the worker and his family. Elements of a decent standard of living include food, water, shelter, education, health, transportation, clothing, and other essential needs including provision for unexpected events" (GLWC, 2016). Results of this study were analyzed by Bacao with the objective to adjust the workers' minimum wage according to the basic local needs to offer better opportunities for them and their families.

As for the social assessment, results from the Living wage survey provided key information to understand the socio-economic conditions of Bacao's workers. The household survey was applied to 154 workers (107 men and 47 women). The selection was made through a random process, with a

confidence level of 99%. The information collected was cleaned and analyzed using the statistical package STATA, as described in the SOP.

Bacao's workers come from communities around the farm. According to the survey, most of the workers (60%) live in Cabuyaro, 34% reside in Viso de Upía and just 5.9% live in Guayabal de Upía. In terms of workers' households, they vary in size, ranging from single-person households (14%) to households made up of a maximum of seven people (4%), while the most common households are made up of three people (25%) followed by households with two and four people, with 19% and 18%, respectively (Figure 7).
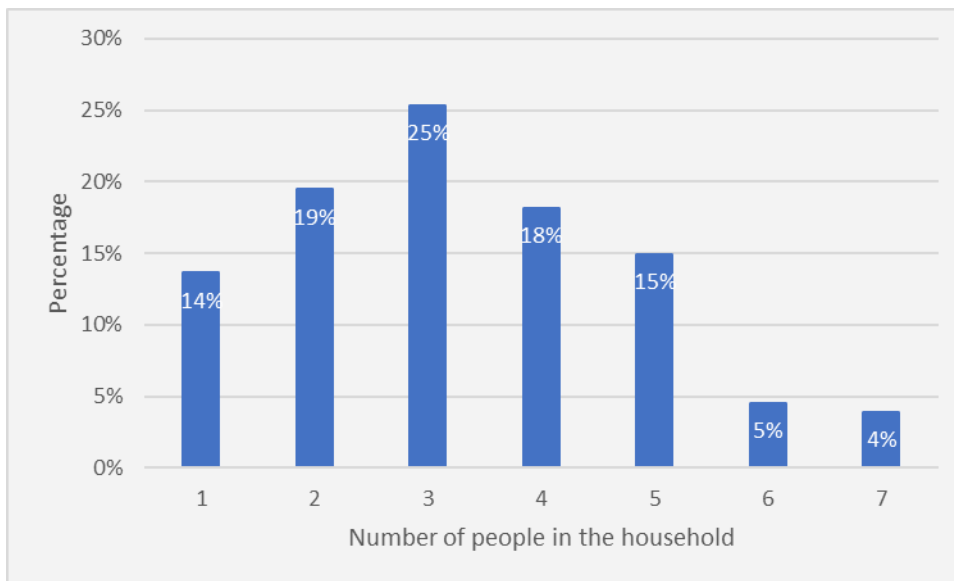
Figure 7. Workers' household composition.

Bacao workers have different education level. The educational level is low, the members of the household over 22 years of age (266 people), 18% have no educational level, and 69% have a basic level (primary and/or secondary) (as shown in Figure 8). Men have a higher participation in the group without any educational level (12.4%) and in primary school (17.7%) compared to women. If only the educational level of the workers is analyzed, in total 71% have basic education and 13% has none.
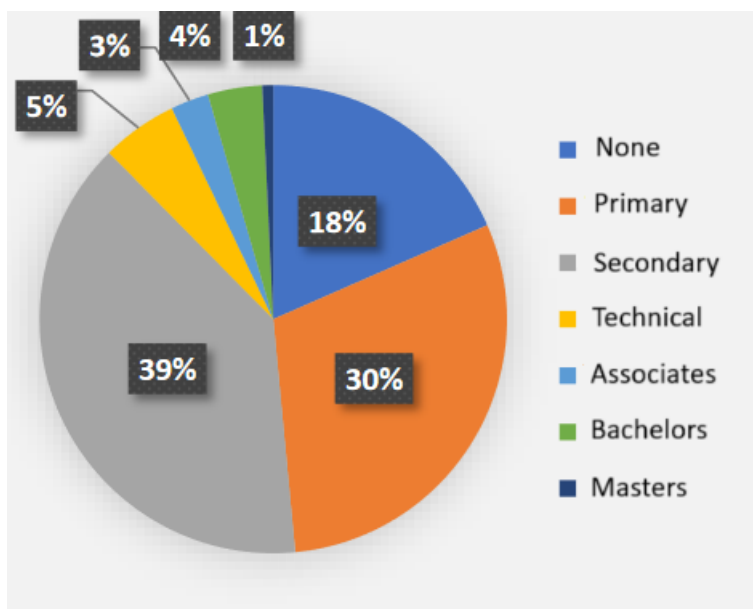
Figure 8. Education levels of Bacao's workers.

The estimated value of the cost of a decent house for a family of three in the municipality of Cabuyaro is $106, which corresponds to $66 for rent and $40 for services per month per family. In this municipality, 65% of the workers' households live in a rental house, while the remaining 35% own a house, almost half (14%) have received their homes through government programs. There is an 8% of households have encroach land where temporary homes have been being built.

For the estimation of household income, income reported by all household members was considered (regardless of if it comes from Bacao o other company/employment in the area). An important remark is that no household reported having income derived from agricultural activities.

Workers' income varies according to the position they have at Bacao, being some of the various positions surveyed administrative, auditing, supervision, coordination with higher incomes compare to field workers with lower income. Likewise, it was observed that, in the latter, income increases to the extent that there are more household members working for the company (as shown Table 22). Additionally, 34.4% of the workers reported receiving government subsidies, from which 94% correspond to field workers' households; one household reported receiving remittances from outside Colombia.

Table 22. Income per worker in household.

Number of workers in household	Income $ per household
1	271.43
2	525.61
3	788.72
4	1,078.63

In the case of households with three members (average around Bacao employees), when evaluating the components considered in the estimation of income and decent salary, it is noted that food is the one component that has the greatest impact on the cost of living of families in Cabuyaro with a participation of 42.3%. Reason why the food bonus (extra-legal benefit), or meals provided at the farm represent an important support for workers.

As part of the legal benefits that Bacao's employees get according to the law, they get the compensation fund, as well as government subsidies to which they are entitled due to their contract. According to the survey, they get the benefits, but they are not fully aware of the breakeven of the benefits received.

Bacao provides extra-legal benefits to their workers. The cost for these benefits were quantified in dollars in a per month base, as shown in

Table 23. The total value of these benefits adds to $83 per month per worker.

Table 23. Price in dollars of extra-legal benefits provided by Bacao to workers.

Extra-legal benefits	$ (3,935,84 COP)
Hydration-Panela	4.07
Food voucher	27.95
Meals at work	4.40
Transportation to farm	29.77
Life insurance	13.01
Total	83.00

In terms of access to these extra legal benefits, the following numbers shows the workers' perception on receiving these benefits according to the surveys (perception does not necessarily represent the benefits provided by the company):

1. Access to drinking water:
   ✓ 92% (142) of workers stated that drinking water is available
   ✓ 8% (12) indicated not having access
   ✓ 56% (86) know they can take it home
   ✓ 33% (50) say they cannot take her home
   ✓ 4% (6) do not know if they can take her home
2. Life insurance:
   ✓ 79% (121) of workers indicate they have life insurance
   ✓ 18% (28) think they do not have life insurance
   ✓ 3% (5) do not know whether or not they have life insurance
3. Means of transportation to the farm:
   ✓ 22% (34) of the workers use the bus provided by Bacao
   ✓ 66% (102) are transported on their own motorcycle
   ✓ 12% (18) use another means of transportation
4. Hydration-"Panelas":
   ✓ 73% (113) of workers receive this benefit
   ✓ 14% (21) households have 2 benefited workers
   ✓ 1% (2) households have 3 benefited workers

5. Food Bonus:
   - ✓ 86% (133) of workers receive this benefit
   - ✓ 17% (26) households have 2 benefited workers
   - ✓ 1% (2) households have 3 benefited workers
6. Meals (breakfast and lunch) provided by Bacao:
   - ✓ 31% (47) of workers receive this benefit
   - ✓ 3% (4) households have 2 benefited workers

Eighty-nine percent of the workers stated to be satisfied with the food bonus they receive, showing how important it is for them that they receive an additional support to complement their families' nutrition. In addition, education and health services are provided by government through public services, so they don't represent and additional cost for workers.

Ninety-three percent of the surveyed employees reported to have gotten a uniform (boots, pants and shirt), while protection gear is given according to the position to be done in the company. Overall, 82% of the workers think they can grow in the company, demonstrating the opportunity they perceive to get a better salary and acquire more responsibilities in the future.

According to the living wage study, the average living wage calculated is $194 (for an average family of 3 members). This varies widely between positions and productivity levels reason why strategies/recommendations to close the gap are being analyzed by the Bacao.

In terms of smallholder farmers, a survey (23 questions) was conducted where a total of 34 farmers were surveyed (20 men, 14 women). Farmers were selected randomly; the sample was defined with 90% confidence and a margin of error of 5%. Many of the farmers have their farms in Viso de Upia y Guayabal (communities adjacent to the Bacao plantation). The average farmer has 5 hectares, and an average of 1.5 hectares are dedicated to cocoa.

In terms of cocoa production, just 50% of the farmers used to have cocoa production before being supported by Impulsa, and they used to grow crops such as plantain (39%), corn (28%), cattle (22%), and others (11%). Half of the cocoa areas have been established in the last 2 years, reason why productivity levels are still low, with an average of 81 kilograms/month.

In terms of the commercialization of cocoa, 89% of the surveyed farmers confirmed that they were selling their product (dry) to intermediaries in the neighboring city of Villavicencio. When farmers were asked about an improved price or less cost when selling their cocoa to Impulsa, 70% identified a better price, while 30% did not. Also, it is important to notice that cocoa is the major crop/source of income for only 34% of the farmers surveyed.

The majority of Impulsa cocoa farmers acknowledge that they have received technical assistance, training, and improved cocoa plants. While benefits like a better price for cacao and a direct purchase of the product is not a perceived benefit by the farmers. Impulsa just started they purchase system in January 2022, so it is expected that the number of farmers benefited will grow in the future, and they get the improved income from it.

Overall, 66% of the surveyed farmers registered increased cocoa production, thus this is a number that needs to increase overtime. Additional information can be found in the full report from the survey conducted, available for the VVB.

Surveys applied to Bacao's employees and Impulsa smallholder farmers are part of the impact monitoring system established by the project. Additionally, operational indicators were monitored to report project activities along implementation as part of the project's monitoring plan.

4.3.2   Monitoring Plan Dissemination (CCB, CM4.3)

The summary of the Community portion of the CCB Monitoring Plan has been created and translated into Spanish and shared with communities in the Project Activity Instance Zone.

The dissemination of the Monitoring Plan and Report was conducted by the on-the-ground project partners. Local stakeholders were asked to comment on the monitoring plan along with the summarized translated MR.

The following community meetings were held to disseminate the MR and the summary:

Participants	Purpose	Date
Workers	Informational meeting, socialize MR summary and process for comments and feedback	September 2022
Smallholder Farmers	Informational meeting, socialize MR summary and process for comments and feedback	September 2022
Local authorities	Share MR summary and results	January 2023

No feedback was provided by the stakeholders during these meetings.

The Monitoring Report summary was made publicly available on the public website www.verra.org. Main results of the project were shared with the communities during informational meetings.The diffusion process was done by Bacao SAS.

4.4 Optional Criterion: Exceptional Community Benefits

Gold Level exceptional community benefits are not applicable to this project.

5 BIODIVERSITY

5.1 Net Positive Biodiversity Impacts

5.1.1 Biodiversity Changes (VCS, 3.19; CCB, B2.1)

Biodiversity Element	Tree cover
Monitored Change	The project increased tree cover in the area by planting shade trees (*Gliricidia sepium*) and windbreaks (*Cariniana pyriformis*), as well as the cocoa trees themselves. During this monitoring period, 880 hectares have been planted which represents 50% of the total project area, where tree cover was increased.
Justification of Change	These trees were planted in areas that were previously degraded pasture with little tree cover. As a result, planting the trees increased tree cover in the project activity instance.

Biodiversity Element	Habitat Connectivity

Monitored Change	The trees planted as part of the project activities have increased habitat connectivity between the forest areas (morichales) at the edges of the area and the agroforestry system.
Justification of Change	The Project Activity Instance was degraded grassland in the baseline. Through the planting of the agroforestry system, tree cover increased and promoted the circulation of species between habitat patches and increased the availability of food sources for these species. During this monitoring period 880 hectares of agroforestry systems have been established, increasing habitat connectivity which allows species to move freely between the morichales and the agroforestry system.

Biodiversity Element	GHG emissions and climate change
Monitored Change	This project is sequestering carbon 56,103 tCO2e from the atmosphere, reducing global warming.
Justification of Change	Establishing a multi-strata cacao agroforestry system on what was previously degraded pasture has increased carbon storage in aboveground biomass (living and dead trees), belowground biomass (roots), and soil organic carbon.

Biodiversity Element	Gallery Forest
Monitored Change	This project allowed the preservation of certain plant species such as *Mauritia flexuosa.* This plant as a group (called Morichales) represent an important ecosystem value, since they regulate the flow of water, store it, and are the habitat of countless living beings, among others.
Justification of Change	These plants helped to preserve and enhance the biodiversity of the project area.

5.1.2   Mitigation Actions (VCS, 3.19; CCB, B2.3)

We anticipated that the project would not adversely affect biodiversity, or the High Conservation Values (HCVs) identified within or around the Project Zone. However, if potential impacts had arisen, certain activities could have mitigated these negative effects on the HCVs, particularly regarding the diversity of species (HCV1) and the ecosystems and habitats (non-flooded and flooded gallery forest-morichales, and riparian forest) (HCV3). The non-flooded and flooded gallery forest-morichales and riparian forest could have been impacted by various project activities. These forests, along with the plantation, supported a diverse array of species (HCV1).

These were some of the project activities that have been implemented to mitigate negative impacts on the areas of HCV (morichales and species diversity).

- Maintenance of conservation areas (morichales)
- Promote and monitor the Zero deforestation policy (in plantations and small farmers)
- Provide training to workers on existing biodiversity and conservation

- Develop a management plan and procedure of agricultural inputs to be used and applied in the plantation
- Develop and apply a procedure for the Establishment of New Crops (Appendix 1: Commercially Sensitive Information)
- Develop and apply a procedure for Crop Maintenance (Appendix 1: Commercially Sensitive Information)

Within the policies established by Bacao to prevent impacts on biodiversity are the following:

- It is forbidden burning any kind of vegetation or open fires for the establishment of crops
- All plastic waste from agricultural activities, must be reported and returned to the supervisor in charge (environmental area) to provide proper final disposal.
- It is prohibited to cut down trees that are on the banks of the Project Activity Instance, rivers, pipes, swamps, without prior authorization.
- Hunting, cutting of trees, fishing and/or capture of animal species is prohibited within the Project Activity Instance.
- If any species of fauna is found in the Project Activity Instance, it should not be mistreated or killed, except for dangerous species, that represents a potential risk to the staff.
- Refrain from smoking inside the plantation since a cigarette butt can cause a fire and the toxic smoke pollutes the environment.

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

Species and habitat	
Setophaga striata	This is a NT specie and the Project activities have not affected the existing forest area. Over time, as plantation trees grow, the plantation will connect with existing forest patches creating corridors to facilitate the movement and food available for this specie.
Dasypus sabanicola	This is a NT specie and the Project activities have not affected the existing forest area. Over time, as plantation trees grow, the plantation will connect with existing forest patches creating corridors to facilitate the movement and food available for this specie.
Panthera onca	This is a NT specie and the Project activities have not affected the existing forest area. Over time, as plantation trees grow, the plantation will connect with existing forest patches creating corridors to facilitate the movement and food available for this specie.

The project's net impacts on biodiversity in the project zone were positive compared with the conditions under the without-project land use scenario. Without the project, the area would have remained as degraded pasture, providing limited habitat for existing species and resulting in poor biodiversity. Project activities did not negatively impact existing forests, ensuring that current biodiversity levels were maintained. Over time, as plantation trees grew, they provided additional tree cover and created new habitats, enhancing biodiversity in the area. The plantation acted as a corridor, linking existing forest patches and facilitating species movement and genetic exchange, fostering a more robust and diverse ecosystem. Compared to the degraded pasture scenario, the introduction and growth of plantation trees transformed the area into more diverse habitats, promoting ecological connectivity.

The improved habitat conditions attracted and sustained a greater variety of wildlife, further enhancing biodiversity. Thus, the project significantly improved the ecological value of the project zone.

The benefits to biodiversity arising from practices for adaptation to climate change are:

a.   Agroforestry and Soil Health Improvement: A diversified agroforestry system provides additional food sources for fauna, supporting wildlife populations and increasing habitat diversity. This enhances the resilience of biodiversity by maintaining ecological balance and providing resources for various species.

b.   Soil and Water Condition Improvement: Healthier soils and better water quality create more favorable habitats for species, improving conditions for plant growth and wildlife. Enhanced soil and water conditions also help sustain ecosystems, supporting the survival and reproduction of diverse species.

c.   Biomass Increase through Agroforestry: The increase in both aboveground and belowground biomass offers more shelter and habitats for flora and fauna. This boost in biomass creates more niches for species, contributing to greater biodiversity by fostering a more complex and stable ecosystem structure.

Moreover, the indicators monitored by the plan are detailed in section 5.3.1. These indicators include the presence of wildlife (amphibians, birds, and mammals) in the project area, the effectiveness of the anti-hunting policy, and the reduction of fire risk within the project area.

5.1.4   High Conservation Values Protected (CCB, B2.4)

Of the two Vulnerable species in the Project Activity Instance, *Ramphastus tucanus* preferred forested areas (Ebird, n.d.), and *Myrmecophaga tridactyla* occupied both forested areas and grasslands (Smithsonian Institute, n.d.). Additionally, there were two species of birds and two species of mammals that were Near Threatened: the birds *Mitu tomentosum* and *Setophaga striata*, and the mammals *Dasypus sabanicola* and *Panthera onca*. Therefore, the conversion of grassland pasture to a multi-species agroforestry system was not anticipated to have a negative impact on the habitat of these two threatened species.

The High Conservation Value category related to biodiversity is HCV 3. The HCV was identified through an assessment through focus groups (where underrepresented groups such as women and elders were part of it) using a participatory mapping activity. This activity captured the inhabitant's vision of the territory. Additionally, to the biodiversity study conducted in the PAI and secondary information from documents published by national institutions that have previously developed projects and research in this region.

5.1.5   Species Used (VCS, 3.19; CCB, B2.5, 2.6)

Species introduced	Classification	Justification for use	Adverse effects and mitigation
Cacao (*Theobroma cacao* (Varieties CCN-51, FTA-2, FEAR-5, FSA-13, FSV-41))	Non-native	Main crop	No known adverse effects. The crop has been and it will be maintained according to the management plan and using sustainable agricultural practices.

88

Species introduced	Classification	Justification for use	Adverse effects and mitigation
Abarco (*Cariniana pyriformis*)	Native	Planted to prevent wind damage and reduce erosion	No known adverse effects. Crop was and it will be maintained according to the farm's agricultural practices.
Matarratón (*Gliricidia sepium*)	Native	Planted to provide shade for the cacao plants (main crop)	No known adverse effects. The species was and it will be maintained according to the farm's agricultural practices.
Kudzu (*Pueraria phaseoloides*), Sweetheart (*Desmodium adscendens*), Velvet bean (*Mucuna pruriens*)	Non-native	Cover crops	No known adverse effects. Cover crops were and it will be maintained according to the farm's agricultural practices.
Plátano Harton (*Musa paradisiaca*)	Non-native	Planted to provide temporary shade Non-invasive herbaceous plant used across Colombia as a food crop. No additional water is used to irrigate this crop.	No known adverse effects. Crop was and it will be maintained according to the farm's agricultural practices.
Achiote (*Bixa orellana*)	Native	Planted to provide shade. Contributes to soil health by adding organic matter through leaf litter. This improves soil fertility and structure, enhancing the productivity of the agroforestry system	No known adverse effects. Crop was and it will be maintained according to the farm's agricultural practice.
Water buffalo (*Bubalus bubalis*)	Non-native	14 water buffalos used as animal traction Safe alternative to use of fossil fuel and mechanical equipment.	No known adverse effects. As work animals, they are unlikely to leave human use.

5.1.6 Invasive Species (VCS, 3.19; CCB, B2.5)

No known invasive species are used in the project activities.

5.1.7 GMO Exclusion (CCB, B2.7)

The project implementor operates their own nurseries where they reproduce and grow the tree species used in the project. Project nurseries have been certified and registered under ICA. No Genetically Modified Organisms (GMO) are used to propagate the plants used in this project. A full list of plant species to be used is included in Section 5.1.5.

5.1.8 Inputs Justification (VCS, 3.19; CCB, B2.8)

Name	Boric acid
Justification of Use	Fertilizer
Adverse Effect	Serious health hazard. Instructions and procedures for safe application need to be followed

Name	Granulated agrimins
Justification of Use	Fertilizer
Adverse Effect	Do not present a public health concern

Name	Basacote 6M
Justification of Use	Fertilizer
Adverse Effect	Do not present a public health concern

Name	Borax crystals
Justification of Use	Fertilizer
Adverse Effect	Serious health hazard. Instructions and procedures for safe application are followed based on label and internal protocol

Name	Granulated borax
Justification of Use	Fertilizer
Adverse Effect	Serious health hazard. Instructions and procedures for safe application are followed based on internal protocol

90

Name	Calmag precisagro
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	White Potassium Chloride
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Potassium Chloride Crystals
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Granular Potassium Chloride
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Monoammonium Phosphate (MAP)
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Monopotassium Phosphate (MKP)
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Fungifert Mycorrhiza
Justification of Use	Fertilizer-Biologic
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Hydrocomplex
Justification of Use	Fertilizer

91

Adverse Effect	Unlikely to present acute hazard in normal use

Name	Kalma G
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Kieserite
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Composted organic matter
Justification of Use	Fertilizer-Organic
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Cane Molasses
Justification of Use	Fertilizer-Organic
Adverse Effect	Unlikely to present acute hazard in normal use

Name	MF Active Magnesium
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	MF Active Manganese
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	MF Active Zinc
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Calcium nitrate
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Potassium nitrate
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Agricultural thermal silicate
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Ammonium sulfate (crystals)
Justification of Use	Fertilizer
Adverse Effect	Serious health hazard. Instructions and procedures for safe application are followed based on internal protocol

Name	Ammonium sulfate (granular)
Justification of Use	Fertilizer
Adverse Effect	Serious health hazard. Instructions and procedures for safe application are followed based on internal protocol

Name	Copper sulfate pentahydrate
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Magnesium sulfate heptahydrate
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Zinc sulfate
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Zinc sulfate heptahydrate
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Sulfex zinc
Justification of Use	Fertilizer
	Unlikely to present acute hazard in normal use

Name	Turba Orange peat
Justification of Use	Fertilizer-Organic
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Urea phosphate
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Granular urea
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Zeoter -A
Justification of Use	Fertilizer
Adverse Effect	Unlikely to present acute hazard in normal use at 0.07 mg/kg rate

94

Name	Dinamic
Justification of Use	Herbicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Becano
Justification of Use	Herbicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Escorpion/Scorpion
Justification of Use	Herbicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Glifosol 480 SL
Justification of Use	Herbicide
Adverse Effect	Serious health hazard. Instructions and procedures for safe application are followed based on internal protocol

Name	METSULFURON
Justification of Use	Herbicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Rongo 150 SL
Justification of Use	Herbicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Linap
Justification of Use	Herbicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	OXYFLUORFEN 240

Justification of Use	Herbicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Rifit
Justification of Use	Herbicide
Adverse Effect	Serious health hazard. Instructions and procedures for safe application are followed based on internal protocol

Name	Verdict 1400
Justification of Use	Herbicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Cipermectina
Justification of Use	Insecticide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Dimetox
Justification of Use	Insecticide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Imaprid
Justification of Use	Insecticide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Lorsban powder
Justification of Use	Insecticide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	TIAMETOXAM
Justification of Use	Insecticide

96

Adverse Effect	Unlikely to present acute hazard in normal use

Name	GALEON 247 SC
Justification of Use	Insecticide
Adverse Effect	Serious health hazard. Instructions and procedures for safe application are followed based on internal protocol

Name	NUVAN 50
Justification of Use	Insecticide
Adverse Effect	Serious health hazard. Instructions and procedures for safe application are followed based on internal protocol

Name	PABLANCO
Justification of Use	Insecticide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	PROTEUS OD170
Justification of Use	Insecticide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Amistar Top SC
Justification of Use	Fungicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Adalto 720 SC
Justification of Use	Fungicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Agrodyne SL
Justification of Use	Fungicide

Adverse Effect	Unlikely to present acute hazard in normal use

Name	Predostar
Justification of Use	Fungicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Silvacur Combi EC 300
Justification of Use	Fungicide
Adverse Effect	Serious health hazard. Instructions and procedures for safe application are followed based on internal protocol

Name	Fosetyl 80 WP
Justification of Use	Fungicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Copper oxychloride
Justification of Use	Fungicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Ridomil Gold MZ 68 WP
Justification of Use	Fungicide
Adverse Effect	Unlikely to present acute hazard in normal use

Name	Vitavax 400
Justification of Use	Fungicide
Adverse Effect	Unlikely to present acute hazard in normal use

Agricultural inputs (fertilizers-organic and non-organic, chemical and biological pesticides, fungicides, herbicides) used in the establishment and maintenance of the agroforestry system are applied based on Good Agricultural Practices (GAP). In terms of agrochemicals manipulation and application the Bacao's protocol called "Health procedure" follows the health recommendations on the labels of the agrochemical based on its toxicity level. Labels which contain information on potential hazards

98

associated with the product and instructions to follow in the event of a poisoning or spill are reviewed prior to each application to minimize the risks and maximize the benefits.

The majority of the products applied in the project are under category 5 under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) Criteria. Which means that may be or is harmful to humans if swallowed.

A health hazard may refer to one or more of the following hazards (Category 4 under GHS): Acute toxicity; causes skin sensitization, skin and eye irritation Irritating to breathing; is narcotic, causes drowsiness or dizziness; dangerous for the ozone layer. These hazards are avoided by following proper protocols under the health procedure.

Some of the agrochemicals applied and mentioned above have been identified under the label as pertaining to a potential serious health hazard (Category 3-GHS). These products are defined as a substance or mixture that may have one or more of the following effects: it is carcinogenic; it affects fertility and the unborn child; it causes mutations; it is a respiratory sensitizer, which can cause allergies, asthma or breathing difficulties if inhaled; it is toxic to certain organs; it is dangerous if ingested or enters the body by any means. All the potential hazards are prevented by providing personal protective equipment, facilitating practical training on proper application and disposal procedures, and reinforcing the application of procedures and protocols in the field.

No agricultural inputs/products applied in the project are considered to be of acute toxicity (Category 1 and 2 -GHS). Acute toxicity is the presence of a chemical that is extremely toxic in contact with the skin, if inhaled or ingested, and can be fatal.

5.2 Offsite Biodiversity Impacts

5.2.1 Negative Offsite Biodiversity Impacts (CCB, B3.1) and Mitigation Actions (CCB, B3.2)

A biodiversity study was conducted to determine possible negative effects and define mitigation measures. In addition, no complaints have been reported by neighbors and/or outsiders, however, within the Fertilizer and Pesticide Application Procedure, a series of instructions have been established to mitigate any possible negative effects from the use agrochemicals in the project activities. If an unforeseen event happens that could generate a negative impact, the instructions is to report it immediately to HSE to prevent possible environmental damage or consequences.

Negative Offsite Impact	Mitigation Measure(s)
Livestock grazing shifts from project area to other sites	• Project owner gave previous owner of livestock a grace period to find a new site before establishing the cacao agroforestry system in the Project Area. • As animal stocking is quite low across the surrounding area, carrying capacity is not yet met. If cattle density is increased in the landscape, and carrying capacity is met, rotational grazing can be implemented.
Hazardous waste pollution	• All used empty sacks/bags were and must be returned, avoiding leaving the empty bags in the field as it could generate accumulation of waste and contamination.

Negative Offsite Impact	Mitigation Measure(s)
	• According to the company's policy, it is forbidden to throw plastic material or any other type of non-biodegradable inorganic solid waste from food and drinks into the crop and drains. • Within the farm all generated waste must be separated and disposed of in the bins for this purpose.
Agricultural Inputs Use and Disposal	• When there was any fertilizer left that was not used, it was and it must be returned. It cannot be dumped in the lot, in water bodies or irrigation channels. As these inputs are costly, they are well kept track of. • Bacao has spill contingency kits available in the storage room and nursery area, for workers in case of a spill. • At all agrochemical mixing points, workers must have absorbent material like sand or sawdust in case of spills, as well as a shovel, broom and plastic bags – this is a company policy.
Water pollution	• Proper use of water is required to avoid negative impacts on water resources. • Water bodies such as pipes and channels, as well as open land must be free of solid waste (plastic material, Styrofoam, containers, or food wrappers) and hazardous waste (containers and material contaminated with chemical substances).
Air pollution	• Within the Bacao farm no open burning is allowed, as it can cause a fire and pollutes the air with toxic smoke. • Smoking inside the plantation is not allowed since a cigarette butt can cause a fire and the toxic smoke pollutes the environment. Workers that must smoke are allowed to do so in designated areas. • On the Bacao farm workers and visitors must avoid exceeding the speed limit, in order to mitigate the emission of particulate matter (dust) that affect human health and the environment.
Visual pollution	• Within the farm, work areas are kept clean to contribute to the improvement of the landscape.

5.2.2   Net Offsite Biodiversity Benefits (VCS, 3.19; CCB, B3.3)

Without the intervention provided by the project, areas outside the Project Activity Instance continued to degrade under intensive livestock and crop production. The lack of tree cover and sustainable management resulted in habitat loss, soil erosion and degradation, and water quality issues. The project's initiatives in both the Project Activity Instance and the surrounding areas contributed to habitat restoration, improved water quality, and sustainable land management. These efforts collectively enhanced biodiversity and ecosystem health, demonstrating that the net effect of the project on biodiversity was positive and significant.

100

In addition to benefits within the Project Activity Instance, this project also provided technical assistance to at least 120 small farmers outside of the Project Activity Instance to support them in establishing cacao agroforestry systems. The establishment of trees outside the Project Activity Instance by small farmers increased tree cover in these areas, potentially providing additional habitat and habitat connectivity for local species. Overall, the net offsite biodiversity benefits were expected to be positive, and no negative impacts were identified.

5.3   Biodiversity Impact Monitoring

5.3.1   Biodiversity Monitoring Plan (CCB, B4.1, B4.2, GL1.4, GL3.4)

The Project developed a comprehensive monitoring plan (Appendix 1: Commercially Sensitive Information) that outlines the variables to be measured to assess progress in achieving biodiversity-related outputs, outcomes, and impacts. The indicators tracked by the Monitoring Plan are described below:

5.3.1.1   Presence of wildlife in the Project Area

- Identification (visual, camaras) of animal species in the agroforestry system (amphibians, reptiles, birds, and mammals)-Project Area

Species	# Species
Amphibians	18
Reptiles	12
Birds	135
Mammals	18

5.3.1.2   Effectiveness of the anti-hunting policy in the project area

- No hunting policy developed and reinforced in the project area
- 3 communicational materials designed on local biodiversity (mammals, birds, reptiles, and amphibians) and the importance of conservation to be delivered to Bacao staff

5.3.1.3   Reduction of fire risk in the Project Area

- 2 fire-prevention training sessions for Bacao employees in the Project Area
- Fire prevention policy in place, 0 fire evidence detected since 2019

The in-field species diversity monitoring was conducted in December 2021 during the rainy season. The methodology used was survey by visual encounter (Crump & Scott 1994). Surveys were carried out between 8:00 am and 12:00 pm for diurnal species and 6:00 pm and 10:00 pm for nocturnal species for four days.

To determine the fauna associated with an agricultural landscape this study characterized the richness, composition, and turnover of species in four groups of vertebrates (amphibians, reptiles, birds and mammals) associated to cocoa crops and two surrounding plant covers (grasslands and remnants of gallery forest) in the Bacao farms. The results of this characterization highlighted the importance of conserving the remnants of the forest, as well as the reservoir and canal areas, since

101

these are home to a high number of exclusive species and can function as a reservoir and source of food for the species.

5.3.1.4 Results of amphibians and reptiles in the PAI

For this monitoring, 32 visual encounters with focal sampling were carried out with a total effort of 120 hours; from the Darwin Core database (standardized format for organizing and sharing biodiversity data), 129 records were evidenced, of which 113 are visual, 13 are auditory, two and one are camera traps and traces (without complete identification) respectively. A total of 33 herpetofauna species were recorded, distributed in 4 orders and 15 families (Table 24), of which approximately 11.8% of the species were observed in addition to the biodiversity study.

Table 24. *List of amphibian species found in the PAI*

Species	Family	IUCN Category	Endemic
Rhinella beebei	Bufonidae	LC	No
Rhinella marina	Bufonidae	LC	No
Boana platanera	Hylidae	LC	No
Scinax x-signatus	Hylidae	LC	No
Osteocephalus taurinus	Hylidae	LC	No
Scinax rostratus	Hylidae	LC	No
Scinax wandae	Hylidae	LC	No
Scinax garbei	Hylidae	LC	No
Scinax sp	Hylidae	Not confirmed	No
Scinax ruber	Hylidae	LC	No
Trachycephalus typhonius	Hylidae	LC	No
Dendropsophus mathiassoni	Hylidae	LC	No
Physalaemus fischeri	Leptodactylidae	LC	No
Leptodactylus fragilis	Leptodactylidae	LC	No
Lithodytes lineatus	Leptodactylidae	LC	No
Leptodactylus colombiensis	Leptodactylidae	LC	No
Leptodactylus fuscus	Leptodactylidae	LC	No
Adenomera hylaedactyla	Leptodactylidae	LC	No
Leptodactylus latrans	Leptodactylidae	LC	No
Adenomera sp	Leptodactylidae		No
Pithecopus hypochondrialis	Phyllomedusidae	LC	No

A total of 78 individuals belonging to 18 amphibian species distributed in forest cover, agroforestry systems, and grassland. Three additional species were recorded outside these covers for a total of 21

102

amphibian species in the study area. Species richness was higher in the forest with 13 species, while the agroforestry system and grassland harbored four species each.

Table 25. List of reptile species found in the PAI

Species	Family	IUCN Category	Endemic
Caiman Crocodilus	Alligatoridae	LC	No
Corallus ruschenbergerii	Boidade	LC	No
Chironius carinatus	Colubridae	LC	No
Atractus punctiventris	Colubridae	LC	Yes
Iguana iguana	Iguanidae	LC	No
Anolis scypheus	Iguanidae: Dactyloinae	LC	No
Epictia signata	Leptotyphlo	DD	No
Podocnemis vogli	pidae	NT	No
Varzea altamazonica	Scincidae	LC	No
Tupynambis teguixin	Teiidae	LC	No
Ameiva ameiva	Teiidae	LC	No
Chelonoidis carbonaria	Testudinidae	DD	No

A total of 44 individuals belonging to 12 reptile species were identified within the Baco Farm. Twelve individuals of eight species were recorded within the three vegetation covers evaluated; however, many individuals (31) and species (9) were recorded in the reservoir and channel. An additional species was recorded in the vicinity of the offices. Restricting the comparisons to the three studied vegetation covers, the forest harbored four species, followed by the crops and the grassland, each with three species.

5.3.1.5   Results of birds observed in the PAI

For this monitoring, 25 counting points and 40 hours of observation were carried out during visual encounters with focal sampling that accumulated an effort of 6 hours/observer. The observation records were organized in the Darwin Core format of the Biodiversity Information System (SIB), generating a database of 972 records, of which 682 are auditory (70%), 852 are within the point and 121 are outside of the point. A total of 135 species of birds were recorded, distributed in 23 orders and 49 families (Table 26), of which approximately 17% (25 species) were recorded only on visual encounters with focal sampling.

Table 26. List of bird species found in the PIA

Species	Family	IUCN Category	Migrant/resident
Cyclarhis gujanensis	Vireonidae	LC	Resident

Species	Family	IUCN Category	Migrant/resident
Vireo olivaceus		LC	Boreal Migratory
Arundinicola leucocephala	Tyrannidae	LC	Resident
Atalotriccus pilaris		LC	Resident
Attila spadiceus		LC	Resident
Camptostoma obsoletum		LC	Resident
Elaenia flavogaster		LC	Resident
Fluvicola pica		LC	Resident
Legatus leucophaius		LC	Resident
Machetornis rixosa		LC	Resident
Megarynchus pitangua		LC	Resident
Myiarchus tuberculifer		LC	Resident
Myiopagis gaimardii		LC	Resident
Myiozetetes cayanensis		LC	Resident
Pitangus sulphuratus		LC	Resident
Poecilotriccus sylvia		LC	Resident
Todirostrum cinereum		LC	Resident
Tolmomyias flaviventris		LC	Resident
Tyrannulus elatus		LC	Resident
Tyrannus melancholicus		LC	Resident
Tyrannus savana		LC	Latitudinal migratory
Turdus ignobilis	Turdidae	LC	Resident
Turdus leucomelas		LC	Resident
Turdus nudigenis		LC	Resident
Trogon virirdis	Trogonidae	LC	Resident
Campylorhynchus griseus	Troglodytidae	LC	Resident
Cantorchilus leucotis		LC	Resident
Troglodytes aedon		LC	Resident
Anthracothorax nigricollis	Trochilidae	LC	Resident
Chionomesa fimbriata		LC	Resident
Phaethornis griseogularis		LC	Resident
Phaethornis hispidus		LC	Resident

Species	Family	IUCN Category	Migrant/resident
Pachyramphus polychopterus	Tityridae	LC	Resident
Crypturellus cinereus	Tinamidae	LC	Resident
Crypturellus undulatus		LC	Resident
Eudocimus ruber	Threskiornithidae	LC	Resident
Mesembrinibis cayennensis		LC	Resident
Phimosus infuscatus		LC	Resident
Theristicus caudatus		LC	Resident
Coereba flaveola	Thraupidae	LC	Resident
Paroaria nigrogenis		LC	Resident
Ramphocelus carbo		LC	Resident
Saltator coerulescens		LC	Resident
Sicalis flaveola		LC	Resident
Sicalis luteola		LC	Resident
Sporophila bouvronides		LC	Resident
Sporophila intermedia		LC	Resident
Thraupis episcopus		LC	Resident
Thraupis palmarum		LC	Resident
Myrmoborus leucophrys	Thamnophilidae	LC	Resident
Myrmophylax atrothorax		LC	Resident
Myrmotherula longipennis		LC	Resident
Sakesphorus canadensis		LC	Resident
Thamnophilus doliatus		LC	Resident
Megascop choliba	Strigidae	LC	Resident
Ramphastos tucanus	Ramphastidae	VU	Resident
Aramides cajaneus	Rallidae	LC	Resident
Amazona amazonica	Psittacidae	LC	Resident
Amazona ochrocephala		LC	Resident
Ara severus		LC	Resident
Eupsittula pertinax		LC	Resident
Forpus conspicillatus		LC	Resident
Orthopsittaca manilatus		LC	Resident

Species	Family	IUCN Category	Migrant/resident
Manacus manacus	Pipridae	LC	Resident
Pipra filicauda		LC	Resident
Campephilus melanoleucus	Picidae	LC	Resident
Colaptes punctigula		LC	Resident
Dryobates passerinus		LC	Resident
Picumnus squamulatus		LC	Resident
Pteroglossus inscriptus		LC	Resident
Ammodramus aurifrons	Passerellidae	LC	Resident
Leiothlypis peregrina	Parulidae	LC	Boreal Migratory
Parkesia noveboracensis		LC	Boreal Migratory
Protonotaria citrea		LC	Boreal Migratory
Setophaga petechia		LC	Boreal Migratory
Setophaga striata		NT	Boreal Migratory
Colinus cristatus	Odontophoridae	LC	Resident
Nyctibius grandis	Nyctibiidae	LC	Resident
Nyctibius griseus		LC	Resident
Anthus chii	Motacillidae	LC	Resident
Momotus momota	Momotidae	LC	Resident
Mimus gilvus	Mimidae	LC	Resident
Cacicus cela	Icteridae	LC	Resident
Gymnomystax mexicanus		LC	Resident
Icterus icterus		VU	Resident
Icterus nigrogularis		LC	Resident
Leistes militaris		LC	Resident
Molothrus oryzivorus		LC	Resident
Psarocolius decumanus		LC	Resident
Sturnella magna		LC	Resident
Hirundo rustica	Hirundinidae	LC	Boreal Migratory
Progne chalybea		LC	Resident
Galbula tombacea	Galbulidae	LC	Resident
Dendroplex picus	Furnariidae	LC	Resident
Phacellodomus rufifrons		LC	Resident

106

Species	Family	IUCN Category	Migrant/resident
Euphonia chlorotica	Fringillidae	LC	Resident
Caracara plancus	Falconidae	LC	Resident
Falco femoralis		LC	Resident
Herpetotheres cachinnans		LC	Resident
Milvago chimachima		LC	Resident
Donacobius atricapilla	Donacobiidae	LC	Resident
Crotophaga ani	Cuculidae	LC	Resident
Crotophaga major		LC	Resident
Piaya cayana		LC	Resident
Tapera naevia		LC	Resident
Mitu tomentosum	Cracidae	LC	Resident
Ortalis guttata		LC	Resident
Cyanocorax violaceus	Corvidae	LC	Resident
Columbina minuta	Columbidae	LC	Resident
Columbina squammata		LC	Resident
Columbina talpacoti		LC	Resident
Leptotila rufaxilla		LC	Resident
Leptotila verreauxi		LC	Resident
Patagioenas cayennensis		LC	Resident
Zenaida auriculata		LC	Resident
Vanellus chilensis	Charadriidae	LC	Resident
Cathartes aura	Cathartidae	LC	Resident
Coragyps atratus		LC	Resident
Hydropsalis cayennensis	Caprimulgidae	LC	Resident
Nyctidromus albicollis		LC	Resident
Burhinus bistriatus	Burhinidae	LC	Resident
Hypnelus ruficollis	Bucconidae	LC	Resident
Bubulcus ibis	Ardeidae	LC	Resident
Egretta thula		LC	Resident
Syrigma sibilatrix		LC	Resident
Tigrisoma lineatum		LC	Resident
Streptoprocne zonaris	Apodidae	LC	Resident

Species	Family	IUCN Category	Migrant/resident
Chloroceryle amazona	Alcedinidae	LC	Resident
Buteogallus meridionalis	Accipitridae	LC	Resident
Geranoaetus albicaudatus		LC	Resident
Rupornis magnirostris		LC	Resident

In total, 135 species of birds were recorded, including records inside and outside the points. One hundred and one (101) species were recorded across 851 records counted within the count points. Species richness among the three evaluated covers was similar, with the forest and crops each housing 59 species, while the grasslands 57 species. On the other hand, the number of species in each coverage increases as additional sampling is carried out at other times of the year. In fact, an additional 34 species were recorded outside the count points for a total of 135 species present in the study area.

5.3.1.6   Results of mammals observed in the PAI

For the capture and detection of medium and large mammals, camera traps separated by at least 200 m between consecutive traps were used. Each camera was georeferenced with a GARMIN-type GPS, marked with a strip of reflective type flagging tape and facilitate subsequent search. 6 Bushnell camera traps were used in each coverage during each sampling night, in addition to 1 camera during one night in the reservoir, a total of 18 species of mammals, distributed in 7 orders and 13 families, were recorded.

Table 27. List of mammal species found in the PAI

Species	Family	IUCN Category
Alouatta seniculus	Atelidae	LC
Dasyprocta punctata	Dasyproctidae	LC
Didelphis marsupialis	Didelphidae	LC
Philander sp	Didelphidae	LC
Rodentia	*Not determined*	LC
Hydrochoerus hydrochaeris	Caviidae	LC
Cuniculus paca	Cuniculidae	LC
Coendou prehensilis	Erethizontidae	LC
Odocoileus virginianus	Cervidae	LC
Panthera onca	Felidae	NT
Dasypus sp	Dasypodidae	LC
Myrmecophaga tridactyla	Myrmecophagidae	VU
Cerdocyon thous	Canidae	LC
Sapajus Apella	Atelidae	CR

Species	Family	IUCN Category
Marmosa (sensu lato)	Didelphidae	LC
Dactylomys dactylinus	Echimyidae	LC
Tamandua tetradactyla	Myrmecophagidae	LC
Dasypus sabanicola	Dasypodidae	NT

Eighteen operational taxonomic units (OTU) were registered of mammals, that is, taxonomic entities that we were able to differentiate, but it is necessary to obtain specimens or more information to achieve a higher level of resolution taxonomic. However, only 13 were identified to the species level while five were classified to the order or genus level. For the correct determination of these four taxa it is necessary to collect specimens to inspect their cranial or skeletal characteristics, and in some cases it is very possible and necessary to resort to molecular methods of identification. However, for analysis purposes the 18 OTUs are treated as distinctive species in this monitoring. The 18 reported species grouped a total of 211 records, 77 through camera traps and 134 through tours. The trap cameras recorded 8 species while 13 species were recorded during the tours.

In summary, the remnant of forest, crops, and grasslands available on the Bacao estates are home to communities of amphibians, reptiles, birds and mammal's representative of the Colombian highlands. At a general level, numbers of species similar to those reported for other localities and similar coverages of the Colombian Orinoquia were found; however, the levels of representativeness of the samples suggest that it is still possible to record additional species in the different coverages due to the above, in order to increase the complementarity of the lists of species by coverages and to know the dynamics of the fauna between coverages. It is recommended to carry out at least one field phase during a rainy season since studies in different taxonomic groups indicate that the richness and abundance of species (i.e. movement patterns) tend to vary seasonally in response to factors such as humidity, availability of resources, among others. others. As much as possible, this field phase should follow the same methodology developed in this study so that the results between stations are comparable.

In the case of some groups such as reptiles, birds, and mammals, it is possible to propose and develop photo trapping and/or participatory monitoring of Bacao workers and visitors as an alternative methodology to track changes in the composition and habitat use of species, particularly of the most common and easy to detect and identify using these methodologies. In Bacao, several species were recorded, which, due to their ecological characteristics (habitat use and diets), can serve as bioindicators of changes in the structure of the vegetation and connectivity of the landscape.

The conservation of natural forest and savannah covers in and around Bacao are key to maintaining connectivity between populations and avoiding possible local extinction processes. The maintenance of these natural areas is key given their contribution as a source of species that contribute to the control of invertebrates and vertebrates within cocoa crops.

Finally, one of the groups of mammals that were not sampled in this study but that are one of the most representative within mammals are bats. For the region of the Colombian and Venezuelan plains, of the total of 183 species of mammals reported, 101 species correspond to bats. Studies carried out in cocoa crops associated with dry and humid forests in the Neotropics indicate that bats maintain a mutualistic relationship with the cocoa crop since it serves as a refuge while they capture a variety of

prey (insects) that can potentially affect crops and surrounding suburban areas. Additionally, bats may use cocoa crops as corridors between forest fragments and patches of secondary vegetation.

5.3.2   Biodiversity Monitoring Plan Dissemination (CCB, B4.3)

The summary of the Monitoring Report was created and translated into Spanish and shared with employees and smallholder farmers from the communities in the Project Zone, using the established communication channels for all stakeholders. The document was readily available in print (in a central and accessible location) or in digital format it was publicly available on the public website www.verra.org, if interest is expressed in seeing them. All stakeholders were asked to comment on the monitoring report along with the summarized translated version, any comments can be made to CCBStandards@vcs.org. The project significantly enhanced habitat, water quality, and land management, leading to improved biodiversity. Additionally, support was provided to 120 small farmers for establishing cacao agroforestry systems, which increased tree cover outside the project area and further benefited local species.

5.4   Optional Criterion: Exceptional Biodiversity Benefits

Gold Level exceptional biodiversity benefits do not apply to this project.

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

Annex/ Section	Information	Justification
A	Household worker survey Report	Results related to social benefits from project activities
B	Report on social surveys conducted to smallholder farmers from Impulsa Program	Results related to social benefits from project activities
C	Report on HCVs	Results related to HCVs
D	Bacao Health and Safety Policy at work	Internal policy
E	Bacao Transparency, Ethics and Anti-corruption program	Internal process
F	2104 BCA Scope Due Diligence Legal (2016 & 2021)	Internal process
G	Bacao Risk Management System to prevent money laundering, anti-terrorist financing and financing of the production of weapons for mass destruction	Internal process
H	On-going dispute for invasion of conservation area in project area	Internal procedure
I	Bacao annual report on operational indicators	Internal monitoring report
J	Procedure for establishing new crops	Internal process
K	Investment model	Financial information
L	Legal agreement for land purchase	Legal documentation
M	Invoices for payments to Bacao workers	Account information

Annex/ Section	Information	Justification
N	Invoices for payments to Impulsa farmers	Account information
O	Minutes of board meetings (investment, strategic and operational planning)	Internal records
P	Yearly audit reports for law compliance	Audit report

APPENDIX 2: ADDITIONAL INFORMATION

The following data and information are made available:

Annex/ Section	Description
A	Bacao Monitoring Plan

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