AFFORESTATION OF DEGRADED GRASSLANDS IN VICHADA, COLOMBIA

Document Prepared By

South Pole Carbon Asset Management S.A.S.

Contact: +57 4 520 5000; j.bolivar@southpole.com

Project Title	*Afforestation of degraded grasslands in Vichada, Colombia*
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Project Location	*Colombia, Vichada*
Project Proponent(s)	*Forest First Colombia S.A.S.* *Contact Name: Tobey Russ* *Email: oficinabogota@forestfirst.com* *Phone: +57 1 745 0560*
Prepared By	*South Pole Carbon Asset Management S.A.S.* *Contact Name: Jhoanata Bolivar* *Email: j.bolivar@southpole.com* *Phone: +57 4 520 5000*
Validation/Verification Body	*Instituto Colombiano de Normas Técnicas. ICONTEC* *Contact Name: Gloria Zapata*

	Email: gzapata@icontec.org *Phone: +57 4 319 8020*
GHG Accounting/ Crediting Period	*September 15, 2016 – September 14, 2046: 30-year lifetime*
Monitoring Period of this Report	*September 15, 2016 – December 03, 2020: 4.2 years.*
History of CCB Status	*Under validation and first verification*
Gold Level Criteria	*The project is not applying for any Gold Level criteria.*

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1 SUMMARY OF PROJECT BENEFITS

The grouped project aim is to restore degraded grasslands in Vichada (Colombia) through the establishment of timber plantations. This first instance consists in the afforestation of 30,605 ha of low-fertility grasslands that have been degraded by livestock in the municipalities of Puerto Carreño and La Primavera, it includes the planting of eucalyptus (Eucalyptus pellita) and acacia (Acacia mangium) as timber species.

Through afforestation activities to recover degraded lands, the project aims to promote connectivity between ecosystems. In addition, this project expects to provide more than 200 full-time employments opportunities (with equal access to women and men) in a zone historically affected by poverty. Furthermore, the increase in the forest cover and sequestration of carbon in living biomass, will contribute to the reduction of greenhouse gases (GHG) emissions by acting as a sink by sequestering an average of 139,489 tCO_2e per year, it is 4,184,664 tCO_2e within the 30-year crediting period.

1.1 Unique Project Benefits

Outcome or Impact	Achievements during the Monitoring Period	Section Reference	Achievements during the Project Lifetime
1) Empowerment of woman and communities.	The project is very committed to the generation of quality employment and to the inclusion of gender. That is why, the percentage of women hired has increased from 14% (the first year, 2016) to 24% (last year, 2020).	4.1.3	The project is very committed to the generation of quality employment and to the inclusion of gender. That is why, the percentage of women hired has increased from 14% (the first year, 2016) to 24% (last year, 2020).
2) Increase in perception/recognition of the value of forest resources.	The current staff of 98 people have been trained in the project activities, including conservation actions, as part of the mandatory initial training. Additionally, several workshops and meetings have been developed with the local communities, the main topics have been: the importance of trees, the difference between planted forest and natural forest, sowing, and various fertilization and fire control methods.	2.3.3 2.3.13 4.1.3	The current staff of 98 people have been trained in the project activities, including conservation actions, as part of the mandatory initial training. Additionally, several workshops and meetings have been developed with the local communities, the main topics have been: the importance of trees, the difference between planted forest and natural forest, sowing, and various fertilization and fire control methods.

3) Promote connectivity between ecosystems.	6,600 ha have been subject to afforestation with eucalyptus (*Eucalyptus pellita*) and acacia (*Acacia mangium*). These activities increase the connectivity in the area and the restoration of degraded landscapes.	5.3	6,600 ha have been subject to afforestation with eucalyptus (*Eucalyptus pellita*) and acacia (*Acacia mangium*). These activities increase the connectivity in the area and the restoration of degraded landscapes.
4) Maintain the local habitat of wildlife.	2,374 ha of threatened and fragile forest ecosystems (*morichales* and riparian forests) have been protected.	5.3	2,374 ha of threatened and fragile forest ecosystems (*morichales* and riparian forests) have been protected.

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	482,581 tCO_2e	3	482,581 tCO_2e
	Net estimated emission reductions in the project area, measured against the without-project scenario	Not applicable		Not applicable
Forest[1] cover	For REDD[2] projects: Number of hectares of reduced forest loss in the project area measured against the without-project scenario	Not applicable		Not applicable
	For ARR[3] projects: Number of hectares of forest cover increased in the project area measured against the without-project scenario	6,600 ha	3	6,600 ha
Improved land management	Number of hectares of existing production forest land in which IFM[4] practices have occurred as a result of the project's activities, measured against the without-project scenario	Not applicable		Not applicable
	Number of hectares of non-forest land in which improved land management has occurred as a result of the project's activities, measured against the without-project scenario	Not applicable		Not applicable

[1] Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (*VCS Program Definitions*)
[2] Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (*VCS Program Definitions*)
[3] Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (*VCS Program Definitions*)
[4] Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood and fuelwood (*VCS Program Definitions*)

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
Training	Total number of community members who have improved skills and/or knowledge resulting from training provided as part of project activities	Throughout 2018 and 2019, different training sessions were offered: 64, on technical aspects; 47, on harvesting; and 25, on job security. An average attendance of 201 employees was achieved in each of the topics. All new workers receive initial training from the plantation manager.	2.3.13 4.1.1 4.1.3	Throughout 2018 and 2019, different training sessions were offered: 64, on technical aspects; 47, on harvesting; and 25, on job security. An average attendance of 201 employees was achieved in each of the topics. All new workers receive initial training from the plantation manager.
	Number of female community members who have improved skills and/or knowledge resulting from training provided as part of project activities of project activities	On average, 17% of staff hired every year have been women and have received initial training from the plantation manager.	2.3.13 4.1.1 4.1.3	On average, 17% of staff hired every year have been women and have received initial training from the plantation manager.
Employment	Total number of people employed in of project activities,[5] expressed as number of full time employees[6]	The total number of employees has increased from 66 (first year, 2016) to 167 (last year, 2020).	4.1.3	The total number of employees has increased from 66 (first year, 2016) to 167 (last year, 2020).
	Number of women employed in project activities, expressed as number of full time employees	The percentage of women hired has increased form 14% (first year, 2016) to 24% (last year, 2020).	4.1.3	The percentage of women hired has increased form 14% (first year, 2016) to 24% (last year, 2020).

[5] Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.
[6] Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
Livelihoods	Total number of people with improved livelihoods[7] or income generated as a result of project activities	The percentage of people hired from the local communities directly by FFC has increased form 21% (first year, 2016) to 74% (last year, 2020), improving their livelihoods by providing stable jobs (which are scarce in the project area)	4.1.1 4.1.3	The percentage of people hired from the local communities directly by FFC has increased form 21% (first year, 2016) to 74% (last year, 2020), improving their livelihoods by providing stable jobs (which are scarce in the project area)
	Number of women with improved livelihoods or income generated as a result of project activities	The percentage of women hired has increased form 14% (first year, 2016) to 24% (last year, 2020), improving their livelihoods by providing stable jobs.	4.1.3	The percentage of women hired has increased form 14% (first year, 2016) to 24% (last year, 2020), improving their livelihoods by providing stable jobs.
Health	Total number of people for whom health services were improved as a result of project activities, measured against the without-project scenario	The 235 inhabitants of Venturosa, through the annually support to the health center		The 235 inhabitants of Venturosa, through the annually support to the health center
	Number of women for whom health services were improved as a result of project activities, measured against the without-project scenario	The 71 women inhabitants of Venturosa, through the annually support to the health center		The 71 women inhabitants of Venturosa, through the annually support to the health center
Education	Total number of people for whom access to, or quality of, education was improved as a result of project	Not applicable		Not applicable

[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
	activities, measured against the without-project scenario			
	Number of women and girls for whom access to, or quality of, education was improved as a result of project activities, measured against the without-project scenario	Not applicable		Not applicable
Water	Total number of people who experienced increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	Not applicable		Not applicable
	Number of women who experienced increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	Not applicable		Not applicable
Well-being	Total number of community members whose well-being[8] was improved as a result of project activities	The percentage of people hired from the local communities directly by FFC has increased form 21% (first year, 2016) to 74% (last year, 2020), improving their livelihoods by providing stable jobs.	4.1.3	The percentage of people hired from the local communities directly by FFC has increased form 21% (first year, 2016) to 74% (last year, 2020), improving their livelihoods by providing stable jobs.
	Number of women whose well-being was improved as a result of project activities	The percentage of woman hired has increased form 14%	4.1.3	The percentage of woman hired has increased form 14%

[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.

Category	Metric	Achievements during Monitoring Period	Section Reference	Achievements during the Project Lifetime
		(first year, 2016) to 24% (last year, 2020), improving their livelihoods by providing stable jobs.		(first year, 2016) to 24% (last year, 2020), improving their livelihoods by providing stable jobs.
Biodiversity conservation	Change in the number of hectares significantly better managed by the project for biodiversity conservation,[9] measured against the without-project scenario	6,600 ha has been subject to afforestation with eucaliptus (*Eucalyptus pellita*) and acacia (*Acacia mangium*) and 2,374 ha of threatened and fragile forest ecosystems have been protected. These activities increase the connectivity in the area and the restoration of degraded landscapes.	5	6,600 ha has been subject to afforestation with eucaliptus (*Eucalyptus pellita*) and acacia (*Acacia mangium*) and 2,374 ha of threatened and fragile forest ecosystems have been protected. These activities increase the connectivity in the area and the restoration of degraded landscapes.
	Number of globally Critically Endangered or Endangered species[10] benefiting from reduced threats as a result of project activities,[11] measured against the without-project scenario	One flora species: *Oxandra espintana;* and one fauna species: *Crocodylus intermedius*	5	One flora species: *Oxandra espintana;* and one fauna species: *Crocodylus intermedius*

[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

2 GENERAL

2.1 Project Description

2.1.1 Implementation Description

The grouped project is developed in the municipalities of Puerto Carreño and La Primavera (Vichada, Colombia), it consists of the afforestation of land degraded by cattle raising, through the establishment of timber plantations that produce wood chips to generate energy.

During the monitoring period, September 15, 2016 to December 03, 2020, which corresponds to the first VCS–CCB verification, Forest First Colombia (FFC) has planted 6,600 ha (274.1 ha in 2016, 3,196.9 ha in 2017, 2,018.6 ha in 2018 and 1,110.5 ha in 2019) of commercial forest with eucaliptus (*Eucalyptus pellita*) and acacia (*Acacia mangium*).

Through afforestation activities, the project has promoted connectivity between ecosystems. In addition, this project has provided more than 100 full-time employments opportunities in a zone historically affected by poverty. Furthermore, the increase in forest cover and sequestration of carbon in living biomass has contributed to the reduction of GHG emissions by acting as sinks and sequestering 482,581 tCO_2e, within the 4.2 years corresponding to the verification period.

2.1.2 Project Category and Activity Type

The project corresponds to VCS scope 14 “Agriculture, Forestry and Other Land Use” as an Afforestation, Reforestation, and Revegetation (ARR) project. It is a grouped project that aims to recover degraded lands that are expected to remain degraded or continue to degrade in the absence of the project.

2.1.3 Project Proponent(s)

Organization name	Forest First Colombia S.A.S
Contact person	Tobey J. Russ
Title	Legal representative
Address	Calle 75 No. 5-88
Telephone	+57 745 05 60
Email	oficinabogota@forestfirst.com

2.1.4 Other Entities Involved in the Project

Organization name	South Pole Carbon Asset Management S.A.S.
Contact person	Jhoanata Bolivar Cardona
Title	Head of Forestry and Land Use Projects - Global
Address	Carrera 46 No. 7-59. Medellín, Colombia

Telephone	+57 4 5205000
Email	j.bolivar@southpole.com

2.1.5 Project Start Date (G1.9)

The reforestation activities began on September 15, 2016. This date corresponds to the first planted lots (A227B and A235) in the project area[12].

2.1.6 Project Crediting Period (G1.9)

The crediting period of the project is 30 years. The project started on September 15, 2016 and will end on September 14, 2046.

2.1.7 Project Location

The project is in the jurisdiction of the Corporación Autónoma Regional de la Orinoquía (CORPORINOQUIA) in the Vichada department, and encompasses the Puerto Carreño and La Primavera municipalities (**Error! Reference source not found.**). The total project zone has 38,859 ha distributed across 46 farms located between the Bita and the Meta Rivers.

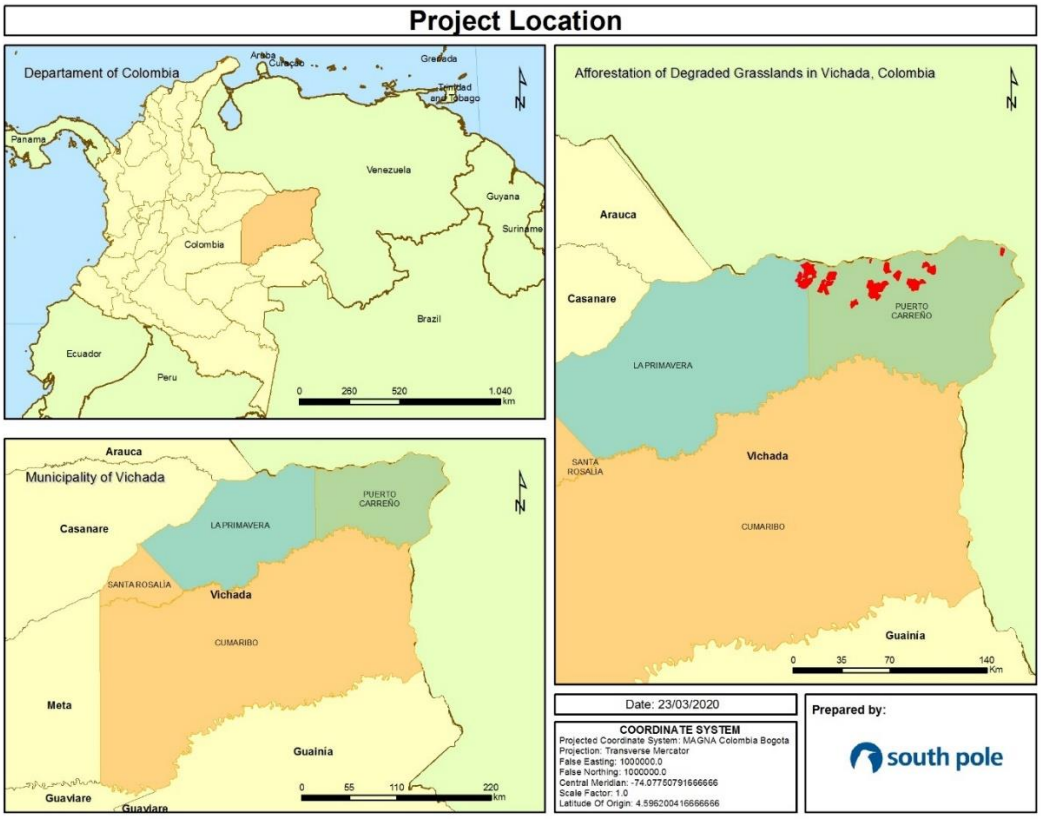


Figure 1: Project location

[12] Supporting information: [StartDate].

2.1.8 Title and Reference of Methodology

This is an AFOLU A/R project that aims to remove GHG by incrementing C sinks through the CO_2 fixation made by forest plantations during their growth.

Methodologies applied:

1. AR-ACM0003 A/R Large-scale Consolidated Methodology – Afforestation and reforestation of lands except wetlands. Version 02.0[13].

Tools applied[14]:

1. AR-AM Tool 02: combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities. Version 1.0
2. AR-AM Tool 08: estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity. Version 4.0
3. AR-AM Tool 12: estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities. Version 3.1
4. AR-Tool 14: estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities. Version 4.2
5. AR-AM Tool 15: estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity
6. AR-AM Tool 16: tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities. Version 1.0

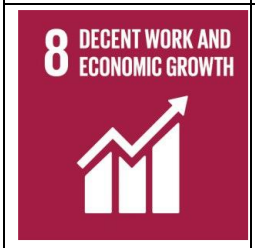
2.1.9 Other Programs (G5.9)

Emission trading programs and other binding limits: the emissions removal as a result of this project will not be used for compliance under any other trading program or mechanism. The current VCS project is entirely independent of any other carbon project scheme being developed in Colombia such as REDD projects; therefore, no double counting has occurred.
Other forms of environmental credit: the project has not sought or received any other GHG environmental credit.
Participation under other GHG programs: the project has not been registered nor is it seeking registration under any other GHG program.

2.1.10 Sustainable Development

To achieve compliance with Sustainable Development Goals, Colombian government proposed in “Plan Nacional de Desarrollo 2018 – 2022”[15] different strategies to each country region based on their social, economic, and environmental issues. The Project Zone is in the Llanos-Orinoquia region, which have one of the highest levels of multidimensional poverty index, Vichada is the most critic department in the region - eight in ten people are considered “multidimensional poor”. Due to its reliance on agricultural and forestry activities, the strategy of the Colombian Government for this region is to strengthen it as a sustainable pantry for the country and the world. The project will contribute to the following national sustainable development goals:[16]

[13] This methodology is available online at: https://cdm.unfccc.int/methodologies/ARmethodologies/approved
[14] These documents are available online at: https://cdm.unfccc.int/methodologies/DB/C9QS5G3CS8FW04MYYXDFOQDPXWM4OE
[15] https://colaboracion.dnp.gov.co/CDT/Prensa/PND-Pacto-por-Colombia-pacto-por-la-equidad-2018-2022.pdf
[16] http://humanumcolombia.org/ods/

	Employment of women and men without any restrictions ensures gender equality within the project. On average, 17% of the staff hired for the project activities have been women.
	The project aims to generate decent employment through formal recruiting. Currently, the project has created approximately 100 full-time positions, thus the project is promoting economic growth in the region.
	All the project activities are urgent actions required to combat climate change and its impact while simultaneously providing positive social impact through developing an economically profitable product. The project has contributed to the reduction of GHG emissions by acting as sinks and sequestering 482,581 tCO_2e in the 4.2 years corresponding to the current verification period.
	The main project goal is to restore land degraded by cattle raising through afforestation activities. Furthermore, the project protects 2,374 ha of native ecosystems: *morichales*[17] and riparian forest. Both activities promote the connectivity and improve the habitat for the wild fauna.

2.2 Project Implementation Status

2.2.1 Implementation Schedule (G1.9)

The implementation schedule has been according with the dates and activities described in the PD.

Date	Milestone(s) in the project's development and implementation
2016 - 2028	Planting trees (new areas).
2016 – 2046	Maintenance of plantation.
2016 – 2046	Generation of employment.
2016 - 2046	GHG accounting period (verification at least every five years)

[17] Vegetation compose of numerous of herbaceous and shrub species, dominated in size and abundance by the moriche palm (*Mauritia flexuosa*), which are scattered in the savannas or in the altillanura (Pacheco *et al.,* 2014). They are associated with seasonal water courses, in areas where water currents are very slow (Trujillo *et al.,* 2016).

Date	Milestone(s) in the project's development and implementation
2017	Initial engagement with communities (Socio-economic baseline study)
2019	Local stakeholder consultation
2020 - 2046	Forest inventory (at least every five years).
2020 - 2046	Harvesting and re-planting of trees (rotation period: seven years)

2.2.2 Methodology Deviations

Not methodology deviations were applied.

2.2.3 Minor Changes to Project Description (*Rules* 3.5.6)

The project has not had changes in the community or biodiversity project design during verification.

2.2.4 Project Description Deviations (*Rules* 3.5.7 – 3.5.10)

There have not been any project description deviations applied during this monitoring period.

2.2.5 Grouped Projects

1) **New Project Areas and Communities (G1.13)**
   There are no new project areas or communities included in the project since the validation.

2) **Removed Project Areas and Communities (G1.13)**
   No project areas or communities have been removed during this period.

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

   Not applicable for this period.

4) **Scalability Limits for Grouped Projects (G1.15)**
   Not applicable for this period.

5) **Risk Mitigation for Grouped Projects (G1.15)**
   Not applicable for this period.

6) **Project Zone Map (G1.13)**
   No changes in the project zone map during this period.

7) **Changes to Management (G4.1)**

   There have been no changes to the management structure, roles, and/or responsibilities because of new entities joining the project.

2.2.6 Risks to the Project (G1.10)

A risk analysis over a period of 100 years was conducted following the guidance of the VCS AFOLU Non-Permanence Risk Tool[18]. The result of the non-permanence risk was 16%.

2.2.7 Benefit Permanence (G1.11)

The project intends to maintain the climate, community, and biodiversity benefits beyond its lifetime by the community empowerment: Training in forest management, fire control and conservation importance (see section 4.1.1 Community Impacts (CM2.1)).

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

Access to information by stakeholders is done through the mechanisms described in section 2.3.1 of the Project Document (PD). The results of the monitoring period 2016-2020 will be shared with stakeholders after auditing and validating the project, through the following channels: the FFC websites, electronic mails, paper communications in communal locations, and the VERRA website.

2.3.2 Dissemination of Summary Project Documents (G3.1)

There are different communication channels designed to share messages with the several parties involved, they depend on the characteristics of the message, the type of information, and the target audience.

Employees: the information about the PD, the implementation of activities, and their monitoring will be informed to every working party through their supervisors, who will report on the progress of the carbon project during the team meetings. Therefore, the heads of the supervisors and contractor companies will include this item in the agenda of their areas of work.

Communities: communications with the population settled in police-inspector ruled jurisdictions will be made through the members of the Community Action Board (JAC). JACs will mediate communications between FFC and the community, the police inspector will also be a key actor throughout the territory for project communication purposes.

Public institutions: communication with public institutions and civil associations identified in the project is on a more formal basis, considering the type of audience and the difficulty of moving from rural encampments to the Puerto Carreño municipal-government seat. Information of the progress of the project or calls for meetings will be made via electronic mail, formal letters, and phone calls.

2.3.3 Informational Meetings with Stakeholders (G3.1)

The detailed information on previous meetings and consultation with stakeholders is described in section 2.3.3 of the PD, this section also includes information on workshops carried out during the baseline socioeconomic study in Venturosa and Aceitico in 2017 (Table 1).

[18] Supporting information: [NPRT].

Table 1: Meetings and socializations in the framework of the project formulation

Date	Place	Lead by	Participants
04/12/2017	Boardroom of the municipal mayor of Puerto Carreño	Grupo social - contractor	Ombudsman, UMATA[19], Secretary of Government, Representative of the Municipal Council
06/12/2017	Communal room - Venturosa	Grupo social - contractor	Community leaders
06/12/2017	Communal room - Venturosa	Grupo social - contractor	FFC employees
07/12/2017	Communal room - Aceitico	Grupo social - contractor	Community leaders
07/12/2017	Communal room - Aceitico	Grupo social - contractor	FFC employees

(Source: South Pole, based on information provided by FFC, 2020)

Below are the meetings held with the JACs of Venturosa and Aceitico, designed to coordinate support for the implementation of various community activities:

Table 2: Meetings with the community for the implementation of activities[20]

Year	Number of meetings	Main topic
2017	8	- Presentation of the Social Plan for the year 2017 - Presentation of the projects to be implemented in the communities. - Road plan with the support of municipal machines. - Definition of the date for the arrangement of the roads. - Conversation about the importance of trees, the difference between planted forest and native species of natural forest, and planting and fertilization methods. - Donation of 66 native trees and fertilizers. - Children's Day celebration - Presentation of the plan for the use of road construction machines in the area - FFC contributes with 800 liters of diesel fuel for the machinery and food for 20 working days of nine municipal workers. - Assignment of responsibilities: the JACs chairman are in charge of planning road upgrading works, and managing personnel.
2018	6	- Presentation of job vacancies within the project - Delivery of medications to the health center - Purchase of plants from the community - Presentation of incentives for fire control plan - Carrying out the family census

[19] Unidad Municipal de Asistencia Técnica Agropecuaria: Municipal Unit for Agricultural Technical Assistance

[20] Supporting_information/Social Baseline/Anexos documentos/Formatos actas y listas de asistencia/Reuniones_Implementación de actividades

Year	Number of meetings	Main topic
		- Support for the soccer championship
2019	15	- Delivery of medications to the health center - Donation of school uniforms - Fundraising campaigns - Discussion on the investment of the incentive for fire control - Delivery of soccer uniforms to the students of Venturosa school - Management of resources with the mayor and the community of Venturosa for the repair of the Chiquichaque bridge - Field day: controlled burning - Realization of recreational week - Forest Football Cup

(Source: South Pole, based on information provided by FFC, 2020)

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

The project pursues, on a permanent basis, construction, and discussion opportunities with community leaders to coordinate the management of activities that could be of interest to them. The communities have been kept informed of the project activities, through the different channels and methods established for such purpose (letters, telephone calls, meetings, workshops, and electronic mail).

During the life of the project, FFC has anticipated several processes to identify the socioeconomic conditions of the territory and the possible impacts of the project on the community. Furthermore, during the meetings carried out for the socialization of the project, its benefits and goals were explained; at the same time, the permanent communication mechanism was validated. The results of this process are described in sections 2.3.3 and 2.3.7 from the PD.

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

During the consultation meetings with stakeholders, local authorities and communities were informed about the workings of carbon market, available standards to get the certification, nature of carbon credits, and the required verification process to achieve those credits. The description of the consultation process can be found in section 2.3.7 of the PD.

As explained in section 2.3.5 of the PD, electronic mails and formal letters addressed to local authorities were used to inform about the period for receiving feedback from the public, and the location of digital and paper-based documents. In the case of the communities, a copy of the PD and Monitoring Report summaries was delivered to the chairman of the directorate of Venturosa and Aceitico JAC; in the Morichalito indigenous community, communication was made directly with the governor and the traditional captain. In the case of personnel, a summary of the PD was available in each place where employees are encamped; and supervisors will be responsible for reporting about their location during the weekly meetings with their team.

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

During the consultation meetings with stakeholders, local authorities and communities were informed of the auditor's visit and its relevance to the validation of the project (see section 2.3.7 of PD).

Furthermore, during the life the project, the Training and Development Manager of FFC has had regular communication with the JAC of Venturosa, because this hamlet is the closest one to the project's planted areas. As of 2021, communications with Aceitico hamlet are expected to be more constant. During the meetings with the community, leaders were informed of the auditor's visit. It must be noted that, FFC has obtained other certifications for developing processes similar to those required for this certification; therefore, the communities have participated in other auditing processes.

2.3.7 Stakeholder Consultation (G3.4)

As mentioned in the previous sections, during the life of the project and in order to coordinate several activities developed with the community, the project has set the stage to have meeting opportunities with community leaders, as the ones described in Table 1. Detailed information on the influence exerted by stakeholders on the project implementation can be found in section 2.3.7 of the PD.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

As mentioned in the PD, the plan to keep permanent communication with the communities includes communication channels defined for each stakeholder and goes beyond the periodical meetings held with community leaders of Venturosa thus far.

The main communication channels for stakeholders to send their comments on project activities are shown in Table 3, below.

Table 3: Permanent communication channels with stakeholders

Stakeholder	Channels/Method	Details
Local communities: La Venturosa, El Aceitico. Indigenous people Morichalito	Regular meeting Letter box Community officer WhatsApp	Grievance reception format Letter boxes have been installed in three points Location: - Venturosa police inspector's residence - Aceitico police inspector's residence - FFC office in Puerto Carreño. Carrera 12 # 18-26 (Barrio Las Acacias)
Employees	Email access Letter box	Additional to official mail channel (contactenos@forestfirst.com for the registration of grievance by employees and contractors, each camp and office have a letter box and formats available.
Local government, environmental authority	Regular meetings Email access Telephone	cotactenos@forestfirst.com + 57 – 3007821917
Contractors	Email access Letter box	contactenos@forstfirst.com Each camp and office have a letter box and formats available.
National government and NGO´s	Web site Email access	contactenos@forestfirst.com info@forestfirst.com

Stakeholder	Channels/Method	Details
All stakeholder	Offices	Puerto Carreño Office: Address: Carrera 12# 18-26. Las Acacias Neighborhood Phone: 3043541529 Bogotá Office: Address: Calle 75 5-88 piso 6 Phone: +57 (1) 7450560

(Source: South Pole, based on information provided by FFC, 2020)

2.3.9 Stakeholder Consultation Channels (G3.5)

To respect the governance and organizational processes of both indigenous and rural communities, FFC focuses on communication with the legitimate representatives of those communities. Therefore, contact between the FFC and the communities is established through JACs of Venturosa and Aceitico; and, in the case of the indigenous community, through the governor. Information on the channels for consultation with stakeholders can be found in section 2.3.9 of the PD.

All consultations and participatory processes have been directly performed with the communities and other stakeholders or through their legitimate representatives. Section 2.1.8 of the PD identifies the stakeholders present in the project's area of influence.

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

All processes for socialization, consultation, and participation in the project activities are publicly promoted; that is, all actors are invited to participate regardless culture or gender. However, in the specific case of the indigenous community, the call for meetings and project information delivery is made through the governor and/or captain of the community and they are responsible for informing the families.

The necessary measures to enable the effective participation of all communities are detailed in section 2.3.10 of the PD. These measures were effectively implemented during informal briefing meetings, the stakeholder consultation (see section 2.3.7 of the PD), and the implementation of project activities in the 2016-2020 period.

2.3.11 Anti-Discrimination Assurance (G3.7)

Information on the activities and processes implemented to ensure non-discrimination at briefing meetings and the implementation of activities can be found in section 2.3.11 of the PD.

During the verification period, there were no reports on bribery or corruption by FFC or its contractor companies.

2.3.12 Grievances (G3.8)

During the verification period of the project, it was not possible to keep a written record of comments received from the community regarding the project activities. The main comments from stakeholders, however, relate to:

- dust produced by cargo trucks passing through the road that crosses the hamlet of Venturosa. To address this complaint, FFC moistens the roads before cargo trucks travel on them to prevent dust particles from rising.

- as the community is not always informed about the donations that FFC delivers through the JACs, FFC agreed with community leaders on using the community megaphone to inform about these matters.

- the Aceitico community wants to benefit from the FFC community programs. In response, FFC informed them that some support for the community will be considered as of 2021, because the plantations close to this community will begin operating this year, and can produce benefits, such as emplying local people.

2.3.13 Worker Training (G3.9)

FFC implements periodic trainings for its workers. Such trainings start when a worker begins an activity for the first time, no matter if he/she is a new worker or was transferred from another area. Trainings are the supervisor's responsibility and last from one to two months, depending on the complexity of the tasks. As part of the trainings, each activity has a procedure[21] that describes the following:

- the proper way of performing the activity;

- the correct personal protective equipment to wear;

- safety protocols; and

- environmental considerations

In addition to initial individual guidance, FFC performs periodic group training across the year to update the workers on new technologies and procedures used within FFC, and new legal, environmental, and internal requirements, and to refresh them on general procedures. The trainings might be provided by internal personnel or external institutions such as universities, external suppliers, contractors, and NGOs, among others.

Periodic group training for the current monitoring period included:

- FSC principles;

- herbicide usage and environmental considerations;

- fertilizer usage and environmental considerations;

- harvesting operations: heavy and light machinery usage, advanced felling and stacking techniques, chainsaw usage, planning, etc;

- safety protocols: fire management, chemical weeding management;

[21] Supporting_information: [Plantations_documents]

- general environmental considerations; and
- soil properties and characteristics.

The trainings performed during this monitoring period sums more than 5,000 hours of trainings, with more than 500 attendants[22].

2.3.14 Community Employment Opportunities (G3.10)

Working opportunities are published either using social media, or specialized networks, or are directed specifically to the local community. Curriculums are evaluated in detail to corroborate the compliance with the requirements of the position. The selection of the personnel is based on the fulfillment of the position conditions. When a non-qualified position is open, the local workforce is considered first, as the trainings can be provided by FFC.

FFC has constant communication with the communities where it operates. Such communications include regular meetings with their representatives. The communities of Aceitico and Venturosa acknowledge FFC's positive impact in the region and recognize it as an employ generator. This is evidenced[23] in the socio-economic baseline study.

Unfortunately, since there is no presence of big universities or educational centers in the project area, most of the management positions are fulfilled by outsiders. On the other hand, there is presence of technical institutes and distance education, and some of the mid-level management positions are fulfilled by local people.

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

The laws regulating the working environment are built based on the "Substantive Labor Code", which was adopted by Decree-Law 2663 of 1950, the recommendations adopted by the Organization and the International Labor Conferences and the Political Constitution of Colombia.

Within the "Substantive Labor Code" the following general principles relevant to project activities:

- definition of work and casual work (Article 5 and 6)
- freedom of work (Article 7)
- equality of workers (Article 10)
- the right to work, unionize and strike (Articles 11 and 12)
- the modalities, execution, effect and termination of contracts (Chapter IV, V and VI)

This has been modified by Decree 1072 of 2015 and by the following laws:

[22] Supporting_information: [Employees/Resumen de Presentaciones 2018-2019]
[23] Supporting_information: [Social Baseline/Estudio de línea base/Final Report]

Law 188 of December 30, 1959	Law 4a of 1976
Law 141 of December 16, 1961	Law 6o of 1981
Law No 171 of December 14, 1961	Law 1846 of 2017
Law 73 of December 13, 1966	Law 1822 of 2017
Law 21 of June 14, 1967	Law 1610 of 2013
Law 22 of June 14, 1967	Law 1563 of 2012
Law 48 of December 16, 1968	Law 1562 of 2012
Law 3a of October 13, 1969	Law 1496 of 2011
Law 5a of October 13, 1969	Law 1468 of 2011
Law 27 of December 20, 1974	Law 1429 of 2010
Law 1788 of 2016	Law 1280 of 2009
Law 1098 of 2006	Law 755 of 2002
Law 995 of 2005	Law 584 of 2000
Law 962 of 2005	Law 550 of 1999,
Law 789 of 2002.	Law 311 of August 12, 1996
Law 278 of April 30, 1996,	Law No. 23 of March 21, 1991
Law 119 of February 9, 1994	Law 50 of 1990
Law 1210 of 2008	Law 71 of December 19, 1988
Law 54 of December 18, 1987	Law 24 of 1986
Law 75 of 1986	Law 39 of February 5, 1985
Law 11 of February 24 of 1984	Law 20 of January 22, 1982
Law 51 of December 22, 1983	

Additional laws, decrees and resolutions that apply to project workers include (but are not limited to):

- Decree Law 21 of 1982: prevention of the evasion of the Social Security System;
- Law 100 of 1993: creation of the Integral Security System, with the objective of guaranteeing the fulfillment of the rights of all people:
- Law 119 of 1994: restriction and regulation the National Learning Service;
- Decree 1266 of 1994: creation of the System of Professional Risks as part of the Integral Security System to protect workers from physical, chemical, biological, psychosocial, sanitary and safety risks they may be exposed at work;

- Law 278 of 1996: creation of the permanent commission for the coordination of wage and labor policies in accordance with the Ministry of Labor;
- Law 789 of 2002: creation of the Social Protection Fund to promote the fulfillment of the rights to health, pension and work;
- Law 931 of 2004: protection of workers against age discrimination;
- Law 1280 of 2009: establishment of five working days of paid bereavement leave;
- Law 1468 of 2011: declaration of 14 weeks paid maternity leave;
- Law 1429 of 2010: creation of incentives for business formalization (Title II), the generation of employment, and labor formalization in the rural and urban sectors (Title III);
- Law 1438 of 2011: transformation and regulation of the General System of Social Security in Health;
- Law 1496 of 2011: guarantee of wage equality between men and women and implementations of mechanisms to eradicate gender discrimination;
- Law 1562 of 2012: definition of work-related accidents (Article 3) and occupational diseases (Article 4), establishment of the rules for their prevention (Article 11) and for basic income in case of temporary injuries (Article 5);
- Law 1610 of 2013: regulation for labor inspections and labor formalization agreements; and
- Law 1636 of 2013: creation and regulation of the Census Protection Mechanism.

2.3.16 Occupational Safety Assessment (G3.12)

Colombian legislation has a labor legal framework known as "*Sistema General de Riesgos Profesionales*" (general system of labor risks), that ensures, among other elements, that all companies provide an assessment of substantial risks to worker safety and implements strategies and measurements to avoid and mitigate such risks.

FFC developed the risk assessment for all relevant activities. In that document, risks associated with each activity are described and measurements for avoiding, minimizing, or mitigating such risks, including usage of personal protective equipment. The contractor is also required to use the mandatory PPE for each activity and are compelled to follow health and safety considerations when performing the activities.

Some risks that can arose during the implementation of the activities include:

- biological hazards: bites from snakes;
- physical agents: wounds, fractures, head trauma, burns, heat stroke; and
- chemical risk: irritation or intoxication from handling agrochemicals

The project meets the requirements for the signaling of occupational hazards in the field and the equipment for emergency care (Figure 2).

Figure 2: Elements for safety at work

Activities and processes[24] implemented to inform workers of risks and how to minimize such risks include:

- Standard Operating Procedures (SOPs) for all field activities;
- initial and periodic technical trainings;

[24] Supporting_information: [Community/Employees/1500-00801S Plan de emergencias campo]

- health and safety trainings: safe practices, safe machinery operations, ergonomics, driving safety, chemical management, snakebite prevention and emergency procedure, first aid, proper wearing of personal protective equipment, and safe fire management, among others;

- a Health and Safety Committee (COPASST[25]) with periodic meetings that analyses and evaluates all topics and issues related to health and safety within FFC;

- safety signs are posted in proper places, visible to workers and visitors;

- an internal emergency brigade;

- a Contractor Controller position, responsible for, among other duties, verifying contractors' compliance with health and safety procedures; and

- FFC is taking actions to obtaining the FSC Forest Management Certification. Such certification includes a chapter of Worker Rights and Employment conditions, and its compliance is mostly supported in the compliance of national regulations.

These activities and processes have positively contributed to the mitigation of the identified risks. This is reflected in the behavior and the health and safety indicators. Figure 3 shows that the accident rate has been decreasing from 2015 to 2020:

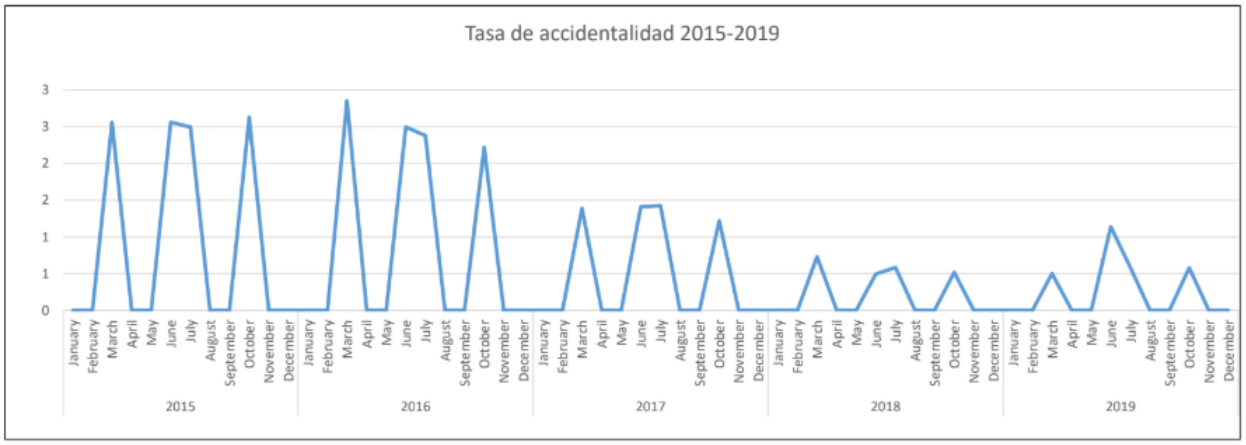


Figure 3: Accidents rate (%)

(Source: FFC, 2021)

2.4 Management Capacity

2.4.1 Required Technical Skills (G4.2)

The companies in charge of developing the technical processes of the plantation in the field are the contracting companies, ENBOSQUE and SILVOTECNIA. Therefore, contracting companies providing

[25] Supporting_information: [Community/Employees/Funcionamiento Comité Convicencia Laboral] and [Community/Employees/Comite de Convivencia workers_feedback]

services to Forest First Colombia are regularly informed and trained on the operational procedures that incorporate FFC. This is done primarily by forestry supervisors and through on the job training.

In relation to carbon quantification, South Pole accompanied the process of validation, monitoring and verification of the climate, community and biodiversity benefits generated by the project. The South Pole team advised on the development of the monitoring report including the climate, community and biodiversity sections, AND the risk analysis and document the burning and grievance mechanism defined by the project participants.

In occupational safety and health, the new employees participate in an induction program to familiarize them field teams and operations[26]. During this period, the employee learns about the occupational risks[27]. The following activities were developed for the existing employees:

Safety meetings:

- road safety (two hours);
- duties and responsibilities in safety (one hour), and
- the proper use of respiratory protection during herbicide application (30 minutes)

In addition, first aid training was provided with the Red Cross and road safety training with a highly experienced trainer.

2.4.2 Management Team Experience (G4.2)

The FFC management team[28] is highly experienced in establishing, managing, and implementing forestry projects, in Colombia, where it has a 10-years presence, and other countries. The team is composed of highly qualified members with top level global experiences in several fields that include: forestry activities, sustainability, wood, business development, project management, governance, capital raising, and stakeholder mapping and management.

This experienced team ensures that the project is developed over strong basis and the management is performed according to the highest standards. As evidence, the project has already achieve carbon certification for the compliance market in Colombia on lands in the same region. In the same way, FFC is preparing for obtaining FSC certification for Forest Management. Above all, FFC has the support of Finnfund[29], which finances responsible sustainable projects that comply with high management standards.

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

FFC partnered with highly experienced forest operators in the country, to support the operations in the field. The operators are:

Silvotecnia SAS[30]:

[26] Supporting_information: [Community/Employees/Entrenamiento Brigada]
[27] Supporting_information: [Community/Employees/Cronograma Temas]
[28] http://www.forestfirst.com/en/management-team/
[29] https://www.finnfund.fi/en/
[30] http://www.silvotecnia.com

Silvotecnia is a forestry company with more than 16 years of experience in the forestry sector. Characterized by its high-quality services, its mission is to provide forest operation, consulting, environmental and forest heritage management services that adhere to the highest standards and corporate social responsibility principles and generate value for its stakeholders.

Silvotecnia provides integral services in the area of forestry plantations, environmental services and environmental, forestry and wood industry consulting. It is committed to strong performance in the sustainable development scenario combined, with social equity, environmental respect, and economic feasibility. It provides high-quality services to the forestry sector that generate employment and operate under the principles sustainability and corporate social responsibility.

Enbosque

Enboque[31] has experience in the region since 2009 and offers several services such as soil analysis, pest management and control, and forestry operations such as nursery management, soil preparation, planting, pruning, and weeding. Its staff has more than 20 years of experience in forestry operations within the country.

Besides its technical and operational capacity, Enbosque also has management capacity and experience in the Orinoquia Region. All the processes are developed in compliance with the national legal framework, related to environmental, labor, social, and legal aspects.

Currently, FFC employs almost 40 people from Enbosque, in different activities across the company.

South Pole[32]

The services of South Pole have been contracted to support the process of project formulation through advice on the construction of the PD and the Monitoring Report (MR), and accompaniment in the processes of validation and verification under the VCS and CCB standards.

South Pole is a sustainability service provider, dedicated to working with clients in the public and private sectors to deliver solutions that contribute to a more sustainable global society and economy. Its vision is to generate positive impacts on the climate, ecosystems, and communities. South Pole's team of over 300 experts located in 18 offices focuses on key sustainability issues such as climate change, renewable energy, forestry and land use, water and sustainable cities and buildings.

For more than 14 years, South Pole has, together with its clients, achieved the following results

- positive impact on 20 million people around the world;
- the reduction of 170 million tons of CO2 emissions;
- the development of more than 700 projects between renewable energy, forestry, agriculture, and the industrial, household, and public sectors.
- the protection or restoration of more than 2 million hectares of land; and
- the creation of 100,000 jobs in developing countries.

[31] https://enbosque.com/
[32] https://www.southpole.com/

Forests and communities have been part of South Pole's core activities from the beginning. South Pole has successfully verified the first community forestry project in South America under the Verified Carbon Standard and the Climate Community and Biodiversity Standard (VCS and CCBS, respectively) in 2011: the Asorpar Degraded Land Regeneration Project in Colombia. In 2013, South Pole verified one of the largest community-based Reduced Emissions from Deforestation and Forest Degradation (REDD+) projects worldwide: the Kariba REDD+ Project in Zimbabwe.

South Pole has a technical and professional team that combines extensive knowledge in GHG emission reduction certification for forestry and land use projects, VMR systems and ecology and dynamics of coastal marine ecosystems, allowing them to comprehensively address all aspects of the project.

FFC also works with the following international partners:

Finnfund

Finnfund[33] is a development financier, that focuses its support in responsible and profitable businesses in developing countries. It provides risk capital, long-term investment loans, mezzanine financing and expertise on how to invest in the developing markets. They put emphasis on sectors that are critical to sustainable development, including sustainable forestry, that produce development impacts.

In 2017, Finnfund invested in FFC. This investment was an important milestone as it provided external validation of the sustainable forestry practices and supports the FFC´s commitment to positively impact the region, and its community and environment.

Sappi

Sappi[34] is "a global diversified woodfiber company focused on providing dissolving wood pulp, packaging and specialty papers, graphic papers, as well as biomaterials and biochemicals" and one of the leading global providers of sustainable woodfiber products and solutions" FFC partnership with Sappi began in 2016. They act as a strategic investor and, as part of their investment, entered into an offtake agreement for up to 2.5 million tons per year. There is also a technical cooperation agreement that will allow FFC to benefit from Sappi's expertise in genetic improvement, silviculture and pest control and disease management.

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

FFC is financially healthy, they are audited periodically by a Baker Tilly Colombia LTDA.[35] Additionally, it has the support of a large and globally recognized fund focused on profitable and responsible business, the Finnfund. In the same line, a cashflow is provided as evidence of the financing support.[36]

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

FFC has an anti-corruption police force, which evidences that FFC is committed to doing business ethically and in compliance with all anti-corruption, antimony laundering and anti-terrorism laws that apply to FFC. The scope of such policy[37] applies to all "employee's officers, directors and third parties acting on behalf of

[33] https://www.finnfund.fi/en/finnfund/
[34] https://www.sappi.com/group-profile
[35] Supporting _information: [Audited_Financial_Statements]
[36] Supporting _information: [NPRT\InternalRisks\Financial_Viability]
[37] Supporting_information: [Community/Employes/anti-corruption policy]

FFC and its affiliates." The policy complies with Colombian Criminal Code article 488 and article 323 and will be amended should Colombian law change

Additionally, there is a code of conduct that is given to all employees, in which FFC's position against corruption and bribery is discussed. The issue is openly discussed with employees who are considered most vulnerable to this type of situation.

2.4.6 Commercially Sensitive Information (*Rules* 3.5.13 – 3.5.14)

No sensitive information has been generated nor excluded from the public version of the project.

2.5 Legal Status and Property Rights

2.5.1 Recognition of Property Rights (G5.1)

The project area is on private property. In accordance with the Land Rights Acquisition Policy of FFC[38], the acquired of land is in line with the legislative requirements of the Republic of Colombia and does not manage land rights or undertake any activities on land that has not been fully titled or is not under private ownership, for this, FFC undertakes a technical and legal due diligence exercise on new land parcels prior to purchase, with the following objectives:

- Ensure the title was properly acquired, is legal and valid;
- ensure the parcel of land is suitable for forestry activities and determine its eligibility areas;
- ensure the parcel of land is free from invasions and/or illegal occupiers, and that there are no additional claims to that parcel of land;
- identify sensitive environmental areas for future conservation;
- identify cultural heritage sites to allow free access to these sites; and
- avoid the forced eviction and displacement of people.

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

The project is on private land and FFC does not purchase any property before clarifying the legal status (see section 2.5.1). According to this, there are not collective territories within the project area that have been awarded to black or indigenous communities[39]. However, the cemetery of one of the near settlements, Venturosa, is located within the boundary of a property owned by FFC, this area was abandoned but FFC delimited it and is protecting and preserving it and allows the community free access.[40]

[38] Supporting information: [Legal_status/0200-003-01E Land Acquisition Policy].
[39] Supporting information: [Legal_status/Certificacion_0818_de_2019].
[40] Supporting information: [Legal_status/0750-003-01E ASI-001 Cementery at Venturosa].

2.5.3 Property Right Protection (G5.3)

Because the project owner has the real ownership rights of the properties (see section 2.5.1), the project activities do not lead or force property right holders to involuntary remove or relocate their habitation or activities.

2.5.4 Identification of Illegal Activity (G5.4)

There are no illegal activities that could affect the project. Currently, around 200 people live inside the six camps located in the project area. Each camp has a heritage guardian in charge of patrolling the project properties, to identify, as early as possible, fire events, the presence of cows (which can damage saplings), or any other natural or illegal activity that could affect the project. This helps avoid or minimize any potential negative impacts of the project.

2.5.5 Ongoing Disputes (G5.5)

There are currently no land disputes in the project area. The RSR documents reports, as annotations, all the changes over rights to lands since the first allocation, indicating that the land tenures have been clear for at least, the last 14 years[41].

In potential future case of disputes over land tenure, the project will take the necessary measurements to resolve the disputes or clarify overlapping claims.

2.5.6 National and Local Laws (G5.6)

Not national or local laws have gone into effect, changed, or been eliminated since the project's validation.

3 CLIMATE

3.1 Monitoring GHG Emission Reductions and Removals

3.1.1 Data and Parameters Available at Validation

Data / Parameter	Carbon Fraction of dry matter (CF)
Data unit	T C t d.m $^{-1}$
Description	Biomass proportion corresponding to carbon. CF is used to convert biomass to carbon.
Source of data	IPCC (2006). Good Practice Guidance for LULUCF. Chapter 4. Forest Land. Table 4.3. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf
Value applied	0.47

[41] Supporting _information: [Legal_status/RSR_reports].

Justification of choice of data or description of measurement methods and procedures applied	The default value from IPCC. It applies for all species and is used in the baseline scenario.
Purpose of the data	Calculation of project emissions
Comments	

Data / Parameter	Carbon Fraction of dry matter (CF)
Data unit	T C t d.m $^{-1}$
Description	Biomass proportion corresponding to carbon. CF is used to convert biomass to carbon.
Source of data	Local estimations. Supporting information: [Wood_analysis/Carbon].
Value applied	*E. pellita:* 0,509 *A. mangium:* 0,513
Justification of choice of data or description of measurement methods and procedures applied	Destructive samples were taken directly from the field.
Purpose of the data	Calculation of project emissions
Comments	

Data / Parameter	Biomass Conversion and Expansion Factor (BCEF)
Data unit	Dimensionless
Description	Ratio of aboveground stem volume to oven-dry biomass.
Source of data	IPCC (2006). Good Practice Guidance for LULUCF. Table 4.5. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf
Value applied	From 0.7 to 4.0.

Justification of choice of data or description of measurement methods and procedures applied	The above-ground tree biomass is calculated using the BEF and wood density in connection to Increment in Volume data. The BEF value for Tropical Climatic Zone and Broadleaf Forest Type was used.
Purpose of the data	Calculation of project emissions
Comments	

Data / Parameter	Volume equation
Data unit	m^3
Description	Equation to estimate the volume of trees of *E. pellita* on the function of diameter (DBH) and height (H).
Source of data	Nieto *et al.* (2016)
Value applied	V=0,000051265*DBH^1,8753∗H^0,9888
Justification of choice of data or description of measurement methods and procedures applied	Biomass equation reported in the literature was used for estimation of GHG removals. The applied equation was developed in Colombia, in areas with similar condition to those presented in the study area.
Purpose of Data	Calculation of project emissions
Comments	–

Data / Parameter	Volume equation
Data unit	m^3
Description	Equation to estimate the volume of trees of *A. mangium* on the function of diameter (DBH).
Source of data	Torres & Del Valle (2007)
Value applied	V=0,000086*DBH^2,747
Justification of choice of data or description of measurement methods and procedures applied	Biomass equation reported in the literature was used for estimation of GHG removals. The applied equation was developed in Colombia, in areas with similar condition to those presented in the study area.
Purpose of Data	Calculation of project emissions
Comments	–

Data / Parameter	Root-Shoot-Ratio (R)
Data unit	Dimensionless

Description	Ratio of the weight of the roots to the weight of the top of the tree. Used for belowground tree biomass estimation according to the standing above-ground biomass
Source of data	*CDM_AR_tool_14. "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities". Page 18 and 20.*
Value applied	Trees = 0.25 Shrubs = 0.40
Justification of choice of data or description of measurement methods and procedures applied	Belowground biomass is usually estimated with this factor, as belowground sampling is destructive and expensive.
Purpose of the data	• Calculation of baseline emissions • Calculation of project emissions
Comments	

Data / Parameter	Dead wood (DF_{DW})
Data unit	%
Description	Conservative default factor expressing carbon stock in dead wood as a percentage of carbon stock in tree biomass
Source of data	*CDM_AR_tool_12. "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities", Version 03.0.*
Value applied	6%
Justification of choice of data or description of measurement methods and procedures applied	Dead wood biomass is usually estimated with this factor, as dead wood sampling is destructive and expensive.
Purpose of data	Estimation of GHG Emission Reductions and Removals.
Comments	

Data / Parameter	Litter (DF_{LI})
Data unit	%
Description	Conservative default factor expressing carbon stock in litter as a percentage of carbon stock in tree biomass

Source of data	*CDM_AR_tool_12. "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities", Version 03.0.*
Value applied	1%
Justification of choice of data or description of measurement methods and procedures applied	Litter biomass is usually estimated with this factor, as litter sampling is destructive and expensive.
Purpose of data	Estimation of GHG Emission Reductions and Removals.
Comments	

Data / Parameter	Factor C to CO_2
Data unit	$tCO_2\ tC^{-1}$ ($CO_{2equivalent}$)
Description	Factor applied to convert the tree carbon sequestered to tree CO_2e sequestered.
Source of data	CDM_AR_tool_12. "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities", Equation 12. Page 14.
Value applied	3.667
Justification of choice of data or description of measurement methods and procedures applied	CDM default value.
Purpose of the data	• Calculation of baseline emissions • Calculation of project emissions
Comments	

3.1.2 Data and Parameters Monitored

Data / Parameter	A
Data unit	Ha
Description	Project Area (eligible planted area)
Source of data	Monitoring of project boundaries is done employing Geographical Information Systems (GIS) allowing the integration of data from different sources (including GPS coordinates and Remote Sensing data)

Description of measurement methods and procedures to be applied	The area was delineated through remote sensing data and verified in the field using GPS
Frequency of monitoring/recording	At the beginning of site preparation and each time a verification is conducted
Value monitored	6,600 ha
Monitoring equipment	GPS equipment and Remote Sensing data
QA/QC procedures to be applied	The delineated area is verified using GPS device
Purpose of data	Calculation of Project emissions
Calculation method	Measurement
Comments	–

Data / Parameter	A_i
Data unit	Ha
Description	Area of stratum i
Source of data	Monitoring of stratum and stand boundaries is done employing GIS, allowing for the integration of data from different sources (including GPS coordinates and remote sensing data)
Description of measurement methods and procedures to be applied	The project stratums area were delineated in the field using GPS device
Frequency of monitoring/recording	Each time a verification is conducted
Value monitored	**Stratum** / **Area (ha)** 2016Am: 164 2016Ep: 110 2017Am: 865 2017Ep: 2,332 2018Am: 679 2018Ep: 1,339 2019Am: 191 2019Ep: 920 **Total**: 6,600
Monitoring equipment	GPS equipment and Remote Sensing data

QA/QC procedures to be applied	The delineated area is verified using GPS device
Purpose of data	Calculation of Project emissions
Calculation method	Measurement.
Comments	–

Data / Parameter	$A_{p.i}$
Data unit	m^2
Description	Area of sample plot in stratum i
Source of data	Field measurement
Description of measurement methods and procedures to be applied	SOPs prescribed under the national forest inventory were applied. See the description in section 3.1.3.2
Frequency of monitoring/recording	Each time a verification is conducted
Value monitored	500 m^2
Monitoring equipment	Digital hypsometer
QA/QC procedures to be applied	To verify that plots were installed properly, and the measurements were taken correctly, 5% of randomly selected plots were re-measured. The re-measurement data was compared with the original measurement data and the error was recorded
Purpose of data	Calculation of project emissions
Calculation method	Sample plot location was registered with a GPS and marked on the project map
Comments	–

Data / Parameter	n_i
Data unit	Dimensionless
Description	Number of plots established in each stratum
Source of data	Sampling error estimations

<table>
<tr><td>Description of measurement methods and procedures to be applied</td><td>The number of plots required for measuring the variation within the project boundary and strata was estimated using the CDM tool</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Each time a verification is conducted</td></tr>
<tr><td>Value monitored</td><td><table><tr><th>Stratum</th><th>Area (ha)</th></tr><tr><td>2016Am</td><td>9</td></tr><tr><td>2016Ep</td><td>3</td></tr><tr><td>2017Am</td><td>41</td></tr><tr><td>2017Ep</td><td>39</td></tr><tr><td>2018Am</td><td>48</td></tr><tr><td>2018Ep</td><td>40</td></tr><tr><td>2019Am</td><td>3</td></tr><tr><td>2019Ep</td><td>10</td></tr><tr><td>Total</td><td>193</td></tr></table></td></tr>
<tr><td>Monitoring equipment</td><td>No applied</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>Sampling error assessment (See section 3.1.3.3.2)</td></tr>
<tr><td>Purpose of data</td><td>Estimation of the number of plots needed for each stratum for complying with a sampling error less than 10%</td></tr>
<tr><td>Calculation method</td><td>Equation (1) of the “A/R Methodological Tool” for “Calculation of the number of sample plots for measurements within A/R CDM project activities”</td></tr>
<tr><td>Comments</td><td>–</td></tr>
</table>

Data / Parameter	Plot location
Data unit	Latitud/Longitud
Description	Localization of each sampling plot
Source of data	Data field sampling
Description of measurement methods and procedures to be applied	Measured with GPS
Frequency of monitoring/recording	Each time a verification is conducted
Value monitored	Latitude and longitude of every plot
Monitoring equipment	GPS

QA/QC procedures to be applied	To verify that plots were installed properly, and the measurements were taken correctly, 5% of randomly selected plots were re-measured. The re-measurement data was compared with the original measurement data and the error was recorded
Purpose of data	Calculation of project emissions
Calculation method	Sample plot location was registered with a GPS and marked on the project map (Figure 4).
Comments	-

Data / Parameter	DBH
Data unit	cm
Description	Diameter at Breast Height of the trees
Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	Typically measured 1.3 m above-ground. All trees in the plots with a DBH ≥ 1.5 cm were measured.
Frequency of monitoring/recording	Each time a verification is conducted
Value monitored	The forest inventory database is presented in Supporting information: [ER/210202_ExpostER_AR_ForestFirst…])
Monitoring equipment	Digital caliper
QA/QC procedures to be applied	To verify that plots were installed properly, and the measurements were taken correctly, 5% of randomly selected plots were re-measured. The re-measurement data was compared with the original measurement data and the error was recorded
Purpose of data	Calculation of Project emissions
Calculation method	Measurement
Comments	–

Data / Parameter	H
Data unit	m
Description	Total height of trees

Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	Measure all the trees height in the permanent sample plots that result in the Project activity
Frequency of monitoring/recording	Each time a verification is conducted
Value monitored	The forest inventory database is presented Supporting information: [ER/210202_ExpostER_AR_ForestFirst…])
Monitoring equipment	Digital hypsometer
QA/QC procedures to be applied	To verify that plots were installed properly, and the measurements were taken correctly, 5% of randomly selected plots were re-measured. The re-measurement data was compared with the original measurement data and the error was recorded
Purpose of data	Calculation of Project emissions
Calculation method	Measurement
Comments	–

3.1.3 Monitoring Plan

3.1.3.1 Verification of changes in carbon stocks in the pools selected

The monitoring plan details the methodology and SOPs implemented for the ARR project activity. The monitoring plan fulfils the requirement that the project activity should have credible and accurate monitoring procedures in place to enable the evaluation of project performance and verification of the net anthropogenic GHG emission removals.

Only the above-ground biomass of trees was measured. Therefore, only the individual growth of trees was monitored.

The carbon content below-ground biomass and dead wood attributable to the project activities was not monitored. These were estimated by using default values and suggested methods using the tools “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities” and the root-to-shoot ratio (R) was used for the estimation of below-ground biomass given the above-ground measures.

3.1.3.1.1 Stratification

The stratification of the project area was defined according to the “A/R Large-scale Consolidated Methodology: Afforestation and reforestation of lands except for wetlands Version 02.0”, section 5.2.11.b: For actual net GHG removals by sinks, the stratification for ex-post estimations is based on the actual implementation of the project planting and management plans. According to this, the stratification was based on the planting dates and the species planted (Table 4). Neither natural nor anthropogenic impacts

(e.g. local fires) nor other factors (e.g. soil type) significantly altered the pattern of biomass distribution in the project area.

Table 4: Stratum for plot sampling

Stratum	Planted year	Planted specie	Area (ha)	Number of plots
2016Am	2016	*Acacia mangium*	164	9
2016Ep	2016	*Eucalyptus pellita*	110	3
2017Am	2017	*Acacia mangium*	865	41
2017Ep	2017	*Eucalyptus pellita*	2332	39
2018Am	2018	*Acacia mangium*	679	48
2018Ep	2018	*Eucalyptus pellita*	1339	40
2019Am	2019	*Acacia mangium*	191	3
2019Ep	2019	*Eucalyptus pellita*	920	10

3.1.3.1.2 Plot type and size

Permanent plots were established for the sampling of carbon stock in all areas. The sample plots were used to take measurements such as tree height (H) and Diameter at Breast Height (DBH). Circular permanents plots (radius of 12.6 m) of 500 m^2 were used for collecting data of the trees with DBH ≥ 1.5 cm. All permanent plots were properly numbered, geo-referenced, and located within a coverage/layer map present in the project scope (Figure 4).

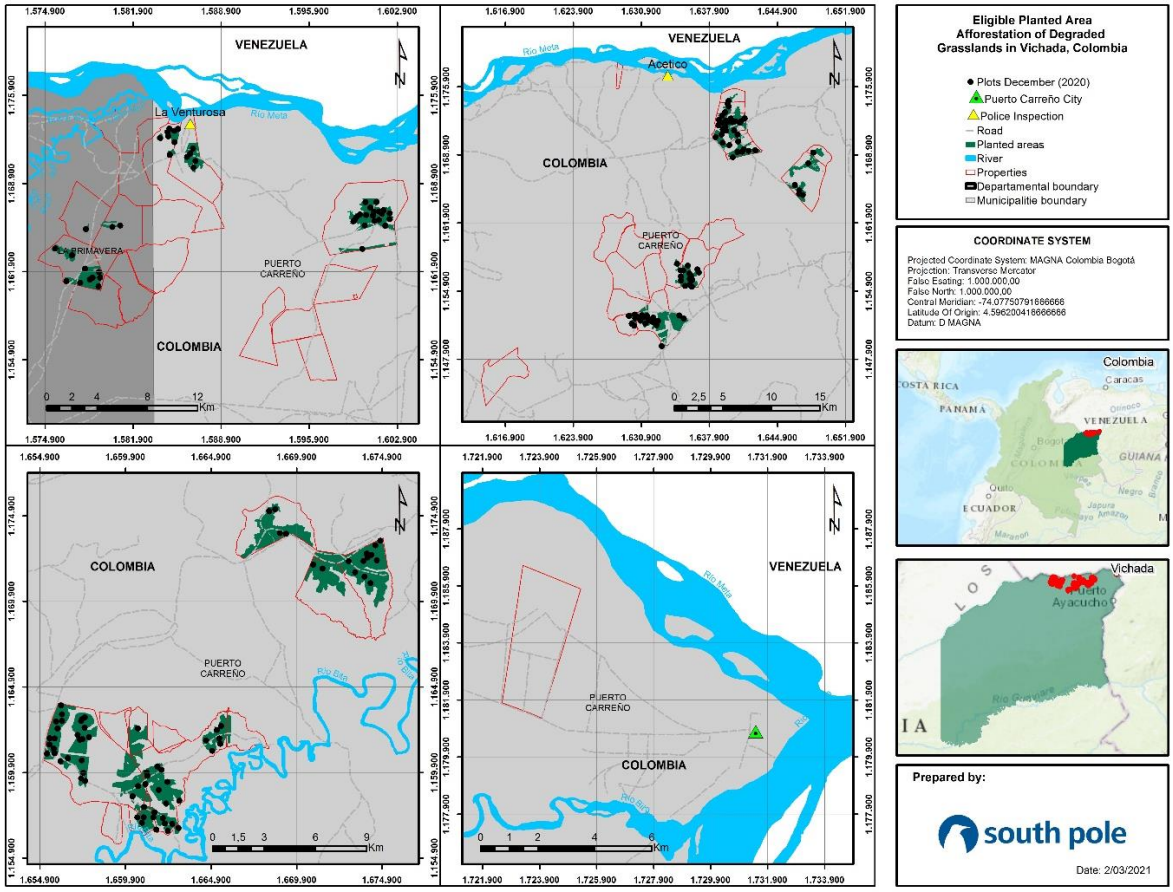


Figure 4: Planted area and plots

3.1.3.2 Standard operating procedure SOP

The plots were randomly located within each stratum to avoid the subjective choice of plot locations (plot centers, plot reference points, movement of plot centers to more "convenient" positions). To do so, the tool "Create Random Points" of the ArcGis program was used. Before the field phase, the center of the plots was identified on a map. For each plot, the geographic position (GPS coordinate), administrative location and stratum code were recorded and archived.

The following steps of the Establishment of Plots were used (refer to the PD for more information, section 3.3.3.2 Standard Operating Procedure):

- access to plots: the plots were located with the help of a georeferenced map and GPS device. The access details were recorded.
- establishment of permanent plots: the central tree was marked with yellow paint and the number (with plaques) and the point of DBH measurement (with paint) of all trees inside the plots were marked.
- data collection in the field: tree DBH and height were measured according with PD SOP recommendations and the Forest First protocol for the use of forest measurement equipment[42].
- recording the data: the field data collected were recorded on the intern memory of the digital caliper, and backup were made and saved in the online servers of South Pole and Forest First.
- monitoring intervals and frequency: the ARR project activities were monitored in a period of less than five years (according to CCB rules), 4.2 years.

3.1.3.3 Procedures for internal auditing and quality assurance (QA)/quality check (QC)

FFC was responsible for centralizing the documentation required for project planning and implementation. QA and QC procedures were implemented to ensure that net anthropogenic GHG removals by sinks are measured and monitored precisely, credible, verifiable, and transparently.

3.1.3.3.1 Field data collection

The staff involved in the measurement of carbon pools is fully trained in field data collection and analysis. SOPs were developed for each step of the field measuring and followed, so the measurements are comparable over time. To verify that plots were installed, and the measurements were taken correctly, at least 5% of randomly selected plots were re-measured (nine plots). The following parameters were evaluated:

1. The location of the plots: all the plots re-measured were easy to find in the field through a GPS device and there was no considerable difference between the two latitudes and longitudes measurements; and
2. DBH and height: the re-measurement data was compared with the original measurement data. The average error found was lower than 10% (Table 5), so corrections were not necessary. The level of errors recorded was calculated and reported using the following equation:

[42] Supporting information: [Forest_Inventory_Protocols/Uso de equipos de medición forestal]

$$Error\ (\%) = \frac{Estimate1 - Estimate2}{Estimate2} * 100$$

Table 5: Diameter and height average error[43]

Plot number	Average DBH plot Error (%)	Average H plot Error (%)
A142	6.4	6.1
A143	10.0	4.4
A147	2.8	5.3
A148	4.0	5.6
A230	3.3	10.8
A420	4.3	4.4
A421	4.5	6.4
A402	4.8	2.8
A501-2	5.9	6.5
Average error	**5.1**	**5.8**

3.1.3.3.2 Sampling error assessment

The project follows the methods from IPCC GPG for LULUCF, GPG 2003, and the modalities and procedures for A/R project activities to estimate net GHG emissions and removals by sinks. In the context of this methodology, the major sources of uncertainties associated with changes in carbon stock in the living biomass pool include natural factors, such as fire and pest outbreaks, forest stand variables such as variation in the yield tables and errors during the measuring. Estimates of sampling error were developed for all stratums involved in the inventory part of the monitoring. It was calculated using the following equation:

$$E(\%) = \frac{t_{val}\ x\ \sqrt{\sum_{i=1}^{M} w_i^2\ x\ \frac{s_i^2}{n_i}}}{b_{TREE}} * 100$$

Where:

E (%)	Sampling error in the carbon stock in trees in the tree biomass estimation (tCO2e)
tval	Two-sided student's t-value for a confidence level of 90% and degrees of freedom equal to n – M, where n is the total number of sample plots within the tree biomass estimation strata and M is the total number of tree biomass estimation strata
wi	Ratio of the area of stratum i to the sum of areas of tree biomass estimation strata
Si^2	Variance of tree biomass per hectare across all sample plots in stratum i
ni	Number of sample plots in stratum i
b_{TREE}	Mean tree biomass per hectare in the tree biomass estimation strata t d.m. ha-1

The sampling error of living biomass pool is 2% and not uncertainty discounts have to be applied, according to AR-Tool 14 "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities. Version 4.2" when the sampling error is less than 10%, no uncertainty discount factor is applied.

[43] Supporting information: [ER/QC_Forest_Inventory].

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

Monitoring plans and all documents and information about the results of the monitoring and verification of this project will be published on VERRA's platforms.

Additionally, the project owner prepared a summary of the monitoring plan and results, which was communicated to the communities and other stakeholders. Please refer to section **Error! Reference source not found.** to see more details of project documents dissemination with communities and workers.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

3.2.1.1 Carbon stock in trees and shrubs in the baseline

The carbon stock in shrubs in the baseline was made following the "AR-TOOL 14. Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities Version 4.2"[44], section 11; equation 26. Thus,

$$C_{SHRUB,t} = \frac{44}{12} \times CF_s \times (1 + R_s) + \sum_i A_{SHRUB,i} \times b_{SHRUB,i}$$

Where:

$C_{SHRUB,t}$	Carbon stock in shrubs within the project boundary at a given point of time in year t; t CO2-e
CF_s	Carbon fraction of shrub biomass; t C (t.d.m.)$^{-1}$. A default value of 0.47 is used unless transparent and verifiable information can be provided to justify a different value.
R_s	Root-shoot ratio for shrubs; dimensionless. The default value of 0.40 is used unless transparent and verifiable information can be provided to justify a different value.
$A_{SHRUB,i}$	Area of shrub biomass estimation stratum i; ha
$b_{SHRUB,i}$	Shrub biomass per hectare in shrub biomass estimation stratum i; t d.m. ha^{-1}

The estimation of carbon stock in litter and dead wood was made according to the "AR -Tool 12 Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities version 03.0". The parameters and key data for the carbon stock estimations in shrubs are presented in Table 6. The above-ground biomass value for shrubs was selected according to a study developed in the same ecological zone where the project is located.

Table 6: Parameters used for shrub carbon stock estimation.

Parameter / Key data	Vegetation Type	Value	Source
Above-ground biomass (t/ha)	Shrubland	2,4	Rao *et al.* (2001). Producción de Biomasa Vegetal Epígea e Hipógea en las Sabanas Nativas. En: Agroecología y

[44] Supporting information: [ER].

Parameter / Key data	Vegetation Type	Value	Source
			Biodiversidad de las Sabanas en los Llanos Orientales de Colombia. Rippstein *et al.* Editores. CIAT, no. 322.
Root to shoot ratio (R)	Shrubland	0.4	CDM_AR_tool_14. "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities".
Carbon fraction	All species	0,47	IPCC "Good Practice Guidance for LULUCF". 2006. Table 4.3.
Factor C to CO2	All species	3,7	IPCC "Good Practice Guidance for LULUCF". 2006. Table 4.3.
DF_{DW} (%)	All species	6	CDM_AR_tool_12. "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities". Biome: tropical; Elevation: <2,000m; Precipitation: >1,600 mm·yr^{-1}.
DF_{LI} (%)	All species	1	

3.2.1.2 Changes in Carbon stock in trees and shrubs in the baseline

As defined in the PD, the change in the baseline carbon stock is estimated to be zero. According to the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities Version 04.2", change in carbon stock in shrubs in the baseline can be accounted as zero if one or more of the conditions presented in section 5.12 are fulfilled. For the project area, burning cycles before the project start date do not allow the successful establishment of vegetation other than grasslands, fulfilling the condition (f): Land is subjected to periodic cycles (e.g. slash-and-burn, or clearing-regrowing cycles) so that the biomass oscillates between a minimum and a maximum value in the baseline.

3.2.2 Project Emissions

The quantification of project emissions and/or removals was calculated following the section 5.5 of the AR-ACM003 methodology ""A/R Large-scale Consolidated Methodology Afforestation and reforestation of lands except wetlands".

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

Where:

$\Delta C_{ACTUAL,t}$	Actual net GHG removals by sinks, in year t; tCO2e
$\Delta C_{P,t}$	Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; tCO2e
$GHG_{E,t}$	Increase in non-CO2 GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year t, as estimated in the tool "Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; tCO2e

3.2.2.1 Change in carbon stock

Change in the carbon stocks in project were calculated following section 5.5 of the methodology "A/R Large-scale Consolidated Methodology Afforestation and reforestation of lands except wetlands"[45]:

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

[45] Supporting information: [ER].

$\Delta C_{TREE\_PROJ,t}$ Change in carbon stock in tree biomass in project in year t, as estimated using the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; tCO2e

$\Delta C_{SHRUB\_PROJ,t}$ Change in carbon stock in shrub biomass in project in year t, as estimated using the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; tCO2e

$\Delta C_{DW\_PROJ,t}$ Change in carbon stock in dead wood in project in year t, as estimated using the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; tCO2e

$\Delta C_{LI\_PROJ,t}$ Change in carbon stock in litter in project in year t, as estimated using the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; tCO2e

$\Delta SOC_{AL,t}$ Change in carbon stock in SOC in project in year t, in areas of land meeting the applicability conditions of the tool "Tool for estimation, of change in soil organic carbon stocks due to the implementation of A/R CDM project activities", as estimated in the same tool; tCO2e

According to the methodology, for the first verification the carbon stock in t_1 corresponds to the carbon stock in the baseline, described in section 3.2.1.1. The methodology for the estimation of the carbon stock in t_2 is described below:

3.2.2.2 Carbon stock in trees at given point in time

To estimate the carbon stock in tree biomass at a given point in time, the method (a) estimation by measurement of sample plots of the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities AR-TOOL14 Version 04.2" was used. According to section 8.1, the sampling design used was "stratified random sampling".

The models and parameters used to estimate the tree biomass and carbon estimations for each plant species of the strata in both instances are presented in sections "3.1.1 Data and Parameters Available at Validation" and "3.1.2 Data and Parameters Monitored".

- Biomass of a tree

Biomass of a tree in a sample plot was estimated by using the equation 4 of the Appendix 1 of the AR-TOOL14:

$$b_{tree,l,p,i} = f_j\left(X_{1,l}, X_{2,l}, X_{3,l}, \ldots\right) x\ (1 + R_J)$$

Where $b_{tree,l,p,i}$ is the biomass of tree l in sample plot p of stratum i (t d.m.), $f_j(x_{1,l}, x_{2,l}, x_{3,l}, \ldots)$ is the above-ground biomass of the tree returned by the allometric equation (t d.m.) and Rj is the Root-shoot ratio (dimensionless).

- Mean tree biomass per hectare

Mean tree biomass per hectare in a sample plot was estimated according to the equation 1 of the Appendix 1 of the AR-TOOL14:

$$b_{tree,p,i} = \frac{\sum_l b_{tree,l,p,i}}{A_{plot}}$$

Where $b_{tree,p,i}$ is the tree biomass per hectare in sample plot per stratum i (t d.m. ha-1) and A_{plot} is the size of sample plot (ha).

- Carbon stock

The estimation of the carbon stock in trees within the tree biomass estimation strata was calculated according to the equation 12 of the AR-TOOL14:

$$C_{tree} = \frac{44}{12} \; x \; CF_{tree} \; x \; B_{tree}$$

Where C_{tree}(tCO_2e) is the carbon stock in trees in the tree biomass estimation strata, B_{tree} (t) is the mean tree biomass per hectare in the tree biomass estimation strata and CF_{tree} is the carbon fraction.

3.2.2.3 Carbon stock in dead wood and litter

The estimation of carbon capture of litter and dead wood was performed following the AR -Tool 12 "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities version 03.1". Values of the conservative default-factors estimate the carbon stock in dead wood and litter as a percentage of carbon stock in tree biomass.

$$C_{DW,i,t} \; = \; C_{TREE,i,t} \; x \; DF_{DW}$$

Where:

$C_{DW,i,t}$	=	Carbon stock in dead wood in stratum i at a given point of time in year t; t CO_2e
$C_{TREE,i,t}$	=	Carbon stock in trees biomass in stratum i at a point of time in year t. as calculated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_2e
DF_{DW}	=	Conservative default factor expressing carbon stock in dead wood as a percentage of carbon stock in tree biomass; per cent

And

$$C_{LI,i,t} \; = \; C_{TREE,i,t} \; x \; DF_{LI}$$

Where:

$C_{LI,i,t}$	=	Carbon stock in litter in stratum i at a given point of time in year t; t CO_2e
$C_{TREE,i,t}$	=	Carbon stock in trees biomass in stratum i at a point of time in year t. as calculated in tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_2e
DF_{LI}	=	Conservative default factor expressing carbon stock in litter as a percentage of carbon stock in tree biomass; percent

3.2.2.4 Increase in non-CO2 GHG emissions

Project emission of non-CO_2 GHGs resulting from the loss of aboveground tree biomass due to fire ($GHG_{E,t}$) is estimated as zero according to the AR-TOOL 08 "Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity", which in paragraph 3 says "Non-CO2 GHG emissions resulting from any occurrence of fire within the project boundary shall be accounted for each incidence of fire…, provided that the accumulated area affected by such fires in a given year is ≥5% of the project area". The greater area affected by fire was in 2020, 0.05% of the planted area (Table 7).

Table 7: Planted area affected by fires[46].

Year	Total planted area (ha)	Planted area affected by fires (ha)	Planted area affected by fires (%)
2016	274	0.0	0.00
2017	3,471	0.0	0.00
2018	5,490	0.1	0.00
2019	6,600	0.0	0.00
2020	6,600	3.0	0.05

3.2.3 Leakage

The cattle were displaced to other existing grazing land. Considering this, leakage emission attributable to the displacement of grazing activities in the project area is considered insignificant and measured as zero, in accordance with the numeral 10:(a)-(e) of the AR-TOOL 15 "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity" Version 2.0.

3.2.4 Net GHG Emission Reductions and Removals

According to the equation 5 of the methodology AR-ACM0003 v2.0, the net anthropogenic GHG removal by sinks is:

$$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t$$

Where:

$\Delta C_{AR-CDM,t}$ = Net anthropogenic GHG removals by sinks. in year t; t CO2-e

$\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks. in year t; t CO2-e

$\Delta C_{BSL,t}$ = Baseline net GHG removals by sinks. in year t; t CO2-e

LK_t = GHG emissions due to leakage. in year t; t CO2-e

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2016	-	0	-	0
2017	-	5,829	-	5,829
2018	-	88,631	-	88,631
2019	-	160,886	-	160,886

[46] Supporting information: [Fire_records].

2020	-	227,235	-	227,235
Total	**-**	**482,581**	**-**	**482,581**

3.3 Optional Criterion: Climate Change Adaptation Benefits

The project does not seek to be validated to the Gold Level for climate change adaptation benefits.

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

The project does not seek to be validated to the Gold Level for climate change adaptation benefits.

4 COMMUNITY

4.1 Net Positive Community Impacts

4.1.1 Community Impacts (CM2.1)

During the verification period, 2016-2020, there have been changes at the local level thanks to the job opportunities offered by FFC upon arrival in the territory. There is also evidence that community organizations have benefited from the programs created to support community development in the territory.

Table *8* offers an overview of the effects produced on the community groups and workers associated with the project.

Table 8: Evaluation from the indicators

Indicator 2016-2020	Product / result / impact	Description	Support information
By 2020, 50% of the workers employed are from the local territory	In 2016, 21%; in 2017, 52%; in 2018, 77%; in 2019, 76%; and in 2020, 74%.	During the project verification period, 2016-2020, on average 60% of employees directly hired by FFC were from the local community.	Annual Staff List[47]
By 2020, 100% of the workers received technical training for the development of their work within the FFC	Throughout 2018 and 2019, different training sessions were offered: 64, on technical aspects; 47, on harvesting; 25, on job security. An average attendance of 201 employees was achieved in each of the topics.[48]	FFC consistently offers training workshops for employees that cover all the necessary aspects for the proper development of the plantation work. Training is delivered by team supervisors and/or by their superiors.	Summary of talks 2018-2019[49]

[47] Supporting_information: [Community/Employees/MaeEmp Annual Staff List]

[48] The data recorded in the trainings database during the first verification did not allow to know the % of trained employees, however, FFC ensures that, during the induction stage, 100% of the employees are trained in the activities they will perform. Besides, the employees receive continuous training on the proper use of work safety equipment.

[49] Supporting_information: [Community/Employees/Resumen de presentaciones 2018 - 2019]

Indicator 2016-2020	Product / result / impact	Description	Support information
By 2020, 100% of FFC workers are trained in risk management	During 2018 and 2019, 25 sessions on job security were held, achieving an average attendance of 161 employees.[48]	FFC has an emergency plan and a coexistence committee, which guarantees job security. Furthermore, team supervisors oversee enforcing safety protocols at work, and they also provide information on occupational risks on a weekly basis, to their teams.	Summary of presentations 2018-2019[49]
By 2020, the workplace accident rate was halved compared to 2016	Higher monthly accident rate during the verification period: 2016: 3% 2017: 1% 2018: 1% 2019: 1%	During 2016 the highest accident rate was 3% during the months of March and June; while for 2019 the highest accident rate was 1.14% during the month of June.	Security and health at work indicators results[50]

4.1.2 Negative Community Impact Mitigation (CM2.2)

For the verification period, no negative impact on the community was identified; therefore, no measures or activities were implemented. However, considering the potential negative impacts identified by the community during the consultation meetings, the following strategies were implemented for their mitigation.

Table 9: Negative community impacts and mitigation strategies

Negative impacts	Mitigation strategy
Conflicts associated with the project activities	Communication mechanism
Poor or biased linkage in FFC community programs	To support the JACs in anticipating strategies for the effective community participation in communal activities.
Ineffective socialization processes and communication channels	Socialization workshops and meetings to ensure access to information for all community groups associated with the project. The project has specific communication channels for each target audience.

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

Community incentive programs: during the 2016-2020 period, the population from the Venturosa community got training and technical support on controlling pasture fires when land is prepared during the growing season. As part of this initiative and to link many people from the community, the project includes an incentive program for the control of fires and cattle grazing.

[50] Supporting_information: [community/indicators_evidencie/Resultados_indicadores_SST_2015-2019]

FFC promotes two major economic incentives for the communities. The first refers to controlled burning, whereby Venturosa community agrees with FFC to notify the burning scheduled date, at least three days in advance, so that FFC can attend and supervise the activity. These controlled burnings include to burn garbage and pastures for cattle grazing. Besides, support from the community for early fire detection is also pursued, through informing FFC on any fire starting in the region.

The second incentive refers to controlled cattle grazing within FFC property; to avoid any damage, no animal should graze in the natural forest or plantation areas, particularly, within the areas that have been seeded within one year. If a member of the community require space for livestock, they must apply for a permit stating the headage, the specific area to be occupied within FFC property, and for how long.

If these goals are met, the community will get an incentive, a specific amount of money to be invested / spent in communal goods. The amount will be reduced in the event of a fire started by the community or if livestock is within FFC areas, without being notified in advance.

Support for works of social interest: during this period, the project has given financial and logistic support to organize activities of cultural and traditional importance for the community, including the celebrations of Tree Day,[51] Children's Day, Mother's Day, gifts for Christmas, and the annual soccer tournament.[52] These activities have fostered social interaction in Venturosa. Additionally, the project has encouraged the organization of recreational activities in Venturosa Educational Center,[53] which take place annually during a given week.

Figure 5: Donation of Christmas gifts

The project has also made annual donations to the school, in the form of books, school supplies, and sports uniforms, so that children and youngsters have everything they need to keep on studying, in case their parents cannot cover those expenses.

[51] Supporting_information: [Community/Actividades 2017/Actividad día del árbol y día del niño 29 – 04 - 17]
[52] Supporting_information: [Community/Actividades 2018/Uniformes, placas y trofeos para la comunidad 05- 12- 18]
[53] Supporting_information: [Community/Actividades 2017/Regalos niños Venturosa 2017]

Figure 6: Upgrading of roads

Upgrading of roads[54, 55]: The project has also promoted a link between the municipal government of Puerto Carreño and Vichada governorate, to upgrade the roads leading to Venturosa, during this period, it was possible to manage machinery to upgrade the road Venturosa-Hato Macho; FFC supported this effort by providing fuel and food to machine operators during the working time.

Support for Venturosa health center[56,57]: support is also provided by ensuring community healthcare and donating medicines to the health center that are essential to its operation. The delivery of medicines is done every three months and witnessed by the chairman and vice-chairman of the JAC, the police inspector, the National Police of Colombia, the Army, and the nurse in charge of the center.

Figure 7: Delivery of medicines to the health center in 2017-2018

Support for works of social interest in the indigenous community[58]: morichalito indigenous community got support to prepare one hectare of land to grow their own food, this activity was verified by the police inspector, the chairman of the JAC, the governor and the captain of the indigenous community.

[54] Supporting_information: [Community/Actividades 2017/Arreglo vía Venturosa Hato Macho]
[55] Supporting_information: [Community/Actividades 2017/Arreglo vía entradas]
[56] Supporting_information: [Community/Actividades 2017/Medicamentos 20-07-2017]
[57] Supporting_information: [Community/Actividades 2017/Entrega de medicamentos 31 – 12 - 2018]
[58] Supporting_information: [Community/Actividades 2017/Hectarea de tierra preparade indígenas]

Figure 8: Preparing land for seeding – Morichalito indigenous community

The indigenous community also got support for social works through to the delivery of 20 zinc tiles, 200 fastenings, and 1 Barnes 10 Hp motor pump, serial number 1809282001, which included 20 meters of hose and couplings.[59]

Figure 9: Support for social Works in Venturosa

Support for social works interest in Aceitico[60]: throughout this period, community programs focused on Venturosa because it is the closest community to the areas that were planted during this time. In 2021, plantations will be developed in new areas close to Aceitico, people from this community are expected to participate in community programs this year. Thus far, there has been support for the maintenance of roads, in 2018, FFC delivered 165 gallons of diesel fuel - to operate machinery for such maintenance - to the Aceitico Police Inspection.

[59] Supporting_information: [Community/Actividades 2018/Materiales para la comunidad 05 -12 -18]
[60] Supporting_information: [Community/Actividades 2018/Combustible arreglo vía aceitico]


Figure 10: Support for social works in Aceitico

Job opportunities[61]: the employment relationship offered by the project has produced positive changes in Venturosa, women have been able to participate in the project activities and avoid being financially dependent on their romantic partner; the inflow of new people in the territory and the financial capacity derived from employment has led some people to start their own business within the community. Furthermore, the project has yielded indirect economic benefits for people from the community who are not necessarily employed in the project, because it promotes the purchase of food products sold by the community to the employee canteen.

Over the last years, the project has offered employment opportunities to the local community, promoting the development of human capital and improving the standard of living of people in the hamlet.

Table 10. Total employees per year in the period 2016-2019

Table *10* shows the number of workers and the percentage of women participating in the project activities during the verification period 2016-2020.

Table 10. Total employees per year in the period 2016-2019

Year	Total workers	Total women (%)
2016	66	14%
2017	103	13%
2018	205	15%
2019	171	22%
2020	167	24%

Thus far, net positive impacts have been obtained, because FFC has managed, supervised, and implemented actions with the permanent participation of community leaders and other PROJECT stakeholders.

[61] Supporting_information: [Community/Employes/MaeEmp Annual Staff List]

4.1.4 Protection of High Conservation Values (CM2.4)

FFC has identified an area of high social value for the Venturosa community, It is located within the boundaries of an FFC property. Consequently, the site has been registered as an area of special interest. The area is considered part of the cultural landscape of the region, and FFC recognizes the cultural value of the cemetery. There are about 35 tombs distributed in an area of approximately 0.5 hectares.

For the sake of its conservation, FFC supported the community in marking the area out, scheduling biannual maintenance efforts and adding new discoveries to the registry.

Figure 11: High Conservation Values - Cemetery

4.2 Other Stakeholder Impacts

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

No negative impacts on communities neighboring the project were identified during the 2016-2020 period. However, FFC has identified two problems:

1) the difficulty of establishing an employment relationship with people from the indigenous community. Given their cultural dynamics, they find it difficult to keep a steady and committed attitude towards fulfilling the responsibilities assumed in the project activities. To address these problems, FFC has maintained communication with the community leaders, to inform them of issues related to its members. However, they are prepared to offer job opportunities to people from the community and to identify additional means to develop a relationship with the

community, like hiring them to produce seedlings of native trees for conservation purposes. Currently, one woman from the community is employed in the project; and

2) the difficulty of linking the Aceitico community due to the distance of the plantation areas from the communal territory. Activities of community interest that can provide new development opportunities for the hamlet are expected to be initiated in 2021. Consultation meetings will be promoted to inform about the progress of the project. The Aceitico community is interested in been trained on FFC's labor protocols, which will facilitate employment opportunities in the project.

4.2.2 Net Impacts on Other Stakeholders (CM3.3)

No negative impacts on other stakeholders were identified during the verification period. On the contrary, the involvement of other stakeholders in the project has been promoted; for example, the participation of the municipal government in upgrading roads, and the involvement of the Omacha Foundation through research projects on biodiversity.

4.3 Community Impact Monitoring

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

As the community-impact monitoring plan was not designed before implementing the activities between 2016 and 2020, the project will include the plan in this report and, additionally, will describe the results from the activities carried out during the first verification period of the project, without considering the evaluation from the indicators.

The monitoring plan will include the goals, indicators, and variables that should be monitored, the types of measurements and sampling methods, and the frequency of monitoring and reporting of each type and method.

The development of the community-impact monitoring plan is based on the Theory of Change approach (Richards & Panfil, 2011), which proposes creating a route of change that analyzes the current situation and modifies it by implementing the project activities. A set of primary, secondary, and tertiary results are identified that enable the desired change to be achieve in the long term.

The plan covers the next five years, with the possibility of modifying or including new indicators according to the dynamics of the project and the achievement of goals.

The community-impact monitoring plan presents three types of indicators:

- **product Indicators:** the immediate results of implementing the activity, for example: the number of people trained, and number of jobs created;

- **result indicators:** they express the medium-term achievement of the implemented activity. They are the results that can be expected by going further than the output indicator. For example, in the case of a training program for entrepreneurship, the result indicator would focus on evaluating how many participants managed to start their own business; and

- **impact indicators:** they are the long-term results expected due to implementing the project activities. Its scope is expressed in percentages and it has a defined compliance term.

For the monitoring period 2016-2020, goals achieved in some of the result and product indicators will be presented; however, there are other indicators that currently do not have information, which will be followed

up for the next verification period. Table 11 and Table 11 show the monitoring activities and planned indicators for the next verification period.

Table 11: Employment indicators

Impact Indicator	Product/Result	Method	Frequency	Focal population
By 2025, 70% of the field workers employed are hired from the local territory	Total number of employees residing in the urban and rural areas of Puerto Carreño and La Primavera municipalities	Annual Staff List	Annual	Employed by FFC and its contractor companies
By 2025, the workplace accident rate will be halved compared to 2020	Number of workplace accidents per year	Security and health at work accidents reports	Annual	Employed by FFC and its contractor companies
	Number of lost days caused by work-related accidents in the last year divided by the number of workers			

Table 12: Community indicators

Impact Indicator	Product/Result	Method	Frequency	Focal population
By 2025, at least 20% of the people who live in the three hamlets in the project's area of influence know and understand the objective of the carbon project.	Number of channels set up to share information about the project	Strategies for disseminating information	Annual	Community leaders
	Number of people surveyed who recognize the characteristics and goals of the project	Surveys	Annual	Population from the hamlets of Venturosa and, Aceitico, and the Morichalito indigenous community
	Number of people upgrading their skills or knowledge on managing controlled burnings within the project's area of influence (Uncontrolled fires is the main threat of the plantations and an important source of CO_2 in the region)	Surveys	Annual	Population from the hamlets of Venturosa and, Aceitico, and the Morichalito indigenous community

Impact Indicator	Product/Result	Method	Frequency	Focal population
	Number of meetings and training sessions carried out with the community	Minutes and attendance rosters	Annual	Population from the hamlets of Venturosa and, Aceitico, and the Morichalito indigenous community

4.3.2 Monitoring Plan Dissemination (CM4.3)

Printed copies of the Monitoring Report summary were distributed to the communities and local authorities of Puerto Carreño municipality. The communication mechanisms already set up within the community will be used.

4.4 Optional Criterion: Exceptional Community Benefits

The project does not seek to be validated to the Gold Level for community change adaptation benefits.

4.4.1 Short-term and Long-term Community Benefits (GL2.2)

The project does not seek to be validated to the Gold Level for community change adaptation benefits.

4.4.2 Marginalized and/or Vulnerable Community Groups (GL2.4)

The project does not seek to be validated to the Gold Level for community change adaptation benefits.

4.4.3 Net Impacts on Women (GL2.5)

The project does not seek to be validated to the Gold Level for community change adaptation benefits.

4.4.4 Benefit Sharing Mechanisms (GL2.6)

The project does not seek to be validated to the Gold Level for community change adaptation benefits.

4.4.5 Governance and Implementation Structures (GL2.8)

The project does not seek to be validated to the Gold Level for community change adaptation benefits.

4.4.6 Smallholders/Community Members Capacity Development (GL2.9)

The project does not seek to be validated to the Gold Level for community change adaptation benefits.

5 BIODIVERSITY

5.1 Net Positive Biodiversity Impacts

5.1.1 Biodiversity Changes (B2.1)

Biodiversity Element	**Connectivity**
Estimated Change	Positive
Justification of Change	As mentioned by Pardo *et al.* (2018) the forest plantations provide shelter and generate transit zones for mammals and birds in areas without previous forest cover, mostly grasslands or degraded lands. The 6,600 ha planted promote connectivity between natural ecosystems of forest, savannas and morichales[62]. Particularly, the main contribution to the landscape connectivity of the project area is its proximity to the Meta and Bita rivers, where the gallery forest and morichales are in a better state of conservation. The good conditions of these surrounding areas result in fauna movement, connecting the conserved areas with several Civil Society Reserves and with the National Park El Tuparro. This allows movement for species like the South American Tapir (*Tapirus terrestris*), peccaries (*Tayassu pecari)*, and several species of the felidae family distributed in the jaguar conservation unit of the Orinoquía. The presence of gallery forest and morichales in the savanna areas allows for connection between populations of the Amazonas and llanos orientales.

Biodiversity Element	**Fauna and Flora**
Estimated Change	Positive
Justification of Change	Regarding the forest inventory of the gallery forest, a total of 109 species were identified in an area of 2.1 ha. The species composition showed a high richness and heterogeneous forest, with the species of Saladillo (*Caraipa llanorum*), Anime (*Protium heptaphyllum*), Manaca (*Euterpe precatoria*), and Arenillo Blanco (*Simarouba amara*) being the most important according to its relative dominance, abundance and frequency (IVI Index). These species are valuable due to its uses for wood, food, and resin. Regarding the Morichal ecosystem, a total of 30 species were identified, with the family of Arecaceae (palms) as the most abundant. According to the IVI Index, the most important species were the Moriche palm (*Mauritia flexuosa*), Copal (*Protium glabrescens*), Cachicamo (*Calophyllum brasiliense*), and Manaca (*Euterpe precatoria*). Therefore, palm trees are a very important type of

[62] Morichales are homogeneous or heterogeneous communities of palms of the genus *Mauritia*, (*Mauritia flexuosa*) and other species, shrubs, and trees, which are scattered in the savannas, or in the altillanura (Pacheco *et al.,* 2014). They are associated with seasonal water courses, in areas where water currents are very slow. The vegetation is composed of numerous herbaceous and shrub species, dominated in size and abundance by palms (Trujillo *et al.,* 2016).

	vegetation in the morichales, especially for the provision of food for birds and mammals. Different studies have shown the importance of the Orinoco region in terms of biodiversity, therefore, the conservation of the native vegetation of the gallery forests and morichales is very important for the maintenance of the fauna associated to them in the region, because these are the locations where food is most available. Regarding the fauna monitoring, a total of 223 species were identified; 18 species of amphibians, 31 of reptiles, 132 of birds, and 42 species of mammals including bats. For the case of reptiles and amphibians no endangered or threatened species were found following the IUCN criteria, but for Colombia, according to the Red Book of Reptiles (Morales-Betancourt *et al.,* 2015) the Red-footed tortoise (*Chelonoidis carbonaria*) founded in the study area is considered vulnerable (VU). In terms of species richness for the birds, the most important families were Thraupidae or tanagers (53 species), Tyrannidae or flycatchers (47 species), and Trochilidae or hummingbirs (24 species). No endemic or endangered species were registered. Of the 42 species of mammals, the most recorded species were the common opossum (*Didelphis marsupialis*), the tamandua (*Tamandua tetradactyla*), the black agouti (*Dasyprocta fuliginosa*), the Ocelot (*Leopardus pardalis*) and the Lowland tapir (*Tapirus terrestris*), being this last one the most important, due to its vulnerable (VU) conservation status for the IUCN and critically endangered (CR) for Colombia. In addition, with the interviews to the communities, it was possible to collect information on the species of fauna observed. The most relevant species were the Lowland tapir (*Tapirus terrestris*), the puma (*Puma concolor*), and the Giant Anteater (*Myrmecophaga tridactyla*) which is vulnerable (VU) according to the IUCN. In summary, the large areas of conservation in the project contain different ecosystems located in water bodies, riparian forest, and wetlands that provide habitats and food to support wildlife.

Biodiversity Element	**Fauna (endangered species)**
Estimated Change	Positive
Justification of Change	For the project area, a total of three species under IUCN threaten categories have been identified (Trujillo and Lasso, 2017). The white-lipped peccary (*Tayassu pecari*) near threatened (NT), the giant armadillo (*Priodontes maximus*) vulnerable (VU), and endangered

	(EN) in the country, and the Lowland Tapir (*Tapirus terrestris*), which is vulnerable (VU), and critically endangered (CR) in the country. These species were founded in the riparian forest and areas near the water courses, showing the importance of the protection of the native ecosystems located in the project area. In addition, regarding the bat species, it is important to highlight the Southern long-nosed bat (*Leptonycteris curasoae*), which is vulnerable (VU) according to the IUCN. This bat plays an important role in pollination of Cactaceae and Myrtaceae families and is threatened due to their specialized feeding and habitat loss (Cole and Wilson, 2006).

5.1.2 Mitigation Actions (B2.3)

Table 13 shows the environmental management sheets developed by FFC to avoid negative impacts on biodiversity.

Table 13: List of environmental management sheets[63]

Management sheet	Objectives	Main activities implemented
MCA-01: Efficient use of water	Establish the necessary measures for the efficient use and saving of water in the project Implement a drinking water treatment system for water consumption	The Plan for the Efficient Use of Water is being developed, in which the following activities are implemented: Six-monthly training workshop for project members on the conservation and, efficient use of water Installation of taps, toilets, and other accessories with water-saving and efficient use systems
MCA-02: Wastewater management	Establish the necessary measures for the adequate management of the wastewater generated in the project Implement a wastewater treatment system for each of the camps that are part of the project	Each project camp has septic tanks and infiltration fields In the medium term (when staff capacity in camps and bases is expanded), the project will implement Wastewater Treatment Plants
MCA-03: Non-hazardous solid waste management	Establish environmental management measures to prevent and mitigate the impacts generated during the handling, storage and transportation of non-hazardous solid waste produced by the project	Temporary storage of non-hazardous waste has been adequate installed and marked Management, transport, and final disposal is carried out by a company with the required environmental licenses: the public utilities company of Puerto Carreño, EMPCA S.A.E.S.P.

[63] Supporting information: [Environmental_management_sheets].

Management sheet	Objectives	Main activities implemented
MCA- 04: Hazardous solid waste management	Establish environmental management measures to prevent and mitigate the impacts generated during the handling, storage and transportation of hazardous solid waste produced by the project	Agrochemical packaging are delivered empty to the responsible supplier, the company D&M solutions SAS. Agrochemical packaging are triple wash Temporary storage of hazardous waste was implemented Solid waste management plan[64] is implemented
MCA-05: Prevention and control of contamination by chemical inputs and fuels	Minimize the risks of pollution, caused by the use of chemical and fuel inputs	Training workshop for project members on the handling of agrochemicals and fuels has been conducted The project avoids store large quantities of fuel The tanking, maintenance, and washing of machinery and equipment is done only in the areas designated for these activities The management and contingency plan[65] is being updated with actions to improve storage, signage, labeling, safety data sheets and review the product compatibility matrix. The new management plan will be updated before May (2021)
MCB-01: Wildlife management	Preserve the functional and structural attributes of the ecosystems in the project's area of influence	The wildlife management activities will be implemented in the new planted areas In April (2021) a workshop on biodiversity will be held by the Omacha fundation
MCB-02: Wild flora management	Preserve the functional and structural attributes of the ecosystems in the project's area of influence	Riparian forests, morichales and wetland ecosystems in the project properties were delimited and are being protected Workshops about high Conservation Values are being conducted and trainings on biodiversity and strategic ecosystems are being projected for the present year (2021)
MCB-03: Integrated management of pests and diseases	Implement integrated pest and disease management as a strategy to minimize impacts on the region's fauna and flora	Last year, a list of substances approved by FSC and OMS was drawn up in order to use only approved substances and identified those that should be eliminated from the operation due to their environmental or health-polluting characteristics

[64] Supporting information: [Environmental_management_sheets/Anexo 24 – Plan de manejo de los residuos solidos].
[65] Supporting information: [Environmental_management_sheets/Anexo 22 – Plan de manejo y contingencia de combustibles].

Management sheet	Objectives	Main activities implemented
		The packaging is delivered empty to the Campo Limpio Corporation The workshops and rotation activities are in process to be implemented
MCB-04: Forest fire management	Conserving wildlife resources through fire prevention and care	Continuous workshop for project members on the prevention and care of fires and uncontrolled burns are conducted Regular maintenance of firewalls is performed The forest fire contingency plan[66] is been implemented

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

The impact of the project is positive, due to the protection of the native ecosystems, and the establishment of 6,600 ha of forest plantations in degraded areas. These actions promote positive conditions for biodiversity, improving habitats, connectivity processes and the protection of fauna and flora species.

Table 14 and Table 15 present an overview of the impacts generated for the flora and fauna in the Project area.

Table 14: Flora indicators

Indicator	Product / Result	Description	Support Information
Quality of gallery forests	A total of 944 individuals of the Poles (fustales) category were registered, distributed across 42 families, 88 genera and 109 species.	For monitoring the forest gallery quality in the project area, 21 plots of 10 m x 100 m were established to identify the tree species present in the area.	5.3.1.1
Quality of morichales	For the morichales cover (poles category), a total of 375 individuals were registered, distributed across 22 families, 29 genera, and 30 species.	For monitoring the Morichales quality in the project area, 7 plots of 10 m x 100 m were established to identify the tree species present in the area.	5.3.1.1

[66] Supporting information: [Environmental_management_sheets/Anexo 23 – Plan de contingencia para incendios forestales].

Indicator	Product / Result	Description	Support Information
Presence of threatened or endangered species in the project area.	During this period a total of two threatened species were registered. A total of 24 individuals of the specie *Parinari pachyphylla* were identified during the inventories and a total of nine individuals of the specie *Virola parvifolia.*	During the flora monitoring, special focus was placed on identifying threatened species. During this monitoring, the species of *Parinari pachyphylla* and *Virola parvifolia* were identified.	5.3.1.1

Table 15: Fauna indicators

Indicator	Product / Result	Description	Support Information
Predators species	*Panthera onca:* four of the 17 people interview indicated they have seen the jaguar at least once per year. *Puma concolor:* the puma was recorded twice in the cameras and one of the 17 people interviewed indicated that he sees the puma once per month.	For the fauna inventories, five locations were selected. Depending on the study group, methods like mist nets, camera trap, and sightings on trails were implemented. In addition, interviews with the local community were performed to register the species that they identified in their daily work.	5.3.1.2
Endangered terrestrial species	*Tapirus terrestris:* the tapir was recorded three times in the cameras and seven of the 17 people interviewed indicated that they see the tapir at least once per year. *Myrmecophaga tridactyla:* nine of the 17 people interviewed indicated that they see the Giant anteater at least once per year.		5.3.1.2

5.1.4 High Conservation Values Protected (B2.4)

As project activities were not implemented on the native forest. no high conservation values were negatively affected by the project. The project activities include the protection of the gallery forests and morichales ecosystems within the project area. These areas were excluded from the areas for plantation and have been the object of supervision to protect them from third parties. Moreover, the fauna corridors associated with the planted areas are maintained, allowing the native fauna to move, by connecting forest fragments, and the protecting fauna species by enabling them to access to the resources they need.

In addition, the activities were implemented in degraded areas, with a buffer of 100 m from native forest, rivers and morichales. Furthermore, the plantations favored the fauna movement, especially for medium to

large mammals like deer, tapirs, pumas, and jaguars, benefiting ecosystem functioning and health. Therefore, no high conservation values were affected.

5.1.5 Invasive Species (B2.5)

The species used in this project are known as exotic and invasive around the world, but not invasive for Colombia (Quiceno, 2017; Quevedo, 2018). During the development of the project, conservation practices of fire belt and periodic control burnings, in addition to the removal of seeds from the surrounding riparian forest and morichales ecosystems to limit the colonization of these species, were implemented in the project.

5.1.6 Impacts of Non-native Species (B2.6)

Species	*Acacia mangium*
Justification of Use	*Acacia mangium* is a species used in areas that were affected by productive conditions or after mining activities, due to its remarkable adaptation characteristics to bad soil conditions. Besides, this is a species of fast growth and adaptability to acid soils, low precipitation, and high temperatures and radiation (Quevedo, 2018).
Potential Adverse Effect	The use of *Acacia mangium* did not have any negative effect, because the plantations were not taking place in natural areas. Additionally, the species did not colonize natural areas.

Species	*Eucalyptus pellita*
Justification of Use	*Eucalyptus pellita* is a species widely planted in the Orinoquia region in Colombia due to its outstanding characteristics of stem straightness and physical properties of the wood. Additionally, the species has a low number of knots, and is very resistant, making it an important species for the construction of fence posts, corral posts and, live fences and, can be used in silvopastoral systems (Castro and Sánchez, 2010).
Potential Adverse Effect	The *Eucalyptus pellita* plantations did not have negative effects, and there were no water deficits on the plantation.

5.1.7 GMO Exclusion (B2.7)

No GMOs were used in the project activities. All seeds used in each nucleus come from certified companies from Colombia.[67]

5.1.8 Inputs Justification (B2.8)

[67] Supporting information: [ICA_records/Seeds].

Name	**Abotek fertilizer (NPK 14-4-23)**
Justification of Use	Soils in Vichada are weathered and with low fertility, acidic pH, and low moisture retention; therefore, the establishment of the plantations required the implementation of granular fertilizers especially for the development of the plants in the early stages, to give them the necessary macro elements (N, P, K) for growth and prevention against damage by water deficit. In these case Abotek fertilizers is a combination of N 14%, P 4%, and K 23%. The high concentration of K is necessary for the production stages.
Adverse Effect	When using fertilizers, it is important to establish the optimum composition, nutrient concentrations, and the type of materials used in its production, as certain components can alter the biochemical characteristics of soil and water, accelerate the process of eutrophication in aquatic systems and negatively affect the soil. Therefore, the usage of fertilizers in other amounts different than the recommended could lead to the accumulation and concentration of minerals, causing soil compaction and degradation in the long-term. This would generate a limitation in root development and plant growth (Massah and Azadegan, 2016). In addition, it is important to ensure good methodologies for application, to ensure that the fertilizer is not leaching or washed away.

Name	**Rafos fertilizer (NPK 12-24-12)**
Justification of Use	Soils in Vichada are weathered and with low fertility, acidic pH, and low moisture retention; therefore, the establishment of the plantations required the implementation of granular fertilizers especially for the development of the plants in the early stages, to give them the necessary macro elements (N, P, K) for growth and prevention against damage by water deficit. In these case, Rafos fertilizer is a combination of N 12%, P 24%, and K 12%. The high concentration of P is necessary in the early stages to promote the root growth and plant development.
Adverse Effect	When using fertilizers, it is important to establish the optimum composition, nutrient concentrations, and the type of materials used in its production, as certain components can alter the biochemical characteristics of soil and water, accelerate the process of eutrophication in aquatic systems and negatively affect the soil. Therefore, the usage of fertilizers in other amounts different than the recommended could lead to the accumulation and concentration of minerals, causing soil compaction and degradation in the long-term. This would generate a limitation in root development and plant growth (Massah and Azadegan, 2016). In addition, it is important to ensure good methodologies for application, to ensure that the fertilizer is not leaching or washed away.

Name	**Roundup 747 (Gliphosate)**
Justification of Use	The use of herbicide in plantations for weed control is required specially in the initial years to eliminate plants that could compete with the growth of the plantation. If weed control is not applied, the consequence might be failure of the plantation, since the weeds in the region grows faster than the trees in their initial stages and are very aggressive.
Adverse Effect	The use of agrochemicals for weed control can generate soil and water contamination through infiltration. The use of this product should be reduced as much as possible and only in the first steps of growth. Non-target plants adjacent to the plantations may be exposed to herbicide, affecting life history traits, like flowering patterns and root development (Dupont *et al.,* 2018). Therefore, it is important to apply the herbicide in dry season with low winds to prevent spreading into near cultivations and grasslands with cows. In addition, water courses or drainage areas should not be exposed to herbicide.

5.2 Offsite Biodiversity Impacts

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

Considering the management measures described for the project, the possible impacts on biodiversity were related to the colonization of invasive species and the use of chemical fertilizers and herbicides.

Negative Offsite Impact	Mitigation Measure(s)
Invasive species can colonize natural areas and displace the native vegetation	Setting up a fire belt along with a periodic control burning will limit the establishment of alien vegetation, and the exotic vegetation will be removed from the natural forests manually
Use the chemical fertilizers and herbicides can generated water and soil contamination	Deliver empty agrochemical packaging to the responsible supplier Carry out a training workshop for project members on hazardous waste management Conduct an annual training workshop for project members on the handling and implementation of agrochemicals

5.2.2 Net Offsite Biodiversity Benefits (B3.3)

The activities implemented in the project aimed to create forest plantations on degraded lands. These activities have a positive impact on the conservation values established for the project, through the generation of new areas for connectivity between ecosystems, that benefit wildlife by providing shelter and safe pathways for movement. In addition, the protection of key areas ensures habitats and food availability which favors the protection of fauna and the long-term viability of their populations in the area.

The above conditions favored the connectivity between Meta and Bita rivers and the protection of the gallery forest and morichales in the area. Additionally, with the protection of these native ecosystems, workshops of fauna management for the employees of the plantation were given, reducing hunting, retaliation, and other harmful actions. Therefore, the potential impacts on biodiversity that the project activities had outside the project zone were positive; no negative impacts have been identified.

5.3 Biodiversity Impact Monitoring

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

5.3.1.1 Flora monitoring

Floristic and structural Analysis of natural plant cover.

During this period, a forest inventory of the gallery forest and the morichal vegetation cover was conducted in five localities of the project area between July and August of 2017. As shown in Figure 12, 28 plots were established and georeferenced through the use of GPS (Figure 12), 21 plots for gallery forest and seven plots for morichales.

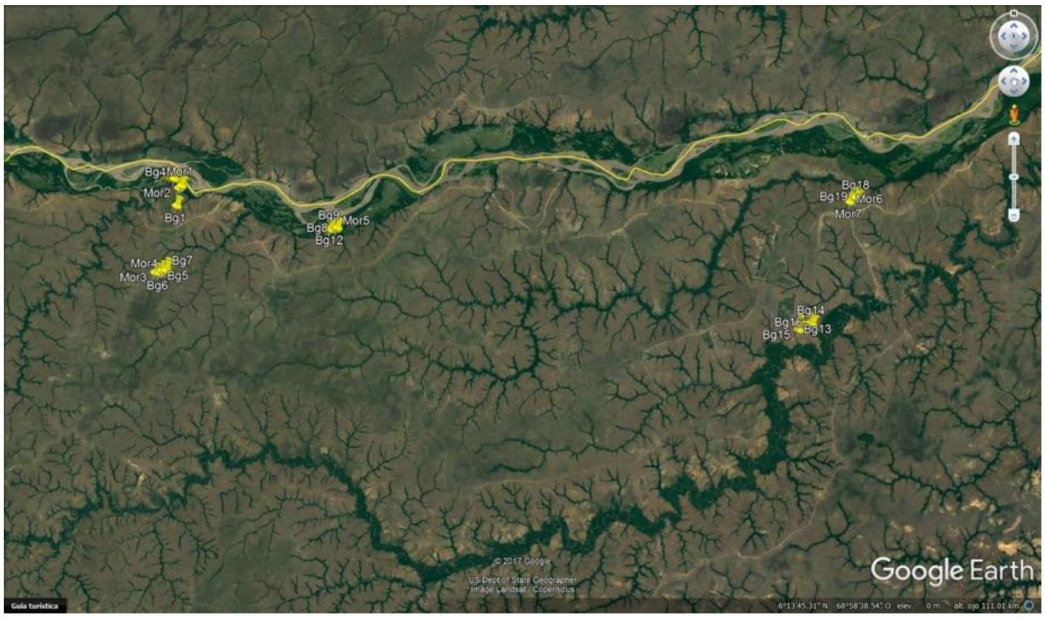


Figure 12: Map of the plot locations of the forest inventory; Bg: Gallery Forest; Mo: Morichales.

Figure 13: Technics implemented during the forest inventory; Georeferenced and label of trees.

Gallery Forest

Importance value index (IVI)

The IVI defines which of species contribute the most to the structure of an ecosystem, it makes it possible to determine the dominance of the species and the degree of heterogeneity of the ecosystem. It is the result of the sum of the relative values of abundance (relative abundance), dominance (relative dominance), and frequency (relative frequency).

A total of 944 individuals of the Poles (fustales) category were registered, distributed in 42 families, 88 genera and 109 species. The specie *Caraipa llanorum* obtained the highest IVI (24.2%). Other important species were *Protium heptaphyllum* with 16.1%, *Euterpe precatoria* with 15.4%, *Guatteria schomburgkiana* with 15.0% and *Simarouba amara* with 13.9% (Table 16, Figure 14). These species are valuable due to its uses for wood, food, and resin.

Table 16: IVI for gallery forest poles category.

Specie	Relative Dominance (%)	Relative Abundance %	Relative Frequency (%)	IVI
Albizia lebbeck	2.8	1.2	0.3	4.3
Alchornea discolor	0.4	0.4	0.6	1.4
Alchornea triplinervia	0.1	0.2	0.6	0.9
Amaioua guianensis	0.1	0.4	0.9	1.4
Andira surinamensis	0.4	0.3	0.9	1.7
Aniba panurensis	0.3	0.5	1.5	2.3
Aspidosperma desmanthum	0.3	0.1	0.3	0.7
Aspidosperma excelsum	0.3	0.2	0.6	1.1
Astronium graveolens	0	0.1	0.3	0.5
Attalea maripa	0.9	0.7	0.9	2.6
Bellucia grossularioides	0.3	0.4	0.9	1.6
Brosimum lactescens	1.9	2.6	3.4	7.9
Calophyllum brasiliense	3.7	3	2.1	8.8

Specie	Relative Dominance (%)	Relative Abundance %	Relative Frequency (%)	IVI
Campsiandra comosa	1.0	0.4	0.6	2.0
Caraipa llanorum	11.6	9.9	2.8	24.2
Coccoloba mollis	0.5	0.4	0.6	1.5
Cochlospermum orinocense	1.0	0.4	0.3	1.7
Cochlospermum vitifolium	0.0	0.1	0.3	0.4
Connarus lambertii	0.2	0.4	0.3	1.0
Copaifera pubiflora	2.9	0.7	1.5	5.1
Cordia sericicalyx	0.2	0.3	0.3	0.8
Crudia oblonga	0.3	0.3	0.3	0.9
Cupania scrobiculata	0.0	0.1	0.3	0.4
Curatella americana	0.0	0.1	0.3	0.4
Dendropanax arboreus	0.3	0.5	0.6	1.4
Diospyros serícea	1.3	2.3	2.8	6.3
Dipteryx punctata	2.2	0.8	0.6	3.7
Elaeagia maguirei	0.1	0.1	0.3	0.5
Enterolobium schomburgkii	0.1	0.1	0.3	0.6
Erythroxylum macrophyllum	0.0	0.2	0.3	0.6
Eschweilera parvifolia	3.2	1.3	2.1	6.6
Eschweilera tenuifolia	1.2	1.4	0.6	3.2
Euplassa saxicola	0.8	0.7	1.2	2.7
Euterpe precatoria	2.3	8.8	4.3	15.4
Ficus americana	0.2	0.1	0.3	0.7
Ficus mathewsii	0.1	0.2	0.3	0.6
Garcinia madruno	0.1	0.2	0.6	0.9
Genipa americana	0.1	0.1	0.3	0.5
Guatteria metensis	0.0	0.1	0.3	0.4
Guatteria schomburgkiana	5.8	5.5	3.7	15
Hebepetalum sp.	1.0	0.5	0.9	2.5
Heterostemon conjugatus	0.0	0.1	0.3	0.4
Himatanthus articulatus	2.9	2.6	2.5	8
Hirtella elongata	1.0	1.2	1.5	3.7
Hydrochorea corymbosa	2.0	0.5	0.9	3.4
Hymenaea courbaril	0.3	0.2	0.3	0.8
Inga cylindrica	1.3	0.5	1.2	3
Jacaranda copaia	0.8	0.7	0.3	1.9

Specie	Relative Dominance (%)	Relative Abundance %	Relative Frequency (%)	IVI
Jacaranda obtusifolia	0.7	0.7	1.2	2.7
Lacistema aggregatum	0.0	0.1	0.3	0.5
Licania hypoleuca	0.1	0.1	0.3	0.5
Licania leucosepala	1.0	1.5	1.5	4.0
Licania parvifructa	0.2	0.4	0.9	1.5
Licania subarachnophylla	0.1	0.1	0.3	0.5
Licaria canella	0.1	0.1	0.3	0.5
Lonchocarpus floribundus	0.1	0.2	0.6	1.0
Mabea trianae	0.4	1.2	1.5	3.1
Mahurea exstipulata	0.3	0.4	0.6	1.3
Maquira coriacea	0.2	0.2	0.6	1.0
Matayba adenanthera	0.3	0.7	0.6	1.6
Matayba scrobiculata	0.3	0.4	0.6	1.3
Mauritia flexuosa	4.6	2.3	1.8	8.8
Micropholis guyanensis	0.1	0.1	0.3	0.5
Myrcia paivae	0.0	0.1	0.3	0.4
Myrcia subsessilis	0.7	1.5	1.5	3.7
Myrciaria floribunda	0.0	0.1	0.3	0.4
Nectandra cuspidata	0.1	0.2	0.3	0.6
Ocotea bofo	2.3	1.5	0.9	4.7
Ocotea longifolia	0.1	0.4	0.3	0.8
Oenocarpus bacaba	0.2	0.5	0.3	1
Ouratea castaneifolia	0.1	0.1	0.3	0.5
Ouratea polyantha	0.0	0.1	0.3	0.4
Parahancornia oblonga	1.5	1.1	1.2	3.8
Parinari pachyphylla	4.6	1.4	2.5	8.4
Pera arborea	0.2	0.3	0.6	1.2
Perebea xanthochyma	0.2	0.1	0.3	0.6
Phenakospermum guyannense	0.1	0.3	0.6	1.0
Phyllanthus attenuatus	0.5	0.3	0.6	1.4
Picramnia magnifolia	0	0.1	0.3	0.5
Pouteria guianensis	0.5	0.3	0.6	1.4
Protium glabrescens	1.6	2.5	1.5	5.6
Protium heptaphyllum	4.6	6.9	4.6	16.1

Specie	Relative Dominance (%)	Relative Abundance %	Relative Frequency (%)	IVI
Protium llanorum	0.1	0.1	0.3	0.5
Quiina macrophylla	0.0	0.1	0.3	0.4
Richeria grandis	0.2	0.3	0.3	0.8
Ruprechtia costata	0.1	0.1	0.3	0.5
Sacoglottis guianensis	3.7	3.1	2.5	9.3
Schefflera morototoni	1.3	1.2	2.1	4.6
Sclerolobium melanocarpum	0.8	1.5	0.3	2.6
Senna silvestris	0.0	0.1	0.3	0.4
Simarouba amara	5.0	4.2	4.6	13.9
Socratea exorrhiza	0.2	1.0	0.6	1.8
Stephanopodium sp.	0.0	0.1	0.3	0.4
Swartzia leptopetala	0.2	0.2	0.3	0.7
Symphonia globulifera	0.7	1.0	1.2	2.9
Tapirira guianensis	1.2	2.8	2.5	6.4
Tetragastris panamensis	0.9	1.0	0.6	2.5
Virola carinata	0.1	0.3	0.6	1.1
Virola elongata	1.4	0.8	0.9	3.2
Virola parvifolia	0.2	0.3	0.6	1.1
Vismia baccifera	0.1	0.4	0.6	1.2
Vismia macrophylla	0.1	0.4	0.6	1.1
Vitex orinocensis	0.4	0.2	0.3	0.9
Vochysia ferruginea	0.1	0.1	0.3	0.5
Vochysia lehmannii	0.3	0.2	0.3	0.8
Vouarana guianensis	0.1	0.1	0.3	0.5
Xylopia aromatica	0.7	1.1	1.2	3
Xylopia emarginata	0.1	0.1	0.3	0.5
Zygia inaequalis	0.0	0.1	0.3	0.4

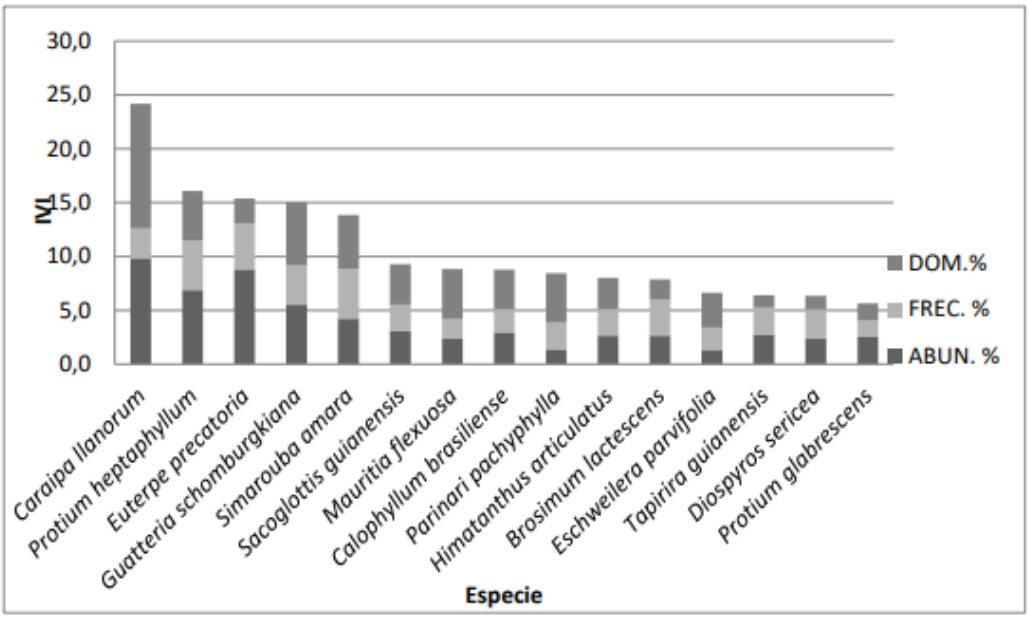


Figure 14: Importance Value Index for gallery forest (poles category).

Vegetation profile of Gallery Forest (Poles category)

For the construction of the vegetation profile in the gallery forest, one plot was selected randomly to generate the graphical representation of the total of individuals registered in the inventory in that specific plot (a total of 23 species registered). The vegetation profile showed continuity of the canopy in terms of vertical structure, which make the differentiation of forest strata difficult. On the other hand, the horizontal structure showed a large proportion of ground cover with the canopy, blocking sunlight. This is typical of gallery forests and is also evidence of a good degree of conservation (Figure 15).

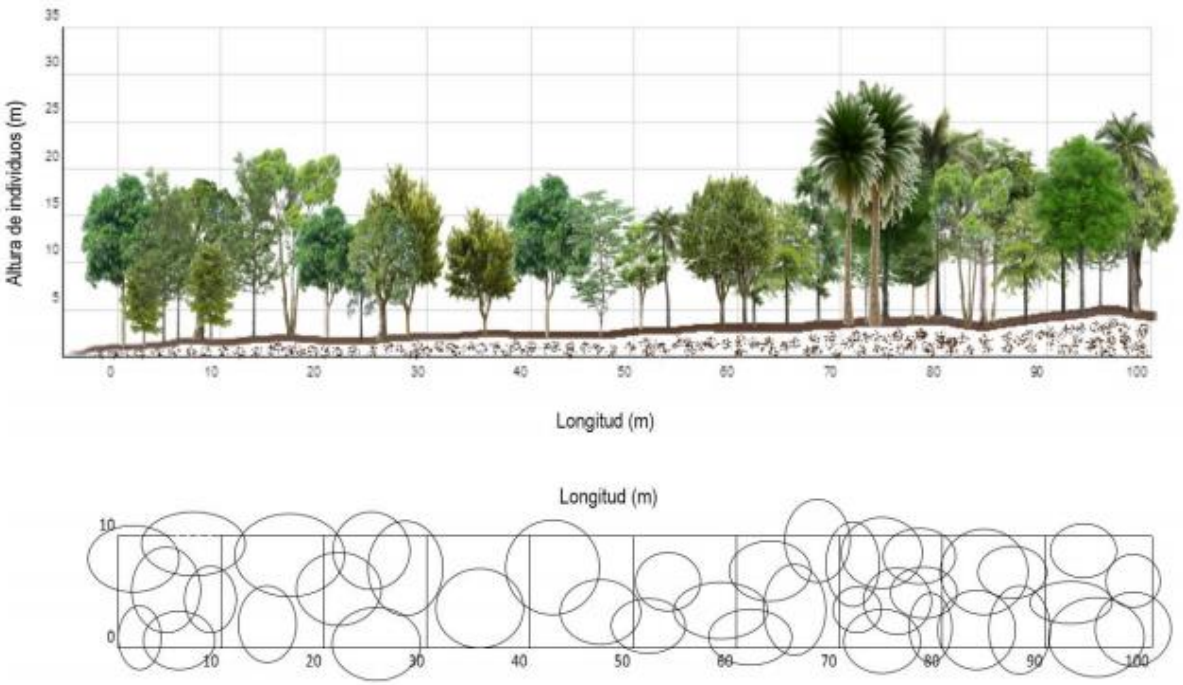


Figure 15: Vegetation profile of gallery forest; vertical structure and horizontal structure.

Morichales

Importance value index (IVI)

For morichales cover (poles category), a total of 375 individuals were registered, represented across 22 families, 29 genera and 30 species. The family Arecaceae (palms) was the most representative, with 200 individuals, equivalent to 53.3% of the total abundance in the inventory. *Mauritia flexuosa* was the most important specie with an IVI of 39.2%, followed by *Protium glabrescens* with 24.9%, *Calophyllum brasiliense* with 22.9%, *Euterpe precatoria* with 22.7% and *Caraipa llanorum* with 19.6% (Table 17 and Figure 16).

This result showed that the morichales in the project area are homogeneous, represented mostly by one species of palm, *Mauritia flexuosa*.

Table 17: IVI for the morichales poles category.

Specie	Relative dominance (%)	Relative abundance %	Relative frequency (%)	IVI
Alchornea discolor	0.3	1.7	0.1	2.1
Brosimum lactescens	0.3	1.7	0.1	2.1
Calophyllum brasiliense	8.5	8.5	5.9	22.9
Caraipa llanorum	7.7	3.4	8.5	19.6
Cecropia peltata	0.5	1.7	0.2	2.4
Dendropanax arboreus	2.1	3.4	0.6	6.1
Diospyros sericea	0.3	1.7	0.0	2.0
Duroia micrantha	0.3	1.7	0.1	2.0
Endlicheria verticillata	0.3	1.7	0.0	2.0
Eschweilera parvifolia	0.5	1.7	0.2	2.4
Euterpe precatoria	13.3	6.8	2.6	22.7
Garcinia madruno	0.3	1.7	0.1	2.1
Guatteria schomburgkiana	1.9	5.1	1.6	8.5
Hirtella elongata	0.5	3.4	0.2	4.2
Hydrochorea corymbosa	0.8	1.7	0.3	2.8
Mahurea exstipulata	4.0	3.4	3.8	11.2
Malouetia virescens	0.5	1.7	0.4	2.6
Maquira coriacea	0.5	3.4	0.3	4.2
Mauritia flexuosa	40	11.9	65.8	117.6

Specie	Relative dominance (%)	Relative abundance %	Relative frequency (%)	IVI
Myrcia subsessilis	0.3	1.7	0.0	2.0
Pachira sessilis	0.3	1.7	0.1	2.0
Parahancornia oblonga	1.1	3.4	0.7	5.2
Protium glabrescens	10.1	10.2	4.6	24.9
Quiina macrophylla	0.3	1.7	0.0	2.0
Symphonia globulifera	0.8	3.4	0.3	4.5
Tapirira guianensis	0.8	3.4	0.2	4.4
Virola carinata	1.6	3.4	1.6	6.6
Virola parvifolia	1.6	1.7	1.2	4.5
Vismia macrophylla	0.3	1.7	0.1	2.0
Xylopia emarginata	0.3	1.7	0.1	2.1

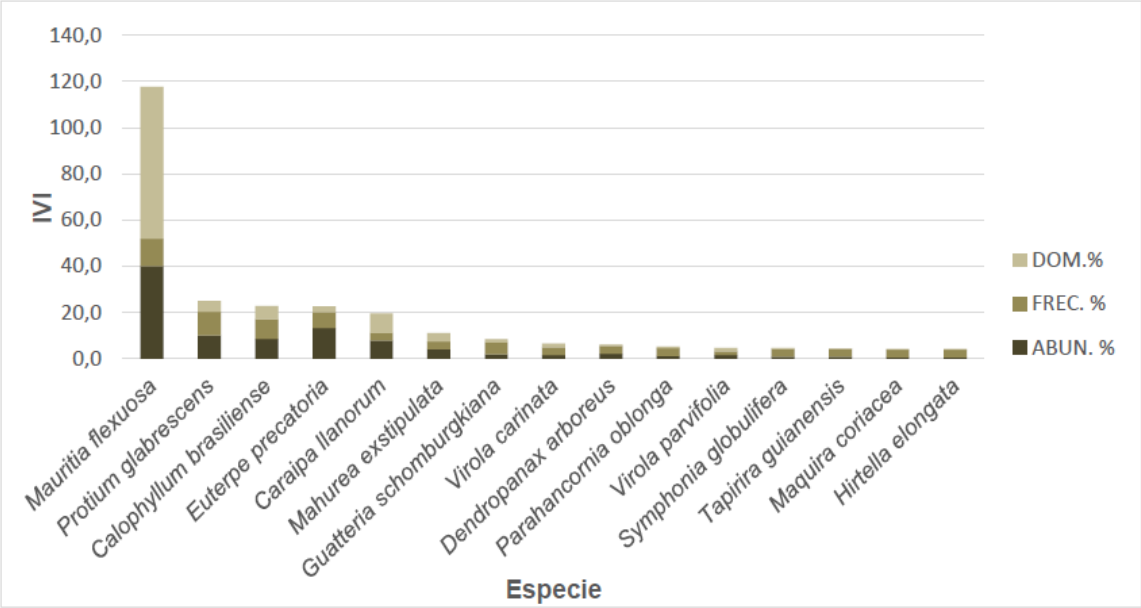


Figure 16: Importance Value Index for gallery forest (poles category).

Vegetation profile of morichales (poles category)

For the construction of the vegetation profile in morichales, one plot was selected randomly to generate the graphical representation of the total of individuals registered in the inventory in that specific plot (a total of seven species registered).

The vegetation profile showed a continuity of the canopy in the vertical structure, similar to the structure found in the gallery forest, therefore, it was difficult to differentiate the forest strata. There was also a clear

dominance in the vertical structure of the *Mauritia flexuosa* species, due to its high IVI. On the other hand, the horizontal structure showed a large proportion of ground cover with canopy, which, block the entrance of sunlight. This is evidence of a good degree of conservation (Figure 17).

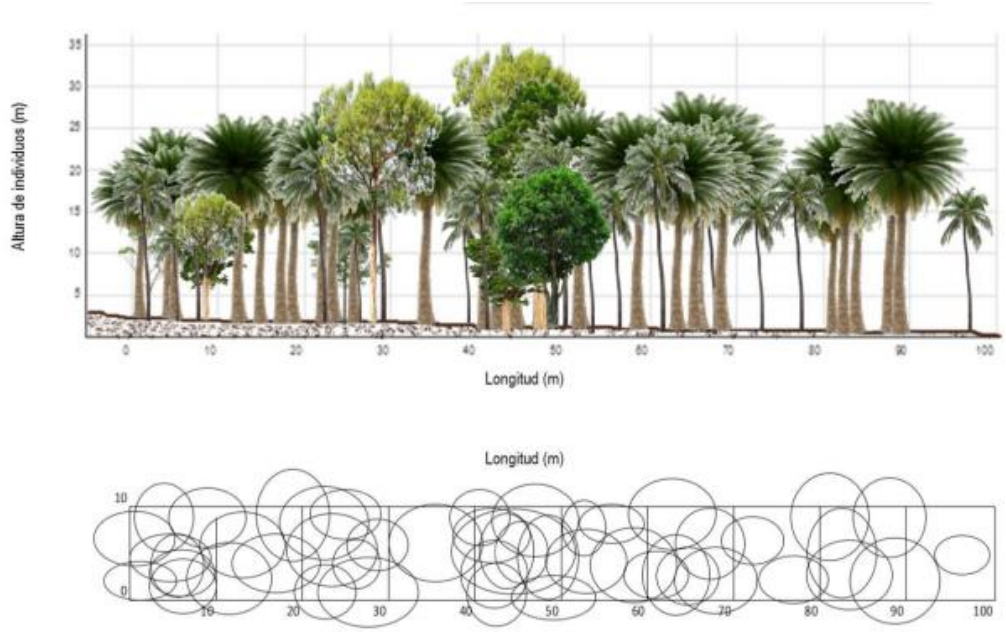


Figure 17:. Vegetation profile of the morichales; vertical structure and horizontal structure.

Threatened, Endangered and Endemic species

According to the forest inventory results, the species *Parinari pachyphylla* (escobo), is reported in the category Endangered (EN) according to Volume 1 of the Red Book of Plants in Colombia, and to MADS Resolution 0192 of 2014 (Table 18).

The species *Virola parvifolia* (Carnevaca), is reported in the vulnerable category (VU) in the IUCN Red List. Other species reported under least Concern (LC) category are included in Table 18.

Table 18: Endemic, threatened, or restricted species.

Specie	Common Name	Resolución 0192/2014 MADS	Red Books	IUCN	CITES	Endemic	Banned
Astrocaryum aculeatum	Cubarro	--	LC	--	--	--	--
Attalea maripa	Cucurita	--	LC	--	--	--	--
Enterolobium schomburgkii	Dormidero	--	--	LC	--	--	--
Eschweilera parvifolia	Coco de mono	--	LC	--	--	--	--
Euterpe precatoria	Manaco	--	LC	--	--	--	--
Hirtella elongata	Garrapato	--	LC	--	--	--	--
Hirtella racemosa	Huesito	--	LC	--	--	--	--
Hymenaea courbaril	Algarrobo	--		LC	--	--	--

Specie	Common Name	Resolución 0192/2014 MADS	Red Books	IUCN	CITES	Endemic	Banned
Licania hypoleuca	Escobo blanco	--	LC	--	--	--	--
Licania leucosepala	Aceituno	--	LC	--	--	--	--
Licania parvifructa	Escobo colorado	--	LC	--	--	--	--
Mauritia flexuosa	Moriche	--	LC	--	--	--	--
Parinari pachyphylla	Escobo	EN	EN	--	--	--	--
Socratea exorrhiza	Choapo	--	LC	--	--	--	--
Virola parvifolia	Carnevaca	--	--	VU	--	--	--

In summary the forest inventory, despite being restricted to five ponits, showed a good conservation status, with a rich species composition and well-formed vertical and horizontal structures. Therefore, these areas provide valuable ecosystem services like food, shelter, and habitat availability for wildlife.

5.3.1.2 Fauna monitoring

Field Phase

During this period, an inventory of terrestrial vertebrates and birds was carried out in the most relevant coverages. The inventory was made with different methods depending on the studied groups.

For the case of amphibians and reptiles, visual encounter surveys were performed in the gallery forest and morichales coverage in five study areas: San Cristóbal, Base Mono, Hato Nuevo, Tierra Adentro and Cuernavaca (Figure 18). Additionally, two boat trips were made along the banks of the Muco and Bita rivers. A total of 378 hours of sampling were carried out with two persons over 21 days in the five areas, for a total of 189 man-hours. Within each zone, daily walks were divided into two strips (day and night), with a total of nine hours of effective walking time. The walks were conducted by reviewing all possible microhabitats for the capture of amphibians and reptiles (puddles, streams, leaf litter), as well as man-made structures. The individuals were grouped in morphotypes, measured and some were collected.

Figure 18: Distribution of the study areas of amphibians and reptiles in the project zone.

Regarding the birds, five sampling stations associated with the gallery forest and morichales cover were established (Figure 19). In each of the sampling station, the methods of direct observation and capture with mist nets were implemented. At each point, elevation data, and geographic coordinates were taken with a GPS device.

The type of habitat and its degree of intervention were described with photographic support for each sampling unit. The mist nets, which were of 12 m and long 2 m high were located in the five stations. Catch sessions started on average at 05:15 h, and the nets remained open for three and a half to six consecutive hours in the morning and afternoon and were checked every 20 minutes. Additionally, during these sessions, direct visual and auditory detections were made.

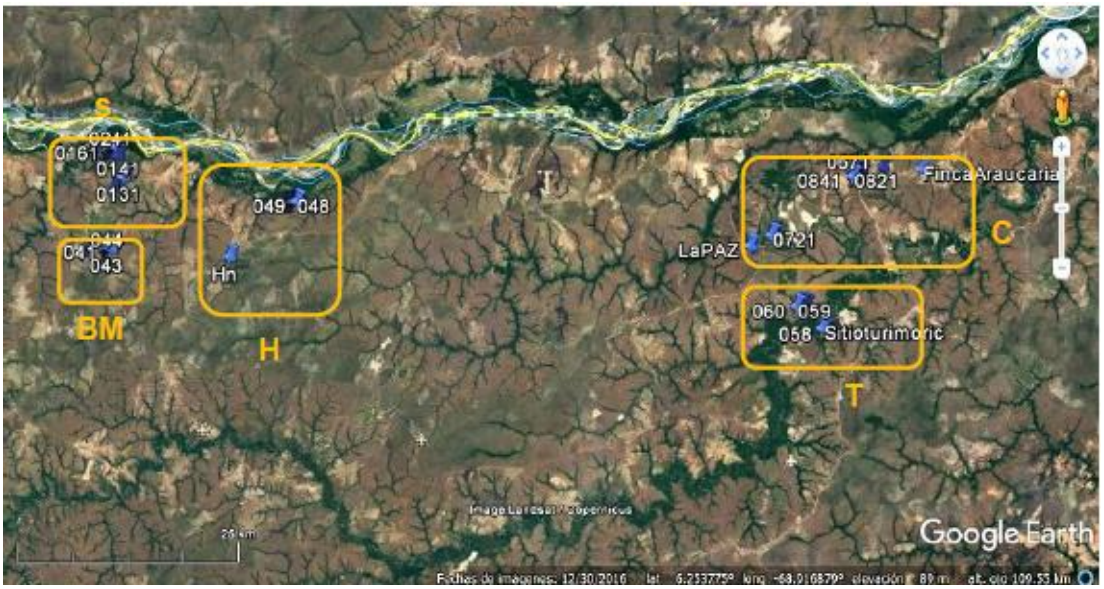


Figure 19: Distribution of the sampling stations for the study of birds; San Cristóbal (S), Base Mono (BM), Hato Nuevo (H), Tierra Adentro (T) and Cuernavaca (C).

Three methods were implemented for the study of mammals. The small mammals were inventoried with the installation of Sherman traps. For the case of medium and large mammals, 33 camera traps were installed in the gallery forest in five sampling points (Figure 20). Ten cameras were distributed at each of the sampling points. The location of the cameras was recorded with a GPS device. Additionally, all information related to the presence of animals, such as footprints, hair, and scratching marks, were collected.

Figure 20: Sampling of camera traps installed during the monitoring.

For the case of bats, mist nets of 1 2m long by 2.6 m height were used. Based on the structure of the forests, nets were either installed in ecotone areas or inside the forests. Due to the flooding conditions only six of 10 nets were installed. Sampling was carried out from 18:00 to 00:00 at each point for three consecutive nights.

Results

Amphibians

During the sampling, a total of 247 sightings of amphibians were reported (Table 19), distributed across three families, nine genera and 18 species. The most abundant family in terms of number of species is Leptodactylidae, which also had the highest abundances, followed by Bufonidae and Hylidae (Figure 21).

The species with the highest number of independent records were *Pseudopaludicola boliviana* (54 individuals), *Rhinella granulosa* (41 individuals), and *Pseudopaludicola llanera* (35 individuals). Regarding other species reported, a low number of records were obtained, especially for *Boana boans* and *Trachycephalus venulosus,* with one individual each (Figure 22).

Table 19: Species of amphibians with abundance registered in the study area during the inventory.

Specie	Location					Total
	San Cristóbal	Base Mono	Hato Nuevo	Tierra Adendro	Cuernavaca	
Boana boans	1					1
Boana crepitans	6	1				7
Boana pugnax			3		2	5
Dendropsophus mathiassoni			6			6
Leptodactylus fragilis	9	3	2			14
Leptodactylus fuscus	1	5	10	7	5	28
Leptodactylus knudseni				3		3
Leptodactylus lithonaetes				10		10
Leptodactylus macrosternum	2		6			8
Physalaemus fisheri			5			5
Pseudopaludicola boliviana		20	2	9	23	54
Pseudopaludicola llanera		10	10		15	35
Rhinella granulosa	24		6	11		41
Rhinella margaritifera	1			1		2
Rhinella marina	1		4	8	4	17
Scinax kennedyi		7				7
Trachycephalus venulosus	1					1
TOTAL	46	46	54	52	49	247

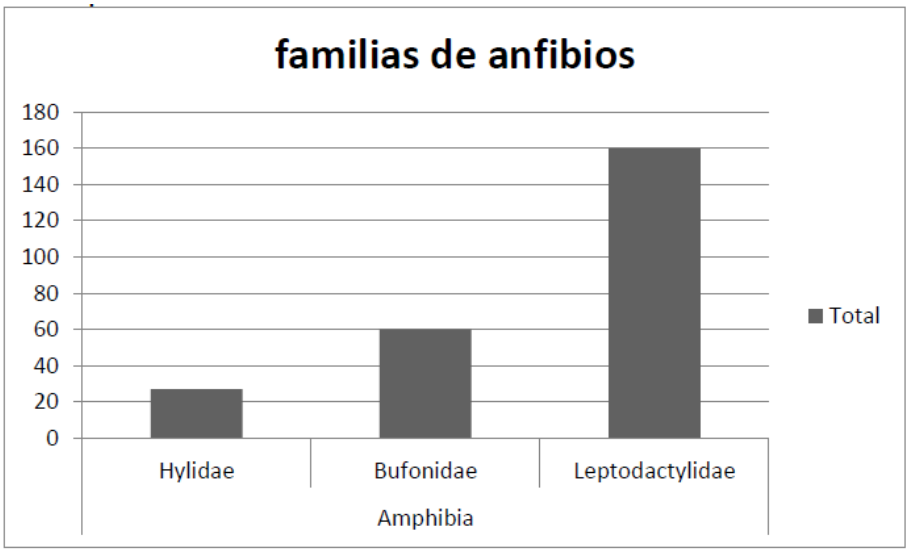


Figure 21: Distribution of the amphibian family's abundance.

Figure 22: Individuals of Trachycephalus venulosus and Scinax kennedyi.

Amphibians species richness Index

The Fisher richness index can be interpreted as the number of new species that can be found each time the number of individuals is doubled.

The species richness index was calculated for each of the five study areas, with the highest diversity founded in the locality of Hato Nuevo, followed by San Cristóbal (Table 20). These two areas had the highest heterogeneity in terms of landscape units, microhabitats, and permanent and seasonal water bodies. It would be expected that the Tierradentro locality had a higher species richness, due to the state of conservation of its ecosystems; nevertheless, the study was conducted in the rainy season, and several areas suitable for amphibians were flooded during that time.

Table 20: Species richness index for amphibians in the study area.

Locations	San Cristóbal	Base Mono	Hato Nuevo	Tierradentro	Cuernavaca	Total
Species	9	6	10	7	5	19
Individuals	46	46	54	52	49	247
Fisher_Alpha Index	3.3	1.8	3.6	2.2	1.4	4.8

Chao-1 Index	14	6	10	7	5	20

Reptiles

Regarding the reptiles, a total of 120 sightings of reptiles were reported, representing 16 families, 28 genera and 31 species divided into 14 species of lizards, 11 species of snakes, four species of turtles and two species of crocodiles. The most abundant family in terms of number of species was Teiidae (three species). The species with the highest number of independent records was *Podocnemis vogli* (17 individuals), *Caiman crocodilus* (11 individuals), *Iguana iguana* and *Tropidurus hispidus* (10 individuals each). Twelve species had only one individual (Table 21, Figure 23, and Figure 24).

Table 21: Species of reptiles with abundance registered in the study area during the inventory.

Specie	Location					Total
	San Cristóbal	Base Mono	Hato Nuevo	Tierradentro	Cuernavaca	
Amphisbaena alba	1					1
Anolis auratus		1	1			2
Anolis ortonii			1			1
Atractus crassicaudatus				1		1
Boa constrictor					1	1
Bothrops atrox			1		1	2
Caiman crocodilus	2		9			11
Chelonoidis carbonaria	3	3	1			7
Chelonoidis denticulata		1				1
Chironius carinatus		1	1	1		3
Cnemidophorus lemniscatus		3	3	4		10
Corallus ruschenbergerii					1	1
Crotalus durissus					1	1

Specie	Location					Total
	San Cristóbal	Base Mono	Hato Nuevo	Tierradentro	Cuernavaca	
Drymarchon corais					1	1
Gonatodes consignatus			1			1
Helicops angulatus		1	1	2		4
Hemydactylus brookii	1		1	1		3
Hemydactylus frenatus		1	1	2		4
Hemydactylus palaichthus				3		3
Iguana iguana		4	8			10
Kentropyx striata			1			1
Leptodeira annulata		4		1		5
Mabuya mabouya		1		1		2
Mabuya sp			1			1
Oxybelis aeneus					1	1
Paleosuchus palpebrosus	1					1
Podocnemis unifilis	7		1			8
Podocnemis vogli	2		15			17
Spilotes pullatus		1				1
Tropidurus hispidus			6	3	1	10
Tupinambis teguixin	1	1				2
Total	19	22	53	19	7	120

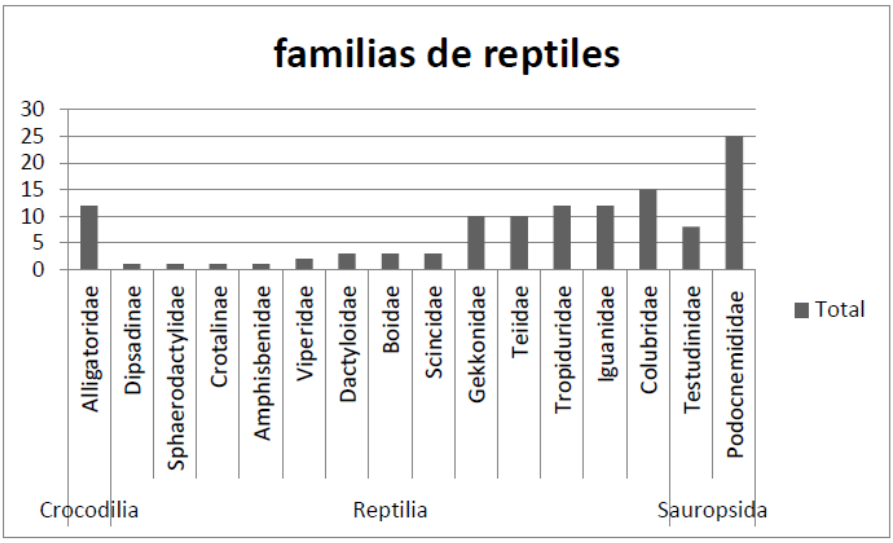


Figure 23: Distribution of the reptile family's abundance.

Figure 24: Species recorded during the inventory: Chironius carinatus and Anolis ortonii.

Reptiles species richness Index

The highest diversity was found in the locality of Base Mono, followed by Hato Nuevo and Tierradentro. It is possible that the location of Base Mono, which is far from areas with human settlements or main roads influenced the results, as humans and roads are the major factors in the decline of reptile species (Table 22).

Table 22: Species richness index for reptiles in the study area.

Locations	San Cristóbal	Base Mono	Hato Nuevo	Tierra Adentro	Cuernavaca	Total
Species	9	12	17	10	7	31
Individuals	19	22	53	19	7	120
Fisher_Alpha Index	6.7	10.8	8.7	8.5	0.0	13
Chao-1 Index	12.3	40.0	83.0	13.3	28.0	44

In addition to the inventory, a presentation was made to the community to generate awareness regarding the importance of the snakes in the ecosystems, due to the indiscriminate pattern of killing of these animals perceived in the community (Figure 25).

Figure 25: Presentation to the community regarding the importance and functions of the reptiles in the ecosystems.

Birds

During the sampling, a total of 530 individuals were identified, in 20 orders, 42 families, and 132 species. With the sighting's method, a total of 117 species were identified, and 48 species were registered in the mist nets. Three migratory species were also identified (*Tyrannus savana*, *Riparia riparia* and *Catharus minimus*) through mist nets and sightings (Figure 26).

Figure 26: Migratory species registered during the inventory; Tyrannus savana, Riparia riparia and Catharus minimus.

The most representative families according to their abundance were Tyrannidae (flycatchers; 83 individuals), followed by Thraupidae (tanagers; 73 individuals), Psittacidae (parrots; 61 individuals), Columbidae (pigeons and doves; 30 individuals), and Trochilidae (hummingbirds; 24 individuals) (Figure 27). Regarding the species richness per family, the most representative families were Thraupidae (53 species), Tyrannidae (47 species), Trochilidae (24 species), Psittacidae (17 species), and Accipitridae (15 species).

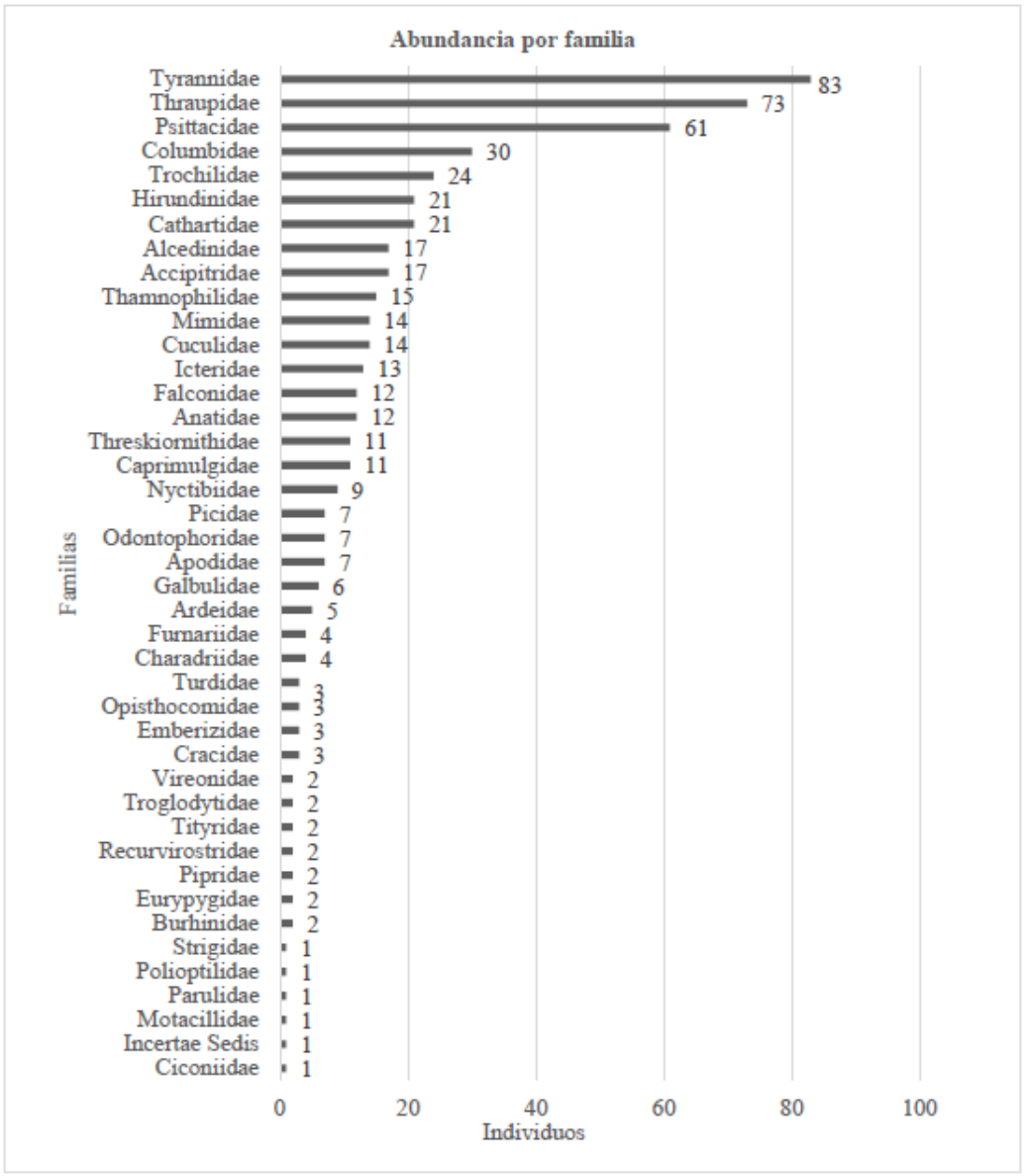


Figure 27: Abundance per family registered in the inventory.

According to resolution 0192 of 2014 of the Ministry of the Environment and Sustainable Development, no species were recorded in any state of threat in this study, although according to the list of globally threatened species (IUCN) the Crestless Curassow (*Mitu tomentosum*) was identified as Near Threatened (NT) and it was recorded in two of the 5¿five sampling points (Figure 28).

Figure 28: Mitu tomentosum captured during the inventory.

Regarding the sampling points, San Cristóbal had the highest abundance (155 individuals), followed by Cuerna vaca and Hato Nuevo (128 and 127 individuals respectively). Tierradentro was the location with fewer individuals (32 individuals in total). In terms of species richness, San Cristóbal and Hato Nuevo shared the same number of species (86 species). Again, Tierradentro was the location with the fewer species registered (21 species) (Figure 29).

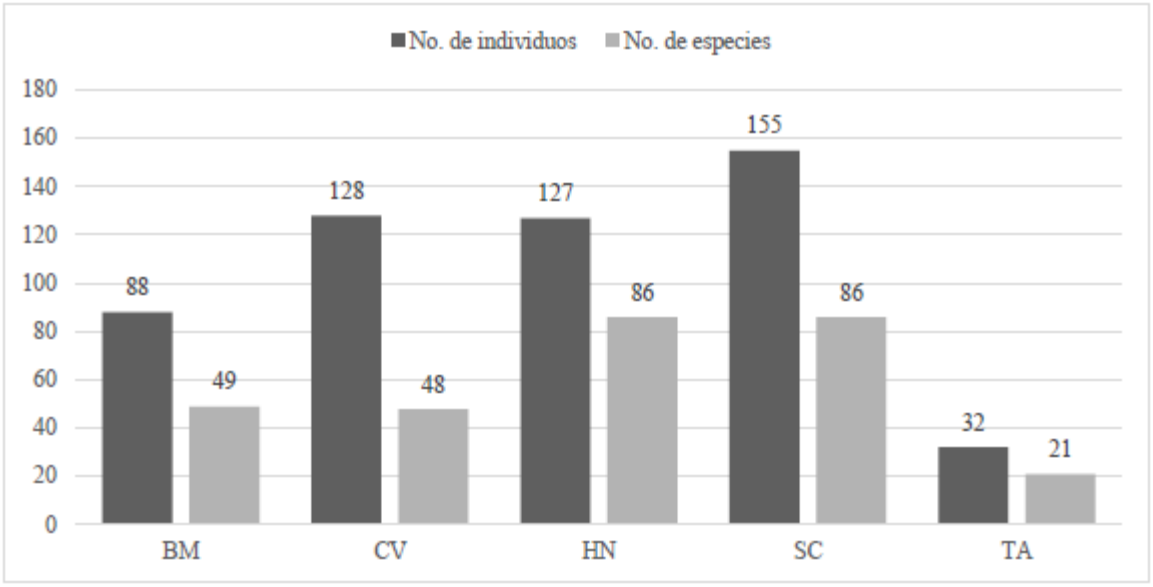


Figure 29: Number of individuals and number of species per location. BM: Base Mono, CV: Cuernavaca, HN: Hato Nuevo, SC: San Cristóbal and TA: Tierra Adentro.

Birds species richness Index

Considering the values obtained per sampling point regarding abundance and species richness, San Cristóbal had the highest value (42.1%), followed by Hato Nuevo (31.6%). The location with the lowest value was Tierradentro (19.6%) (Table 23).

Table 23: Species richness index for birds in the study area.

Locations	San Cristóbal	Base Mono	Hato Nuevo	Tierra Adentro	Cuernavaca
Species	65	36	51	19	38
Individuals	155	88	127	32	128
Fisher_Alpha Index	42.1	22.7	31.6	19.7	18.3
Chao-1 Index	92.3	57.4	83.5	45.0	59.4

Mammals

During the sampling, a total of 42 species were registered using various methods. For the case of small mammals, the sampling effort was equivalent to 900 traps/day, with a total of four registers, being the success of capture very low (only 0.4% success) (Figure 30 and Table 24).

Figure 30: Zygodontomys brevicauda registered during the inventory.

For camera traps the sampling effort was based on employing 50 camera traps for 19 days per 24 hours of sampling per day, which was equivalent to 22,800 hours of effective sampling. Of a total 3,269 images captured, 2,114 corresponded to mammal records (65%).

A total of 17 species across 15 families, were recorded by cameras traps. The most frequently recorded species were *Didelphis marsupialis*, *Metachirus nudicaudatus*, *Tamandua tetradactyla*, and *Dasyprocta fuliginosa* which were found in four of the five locations, followed by *Cuniculus paca*, *Cerdocyon thous, Leopardus pardalis*, and *Tapirus terrestres* in three of the five locations. While the least recorded species were *Priodontes maximus* and *Coendou prehensilis*.

Table 24: Records of mammal species by locations and occurrence between properties.

Orden	Family	Specie	Locations				
			San Cristóbal	Base Mono	Hato Nuevo	Tierra Adentro	Cuernavaca
Artiodactyla	Tayssuidae	*Tayassu pecari*	0	0	1	0	0
Carnivora	Canidae	*Cerdocyon thous*	0	0	1	0	0
Carnivora	Felidae	*Leopardus pardalis*	0	0	1	1	1
Carnivora	Felidae	*Puma concolor*	1	0	1	0	0
Carnivora	Mustelidae	*Eira barbara*	1	0	0	1	0

Orden	Family	Specie	Locations				
			San Cristóbal	Base Mono	Hato Nuevo	Tierra Adentro	Cuernavaca
Chiroptera	Phyllostomidae	Bat sp 1	0	0	0	0	1
Cingulata	Dasypodidae	*Priodontes maximus*	0	0	0	0	1
Didelphi - morphia	Didelphidae	*Didelphis marsupialis*	1	1	1	0	1
Didelphi - morphia	Didelphidae	*Metachirus nudicaudatus*	0	1	1	1	1
Perisso - dactyla	Tapiridae	*Tapirus terrestris*	1	0	1	0	1
Pilosa	Myrmeco - phagidae	*Tamandua tetradactyla*	1	1	0	1	1
Rodentia	Caviidae	*Hydrochoerus hydrochaeris*	1	0	1	0	0
Rodentia	Cricetidae	Mouse sp 1.	0	1	0	0	0
Rodentia	Cuniculidae	*Cuniculus paca*	1	1	0	1	0
Rodentia	Dasyproctidae	*Dasyprocta fuliginosa*	1	0	1	1	1
Rodentia	Erethizontidae	*Coendou prehensilis*	0	0	1	0	0
Rodentia	Sciuridae	*Sciurus igniventris*	0	1	0	1	0

It is important to note that of the species recorded, three are in the category of Vulnerable (VU) based on the criteria of the International Union for the Conservation of Nature (IUCN) and two of them are Endangered (EN) for Colombia:

- *Tayassu pecari*: (VU), recorded in Hato Nuevo
- *Priodontes maximus*: (VU-EN), registered in Cuernavaca
- *Tapirus terrestris*: (VU-EN), recorded in San Cristóbal, Hato Nuevo and Cuernavaca.

These species are under this degree of threat to their conservation due to the anthropic pressure generated by hunting and the expansion of the agricultural frontier, which makes them conservation objects in the area. In addition, the presence of large carnivores such as *Puma concolor* and *Leopardus pardalis* in the area is noteworthy, as they are indicators of ecosystem health.

Figure 31: Cerdocyon thous registered during the inventory.

Indications and observations methods

A total of 16 mammal species were identified during the sampling based on vocalizations, observation of specimens, and clues such as animal tracks (Table 25 and Figure 32). The species with the highest occurrence were *Alouatta seniculus* (Howler monkey), *Lontra longicaudis* (Neotropical otter) and *Sylvilagus floridanus* (Eastern cottontail).

Some of the most important species identified were Jaguarundi (*Herpailurus yagouaroundi)*, which is a small feline generally associated with conserved areas, the Giant otter and Neotropical otter (*Pteronura brasiliensis* and *Lontra longicaudis*), the Giant armadillo (*Priodontes maximus*), and the Lowland tapir (*Tapirus terrestris*); These species are listed under some degree of threat by the IUCN, which makes them valuable indicators of the conservation status of ecosystems in the project area.

Table 25: Species recorded at the Forest sampling locations based on observations and evidence. Voice, Footprints, Obs; observation.

Orden	Familiy	Specie	Quantity		IUCN
Artiodactyla	Cervidae	*Odocoileus cariacou*	Footprint	2	LC
			Voice	1	
Carnivora	Felidae	*Puma yagouaroundi*	Obs.	1	LC
Carnivora	Mustelidae	*Lontra longicaudis*	Obs.	2	**NT**
			Voice	1	
Carnivora	Procyonidae	*Potos flavus*	Obs.	1	LC
Cetacea	Iniidae	*Inia geoffrensis*	Obs.	2	**EN**

Orden	Familiy	Specie	Quantity		IUCN
Didelphimorphia	Didelphidae	*Didelphis marsupialis*	Obs.	1	LC
Pilosa	Myrmecophagidae	*Tamandua tetradactyla*	Obs.	1	LC
Primates	Atelidae	*Alouatta seniculus*	Voice	3	LC
Rodentia	Cuniculidae	*Cuniculus paca*	Footprint	1	LC
Cingulata	Dasypodidae	*Priodontes maximus*	Footprint	1	**VU**
Lagomorpha	Leporidae	*Sylvilagus floridanus*	Obs	3	LC
Carnivora	Felidae	*Puma concolor*	Footprint	1	LC
Perissodactyla	Tapiridae	*Tapirus terrestris*	Footprint	3	**VU**
Carnivora	Mustelidae	*Pteronura brasiliensis*	Obs.	1	**EN**
Cingulata	Dasypodidae	*Dasypus sabanicola*	Obs.	1	**NT**

Figure 32: Footprint of a Tapirus terrestris registered during the inventory, and an image of an Odocoileus cariacou individual.

Regarding flying mammals, the sampling effort was 6,480 hours/net. A total of 117 individuals were captured, distributed across four families, eight subfamilis, 17 genera, and 22 species. The most abundant species were the large fruit bat (*Artibeus planirostris*) with 23.93% of the specimens recorded, the small Amazonian fruit bat (*Rhynophylla pumilio*) with 20.51%, the short-tailed fruit bat (*Carollia perspicillata*) with

19.66%, and finally, the yellow-eared bidet bat (*Vampyriscus bidens*) with 11.97%. The remaining 18 species had low abundances, fluctuating between 3% and 1% (Figure 33 and Figure 34).

Regarding the species of *Glyphonycterys silvestris, Leptonycteris curasoe* and *Vampyrum spectrum,* it is important to mention that these are bat species that are reported as near threat (NT) under the IUCN criteria.

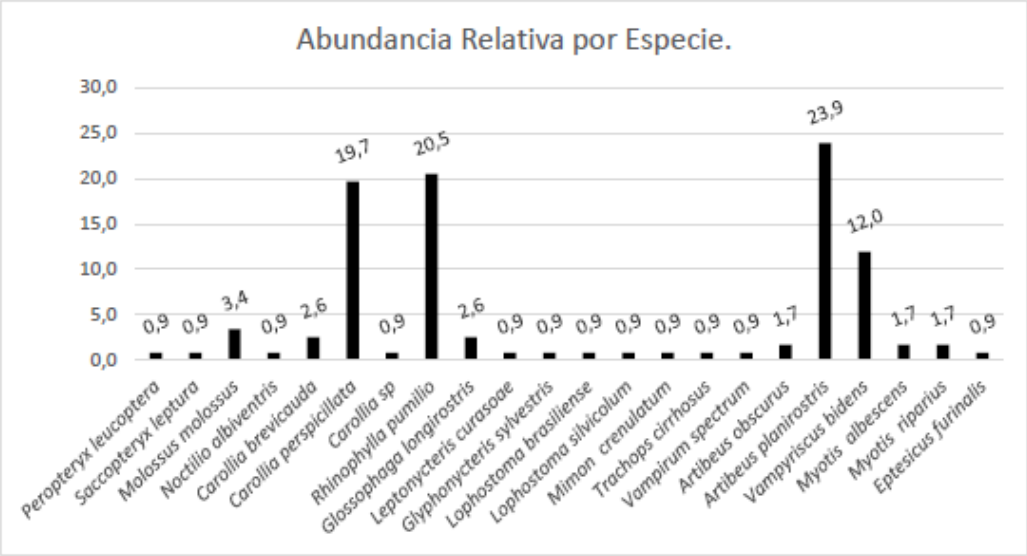


Figure 33: Abundance per species registered during the inventory.

Figure 34: Fringe-lipped bat (Trachops cirrhosus) captured during the inventory.

Bat species Richness Index

The most diverse location of the study in terms of bat species richness was Tierradentro, which is the site with the highest occurrence of species like *Saccopteryx leptura, Eptesicus furinalis, Myotis albescens* and *Myotis riparius* species represented by only one individual. The next most diverse locations were Base Mono with species like *Peropteryx leucoptera, Leptonycteris curasoae* and *Trachops cirrhosis*, and finally Cuernavaca with *Mimon crenulatum* and *Vampirum spectrum* (Table 26).

Table 26: Species richness index for bats in the study area.

Locations	San Cristóbal	Base Mono	Hato Nuevo	Tierradentro	Cuernavaca
Species	65	36	51	19	38
Individuals	155	88	127	32	128
Fisher_Alpha Index	42,12	22,74	31,63	19,68	18,27
Chao-1 Index	92,35	57,38	83,5	45	59,38

Threatened species and rare species

In the case of reptiles and amphibians, no endangered or threatened species were found following the IUCN criteria; however, according to the Red Book of Reptiles (Morales-Betancourt *et al.,* 2015), the red-footed tortoise (*Chelonoidis carbonaria*) found in the study area is considered vulnerable (VU). During the monitoring, the red-footed tortoise was registered in four of the five sampling points, commonly in pairs, which showed that their numbers are strong in these areas. In addition, several shells of hatched eggs were also found. The threats to the species are related to the exploitation of its natural habitat for resources or food. In addition, this species is vulnerable to land use change in the Orinoquia due to the expansion of cattle ranching (Morales-Betancourt *et al.,* 2015).

In the case of birds, the Crestless curassow (*Mitu tomentosum*) was identified by the camera traps. This species is considered Near Threatened (NT) by the IUCN and was recorded at two of the sampling points. The species is under threat due to land use change, particularly for palm oil plantations.

Regarding the mammals, eight species were registered with some degree of threat according to IUCN criteria. The main threats are the fragmentation of forests and hunting (Table 25).

Interviews and Community Monitoring

The use of community cartography and interviews was a valuable strategy to gain insight into the community's perception regarding fauna present in the area. A total of 17 interviews were answered by individuals in the community (Table 27). The interview consisted of questions regarding sightings of the species under threatened categories. With the help of images of the species, the interviews answered the frequency of sightings. It is important to note that all the listed species were seen by at least one interview.

In addition, a total of six maps were developed and filled by the community with the objective of identifying the existing fauna in the project area and approximating where they have been seen. A total of 32 species were named and located by the community (

Table *28* and Figure 35). This information is very valuable as it helps identify possible conflict zones between humans and felids or snakes.

Table 27: Results of the interviews performed in the field visit regarding the sightings of threatened species.

Species	Sighting Frecuency					
	Never	Once per week	Once per month	Twice per year	Once per year	Not available
Panthera Onca (Tigre- Jaguar) (NT)	11	0	0	3	1	2
Leopardus wiedii (Tigrillo) (NT)	11	0	1	1	1	3
Puma concolor (Puma) (LC)	14	0	1	0	0	2

Species	Sighting Frecuency					
	Never	Once per week	Once per month	Twice per year	Once per year	Not available
Puma yagouaroundi (Gato de monte) (LC)	14	0	0	1	1	1
Tayassu pecari (Pecarí barbiblanco) (VU)	9	1	4	1	1	1
Tapirus terrestris (Danta) (VU)	9	0	2	3	2	1
Myrmecophaga tridactyla (Oso hormiguero) (VU)	6	0	4	1	4	2
Pridontes maximus (Armadillo gigante) (VU)	10	0	4	0	0	3
Lontra longicaudis (Nutria) (NT)	15	0	1	1	0	0
Pteronura brasiliensis (Perro de agua) (VU)	6	4	5	0	1	1
Inia geoffrensis (Delfín rosado) (EN)	4	4	4	1	1	3
Crocodylus intermedius (Caíman llanero) (CR)	11	2	3	0	0	1
Chelonoides carbonaria (Morrocoy de patas rojas) (VU)	1	10	6	0	0	0
Podocnemis expansa (Tortuga chapara) (CR)	3	6	5	1	2	0
Mitu tomensoum (Paujil copete de piedra) (NT)	11	2	1	0	2	1

Table 28: Common names of the species identified by the community in the social cartography of the project area.

Common names of the species identified by the community in the project area	
Margay	Capybara
Jaguarundy	savanna armadillo
Lowland Tapir	Deer
Peccary	Jaguar
Tamandua	Arrau turtle
Giant otter	Giant anteater
Neotropical otter	Anaconda
Amazon river dolphin (Tonina)	Puma
Red-footed tortoise	Lowland Paca
Crocodylus	Red howler Monkey
Curassow	Spectacled caiman
Macaw	Woodpecker
Savanna turtle	Owl
Hunting snake	Stone-curlew (Alcaraban)
Cottontail rabbit	Goose
Fox	Blue tanager

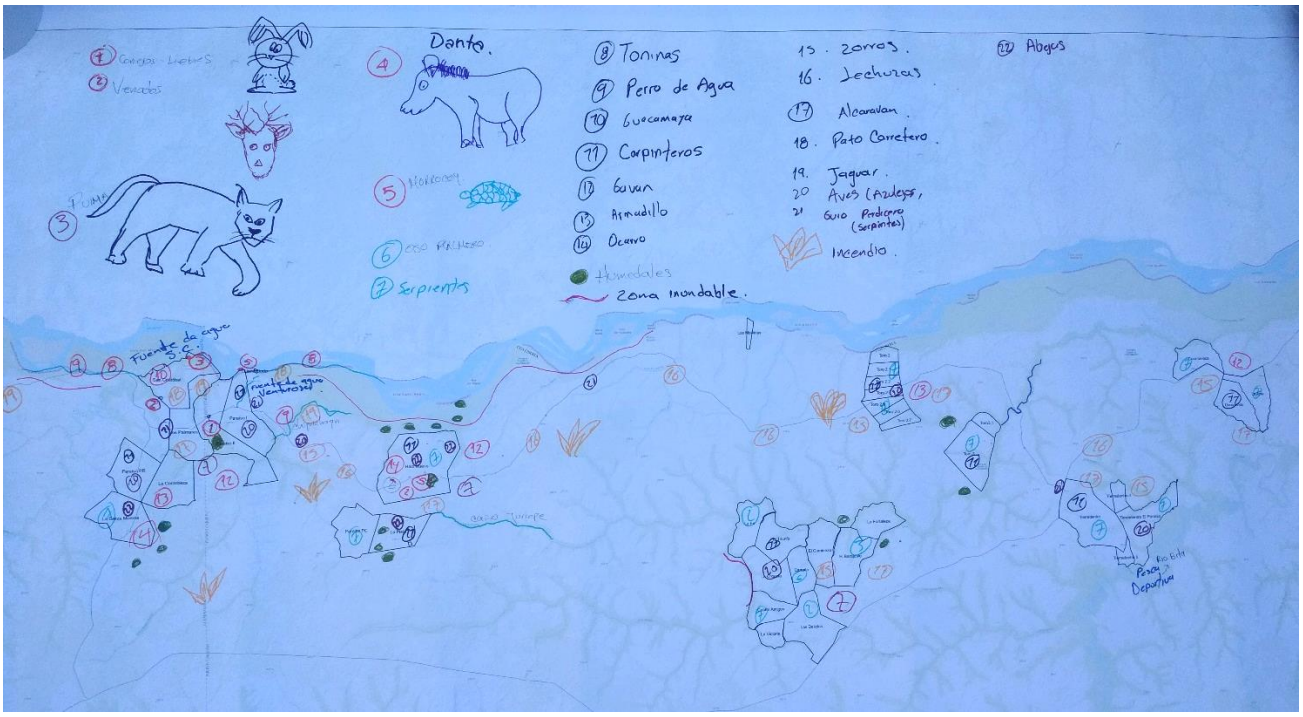


Figure 35: Example of Social Cartography generated during the fauna interviews with the community.

5.3.2 Biodiversity Monitoring Plan Dissemination (B4.3)

The Monitoring Plan and all documents and information about the results of the monitoring and verification of this project will be published in the platforms of VERRA as usual.

5.4 Optional Criterion: Exceptional Biodiversity Benefits

The project does not seek to be validated to the Gold Level for biodiversity change adaptation benefits.

5.4.1 Trigger Species Population Trends (GL3.3)

The project does not seek to be validated to the Gold Level for biodiversity change adaptation benefits.

6 ADDITIONAL PROJECT IMPLEMENTATION INFORMATION

There is no additional information related to the implementation of the Project.

7 ADDITONAL PROJECT IMPACT INFORMATION

There is no additional project impact information.

APPENDICES

Appendix 1: Bibliography

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