CONSERVATION PROJECT REDD+ SUR DEL META BOSQUES DE PAZ, SUSTENTO DE VIDA



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Project Location	Colombia, Meta department, Vista Hermosa, Puerto Lleras, Puerto Rico and Puerto Concordia municipalities
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Project Lifetime	18 January 2020 – 17 January 2050; 30-year lifetime
GHG Accounting Period	18 January 2020 – 17 January 2050; 30-year lifetime
History of CCB Status	Previous attempts at validation. Listing date: 01-March-2022 After validation's site visit, the project proponent decided to validate the Project, only by the scope of VCS Standards and no longer by CCB Standard A new listing process is started on: June 2026 for CCB component.
Gold Level Criteria	GL1 Climate Change Adaptation Benefits: Training and education for the improvement of individual, collective and organizational capacities of project partners. This line of action seeks to provide project partners with the knowledge, skills, and tools necessary to actively participate in the sustainable management of their territories and build long-term resilience to climate change. Land formalization: Recognizing that secure land tenure is foundational for climate adaptation, especially in rural Colombia, the project supports voluntary land formalization processes for partners Consolidate the territorial governance of the project partners and strengthen citizen awareness: Effective governance is central to adaptation. This line of action consolidates territorial governance mechanisms through the creation and operationalization of coordinating and supervisory committees, development of farm plans, and implementation of participatory monitoring systems. These measures facilitate adaptive management of forests and biodiversity, ensuring timely responses to climate threats such as wildfires, invasive species, or disease outbreaks. Sustainable productive projects: The most direct interface between climate adaptation and community welfare lies in diversifying and strengthening rural livelihoods. GL2. Exceptional Community Benefits: The project implements community engagement, capacity building in sustainable land use, forest monitoring, and community-defined productive and restoration activities supported through carbon benefit-sharing, including the provision of agricultural inputs, livestock management materials, and native tree seedlings. By fostering collective stewardship of natural resources and strengthening trust between communities and institutions, the project also contributes to peacebuilding and social cohesion in conflict-affected and vulnerable territories. Expected results include reduced deforestation, improved and diversified livelihoods, strengthened local governance, and increased community resilience. Together, these outcomes generate sustained social, climate, and environmental benefits — while also advancing peaceful coexistence,

	reducing land-related tensions, and building the foundations for long-term territorial peace. GL3. Exceptional Biodiversity Benefits The project seeks validation to the Gold Level for exceptional biodiversity benefits under CCB Standards v3.1. The project zone supports 53 species identified as High Conservation Value (HCV 1), including four species classified as Endangered (EN) on the IUCN Red List, 12 Vulnerable (VU) species, multiple restricted-range Colombian endemics, and a confirmed active Harpy Eagle breeding nest under continuous monitoring since 2021. The following sections demonstrate that the project meets all three Gold Level criteria: the site qualifies as a high biodiversity conservation priority area (GL3.1), the project's Theory of Change identifies clear causal pathways from conservation activities to positive population trends for designated trigger species (GL3.2, GL3.3), and the Biodiversity Monitoring Plan includes specific indicators to track these trends over the project lifetime (GL3.4).
Expected Verification Schedule	22-July-2026

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1 SUMMARY OF PROJECT BENEFITS

The Conservation Project REDD+ Sur del Meta Bosques de Paz, Sustento de Vida is located in the municipalities of Vista Hermosa, Puerto Rico, Puerto Concordia and Puerto Lleras in the department of Meta and is seeking for CCB label.

The project seeks to protect 40,637 hectares of natural forest from the advance of deforestation, which for the year 2017 reported an increase in the country of 23% in relation to the previous year, having the department of Meta as the third in national deforestation (IDEAM, 2018). The causes of deforestation are directly related to the conversion of forest areas into clean or weeded pastures for extensive cattle ranching (SINCHI, 2016). Considering the low productivity of this type of use, an increase in deforestation is expected, generating larger livestock and agricultural areas, which will allow the subsistence of the families settled there.

Through the implementation of strategic actions, such as improving the productivity and sustainability of livestock, cacao, coffee, and citrus, strengthening these production chains in the region, technical training and raising awareness of the role of conservation in the communities, youth, children, leaders, and women, a total of 3,768,645 tCO_2 will be reduced over a minimum of 30-year period, with an annual average of 121,569 tCO_2.

This will improve the living conditions of the families of the 985 members where the project is being developed, a peasant population, a large percentage of whom are victims of the country's historical armed conflict. It will also strengthen their organizations (unions and community organizations) through training and technical support. All of this will result in an increase in forest governance, bringing direct and indirect benefits to the inhabitants of the four municipalities.

In terms of biodiversity, the area is recognized as an habitat and corridor for species of high conservation interest, such as the jaguar, or species at high risk of extinction, such as the giant otter, as well as other species of wild flora and fauna listed as endangered. In this sense, reducing the loss of their habitats contributes to reducing the risk of extinction of these species. The development of community monitoring plans will not only make it possible to follow up on the status and presence, but also to increase the value of this resource in the community collective.

The project protects remnants of primary and secondary forest form the Amazonian biome and all its associated biodiversity. Hunting will not be allowed, and only sustainable fishing will be permitted. Because the forest inside the project is owned by peasants and farmers and because the main deforestation driver identified was the expansion of grasslands for livestock production, the project will not allow the extraction of wood for commercial purposes. Only those able to obtain harvesting permits for domestic purposes will be allowed.

Positive impacts on biodiversity outside the project areas are expected to be generated mainly due to the conservation of habitats for species with extensive home ranges or home ranches, such as medium and large felines, large terrestrial fauna species and aquatic mammals.

1.1 Unique Project Benefits

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
1) Decrease in the number of hectares deforested	3.2
2) Community empowerment for sustainable production systems	4.2
3) Recovery of habitats for endangered species	5.2

1.2 Standardized Benefit Metrics

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
GHG emission reductions or removals	Net estimated emission removals in the project area, measured against the without-project scenario	Not applicable	Not applicable
	Net estimated emission reductions in the project area, measured against the without-project scenario	3,768,645 tCO_2 over 30-year period	3.2
Forest[1] cover	For REDD[2] projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario	16,783	3.2
	For ARR[3] projects: Estimated number of hectares of forest cover increased in the project area measured against the without-project scenario	Not applicable	Not applicable
Improved land man	Number of hectares of existing production forest land in which IFM[4] practices are expected to	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	Estimated by the End of Project Lifetime	Section Reference
	occur as a result of project activities, measured against the without-project scenario		
	Number of hectares of non-forest land in which improved land management practices are expected to occur as a result of project activities, measured against the without-project scenario	Not applicable	Not applicable
Training	Total number of community members who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities	600	4.2.
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	300	4.2.
Employment	Total number of people expected to be employed in project activities,[5] expressed as number of full-time employees[6]	16	4.2.
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	7	4.2.
Livelihoods	Total number of people expected to have improved livelihoods[7] or income generated as a result of project activities	985	4.2.
	Number of women expected to have improved livelihoods or income generated as a result of project activities	*298*	4.2.
Health	Total number of people for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	Not applicable	

[5] Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.
[6] Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from the UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])
[7] Livelihoods are the capabilities, assets (including material and social resources) and activities required for a means of living (Krantz, Lasse, 2001. *The Sustainable Livelihood Approach to Poverty Reduction*. SIDA). Livelihood benefits may include benefits reported in the Employment metrics of this table.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	Not applicable	
Education	Total number of people for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	985	4.2.
	Number of women and girls for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	493	4.2.
Water	Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	Not applicable	
	Number of women who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	Not applicable	
Well-being	Total number of community members whose well-being[8] is expected to improve as a result of project activities	985	4.2.
	Number of women whose well-being is expected to improve as a result of project activities	493	4.2.

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

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation,[9] measured against the without-project scenario	40,637[10] ha	5.2.
	Expected number of globally Critically Endangered or Endangered species[11] benefiting from reduced threats as a result of project activities,[12] measured against the without-project	8 4 prioritized.	5.1.2. 5.4.1.

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

[10] total project area under active conservation agreements, monitoring, and wildlife protection measures, representing a significant improvement in biodiversity management against the without-project scenario of unmanaged forest with no conservation incentives

[11] Per IUCN's Red List of Threatened Species

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

2 GENERAL

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Project Proponent (G1.1)

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The Project Proponent previously registered in the VCS as ALLCOT GROUP underwent a corporate transition following the acquisition by the Karbon-X group of certain assets and climate project interests of Allcot AG pursuant to an Asset Purchase Agreement dated 14 May 2025. As part of such transaction, the rights and interests relating to the REDD+ Sur del Meta Project were transferred within the Karbon-X group structure. The transaction received approval from the Cantonal Court of Zug on 23 June 2025 within the context of the Allcot AG restructuring proceedings. Accordingly, the participation and involvement of ALLCOT GROUP in the Project has been replaced by the corresponding Karbon-X group entity.

Furthermore, section 1.5 of the registered PDD included 46 Community Action Boards (JAC) as other entities involved, all of which have been replaced by the Corporations mentioned above.

2.1.2 Project Objectives (G1.2)

The project aims to address the drivers of deforestation through integrated strategies that generate positive impacts on climate, community, and biodiversity.

Climate

The climate objective of the project is to reduce greenhouse gas emissions by avoiding unplanned deforestation and conserving 40,637 hectares of natural forest. Through the implementation of sustainable production systems, such as silvopastoral and agroforestry models, along with technical assistance, value addition to agricultural production, and the strengthening of commercial chains, the project expects to reduce a total of 3,768,645 tCO_2 over a 30-year period, with an annual average reduction of 121,569 tCO_2.

Community

The community objective is to improve the quality of life and resilience of local populations, particularly the 985 project partners, many of whom are victims of Colombia's historical armed conflict. By supporting food security through sustainable land use practices, providing training in project management and environmental stewardship, and reinforcing local organizations and governance structures, the project empowers communities to play a central role in conservation. Gender and generational inclusion are fundamental to building long-term local capacity and ownership of the conservation process.

Biodiversity

The biodiversity objective is to protect critical habitats for endangered and conservation-priority species such as the jaguar, harpy eagle, giant otter and tapir. By conserving both primary and secondary forest within the Amazonian biome and prohibiting hunting and commercial timber extraction, the project safeguards terrestrial and aquatic ecosystems. The implementation of community participatory biodiversity monitoring plans enhances local understanding and valuation of wildlife, while also contributing to broader ecological connectivity beyond project boundaries—especially for species with wide-ranging habitat needs.

2.1.3 Physical Parameters (G1.3)

The REDD+ Sur del Meta Project is located in the department of Meta, Colombia, in the municipalities of Vista Hermosa, Puerto Rico, Puerto Concordia and Puerto Lleras. The project area covers a total of **40,637 hectares** of native tropical forest within the Amazonian–Orinoquian transition zone, situated entirely within the Área de Manejo Especial de La Macarena (AMEM).

Location and geodetic coordinates

The project area is bounded by the following corner coordinates (Magna Colombia Bogotá / geographic decimal degrees):

Table 1. Geodetic coordinates — Project boundary corners

Point	East (X) Magna-Sirgas	North (Y) Magna-Sirgas	Longitude (°) Decimal	Latitude (°) Decimal
1	1,077,793.677	882,531.021	−73.377371	3.533636
2	1,149,733.632	770,055.353	−72.731263	2.516035
3	1,182,560.157	794,863.336	−72.435903	2.739954
4	1,004,500.324	839,764.893	−74.037020	3.147149

Complete geodetic coordinates and spatial files are provided in Section 1.11 and Section 3.3 of the registered and validated VCS Project Description (VCS Project ID 2084, v4.0).

Elevation

The project area ranges from approximately 100 to 900 metres above sea level (masl). The dominant elevation range is 200–300 masl, covering 78.0% of the project area (31,704 ha). A total of 92% of the project area falls within the 100–500 masl range, consistent with the lowland and foothill forest character of the Amazonian–Orinoquian transition zone. The remaining 8% extends into premontane elevations up to approximately 900 masl in the western portions of Vista Hermosa municipality, adjacent to the PNN Sierra de La Macarena.

Slope

Terrain is predominantly flat to gently undulating. Slopes of 0–3° cover 48.0% of the project area (19,489 ha), and slopes of 3–7° cover a further 35.5% (14,418 ha). A total of 90.8% of the project area has slopes below 12°, consistent with conditions that historically favour agricultural and livestock frontier expansion — the primary driver of deforestation in the project zone.

Climate

The project area is characterized by a humid warm climate (Caldas-Lang classification), with the following dominant conditions:

Mean annual precipitation: 2,500–3,000 mm, covering 97.4% of the project area (39,562 ha). The remaining 2.6% (1,075 ha) receives 3,000–4,000 mm annually, concentrated in the western foothill areas.

Mean annual temperature: above 24°C across 93.6% of the project area. The remaining 6.4% in the western piedmont zone has mean annual temperatures of 18–24°C.

Climate seasonality: a bimodal rainfall regime with two dry seasons (December–February and June–August) and two wet seasons, generating high interannual climate variability. Recent El Niño events (2023–2024) caused extensive forest fires across the Orinoquía, underlining the climate vulnerability of the project zone.

Forest types

Two forest life zones are present within the project area, as classified under the Holdridge system and IDEAM's national forest mapping:

Tropical humid forest (bosque húmedo tropical, bh-T): 39,598.5 ha, representing 97.4% of the project area. This is the dominant forest type, characteristic of the lowland Amazonian–Orinoquian transition.

Very humid premontane forest (bosque muy húmedo premontano, bmh-PM): 1,038.7 ha, representing 2.6% of the project area, located in the elevated western portions adjacent to the PNN Sierra de La Macarena.

Both forest types are consistent with those present across 100% of the reference region, confirming the landscape-level homogeneity required under the applied methodology.

Hydrography

The project area is drained by the Ariari–Güejar–Guayabero river system, a major tributary network of the Orinoco and Amazon basins. The Ariari River and its main tributaries (Güejar, Guapaya, and associated caños) traverse the project zone across all four municipalities, providing the primary hydrological corridors for both human livelihoods and aquatic biodiversity. Gallery forests lining these watercourses are classified as Endangered (EN) under the Colombia Red List of Ecosystems and constitute critical habitat for multiple HCV species.

2.1.4 Social Parameters (G1.3)

The project is implemented within the municipalities where demographic characteristics, population size and rural-urban distribution are presented (PD document, p. 106-109).

Land use and livelihood activities are dominated by extensive cattle ranching and agricultural frontier expansion, which are identified as the main drivers of deforestation in the region (PD document, p. 96-100; p. 117-118).

The project documentation describes the regional historical context, including expansion of the agricultural frontier, armed conflict impacts on land tenure, displacement and land concentration, and previous dependence on illicit crop economies (PD document, p. 106-117).

Socio-cultural characteristics such as age distribution, gender participation, education levels, poverty conditions, and cultural practices are presented in the socioeconomic characterization of producers and communities.

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

The required information can be found in the registered VCS PD document as follows:

- Section 1.11 – Project Location: provides the project location, general map and geodetic coordinates.

- Section 3.3 – Project Boundaries: defines and maps the Project Area, the Reference Region (project zone) and the Leakage Belt, and includes the corresponding spatial files and the criteria for the inclusion of new areas in the grouped project. Areas were other stakeholders will be impacted (Section 4.3).

2.1.6 Stakeholder Identification (G1.5)

The stakeholder identification and analysis process is described in Section 2.5, AFOLU-Specific Safeguards – Stakeholder Identification (pages 59–62) of the VCS Project.

The partner linking process of the first stage of the grouped project began in December 2018 and runs between 2019 and 2020, closing on October 31, 2020. Over time, information was delivered to the adherent partners regarding the contract, project, climate change, market of carbon, distribution of benefits, sustainable actions among other topics.

Appendix 1 contains a stakeholder Description Table. Besides, an internal procedure (SOP) for the identification and commitment of the partners was carried out to establish a process to identify, involve and commit key partners in the REDD+ Sur del Meta project in order to guarantee their participation, their continued support for forest conservation activities, and the implementation of the Theory of the project guaranteeing ownership of the carbon credits (SOP ID 2084_01).

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

The Stakeholder Description Table of the Appendix 1 is used to complete this section.

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

The theory of change for this project is described in Section 1.10 of the registered VCS PD document (pages 26–31).

2.1.9 Climate, Biodiversity and Community Benefits Assessment Period (G1.9)

This duration complies with the VCS Program requirements, as established in the VCS Standard, which states that for REDD projects, the initial crediting period shall be a minimum of 20 years and up to a maximum of 100 years, and may be renewed provided that the total project crediting period does not exceed 100 years. Therefore, the chosen 30-year crediting period falls within the allowable range defined by the VCS Program.

The CCB benefits assessment period is the same as the monitoring period indicated above. Changes in climate change adaptive capacity and resilience, community well-being, and biodiversity resulting from project activities are monitored over the same time period.

2.1.10 Differences in Assessment Periods (G1.9)

There are no differences between the assessment periods. The accounting of GHG emissions reductions, as well as the assessment of climate adaptive capacity and resilience, community, and biodiversity benefits, are conducted over the same monitoring and reporting period.

2.1.11 Implementation Schedule (G1.9)

Table 1. Project milestones

Date/Period	Milestone	Relevance
2017–2018	Initial stakeholder engagement and project identification	Introductory consultations, REDD+ awareness activities, and identification of participating communities and organizations.
2018–2020	Signature of participation agreements	Formalization of participation agreements with landholders and community organizations.
January 2020	Start of REDD+ implementation activities	Initiation of field implementation activities focused on awareness, governance strengthening, and deforestation reduction actions.
30 January 2020	VCS Listing	Project listed under the VCS Program.
14 February 2020	RENARE registration	Registration under Colombia's national emissions reduction registry.

2020–2022	Capacity building and governance strengthening	Training, participatory meetings, and strengthening of local governance and community participation structures.
2021–2023	Participatory monitoring and follow-up	Monitoring visits and participatory follow-up activities to support adaptive management and safeguard implementation.
16 July 2024	VCS Validation Registration	Final oficial registration under the VCS Program.
2024–2025	Community engagement and communication activities	Dissemination of project progress, awareness raising, audiovisual documentation, and stakeholder engagement activities.
2025–2026	Consolidation of monitoring and governance systems	Strengthening of biodiversity/carbon monitoring and community governance mechanisms.

Source: Karbon-X

2.1.12 Risks to the Project (G1.10)

The risks identified to the benefits of the project and the general measures taken to mitigate these risks are presented in Annex 2: Project Risks Table.

2.1.13 Benefit Permanence (G1.11)

Karbon-X, within its follow-up and accompaniment scheme, seeks to create and leave the capacities installed in the coordinating committees in such a way that periodic planning and formulation of annual operational plans are carried out to identify priorities by municipality. Part of the process is the implementation of the sustainable actions identified with the partners.

The focus of the investments is on sustainable production practices that seek to enhance climate, community and biodiversity benefits, which will be maintained over time and beyond the life of the project. The production systems will be focused on increasing income or reducing costs generated by the partner, valued through the use of market prices, taking into account the economic benefits associated with the adoption of new technologies and good social, environmental and agricultural practices. In parallel to this, training, support for formalization and land tenure, governance, technical assistance and community monitoring actions will be implemented, which are expected to have a great impact on the community and thus minimize the risk for future generations and ensure generational replacement.

In addition, the monitoring of indicators associated with the project's Theory of Change allows for continuous improvement and adaptive management of project activities, contributing to the long-term permanence of climate, community and biodiversity benefits. Further information is provided in Section 4.4.1 Community Monitoring Plan.

The monitoring and community knowledge program also enables the assessment of changes over time related to climate, community and biodiversity outcomes, supporting informed decision-making and resource management by the municipal corporations. Business plans are intended to demonstrate the profitability of sustainable actions, facilitate access to competitive funding opportunities and strengthen long-term management capacities among committees and project partners.

2.1.14 Financial Sustainability (G1.12)

The costs of project activities will be fully financed by the sale of the carbon credits. This is based on thorough financial analysis. Karbon-X financed all the activities pre-issuance of the carbon credits. After that, the project proponent is engaging with market buyers to identify suitable financiers for the project intending to purchase the credits who would otherwise not invest in a project of this type.

Project costs include field monitoring and verification activities, community engagement and capacity building, technical assistance for the implementation of Planes Finca and sustainable productive systems, administrative coordination across four municipalities, and the costs associated with periodic VCS/CCB audits and re-verifications. These costs are covered exclusively by carbon credit revenues, with no reliance on grant financing or public subsidies, which strengthens the project's financial independence over the long term.

2.1.15 Eligibility Criteria for Grouped Projects (G1.14)

The eligibility criteria for the inclusion of new project areas remains unchanged with respect to those established in the Section 1.3 of the registered PD document (climate/carbon requirements). The same criteria are applied for project expansion and are consistent with the provisions of the CCB Standards, in particular G1.14.

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

Please refer to Section 1.3, Project Eligibility – Eligibility Criteria- Scalability Limits for the Grouped Projects (page 6) of the VCS Project Description.

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

Please refer to Section 1.3, Project Eligibility – Eligibility Criteria- Risk Mitigation Approach for Grouped Projects (page 7) of the VCS Project Description.

2.2 Without-project Land Use Scenario and Additionality

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

For alternative land-use scenarios that could have occurred within the proposed project boundaries, please refer to Section 3.5, Additionality, Step 1 – Identification of alternative land-use scenarios to the proposed VCS AFOLU project activity (page 148) of the VCS Project Description.

2.2.2 Most-Likely Scenario Justification (G2.1)

For most-likely scenario justification, please refer to Section 3.5, Additionality, Substep 1c. Selection of the baseline scenario (page 149-150) of the VCS Project.

2.2.3 Additionality (G2.2)

Please refer to Section 3.5, Additionality (page 146-160) of the VCS Project Description to assess the climate additionality.

The community and biodiversity benefits generated by the Sur del Meta REDD+ project would not have occurred in the absence of the project. This conclusion is grounded in the same analytical framework applied for the climate component (VT0001, v3.0), extended to demonstrate that the without-project scenario would have perpetuated conditions of rural poverty, forest loss, and biodiversity decline across the project area.

In the absence of the project, the most probable land use trajectory — identified as Scenario 1 in the baseline analysis — is the continued expansion of the agricultural and livestock frontier through slash-and-burn practices, illegal logging, and gradual forest conversion. This scenario is documented by IDEAM satellite data (2010–2018) showing a consistent decrease in forest cover corresponding to increases in pasture, permanent crops, and heterogeneous agricultural areas across the municipalities of Puerto Concordia, Puerto Rico, Vista Hermosa, and Puerto Lleras.

Colombia has a legal framework governing forest use, including Decree 1791 of 1996 (forest harvesting regime), the National Natural Resources Code (Law 2 of 1959), and the National Organic Law of Land Planning (Law 1454 of 2011). These instruments require prior authorization from Regional Autonomous Corporations (CAR) for forest harvesting and land use change.

However, the PDD document clearly that these laws are not being enforced in practice in the project area.

Colombia's own Nationally Determined Contribution (NDC) recognizes post-conflict dynamics as a national circumstance that is expected to increase deforestation in former conflict areas — precisely the geography of the Sur del Meta project.

According to legal context indicated above, project activities are not required by law. Where laws exist that could theoretically prevent deforestation, there is documented and systemic non-enforcement. Community and biodiversity benefits generated by the project therefore qualify as additional, as they would not have been guaranteed by the existing regulatory framework.

From a financial approach, the investment (simple cost) analysis conducted under VT0001 Sub-step 2b (Option I) demonstrates that productive activities such as sustainable livestock intensification, agroforestry, or conservation-compatible land management are financially attractive in theory but practically inaccessible to the majority of smallholders in the project area due to significant financial and capacity barriers.

Given these barriers, the most rational and accessible economic decision for smallholders — particularly small landowners — is to clear-cut new forest areas. Newly cleared land has better initial soil conditions, requires no credit, and demands only seed and family labour. This is the without-project default behaviour the project is designed to interrupt.

The project provides additionality by offering an alternative: it helps landowners overcome these financial and capacity barriers, enabling productivity improvements on existing agricultural land without expanding into forests. This is the mechanism by which community and biodiversity benefits are generated — and why they would not occur without the project.

In summary:

Climate benefits are established through the VT0001 investment and barrier analyses described above, as validated under the VCS component.

Community Benefits: The community benefits — including improved livelihoods, reduced vulnerability to deforestation-driven land conflict, access to technical assistance and market linkages, and formal recognition of conservation contributions — are additional because:

- No equivalent program or payment for ecosystem services (PES) scheme exists in the project area accessible to smallholders without clear legal land tenure.
- Government programs addressing deforestation nationally do not have discrete area allocation or verifiable monitoring linking investments to outcomes at the farm level and are not yet operational in the project's reference region.
- The project is a pioneering initiative in the department of Meta and its constituent municipalities; no comparable REDD+ project with equivalent community benefit components has previously operated in the area (confirmed by common practice analysis under Step 4 of VT0001).

Biodiversity Benefits: Forest conservation and the prevention of riparian forest loss generate biodiversity co-benefits — habitat protection, connectivity maintenance, protection of endemic and migratory species, that would not occur under the without-project scenario of progressive deforestation. These benefits are additional because:

- The without-project trajectory leads to fragmentation and loss of the two forest life zones present in the project area (tropical humid forest — bh-T — and very humid premontane forest — bmh-PM), which are irreversible at the project timescale.
- No biodiversity conservation incentive mechanism is available to project landowners absent the project.
- The progressive elimination of riparian forests — documented as a likely outcome of continued intensive grazing — would destroy hydrological connectivity and watershed services upon which both biodiversity and local communities depend.

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

No offsets, other than carbon emission reductions, are expected to be obtained by this project.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

The REDD+ Sur del Meta Project has established a Communication Manual that sets out the principles, channels, and practices governing all information-sharing, consultation, and dialogue processes with communities and other stakeholders throughout the project lifetime. This manual serves as the project's formal communication policy and is itself a publicly available document. The provisions described below are grounded in and consistent with the Communication Manual.

The REDD+ Sur del Meta Project ensures that full project documentation, including the project description, monitoring reports, validation and verification statements, and other relevant technical materials, is accessible to communities, project partners, and other interested stakeholders throughout the project lifetime.

Project documentation is made available through a digital repository, where technical and operational documents are organized and kept up to date. This repository serves as the primary reference point for any person seeking detailed information about the project's design, implementation, and results. Validation and verification reports produced by the independent auditing body are also published in this repository as they become available; given that these documents are originally produced in English, the project commits to translating them into Spanish and publishing both versions to facilitate access by local communities.

In addition to passive availability, the project actively disseminates information to communities through multiple channels. Key project information and updates are shared through monthly meetings with project partners, the community bulletin Voces del Bosque, WhatsApp groups, social media (Facebook and Instagram), and in-person community spaces. These channels ensure that information reaches communities regardless of their connectivity conditions, and that it is explained in plain language rather than remaining in technical formats.

As monitoring activities are carried out — including fauna, flora, and carbon monitoring — communities are informed in advance and notified of results through the same channels once they are available. Summaries in plain language are prepared and distributed to ensure that monitoring results are understood by all community members, not only by those with technical backgrounds.

Communication with communities is structured through the project's governance bodies. ALLCOT Sur del Meta LLC, as the implementing entity, communicates directly with the presidents of the four municipal corporations, who in turn channel information to the village-level committees (comités veredales) operating across the four municipalities. This two-way structure ensures that information flows both from the project to communities and from communities back to the project team.

Any person may also request specific information or clarifications directly through the available communication channels, including email and the project's grievance and feedback mechanism (PQRS). Requests are managed by the project team, which is responsible for providing timely and comprehensible responses.

2.3.2 Dissemination of Summary Project Documents (G3.1)

The REDD+ Sur del Meta Project actively disseminates summary project information to communities through a set of complementary channels defined in the project's Communication Manual. This manual establishes the principles, tools, and responsibilities that guide all dissemination processes throughout the project lifetime, ensuring that key content reaches all partners regardless of their literacy level, connectivity conditions, or technical background.

The primary instrument for dissemination is the monthly community bulletin Voces del Bosque, produced by Karbon-X and distributed to project partners. The bulletin presents project updates, progress, agreements, and upcoming activities in plain language, making technical content accessible to a broad community audience. It also serves as a record of key milestones and decisions, allowing community members who did not attend meetings to stay informed.

Monthly meetings with project partners provide the main space for direct dissemination and explanation of project information. In these sessions, the project team presents updates, explains relevant developments, and opens the floor for questions and discussion. These meetings are complemented by WhatsApp groups, through which convening notices, meeting summaries, key messages, and explanatory materials are shared in accessible formats on an ongoing basis.

For community members with limited digital access, in-person community spaces and field visits provide direct channels for information sharing and explanation, with particular relevance in areas of limited connectivity across the four municipalities.

Regarding monitoring results, communities will be informed in advance whenever monitoring activities — including fauna, flora, and carbon assessments — are scheduled to take place. This prior notice is shared through monthly meetings, the Voces del Bosque bulletin, and WhatsApp groups. Once results are available, summaries in plain language will be prepared and disseminated through the same channels, ensuring that communities are informed of both the process and the findings. The goal is that monitoring results are not only technically documented but understood and accessible to all community members.

2.3.3 Informational Meetings with Stakeholders (G3.1)

Project has actively conducted informational meetings with communities and local stakeholders to ensure transparency, inclusivity, and engagement throughout the project lifecycle. These meetings serve as platforms for sharing project updates, monitoring results, benefits, and addressing community concerns.

1. Frequency and format of informational meetings: Regular meetings are held in key project areas to update communities and stakeholders on project progress, monitoring results, and future activities. Additional meetings are conducted on an as-needed basis to address specific concerns or provide updates on major project milestones. Monthly virtual meetings are also organized with the communities to give the opportunities to have access to the most recent updates of the project.

2. Types of informational meetings

    a. Community consultation meetings: Held at village/community centers to discuss project implementation, progress, and benefits.

b. Stakeholder coordination meetings: Conducted with government agencies and local organizations to align efforts and share updates.

c. Capacity-building workshops: Designed to educate communities on carbon project methodologies, biodiversity, financial education, monitoring processes, and benefit-sharing mechanisms.

3. Publicity and awareness of meetings: To maximize participation and ensure that all stakeholders are informed, the project employs various publicity methods, including whasap groups, local announcements, word-of-mouth mobilization and dedicated field officers personally inform communities and facilitate attendance.

4. Ensuring inclusivity and active participation: Meetings are scheduled at times convenient for local communities, including weekends to accommodate work schedules. Community members are encouraged to actively participate through Q&A sessions, discussion panels, and group activities. Through these structured and well-publicized meetings, the Project ensures ongoing engagement, transparency, and inclusivity, fostering strong stakeholder relationships and community trust. On the other hand, posters, flyers and documentation of the project was and will be prepared and distributed into the community to facilitate the awareness and knowledge. Considering that many partners are in non-interconnected areas, audio, text messages and printed flipchart posters are and will be taken to areas without electricity to facilitate the communication.

   It is important to emphasize that the participatory process is not imposed. What has been developed is an empowerment process that involves not only women, but also young people and victims of the armed conflict. The aim is for their participation to arise from their own willingness and capacity to contribute, rather than from the mere guarantee of a quota in the pursuit of equality.

Please refer to Section 2.2, Local Stakeholder Consultation, for further Informational Meetings with Stakeholders (pages 56–58) of the VCS Project Description. Additionally, the folder Annex 2.3.3. Informational Meetings with Stakeholders contains validated information.

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

The REDD+ Sur del Meta Project has ensured that communities received relevant and adequate information about the potential costs, risks, and benefits of participating in the project through a participatory and transparent process, prior to any decision they were asked to make regarding their participation.

Information provided and materials developed

Information on potential benefits and risks was presented at briefing meetings held across the four municipalities, supported by materials specifically developed to facilitate understanding among community audiences. These included a project summary document, presentations, posters, and a primer distributed to all partners. Both the summary document and the primer address the project's benefits and risks and describe the environmental and social safeguards applicable to REDD+ projects in Colombia.

An infographic on benefit sharing was produced and presented at workshops with partner organizations and subsequently distributed through the project's social media channels. This material explained in visual and accessible terms how economic benefits are distributed among partners in proportion to the surface area of land contributed to the project. Supporting documentation for these actions is included in Annex 2.3.4 Community Costs, Risks and Benefits.

To address questions that arose throughout the process, the project developed a frequently asked questions document that was enriched over time as new concerns emerged from the communities. This adaptive approach ensured that information remained responsive to the actual questions and uncertainties of community members at each stage.

Forward-looking communication framework

With the recent adoption of the project's Communication Manual, the processes through which information on costs, risks, and benefits is shared with communities are now governed by a formal and updated communication policy. The Manual establishes the principles, channels, and responsibilities that structure ongoing dialogue between the project and its partners, ensuring that any updates, changes, or new developments relevant to community decision-making are communicated in a timely, accessible, and structured manner. This includes the use of monthly meetings, the Voces del Bosque bulletin, WhatsApp groups, and in-person community spaces as the primary channels for ongoing information sharing and clarification.

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

The REDD+ Sur del Meta Project informs communities and other stakeholders about the CCB validation and verification process through a combination of in-person and digital measures, consistent with the communication approach established in the project's Communication Manual.

Measures taken

During the initial validation phase, the project carried out a direct outreach campaign to ensure that all partners and community representatives were informed about the nature and purpose of the validation and verification process. This included in-person municipal meetings held on August 12, 13, and 14, 2021, in which the project team presented the status of the project, the results of the forest inventory, and an explanation of the validation and verification process. Representatives from the Juntas de Acción Comunal (JAC) and local associations were invited to these sessions, with the explicit commitment to replicate the information among their affiliated partners. A follow-up virtual meeting was held on August 29, 2021, with Agrocavis partners, focused specifically on resolving doubts about the validation and verification process. Supporting documentation for the actions taken during the initial validation phase is included in Annex 2.3.5.

Going forward, communities and partners will be informed of upcoming CCB validation and verification processes through the channels established in the Communication Manual. Notifications will be issued at least 30 days in advance of any auditor site visit, through monthly meetings, the Voces del Bosque bulletin, and WhatsApp groups. The project's governance structure — through the four municipal corporations and their affiliated village-level committees — ensures that information reaches all partners across the four municipalities.

Communication methods used

During the initial phase, a dedicated brochure explaining the validation and verification process was distributed via WhatsApp to all project partners. To maximize reach, a personal phone call was made to each landowner participating in the project; in cases where calls were not answered, a voice message was left. This combination of written and verbal outreach ensured that no partner was left uninformed.

For ongoing and future verification cycles, the project will continue to use its full multichannel communication system — monthly meetings, Voces del Bosque bulletin, WhatsApp groups, social media, and in-person community spaces — to keep stakeholders informed of the process, its timeline, and its results.

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

The REDD+ Sur del Meta Project ensures that communities and other stakeholders are informed of auditor site visits in a timely manner, and that the independence of the auditor in its engagement with communities is fully guaranteed. The procedures described below are established in the project's Communication Manual, which serves as the formal policy governing communication processes throughout the project lifetime.

Advance notification of site visits

Communities and project partners will be informed of upcoming auditor site visits with at least 30 days of anticipation. Notification will be issued through the project's established communication channels — monthly partner meetings, the Voces del Bosque community bulletin, and WhatsApp groups — ensuring broad and timely reach across the four municipalities of Vista Hermosa, Puerto Rico, Puerto Lleras, and Puerto Concordia. The notification will include information on the estimated date of the visit and its purpose.

Direct and independent communication with the auditor

The auditing process guarantees the full independence of the auditing body in its engagement with communities and stakeholders. The auditor has unrestricted freedom to request interviews or meetings with any person in the territory, without intermediation by the project team. To facilitate this, the project will provide the auditor with a list of contacts covering communities and relevant stakeholders across all four municipalities, from which the auditor may independently determine who to engage based on the objectives of the review. This communication may take place in person during field visits or through any other means the auditor considers appropriate.

2.3.7 Stakeholder Consultations (G3.4)

Please refer to Section 2.2, Local Stakeholder Consultation, for information on the local stakeholder consultation process (pages 56–58) of the VCS Project Description.

2.3.8 Continued Consultation and Adaptive Management (G3.4)

The REDD+ Sur del Meta Project has established a structured plan for ongoing consultation with communities and other stakeholders throughout the project lifetime, grounded in the governance framework of the four municipal corporations and operationalized through the communication channels defined in the project's Communication Manual.

Consultation plan

Ongoing communication and consultation between the project and communities takes place through two complementary and permanent spaces. The first are the monthly meetings with project partners, which constitute the primary recurring forum for information sharing, dialogue, and collection of community input. These meetings bring together partners and community representatives across the four municipalities, providing a regular and predictable space for communities to raise concerns, ask questions, and put forward proposals related to project implementation.

The second are the assemblies of the four municipal corporations — the formal governance bodies representing communities in each municipality. These assemblies, convened by each corporation's Board of Directors, are the space where community input is formally discussed and where decisions with implications for project management are deliberated. The Board of Directors of each corporation, elected by the general assembly and renewed every two years, holds the authority to represent community positions and engage formally with the project on matters requiring management adjustments.

In addition to these structured spaces, the project has two Social Workers permanently based in the territory, employed by the implementing entity. These professionals play a key role in the day-to-day articulation between the project team and the community partners, as well as with the boards of each municipal corporation. They coordinate project activities carried out in the field and provide continuous on-the-ground accompaniment, strengthening communication, participation, and community monitoring processes. Their permanent presence in the territory ensures that consultation is not limited to scheduled meetings but is embedded in the ongoing relationship between the project and the communities.

Communities may also raise issues at any time through the project's full communication system — WhatsApp groups, the Voces del Bosque bulletin, email, in-person community spaces, and the PQRS grievance mechanism — ensuring that consultation channels remain open and accessible on a continuous basis.

Adaptive management process

When community input raises issues that require a management adjustment — whether related to project activities, implementation processes, benefit distribution, or other operational matters — the input is documented and elevated to ALLCOT Sur del Meta LLC for joint evaluation with the relevant corporation. This joint review process assesses the nature of the concern, its implications for project implementation, and the feasibility of the proposed adjustment in light of the project's technical and contractual commitments.

Where adjustments are determined to be appropriate, they are incorporated into project management and communicated back to communities through the established channels, with a clear explanation of what was changed and why. Where adjustments are not adopted, the reasons are explained to the community in a transparent manner. This feedback loop, from community input to internal evaluation to communicated response, is fundamental to ensuring that consultation is meaningful and not merely procedural.

This consultation and adaptive management structure will be maintained throughout the entire project lifetime and will be reviewed periodically in light of community feedback and project learnings, in accordance with the adaptive approach established in the Communication Manual.

2.3.9 Stakeholder Consultation Channels (G3.5)

To maximize community reach and advance territorial articulation, the project worked closely with the presidents of Juntas de Acción Comunal (JAC) and representatives of eight productive associations and one association of community action boards. These organizations operate through first and second-level organizational structures that enable representation at the village level — the primary unit of family organization in the territory.

In all municipalities, the direct participation of JAC presidents was sought. In cases where presidents chose not to participate, community members were linked to the project through a productive association of their choosing, ensuring that partners retained full autonomy in selecting their representative organization.

This structure resulted in three complementary levels of consultation. The first involved leaders of second-level organizations such as productive associations. The second engaged first-level organizations, principally the JACs. The third level supported the free, prior, and informed consent of each individual landowner or land holder, who received direct and comprehensive information prior to signing a forest conservation agreement within the framework of the contracts established between the organizations and the project.

Second-level organizations were consulted on a continuous basis and participated in informational meetings, training sessions for local-level socialization, and workshops to analyze drivers and agents of deforestation and to identify and prioritize sustainable activities. The first three associations in Puerto Rico and Vista Hermosa participated in informational meetings and concerted actions during 2019, 2020, and 2021. The five organizations in Puerto Concordia and Puerto Lleras participated in socialization sessions conducted by local teams in May and June 2020, and by the Project Proponent technical team in November 2020 and February 2021 to prioritize sustainable actions.

Following the onset of the COVID-19 pandemic, the project adapted its consultation approach by holding weekly virtual sessions with the organizations responsible for community socialization and partner outreach, as well as meetings with the mayors and municipal councils of Puerto Concordia and Puerto Rico.

Further detail on stakeholder consultation channels is available in the registered and validated VCS Project Description.

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

The REDD+ Sur del Meta Project has designed its governance and implementation structure to enable the effective and meaningful participation of all community members in project decision-making, with particular attention to inclusion and cultural appropriateness.

Participation through governance structures

During the earlier phases of the project, community participation in planning and decision-making was channeled through municipal coordinating tables (mesas coordinadoras municipales), which served as the primary operational spaces for collective discussion, prioritization of activities, and coordination between the project and community organizations. These tables brought together representatives of productive

associations, Juntas de Acción Comunal, and other local actors, and played a key role in building the participatory foundations of the project.

As the project matured, this governance model evolved toward a more institutionalized structure. The four municipal corporations, formally constituted since 2025 and registered under Colombian law, now serve as the governance bodies through which communities participate in project decision-making. These corporations consolidate the organizational experience accumulated through the earlier coordinating tables and provide a stronger, more permanent framework for community representation and participation. Representatives of all village-level committees (comités veredales) operating within each municipality hold positions within the corresponding corporation, ensuring that decision-making reflects the priorities and perspectives of the broader partner community.

This structure has been progressively built on a foundation of trust, through the joint definition of objectives and goals, and the recognition of communities' right to collective self-determination. Partners have been involved not only as recipients of information but as active participants in shaping the direction of the project, including through consultations on sustainable actions and priorities in their territories.

Culture- and gender-sensitive implementation

The project recognizes the importance of ensuring that participation is accessible and meaningful for all community members, including those who may face barriers to engagement in traditional organizational spaces. Meeting formats and communication approaches are adapted to the social and cultural dynamics of each territory, consistent with the principles established in the project's Communication Manual.

With regard to gender, the project acknowledges that women are currently underrepresented among project partners, with less than 31% of partners being women — a reflection of the historically male-dominated land tenure and organizational structures in the region. The project is committed to progressively addressing this gap by actively promoting the participation of women in meetings, governance spaces, and decision-making instances. Going forward, the project will develop specific measures to strengthen women's participation and empowerment within the governance structures of the corporations and village-level committees. The participation of older adults and other groups is similarly encouraged across all project spaces.

2.3.11 Anti-Discrimination Assurance (G3.7)

The REDD+ Sur del Meta Project ensures that all entities involved in its design and implementation are committed to the prevention of discrimination and sexual harassment through a set of interrelated corporate policies that apply to all employees, contractors, consultants, and partners acting on behalf of the project.

Corporate policy framework

At the organizational level, Karbon-X has established a formal framework of policies that collectively address non-discrimination. The Corporate Code of Conduct applies to all officers, employees, and directors of Karbon-X and its subsidiaries, including ALLCOT Sur del Meta LLC as the implementing entity. The Code establishes binding obligations of integrity and honesty, explicitly prohibits any form of improper conduct, and includes a formal non-retaliation policy that protects any person who raises a concern or reports a violation. Violations of the Code are subject to disciplinary action, up to and including termination of employment.

The Environmental and Social Policy of Karbon-X reinforces these commitments by explicitly requiring fair labor practices, safe working conditions, and non-discrimination across all operations and the company's value chain. The Policy applies to all activities and geographies in which Karbon-X operates, and commits the company to respecting internationally recognized human rights and promoting equitable participation of all stakeholders. The ESG Coordinator and the Human Resources department hold shared responsibility for implementing these commitments, including equality, non-discrimination, and internal grievance mechanisms.

Gender-specific measures

Karbon-X has developed a Gender Guidelines document that establishes the company's specific commitments on gender equality and non-discrimination across its operations and projects. Key provisions directly relevant to this criterion include a commitment to provide a safe, inclusive, and respectful working environment free from harassment, discrimination, or bias; to apply gender-sensitive approaches to stakeholder engagement; to organize consultations at times and locations accessible to women; and to operate a gender-sensitive grievance mechanism that is accessible and safe for women. The Guidelines are overseen by a Gender and Inclusion Committee composed of the Global HR Officer, ESG Coordinator, and social and project experts, and are implemented through a structured action plan with defined responsibilities and timelines.

With respect to the Sur del Meta project specifically, the current internal project team includes both women and men, with no gender-based gaps identified in hiring, compensation, or contractual conditions. At the community level, the project actively promotes a minimum of 40% participation of women in project activities, while respecting community autonomy in the selection of participants. The project acknowledges that women are currently underrepresented among project partners — a reflection of historically male-dominated land tenure and organizational structures in the region — and is committed to progressively addressing this gap through its governance structures and community engagement processes.

Supports are available in folder Annex 2.3.11 Antidiscriminatory assurance.

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

A Feedback and Grievance Redress Mechanism (FGRM) was established for the REDD+ Sur del Meta Project at the time of its initial validation, as documented in Section 2.5, AFOLU-Specific Safeguards – Feedback and grievance redress procedure (pages 59–63) of the VCS Project Description.

This mechanism was subsequently reviewed and updated in the context of Karbon-X joining the project as its implementing entity and as result of the implementation of ESG policies in the company. The updated procedure — titled Procedimiento de Recepción y Atención de Peticiones, Quejas, Reclamos y Sugerencias (PQRS), Version 02-2026 is described below.

Process for receiving, hearing, responding to, and resolving grievances

The PQRS mechanism establishes multiple accessible channels for receiving grievances, including WhatsApp/phone, email (infosurdelmeta@karbon-x.com), in-person registration during community meetings, and direct contact with the social team in the field. Upon receipt, each case is assigned a unique tracking number and an acknowledgment of receipt is issued to the complainant, informing them of the registration number, case type, follow-up channel, and estimated response times.

The mechanism incorporates traditional and community-based conflict resolution approaches by allowing oral submissions, providing social team accompaniment for community members who face literacy or connectivity barriers, and using community assemblies and Municipal Coordinating Committees as legitimate spaces for raising and managing grievances. Responses are delivered through the channel most suitable to the complainant, and confidentiality and non-retaliation are guaranteed throughout the process.

Three-stage structure with defined time limits

The procedure is structured around three escalating stages, each with defined timeframes:

- Stage 1 – Resolution attempt (internal): Upon receipt and registration, the social team analyzes and assigns the case, determining its nature, scope, and priority level, and assigns it to the corresponding area or responsible party. Resolution is pursued through clarification of information, corrective actions, adjustments to project processes or activities, and mediation where needed. Response timeframes are established as follows: petitions and suggestions are addressed within a maximum of 15 business days, while complaints and claims are managed within a maximum of 30 business days. Cases involving serious risks or harm are prioritized for immediate attention, regardless of the established timeframes.

- Stage 2 – Mediation (appeal/second review): If the complainant is not satisfied with the response received, they may request a review of the case. This triggers a second internal review involving additional project instances and validation of the decision taken, strengthening the transparency and legitimacy of the outcome.

- Stage 3 – Administrative tribunal or courts: Should the complainant persist in their petition, complaint, claim, or suggestion after exhausting the internal stages, the matter is referred to the Administrative Tribunal or administrative judge with jurisdiction in the location where the situation was filed. In accordance with Colombia's Law 1755 of 2015, the tribunal or judge will decide in a single instance whether to deny or accept — fully or partially — the request submitted. Karbon-X, or any of its subsidiaries, is responsible for submitting the corresponding documentation to the tribunal or administrative judge, who must issue a decision within ten (10) business days.

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

The PQRS mechanism is publicized through multiple channels adapted to the territorial and sociocultural context of the project area. At the community level, the mechanism is disseminated during community meetings, assemblies, and participatory spaces held across the four municipalities of Vista Hermosa, Puerto Rico, Puerto Lleras, and Puerto Concordia, where the social team directly informs participants about their rights and the available channels. Additionally, project information (including the grievance redress procedure) is publicly accessible through the project's dedicated public repository.

To ensure accessibility regardless of connectivity, geographic location, or literacy level, the mechanism operates through four complementary channels:

- WhatsApp and phone line: A dedicated telephone channel enables reception of text messages, voice notes, and calls, prioritizing accessibility in rural areas where mobile applications are more commonly used than email.

- Email: The official address infosurdelmeta@karbon-x.com is available for formal submissions, particularly where documentation or detailed descriptions need to be attached.

- Registration at community meetings and spaces: Grievances may be submitted verbally during community assemblies or participatory events, with the social team responsible for formal registration of the case.

- Direct contact with the social team in the field: Community members may approach the project's social team directly in territory, who will provide support in formulating, registering, and following up on the PQRS.

In all cases, where a person is unable to write or faces difficulties expressing their request through formal channels, the project team ensures that the case is properly documented on their behalf, eliminating literacy and language barriers to access.

Documentation and public availability of grievances and responses

Each grievance received is assigned a unique registration number and documented in the official PQRS Registration Form, which captures the complainant's details (with anonymity options available), the type and description of the request, supporting evidence, priority level, and preferred response channel. An acknowledgment of receipt is issued to the complainant upon registration.

Cases are consolidated in a Monthly PQRS Monitoring Report, which tracks registration date, case type, subject, status, response date, time elapsed, responsible party, corrective actions adopted, and complainant satisfaction.

Upon resolution, each case is formally closed through a PQRS Closure Declaration signed by the complainant, confirming receipt of the response and satisfaction with the outcome. Grievance trends, lessons learned, and corrective actions derived from the mechanism are incorporated into the project's continuous improvement processes and reported in the corresponding monitoring. cycles.

2.3.14 Worker Training (G3.9)

Worker training is a fundamental axis of the change process and constitutes the first of the lines of action defined in the project. The success of the sustainable actions will depend on its implementation, since it is the farmers themselves who will develop the improvements to their productive systems aimed at consolidating green and sustainable businesses, for which they require a training and capacity building process in administrative, accounting, and financial issues, as well as in technical issues of forest monitoring and biodiversity, sustainable production and good environmental practices.

In addition, learning routes will be developed for all the members of the family nucleus, to raise awareness and strengthen capacities throughout the community, aiming at the cultural anchoring of the changes that are taking place at the level of forest conservation and sustainable production systems.

During the design of the project, local professional, technical and operational personnel were hired and had access to induction and training sessions to enable them to carry out their functions. Such was the case of the training of personnel hired for socialization and for the georeferencing of properties and linking of

families, as well as training in the digital tool for the team of surveyors who applied the SDG survey, the data processing format, biosafety protocols, among other topics. Results will be presented on the monitoring report.

It is expected that 50% of the community will have received some type of training on topics such as climate change and deforestation for the first verification and that the entire population will receive some type of technical training by the end of the project.

In objective one of the project "Training and education for the improvement of the individual, collective and organizational capacities of the project partners" a curriculum aimed at partners and stakeholder was developed, beginning with issues related to climate change, governance, valuation of flora and fauna, as the project progresses, the training will be focused in relation to the defined productive lines, the curriculum is presented below.

Table 2. Training topics.

ENVIRONMENTAL	TECHNICIANS	SOCIAL BUSINESS
Environmental pollution	Climate Change	Community organization and business partner
Protection of water sources	Technical management of the crop	Basic functions of the company
Protection and conservation of biodiversity and forests	Good farming practices	Systems management (Development and training to improve the individual, collective, and organizational capacities of project partners) A curriculum was developed for partners and stakeholders, starting with topics related to climate change, governance, and the valuation of flora and fauna. As the project progresses, the training will focus on the defined production lines. (Spreadsheets and text)
Soil management and conservation	Livestock technical management	Strategic planning
Preparation and application of organic fertilizers	Weed management	Quality management system
Organic production and clean technologies	Good farming practices	Sources of funding
Integrated management of pests and diseases	Good milking practices	Marketing
Agrotoxicology	Silvopastoral systems	Business plans

Safe use of pesticides	Disease management	Agribusiness management
Environmental management	Good manufacturing practices	Accounting
Use of protective equipment for industrial safety and application of agrochemicals	Ecological agriculture	
Forest management and implementation of temporary and permanent shadows		
Management of microwatersheds		
Wildlife protection		
Management and protection of gallery forests		
Ecological planting of crops		
Conservation of soils and water resources		
Management and control of forest fires		
Food safety.		

Source: Karbon-X

In principle, the curricula are taught by Karbon-X team, as the governance of the project is consolidated, the activity is left to the Municipal Coordinating Committees with the support of Karbon-X to guarantee compliance with the indicators.

At present, the project proponent has carried out a training process within the socializations where the following topics have been worked on:

- Sustainable finances
- Importance of the forest
- Project information
- Code of ethics, biosafety protocols,
- Forest inventory and its relationship with the project
- Communication mechanisms
- Sustainable livestock farming and its relationship with the conservation of natural resources

- Mechanisms for prioritizing resources and structuring projects
- Behavior of deforestation, drivers of deforestation, actions to counter the drivers of deforestation
- Strategic planning, identification of causes, prioritization of alternatives, participation mechanisms and citizen attention, flora and fauna workshop
- REDD+ projects, deforestation, conservation
- Training in georeferencing
- Water resource quality
- Biodiversity monitoring, specifically focused on birds
- Business training through regional universities
- Project Structuring

Approximately 445 women and 820 men have attended the meetings and have received training for a total of 1,245 partners and stakeholders.

2.3.15 Community Employment Opportunities (G3.10)

One of the central conditions for the success of the project, which was agreed with the communities and their representative leaders, is precisely that the project generates productive alternatives and green employment opportunities for the project leaders and partners, and opportunities for vulnerable people who do not have land, but who may eventually become deforestation agents.

Thus, the strategic plan and action plan of each municipality includes resources to guarantee the functioning of the operating and oversight committee, to ensure fair payment for the work of those responsible for coordinating and executing all project activities.

In addition, sustainable productive projects will also generate opportunities for local experts with experience in good agricultural and livestock practices, who can be hired as farmer-to-farmer trainers, one of the most effective methodologies proven for on-farm productive reconversion processes.

The training program will ensure that the partners can benefit from the employment generated by the project, both in training in best practices and in the transformation and value-adding processes to consolidate production chains.

Directly, as part of the committees, 20 jobs are expected to be created, 10 of which expected to be women.

During the monitoring activities, another 10 people were hired for participating in the forest inventories and surveys of the “Plan Finca”, 6 of them were women.

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

ALLCOT Sur del Meta LLC as implementer follows the Legal Framework for Colombia as follows:

- Political Constitution of Colombia. Article 53. The corresponding law shall consider at least the following minimum fundamental principles:

- Mandatory compliance Decree 1072 of 2015.

    - INDUCTION: "It is a process aimed at initiating the employee in his or her integration to the organizational culture during the four months following his or her engagement. (Decree 1567 of 1998, article 7).

    - REINDUCTION: "It is aimed at reorienting the employee's integration to the organizational culture by virtue of the changes produced in any of the matters to which its objectives refer" (Decree 1567 of 1998, article 6, 7).

    - TRAINING: "On-the-job training refers to a teaching-learning process that allows the employee to acquire and/or develop knowledge, skills and abilities necessary to achieve an efficient performance translated into the contribution to the development of specific functions" (Administrative Department of Public Function (DAFP) of February 21, 2026.

Supports of these procedures are in Annex 2.3.16 relevant laws and regulations related to worker´s rights

2.3.17 Occupational Safety Assessment (G3.12)

Karbon-X and its subsidiary companies have developed a comprehensive occupational health and safety (OHS) framework to anticipate, identify, evaluate, and control risks arising from project implementation. The framework addresses two primary work environments — in-office (administrative) work and field operations — and establishes protocols to inform workers of risks and the measures required to minimize them. Full documentation is available in Annex 2.3.17: Evaluation of Safety at Work.

Legal and Regulatory Framework

In compliance with Colombian law, Karbon-X has implemented a Work Health and Safety Management System (SG-SST) that covers all work centers and personnel, regardless of their contractual relationship with the company. This includes direct employees, contractors, and subcontractors. The system encompasses:

- A formal identification of the nature of hazards present at each work center.

- A documented organizational commitment to SG-SST implementation, integrated with company management policies.

- Policies that are clearly written, dated, signed by the legal representative, and reviewed and approved annually.

- Dissemination of the legal and policy framework at all levels of the organization, ensuring accessibility to all personnel.

Identified Substantial Risks

Two categories of risk have been assessed based on the type of work performed:

1. In-Office (Administrative) Work Risks

- Ergonomic risks: repetitive strain, poor posture, sedentary work.
- Psychosocial risks: work-related stress, workplace conflict, and burnout.
- Biosafety risks: exposure to communicable diseases, particularly relevant in shared workspaces.
- Electrical and physical risks: improper use of equipment, slips and falls.

2. Field Work Risks

- Physical hazards: working in remote or challenging terrain, exposure to extreme weather conditions, and risks associated with travel.
- Biological hazards: exposure to wildlife, insects, and vegetation in natural ecosystems where carbon projects are implemented.
- Road safety risks: accidents during transportation to and from field sites.
- Psychoactive and substance-related risks: impairment during field operations.

Measures to Inform Workers of Risks

Karbon-X ensures that all workers — regardless of their role or location — are informed of relevant risks and the corresponding preventive measures through the following mechanisms:

- Induction and onboarding training covering all applicable safety protocols.
- Regular dissemination of safety policies through internal communications, accessible to all staff.
- Mandatory review and acknowledgment of the Industrial Hygiene and Safety Regulations.
- Specific training sessions aligned with each protocol (see protocol list below).
- Accessibility of all safety documentation in physical and digital formats across all company levels.

Risk Minimization: Governance Bodies and Protocols

To operationalize risk prevention, Karbon-X has established the following governance bodies:

- Labor Coexistence Committee (LCC): Addresses psychosocial risks, workplace conflict, and harassment, promoting a healthy and respectful work environment.
- Joint Occupational Health and Safety Committee (COPASST): Oversees the implementation of safety actions and monitors the well-being of all workers.

These bodies are supported by the following documented protocols and policies:

1. Industrial Hygiene and Safety Regulations
2. General Policy and Objectives — SG-SST
3. Work at Home Policy and Biosafety Protocols (x2)
4. General Biosafety Protocol for Office Work
5. Work Safety Protocol for Field Operations
6. Road Safety Policy
7. Emergency Response Protocol (how to act in case of emergencies)
8. Alcohol, Tobacco, and Psychoactive Substances Prevention Policy

Continuous Improvement Approach

Karbon-X's worker protection framework follows a structured cycle of: policy definition → organizational setup → planning → application → evaluation → audit → continuous improvement. This cycle is applied consistently to anticipate, recognize, evaluate, and control all risks that may affect the safety and health of workers involved in project implementation — from in-office administrative staff to field teams operating in complex natural environments.

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

Karbon-X is the project owner and primary project participant, responsible for overall project design, financing, and strategic oversight. ALLCOT Sur del Meta LLC, a subsidiary of Karbon-X, serves as the operational implementing entity directly responsible for on-the-ground execution, community engagement, monitoring, and reporting across the four project municipalities: Puerto Lleras, Vista Hermosa, Puerto Rico, and Puerto Concordia.

In the initial phase of the project, commercial agreements were established between ALLCOT — then acting as project proponent — and the associations and Community Action Boards, as well as through individual agreements signed by landowners adhering to those contracts. Karbon-X assumes the role of project owner and project participant, with overall strategic oversight and accountability for compliance with project standards and carbon market commitments.

The governance of the REDD+ Sur del Meta Project has evolved progressively since its inception, building from pre-existing community structures toward formally constituted entities designed to ensure transparency, local autonomy, and long-term sustainability. At the base of the governance structure are the landowners and land holders (partners) who have voluntarily committed to forest protection on their properties. These community members are organized into village-level committees (comités veredales), the foundational operational unit of territorial governance. Committee representatives are elected by the

members themselves through a voting process. There are currently 20 active village-level committees distributed across the four municipalities: 7 in Vista Hermosa, 5 in Puerto Lleras, 3 in Puerto Rico, and 5 in Puerto Concordia. These committees were the primary spaces for project socialization, benefit-sharing negotiation, and participatory decision-making during the earlier phases of the project, and they continue to operate as the channel through which individual partners participate in project governance. In the initial phase, governance was additionally channeled through the Juntas de Acción Comunal (JAC) — traditional community action boards — and through associations such as Asojuntas and Agrocavis in Vista Hermosa, and Puerto Lleras. As the project matured, these structures were phased out of the formal contractual arrangements, as they were not considered directly responsible for project obligations. Commercial agreements are now established directly between the project developer and the community partners, through the corporate entities described below.

The most institutionalized tier of community governance consists of four municipal corporations (corporaciones), one per municipality, formally constituted since 2025 and registered in the Chamber of Commerce (Cámara de Comercio) with full legal standing (personería jurídica) under Colombian law. Each corporation was formed with the most active of the village-level committees and engaged partners, and additional partners may join as adherent members. Decision-making authority rests with the members of the Board of Directors (Directorio), whose members were elected by general assembly and whose positions are renewed every two years, or when convened by the assembly. The board structure includes a president, vice-president, secretary, treasurer, at least two vocal members, and a fiscal auditor. Each corporation ensures representation of all village-level committees operating within its municipality. The corporations are the formal counterparts in the commercial relationship with the project developer, and will act as the direct recipients of project economic benefits, which are distributed to all partner members in proportion to the surface area of land each member contributes to the project. The corporations are subject to external audit by the Gobernación del Meta. The corporate objects of each corporation are explicitly anchored to the objectives of the REDD+ project.

The village-level committees (comités veredales) continue to operate as the primary channel through which individual partners engage with the project. Elected representatives from these committees hold positions within the municipal corporations, ensuring that decision-making at the corporate level reflects the interests and priorities of the broader partner community. Supervisory committees at both the veredal and municipal levels are responsible for following up on the transparency of execution and on the grievance and safeguards mechanism.

Within the governance of the corporations, ALLCOT Sur del Meta LLC holds a vocal position (with voice but without voting rights) in the corporations of Puerto Lleras, Vista Hermosa, and Puerto Concordia. In Puerto Rico, ALLCOT Sur del Meta LLCX holds the position of secretary within the corporation. In all cases, the role of ALLCOT Sur del Meta LLC within the corporate governance bodies is to ensure compliance with the statutory objects of each corporation, which are anchored to the objectives of the REDD+ project. Karbon-X, as project participant, acts as an external observer ensuring that project standards and carbon market commitments are upheld.

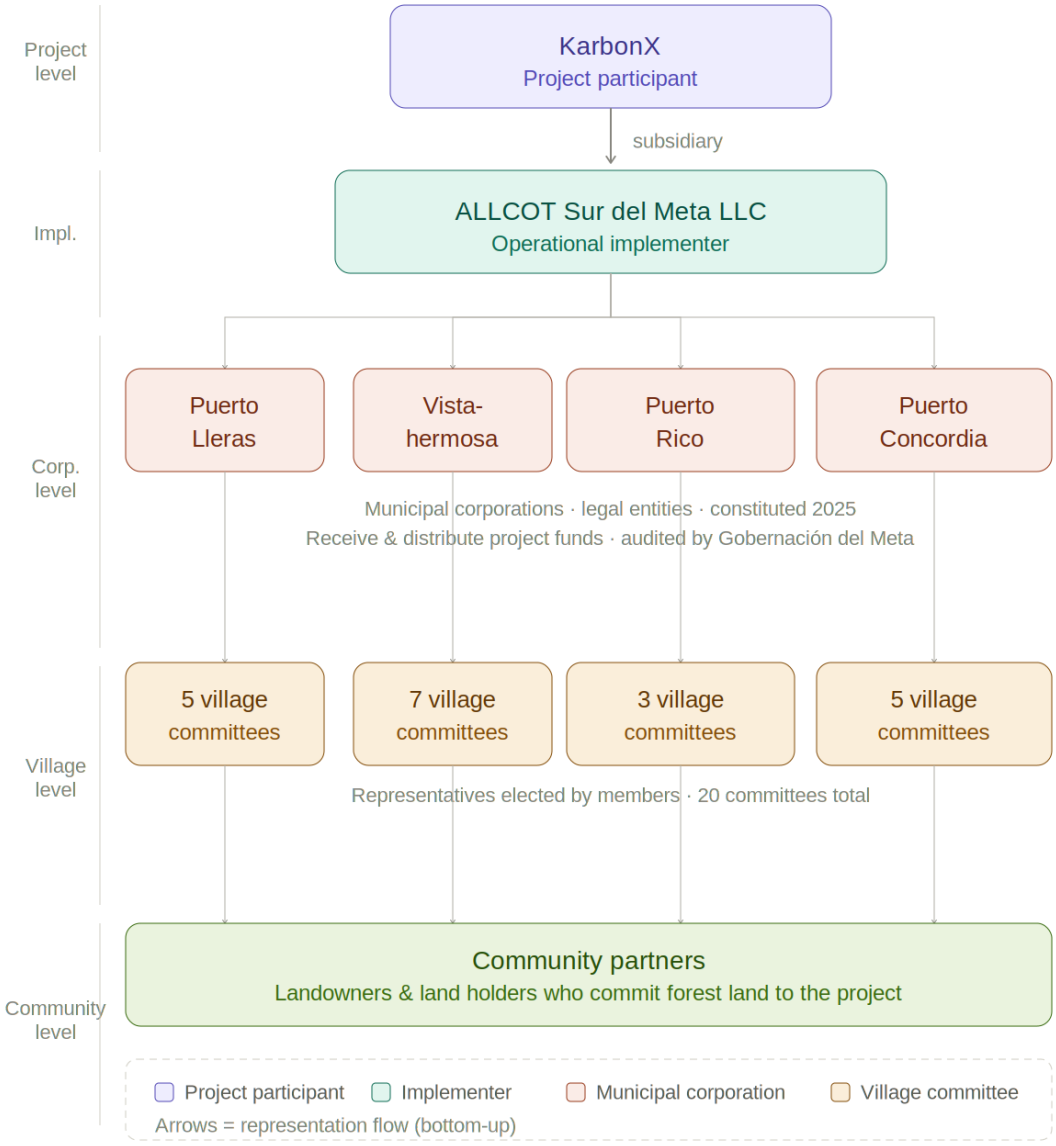


Figure 1. Project Governance Structure Source: Karbon-X.

2.4.2 Required Technical Skills (G4.2)

The successful implementation of the REDD+ Sur del Meta Project requires a multidisciplinary team with specialized expertise across the AFOLU sector, integrating technical, social, environmental, legal, and financial competencies in accordance with VCS and CCB requirements.

Core Technical Competencies

The project requires the following key technical skill sets:

- Forestry, AFOLU expertise and carbon accounting: Professionals with strong technical backgrounds in forest ecology, silviculture, and land-use dynamics, with demonstrated experience in the design and implementation of REDD+ projects under standardized methodologies (e.g., VCS VM0015). This includes advanced competencies in GHG accounting, such as baseline scenario construction, quantification of emission reductions, uncertainty assessment and management, and the design and operation of robust monitoring systems in accordance with VCS requirements for AFOLU projects.

- Geographic Information Systems (GIS) and remote sensing: Experts in land-use/land-cover classification, deforestation modeling, spatial analysis, and identification of drivers and patterns of land-use change.

- Biodiversity assessment and monitoring: Professionals with expertise in biodiversity valuation, ecological monitoring, and design of participatory biodiversity monitoring systems consistent with CCB criteria.

- Social and community engagement: Specialists in stakeholder engagement, participatory processes, safeguards implementation, risk analysis, and development of sustainable livelihoods and green business models with rural communities.

- Forest inventory and carbon stock assessment: Technical personnel trained in forest inventories, biomass estimation, and carbon stock quantification in accordance with VCS requirements.

- Legal expertise: Professionals with experience in land tenure, contract structuring, and regulatory compliance within the Colombian legal framework.

- Financial and administrative management: Personnel responsible for financial planning, fund management, and contractual oversight across all project agreements (e.g., community agreements, corporate structures, service providers, and landholder contracts).

2.4.3 Management Team Experience (G4.2)

The project is supported by a highly experienced management team with demonstrated expertise in the design, validation, implementation, and monitoring of carbon and land-use projects at national and international scales, including REDD+ initiatives under leading standards such as VCS, CCB, and Gold Standard.

Senior Management

- Mercedes García Madero– VP of Projects and Implementation, Karbon-X

Biologist with over 20 years of experience leading the development, certification, and scaling of high-integrity climate projects across both voluntary and compliance markets. She has overseen the full lifecycle of carbon projects, from early-stage feasibility and methodology selection to validation, verification, issuance, and portfolio governance, under standards such as VCS, Gold Standard, CDM, and CCB. She led multinational technical teams and served as senior counterpart to VVBs, investors, multilaterals, and project owners, ensuring environmental integrity, audit readiness, and delivery certainty.

- Juan Diego Muñoz – NBS Program Manager, Karbon-X

Forest Engineer with more than 20 years of professional experience in environmental and infrastructure-related projects, with a focus on environmental monitoring, flora and fauna assessments, and land-use management. His experience spans both rural and urban contexts, including environmental oversight in infrastructure development and water supply systems.

He holds postgraduate training in environmental engineering and management, water and sanitation in international cooperation contexts, carbon and water footprinting, and Sustainable Development Goals (SDGs). As a certified Project Manager, he is responsible for overseeing project planning, implementation, and monitoring processes across Karbon-X's project portfolio, ensuring timely execution, quality control, and alignment with technical and safeguard requirements.

Technical Management

- Emanuel Ayala – Climate Change Consultant

Environmental Engineer with more than 14 years of professional experience in climate change, GHG accounting, and environmental project development. Since 2023, he has been part of the technical team responsible for the preparation of Project Description Documents (PDDs) and carbon accounting under standardized methodologies in both AFOLU and energy sectors. Within this project, he is responsible for the development and completion of the PDD in accordance with VCS and CCB requirements, as well as for the quantification of emission reductions from avoided deforestation. His expertise includes baseline scenario construction, estimation of emission reductions, uncertainty assessment and management, and the design and implementation of robust MRV systems in line with VCS requirements for AFOLU projects.

- Nicolás Herranz – Social Expert

As the Social Expert for the REDD+ Sur del Meta Project, Nicolás leads the social component of the initiative, ensuring robust governance structures and transparent communication among partners and stakeholders. His role centers on safeguarding community rights, maintaining reliable communication channels, and fostering a clear understanding of project activities among all involved parties.

Nicolás brings extensive field experience working directly in the Sur del Meta territory and with its communities. This deep-rooted knowledge enables him to design and implement participatory mechanisms that reflect local realities, strengthen trust, and promote accountability. He has facilitated dialogue between community leaders, local organizations, and project stakeholders, championing inclusive decision-making processes aligned with international REDD+ standards.

Drawing on his territorial and community-based expertise, Nicolás contributes to building long-term, sustainable relationships that support effective land management and carbon project implementation at scale. His work ensures that the social dimension of the project not only meets best-practice standards but actively enhances transparency, credibility, and the overall success of the REDD+ Sur del Meta initiative.

- Edwin Sebastián Gutiérrez Rojas – GIS Expert

Forest engineer with over five years of experience in the development and certification of carbon projects under international standards — including VCS (Verra), REDD+, and AFOLU methodologies. Edwin has

contributed to the structuring and validation of projects at an international scale, supporting initiatives covering more than two million hectares across diverse ecological and socioeconomic contexts.

Within the REDD+ Sur del Meta Project under the VM0048 methodology, he served as a technical expert in the formulation and development of the Project Design Document (PDD), with a focus on methodological consistency, rigorous assessment of assumptions, and the overall technical robustness of the project design.

His key contributions include:

- Geospatial input analysis and validation: Conducted a critical review of project area boundaries, reference regions, and stratification, ensuring the consistency of spatial data with VM0048 eligibility criteria and methodological requirements.

- Baseline scenario assessment: Contributed to the review and refinement of the baseline, including the characterization of degradation conditions and deforestation dynamics. Under conditions of limited or uncertain historical data, he supported the definition of conservative and technically defensible assumptions.

- Drivers of deforestation analysis: Identified and validated the key drivers of deforestation and degradation, ensuring their alignment with local context and proper integration into the project design.

- Quantification of avoided emissions: Provided technical support in estimating GHG emissions, including the review of emission factors, activity data, and underlying assumptions, applying conservative approaches to prevent overestimation.

- Uncertainty and critical assumption management: Identified and documented key sources of uncertainty — including activity data, emission factors, and deforestation dynamics — and proposed conservative, methodologically sound approaches for their treatment within the PDD.

- Methodological compliance review: Verified the project's alignment with VM0048 requirements, covering eligibility criteria, additionality, and the internal consistency of the project design.

- Technical documentation: Contributed to the drafting and review of key PDD sections, ensuring the traceability of technical decisions and anticipating potential findings during the validation process.

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

Where specific technical experience is not directly available within the core project team, the project will establish strategic partnerships with specialized external organizations to ensure full technical coverage and compliance with applicable standards.

For forest inventory and carbon stock assessment, the project will engage qualified third-party companies with demonstrated experience in forest measurements, including the monitoring of arboreal and non-arboreal species, biomass estimation, and carbon stock quantification. These organizations will support the implementation of field inventories in accordance with recognized methodologies and best practices, ensuring the robustness and accuracy of carbon accounting.

Regarding biodiversity assessment and monitoring, the project will collaborate with Fundación Bioherencia, a specialized organization with proven expertise in biodiversity conservation and monitoring. Fundación Bioherencia manages the Harpy Eagle Reserve, located within the project area, providing strong local presence and ecological knowledge.

Through this partnership, biodiversity monitoring activities will be designed and implemented using scientifically robust and context-specific approaches, leveraging the foundation's experience in species monitoring and ecosystem conservation. This ensures alignment with CCB biodiversity criteria and strengthens the technical quality and credibility of project outcomes.

Additionally, for field implementation and community engagement activities, the project may rely on dedicated field-based technical teams with experience working directly with local producers and rural communities. These teams will support activities such as field data collection, implementation of sustainable practices, land tenure formalization processes, and facilitation of community participation. This approach ensures effective on-the-ground execution, strengthens trust with local stakeholders, and enhances the overall operational capacity of the project.

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

The financial health of the implementing organization is supported by its demonstrated experience in the development and implementation of carbon projects, as well as its access to diversified funding sources, including internal capital and forward agreements for the commercialization of carbon credits.

Detailed financial information, including financial statements and supporting documentation, is considered confidential and will be made available to the validation body upon request under appropriate confidentiality arrangements.

Notwithstanding the above, the project has secured sufficient financial backing to cover the initial phases of implementation, including project design, stakeholder engagement, and early-stage activities prior to the first verification. Long-term financial sustainability is expected to be ensured through revenues generated from the issuance and sale of verified carbon units (VCUs), complemented by additional funding sources where applicable.

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

Karbon-X Corp. (hereinafter Karbon-X) and ALLCOT Sur del Meta LLC, as project owner and implementing entity respectively, provide full assurance that neither organization is involved in, or complicit in, any form of corruption, bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, or collusion in connection with the design or implementation of the REDD+ Sur del Meta Project. This assurance is underpinned by a set of binding corporate policies applicable to all personnel and entities involved in the project.

Corporate Code of Conduct

Karbon-X's Corporate Code of Conduct applies to all directors, officers, and employees of Karbon-X and its subsidiaries. The Code establishes an explicit and unconditional prohibition on bribes, kickbacks, and any other improper payments, whether made to government officials or to any party in the private sector,

and whether made directly or indirectly through third parties. It further prohibits the acceptance of any such payments by company personnel.

The Code requires all personnel to maintain accurate and timely financial records, to avoid conflicts of interest, and to conduct all transactions at arm's length and in full compliance with applicable laws. Related-party transactions require prior approval by a majority of the Board of Directors. Any personnel who become aware of a possible violation are required to report it within ten days through established channels — either to the CEO and Corporate Compliance Officer (cc@karbon-x.com) or to the Chair of the Audit Committee of the Board of Directors. Anonymous reporting is permitted. The Code guarantees a strict non-retaliation policy for anyone who reports a concern in good faith, and establishes that violations may result in disciplinary action up to and including termination of employment.

Environmental and Social Policy

Karbon-X's Environmental and Social Policy (Version 01, 2026) reinforces these commitments at the organizational level, establishing integrity, transparency, and accountability as core values governing all company activities. The Policy explicitly commits the organization to ethical conduct across all operations and partnerships, and is publicly available on the Karbon-X website. Ultimate accountability rests with the CEO and Board of Directors, with oversight provided by the ESG Coordinator.

Internal controls and oversight

At the project level, financial transparency and accountability are further ensured through the governance structure of the four municipal corporations, each of which includes a fiscal auditor (fiscal) elected by its general assembly. The corporations are additionally subject to external audit by the Gobernación del Meta through its Secretaría de Participación Social, providing an independent layer of oversight over the use of project funds and the distribution of benefits to community partners.

Benefit-sharing mechanisms are designed to be transparent and auditable, with distributions made directly to the corporations in proportion to the surface area contributed by each partner and documented in accordance with the contractual arrangements established between the project and the community organizations.

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

A description of any commercially sensitive information excluded from the public version of this document, along with the corresponding justification, is provided in Section 1.18.2 of the registered and validated VCS PD document (page 53).

2.5 Legal Status and Property Rights

2.5.1 Statutory and Customary Property Rights (G5.1)

The project area is located across four municipalities in the department of Meta (Vista Hermosa, Puerto Rico, Puerto Lleras, and Puerto Concordia) in a territory historically shaped by colonization processes driven by violence, displacement, and the absence of a stable state presence. The area was originally populated by peasants displaced from other regions of Colombia during the violence of the 1940s and 1950s. Early colonization was in some cases led by extensive cattle ranching and monoculture projects in

Caquetá and Guaviare, supported by the State, which opened adjacent areas to further settlement. The colonization focus began in the Sierra de La Macarena (Colombia's first natural reserve) and spread across the plains, eventually giving rise to the creation of the Sierra de La Macarena and Tinigua National Parks and the Ariari River Integrated Management District (DMI).

Government agencies responsible for land management and titling (first INCORA, later INCODER) initiated processes of subtraction of forest reserve areas in the Amazon and allocation to settlers. Crucially, settlers were required to clear one third of the area to be titled in order to demonstrate dominion over the land, a condition that structurally incentivized deforestation and did not account for the productive potential of forested land. These processes were interrupted by recurring cycles of violence, forced displacement, and institutional instability, preventing many settlers from obtaining formal title to their lands.

As a result, land tenure in the project area is characterized by high levels of informality. The National Rural Agency's Plan Integral de Desarrollo Agropecuario y Rural con Enfoque Territorial de Meta[13] reports that more than 75% of the department of Meta has informal land tenure. The project area presents an even higher rate of 82.53% informal tenure. More specific studies such as “Lineamientos De Un Programa De Ordenamiento De La Propiedad Rural En La Zona De La Macarena”[14] shows for the rural area of Puerto Rico and Vista Hermosa 77% and 97% of illegal tenure for each one, similar to 85% and 97.5% in the project area. Puerto Lleras, according to its “Plan de Ordenamiento Social de la Propiedad Rural” has 63.46 % of land under this figure and the Project Area for this municipality has 51.7%.

Within this context, the following forms of land tenure exist in the project zone:

- Ownership: All land belongs to farmers and peasants who are responsible for their property rights. All landowners can prove their legal tenure through documentation recognized by the Colombian government and the Ministry of Agriculture as sufficient to demonstrate land rights.

- Possession: In accordance with Article 762 of the Colombian Civil Code, possession is a legal figure through which a person exercises the spirit of owner over a property with the aim of acquiring ownership through acquisitive prescription over time. Two forms exist: regular possession, which is accompanied by a just title constitutive or transfer of ownership (including sale, donation, exchange, or other valid instruments under Article 673 of the Civil Code); and irregular possession, which lacks a just title but may still lead to acquisition through prescription over time.

- Community Action Boards (JAC): A significant portion of project partners participate in Community Action Boards, legally recognized community organizations in Colombia that play a fundamental role in local governance and collective decision-making. Certificates issued by JACs have historically been used by municipalities as mechanisms to validate land possession and tenure, serving as community-based and administrative support. However, these certificates do not constitute formal property titles. Within the project, JACs operate as institutional mechanisms to channel resources, coordinate processes, and strengthen community governance, complementing but not replacing the individual contractual relationships and legal tenure of landowners.

[13] https://www.adr.gov.co/wp-content/uploads/2021/07/META-TOMO-1.pdf
[14] https://ccai-colombia.org/files/primarydocs/1010OrdenamientoLaMacarena.pdf

Supporting legal research on land tenure modalities in the project area is available in Annex 2.5.1.

2.5.2 Recognition of Property Rights (G5.1)

The project fully recognizes and respects the property rights of all its partners in their diverse legal forms, including formal ownership, possession, and rights. As a condition of participation, each partner is required to provide documentation demonstrating legal ownership or recognized tenure of the land, in accordance with the process described in the VCS Project Description and the project's internal Standardized Operational Procedure on land ownership and tenure (Procedure ID 2084_01), which establishes the national regulatory context in Colombia and is transparently shared with all project partners.

In the initial phase of the project, commercial agreements were established between ALLCOT, then acting as project proponent, and the associations and Community Action Boards, as well as through individual agreements signed by landowners adhering to those contracts. Following the acquisition of ALLCOT by Karbon-X Corp., the entity was restructured as ALLCOT Sur del Meta LLC, a subsidiary of Karbon-X Corp. that now serves as the local implementing entity responsible for on-the-ground execution, community engagement, monitoring, and reporting. Karbon-X assumes the role of project owner and project participant, with overall strategic oversight and accountability for compliance with project standards and carbon market commitments.

As the project has matured, the contractual structure has also evolved on the community side. Commercial agreements continue to be established directly between ALLCOT Sur del Meta LLC and individual landowners, ensuring that contracts remain personal and legally binding. At the same time, the four municipal corporations have progressively assumed the role of institutional mechanisms for channeling resources and coordinating processes with the project’s partners. This evolution reflects the strengthening of community governance structures, while preserving the individual nature of contractual relationships and reinforcing the legal framework underpinning the recognition of partner rights.

The project additionally recognizes land formalization as a structural challenge in the territory and a driver of deforestation in its own right, the historical requirement to clear forest in order to obtain title has contributed directly to land use patterns that the project seeks to reverse. For this reason, support for the formalization of land ownership is explicitly included in the project's theory of change as a dedicated line of action, to be developed in the early years of implementation following first verification. This includes support for processes of land belonging, titling, and judicial regularization, with the objective of strengthening the legal security of partners, reducing deforestation incentives, and consolidating the territorial governance of project communities.

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

A description of Free, Prior and Informed Consent is provided in Section 2.5 AFOLU-Specific Safeguards of the registered and validated VCS PD document (page 63).

2.5.4 Property Rights Protection (G5.3)

Within the signed agreements, there is the following clause, which specifies the protection of the property rights of the adherent members:

"*The present Agreement does not constitute a legal business of transfer of ownership, and consequently, it shall not grant any right of ownership to THE BUYER INVESTOR GROUP, or its members over the properties linked to the Project; therefore, within the framework of the present Agreement, the participants of the same, and members of THE SELLING ORGANIZATION, shall not lose, under any circumstance, the ownership of their lands, nor the right of dominion over their lands, nor the autonomy of management of their forests, where they may implement any productive project (that does not imply the cutting of trees) and, in any case, all within the framework of the documents subscribed and referenced herein*".

2.5.5 Illegal Activity Identification (G5.4)

The project has identified a set of activities that, if carried out within the project area, could undermine project integrity, jeopardize the achievement of climate and biodiversity benefits, or result in project benefits being derived from illegal conduct. These activities are explicitly prohibited under the conservation agreements signed between Karbon-X and each project partner, and their prevention is embedded in the project's governance and monitoring structure.

The following activities are prohibited within the project area under the terms of the conservation contracts and applicable Colombian environmental law: unauthorized logging or pruning of trees under conservation; changes in land use, including opening of new roads or clearing of forest; burning; and hunting. Any use of natural resources within the conservation area requires prior processing of the relevant permits, concessions, and authorizations from the competent environmental authority. Limited tree felling for domestic consumption is permitted only when planned and conducted within the framework of current legislation.

Prevention and detection of prohibited activities is embedded at multiple levels of the project's governance structure. At the community level, the village-level supervisory committees play a central role in identifying situations that contravene the conservation agreements and acting accordingly. These committees, operating at both the veredal and municipal levels, are responsible for following up on the transparency of project execution and flagging any irregularities for escalation to the implementing entity.

At the organizational level, Karbon-X supports the governance capacity of the municipal corporations and their affiliated committees through training programs on financial management, budgeting, and project administration, as part of the project's theory of change. A dedicated tool is being developed to assist committees in tracking budgets and activities, strengthening their capacity to detect and report anomalies. Karbon-X additionally supports partners through Know Your Customer (KYC) processes to ensure that all entities and individuals involved in the project are properly identified and that project benefits are channeled exclusively through legitimate and verified recipients.

With respect to biodiversity protection, the importance of prohibiting hunting within the project area has been discussed with partners through workshops, and a formal set of community rules will be established as part of the design of the community monitoring program currently under development.

2.5.6 Ongoing Disputes (G5.5)

The project area is characterized by a context of informal land tenure rather than active territorial disputes in the conventional sense. As described in Section 2.5.1, the high rates of tenure informality across the municipalities of Vista Hermosa, Puerto Rico, Puerto Lleras, and Puerto Concordia reflect the structural

legacy of interrupted formalization processes, recurring cycles of violence, and institutional absence, rather than competing claims between identifiable parties.

Within this context, the central challenge faced by project partners is not the existence of formal disputes over land, but rather the absence of documentation sufficient to demonstrate continuous and legally recognized tenure under the frameworks applicable to the territory. A core component of the project's intervention has been to accompany partners in evidencing that the tenure they exercise over their lands is valid and legally grounded under the modalities recognized by Colombian law, including ownership, possession, and collective governance through Community Action Boards, as described in the preceding section.

At present, no territorial conflicts have been identified between the project area and indigenous communities, national parks, forest reserve areas, or any other stakeholder not participating in the project. The project area does not overlap with indigenous resguardos, collectively titled Afro-Colombian territories, or protected areas under the Sistema Nacional de Áreas Protegidas (SINAP). No claims or objections from third parties over lands included in the project have been registered to date.

The project does not undertake any activity that could prejudice the outcome of pending tenure regularization processes. To the contrary, support for land formalization is embedded in the project's theory of change as an explicit line of action, designed to strengthen the legal security of partners and reduce the structural drivers of deforestation associated with tenure insecurity.

2.5.7 National and Local Laws (G5.6)

A comprehensive list of all national, regional, and local laws, statutes, and regulatory frameworks applicable to the project activities in Colombia, together with assurance of compliance and a demonstration of how compliance is achieved, is provided in Section 1.13 Compliance with Laws, Statutes and Other Regulatory Frameworks (pages 41-45) of the registered and validated VCS PD.

2.5.8 Approvals (G5.7)

Approval is not required as such, although the Colombian government requires the registration of the project in the National Registry of GHG Emission Reduction RENARE, which was done as stated in this document.

2.5.9 Right to Claim Benefits (G5.8)

Karbon-X, as project participant, holds the legal authority to implement the project and claim GHG emission reductions and other environmental benefits on behalf of the project. This authority is established through a two-tier contractual structure: master agreements between Karbon-X and the four municipal corporations, and individual accession agreements signed by each landowner or land holder adhering to those contracts. As a condition of participation, all partners are required to provide documentation verifying their legal ownership or recognized tenure of the land, ensuring that the right to operate within each property area is duly established prior to inclusion in the project.

Carbon rights are recognized in relation to the land area accredited by each partner's property documentation and subsequently ratified through georeferencing. While the assignment of carbon rights to Karbon-X as project proponent is embedded in the contractual framework governing the relationship between Karbon-X and its partners, the project acknowledges that this assignment would benefit from more

explicit contractual language in future agreement renewals, which will be addressed as part of the ongoing strengthening of the project's legal and governance framework.

2.5.10 Other Programs (G5.9)

The REDD+ Sur del Meta Project (Verra Project ID: 2084) seeks exclusively to generate Verified Carbon Units (VCUs) through the Verified Carbon Standard (VCS) Program administered by Verra. The project does not seek to generate, and has not received, any other form of environmental or social credit, including any tradable climate, community, or biodiversity unit under any other program. The project is not registered under, nor does it intend to participate in, any additional voluntary or compliance carbon market program or environmental crediting mechanism.

2.5.11 Double Counting (G5.9)

At the time of validation, a dedicated analysis was conducted to identify potential overlaps with other registered projects in terms of geographic area, as well as any registration or participation under other GHG programs that could give rise to double issuance or double claiming. This analysis confirmed that no such overlaps or parallel registrations exist.

This analysis is provided in Section 1.14.1 Projects Registered or Seeking Registration under Other GHG Program(s) (page 46) of the registered and validated VCS PD.

3 CLIMATE

3.1 Without-Project Climate Scenario

3.1.1 Without-Project Estimated Greenhouse Gas Emissions (CL1.1)

Please refer to Section 4.1 Baseline Emissions (pages 161-187) of the VCS Project Description (VCS Project ID 2084, v4.0, 27 May 2024).

3.2 Net Positive Climate Impacts

3.2.1 With-Project Estimated Greenhouse Gas Emissions (CL2.1)

Please refer to Section 4.2 Project Emissions (pages 161-187) of the VCS Project Description (VCS Project ID 2084, v4.0, 27 May 2024).

3.2.2 Net Impact (CL2.2)

Please refer to Section 4.4 Net GHG Emission Reductions and Removals (pages 199-202) of the VCS Project Description (VCS Project ID 2084, v4.0, 27 May 2024).

3.3 Offsite Climate Impacts (Leakage)

3.3.1 Types of Expected Leakage (CL3.1)

Please refer to section 4.3 Leakage (page 195- 198) of the VCS Project Description (VCS Project ID 2084, v4.0, 27 May 2024).

3.3.2 Quantity of Expected Leakage (CL3.1, 3.3)

Please refer to section 4.3 Leakage (page 188- 195) of the VCS Project Description (VCS Project ID 2084, v4.0, 27 May 2024).

3.3.3 Leakage Mitigation (CL3.2)

There are no measures designed to mitigate leakage.

3.4 Climate Impact Monitoring

3.4.1 Climate Monitoring Plan (CL4.1)

Please refer to Section 5.3 Monitoring Plan (pages 233-226) of the VCS Project Description (VCS Project ID 2084, v4.0, 27 May 2024).

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

The REDD+ Sur del Meta Project ensures that the monitoring plan and its results are disseminated to communities, stakeholders, and the general public through a structured approach established in the project's Communication Manual, which serves as the formal policy governing all information-sharing processes throughout the project lifetime.

Public availability

The monitoring plan, and any results of monitoring undertaken in accordance with the monitoring plan will be made publicly available through the digital repository hosted on the project website. This repository is accessible to any interested person and is kept up to date as new documents and reports become available. Verification reports produced by the independent auditing body, which incorporate monitoring results, are also published in this repository; given that these documents are originally produced in English, the project commits to translating them into Spanish and publishing both versions to ensure accessibility for local communities and Spanish-speaking stakeholders.

Dissemination to communities and stakeholders

Summaries of the monitoring plan and its results are actively disseminated to communities through the multicanal communication system defined in the Communication Manual. Communities are informed in advance whenever monitoring activities are scheduled to take place, through monthly partner meetings, the Voces del Bosque community bulletin, and WhatsApp groups. Once results are available, plain-language summaries are prepared and shared through the same channels, ensuring that findings are communicated in an accessible and timely manner to all project partners across the four municipalities.

The monthly meetings with project partners serve as the primary space for presenting and explaining monitoring results, allowing community members to ask questions and engage directly with the findings. The Voces del Bosque bulletin consolidates key monitoring updates in a structured format, reaching community members who may not have attended meetings. WhatsApp groups complement these channels by enabling rapid and broad dissemination of updates and notifications.

The two Social Workers permanently based in the territory play an important role in this process, supporting the communication of monitoring information at the community level and ensuring that results reach partners across all village-level committees (comités veredales) operating in the four municipalities.

3.5 Optional Criterion: Climate Change Adaptation Benefits

3.5.1 Regional Climate Change Scenarios (GL1.1)

This chapter presents the analysis of climate projections for the department of Meta, considering variables such as precipitation, mean, maximum and minimum temperature, relative humidity, wind speed, and solar radiation. The projections cover the periods 2021–2040, 2041–2060, 2061–2080, and 2081–2100, and are compared with the historical baseline period of 1981–2010. Results are analyzed under the four Shared Socioeconomic Pathways (SSP) developed for the IPCC Sixth Assessment Report (AR6): SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5.

Each scenario represents a distinct global development trajectory:

- SSP1 (“Sustainability”): assumes low population growth, high levels of education and governance, international cooperation, technological development, and strong environmental awareness. It represents low challenges for both mitigation and adaptation.

- SSP3 (“Fragmentation”): assumes high population growth, low economic development, limited access to education, and weak international cooperation, resulting in high challenges for mitigation and adaptation.

- SSP4 (“Inequality”): envisions rapid technological progress in developed countries, but limited access to its benefits in less developed regions, leading to high adaptation challenges.

- SSP5 (“Fossil-fueled Development”): is characterized by accelerated economic growth and intensive use of fossil fuels, generating the highest challenges for mitigation.

The projections used were obtained from Colombia’s Fourth National Communication on Climate Change[15], which provides a publicly available database with disaggregated climatic data at the departmental level for all meteorological stations. The following sections present the average projected changes for the main climate variables.

Table 3.Changes in precipitation for the department of Meta compared with the historical baseline period of 1981–2010 (%).

[15] Ideam. (2024). Escenarios de cambio climático de la Cuarta Comunicación de Colombia. Instituto de Hidrología, Meteorología y Estudios Ambientales - Ideam, Ministerio de Ambiente y Desarrollo Sostenible, Programa de las Naciones Unidas para el Desarrollo - PNUD, Fundación Natura y Proyecto GEF-CBIT “Transparencia Climática Colombia”

Scenario	2021-2040	2041-2060	2061-2080	2081-2100
SSP1-2.6	5.09	6.00	5.76	6.04
SSP2-4.5	3.43	4.94	7.75	8.27
SSP3-7.0	2.18	3.37	4.32	5.34
SSP5-8.5	2.53	3.95	6.19	9.33

Source: Karbon -X, 2026. Based on IDEAM data.

Table 4. Changes in mean temperature for the department of Meta compared with the historical baseline period of 1981–2010 (°C).

Scenario	2021-2040	2041-2060	2061-2080	2081-2100
SSP1-2.6	0.93	1.32	1.44	1.37
SSP2-4.5	1.00	1.66	2.12	2.45
SSP3-7.0	1.03	1.88	2.79	3.68
SSP5-8.5	1.12	2.14	3.33	4.52

Source: Karbon-X, 2026. Based on IDEAM data.

Table 5.Changes in maximum temperature for the department of Meta compared with the historical baseline period of 1981–2010 (°C).

Scenario	2021-2040	2041-2060	2061-2080	2081-2100
SSP1-2.6	0.40	0.81	0.96	0.88
SSP2-4.5	0.55	1.25	1.78	2.17
SSP3-7.0	0.45	1.39	2.42	3.48
SSP5-8.5	0.55	1.68	3.07	4.49

Source: Karbon -X, 2026. Based on IDEAM data.

Table 6. Changes in minimum temperature for the department of Meta compared with the historical baseline period of 1981–2010 (°C).

Scenario	2021-2040	2041-2060	2061-2080	2081-2100

SSP1-2.6	0.59	0.89	0.97	0.93
SSP2-4.5	0.65	1.17	1.54	1.81
SSP3-7.0	0.68	1.34	2.10	2.86
SSP5-8.5	0.73	1.55	2.54	3.61

Source: Karbon X, 2026. Based on IDEAM data.

Table 7. Changes in relative humidity for the department of Meta compared with the historical baseline period of 1981–2010 (%).

Scenario	2021-2040	2041-2060	2061-2080	2081-2100
SSP1-2.6	-0.28	-0.40	-0.61	-0.44
SSP2-4.5	-0.40	-0.86	-1.05	-1.16
SSP3-7.0	-0.44	-1.12	-1.91	-2.82
SSP5-8.5	-0.64	-1.48	-2.63	-3.87

Source: Karbon X, 2026. Based on IDEAM data.

Table 8. Changes in wind speed for the department of Meta compared with the historical baseline period of 1981–2010 (m/s).

Scenario	2021-2040	2041-2060	2061-2080	2081-2100
SSP1-2.6	-0.27	-0.29	-0.26	-0.25
SSP2-4.5	-0.22	-0.19	-0.25	-0.27
SSP3-7.0	-0.26	-0.22	-0.18	-0.12
SSP5-8.5	-0.24	-0.21	-0.15	-0.11

Source: Karbon X, 2026. Based on IDEAM data.

Table 9. Changes in global radiation for the department of Meta compared with the historical baseline period of 1981–2010 (W/m^2).

Scenario	2021-2040	2041-2060	2061-2080	2081-2100
SSP1-2.6	3.02	3.37	4.18	3.99

SSP2-4.5	2.79	3.52	3.58	3.91
SSP3-7.0	2.03	3.22	3.55	4.37
SSP5-8.5	3.27	4.57	5.54	6.42

Source: Karbon X, 2026. Based on IDEAM data.

At the regional level, the recent El Niño events (2023- 2024) highlighted the high vulnerability of the Orinoquía to extreme climate conditions. During this period, thousands of hectares of savannas and forests were devastated by forest fires associated with high temperatures and the prolonged absence of rainfall during the dry season. At the beginning of February, fires aggravated by drought destroyed more than 17,000 hectares of vegetation in Colombia, causing significant losses in agricultural and livestock production, as well as interruptions in communications and transportation[16]. By May of the same year, the four departments of the Orinoquía were among the six most affected by forest fires at the national level, with 66% of the events occurring in grasslands, 28% in forests, and 2% in agricultural land[17].

The increasing climate variability between dry and rainy seasons will heighten the risks associated with extreme events. On the one hand, periods of intense drought will favor the spread of forest fires and the degradation of vegetation cover; on the other hand, concentrated and irregular rainfall will increase the frequency of floods and flash floods.

The rise in temperatures, the decrease in relative humidity, and the limited variation in precipitation projected for the Meta region could favor conditions suitable for the generation and spread of fires. Relative humidity is important because dead forest fuels and the air are in constant exchange of moisture. When humidity is low, the air extracts moisture from the fuels; on the contrary, when humidity is high, the fuels absorb moisture from the air. When relative humidity drops, fire behavior intensifies, as fine fuels dry quickly[18].

On the other hand, the Orinoquía region has one of the largest floodable areas in the country. The basins of the Arauca, Guaviare, Inírida, Meta, Vichada, Tomo-Tuparro, and Atabapo rivers represent 31.7% of the national floodable surface, with an approximate extension of 32,343 km². A large part of this area is located in the department of Meta, where increasingly erratic rainfall increases the risk of overflows and impacts on settlements located in low-lying areas[19].

[16] ACAPS, 2024. COLOMBIA Anticipatory impact of wildfires. Disponible en https://www.acaps.org/fileadmin/Data_Product/Main_media/20240220_ACAPS_briefing_note_wildfires_in_Colombia.pdf
[17] Reliefweb, 2024. Hallazgos de evaluaciones sobre situaciones crónicas en Colombia, enero-abril 2024. 3iSolution. Disponible en: https://reliefweb.int/report/colombia/hallazgos-de-evaluaciones-sobre-situaciones-cronicas-en-colombia-enero-abril-2024
[18] US National Park Service. Understanding Fire Dange. Disponible en: https://www.nps.gov/articles/understanding-fire-danger.htm
[19] Plan Nacional de Adaptación al Cambio Climático de Colombia, 2016. https://www.minambiente.gov.co/wp-content/uploads/2022/01/PNACC-2016-linea-accion-prioritarias.pdf

In hydrological terms, the capacity for water retention and regulation is low in most of Meta[20], which exacerbates the combined effects of prolonged droughts and intense precipitation events.

Among the main impacts expected from climate change in the department of Meta, a significant effect is projected on agricultural and livestock productivity, natural ecosystems, and public health.

In the livestock sector, a progressive reduction in meat and milk production of approximately 2% per year is estimated until 2040, compared to the reference period 1970–2010. This decrease is attributed to reduced availability of improved pastures due to reduced seasonal rainfall and thermal stress generated by the frequent exceedance of the maximum temperature threshold of 35 °C, a condition that limits forage biomass growth and affects animal performance[21].

In the agricultural sector, an average reduction of 4% per year in the yield of technified maize is projected, compared to the period 2000–2010, as a combined consequence of reduced seasonal precipitation and sustained increases in mean temperature. This impact is especially relevant considering that Meta accounts for 11% of the national area planted with technified maize[22].

In the forestry sector, an increase of 15% in the yield of Pinus caribaea crops is estimated in low-altitude areas, along with a reduction in forestry rotation periods, from 6.6 to 5.3 years, under warmer climate conditions. This positive response is associated with rising temperatures and CO_2 fertilization, although its sustainability will depend on water availability and the increasing risk of fires[23].

At the ecosystem level, incipient desertification processes are observed in the basal forest of the Orinoco and in shrub savannas, with the potential to evolve into arid or semi-arid savannas if current trends of deforestation, soil degradation, and reduced precipitation persist. These changes could compromise the capacity of ecosystems to store carbon, regulate water, and sustain biodiversity[24].

On the other hand, the Regional Comprehensive Climate Change Plan for the Orinoquía dentifies that all urban agglomerations of Meta are currently exposed to the Aedes aegypti vector, transmitter of dengue, zika, and chikungunya viruses. An increase in the distribution and persistence of the vector toward rural areas is expected, driven by rising temperatures and the expansion of favorable habitats associated with climate variability[25].

In this context, the projected climate pressures not only reduce agricultural and livestock productivity in large areas of Meta, but also increase the likelihood of expansion of the agricultural and livestock frontier into forested areas, especially in savanna-forest landscapes and in zones with relatively higher water availability. The loss of soil moisture, thermal stress on crops and pastures, and the increased frequency of droughts may lead producers to seek new production areas in soils currently covered by forests, deepening the deforestation processes already affecting the region. Added to this is that more frequent and severe fires, driven by higher temperatures and lower relative humidity, can accelerate forest degradation,

[20] Ibid.
[21] Ibid.
[22] Ibid.
[23] Ibid.
[24] Ibid.
[25] CIAT, Cormacarena, Corporinoquia, ECOPETROL. 2018. Plan Regional Integral de Cambio Climático para la Orinoquía - Meta, Resumen Ejecutivo. CIAT publicación No. 460. Disponible en: https://colaboracion.dnp.gov.co/CDT/Ambiente/PNACC/PIGCCT%20Meta.pdf

reducing the ecosystem's natural capacity to recover and creating favorable conditions for land-use change. Taken together, these climatic dynamics configure a scenario of increased pressure on forests, where economic and environmental pressures converge toward an acceleration of tree cover loss. In this sense, a REDD+ project takes on a strategic role by strengthening territorial resilience, reducing vulnerability to these impacts, and preventing climate change from triggering new waves of deforestation.

3.5.2 Climate Change Impacts (GL1.2)

Climate projections for the Orinoquía region, and particularly for the department of Meta, anticipate increasing temperatures, a reduction in relative humidity, and greater variability in rainfall, all of which have direct implications for the well-being of local communities. For example, the concentration of rainfall in short and intense events increases the risk of floods and overflow events in settlements located in low-lying areas, resulting in losses of infrastructure, housing, and assets for vulnerable families.

Recently, in 2025, a major flooding event was recorded that clearly illustrates this situation and that, according to climate projections, may increase in both intensity and frequency due to climate change and ongoing land-use changes. In May 2025, at least 16 of the 29 municipalities in the department of Meta reported more than 6,000 affected families and losses in over 7,000 hectares of crops, including cassava, plantain, papaya, maize, mango, and cacao, among others. During this event, the Ariari River caused the greatest damages; however, overflow events were also observed along the Meta, Humadea, and Upía rivers, impacting extensive rural and peri-urban areas[26].

These flooding events, as well as periods of drought, affect the availability of potable water and directly impact family farming enterprises and livestock use, increasing costs for rural households that depend on the territory for their livelihoods. In addition, the rise in the frequency of forest and grassland fires during the dry season, favored by the previously described climate projections, leads to losses of pastures, interruptions in rural transportation, increased smoke and air pollution, which could affect respiratory health and limits residents' mobility.

Disruptions to water supply and quality can also generate significant public health impacts. In addition, an increase in the presence and persistence of the Aedes aegypti mosquito, the transmitter of dengue, zika, and chikungunya viruses, is expected in both urban and rural areas, driven by rising temperatures and the expansion of favorable habitats associated with climate variability.

Climate change is already altering ecosystem dynamics in the Orinoquía region and is expected to intensify in the coming decades. In the Meta department, shifts in climate patterns, including increased average temperatures, reduced relative humidity, and changes in rainfall distribution, are contributing to a rise in the frequency and severity of extreme weather events. These include more frequent and prolonged droughts, followed by concentrated heavy rainfall that leads to flash floods. Together, these changes increase the likelihood of forest and savanna fires, which degrade vegetation cover and fragment habitats critical to biodiversity conservation.

[26] Punto suspensivos noticias, 2025. Emergencia en el Meta: ya son más de 6000 familias damnificadas en 16 municipios por inundaciones. Disponible en: https://puntossuspensivosnoticias.com/meta/emergencia-en-el-meta-ya-son-mas-de-9000-familias-damnificadas-en-18-municipios-por-inundaciones/

In this context, flooded and gallery forests play a crucial ecological role. These ecosystems act as buffers during extreme hydrometeorological events by regulating water flow and retaining sediments and nutrients. They are also important carbon sinks, with some of the highest carbon storage per hectare in Colombia's biomass[27] (IDEAM, 2013). However, they are increasingly threatened by deforestation, land use change, and hydrological alterations linked to both climate change and human activity. Their loss would not only exacerbate local climate impacts but also contribute to global greenhouse gas emissions.

Tropical forest loss has been shown to significantly impact biodiversity across multiple taxonomic groups, primarily due to habitat area loss, fragmentation, and the disruption of ecological interactions (Brook et al., 2003; 2008; Krauss et al., 2010; Estes et al., 2011). In the Orinoquía, species such as the river dolphins (Inia geoffrensis, Sotalia fluviatilis) are among the most threatened cetaceans worldwide. Climate change impacts on hydrological cycles, particularly alterations to river productivity and fish migration patterns, are reducing suitable habitat availability. These effects are compounded by land use conversion, mainly for cattle ranching near rivers, as well as increased boat traffic from tourism and fishing pressure (Mosquera-Guerra et al., 2016).[28]

Populations of giant otters (*Pteronura brasiliensis*) are also highly vulnerable. Shifting hydroclimatic regimes are altering their foraging behavior, reproductive cycles, and habitat use. These changes, combined with declining prey availability, are expected to reduce body size and lead to a contraction of optimal habitat areas (Fraser & Hofmann, 2003; Sheridan & Bickford, 2011; Fundación Omacha & Corpoguajira, 2015).[29]

Large terrestrial mammals like the lowland tapir (Tapirus terrestris) are at risk due to both direct threats and indirect pressures from land cover conversion. Over 50% of their natural habitat in Colombia has already been transformed, reducing their access to critical resources. Additionally, climate change emerges as a serious threat to the species, as shifts in temperature and precipitation could reduce the potential distribution area and food availability for tapirs, particularly in montane and transitional forest zones.[30] These combined stressors diminish the species' ability to adapt to extreme climate events, such as increasingly frequent wildfires and droughts, thereby accelerating their decline and ecological displacement.

Similarly, the conversion of gallery forests into savannas or agricultural land, often associated with cattle grazing, directly threatens the habitat of apex predators such as the jaguar (Panthera onca) and other umbrella species like the tapir. The displacement of these species not only signals ecological imbalance but also undermines the resilience of the broader landscape to climate-related stressors.

In the Sierra de La Macarena region, in the department of Meta, four threatened mammal species have been officially recorded, as recognized under Resolution 126 of 2024 by Colombia's Ministry of Environment and Sustainable Development (MADS). These include the white-lipped peccary *(Tayassu pecari)*, classified as Endangered (EN), and three species listed as Vulnerable (VU): the southern naked-tailed armadillo (*Cabassous unicinctus*), the giant anteater (*Myrmecophaga tridactyla*), and the giant armadillo (*Priodontes*

[27] https://www.parquesnacionales.gov.co/wp-content/uploads/2020/10/plan-de-manejo-pnn-sierra-de-la-macarena.pdf
[28] https://scispace.com/pdf/biodiversidad-de-la-sierra-de-la-macarena-meta-colombia-57cf7tv2lf.pdf
[29] https://www.minambiente.gov.co/wp-content/uploads/2021/10/Plan-de-manejo-para-la-conservacio%CC%81n-de-las-nutrias-en-Colombia-2016.pdf
[30] https://www.omacha.org/descargas/2025/Libro_Colombia_Pais_de_Tapires.pdf

maximus).[31]These species are highly sensitive to habitat loss, fragmentation, and increased disturbance linked to both deforestation and climate change. Their presence underscores the ecological importance of conserving intact forest landscapes within the project zone to ensure long-term habitat viability and ecosystem integrity.

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

In response to these challenges, the REDD+ project in Meta has formulated a comprehensive adaptation strategy for local communities and biodiversity. The planning follows a theory of change . This approach means that each intervention was designed based on a participatory problem analysis (identifying deforestation drivers and climate vulnerabilities) and is linked to specific outcomes via results chains (cause-and-effect pathways). The ultimate goal is to reduce deforestation and enhance the capacity of both people and ecosystems to adapt to the probable impacts of climate change. Below, the key measures are grouped into major action lines, explaining their purpose and the expected adaptive outcomes for communities and biodiversity.

- **Training and education for the improvement of individual, collective and organizational capacities of project partners**

This line of action seeks to equip project partners—associations and community action boards—with the knowledge, skills, and tools necessary to actively participate in the sustainable management of their territories and build long-term resilience to climate change. Communities involved in the project have identified the lack of technical, environmental, and organizational capacity as a key barrier to forest conservation, along with limited understanding of climate change and the economic opportunities linked to protecting forest ecosystems.

To address this, the project has established a multi-tiered training strategy with three interrelated objectives:

- Build individual, collective, and organizational capacities for project governance
  A targeted training program is being developed for members of the Coordinating Committees, who are responsible for leading implementation. This program includes theoretical and practical modules on project management, finance, administration, environmental governance, communications, green business development, and ICTs. These skills will enable them to manage REDD+ projects, design investment strategies, ensure accountability, and align land use decisions with environmental regulations and sustainability principles. The training process also includes inter-community exchanges and peer learning to foster cooperation, share experiences, and scale best practices.
- Raise environmental awareness and promote behavioral change through participatory education
  A second objective of this line of action is to design and deliver a training program with a differential approach—taking into account gender, generation, and vulnerability—that reaches all project partners. Through participatory workshops, the program will promote deeper understanding of the environmental and social consequences of deforestation, the basic principles of climate change, and the REDD+ mechanism. By highlighting the co-benefits of emission reductions and

[31] https://sinchi.org.co/files/publicaciones/publicaciones/pdf/fauna.pdf

conservation-based economies, this program is expected to engage over 600 partners and catalyze action at the farm level to reduce deforestation.

- Create a community of knowledge on forests and climate change The third component focuses on the development of learning routes, experiential activities, and family life plans to foster environmental consciousness across age groups. These initiatives aim to engage children, youth, adults, and the educational sector to build a shared understanding of ecosystem services, forest values, and climate risks. The ultimate goal is to establish an intergenerational culture of care, promote local leadership, and deepen community-wide participation in the socio-environmental transformation of the territory.

- **Land formalization**

Recognizing that secure land tenure is foundational for climate adaptation, especially in rural Colombia, the project supports voluntary land formalization processes for partners. With technical guidance and legal accompaniment, the initiative helps rural families legitimize their tenure status, enabling:

- Long-term investment in sustainable and climate-resilient land management.
- Improved access to public services, state programs, and legal protection against land-related conflicts.
- Greater motivation for forest conservation and ecosystem service preservation on formalized lands.
- By addressing this historical barrier, the project strengthens community agency and reduces the socio-political vulnerability that exacerbates climate risks.

- **Consolidate the territorial governance of the project partners and strengthen citizen awareness through knowledge management and learning to generate an intergenerational culture for the care and sustainable management of forests.**

Effective governance is central to adaptation. This line of action consolidates territorial governance mechanisms through the creation and operationalization of coordinating and supervisory committees, development of farm plans, and implementation of participatory monitoring systems. These measures:

- Facilitate adaptive management of forests and biodiversity, ensuring timely responses to climate threats such as wildfires, invasive species, or disease outbreaks.
- Encourage landscape-level planning, including zoning for conservation and productive areas, to manage floodplains and buffer zones strategically.
- Promote civic participation, knowledge co-production, and communication strategies that enhance climate literacy and foster collective action.
- Through this approach, communities are better positioned to anticipate, prepare for, and respond to climate-related pressures on their territories and natural assets.

- **Sustainable productive projects**

The most direct interface between climate adaptation and community welfare lies in diversifying and strengthening rural livelihoods. This line of action supports:

- Identification and implementation of sustainable productive projects such as agroforestry, climate-smart agriculture, and sustainable livestock practices.
- Technical assistance and agricultural extension to improve water and soil management, reduce agrochemical dependence, and boost yields under variable climatic conditions.
- Strengthening of value chains to add value to local products, reduce economic vulnerability, and expand market access.
- Increased productivity on existing lands reduces pressure on forests, while better income opportunities improve families' capacity to cope with shocks such as floods or prolonged dry spells.

4 COMMUNITY

4.1 Without-Project Community Scenario

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

The data collected in the project's baseline show a situation of widespread poverty and many limitations of the communities in terms of unsatisfied basic needs, lack of access to services, deforestation and degradation of natural resources that are used as raw materials to generate sources of income. Today the community finds itself in a scenario of frustration due to so many failed projects of the past, and with great distrust in both public and private entities because the projects offered are generally of very short duration and do not meet the objectives set, and in some cases the organizations do not return to the territory.

It is most likely that if the trend continues with the current productive practices, the forests, soils and ecosystems in general in southern Meta will continue to be degraded, which will lead to an increase in the agricultural frontier, rising use and tenure conflicts, progressively depleting the soils, which will ultimately lead to an intensification in the multidimensional poverty levels of the communities.

In chapter 2.1.4 on social parameters, a description was made of the population process through migratory dynamics and the current situation of the communities after the peace agreement, presenting the main municipal data, and in 2.1.12 from the VCS PDD the baseline of the survey conducted to measure the SDGs is presented.

Among the project partners there are at least three large groups and two minority groups, on one hand, the majority group made up of migrant peasant settlers from years ago, who have roots in the territory, but do not have title deeds and hope that someday their land tenure will be formalized (80% who do not have deeds). Within this group, there are 35.67% of possessors, 12.33% of tenants and 52% who have letters of sale that support their ownership.

On the other hand, there are peasant settlers with legal titles to their land (26.38%), some of whom are elders whose children do not live in the territory and do not plan to return, and others who are waiting for the generational replacement for the administration and care of the farms.

The third group is the large absentee landowners, who live in the city and have their farms for livestock production or palm crops, but wish to conserve forest remnants on their properties and are interested in

improving or changing their productive activity because they have suffered the economic impact of the low productivity of their production systems and the effects of climate change.

Finally we find the minority groups, that even though in the project area there are no indigenous reserves or collective territories of black communities, the survey conducted does show the existence of community members who recognize themselves as Afro-Colombian (2.84%) or indigenous (0.17%), thus forming two minority groups within the project, which must be characterized at the beginning of the execution, to establish the differential actions to be implemented and thus guarantee the special rights that cover these communities.

Archetype: The average member is 53 years old, has 3 children, monthly income between 250,000 colombian pesos and 500,000 colombian pesos and has lived in the same village for more than 4 years.

71% of those surveyed are men and 29% women, which is related to the universe of partners that presents 68% men and 32% women.

To contextualize the starting conditions of the communities, the results of the Sustainable Development Goals - SDG survey are presented.

- 52% of those surveyed state that they are owners, 35.67% possessor and 12.33% holder.
- 52.75% say they support the possession in a sales letter, 20.87% in writing and 26.38% in another document.
- 85.64% of those surveyed state that they feel between secure and very secure about their property rights over the land.
- 91.82% of those surveyed state that they are in the subsidized health system, 6.84% in the contributory system and 1.34% do not have coverage.
- 92.49% do not have access to a computer/tablet at home, 7.51% do.
- 96.83% do not have internet access at home.
- 95.49% do not have access to drinking water.
- 0.67% disposes of wastewater in the sewer system, 64.27% in a septic tank and 35.06% in the open sky.
- 1.84% dispose of their solid waste in a sanitary landfill (the truck passes), 59.27% bury it, 31.72% burn it and 7.18% leave it in the open.
- 74.46% do not have access to electricity, 25.54% do have access.
- In general, people who do not have access to electricity use solar energy.
- The municipality most affected by the armed conflict is Vista Hermosa, 79% of those surveyed in said municipality have been victims of the conflict, compared to 49% in Puerto Concordia, 48% in Puerto Rico and 31% in Puerto Lleras.
- Displacement is the violent act experienced.
- It is recorded that the greatest effects of Covid-19 have been economic and very few people have a family member who has contracted Covid-19.

- In general, the state of health is good for all ages, except for the range that includes ages between 64 and 74 years, where the most common response recorded was "fair".
- 56% indicate that the main cause of deforestation is the need to plant pastures for livestock and 26% the lack of economic opportunities.
- 35% indicate that the main consequence of deforestation is the loss of rivers and streams, 26% damage to soil quality and 33% loss of biodiversity.
- The main uses of wood indicated by the respondents are for fences, infrastructure and domestic use.
- 86% of those surveyed cook with firewood.
- The species that cut down the most are cedar, myrtle and cumin.
- The fauna species most affected are the lapa and the armadillo, local species.
- Despite the fact that 81% of the treatment group considers that the socialization process was sufficient, 64% know what their obligations and benefits are, and only 43% know the governance bodies.
- The relation to sustainable actions would like to participate in sustainable agricultural systems (33%), followed by sustainable livestock systems (31%) and land formalization (14%).As a third option, transformation issues and added value to products appear.

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

The communities identified in the project area are mostly low middle-income peasant communities, small and medium landowners who derive their livelihood mainly from livestock and agriculture, with landholdings ranging from 1 to 100 hectares.

However, there are indications that in general there are no conflicts or significant commercial relations, except for some small landowners or owners of less than 10 hectares who offer their labor on the larger farms, especially in the palm oil companies. Data to determine the magnitude of this situation within the project should be collected in the field during implementation.

Relations within the community groups of small and medium landowners are channeled through their grassroots organizational structures, which are the community action boards; eventually the communities participate in projects led by productive associations, but they remain part of the association for the duration of the project.

Large landowners rarely participate in the organizational dynamics of the villages, but they do participate in the processes if they are called upon by the municipal administration or participate through the administrators or owners of their farms.

In general terms, there are good relations between the communal action boards among themselves, and between these and the productive associations, since, in general, there are presidents of the communal action boards in the boards of the associations. However, at times there may be some rivalry between Asojuntas and productive associations, as they compete for resources and representation in relation to projects and resources.

In the framework of the REDD+ project, this rivalry is overcome by recognizing the strategic role of both organizations, because while the community action boards have a role of territorial representation and

concrete community interest, the productive associations are the platform for channeling undertakings and seeking synergies aimed at consolidating value chains.

Relations with people who self-identify as ethnic minorities do not present any type of conflict or evident discrimination, nevertheless as presented on the Ongoing disputes, the relationship with the indigenous communities, next to the project, will be monitored and information will be available for them.

4.1.3 High Conservation Values (CM1.2)

To identify the High Conservation Values (HCVs) within the project area, the Generic Guide for the Identification of High Conservation Values developed by the HCV Resource Network32 was applied. This framework assesses six categories of conservation value: HCV 1 (species diversity), HCV 2 (landscape-level ecosystems and mosaics, including Intact Forest Landscapes), HCV 3 (ecosystems and habitats), HCV 4 (ecosystem services), HCV 5 (community needs), and HCV 6 (cultural values). The identification process considered the key concepts, indicators, and data sources recommended in the guide for each HCV category.

The Ariari River basin is one of the most important hydrological systems in the department of Meta, Colombia, and forms part of the Guaviare–Orinoco river system. The basin encompasses several municipalities, including Vista Hermosa, Puerto Lleras, Puerto Rico and Puerto Concordia, and supports a mosaic of ecosystems ranging from Andean foothills and humid tropical forests to floodplains and savanna landscapes.

These ecosystems provide essential ecosystem services, including hydrological regulation, erosion control, habitat provision and climate regulation. In particular, gallery forests, wetlands and mountain ecosystems play a key role in maintaining water availability and ecological connectivity throughout the basin, while also supporting agricultural production, fisheries and other livelihoods for local communities[33].

Given its ecological importance and its role in sustaining local communities, the Ariari River basin contains several areas that may qualify as High Conservation Values (HCVs), particularly those related to critical ecosystem services (HCV 4), areas fundamental for community livelihoods (HCV 5), and areas important for cultural identity and traditional values (HCV 6).

In addition, the Sierra de La Macarena National Natural Park is one of the most ecologically and culturally significant landscapes in Colombia. Located in the upper basins of rivers such as the Ariari and Guayabero, the park forms a unique biogeographic transition zone where Amazonian, Andean, and Orinoco ecosystems converge, supporting a high diversity of habitats and species and maintaining regional ecological connectivity[34].

Beyond its ecological importance, the landscape also holds significant cultural value (HCV 6). The rivers, forests, and surrounding landscapes are closely linked to the historical occupation, livelihoods, and cultural identity of local communities, whose productive practices and territorial relationships have been shaped by these ecosystems. As a result, the Sierra de La Macarena and its associated river systems, including the

[32] HCV Resource Network. https://cdn.prod.website-files.com/624493bb51507d22cf218d50/6286878c1de2255dee34ecfc_HCVCommonGuide_English-07-17-web.pdf
[33] https://www.anla.gov.co/documentos/biblioteca/szh_rio_ariari.pdf
[34] https://www.parquesnacionales.gov.co/wp-content/uploads/2020/10/plan-de-manejo-pnn-sierra-de-la-macarena.pdf

Ariari basin, represent a landscape where ecological processes and cultural heritage are deeply interconnected.

Table 10. HCV Gallery forest

High Conservation Value	HCV4: Critical ecosystem services - Gallery forests
Qualifying Attribute	Gallery forests that regulate hydrological dynamics, protect riverbanks, and provide habitat for wildlife.
Focal Area	Riparian forests along the Ariari River and its tributaries across Puerto Lleras, Puerto Rico and Puerto Concordia.[35]

Source: Karbon-X

Table 11. HCV Mountain ecosystems

High Conservation Value	HCV4: Critical ecosystem services- Mountain ecosystems
Qualifying Attribute	Mountain ecosystems that capture moisture, regulate the hydrological cycle, and supply water to downstream areas.
Focal Area	Foothills and mountain ecosystems in the upper Ariari basin affecting Vista Hermosa and downstream municipalities

Source: Karbon-X

Table 12. HCV Alluvial floodplains

High Conservation Value	HCV4: Critical ecosystem services - Alluvial floodplains
Qualifying Attribute	Alluvial floodplains and wetlands that regulate flooding and maintain water storage capacity.
Focal Area	Floodplains of the Ariari River across Puerto Rico, Puerto Lleras and Puerto Concordia

Source: Karbon-X

Table 13. HCV Natural forest cover

High Conservation Value	HCV4: Critical ecosystem services - Natural forest cover
Qualifying Attribute	Natural forest cover that provides climate regulation, erosion control, and refuge for biodiversity.
Focal Area	Remaining natural forest patches and humid tropical forests within the Ariari basin landscape

Source: Karbon-X

Table 14. HCV Rivers and water sources

High Conservation Value	HCV 5: Areas fundamental for community livelihoods

[35] https://www.anla.gov.co/documentos/biblioteca/szh_rio_ariari.pdf

Qualifying Attribute	Rivers and water sources used for domestic supply, livestock, and agriculture. Water availability in the region for productive projects and the life of communities
Focal Area	Ariari River basin and tributaries supplying rural communities across Vista Hermosa, Puerto Lleras, Puerto Rico and Puerto Concordia

Source: Karbon-X

Table 15. HCV Rural landscapes

High Conservation Value	HCV 5: Areas fundamental for community livelihoods
Qualifying Attribute	Rural landscapes used for agricultural and livestock production that sustain local economies.
Focal Area	Agricultural and cattle ranching landscapes within the Ariari floodplain and piedmont

Source: Karbon-X

Table 16. HCV Touristic ecosystems

High Conservation Value	HCV 6: Areas important for cultural identity and traditional values
Qualifying Attribute	Ecosystems associated with tourism and ecotourism potential.
Focal Area	Areas near the foothills and natural landscapes of Vista Hermosa and surrounding municipalities

Source: Karbon-X

Table 17. HCV National Natural Park Sierra de la Macarena

High Conservation Value	National Natural Park Sierra de la Macarena HVC 6 local: site of recognized and important historical or cultural value, even if it is not protected by any legislation
Qualifying Attribute	The Serranía de la Macarena is one of the oldest geological formations in Colombia. It was colonized in the mid-twentieth century by peasants displaced by violence, marking a milestone as it was the first amnesty process where economic support was given for the relocation to this region, from where the colonization of the region known as the Macarena Special Management Area spread. The Serranía de la Macarena is appreciated as one of the most outstanding wildlife refuges on the planet since it brings together ecosystems of the Andean, Orinoquia and Amazon regions, it provides water services to the municipalities of Puerto Rico and Vista Hermosa. The communities have created, with the help of the European Fund for Peace, a regional brand called "Serranía La

	Macarena. Territorio mágico" with which they seek to redefine the geographical and historical landmark in a region in search of peace and prosperity. Center of confluence of colonist and peasant interests in terms of conservation.
Focal Area	The areas adjacent to the National Park, which are part of the project, can be converted into a protection buffer. Vista Hermosa and Puerto Rico

Source: Karbon-X

Table 18. HCV Natural Park Laguna San Vicente

High Conservation Value	HVC 6 local: site of recognized and important historical or cultural value, even if it is not protected by any legislation regional Natural Park Laguna San Vicente, Puerto Rico, Meta
Qualifying Attribute	Supply of environmental goods and services and nature tourism activities. Conserve areas with wildlife species, water, and that are unique or attractive scenic areas. Preserve habitats and populations for the survival of species of interest.
Focal Area	Natural Park Laguna San Vicente

Source: Karbon-X

Table 19. HCV Caño Unión

High Conservation Value	HCV 6: site of recognized and important historical or cultural value, even if it is not protected by any legislation Caño Unión waterfalls in Vista Hermosa
Qualifying Attribute	Nature tourism activities. The waterfalls fall in a kind of labyrinth, due to the rock formations of its walls
Focal Area	Caño Unión waterfalls

Source: Karbon-X

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

Under the without-project land use scenario, deforestation in the project zone is expected to continue due to the ongoing expansion of extensive cattle ranching and agricultural activities, which are the main drivers of forest conversion in the region. These activities typically involve the clearing of forest areas to establish low-productivity pastures that support the subsistence of local families. As a result, forest cover and associated ecosystem services are expected to progressively decline.

The degradation and loss of forests would negatively affect the well-being of local communities, whose livelihoods depend directly on natural resources and ecosystem services provided by the forest landscape.

Reduced forest cover would diminish the availability of resources such as water regulation, soil protection, biodiversity, and forest products used for domestic purposes. In addition, the continued expansion of unsustainable land uses would limit opportunities for improving agricultural productivity and income diversification, maintaining local households in low-income production systems and reinforcing cycles of deforestation and environmental degradation.

Given that the project involves approximately 985 members belonging to peasant communities—many of whom are victims of the historical armed conflict in Colombia—the absence of the project would likely weaken community organizations, reduce opportunities for technical training and sustainable production systems, and limit improvements in governance and collective management of forest resources. Consequently, the well-being conditions of these communities would likely remain stagnant or deteriorate under the without-project scenario.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

Table 20. Vulnerable groups.

Community Group	Vulnerable groups: women heads of household, elderly, children and adolescents, day laborers, victims of violence
Impact(s)	Positive impacts. Vulnerable groups are often marginalized and their roles limited to certain activities and excluded from participation in activities and decision-making regarding family and community dynamics. It is expected that by joining the project, these groups will be called upon to have a voice and vote in the project
Type of Benefit/Cost/Risk	Vulnerable groups will have active and equal participation in the proposed project activities, thus emphasizing their relevance and contribution to the project, vindicating their rights and strengthening their capacities and skills.
Change in Well-being	Empowerment and strengthening of vulnerable groups within the family and community groups

Source: Karbon-X

Table 21. Small landowners or holders

Community Group	Small landowners or holders (less than 10 hectares)
Impact(s)	Positive cultural, educational, governance, social and economic welfare impact
Type of Benefit/Cost/Risk	Welfare benefits.land access and use. The project considers involving small landowners regardless of the amount of area contributed in order to ensure that benefits reach all partners

Change in Well-being	-Social appropriation of knowledge about the forest and biodiversity to control deforestation and degradation. Communities achieve long-term goals of their life plans thanks to the articulation of actions and resources. -Partners make decisions on the convenience of implementing productive projects. -Through the implementation of Farm Plans in productive projects, partners adopt new management practices that improve productivity, which contributes to improving family income, migration and quality of life. - Cultural and intergenerational change in the way of seeing and relating to nature and managing the goods and services it offers in an efficient manner. Installed capacities for community self-management. -More resilient communities in the face of climate change. -Claiming the right to land, peaceful environment. - Creation or increase of territorial governance capacity

Source: Karbon-X

Table 22. Medium landowners or holders

Community Group	Medium landowners or holders (51 to 100 hectares)
Impact(s)	Positive cultural, educational, governance, social and economic welfare impact
Type of Benefit/Cost/Risk	Welfare benefits.land access and use. The project considers involving small landowners regardless of the amount of area contributed in order to ensure that benefits reach all partners.
Change in Well-being	Reduction of rural poverty and unsatisfied basic needs. Creation or increase of territorial governance capacity. This group achieves its goals related to its long-term life plans thanks to the articulation of actions and resources. -Partners make decisions on the convenience of implementing productive projects. -Through the implementation of Farm Plans in the productive projects, the partners adopt new management practices that improve productivity, which contributes to improving family income, migration and quality of life. - Cultural and intergenerational change in the way of seeing and relating to nature and managing the goods and services it offers efficiently.

Source: Karbon-X

Table 23. Large landowners or holders

Community Group	Large Landowners and holders (more than 101 hectares)
Impact(s)	Identify impact(s): Positive impacts on ecosystems and communities, as well as cultural, educational, governance, social and economic wellbeing
Type of Benefit/Cost/Risk	Activities will support the design of specific incentives aimed at reducing deforestation and promoting conservation activities on large tracts of land, taking into account the cost of productivity per hectare that is attractive to the partner.
Change in Well-being	- Partners make decisions on the convenience of implementing productive projects. -Through the implementation of Farm Plans in productive projects, partners adopt new management practices that improve productivity. - Cultural and intergenerational change in the way of seeing and relating to nature and managing the goods and services it offers in an efficient manner.

Source: Karbon-X

4.2.2 Negative Community Impact Mitigation (CM2.2)

The main negative impacts on the community are related to the livelihood of those communities and people, whose income derives from activities that are no longer allowed by this project, such as logging. These risks are expected to be mitigated by upgrading their existing activities by making investments, studies and training to increase yield and income and thus reduce the need to deforest to increase their income.

Some others, related to hunting or uncontrolled forest fires, will be mitigated by consolidating forest governance, adopting good production practices through training, and improving knowledge and skills.

There are no project activities that threaten HCVs in the community.

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

Within the net positive welfare of the community, the following changes are expected to be achieved with the implementation of the activities:

Objective 1. Training and education for the improvement of individual, collective and organizational capacities of the project partners.

The following results are expected:

- Coordinating Committees have the necessary skills to manage projects, manage resources, formulate business plans and follow up on investments.
- Project partners develop skills at the personal, family and business levels.
- Project partners form communities of knowledge on forest governance, community organization and associativity, sustainable production and consumption.

- Project partner families define short, medium and long term objectives and goals, and strategies to achieve them, in order to improve their quality of life and become more resilient to climate change.
- Project partner families form a learning community to build and value knowledge.
- Generate roots in the partners and communities on the implementation of good livestock, agricultural and environmental practices.
- To increase the level of knowledge and sensitivity to the impacts generated by human activity on ecosystems.

Objective 2: Support the formalization of property ownership through ownership, titling and judicial processes.

The following results are expected:

- Appropriation and valuation as one's own of productive spaces and forests in formalized properties.
- Consolidate the territorial governance of the project partners, and strengthen citizen awareness through knowledge management and learning to generate an intergenerational culture for the care and sustainable management of the forests.

Objective 3: Implement management actions to advance in the consolidation and adoption of sustainable production processes linked to the conservation and use of forests, improving traditional production systems.

The following results are expected for objective 3:

- Coordinating committees strengthened with planning instruments that support their operability.
- Increased knowledge and social control of the forest and biodiversity on their land.
- A more informed community with the capacity to influence project decisions.
- Communities and other stakeholders are aware of the status of the project and communicate it assertively.
- Complementarity of project actions
- Project activities are in line with environmental determinants.
- Sustainably managed farms
- Capacities for forest harvesting as a long-term sustainable action.

Objective 4: Promote an economy based on sustainable productive projects based on integrated rural development, contributing to the closing of the agricultural frontier and the improvement of forest goods and services.

The expected results of Objective 4 are:

- Creation of consensus on the needs for support to productive projects and the prioritization of these.
- Productive activities and their financing included within the strategic plans.
- Guarantee the participation of the partners in the definition of the productive projects: "The partners have a guide that allows them to implement good agricultural and environmental practices that guarantee the sustainability of the productive projects.
- Decrease dependence on agrochemicals and rationalize their use.
- The coordinating committees are aware of the members' agricultural activities and technical assistance needs.

- The Coordinating Committees have a document that allows them to manage resources (human, technical and financial) for the targeting of technical assistance and agricultural extension activities.
- The Coordinating Committees identify gaps in production systems and alternative solutions.
- Technical assistance and agricultural extension activities contribute to the development of members' capacities and skills by strengthening aspects such as administration, management and process development, with a view to improving competitiveness and agricultural productivity.
- To guarantee the variety of products in the farm of the partners that contributes to the decrease of the dependency to a single productive system.
- Open the possibility of new business opportunities and sources of income, facilitating the creation of new products and services.
- Increase in employment opportunities. Fair and equitable distribution of economic benefits.
- Facilitate marketing and distribution channels and create alliances with direct buyers to reduce intermediation and increase profits for the partners. Transforming products with added value and generating competitive advantages in the market with the development of production lines.

As described in Section 3.5.2 (Climate Change Impacts), the project area is exposed to several climate-related risks, including forest fires, floods and droughts, which may affect forest ecosystems, agricultural productivity and the livelihoods of rural communities in the municipalities of Vista Hermosa, Puerto Rico, Puerto Lleras and Puerto Concordia. These climate-related hazards are expected to intensify under future climate change scenarios and therefore represent a key challenge for the long-term sustainability of both ecosystems and community livelihoods.

In response to these risks, the project integrates a set of activities designed to strengthen the adaptive capacity and resilience of local communities. These measures are aligned with the Theory of Change described in Section 2.1.8, which links sustainable land management, forest conservation and community capacity building with improved resilience to climate variability and extreme events.

First, the project promotes capacity building and environmental education programs aimed at strengthening individual, collective and organizational capacities among project partners and local associations. These training processes improve understanding of climate change, forest ecosystem services and sustainable land management practices, enabling communities to better anticipate and respond to climate-related risks.

Second, the project supports the transition toward more sustainable and diversified production systems, including improved livestock practices and agroforestry-based systems. These practices increase soil fertility, reduce land degradation and enhance ecosystem functions such as water regulation and carbon storage. By improving productivity while maintaining forest cover, these systems reduce the vulnerability of rural livelihoods to climate variability.

Third, the project strengthens community governance and territorial management capacities through the consolidation of associations, community action boards and coordinating committees. These governance mechanisms enable communities to collectively manage forest resources, monitor environmental changes and implement adaptive land-use decisions that respond to climate and socio-economic pressures.

Finally, the project contributes to land tenure formalization processes, which increase legal certainty over land ownership and create incentives for long-term investment in sustainable and climate-resilient land management practices. Secure land tenure strengthens the willingness of landholders to conserve forests and maintain ecosystem services that are essential for climate adaptation.

Through these integrated interventions, the project contributes to enhancing the adaptive capacity of rural communities while simultaneously protecting forest ecosystems that provide critical ecosystem services, including climate regulation, water regulation and soil protection. As a result, the project supports both climate mitigation and community adaptation, consistent with the Gold Level criteria for climate change adaptation benefits.

4.2.4 High Conservation Values Protected (CM2.4)

The present and future well-being of the community depends on the possibility of improving the current dynamics of soil use, because livelihoods based mainly on livestock and agriculture are based on cultural practices that lead to the progressive degradation of soils, which motivates increased deforestation to access new soils.

The project will provide technical assistance and the necessary technological packages to improve productivity and thus prevent families from having to deforest in order to access new land for cultivation. This will ensure livelihoods for the community.

All project activities will respect national, regional and municipal environmental determinants and land use and management guidelines, so that protected areas and other areas with high conservation values for the local communities will be better preserved indirectly, thanks to the economic alternatives that the project will generate for the communities. Also, as many of the project areas are located in the buffer zones of, for instance national and regional parks.

Regarding the presence of sacred, cultural and archaeological sites, most people agree that there is no presence of these sites. However, the members of the community consider the Serranìa de la Macarena, rivers and spas as spaces of cultural importance and the lagoons as places of special interest that should be consolidated as reserves for the region due to the presence of flora and fauna.

It is important to clarify that there is no presence of indigenous groups or Afro-descendants. The population is mostly settlers who came from different areas of the country to look for a job opportunity and productive land for their usufruct.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

Positive

- Mayors' offices, the governor's office and environmental authorities benefit because the project contributes to the fulfillment of their jurisprudential mandates and institutional goals to reduce deforestation.

- Rural development and post-conflict agencies can benefit by strengthening the communities' productive projects for alternative rural development.

- All the region will be beneficiated by the conservation of buffer areas around water supplies as well as interconnectivity on other ecosystem services.

Negatives

- Collection center, by increasing productivity and promoting value chains, would affect current intermediaries in product marketing.

- Potential conflicts between sawmillers and communities committed to conservation.

- The relationship between the community and the environmental authorities could be weakened by the empowerment of the community in the governance of their forests.

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

The project has identified potential negative well-being impacts on certain stakeholders and has designed specific measures to prevent or mitigate these impacts through dialogue, capacity building and the promotion of alternative economic opportunities.

Intermediaries in product commercialization (transporters and traders).

To prevent exclusion of existing actors in local value chains, the project will promote fairer and more transparent commercialization conditions among stakeholders. Strategic alliances between partner organizations and intermediaries will be encouraged, enabling these actors to participate in improved and more sustainable value chains while strengthening market access for local producers.

Sawmillers.

As the project restricts commercial timber extraction within the project area, social dialogue processes will be promoted with local sawmillers to prevent conflicts. Environmental education activities will be implemented to raise awareness about forest conservation, while alternative livelihood opportunities—particularly green employment linked to sustainable agricultural and livestock production systems promoted by the project—will be encouraged.

Environmental authorities.

The project will maintain continuous coordination and dialogue with environmental authorities in order to align project activities with regional environmental policies and programs. Through this collaboration, the project will seek to identify and strengthen synergies that contribute to forest conservation and sustainable development while minimizing potential institutional conflicts.

Indigenous communities located near the project area.

The project area in the municipality of Puerto Concordia includes private properties that are geographically contiguous to legally recognized indigenous reserve (resguardo indígena) territories, as documented in the geospatial records of the Agencia Nacional de Tierras (ANT) and publicly available through the Portal Nacional de Información Geoespacial (Colombia en Mapas, https://www.colombiaenmapas.gov.co/). It is

important to note that no project parcels overlap with or fall within any indigenous reserve area; the project operates exclusively on private properties located adjacent to these territories.

Although the indigenous community located near the project area has not shown interest in participating in informational meetings, the project will continue to maintain open communication channels and share relevant information about project activities. Awareness campaigns promoting sustainable wildlife management and the prohibition of hunting within private properties participating in the project will also be implemented. All project activities will respect and comply with the rights of Indigenous Peoples in accordance with applicable national legislation, including Law 21 of 1991, which incorporates ILO Convention 169 into Colombian law.

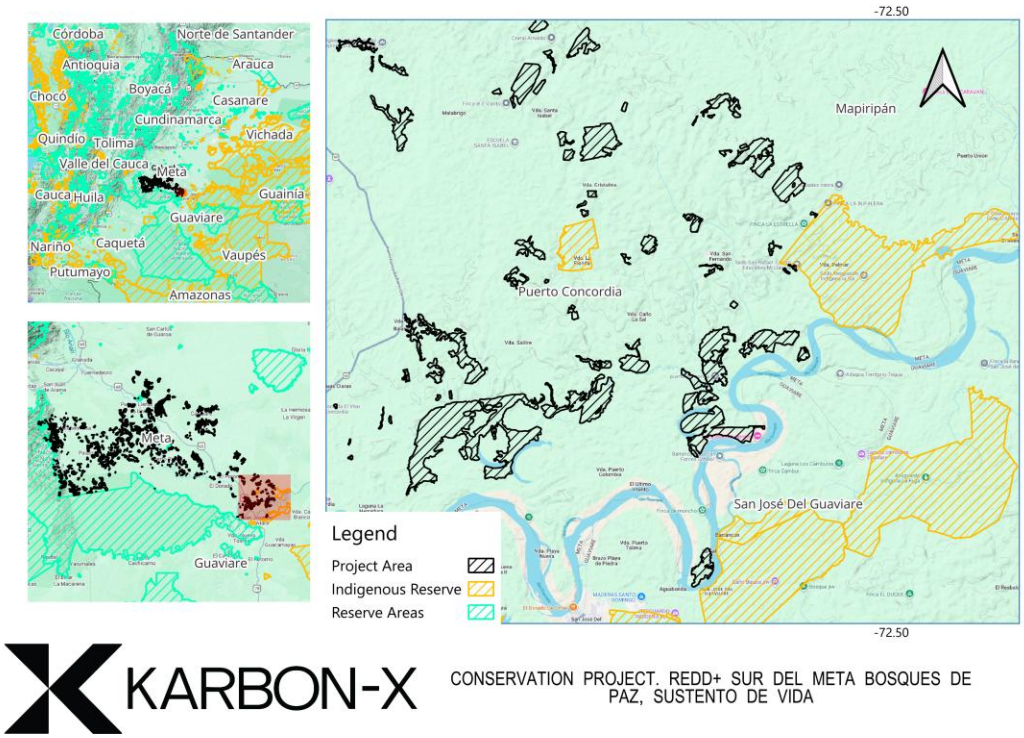


Figure 2. Project Area, Indigenous Reserve and Reserve Areas. Source: Karbon-X, 2026.

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

The project is not anticipated to result in net negative impacts on the well-being of other stakeholders. While certain groups may experience transitional adjustments as a result of project activities, the mitigation measures outlined in CM3.2 are designed to ensure that potential adverse effects are offset by broader social, economic, and environmental benefits.

4.4 Community Impact Monitoring

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

The Social Monitoring Plan (SOP ID 2084_09, Plan de Monitoreo Social) establishes the system through which the project tracks, evaluates and reports the impacts generated on partner communities, identified community groups and stakeholders across the four project municipalities of Vista Hermosa, Puerto Rico,

Puerto Lleras and Puerto Concordia. The plan covers the full project lifetimeand is aligned with the GHG accounting period and the CCB benefit assessment period. The following section summarises the plan's structure, scope and key components; the complete plan is available as a standalone document (SOP ID 2084_09).

The monitoring plan covers three levels of community actors. The first level comprises the partner landowners (socios propietarios) — over 900 farming families who have entered into commercial agreements with the project and are the primary agents of forest conservation and sustainable production. The second level comprises the village committees (comités veredales), which serve as the organisational link between individual partners and the municipal corporations, functioning as the primary space for participatory decision-making, priority setting and information dissemination. The third level comprises the four municipal corporations which are the formally constituted legal entities responsible for project implementation, strategic planning, accountability and institutional coordination at the municipal level.

The plan applies a two-level classification system to ensure differentiated impact assessment. Level 1 classifies partners by property size (micro-owners <10 ha, small owners 11–49 ha, medium owners 50–99 ha, and large owners >100 ha), which serves as the primary analytical unit for economic and productive variables. Level 2 applies a cross-cutting vulnerability layer identifying women, elderly persons, youth (children and adolescents), day labourers (jornaleros), and victims of the armed conflict. A single partner may belong to more than one group simultaneously, enabling the monitoring system to capture both productivity-related and vulnerability-related impacts without multiplying analytical units.

All monitoring variables are derived from the project's Theory of Change, which is structured around four specific objectives: (SO1) training and capacity-building for individual, collective and organisational development; (SO2) support for land tenure formalization; (SO3) consolidation of territorial governance and intergenerational environmental awareness; and (SO4) promotion of a sustainable productive economy to close the agricultural frontier. Each variable traces directly from an activity to a product, indicator, target and measurement method defined in the Theory of Change, ensuring full traceability between project actions and monitored outcomes.

4.4.2 Monitoring Plan Dissemination (CM4.3)

The dissemination of the Social Monitoring Plan and its results is governed by the project's Communication Manual (Manual de Comunicación, SOP 2084_06), which establishes the principles, channels and practices applicable to all project information-sharing with communities and stakeholders. The complete Social Monitoring Plan is publicly available through the project's digital repository on the Karbon-X website. The following mechanisms ensure that summaries and results reach all communities and stakeholders:

Monitoring results are communicated to communities through the project's multi-channel system. Monthly virtual meetings with project partners serve as the primary space for presenting monitoring progress, explaining results and receiving direct feedback. The community bulletin Voces del Bosque, produced monthly by Karbon-X, provides accessible summaries of monitoring findings, partner testimonials and key takeaways in plain language adapted to the rural context. WhatsApp groups deliver reminders, key messages and audio explanations of monitoring results on a continuous basis. The annual General Assembly of each municipal corporation presents the consolidated annual monitoring report, including the SDG Survey results, and constitutes the formal space for community evaluation of project impacts. The project's website and social media channels (Facebook and Instagram) provide permanent public access to technical reports and monitoring documentation.

All monitoring reports are produced in Spanish and written or summarised in plain language to eliminate comprehension barriers. Information flows through the project's governance structure. This two-way structure ensures that results reach all communities and that community feedback is incorporated into the adaptive management of the monitoring plan. Any person may additionally request specific information through the project's PQRS mechanism (Petitions, Complaints, Claims and Suggestions), which operates continuously, confidentially and without reprisal.

Following each external audit cycle (validation or verification), audit results are communicated to communities through the bulletin, WhatsApp groups and monthly meetings, with a plain-language summary of the auditor's principal conclusions. Full audit reports (originally produced in English) are translated into Spanish and published in the project's digital repository.

4.5 Optional Criterion: Exceptional Community Benefits

4.5.1 Exceptional Community Criteria (GL2.1)

The REDD+ Sur del Meta Project is implemented in a territorial context characterized by low levels of human development and high levels of poverty, thereby meeting the eligibility criteria for Gold Level validation for exceptional community benefits under the Climate, Community & Biodiversity (CCB) Standards.

The project area is located in the municipalities of Vista Hermosa, Puerto Rico, Puerto Lleras, and Puerto Concordia, in the department of Meta, Colombia. According to the National Administrative Department of Statistics (DANE), these municipalities present high levels of monetary and multidimensional poverty, particularly in rural and dispersed rural areas. Data from the Multidimensional Poverty Index (MPI) indicate significant development gaps between urban and rural areas in Meta, with rural communities experiencing the highest levels of deprivation related to education, employment, access to basic services, and housing conditions.

Furthermore, according to the United Nations Development Programme, although Colombia is classified as a country with high human development, significant territorial disparities persist across the country. Evidence from national human development analyses shows that rural and conflict-affected regions, particularly those located in peripheral departments such as Meta, exhibit substantially lower development indicators than the national average. These disparities reflect a pronounced territorial gap between urban centers and rural areas, where limitations in infrastructure, public services, and economic opportunities continue to constrain human development outcomes (UNDP, 2022)[36]. These territorial fractures are closely linked to historical patterns of violence, institutional fragility, and environmental degradation that have shaped development trajectories across the country.

Territorial diagnostics developed within national initiatives such as the Territorially Focused Development Programs (PDET), together with statistical evidence from the National Administrative Department of Statistics, reveal persistent poverty and structural socioeconomic constraints in rural municipalities affected by armed conflict. According to the 2023 Quality of Life Survey for PDET municipalities, 70.2% of household heads report perceiving themselves as poor, with even higher levels in rural and dispersed areas (75.6%) compared to municipal centers (63.3%). These territories are characterized by local economies largely dependent on small-scale and subsistence agriculture, alongside limited access to markets, infrastructure,

[36] https://www.undp.org/sites/g/files/zskgke326/files/2024-05/undp_co_pub_indh_resumen_ejecutivo_may_22_2024.pdf

and public services, conditions that continue to restrict economic diversification and development opportunities (DANE, 2023)[37].

These communities have been historically affected by armed conflict, forced displacement, and prolonged institutional absence, which has constrained socio-economic development opportunities and increased vulnerability to environmental pressures such as deforestation and land-use change. In this context, the REDD+ Sur del Meta Project is implemented in a territory where structural conditions of poverty and social exclusion are prevalent, fulfilling the CCB criterion for administrative areas within countries of medium or high human development in which at least 50% of households are below the national poverty line.

In addition, participating communities maintain a direct and long-standing relationship with the territory, engaging in productive activities and landscape management practices that are fundamental to the generation of the project's climate, community, and biodiversity benefits. While full land tenure formalization remains a challenge in the region, the project recognizes and strengthens existing rights of use, occupation, and territorial management, promoting active community participation in decision-making processes and in the implementation of REDD+ activities.

Moreover, the REDD+ Sur del Meta Project places a strong emphasis on social inclusion and the empowerment of historically marginalized groups. Specific efforts are directed toward women, youth, and victims of the armed conflict, ensuring that their participation is voluntary, meaningful, and based on their capacity to contribute rather than on quotas. Through targeted training, leadership opportunities, and mechanisms for equitable resource distribution, the project fosters empowerment and strengthens community resilience. This approach not only enhances the quality of participation but also generates transformative social benefits that go beyond traditional development indicators, consolidating the project's eligibility for Gold Level recognition under the CCB Standards.

In this context, the REDD+ Sur del Meta Project represents not only a climate mitigation initiative but also a territorial peacebuilding intervention that contributes to reducing structural drivers of conflict such as poverty, economic marginalization, and institutional absence. By strengthening community capacities, improving livelihoods, and supporting forest conservation, the project generates significant and transformative benefits for local communities.

Consequently, the REDD+ Sur del Meta Project meets the eligibility requirements for Gold Level Exceptional Community Benefits, as it is implemented in a territory characterized by high levels of poverty, social vulnerability, and development gaps, where project interventions generate significant, additional, and transformative benefits for local communities.

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

The REDD+ Sur del Meta Project is designed to generate net positive well-being benefits for smallholders and community members in both the short term and the long term, directly linked to project implementation and sustained over time through strengthened local capacities and governance structures.

In the short term, the project provides immediate socio-economic benefits through the active participation of community members in project-related activities. These include employment and income opportunities associated with forest monitoring, social facilitation, community assemblies, environmental education, and technical field activities. Capacity building processes such as training in sustainable land management, forest conservation, community monitoring, and organizational strengthening enhance local skills and

[37] https://www.dane.gov.co/files/operaciones/ECV/bol-PDET-ECV-2023.pdf

knowledge, contributing to improved livelihoods and increased social capital. Additionally, the project facilitates access to information, participatory decision-making spaces, and benefit-sharing mechanisms, strengthening trust and transparency between the project and participating communities.

In the long term, the project contributes to sustainable improvements in community well-being by supporting the diversification and stabilization of local livelihoods, reducing dependency on activities associated with deforestation and forest degradation. Through the implementation of long-term benefit-sharing mechanisms derived from carbon revenues, the project promotes investments in productive, social, and environmental initiatives identified by the communities themselves. These initiatives aim to improve household income, food security, access to basic services, and community infrastructure, while reinforcing sustainable land-use practices.

Furthermore, the project strengthens local governance and community organization, enabling communities to play an active role in territorial management, environmental decision-making, and monitoring processes. By integrating local knowledge with technical systems, the project enhances adaptive capacity to climate-related risks such as droughts, fires, and pest outbreaks. Over time, these combined interventions contribute to increased resilience, reduced vulnerability, and improved overall well-being for smallholders and community members.

In addition, the project has already delivered tangible inputs to participating communities to strengthen their productive initiatives, all of which were selected by the communities themselves based on their priorities and needs. These inputs include materials for the installation of livestock fencing to prevent forest encroachment and reduce deforestation, agricultural supplies to support crop production, and a large-scale delivery of native tree seedlings for reforestation activities across the four municipalities within the project area. These actions demonstrate the project's immediate and practical contribution to community livelihoods while reinforcing conservation and regeneration objectives.

4.5.3 Community Participation Risks (GL2.3)

The REDD+ Sur del Meta Project recognizes that the effective participation of smallholders and community members including campesino families, community leaders, women, youth, and other local stakeholders may be affected by various social, economic, and historical risks, which have been identified and analyzed through participatory processes conducted as part of project implementation.

One of the main risk factors identified is related to the historical context of armed conflict that has affected the southern Meta region for several decades. This context has generated distrust toward external actors, fear of participation in collective initiatives, low initial willingness to engage in dialogue, and past experiences of stigmatization, unfulfilled commitments, or security-related impacts on communities. These dynamics have influenced levels of community participation, particularly during initial engagement stages, and affect not only smallholders but the broader social fabric of the territory.

In addition, other relevant participation risks have been identified, including: 1) time and availability constraints linked to subsistence-based livelihoods; 2) information and capacity asymmetries that may limit understanding of REDD+ technical processes; 3) geographic dispersion and limited connectivity, characteristic of rural areas; and 4) risks of exclusion affecting historically marginalized groups such as women, youth, and households in situations of heightened vulnerability.

The project design incorporates specific measures to avoid negative trade-offs and to effectively manage the identified risks. From its inception, the project adopts a progressive trust-building approach, prioritizing long-term territorial engagement, active listening, and respect for community timelines and local dynamics.

Prior to the implementation of any activity, the project conducts prior and participatory consultations with communities, ensuring that decisions are made in an informed, voluntary, and collective manner.

Furthermore, the project promotes gradual and non-coercive participation, recognizing the sensitivities of a conflict-affected context and avoiding undue pressure on communities. Community activities are scheduled flexibly and aligned with local productive calendars and security conditions, thereby reducing opportunity costs and perceived risks for participants.

To address information asymmetries and strengthen trust, the project implements a clear, continuous, and culturally appropriate communication strategy, using accessible language, pedagogical materials, and a sustained on-the-ground presence. Equitable participation of women, youth, and other vulnerable groups is actively promoted through inclusive methodologies and the creation of safe dialogue spaces.

In addition, the project has established a grievance redress mechanism (PQRS) that is transparent, accessible, and culturally appropriate, allowing concerns to be raised and addressed in a safe and confidential manner particularly important in a context shaped by past violence and institutional distrust. This mechanism, together with ongoing social monitoring, enables the project to adapt participation strategies over time.

Collectively, these measures ensure that the REDD+ Sur del Meta Project effectively manages participation-related risks in a conflict-affected territory, avoids negative impacts or undue trade-offs, and promotes inclusive, informed, voluntary, and sustained community participation.

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

The REDD+ Sur del Meta Project applies a Do No Harm and social equity approach through early identification of vulnerable groups, continuous social monitoring, and community feedback mechanisms. Any potential negative impacts are identified through participatory processes and addressed in a timely manner through preventive, corrective, and adaptive measures, ensuring that project benefits are net positive for all involved community groups.

Table 24. Rural Smallholder Campesino Families

Community Group 1	Rural Smallholder Campesino Families with subsistence or low-scale livelihoods, located in dispersed rural areas, with limited access to basic services, infrastructure, markets, and land formalization processes.
Net positive impacts	The project generates positive well-being impacts through income opportunities linked to project activities (e.g., forest monitoring, community participation, social facilitation), capacity-building in sustainable land management, improved access to information, and participation in benefit-sharing mechanisms derived from carbon revenues. These impacts contribute to improved livelihoods, reduced economic vulnerability, and strengthened community resilience.
Benefit access	The project identifies and addresses barriers such as geographic dispersion, time constraints, and information asymmetries through a sustained on-the-ground presence, flexible scheduling of activities, accessible communication, and participatory methodologies. Participation is ensured to be

	voluntary, informed, and non-exclusive, guaranteeing equitable access to project benefits.
Negative impacts	Potential risks such as opportunity costs related to time commitment or misunderstandings regarding project obligations are identified. To avoid negative impacts, the project implements clear socialization processes, prior consultation before any activity, a grievance redress mechanism (PQRS), and continuous social monitoring. Unforeseen impacts are addressed through timely and participatory corrective measures.

Source: Karbon-X

Table 25. Rural women

Community Group 2	Rural women, including female-headed households, with productive and reproductive roles that are often unpaid and with historical limitations in access to decision-making spaces, income-generating opportunities, and community representation
Net positive impacts	The project promotes the active participation of women in community spaces, capacity-building processes, sustainable productive activities, and governance mechanisms, strengthening autonomy, skills, social recognition, and access to economic and non-economic benefits generated by the project.
Benefit access	Cultural, time-related, and caregiving barriers are identified and addressed through inclusive methodologies, flexible schedules, safe participation spaces, and the explicit promotion of women's participation in community decision making bodies.
Negative impacts	Risks such as increased workload or indirect exclusion are assessed. To mitigate these risks, participation remains voluntary, benefit distribution is monitored for equity, and project activities are adjusted to avoid negative impacts on women's well-being.

Source: Karbon-X

Table 26.Rural youth

Community Group 3	Rural youth with limited access to educational, employment, and participation opportunities, and high exposure to migration pressures, illegal economies, or social exclusion.

Net positive impacts	The project strengthens youth technical and social capacities through training processes, participation in community monitoring, environmental leadership, and sustainable productive activities, promoting local employment opportunities and territorial rootedness.
Benefit access	Barriers to youth participation are addressed through adapted methodologies, dedicated participation spaces, and integration with existing community processes, ensuring equitable access to project benefits.
Negative impacts	Risks such as unrealistic expectations or limited sustained participation are identified. These are mitigated through continuous accompaniment, clear communication regarding project scope, and monitoring of youth engagement.

Source: Karbon-X

4.5.5 Net Impacts on Women (GL2.5)

The REDD+ Sur del Meta Project is designed to generate net positive impacts on the well-being of women, recognizing their fundamental role in territorial management, rural livelihoods, environmental conservation, and social cohesion. The project adopts a gender equity approach, ensuring that women not only have access to project benefits but also actively participate in and influence decision-making processes.

In terms of well-being, the project promotes positive impacts through the strengthening of women's technical, organizational, and productive capacities, including training in sustainable land management, participation in project-related community activities, environmental education, and access to opportunities linked to benefit-sharing mechanisms. These actions contribute to improved livelihoods, enhanced economic autonomy, and increased recognition of women's roles within their communities.

Regarding participation and influence in decision-making, the project actively promotes the inclusion of women in community spaces, assemblies, local committees, and governance structures associated with the project. Women's effective participation is fostered through inclusive methodologies, explicit support for women's leadership, and mechanisms that ensure women's voices are heard and incorporated into decisions related to project planning, implementation, and benefit distribution.

The project proactively identifies and addresses structural barriers that may limit women's participation, such as disproportionate caregiving and domestic workloads, cultural norms, time constraints, and limited access to information. Measures such as flexible scheduling, safe participation spaces, accessible communication, and continuous on-the-ground support are implemented to ensure that participation is voluntary, informed, and equitable.

In addition, the project conducts gender-responsive social monitoring, enabling early identification of any potential negative impacts on women's well-being and the implementation of preventive, corrective, or adaptive measures as needed. Through these mechanisms, the project ensures that its interventions do not create additional burdens or adverse impacts on women.

Overall, the REDD+ Sur del Meta Project demonstrates that it delivers additional, sustained, and net positive impacts on women's well-being, while strengthening women's participation and influence in decision-making.

4.5.6 Benefit Sharing Mechanisms (GL2.6)

The REDD+ Sur del Meta Project has benefit-sharing mechanisms that have been designed and implemented through participatory processes, ensuring that smallholders and community members fully, effectively, and informatively participate in both the definition of decision-making processes and the structure and operation of the benefit-sharing mechanism.

From the early stages of the project, the benefit-sharing mechanism has been developed through participatory spaces, including community meetings, socialization workshops, local assemblies, and continuous dialogue processes in the territory. These spaces have enabled communities to express their expectations, priorities, and concerns, which have been incorporated into the mechanism's design, ensuring that benefit distribution responds to local realities, needs, and dynamics.

The benefit-sharing mechanism clearly establishes that more than 50% of project revenues are allocated directly to the communities, while the remaining % is allocated to project operational costs, which are necessary to ensure long-term implementation, sustainability, monitoring, validation, verification, and overall project management. This structure has been socialized and discussed with the communities, allowing for a transparent understanding of how project resources are generated, managed, and distributed.

In addition, as part of strengthening community governance and providing a legal foundation for benefit distribution processes, community-based corporations have been established—one in each municipality within the project area. These corporations serve as legal entities representing the communities, facilitating resource management, collective decision-making, and engagement with the project and third parties, thereby reinforcing community autonomy and empowerment.

Furthermore, the project promotes community participation in the monitoring and oversight of the benefit-sharing mechanism through the established municipal community corporations and other representative structures, as well as through the project's grievance redress mechanism (PQRS), which allows concerns related to benefit allocation or use to be addressed in a transparent manner.

4.5.7 Benefits, Costs, and Risks Communication (GL2.7)

The project has established a systematic, continuous, and participatory communication process to ensure that smallholders and community members receive relevant, adequate, and understandable information about the predicted and actual benefits, costs, and risks associated with the project, and that this information is effectively understood.

Communication has been carried out through multiple channels and methodologies, including in-person community meetings, local assemblies, participatory workshops, open dialogue spaces, field visits, and ongoing support provided by the project's social team. Information is presented using clear and accessible language, avoiding unnecessary technical terminology and adapting content to the cultural, educational, and territorial contexts of the communities.

With respect to project benefits, the project has clearly communicated the types of expected benefits, both monetary and non-monetary, including those derived from carbon credit generation, benefit-sharing mechanisms, capacity building, livelihood improvement, and the environmental and social benefits associated with forest conservation and territorial regeneration. It has also been explained that benefits are realized progressively and are subject to project performance, validation, and verification processes.

Regarding costs, the project has transparently communicated the operational costs required for project implementation and sustainability, including technical, social, administrative, monitoring, validation, and verification activities. The resource allocation structure has been explicitly explained, ensuring that communities understand how project funds are managed and used.

In terms of risks, the project has openly communicated potential risks associated with project implementation, such as delays in revenue generation, carbon market fluctuations, climate-related, social, or institutional risks, and operational constraints. These risks have been discussed in a participatory manner, together with the mitigation measures adopted by the project and the role of communities in managing these risks.

Additionally, the project maintains continuous social monitoring, which allows for the identification of information gaps, correction of potential misunderstandings, and adaptive adjustments to communication strategies. This approach ensures that information on benefits, costs, and risks is not only shared but internalized and owned by the communities, strengthening trust, transparency, and informed participation.

4.5.8 Governance and Implementation Structures (GL2.8)

The governance structure of the REDD+ Sur del Meta Project (described in detail in Section 2.4.1 above) has been designed to enable the full and effective participation of smallholders and community members in project decision-making and implementation at every level. This section demonstrates how that structure functions in practice as a mechanism for meaningful community participation rather than nominal representation.

Individual landowners and land holders participate in the project through village-level committees, which serve as the primary self-governance and aggregation unit for smallholders across the four municipalities. These committees are organized at the vereda level, the most immediate unit of rural social organization in the territory, and their representatives are elected directly by the partner members through a voting process. This bottom-up structure ensures that participation begins at the most local level, where partners have direct knowledge of their territory and its conditions.

The 20 active veredal committees are in turn represented within the four municipal corporations, creating a two-tier aggregation structure that connects individual smallholders to the formal governance bodies of the project. Elected representatives from the committees hold positions within the corporations, ensuring that the interests and priorities of the broader partner base are carried upward into corporate decision-making. This structure allows the project to operate at scale across more than 40,000 hectares while maintaining genuine community representation at the base.

Decision-making authority within the community governance structure rests with the Board of Directors (Directorio) of each municipal corporation, whose members are elected by general assembly and renewed every two years. This electoral mechanism ensures that leadership is accountable to the partner base and can be replaced when the assembly so decides. The general assembly itself (in which all partners may

participate) is the highest decision-making body of each corporation, and it is through this space that key project decisions, including benefit-sharing arrangements and governance priorities, are deliberated and adopted.

Ongoing participation between assemblies is maintained through monthly meetings with project partners, which serve as the primary recurring forum for information sharing, discussion of project activities, and collection of community input. When community input raises issues requiring management adjustments, these are elevated to ALLCOT Sur del Meta LLC for joint evaluation with the relevant corporation, ensuring that partner voices translate into concrete responses rather than remaining unaddressed.

The structure incorporates several features designed to prevent the concentration of decision-making in the hands of the implementing entity and to preserve genuine community autonomy. ALLCOT Sur del Meta LLC participates in the corporate governance bodies with voice but without voting rights, ensuring that commercial interests do not override community decisions. Karbon-X acts as an external observer without governance authority over the corporations. Supervisory committees operating at both the veredal and municipal levels provide an independent community-level check on the transparency of project execution and the functioning of the grievance and safeguards mechanism. The corporations are additionally subject to external audit by the Gobernación del Meta through its Secretaría de Participación Social, providing a further layer of accountability beyond the project itself.

Any partner may also raise concerns or requests at any time through the project's grievance mechanism (PQRS), which is accessible through multiple channels and guarantees confidentiality and non-retaliation, ensuring that participation is not limited to formal governance spaces.

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

The project incorporates a comprehensive capacity development approach aimed at strengthening the technical, organizational, administrative, and social capacities of smallholders and community members, as well as relevant local organizations and institutions, in order to ensure their active, effective, and sustained participation in project design, implementation, and management.

Capacity development is implemented through continuous training and on-the-ground accompaniment processes, designed in a participatory manner and adapted to the social, cultural, and educational conditions of the communities. A key element of this approach is the articulation with regional universities, such as Universidad Santo Tomás, which provide academic rigor, pedagogical methodologies, and, where applicable, certification of training processes, thereby generating greater impact, legitimacy, and long-term sustainability in community capacity development.

These training processes cover key topics including REDD+ fundamentals, forest conservation and sustainable land management, community-based monitoring, climate change adaptation, local governance, community leadership, organizational management, and conflict resolution. The involvement of academic institutions allows training content to be tailored to local realities and strengthens practical learning, promoting capacities that extend beyond the project and remain within communities over the long term.

In addition, the project strengthens the organizational and management capacities of community governance structures and the municipal corporations established in each of the project municipalities. This includes training in basic administration, financial management, collective decision-making, accountability,

participatory planning, and compliance with legal requirements, enabling communities to take a leading role in resource management and in the implementation of project activities.

From a technical implementation perspective, the project promotes the direct participation of both small and large producers, as well as other community members, in activities such as forest and environmental monitoring, field data collection, and the implementation and follow-up of conservation and regeneration actions. The project adopts an inclusive approach that recognizes the diversity of actors within the territory and seeks to ensure that all participants, regardless of the scale of their landholdings or productive activities, are protected and have access to project benefits and opportunities, based on principles of equity and shared responsibility.

Furthermore, the project supports the capacity development of relevant local and institutional actors through coordination with local authorities, community organizations, producer associations, and other initiatives present in the territory. This coordination contributes to institutional coherence, long-term sustainability, and the integration of the project into broader territorial development processes.

Capacity development is continuously monitored, allowing progress to be assessed, gaps to be identified, and training processes to be adaptively adjusted. Through this approach, the REDD+ Sur del Meta Project ensures that both small and large producers and community members are equipped with the necessary tools to participate in an informed and effective manner in decision-making processes, assume management responsibilities, and benefit fairly from the project.

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (B1.1)

The methodology used to generate the baseline and, in turn, estimate the changes in biodiversity is based on the identification of potential species in the project area. Potential species are defined by searching certified databases for this purpose in the country and reviewing scientific literature. Based on this information, lists of species that have been reported in ecosystems, forests, semi-natural areas or other types of cover similar to those found within the project area are generated.

To establish the current state of biodiversity in the project area, three taxonomic groups have been considered that have abundant information in the country. Specifically, four classes mammalia, reptilia, amphibia and birds. It should be noted that these taxonomic groups are widely used in the baseline characterization for environmental studies in Colombia, mainly those that include the perspective of environmental impact assessment[38].

In Colombia, the main sources of information that are also associated with cartographic products are:

- Sistema de información sobre Biodiversidad (SiB) en Colombia. Available on: https://biodiversidad.co/

[38] https://www.andi.com.co/Uploads/Metodolog%C3%ADa%20Estudios%20Ambientales%202018.pdf

- Online scientific collections (not always available for download) from Instituto de Ciencias Naturales – ICN de la Universidad Nacional de Colombia Available on: http://www.biovirtual.unal.edu.co/es/colecciones/

- Online Databases from investigación de Recursos Biológicos Alexander von Humboldt. Disponible en: http://catalogo.humboldt.org.co/pages.pl?p=bases

In particular, for the bird group, databases were reviewed in the eBird of the Cornell Lab Ornithology project (available on: https://ebird.org/home). Also, it was used printed books like: “The field guide to the of Birds of Colombia" (Mc Mullan and Donegan, 2014), "A Guide to the Birds of Colombia" (Hilty and Brown, 2001), the "Guía Ilustrada de la avifauna colombiana" (Ayerbe-Quiñones, 2018), the "Guía de las especies migratorias de la Biodiversidad Colombiana" (Naranjo et al., 2012) and the "Updated list of endemic and near-endemic birds of Colombia" (Chaparro-Herrera et al., 2013).

For the characterization of the mammal group, sources were consulted such as the lists on species and classification given by: Eisenberg, (1989)[39] ; Emmons, (1997)[40]; Muñoz (2001); Gardner (2008)[41]; Mantilla, (2009); Defler, (2010)[42]; Solari et al. (2013)[43]; Ramírez-Chaves et al. (2016)[44]; and Díaz et al. (2016), likewise, the checklist of Mammals of Colombia of the Colombian Society of Mammalogy published in the Colombian Biodiversity Information System - SIB[45].

The potential herpetofauna for the municipalities to be studied was consulted from previous research and work, scientific literature and environmental impact studies conducted in the area, as well as official virtual catalogs above mentioned (ICN, 2020; IAvH-R, 2020), databases and scientific collections.

As a result of this database review, a general result was obtained for the municipalities of Puerto Concordia, Puerto Rico, Vista Hermosa and Puerto Lleras, with the highest representation of species in the group of birds, followed by mammals, reptiles and finally amphibians, with the highest representation of number of potential species in the municipality of Puerto Lleras.

[39] Eisenberg JF. 1989. Mammals of the Neotropics. The Northern Neotropics: Panama, Colombia, Venezuela, Guyana, Suriname, French Guiana. Vol 1. University of Chicago Press.
[40] Emmons LH, Feer F. 1997. Neotropical rainforest mammals: a field guide. 2nd ed. Chicago: University of Chicago Press.
[41] A. L. Gardner (ed.). 2007 [2008]. Mammals of South America. Volume 1: Marsupials, Xenarthrans, Shrews, and Bats. University of Chicago Press, Chicago, Illinois, and London, United Kingdom, 669 pp. ISBN-13: 978-0-226-28240-4.
[42] Historia natural de los primates colombianos / Thomas Richard Defler. -- 2a. ed. – Bogotá : Universidad Nacional de Colombia. Facultad de Ciencias. Departamento de Biología, 2010
[43] SOLARI, Sergio et al. Riqueza, endemismo y conservación de los mamíferos de Colombia. Mastozool. neotrop. [online]. 2013, vol.20, n.2 [citado 2026-03-17], pp.301-365. Disponible en: <https://www.scielo.org.ar/scielo.php?script=sci_arttext&pid=S0327-93832013000200008&lng=es&nrm=iso>. ISSN 1666-0536
[44] Ramírez-Chaves, Héctor E., y Andrés Felipe Suárez-Castro. 2014. «Adiciones Y Cambios a La Lista De mamíferos De Colombia: 500 Especies Registradas Para El Territorio Nacional». Mammalogy Notes 1 (2), 31-34. https://doi.org/10.47603/manovol1n2.31-34.
[45] Sistema de Información sobre Biodiversidad de Colombia. Mamíferos de Colombia. Sociedad Colombiana de Mastozoología. https://biodiversidad.co/dataset/e8b9ed9b-f715-4eac-ae24-772fbf40d7ae

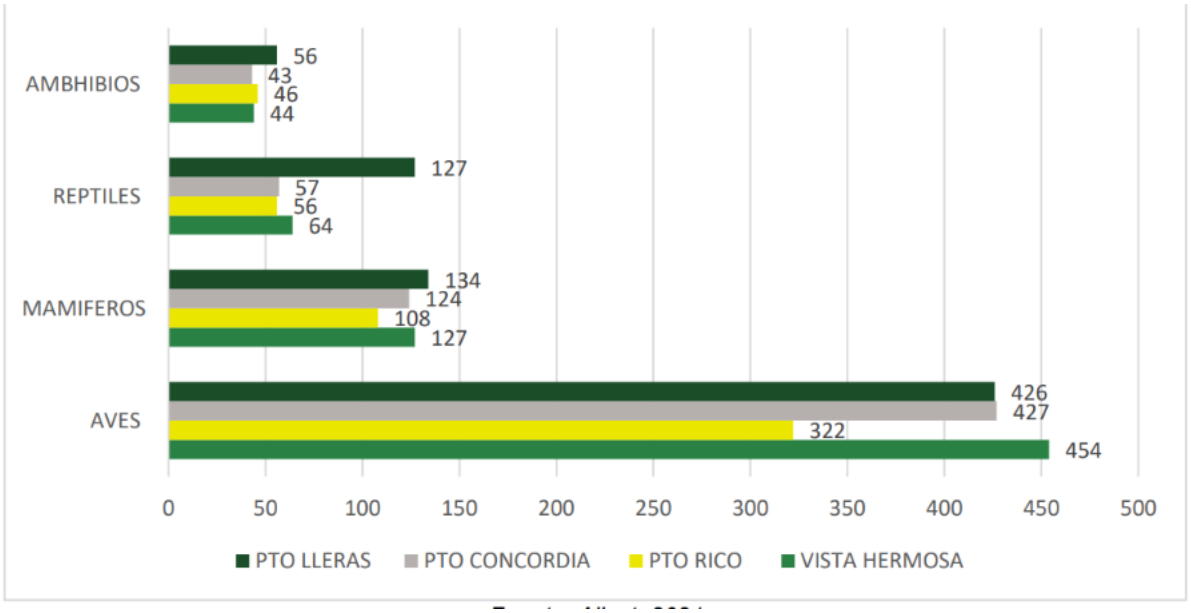


Figure 3. Number of potential species per fauna group in the monitoring municipalities. Source: Karbon-X, 2021

The municipality of Puerto Lleras had the highest number of species reported, with a total of 743 species for all groups of fauna (birds, mammals, reptiles and amphibians), followed by Vista Hermosa with a total of 689 potential species, Puerto Concordia with a total of 651 and finally Puerto Rico with 532 potential species.

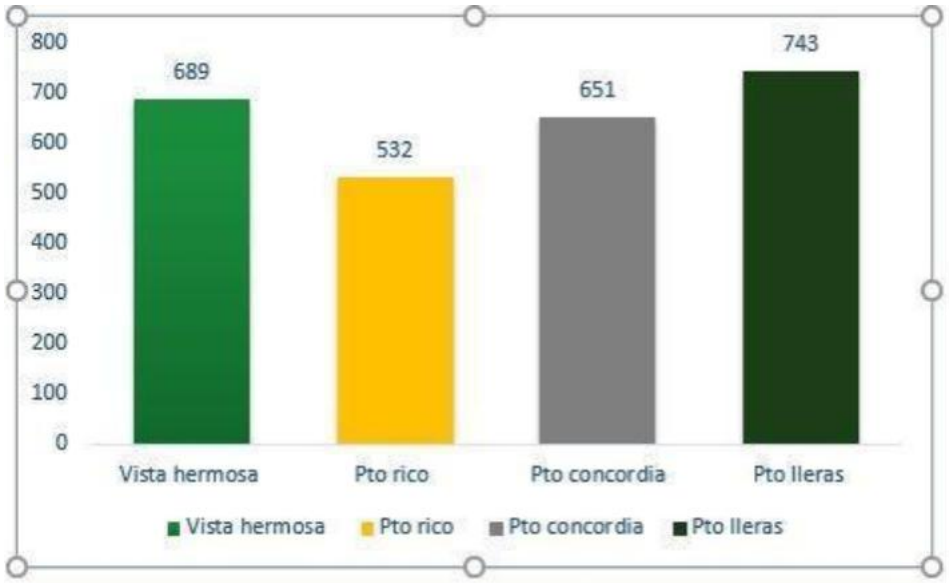


Figure 4. Total of potential species per municipality. Source: Karbon-X, 2021

A detailed biodiversity assessment was conducted in 2021[45] at the municipal level. This assessment identified potential species of mammals, amphibians, reptiles, and birds present in the project area and classified them according to their conservation status and threat category.

In addition, participatory workshops were carried out to complement the technical analysis. These workshops aimed to document local communities' perceptions, attitudes, uses, and spatial knowledge regarding prioritized species (HCV-related species) across the municipalities of Puerto Lleras, Puerto Rico, Puerto Concordia, and Vista Hermosa. The process allowed for the identification of habitat areas, the recognition of species associated with different land uses and land cover types, and a better understanding of the relationship between communities and their surrounding environment.

The workshops were conducted between April 20 and 23, 2021. The results are presented in the aforementioned report.

Additional information on faunal biodiversity is provided by systematic surveys conducted by Fundación Bioherencia at the Reserva Natural Harpy Eagle (Vereda Alto Guapaya, Vista Hermosa), which recorded a total of 562 species across four taxonomic groups: 301 bird species distributed across 18 orders and 44 families (15 confirmed migratory bird species use the project zone as stopover habitat.), 33 mammal species across 7 orders and 16 families, 204 diurnal butterfly species across 5 families, and 24 reptile species across 13 families and 3 orders.

The listed species are available in the annex folder 5.1.1. Existing conditions.

The analysis of forest species diversity was obtained from 168 plots (50 x 50m equivalent to 0.25 ha) described in Section 3.2.1 Baseline Emissions.

The available databases for estimating the average carbon content in the biomass pool only use denomination down to genus level and, if possible, down to species level. For this reason, we searched for the most probable species of trees in the region that are related to the genus.

Table 27. Forest species categorized as Endangered (EN) or Critically Endangered (CR)

FAMILY	SPECIE	COMMON NAME	EVALUATED SPECIE	UICN
APOCYNACEAE	Lacmellea sp	Cerillo	Lacmellea bahiensis	EN
BURSERACEAE	Dacryodes sp	Caraño	Dacryodes colombiana	EN
BURSERACEAE	Tetragastris sp	Cariaño	Tetragastris catuaba	EN
CLUSIACEAE	Chrysochlamys sp	Jorco	Chrysochlamys pavonii	CR
EBENACEAE	Diospyros sp	Nanciguiste	Diospyros esmereg	EN
LAMIACEAE	Aegiphila sp	Manú blanco	Aegiphila lopez-palacii	EN
LAURACEAE	Aiouea sp	Aguacate Mico	Aiouea benthamiana	EN
LAURACEAE	Caryodaphnopsis sp	Cocobola	Caryodaphnopsis parviflora	EN
LAURACEAE	Ocotea sp	Laurel/Arenillo/Laurel Perro	Ocotea pachypoda	CR
LAURACEAE	Rhodostemonodaphne sp	Laurel	Rhodostemonodaphne velutina	CR
LECYTHIDACEAE	Eschweilera cabrerana	Cabo de hacha	Eschweilera cabrerana	EN
LECYTHIDACEAE	Eschweilera sp	Arenillo/Cargadero	Eschweilera compressa	CR
LEGUMINOSAE	Brownea sp	Palo Cruz	Brownea santanderensis	EN
LEGUMINOSAE	Dialium sp	Tres tablas	Dialium rondoniense	EN
LEGUMINOSAE	Machaerium sp	Nacedero	Machaerium cultratum	CR
LEGUMINOSAE	Mimosa sp	Dormidero	Mimosa loxensis	EN
MAGNOLIACEAE	Magnolia sp	Alma negra	Magnolia cespedesii	CR

MALPIGHIACEAE	Byrsonima sp	Nance	Byrsonima frondosa	EN
MALVACEAE	Herrania sp	Cacaotillo	Herrania umbratica	CR
MORACEAE	Perebea sp	Leche Chiva	Perebea glabrifolia	CR
PRIMULACEAE	Clavija sp	Durazno de Monte	Clavija cauliflora	EN
VOCHYSIACEAE	Erisma sp	Guayabeto	Erisma fuscum	EN

Source: Karbon-X, 2021

The four project municipalities — Vista Hermosa, Puerto Rico, Puerto Concordia and Puerto Lleras — are located entirely or predominantly within the Área de Manejo Especial La Macarena (AMEM), the largest environmental management unit in Colombia, covering 3,916,463 hectares where the Andean, Orinoquian and Amazonian regions converge, connecting ecosystems characteristic of each — páramos, sub-páramos, piedmont forests, seasonally flooded alluvial forests, humid rainforest and savannas, among others.[46]

This landscape encompasses one National Natural Park (Sierra de La Macarena, 629,280 ha), two Integrated Management Districts (Ariari-Guayabero and Macarena Norte) and two Regional Natural Parks (Laguna de San Vicente and Laguna de Lomalinda). This combination, together with the morichal palm formations, gallery forests of the Güejar-Ariari axis and transitional savannas, supports over 737 bird species (approximately 37% of the national total), as well as reproducing populations of jaguar, South American tapir and giant anteater, among others.

The AMEM was created by Decree-Law 1989 of 1989. The decree groups four national parks (Sierra de La Macarena, Tinigua, Cordillera de Los Picachos and the Meta portion of Sumapaz) and three integrated management districts (Ariari-Guayabero, Macarena Norte and Macarena Sur), distributed across preservation zones, recovery-for-preservation zones, recovery-for-production zones and production zones. The project is located essentially within the Production Zones and Recovery-for-Production Zones of the DMI Ariari-Guayabero, where controlled productive activities are permitted and are compatible with REDD+ and sustainable-use schemes, provided they comply with the Comprehensive Management Plan adopted by CORMACARENA.

The following section details the categories and zoning units of the AMEM that overlap with each of the four project municipalities, and the proportion that each unit represents relative to the total municipal area:[47]

Table 28. Municipal AME zoning

Municipality	AMEM	PNN Sierra de La Macarena	Production Zone (DMI Ariari-Guayabero)	Recovery for Preservation — North (DMI Macarena Norte)	Recovery for Production — North (DMI Macarena Norte)

[46] Parques Nacionales Naturales de Colombia. Parque Nacional Natural Sierra de la Macarena. Plan de Manejo 2018 – 2023. https://www.parquesnacionales.gov.co/wp-content/uploads/2020/10/plan-de-manejo-pnn-sierra-de-la-macarena.pdf
[47] Íbid.

Puerto Concordia	123.772 ha (100%)	3.747 ha (3%)	102.821 ha (83%)	-	17.203 ha (14%)
Puerto Lleras	94.735 ha (38%)	-	94.735 ha (38%)	-	-
Puerto Rico	342.249 ha (100%)	137.732 ha (40%)	88.341 ha (26%)	-	116.176 ha (34%)
Vista Hermosa	482.309 ha (100%)	252.352 ha (52%)	78.864 ha (16%)	75.729 ha (16%)	75.363 ha (16%)

Source: ANLA[48]

[48] AUTORIDAD NACIONAL DE LICENCIAS AMBIENTALES - ANLA. Reporte Área de Manejo Especial de La Macarena. https://www.anla.gov.co/documentos/biblioteca/reportaleamem6.pdf

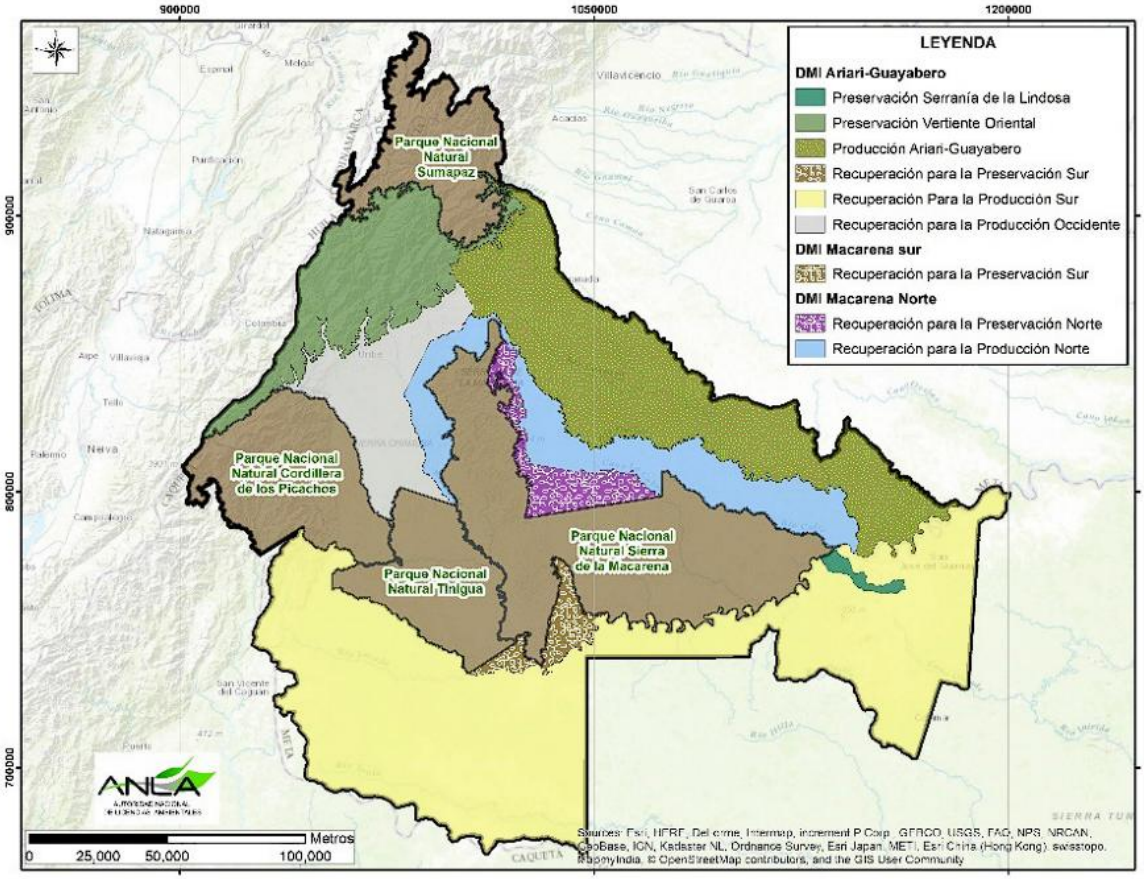


Figure 5. Management categories by DMI within the AMEM. Source: ANLA[49]

Additionally, the project zone includes two Regional Natural Parks: Laguna San Vicente and Laguna Lomalinda, located in the municipalities of Puerto Rico and Puerto Lleras respectively.

Declared a nature reserve in 2004 by Agreement No. PS-GJ.1.2.42.2.11.010 of the Corporation for the Sustainable Development of the Special Management Area of La Macarena (CORMACARENA), the Laguna San Vicente Regional Natural Park is an ecosystem of biological importance due to its natural conditions and the environmental services it provides to the municipality of Puerto Rico. Covering an area of 144.5 hectares, this zone not only functions as a water recharge area for the aquifer that supplies groundwater to the rural population, but also provides numerous additional benefits to the region. Ecologically, the wetland acts as a refuge for numerous species, providing critical habitat for the reproduction, shelter and feeding of wildlife. Among the species that use this ecosystem are birds such as antbirds (family Thamnophilidae), nunbirds and puffbirds (family Bucconidae), herons (family Ardeidae), and reptiles such as the green iguana (Iguana iguana). Notable plant species within the park include the wild cane (Gynerium sagittatum), the ceiba tree (Ceiba pentandra) and the moriche palm (Mauritia flexuosa)[50].

[49] íbid
[50] Turismo Meta. Parque Regional Natural Laguna San Vicente. https://app.turismometa.gov.co/places/1261/parque-regional-natural-laguna-san-vicente

The Laguna Lomalinda Regional Natural Park was created by Agreement No. PS-GJ.1.2.42.2.11.010 of CORMACARENA. The Lomalinda Wetland System is a biologically significant complex that provides critical environmental services to the municipality of Puerto Lleras and the department of Meta, including groundwater recharge for the urban water supply, hydrological buffering, water quality maintenance, humidity retention, and recreational and ecotourism value.

The wetland is a strategic ecosystem characterised by gallery forests in various successional stages, interspersed with areas of mixed palm stands, shrubland and transitional strips between forested zones and natural savanna, with a predominance of morichal palm formations. The savanna landscape is dominated by grasses of the genera Trachypogon, Paspalum, Axonopus and Andropogon, alongside woody species including chaparro (Curatella americana), chaparro manteco (Byrsonima crassifolia), alcornoque (Bowdichia virgiloides) and frute burro (Xylopia aromatica). Gallery forests line the margins of the water body and Caño Chigüiro, featuring species such as yellow flower tree (Tabebuia serratifolia), ceiba (Ceiba pentandra), algarrobo (Hymenaea courbaril) and sarrapio (Coumarouna rosea). The morichal formations — palm communities dominated by the moriche palm (Mauritia flexuosa) reaching heights of up to 13 metres — grow along the margins of water bodies and in seasonally flooded or waterlogged areas, and are the most ecologically distinctive vegetation type of the wetland landscape.[51]

5.1.2 High Conservation Values (B1.2)

Given the exceptional biodiversity of the project zone the number of species that could qualify as High Conservation Value (HCV) varies considerably depending on the criteria applied. To ensure a rigorous, transparent and replicable selection process consistent with the CCB Standards v3.1 (Section B1.2), the following prioritization criteria were adopted for the identification of HCV species within the project zone:

A species is classified as HCV 1 if it meets at least one of the following conditions:

- (i) listed as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) under Colombia's national species protection framework (Resolution 0126/2024);
- (ii) listed as CR, EN or VU on the IUCN Red List of Threatened Species;
- (iii) listed as Near Threatened (NT) on the IUCN Red List and simultaneously regulated under any CITES Appendix (I, II or III);
- (iv) listed as Least Concern (LC) on the IUCN Red List but regulated under CITES Appendix I, which denotes species at risk of extinction due to trade;
- (v) confirmed as endemic to Colombia ; or
- (vi) confirmed as endemic at regional level and meeting at least one of the above criteria (listed on the IUCN Red List as CR, EN, or VU; or regulated under any CITES Appendix)

[51] CORPORACION PARA EL DESARROLLO SOSTENIBLE DEL AREA DE MANEJO ESPECIAL LA MACARENA "CORMACARENA". ACUERDO No.PS-GJ.1.2.42.2.11.009.

Species categorized as NT without any CITES listing, and species classified as LC under CITES Appendices II or III without any additional qualifying criterion, were not included, in order to maintain the scientific rigor and proportionality of the HCV identification process.

Applying these criteria to the species inventories available for the project zone, drawn from systematic field surveys and regional biodiversity databases covering the four project municipalities, a total of 53 species were identified as HCV 1, distributed across mammals 24 species), birds (13 species), reptiles (8 species) and amphibians (8 species).

For HCV 2, the landscape qualifies by virtue of its scale (over three million hectares of continuous protected areas), its character as the only biogeographic confluence of the four major provinces of northern South America, its global recognition as an Endemic Bird Area and as an Andean-Amazonian connectivity bridge, and by sustaining reproducing populations of at least 12 globally threatened species (IUCN VU–EN) that require large territorial ranges. For HCV 3, the simultaneous presence of piedmont forests classified as EN, morichales as VU, gallery forests as EN and transitional savannas as VU in the Colombia Red List of Ecosystems, together with two lacustrine Regional Natural Parks unique within the subregion, confirms the category.

Table 29. HCV Globally and nationally threatened bird species present in the project zone

High Conservation Value	HCV 1-A — Globally and nationally threatened bird species present in the project zone A total of 13 bird species have been identified as HCV 1 in the project zone, including one species classified as Critically Endangered (CR) under national legislation, five Vulnerable (VU) nationally or internationally, three Near Threatened (NT) with CITES listing, and four Least Concern (LC) species regulated under CITES Appendix I.
Qualifying Attribute	The following species are included: *Helicolestes hamatus* (IUCN: LC; CITES I-II) — *Spizaetus ornatus* (IUCN: NT; CITES II) — *Harpia harpyja* (IUCN: VU; CITES I) — *Oressochen jubatus* (Res 0126: VU) — *Jabiru mycteria* (IUCN: LC; CITES I) — *Setophaga cerulea* (IUCN: NT; Res 0126: VU) — *Polystictus pectoralis* (IUCN: LC; Res 0126: VU) — *Tinamus tao* (IUCN: VU) — *Morphnus guianensis* (IUCN: NT; CITES II) — *Buteogallus solitarius* (IUCN: NT; CITES II; Res 0126: CR) — *Falco deiroleucus* (IUCN: NT; CITES II) — *Falco peregrinus* (IUCN: LC; CITES I) — *Ara macao* (IUCN: LC; CITES I) Without the project, continued deforestation would eliminate the large, undisturbed forest territories that support these apex aerial predators and forest-dependent species.
Focal Area	All primary and advanced secondary forest areas across the four project municipalities (Vista Hermosa, Puerto Rico, Puerto

	Concordia and Puerto Lleras) constitute the focal management area. Continuous primary forest patches. Riparian forest corridors along the Guejar and Ariari rivers. Open water bodies and wetland edges supporting bird species.

Source: Karbon-X

Table 30.HCV Globally and nationally threatened mammal species present in the project zone

High Conservation Value	HCV 1-B — Globally and nationally threatened mammal species present in the project zone A total of 24 mammal species have been identified as HCV 1 (the largest group) including species classified as Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) at national and/or international level, Near Threatened (NT) species regulated under CITES, and two species endemic to Colombia.
Qualifying Attribute	The following species are included: *Aotus brumbacki* (IUCN: VU; Res: VU) — *Ateles belzebuth* (IUCN: EN; CITES II; Res 0126: EN) — *Lagothrix lagothricha* (IUCN: VU; CITES II; Res 0126: VU) — *Speothos venaticus* (IUCN: NT; CITES I) — *Odocoileus virginianus tropicalis* (IUCN: LC; CITES III; Res 0126: CR) — *Priodontes maximus* (IUCN: VU; CITES I; Res 0126: VU) — *Proechimys oconnelli* (IUCN: DD; Endemic) — *Leopardus pardalis* (IUCN: LC; CITES I) — Leopardus wiedii (IUCN: NT; CITES I) — *Panthera onca* (IUCN: NT; CITES I; Res 0126: VU) — *Puma concolor* (IUCN: LC; CITES I/II) — *Puma yagouaroundi* (IUCN: LC; CITES I/II) — *Inia geoffrensis* (IUCN: EN; CITES II; Res 0126: EN) — *Lontra longicaudis* (IUCN: NT; CITES I; Res 0126: VU) — *Pteronura brasiliensis* (IUCN: EN; CITES I) — *Myrmecophaga tridactyla* (IUCN: VU; CITES II; Res 0126: VU) — *Lonchorhina orinocensis* (IUCN: VU; Res 0126: VU) — *Plecturocebus ornatus* (IUCN: VU; CITES II; Res 0126: VU; Endemic) — *Tapirus terrestris (*IUCN: VU; CITES II; Res 0126: VU) — *Tayassu pecari* (IUCN: VU; CITES II; Res 0126: EN) — Marmosa sp. (Res 0126: EN) — *Dasypus sabanicola* (IUCN: NT; Res 0126: VU) — *Lagothrix lagotricha* (IUCN: VU; CITES II) — *Herpailurus yagouaroundi (*IUCN: LC; CITES I-II)
Focal Area	All primary and secondary forest areas and associated aquatic ecosystems across the project zone, with priority on: (i) Continuous primary forest patches

	(ii) Riparian forest corridors and associated fluvial habitats along the Guejar-Ariari system, essential for Pteronura brasiliensis, Inia geoffrensis, Lontra longicaudis and Tapirus terrestris; (iii) Forest-pasture transition zones and natural movement corridors used by Panthera onca and other wide-ranging felids;

Source: Karbon-X

Table 31.HCV Globally and nationally threatened reptile species and endemic species present in the project zone

High Conservation Value	HCV 1-C — Globally and nationally threatened reptile species and endemic species present in the project zone A total of 8 reptile species have been identified as HCV 1, including one CR nationally, three VU nationally or internationally, three species regulated under CITES Appendix I (including one endemic to Colombia with insufficient data), and species regulated under CITES Appendices I-II.
Qualifying Attribute	The following species are included: *Liotyphlops anops* (IUCN: DD; Endemic) — *Podocnemis unifilis* (IUCN: VU; CITES II; Res 0126: EN) — *Chelonoidis denticulatus* (IUCN: VU; CITES II) — *Chelonoidis carbonarius* (CITES II; Res 0126: VU) — *Melanosuchus niger* (IUCN: LC; CITES I-II; Res 0126: VU) — *Boa constrictor* (IUCN: LC; CITES I-II) — *Podocnemis expansa* (IUCN: Lower Risk/conservation dependent; CITES II; Res 0126: CR) — *Caiman crocodilus* (IUCN: LC; CITES I/II)
Focal Area	Aquatic habitats, riverine systems and associated forest cover across the project zone, with priority on: (i) Sandy riverbanks and beach habitats along the Guejar and Ariari rivers used; (ii) Deep pools, oxbow lakes and riparian forest along the Guejar-Ariari system, providing foraging habitat for freshwater turtles and caimans;

	(iii) Humid forest interior, rocky outcrops and stream banks providing microhabitat for endemic species (*Liotyphlops anops, Amphisbaena fuliginosa*); (iv) Gallery forest and flooded forest margins critical for *Melanosuchus niger* breeding habitat.

Source: Karbon-X

Table 32. HCV Threatened and endemic amphibian species present in the project zone

High Conservation Value	HCV 1-D — Threatened and endemic amphibian species present in the project zone A total of 8 amphibian species have been identified as HCV 1, seven of them endemic to Colombia, and one of them endemic at regional level. One species, *Pristimantis affinis*, is classified as EN both nationally (Res 0126/2024) and internationally (IUCN), and Allobates femoralis is additionally regulated under CITES Appendix II.
Qualifying Attribute	The following species are included: *Allobates femoralis* (IUCN: LC; CITES II; Endemic at regional level) — *Rheobates palmatus* (IUCN: LC; Endemic) — *Pristimantis medemi* (IUCN: LC; Endemic) — *Pristimantis affinis* (IUCN: EN; Res 0126: EN; Endemic) — *Hyloxalus subpunctatus* (Endemic) — *Scinax blairi* (IUCN: LC; Endemic) — Dendropsophus mathiassoni (IUCN: LC; Endemic) — *Osteocephalus carri* (IUCN: LC; Endemic) — *Osteocephalus carri* (IUCN: LC; Endemic)
Focal Area	Humid forest microhabitats, stream banks and leaf litter across the project zone, with particular priority on: (i) Intact humid forest interior with well-developed leaf litter, fallen logs and rocky microhabitats; (ii) Small stream systems and their immediate forest margins, providing breeding and foraging habitat for certain species; (iii) Riparian gallery forest strips across all four municipalities, which maintain the humidity gradients essential for endemic amphibian persistence; (iv) Mature secondary forest areas in advanced succession, which recover microhabitat structure and humidity conditions for forest-specialist amphibians.

Source: Karbon-X

Table 33. HCV Globally and regionally significant large landscape-level area

High Conservation Value	HCV 2 — Globally and regionally significant large landscape-level area supporting viable populations of most naturally occurring species in natural patterns of distribution and abundance
Qualifying Attribute	The project zone forms part of the Area de Manejo Especial de La Macarena , directly adjacent to the PNN Sierra de La Macarena (629,280 ha) and encompassing the DMI Ariari-Guayabero and DMI Macarena Norte. Together, these areas constitute a continuous native forest matrix of over three million hectares connecting the Eastern Cordillera, the Amazonian lowlands and the Orinoquian savannas through the Guejar-Ariari-Guayabero-Guaviare river system. The landscape supports verified populations of wide-ranging species mentioned above. Systematic surveys conducted in the region record 737 bird species — approximately 37.7% of Colombia's total avifauna — as well as 245 fish species (22 endemic), 39 amphibians, 68 reptiles[52], and an estimated 1,568 documented vascular plant species, with regional estimates reaching up to 12,000 species[53]. Scale and continuity: The project's 40,637 ha of native forest is embedded in a continuous landscape exceeding 3 million hectares of formally protected areas — a scale that sustains viable populations of species requiring very large home ranges. Population viability for these species cannot be sustained in fragmented landscapes below large thresholds. Global biogeographic uniqueness: The AMEM is the only point in Colombia where the Andean, Amazonian, Orinoquian and Guayanese biotic provinces converge. Clerici et al[52] and WWF[53] classify this corridor as globally critical for maintaining genetic flow between Andean and Amazonian biomes.
Focal Area	The entire project zone across the four municipalities constitutes the focal management area for HCV 2, with the following priority elements:

[52] Instituto Humboldt. Más de mil especies en cercanías a ríos aledaños a La Macarena. https://www.humboldt.org.co/noticias/mas-de-mil-especies-en-cercanias-a-rios-aledanos-a-la-macarena
[53] Zarate, C., Ruiz, O., Rodriguez, L, 2018. Plan de Manejo del Parque Nacional Natural Sierra de la Macarena. Parques Nacionales Naturales de Colombia. https://www.parquesnacionales.gov.co/wp-content/uploads/2020/10/plan-de-manejo-pnn-sierra-de-la-macarena.pdf

	(i) Forest matrix connectivity zones linking the project area to PNN Sierra de La Macarena and the AMEM, particularly in Vista Hermosa and Puerto Rico, where the project borders the PNN buffer zone; (ii) Riparian forest corridors along the Guejar, Guapaya and Ariari rivers and their tributaries, the primary structural connectors for wide-ranging fauna (jaguars, river dolphins, giant otters, tapirs) and the main biological corridors between the PNN and the DMI production zones; (iii) The continuous forest matrix of the DMI Ariari-Guayabero Production and Recovery Zones within the project, which provides the habitat base for primate populations, felids and large terrestrial mammals that cannot persist in fragmented landscapes; (iv) Forest-pasture and forest-savanna transition zones in Puerto Concordia and Puerto Lleras, which represent the active agricultural frontier and the areas of greatest deforestation risk, where conservation measures have the highest additionality value; (v) The Guejar-Ariari-Guayabero aquatic corridor, whose conservation is essential for Amazon River Dolphin (EN) and Giant River Otter (EN) population persistence across the four municipalities.

Source: Karbon-X

Table 34. HCV Rare, threatened and endangered ecosystems in the project zone

High Conservation Value	HCV 3 — Rare, threatened and endangered ecosystems in the project zone, as classified by the Red List of Ecosystems of Colombia (LRE-Colombia 2017)[54] Four ecosystem units mapped within the project zone are formally classified as threatened or at risk of collapse under the Red List of Ecosystems of Colombia. These classifications are consistent with the Tremarctos Colombia 3.0 platform[55], the official online implementation of the LRE. Their presence and threat categories by municipality can be consulted on the platform. The ecosystem units are as follows:

[54] Etter A., Andrade A., Saavedra K., Amaya P. y P. Arévalo 2017. Estado de los Ecosistemas Colombianos: una aplicación de la metodología de la Lista Roja de Ecosistemas (Vers2.0). Informe Final. Pontificia Universidad Javeriana y Conservación Internacional- Colombia. Bogotá. 138 pp. https://www.conservation.org.co/media/A7.LRE-Colombia_INFORME%20FINAL_%202017.pdf
[55] Tremarctos Colombia. Sistema de Información de Alertas Tempranas. https://breakstudio.co/clientes/tremarctoscolombia/ and Análisis Biodiversidad Tremarctos CI. https://conservation.maps.arcgis.com/apps/webappviewer/index.html?id=90e0f9ed976c4e238e303dd453a4793b

	CR: P_ZBH-S4 — Savannah herbaceous and shrublands on Piedmont Terraces (Villavicencio-San Martín). Biome: Pedobiomes of the Zonobiome of Tropical Rainforests. Present in: Vista Hermosa. EN: ZBH-B5 — Dense Medium Forest on eroded surfaces of the Llanos Altillanura (Orinoquia). Biome: Zonobiome of Tropical Rainforests. Present in: Puerto Concordia, Puerto Lleras. [VU] He_ZBH-B29 — Dense Medium Forest on Llanero alluvial erosional plains. Biome: Helobiomes of the Tropical Rainforest Zonobiome. Present in: Vista Hermosa, Puerto Lleras. [VU] He_ZBH-B31 — Dense Medium and Low Forest on alluvial erosional plains ('morichales'). Biome: Helobiomes of the Tropical Rainforest Zonobiome. Present in: Vista Hermosa, Puerto Rico, Puerto Concordia, Puerto Lleras.
Qualifying Attribute	P_ZBH-S4 — Savannah herbaceous and shrublands, Piedmont Terraces Villavicencio-San Martín [CR]: The Critically Endangered status of this ecosystem is supported by two criteria, one of which reaches CR level, under the IUCN Red List of Ecosystems protocol[56]. Under Criterion A1, the reduction in geographic distribution over the last 50 years meets the EN threshold (≥50% decline), reflecting the rapid conversion of piedmont savannah terraces to introduced pastures, rice and oil palm cultivation, and the total suppression of the natural fire regime that defines this ecosystem. Under Criterion A3, the historical reduction since approximately 1750 reaches the CR threshold: only 14% of the original national extent of this ecosystem type remains in comparison with pre-industrial period. The CR classification under A3 is the determining criterion. This ecosystem type has been effectively extirpated across most of its original range, making any remaining fragment of exceptional conservation significance. ZBH-B5 — Dense Medium Forest, eroded Altillanura surfaces [EN]: The Endangered status of this ecosystem is supported by four criteria under the IUCN Red List of Ecosystems protocol, with two reaching EN level. Under Criterion A1, the reduction in geographic distribution over the last 50 years meets the EN threshold, driven by concentrated and sheet erosion processes and extensive livestock ranching on the eroded altillanura surfaces. Under Criterion A3, the historical reduction since

[56] Bland, L.M., Keith, D.A., Miller, R.M., Murray, N.J. and Rodríguez, J.P. (eds.) (2016). Directrices para la aplicación de las Categorías y Criterios de la Lista Roja de Ecosistemas de UICN, Versión 1.0. Gland, Suiza: UICN. ix + 96pp. https://portals.iucn.org/library/sites/library/files/documents/2016-010-Es.pdf

	approximately 1750 meets the VU threshold. Under Criterion D1, biotic process disruption over the last 50 years reaches VU level: soil degradation by erosion alters the physical structure on which the characteristic forest biota depends, reducing recruitment success and progressive forest regeneration capacity. Under Criterion D2, projected future biotic disruption reaches the EN threshold: the ongoing expansion of the agricultural frontier in Puerto Concordia and Puerto Lleras (where this ecosystem unit is present) combined with continued soil degradation by erosion and the absence of effective governance mechanisms in these territories, means that functional biotic integrity is projected to decline at EN severity and spatial extent over the next 50 years. He_ZBH-B29 — Dense Medium Forest, Llanero alluvial plains [VU]: The Vulnerable status of this ecosystem is supported by Criterion A1 under the IUCN Red List of Ecosystems protocol. The reduction in geographic distribution over the last 50 years meets the VU threshold, driven primarily by timber extraction and localised agricultural frontier expansion along the alluvial plains of the Orinoquia. With an original national extent of 601,281 ha concentrated in Meta and Vichada the ecosystem continues to decline. Although the remaining proportion (95% nationally) is relatively high compared to other threatened units in the project zone, the active and ongoing nature of the threats in the project municipalities means that the trajectory is towards further loss without the conservation measures implemented by this project. He_ZBH-B31 — Dense Medium and Low Forest, morichal alluvial plains [VU]: The Vulnerable status of this ecosystem is supported by four independent criteria under the IUCN Red List of Ecosystems protocol. Under Criterion A1, the reduction in geographic distribution over the last 50 years meets the VU threshold. Under Criterion A3, the historical reduction since approximately 1750 also meets the VU threshold, reflecting the long-term transformation of alluvial plains across the Orinoquia through drainage works, burning incursions and cattle ranching. Under Criterion D1, biotic process disruption over the last 50 years reaches VU level: cattle trampling compacts soils and disrupts the hydrological infiltration that sustains the moriche palm community, while channel siltation from adjacent eroded uplands alters the inundation regime on which the characteristic biota depends — representing an interruption of the defining abiotic-

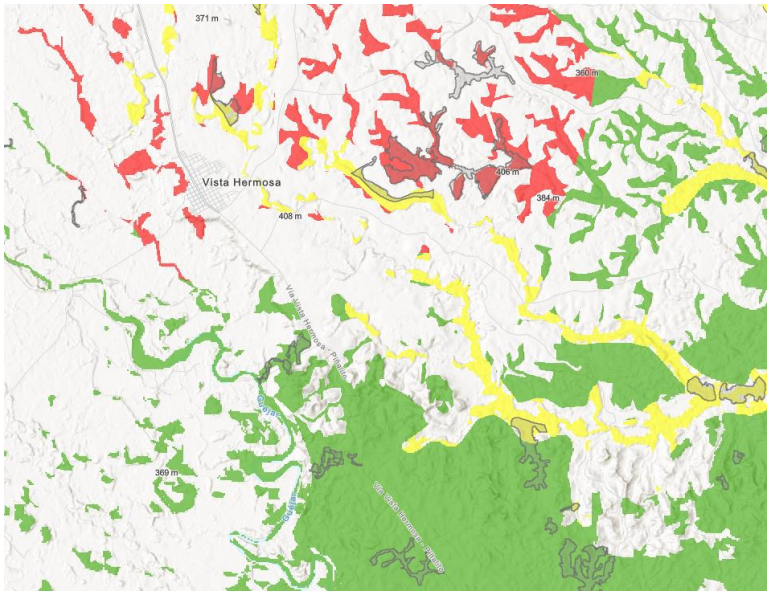
	biotic feedbacks of the morichal at VU severity and spatial extent. Under Criterion D2, projected future biotic disruption also meets VU: without active conservation measures, the ongoing process of cattle incursion and burning from surrounding lands is projected to continue, progressively degrading the structural and functional integrity of the morichal community over the next 50 years. The convergence of four independent criteria at VU level makes the conservation of this ecosystem within the project zone particularly well-justified under the precautionary principle.
Focal Area	The focal areas for HCV 3 management and monitoring correspond to the project parcels that spatially coincide with the ecosystem units described above, as identified through GIS overlay of the LRE-Colombia ecosystem map with the project boundary. Within these parcels, priority attention will be given through two approaches: systematic field-based forest monitoring using vegetation plots and biodiversity surveys, or satellite-based analysis using multi-temporal imagery to detect changes in forest cover, canopy integrity and ecosystem condition. The following figures show project area and vulnerability (green: LC; yellow: VU; red: CR) overlapped layers in Vista Hermosa; and a sample plot.  Figure 6. Partial project areas and vulnerability levels. Source: Tremarctos Colombia 3.0 platform



Figure 7. Parcel plot area and vulnerability levels. Source: Tremarctos Colombia 3.0 platform

Source: Karbon-X

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

To evaluate the potential impact on biodiversity in the without-project scenario, the main drivers of biodiversity loss were considered. These drivers of loss were obtained using the biodiversity report prepared by the Alexander von Humboltd Biological Resources Research Institute, the guidelines of the Ministry of Environment and Sustainable Development and the results of the monitoring of deforestation in Colombia (IDEAM, 2020)[57]. In particular, direct drivers are identified, such as: logging, poor extensive cattle ranching practices, illegal mineral extraction, unplanned transportation infrastructure, agricultural expansion in unpermitted areas, and illegal logging. In addition, the workshops with the communities verified the occurrence of these drivers of loss and identified their causes.

In the project area there is evidence of habitat loss and degradation, especially those represented in forests and semi-natural areas. One of the main reasons for this impact on biodiversity is the change in land use from forest cover to agricultural and/or livestock use.

Habitat loss induced by human activities has been considered as the main threat to 85% of all species classified as threatened in the red list of the International Union for Conservation of Nature - IUCN (IUCN, 2015)[58]. Therefore, if the main objective is to prevent the extinction of species, the most important strategy is to prevent them from being at risk of extinction, since once the species are threatened, without taking timely actions for their conservation, the situation will become increasingly critical and irreversible.

[57] IDEAM. RESULTADOS DE MONITOREO DEFORESTACIÓN 2019. https://www.ideam.gov.co/sala-de-prensa/informes/Informe-anual-del-monitoreo-de-bosque-y-la-deforestacion
[58] IUCN,2105. Conservation successes overshadowed by more species declines – IUCN Red List update. https://iucn.org/content/conservation-successes-overshadowed-more-species-declines-iucn-red-list-update

In this sense, the continued loss of habitat caused by increased deforestation in the without-project scenario will affect the populations of identified potential wildlife species, many of which are listed at different levels of extinction threat by the IUCN and reported by government authorities and research centers in Colombia.

Additionally, deforestation increases habitat fragmentation processes, worsening habitat connectivity. In this context, in degraded and fragmented habitats, plant species have little chance of persisting and finding the climatic conditions required for their development (Ash, Givnish, & Waller, 2017)[59].

The wildlife study conducted during the diagnostic phase of the POMCA of the Middle and Lower Ariari River, exposes two causes of the affectation to bird populations in the municipalities where the Project is circumscribed. The first cause, specifically related to species categorized as threatened, is trade and illegal trafficking, for example, species that are used as pets such as the Alcaraván and most Psittaciformes are reported. The second cause is hunting, the case of Agamia agami, Mitu tomentosum and Odontophorus gujanensis is reported (CORMACARENA, 2016)[60].

Among the mammals, species used as food were found, including: *Dasypus novemcinctus* (Armadillo), *Cunilus paca* (Lapa or Paca) and *Dasyprocta punctata* (Guatin). Other species are hunted because they compete for resources with the communities, for example, *Cerdocyon thous* (Zorro) and *Didelphis marsupialis* (Zarigueya) (CORMACARENA, 2016)[61].

Many of species mentioned are sensitive to habitat destruction and deforestation, which means that they do not adapt well to disturbed habitats and are easy prey for natural predators and hunting. This species needs well-preserved habitats that provide refuge from predators and watercourses (Rodríguez-Mahecha et al., 2006)[62].

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[59] Ash, Jeremy & Givnish, Thomas & Waller, Donald. (2016). Tracking lags in historical plant species' shifts in relation to regional climate change. Global Change Biology. 23. 10.1111/gcb.13429. Can species shift their distributions fast enough to track changes in climate? We used abundance data from the 1950s and the 2000s in Wisconsin to measure shifts in the distribution and abundance of 78 forest-understory plant species over the last half-century and compare these shifts to changes in climate. We estimated temporal shifts in the geographic distribution of each species using vectors to connect abundance-weighted centroids from the 1950s and 2000s. These shifts in distribution reflect colonization, extirpation, and changes in abundance within sites, separately quantified here. We then applied climate analog analyses to compute vectors representing the climate change that each species experienced. Species shifted mostly to the northwest (mean: 49 ± 29 km) primarily reflecting processes of colonization and changes in local abundance. Analog climates for these species shifted even further to the northwest, however, exceeding species' shifts by an average of 90 ± 40 km. Most species thus failed to match recent rates of climate change. These lags decline in species that have colonized more sites and those with broader site occupancy, larger seed mass, and higher habitat fidelity. Thus, species' traits appear to affect their responses to climate change, but relationships are weak. As climate change accelerates, these lags will likely increase, potentially threatening the persistence of species lacking the capacity to disperse to new sites or locally adapt. However, species with greater lags have not yet declined more in abundance. The extent of these threats will likely depend on how other drivers of ecological change and interactions among species affect their responses to climate change. https://www.researchgate.net/publication/305338283_Tracking_lags_in_historical_plant_species'_shifts_in_relation_to_regional_climate_change

[60] Capítulo 13 CARACTERIZACIÓN DE FAUNA. https://www.cormacarena.gov.co/instrumentos-de-planificacion-ambiental/pomca-rio-medio-y-bajo-ariari

[61] Íbid.

[62] RODRÍGUEZ-MAHECHA JV, M ALBERICO, F TRUJILLO y J JORGENSON (Eds.). 2006. Libro Rojo de los Mamíferos de Colombia. Serie Libros Rojos de Especies Amenazadas de Colombia. Conservación Internacional Colombia y Ministerio de Medio Ambiente, Vivienda y Desarrollo Territorial, Bogotá, D.C. 433 pp.

The terecay turtle (*Podocnemis unifilis*) has been the object of commercial exploitation and massive consumption of eggs and adults, the constant plundering of nests, the illegal commercialization of turtles as pets, has generated that today it is the second most important food source according to Morales-Betancourt et al. (2012)[63]. In the seizure statistics, *Podocnemis unifilis* is the second species at the national level and the first for its distribution region. According to the databases of the regional autonomous corporations, between 2006 and 2011, 3,850 seizure records were obtained. In order of importance, the most recorded seizures were concentrated in eggs, individuals and shells.

Illegal trade and trafficking or hunting of wildlife species in the non-project scenario can lead to population declines and even local extinction of species of ecosystem interest. Forest conservation projects and the economic incentives that can be derived from them can focus on raising awareness about the importance of these species and prevent these practices from continuing to be carried out in contravention of regulations or in an unsustainable manner and, above all, perpetuating themselves culturally.

It should be pointed out that Colombian legislation protects wildlife species from trafficking, in Decree 1076 of 2015 (MADS), article 2.2.2.1.2.2.1.6 "the wildlife found in the national territory belongs to the nation, except for the species of zoo farms and privately owned hunting preserves" in that sense its administration and care also corresponds to the State entities.

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

The REDD+ Sur del Meta Project is expected to generate net positive biodiversity changes across the project zone compared to the without-project scenario, through two interacting mechanisms: the conservation of more than 40,637 hectares of continuous native forest preventing habitat loss and fragmentation, and the reduction of direct exploitation pressure (hunting and selective logging) through community agreements, environmental education and participatory governance. The changes described below are estimated for the full 30-year project lifetime (2020–2050) and are organized by biodiversity element.

Biodiversity Element	Flora
Estimated Change	Positive change. Maintenance of 40,637 ha of primary and advanced secondary forest in a continuous matrix connected to PNN Sierra de La Macarena and the AMEM (>3 million ha). Net forest loss reduced to zero within the project boundary versus a projected loss under the without-project scenario over 30 years.
Justification of Change	The without-project deforestation trend (IDEAM 2010–2018 satellite data) projects progressive conversion of forest to pasture at the rates documented in the VCS baseline. The activities included in the Project will directly address the selective logging pressure that disproportionately targets large-diameter individuals of commercially valued species. Continuity of the canopy structure prevents recruitment failure in shade-tolerant species.

[63] https://reporte.humboldt.org.co/assets/docs/2016/2/201/libro-rojo-de-reptiles/34-podocnemis-unifilis.pdf

	The conservation of the project area is both a biodiversity outcome and a climate adaptation measure, as they regulate local hydrological cycles and buffer against flood and drought extremes projected under climate change scenarios for the Orinoquía To this end, the project area will be monitored via satellite to identify deforestation points (if any) and hot spots to prevent possible fires in the area.

Biodiversity Element	Fauna - overall habitat availability
Estimated Change	Maintenance of 40,637 ha of primary and advanced secondary forest in a continuous matrix connected to PNN Sierra de La Macarena and the AMEM (>3 million ha). Maintenance and stabilization of the confirmed active breeding nest at Reserva Natural Harpy Eagle (Vereda Alto Guapaya, Vista Hermosa) estimated support for 6–10 breeding pairs within the project zone under full forest conservation. Maintenance and stabilization of several endangered species (*Pteronura brasiliensis, Tapirus terrestris, Lagothrix lagothricha lugens, Ateles belzebuth, Panthera onca, Inia geoffrensis humboldtiana, Podocnemis unifilis* and other threatened bird species)
Justification of Change	Forest conservation directly prevents loss of the interior forest habitat required by species such as *Harpia harpyja* (VU), *Tinamus tao* (VU) and *Morphnus guianensis* (NT-CITES II). Forest conservation prevents the hydrological disruption (stream siltation, vegetation loss) that would eliminate the microhabitat structure supporting biodiversity. By enhancing knowledge of the importance of the biodiversity and implementing comprehensive protection, observation and recording measures in the project area, the Project will create more favorable habitat conditions for the Fauna. These improved conditions, in terms of natural resources essential for wildlife survival and reproduction, would help boost the local wildlife population.

5.2.2 Mitigation Measures (B2.3)

The major negative impacts on biodiversity in the project zone are driven by two interacting processes: deforestation and direct exploitation of wildlife. Deforestation results in the loss and fragmentation of habitat, the disruption of ecological connectivity between forest patches, the reduction of food supply for frugivorous and herbivorous species, and the progressive isolation of wildlife populations below minimum viable thresholds. Direct exploitation, primarily through hunting, compounds these effects by targeting the same species most sensitive to habitat loss, including large-bodied mammals and birds with slow reproductive rates.

To address these impacts, the project will implement the following mitigation measures:

- Forest conservation and connectivity: The primary mitigation measure is the conservation of more than 40,000 hectares of continuous native forest within the project zone, maintained through community conservation agreements with landowners across the four municipalities. This directly addresses habitat loss and fragmentation as the structural driver of biodiversity decline. The project's forest matrix is connected to the PNN Sierra de La Macarena and the AMEM, preserving the landscape-level connectivity required by wide-ranging species such as the jaguar, harpy eagle, spider monkey and giant river otter, whose population viability depends on access to territories substantially larger than any single landholding.

- Hunting pressure reduction through community engagement and environmental education: Hunting in the project zone is not exclusively driven by food security needs. In many cases it is associated with cultural misconceptions about the role of certain species in the ecosystem (particularly apex predators and large raptors perceived as threats to livestock or poultry) or with the absence of non-lethal alternatives for managing wildlife conflicts with crops and domestic animals. To address these drivers, the project will implement a structured capacity-building programme targeting landowners, farmers and community members across all four municipalities. This programme will include: (i) species-specific awareness sessions explaining the ecological role of trigger and HCV species, including predator-prey dynamics, seed dispersal functions and the role of aquatic species as indicators of water quality; (ii) dissemination of accessible, locally relevant materials on the conservation status of species present in the project zone, their legal protection under Resolution 0126/2024 and the consequences of illegal hunting; and (iii) engagement of local community members as biodiversity monitors within the project's monitoring programme, creating a direct economic and social incentive for conservation behaviour.

- Community-based biodiversity monitoring: A key mitigation measure that simultaneously addresses hunting pressure and builds long-term conservation stewardship is the incorporation of local community members as active participants in the biodiversity monitoring programme. Landowners and residents across the four municipalities will be trained by Fundación BioHerencia to conduct camera trap checks, record wildlife observations, report hunting incidents and document species presence along established transects. This community guardian network creates a direct and sustained connection between local livelihoods and the conservation of the species present on their land, generating economic incentives that provide a concrete alternative to wildlife exploitation. Community monitors also extend the spatial coverage of the monitoring programme well beyond what a technical team alone could achieve, ensuring that population trends and threat levels are tracked across the full project zone rather than solely at the reference monitoring site.

- Monitoring as an adaptive management tool: The biodiversity monitoring plan established will generate the empirical baseline and trend data required to evaluate the effectiveness of mitigation measures over time.

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

The project's anticipated net impacts on biodiversity in the project zone are positive compared with conditions under the without-project land-use scenario across all assessed dimensions (habitat extent, species population trends, ecosystem integrity and landscape connectivity).

Under the without-project scenario, the project zone is subject to the highest deforestation pressure in Colombia. Without intervention, progressive forest loss would fragment the continuous native forest matrix below the minimum thresholds required by wide-ranging HCV species, eliminate riparian habitat critical for EN and CR aquatic species, reduce prey availability for apex predators, and expose all ten trigger species to population declines ranging from 30% to over 90% depending on the species and the combined effect of habitat loss and hunting pressure.

With the project, the conservation of 40,637 hectares of continuous native forest directly and demonstrably reverses these trajectories:

- The project prevents the conversion of forest to pasture and illicit crops across the project zone, maintaining the structural integrity of primary and advanced secondary forest that constitutes the habitat base for all HCV species. Forest conservation also preserves the riparian and gallery forest strips along the Güejar, Ariari and Guayabero rivers, which are classified as Endangered (EN) under the Colombia Red List of Ecosystems and are the essential habitat for Pteronura brasiliensis (EN), Inia geoffrensis (EN), Podocnemis unifilis (EN nationally) and Melanosuchus niger (CR nationally), among others.

- For each of the ten trigger species (section 5.5.2), the with-project scenario is projected to maintain or improve population status relative to the without-project baseline. The confirmed active Harpy Eagle nest will be actively protected, with an estimated 6–10 breeding pairs supported by the project zone under full forest conservation. Jaguar populations are projected to reach 17 adults applying regional density estimates, compared with a projected decline to 4–12 individuals under the without-project scenario. Spider monkey (Ateles belzebuth, EN) and woolly monkey (Lagothrix lagothricha lugens, CR nationally) populations are estimated at 600–1,600 and 1,200–2,400 individuals respectively under the with-project scenario, compared with potential declines to 180–240 and 130–175 individuals under conditions of continued deforestation and uncontrolled hunting. For aquatic species (such as *Inia geoffrensis, Pteronura brasiliensis and Podocnemis unifilis*) the project prevents the functional extinction from key river segments within the project zone that represents the most likely without-project outcome.

- Ecosystem integrity. The project conserves four threatened ecosystem types identified under the Colombia Red List of Ecosystems (Section 5.1.2): piedmont savannah (S4, CR), altillanura dense forest (B5, EN), llanero alluvial forest (B29, VU) and morichal formations (B31, VU). Without the project, continued degradation under criteria A, D1 and D2 would progressively reduce the functional integrity of these ecosystems; with the project, conservation and restoration activities maintain the biotic processes)hydrological regimes, seed dispersal, pollination, predator-prey dynamics) that define their ecological character.

- Landscape connectivity. By maintaining 40,637 ha of forest contiguous with the PNN Sierra de La Macarena and the AMEM, the project preserves a critical section of the Andean-Amazonian connectivity corridor identified by Clerici et al. and WWF as globally irreplaceable for maintaining genetic flow between the Andean and Amazonian biotic provinces. This landscape-level function sustains viable metapopulations of all wide-ranging trigger species and prevents the genetic isolation that would accelerate local extinction risk under a fragmented without-project scenario.

The net biodiversity impact is therefore unambiguously positive: the project maintains habitat, population viability and ecosystem integrity for a documented assemblage of 61 HCV species and four threatened ecosystem types, in a landscape that without intervention would continue to experience the highest deforestation rates in Colombia.

Climate change adaptation benefits for biodiversity (GL1.4)

The project contributes to biodiversity adaptation to climate change through four categories of activities and outcomes, demonstrating eligibility for Gold Level climate change adaptation benefits under CCB Standards v3.1:

- Maintenance of climate refugia and thermal buffering: The continuous forest matrix conserved by the project functions as a thermal refuge for species experiencing range shifts in response to rising temperatures. Dense closed-canopy forest maintains cooler and more stable microclimatic conditions than open or fragmented landscapes, buffering against the increased frequency and intensity of heat stress events projected for the Colombian Amazon-Orinoquia transition zone. Riparian forest corridors along the Güejar and Ariari rivers are particularly important as linear refugia that maintain cool, humid microhabitats along the altitudinal gradient from the piedmont to the lowlands.

- Facilitation of species range shifts and elevational movement: The altitudinal gradient within the project zone (from approximately 800 m a.s.l. to over 1,700 m a.s.l.) provides a continuous forest corridor along which species can shift their distributions upslope in response to warming, without encountering deforested barriers. By maintaining connectivity between the lowland forest of Puerto Concordia and Puerto Lleras and the premontane forest of Vista Hermosa the project preserves the movement pathways essential for climate-driven range adjustments.

- Conservation of ecosystem hydrological functions. Climate change projections for southern Meta indicate increased variability in precipitation, with more intense dry seasons and episodic flood events. Morichal formations and gallery forests conserved by the project are critical regulators of local hydrological cycles — they maintain groundwater recharge, buffer flood peaks and sustain dry-season water availability in the caños and wetlands on which aquatic HCV species depend. Loss of these ecosystems under the without-project scenario would amplify the hydrological impacts of climate variability, potentially causing dry-season habitat collapse for some aquatic species.

- Reduced vulnerability of species to compounded stressors. Climate change acts synergistically with habitat loss and hunting to increase species extinction risk: populations already reduced and fragmented by deforestation have diminished capacity to respond to additional climate-driven stressors. By maintaining large, well-connected and structurally intact forest, the project reduces the exposure and sensitivity of all HCV species to climate variability, enhancing their adaptive capacity. This is particularly relevant for species with slow reproductive rates, such as the harpy eagle, giant river otter and woolly monkey, for which population recovery from climate-induced mortality events requires decades of undisturbed breeding habitat.

5.2.4 High Conservation Values Protected (B2.4)

The Project does not propose to make changes in native ecosystems and the productive projects will be generated under agroecological sustainability logics and in areas that are already deforested.

5.2.5 Species Used (B2.5)

No species will be brought to the project area, as the forest will not be enriched. As for the sustainable activities, species and varieties will be selected under parameters of protection of the forest, no invasive.

5.2.6 Invasive Species (B2.5)

No invasive species will be brought to the project area. The presence of Gmelina Arborea (Teca) and Acacia Mangium (Acacia) plantations has been reported in the project reference area. These species are used in the Llanos Orientales region of Colombia for commercial reforestation. However, colonization of these species in natural forests has not been reported. In addition, there are no reports of these species behaving as alien or invasive species.

Monitoring of the presences and impact on the project area will be performed during inventories.

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

Species	Not applicable
Justification of Use	Not applicable
Potential Adverse Effect	Not applicable

5.2.8 GMO Exclusion (B2.7)

According to the lines of the project no GMO will be used on the project.

5.2.9 Inputs Justification (B2.8)

Name	Not applicable
Justification of Use	Not applicable
Potential Adverse Effect	Not applicable

5.2.10 Waste Products (B2.9)

Conservation activities that form the core of this project do not generate waste products in themselves. By their nature, these activities have a negligible material footprint and produce no significant solid, liquid, or hazardous waste streams.

However, waste generation may occur as a secondary effect of implementing sustainable productive projects in rural areas (e.g., agroforestry systems, improved agricultural practices, or community enterprises). The types of waste potentially associated with these activities include:

- Organic waste from agricultural or agroforestry production (plant material, food residues)
- Agrochemical packaging (containers, bags, and wrappers from pesticides, herbicides, or fertilizers used in transitional or productive systems)
- General solid waste from field operations or community activities (plastics, paper, packaging)

Waste Management Approach

Given the rural context of the project areas, a critical consideration is that most municipalities do not provide waste collection services in rural zones. This structural gap means that conventional disposal pathways are unavailable for beneficiary communities, making on-site waste management training and capacity building especially important.

To address this, waste management will be handled through two complementary mechanisms:

- Specific Waste Management Plans will be developed and implemented for each sustainable productive project. These plans will identify the types and volumes of waste generated, define responsible actors, and establish disposal or valorization routes appropriate to the rural context.
- Training and capacity building has been and will continue to be provided to community members on proper waste management practices. This includes:
    - Composting of organic waste, enabling communities to valorize agricultural residues as inputs for their own productive systems, reducing both waste and input costs.
    - Proper disposal of agrochemical packaging, following national regulations for the triple-rinsing and collection of these containers, minimizing contamination risks to soils and water bodies.

5.3 Offsite Biodiversity Impacts

5.3.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Measures (B3.2)

Table 35. Negative Offsite Biodiversity Impacts and Mitigation Measures

Negative Offsite Impact	Mitigation Measure(s)
There are forest species of high commercial value that are frequently harvested and were identified within the project areas. It is possible that the harvesting of these species will increase outside the project areas. Environmental education activities have been proposed to communities near the project areas to stop or reduce the overexploitation of forest species.	The project areas can be sources of seed and seedlings for the propagation of species of high commercial value and ecosystemic importance

Wildlife hunting is another activity that may increase outside the project areas.	Since hunting activities will be restricted within the project areas, it is possible that the same communities within the project will carry out this activity in forests outside the project area. It is necessary to carry out environmental education campaigns and coordinate strategies with regional environmental authorities that focus on reducing these types of practices.

Source: Karbon-X

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

The net offsite biodiversity impact of the REDD+ Sur del Meta Project is assessed as positive. While certain displacement risks have been identified and are addressed through the mitigation measures described in previous sections, the project generates a range of positive biodiversity outcomes beyond its boundaries through four distinct mechanisms.

Landscape connectivity and buffer function for the AMEM

The project's 40,637 hectares of conserved native forest form a continuous matrix directly adjacent to the PNN Sierra de La Macarena and embedded within the Área de Manejo Especial de La Macarena (AMEM). By maintaining intact forest cover in the Production Zones and Recovery-for-Production Zones of the DMI Ariari-Guayabero — which are not formally protected and receive no dedicated conservation management absent the project — the project substantially reinforces the effectiveness of adjacent formally protected areas. Wide-ranging species such as the jaguar (Panthera onca), harpy eagle (Harpia harpyja), spider monkey (Ateles belzebuth), and giant river otter (Pteronura brasiliensis) depend on movement corridors that extend well beyond any single protected area. The project zone functions as an essential stepping stone in the Andes–Amazonia–Orinoquia connectivity corridor identified as globally irreplaceable for maintaining genetic flow between biotic provinces (Clerici et al.; WWF). Without the project, progressive deforestation in this buffer zone would fragment the landscape below the minimum thresholds for viable metapopulations of these species, undermining the conservation value of the PNN Sierra de La Macarena itself.

Offsite benefits through the grouped project structure

The project operates as a grouped project, allowing new landowners in the reference region to join as additional project areas in future verification periods. Each new adherent brings additional hectares under formal conservation agreements, extending the no-hunting, no-logging, and no-clearing commitments beyond the current project boundary. This mechanism generates progressive positive biodiversity outcomes in areas that would otherwise remain unmanaged, contributing to a gradual expansion of the effective conservation footprint within the AMEM production zone.

Positive spillover through community environmental education

The environmental education programme implemented with project partners is designed and delivered as an open process accessible to stakeholders beyond the project boundary, including non-partner landowners, local sawmillers, members of adjacent communities, and fishing communities along the Ariari, Güejar and Guayabero rivers. By strengthening understanding of the ecological role of HCV species —

including apex predators, large primates, aquatic mammals and endemic amphibians — among a broader rural population, the project generates awareness-driven conservation behaviour that is not spatially constrained to the project area. This is particularly relevant for species with wide home ranges, such as the jaguar and the Amazon river dolphin, whose conservation status depends on attitudes and practices across an area substantially larger than the project boundary.

Synergies with Visión Amazonía and regional conservation programmes

The project zone overlaps with the area of influence of Visión Amazonía, Colombia's national REDD+ programme, which implements complementary deforestation reduction activities at departmental scale across Meta, Caquetá, Guaviare, Putumayo and Amazonas. The convergence of project-level and jurisdictional-level conservation incentives in the same landscape generates synergistic effects: project partners receive direct economic benefits from carbon credit revenues, while the broader Visión Amazonía framework provides institutional, governance and financial support to surrounding territories. This institutional layering reduces the risk that negative offsite impacts — primarily hunting and selective logging displacement — are sustained over time, and increases the likelihood of positive spillover from the project's governance and capacity-building model to adjacent communities.

Assessment of net balance

Weighing the residual displacement risks identified in B3.1 and B3.2 against the four positive offsite mechanisms described above, the net offsite biodiversity impact of the project is assessed as positive. The displacement risks are real but bounded: they affect a defined and already-degraded landscape fringe, are addressed through active mitigation measures, and are unlikely to generate irreversible biodiversity loss given the landscape context. The positive offsite mechanisms, by contrast, operate at landscape scale, are self-reinforcing over time through the grouped project structure and community governance model, and directly benefit the same HCV species assemblage identified in Section B1.2 whose persistence depends on the integrity of the broader AMEM landscape.

5.4 Biodiversity Impact Monitoring

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

The biodiversity monitoring activities are conducted across the four project municipalities — Vista Hermosa, Puerto Rico, Puerto Concordia, and Puerto Lleras — covering more than 40,000 hectares of native forest in the Orinoquia-Amazonia transition zone.

The monitoring program is structured around three complementary components: (i) systematic biological surveys of five taxonomic groups — birds, mammals, amphibians, reptiles and flora — providing a comprehensive baseline and long-term trend data across the project zone; (ii) focused population monitoring of HCV representative indicator species, selected for their ecological function, sensitivity to the main threats addressed by the project, and capacity to serve as proxies for the health of the broader species assemblage; and (iii) a community participatory monitoring network that ensures spatial and temporal continuity between expert survey campaigns while building local environmental governance capacity. Together, these three components enable the continuous assessment of biodiversity status and trends, the

rigorous evaluation of HCV maintenance effectiveness, and the generation of the population trend and climate adaptation indicators required under CCB Standards v3.1, sections B4.1, B4.2, GL1.4 and GL3.4.

Consolidating a monitoring system that integrates scientific rigor, technological tools and meaningful community participation is essential to the long-term success of the project's biodiversity objectives. Such a system enables: (i) the identification and systematic tracking of indicator species and species of high ecological and conservation value; (ii) the establishment of quantitative reference parameters to detect and assess changes in biodiversity composition, abundance and distribution over time; (iii) the generation of reliable scientific information to support adaptive management and conservation decisions at the property, municipal and landscape scale; (iv) the strengthening of environmental governance through the active involvement of local communities as agents of conservation; and (v) compliance with the monitoring standards and methodologies required by the project's CCB and VCS frameworks in relation to partners, communities and funders.

The monitoring plan is directly linked to the project's biodiversity objective — to evaluate and understand, through a continuous participatory monitoring process, the state of biodiversity conservation within the prioritized natural forests designated as areas of the project.

Specific objectives are:

- To estimate the richness and identify the composition of terrestrial mammals and birds within the prioritized natural forests designated as areas of the REDD+ Sur del Meta project.
- To implement a capacity-building strategy to create community monitors that support the tracking and characterization of terrestrial mammals and birds within the prioritized natural forests designated as areas of the project.
- To implement a capacity-building strategy that enables the creation of community monitors to support the monitoring and characterization of terrestrial mammals and birds within the prioritized natural forests designated as areas of the project.
- Create a participatory community monitoring network to track the status and presence of terrestrial mammals and birds within the prioritized natural forests designated as areas of the project.

Biodiversity characterization focuses on five taxonomic groups — birds, mammals, reptiles, amphibians and flora— widely used as ecological health indicators in Colombian environmental assessments. Prior to fieldwork, a literature review and consultation of national biodiversity databases were conducted to establish the potential species list for each group, complemented by interviews with community members and reserve staff to gather local knowledge on species use, detectability, and key sampling areas.

Field surveys employ a combination of methods tailored to the ecological characteristics of each group.

- Birds are recorded through free visual and auditory detection surveys conducted at a constant pace during periods of highest bird activity (06:00–11:00; 15:00–18:00), recording all observations, estimated distance from the transect, locality, start and end coordinates, altitude, date, time, behavior, common and scientific name of each observed species, vegetation cover, stratum, location of the individual within the ecosystem structure, and substrate. Technological

applications such as Merlin and eBird will be used for data recording and to support visual and auditory species identification. Additionally, whenever possible, photographic records of the observed individuals will be taken.

- Mammals are surveyed using three complementary approaches: free-path searches for tracks and signs (footprints, scat, hair, markings) with direct observation and vocalization records; a camera-trap grid — including canopy-mounted stations — deployed across multiple habitat types such as understory, shrublands, riparian forest, and secondary forest, active 24 hours a day and checked periodically; and semi-structured interviews conducted with community members using identification guides to document information on inconspicuous and difficult-to-record species, the use of some of these species, and human conflicts.

- Reptiles are surveyed using Visual Encounter Surveys (VES) conducted during both diurnal and nocturnal walks, covering stream banks, rocky outcrops, grasslands, leaf litter, and forest at varying successional stages.

- Amphibians are recorded through VES conducted during both diurnal and nocturnal walks, with particular emphasis on stream banks, humid microhabitats, leaf litter, and forest at varying successional stages — habitat types known to concentrate amphibian diversity in the region.

- Flora is monitored through forest inventories, using the same sampling framework and field measurements applied for biomass and carbon stock quantification. These inventories record species composition, abundance, diameter at breast height (DBH), tree height, and structural attributes of vegetation across the different land-cover types and forest conditions present within the project area. The collected data support both biodiversity assessment and carbon accounting analyses.

A community-based participatory biodiversity monitoring program will be established to strengthen local capacities for biodiversity conservation and ecosystem governance within the project area. People will be trained in biodiversity monitoring methodologies, including camera trapping, equipment handling and maintenance, data recording, bird counting techniques, biodiversity values and ecosystem services, and governance and conservation practices.

Training activities will follow a theoretical-practical approach combining in-person workshops, field demonstrations, and hands-on learning sessions. The program will include training on: (i) biodiversity and local conservation concepts; (ii) field safety, wildlife handling, and ethical considerations; (iii) use and maintenance of monitoring equipment such as binoculars, cameras, camera traps, and digital applications; (iv) biodiversity sampling methodologies for different taxonomic groups, including observation points, transects, and camera-trap deployment; (v) data management and storage protocols; and (vi) basic species identification using field guides and applications such as iNaturalist, eBird, Merlin, and Avenza.

The information and indicators generated through this process will contribute to the project's biodiversity monitoring system and support adaptive management, conservation decision-making, and sustainable ecosystem management within the project zone. Monitoring equipment and pedagogical materials developed during the project will remain permanently within participating properties, enabling the long-term continuity of community-led monitoring activities beyond the project implementation period.

Results will be reported periodically, and disseminated publicly through the project's digital repository, the community bulletin Voces del Bosque, and stakeholder meetings, according to Procedure of Communication.

The following table presents the full monitoring framework by taxonomic group, including variables, indicators, sampling methods, frequency and priority monitoring areas. Variables were selected based on their direct linkage to the project's biodiversity objectives, their sensitivity to the main deforestation and hunting drivers, and methodological replicability by community monitors over time.

Table 36. Monitoring Plan. Variable and indicators.

Taxonomic group / Component	Variables and indicators	Frequency	Monitoring area
Birds	Species richness; relative abundance; presence of HCV species	At least every 3 years	All habitat types; priority in primary and advanced secondary forest across four municipalities
Mammals	Species richness; relative abundance; presence of HCV species	Cameras: continuous (24 h/day, reviewed quarterly by community monitors); field surveys: at least every 3 years	Primary forest, riparian corridors, forest-pasture edges, water sources
Amphibians	Species richness; habitat association; presence of endemic species	At least every 3 years	Stream banks, leaf litter, humid forest interior and riparian forest margins
Reptiles	Species richness; presence of HCV species	At least every 3 years	Open habitats, transition zones, stream banks, forest edges
Flora / Vegetation	Forest structural integrity: DBH, height, IVI of dominant species; threatened tree species (EN/CR)	In each verification event	Primary and secondary forest strata across all municipalities in sampling plots

Source: Karbon-X

Given the large number of species identified as HCV 1 in the project zone , monitoring efforts for HCV assessment are concentrated on ten representative indicator species selected on the basis of three complementary criteria: (i) ecological function — the species reflects the health of a key ecosystem process (predation, seed dispersal, aquatic integrity); (ii) sensitivity — the species is demonstrably responsive to the main threats addressed by the project (deforestation, hunting, river degradation); and (iii) monitorability — the species can be reliably detected and tracked using standardized methods replicable by community monitors over time.

These ten species serve as proxies for the broader HCV assemblage: their population trends, combined with the community-level biodiversity data from the general monitoring framework, provide a comprehensive and cost-effective assessment of HCV maintenance effectiveness.

Table 37. Monitoring of indicators species.

Indicator species	Threat category	Ecological function	Justification
Harpy Eagle (*Harpia harpyja)*	VU — IUCN CITES I	Apex predator. Top-down regulator of forest prey communities (primates, sloths, large reptiles); indicator of primary forest integrity and continuity.	Active monitored nest in the project area confirmed since 2021, one of the few accessible nest sites in Colombia. Highly sensitive to deforestation and human disturbance.
Jaguar (*Panthera onca*)	NT — IUCN VU — Colombia CITES I	Apex predator. Keystone top predator regulating ungulate and large herbivore populations across landscape scale; umbrella species for connectivity.	As predators they are key in the balance of ecosystems, since they control the behavior and populations of the species on which they feed. The presence of jaguar populations is an indicator of the good health of the area where they live, since it notices the existence of enough prey to maintain the population of predators. The jaguar is classified as an "umbrella" species whose proper conservation contributes to the maintenance and protection of ecosystems and biodiversity that cooperate with this species.

Tigrillo *(Leopardus wiedii)*	NT-IUCN CITES I	Mesopredator. Arboreal felid regulating small mammal and bird populations in forest interior; indicator of structural forest complexity (multi-strata canopy).	Highly sensitive to forest fragmentation and hunting; presence confirms persistence of structurally complex forest required by multiple other HCV species
Bushdog/Perro vinagre *(Speothos venaticus)*	NT-IUCN CITES I	Mesopredator regulating small and medium mammal populations; strict indicator of high-quality, low-disturbance forest.	One of the least known canids in the world — basic aspects of its ecology, home range, pack dynamics and population size remain poorly understood across its entire range, making any confirmed detection scientifically significant; its presence in the project zone is itself a conservation finding of regional importance; as a species known to require high-quality, low-disturbance forest with minimal human contact, camera trap detection rate serves as a direct proxy for forest integrity and low anthropogenic pressure — precisely the condition that the project aims to maintain.
Spider Monkey *(Ateles belzebuth)*	EN — IUCN and Colombia CITES II	Long-distance seed disperser of large-seeded tree species; indicator of mature, continuous forest; umbrella species for forest-dependent biodiversity.	Single confirmed individual qualifies site under CCB GL3.1(a)(i); population viability directly dependent on forest connectivity maintained by the project.
Woolly Monkey *(Lagothrix lagothricha)*	VU — IUCN and Colombia CITES II	Seed disperser; folivore-frugivore regulating forest regeneration dynamics; indicator of low hunting pressure and high canopy quality.	Co-occurs with Ateles belzebuth — joint monitoring maximises efficiency; sensitive to both hunting and habitat loss.
South American Tapir *(Tapirus terrestris)*	VU — IUCN and	Large herbivore. Ecosystem engineer —	Requires large forest areas with access to rivers and

	Colombia CITES II	seed disperser of large-seeded trees, regulator of vegetation structure through browsing; indicator of continuous forest with intact understorey.	mineral licks; presence confirms functional connectivity between forest patches across the project zone.
Giant river otter *(Pteronura brasiliensis)*	EN — IUCN and Colombia CITES I	Apex aquatic predator; indicator of pristine or near-pristine riparian systems, clean water and undisturbed gallery forest	Indicator of aquatic ecosystem integrity; requires high water quality and intact riparian forest; sensitive to human disturbance
Amazon river dolphin *(Inia geoffrensis)*	EN — IUCN and Colombia CITES II	Top predator of the freshwater food web; indicator of intact river systems, continuous riparian forest and low aquatic disturbance.	Top aquatic predator; indicator of fish community health and overall river ecosystem condition
Terecay *(Podocnemis unifilis)*	VU-IUCN EN-Colombia CITES II	Herbivore-omnivore regulating aquatic vegetation and nutrient cycling in river systems; nesting site fidelity makes it a sensitive indicator of riparian disturbance.	Heavily hunted for food — both adults and eggs are harvested by local communities, making hunting pressure reduction a direct project conservation outcome; nesting requires both intact sandy riverbanks and adjacent tall gallery forest.

Source: Karbon-X

5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

The dissemination of the Biodiversity Monitoring Plan and its results is governed by the project's Communication Manual (*Manual de Comunicación*, SOP ID 2084_06), which establishes the principles, channels and practices applicable to all project information-sharing with communities and stakeholders. The complete Biodiversity Monitoring Plan is publicly available through the project's digital repository on the Karbon-X website. The following mechanisms ensure that summaries and results reach all communities, stakeholders and the public:

When the project conducts fauna, flora or carbon monitoring activities, communities are informed in advance through the monthly virtual meetings, the community bulletin Voces del Bosque, WhatsApp groups and social media, as established in the Communication Manual. Once results are available, they are summarised and communicated through the same channels, ensuring that communities are aware of both the monitoring activities conducted and their principal findings.

Technical biodiversity monitoring reports are prepared periodically in coordination with Karbon-X. Full technical reports are published in Spanish in the project's public digital repository. Community summaries are produced in plain language with graphic material adapted to rural contexts and distributed in printed and digital formats through the bulletin Voces del Bosque, the monthly meetings and WhatsApp groups. HCV indicator species trend reports are integrated into the biodiversity reports and communicated to communities as part of the annual General Assembly of each municipal corporation.

Community monitoring data generated by trained monitors (including camera-trap records, wildlife sighting reports and habitat observations) are systematically uploaded to citizen science platforms (iNaturalist, eBird), creating a publicly accessible, georeferenced biodiversity database for the project zone. This integration connects local monitoring efforts with national and global biodiversity data infrastructure and enables public access to monitoring results beyond the project's own channels.

Following each external audit cycle, biodiversity verification results are communicated to communities through the channels described above, and full audit reports are translated into Spanish and published in the project repository. All monitoring plans and results remain available to verification bodies and the public throughout the project lifetime.

5.5 Optional Criterion: Exceptional Biodiversity Benefits

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

Biodiversity assessments conducted across the four project municipalities — Vista Hermosa, Puerto Rico, Puerto Concordia and Puerto Lleras (Meta, Colombia) — have identified a total of 53 species of High Conservation Value (HCV 1) across four taxonomic classes: 24 mammal species, 13 bird species, 8 reptile species and 8 amphibian species (Section 5.1.2). Of these, 16 species are classified as Endangered (EN) or Vulnerable (VU) on the IUCN Red List. An additional eight species are threatened or critically endangered under Colombia's national classification framework (Resolución 0126/2024) but are categorized at lower threat levels by the IUCN.

Presence of CR and EN Species

Four species classified as Endangered (EN) on the IUCN Red List have confirmed or strongly supported presence in the project zone.

Ateles belzebuth (White-bellied Spider Monkey; EN — IUCN; EN — Res 0126; CITES II). Stevenson (2020) reported population densities of 20 individuals/km² in La Macarena. Applying a conservative density estimate of 5–10 individuals/km² to the approximately 120–160 km² of structurally suitable mature forest within the project area, the local population at the start of the project is estimated at between 600 and 1,600 individuals. The presence of the species is therefore not marginal or incidental but represents a resident, reproductively viable population directly dependent on the forest habitat conserved by the project.

Pteronura brasiliensis (Giant River Otter; EN — IUCN; CITES I). The species is confirmed present in the broader Guéjar–Ariari–Guayabero–Guaviare fluvial system that encompasses the project area. In Colombia, the species has been recorded in the Meta, Guayabero, Guaviare, Arauca, Casanare, Putumayo and Caquetá river basins. The most recent field study in the Meta department was conducted by Parra-Mendoza (2025) at the Reserva ProAves El Jaguar on the Río Guaviare in Mapiripán.

Inia geoffrensis (Amazon River Dolphin; EN — IUCN; EN — Res 0126; CITES II). The subspecies I. g. humboldtiana, inhabiting the Orinoco system, is confirmed present in the tributary network that includes the project zone. Monitoring programmes along the Orinoco and its tributaries report density values of 0.7–6.3 individuals/km in the Guaviare basin and 0.57–1.96 individuals/km in the Meta basin main channel, increasing to up to 9.29 individuals/km in confluence habitats.

Presence of Vulnerable (VU) Species Exceeding Population Thresholds

In addition to the four EN species documented above, the project zone supports confirmed populations of 12 species classified as Vulnerable (VU) on the IUCN Red List. For several of these, the evidence demonstrates populations substantially exceeding the threshold of 30 individuals or 10 pairs.

Harpia harpyja (Harpy Eagle; VU — IUCN; CITES I). Fundación BioHerencia has maintained continuous monitoring of an active breeding nest at the Reserva Natural Harpy Eagle (Vereda Alto Guapaya, Vista Hermosa, Meta) since 2021. This nest has successfully fledged two juveniles in five years of monitoring, with a third breeding cycle underway at the time of writing (at least 4 individuals). Under full forest conservation, the project zone is estimated to support 6–10 breeding pairs, based on regional nest density data of 1.97–4.84 nests/100 km², exceeding the 10-pair threshold for VU species under GL3.1.

Lagothrix lagothricha (Common Woolly Monkey; VU — IUCN; VU — Res 0126; CITES II). The subspecies present in the project zone, L. l. lugens, is classified as CR under Colombia's national threat assessment (Res 0126/2024). Applying a conservative density estimate of 10–15 individuals/km² to the 120–160 km² of structurally suitable forest within the project area, the local population is estimated at between 1,200 and 2,400 individuals, far exceeding the 30-individual threshold.

Other Vulnerable species with confirmed or strongly supported presence and populations likely exceeding the GL3.1 threshold include: the Giant Anteater (*Myrmecophaga tridactyla*, VU — IUCN; VU — Res 0126), documented through field surveys and community workshops; the South American Tapir (*Tapirus terrestris*, VU — IUCN; VU — Res 0126), with particularly notable reports of multiple individuals in Vista Hermosa; the White-lipped Peccary (*Tayassu pecari*, VU — IUCN; EN — Res 0126), confirmed through community perception surveys; Brumback's Night Monkey (*Aotus brumbacki*, VU — IUCN; VU — Res 0126), a Colombian endemic confirmed present in the project zone; the Ornate Titi Monkey (*Plecturocebus ornatus*, VU — IUCN; VU — Res 0126; CITES II), another Colombian endemic with a restricted distribution; the Yellow-footed Tortoise (*Chelonoidis denticulatus*, VU — IUCN; CITES II), documented in forest habitats; and the Gray Tinamou (*Tinamus tao*, VU — IUCN), detected through acoustic monitoring and point counts.

5.5.2 Trigger Species Population Trends (GL3.2, GL3.3)

Table 38. *Harpia harpyja* population trends

Trigger Species	*Harpia harpyja*
Population Trend at Start of Project	The Harpy Eagle confirmed present in the project zone through the continuous monitoring of an active breeding nest at the Reserva Natural Harpy Eagle (Vereda Alto Guapaya, Vista Hermosa, Meta), which has been under systematic observation since 2021 by Fundación BioHerencia. This nest has successfully fledged two juveniles in five years of active monitoring, with a third breeding cycle underway.[78]

	Another individual was rescued in Vista Hermosa in October 2020, and a confirmed case of persecution, involving the killing of an individual near the nest site in October 2021, documents the ongoing direct mortality pressure on the local population[79]. No specific population estimate exists for Colombia. Available distribution data for the country indicate that the historical range of *Harpia harpyja* in Colombia included the upper Magdalena valley in the department of Tolima; however, due to the absence of recent records and severe habitat loss in that area, it has been classified as lost habitat for the species, and current species distribution models exclude it from the predicted range[80]. This pattern of range contraction at the national level underscores the conservation significance of the remaining confirmed populations in the Amazonian and Orinoquian piedmont, including the project zone, which now represents one of the most accessible and best-documented breeding sites for the species in Colombia. In the absence of Colombia-specific population density data, reference values from other countries within the species' range are used here to contextualise the local situation and provide a basis for population projections. Recorded home ranges vary from 10–20 km² in Panama to 43–80 km² in Venezuela and Peru. Nest densities in the Arc of Deforestation in Brazil have been estimated at 1.97–4.84 nests/100 km² of forest habitat . At the national level, population estimates from other countries range from 5,000–10,000 individuals in Peru and 1,000–2,000 mature individuals in French Guiana with the global population tentatively estimated at 100,000–250,000 mature individuals, acknowledging that hunting and selective logging are likely to have depleted densities across large parts of the range [81]. The IUCN reports a declining global population trend, with a projected decline of 27–57% over the next three generations (60 years from 2020), driven by combined forest loss and hunting pressure[82]
Without-project Scenario	In the absence of project activities, the Harpy Eagle population in the project zone would face two primary and interacting threat categories, both of which are already documented at the local level and are consistent with the threats identified by the IUCN across the species' range. Forest loss and degradation constitute the structural threat. The Harpy Eagle cannot tolerate landscapes with less than 50% forest cover remaining and does not cross forest gaps greater than approximately 500 m[83]. Forest is lost primarily through conversion to pasture and agriculture, the dominant deforestation driver in the project municipalities. Remaining forest is further degraded by selective logging, which poses a specific and underappreciated risk: almost all tree species used by Harpy Eagles for nesting are

	commercially valuable timber species, and felling of nest trees results in the direct mortality of nestlings[84]. The IUCN projects that if the 2016–2020 rate of deforestation within the species' range were to continue over three generations, approximately 38% of suitable habitat would be lost. Additionally, climate change models project a range contraction of 7–14% by 2090[85], adding a long-term structural dimension to habitat loss that operates independently of land-use decisions. Hunting, poaching and persecution represent the second critical threat and are already confirmed at the project site. Although the species is not consumed as food, it is frequently killed across its range for multiple reasons: to protect livestock, out of curiosity, for use of its feathers in traditional headdresses or souvenirs, or to be kept or traded as a live mascot[86]. In the Meta piedmont region, the expansion of cattle ranching creates the specific conditions for retaliatory killing. Studies in Brazil documented shooting mortality of 2.59 individuals per 100 km² annually in active deforestation zones, a rate sufficient to drive local population depletion or extirpation[87]. The Harpy Eagle's biological characteristics make it disproportionately vulnerable to even low levels of persecution: it is large, conspicuous, diurnally active and bound to a fixed territory with recognizable signs. It produces at most one fledgling every two to three years, meaning that the loss of a single adult in a breeding pair eliminates the reproductive contribution of that pair for a minimum of five to seven years. Without the project, the combination of progressive forest fragmentation, selective logging of nest trees, prey depletion and continued persecution would be expected to result in the abandonment of the confirmed active nest site and the loss of additional potential breeding territories within the project zone within a decade.
With-project Scenario	The project will implement the following measures to maintain and enhance the Harpy Eagle population within the project zone: (i) conservation of more than 40,000 hectares of continuous native forest connected to the PNN Sierra de La Macarena, maintaining the large, structurally intact forest territories required by breeding pairs and preserving the prey populations, particularly primates, sloths and large reptiles, on which the species depends; (ii) active protection of the confirmed nest site and a minimum 500 m buffer zone around it, preventing agricultural expansion, selective logging and human disturbance within the nest territory; (iii) no-hunting agreements with landowners and local communities across all four municipalities, directly reducing the primary direct mortality driver; and (iv) targeted environmental education addressing the misconception that Harpy Eagles represent a threat to livestock, which is the principal stated motivation for persecution in the Meta region.

Source: Karbon-X

Table 39. *Panthera onca* population trends

Trigger Species	*Panthera onca*
Population Trend at Start of Project	Bibliographic evidence confirms the presence of *Panthera onca* populations across all four project municipalities. This is further supported by mammal perception and sighting surveys conducted in 2021, which recorded confirmed jaguar observations in Vista Hermosa[64]. According to the IUCN Red List, jaguar density in the Colombian Amazon was estimated at 4.5 individuals/100 km² within Amacayacu National Park and 2.5 individuals/100 km² in unprotected areas (Payán, 2008)[65]. Applying the lower regional density estimate to the 406 km² of the project area, the local population at the start of the project is estimated at approximately 10 individuals. The IUCN currently reports a declining global population trend for the species.
Without-project Scenario	According to the IUCN, jaguar populations across 18% of the species' global range (approximately 1.6 million km²) have only a medium probability of long-term survival. These areas are generally contiguous with zones considered to have high survival probability and include most of the Colombian Llanos, placing the project zone within a regionally significant but vulnerable landscape.[66] WWF identifies four primary threats to jaguars in Colombia that are directly relevant to the project area: habitat loss and degradation driven by agricultural frontier expansion, mining and unsustainable logging; human-wildlife conflict, whereby habitat degradation forces jaguars to prey on livestock, triggering retaliatory killings; illegal wildlife trafficking, with seizures of jaguar teeth, pelts and skulls reported across multiple Amazonian countries; and climate change, which threatens to degrade the Amazonian ecosystem and reduce the ecological services on which the species depends[67]. Without the conservation measures proposed by this project, and applying the lower bound of the regional density range (1–3 individuals/100 km²)[68] to the 406 km² project area, the local population is projected to decline from the current estimate of approximately 10 individuals to around 4 individuals under continued habitat loss and fragmentation.
With-project Scenario	The project will implement the following measures to maintain and enhance the jaguar population within the project zone: (i) conservation of more than 40,000 hectares of continuous native forest connected to the PNN Sierra de La Macarena, maintaining the functional jaguar corridor between the Andes, the Amazonia and the Orinoquia, and limiting human-wildlife conflict by preventing agricultural frontier

[64] ALLCOT/KARBON-X, 2021. Documento Técnico- Síntesis de Revisión de información secundaria. Listado de especies potenciales a escala regional y municipal. Selección de especies con altos valores de conservación Talleres de biodiversidad. Propuesta de monitoreo participativo.
[65] IUCN. *Panthera onca*. https://www.iucnredlist.org/species/15953/123791436
[66] Íbid.
[67] WWF. Hablemos de Jaguares. https://www.wwf.org.co/que_hacemos/especies/hablemos_de_jaguares/
[68] Jędrzejewski, W. et al. (2023). Jaguars (Panthera onca) in the Llanos of Colombia and Venezuela: Estimating Distribution and Population Size by Combining Different Modeling Approaches. In: Mandujano, S., Naranjo, E.J., Andrade Ponce, G.P. (eds) Neotropical Mammals. Springer, Cham. https://doi.org/10.1007/978-3-031-39566-6_9

	expansion into jaguar habitat; (ii) systematic camera-trap monitoring as part of the project biodiversity monitoring plan; and (iii) no-hunting agreements with landowners and local communities across all four municipalities. Applying the average jaguar density of 4.4 ± 0.7 individuals/100 km² reported by Tobler et al. for the South-Western Amazon to the project area under full forest conservation[69], the project zone could sustain up to 17 adult individuals at the end of the project period, contributing to the genetic connectivity of the Andes–Amazonia–Orinoquia jaguar corridor.

Source: Karbon-X

Table 40. *Ateles belzebuth* population trends

Trigger Species	*Ateles belzebuth*
Population Trend at Start of Project	The white-bellied spider monkey (*Ateles belzebuth*) is likely present in the project zone, particularly in Vista Hermosa, given the municipality's direct adjacency to the PNN Sierra de La Macarena — one of the most important protected areas for this species in Colombia. According to the IUCN Red List, the species remains relatively common within protected areas across its range. Stevenson (2020)[70] reported a population density of 20 individuals/km² in La Macarena, Colombia. Applying a conservative density estimate of 5–10 individuals/km² to the approximately 120–160 km² of structurally suitable forest within the project area (defined as mature forest with a well-developed emergent layer) the population at the start of the project is estimated at between 600 and 1,600 individuals. The IUCN currently reports a declining population trend for the species.
Without-project Scenario	In the absence of project activities, *Ateles belzebuth* populations in the project zone would face two compounding threats. First, continued deforestation driven by cattle ranching expansion and fragment the mature forest habitat on which the species depends. Spider monkeys are among the most sensitive primates to forest fragmentation, as they require large, continuous tracts of forest with a well-developed canopy to sustain viable group territories (minimum estimates for group home ranges exceed 150 ha in La Macarena)[71]. Second, subsistence hunting and commercial bushmeat trade represent a direct and significant mortality source. As a large-bodied primate with a slow reproductive rate A. belzebuth populations cannot sustain even low levels of offtake. Studies on spider monkey populations subjected to high hunting

[69] Tobler, Mathias & Carrillo-Percastegui, Samia & Zuniga, Alfonso & Powell, George. (2013). High jaguar densities and large population sizes in the core habitat of the southwestern Amazon. Biological Conservation. 159. 375–381. 10.1016/j.biocon.2012.12.012.
[70] Stevenson, P. R. 2018. Abundancia de primates diurnos y otros elementos de fauna en el Parque Nacional Natural Tinigua, sierra de La Macarena, Meta, Colombia: comparación de métodos y variación anual en los años 1990. Pp. 307-329. En: Lasso, C. A., M. A. Morales-Betancourt e I. D. Escobar-Martínez (Eds.). V. Biodiversidad de la sierra de La Macarena, Meta, Colombia. Parte I. Ríos Guayabero medio, bajo Losada y bajo Duda. Serie Editorial Fauna Silvestre Neotropical. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Bogotá, D. C., Colombia. https://scispace.com/pdf/biodiversidad-de-la-sierra-de-la-macarena-meta-colombia-57cf7tv2lf.pdf
[71] IUCN. Ateles belzebuth. https://www.iucnredlist.org/species/2276/191684587

	pressure document densities as low as 1.5 individuals/km².[72] Applying this lower density to the estimated optimal habitat within the project area, the local Ateles belzebuth population could decline to between 180 and 240 individuals.
With-project Scenario	The project will implement the following measures to maintain and enhance the *Ateles belzebuth* population within the project zone: (i) conservation of more than 40,000 hectares of continuous native forest connected to the PNN Sierra de La Macarena and the AMEM, preserving the large, structurally complex forest patches required for viable spider monkey group territories; (ii) no-hunting agreements with landowners and local communities across all four municipalities, directly addressing the primary direct mortality driver; and (iii) population monitoring through line transect distance sampling surveys. Assuming that forest conservation stabilizes current densities, the project zone is estimated to sustain, at least, between 600 and 1,600 individuals of A. belzebuth by the end of the project period.

Source: Karbon-X

Table 41. *Lagothrix lagothricha* population trends

Trigger Species	*Lagothrix lagothricha*
Population Trend at Start of Project	The woolly monkey is considered likely present in the project zone given its direct adjacency to the PNN Sierra de La Macarena and PNN Tinigua. Stevenson (2018)[73], documented *Lagothrix lagothricha lugens* as the most abundant primate species in the area, with a density of 30 individuals/km². This figure is consistent with the IUCN assessment, which notes that densities in the Andean piedmont may reach 40–50 individuals/km² (Stevenson 2018)[74]. Applying a conservative density estimate of 10–15 individuals/km² to the approximately 120–160 km² of structurally suitable forest within the project area, the local population at the start of the project is estimated at between 1,200 and 2,400 individuals. The IUCN currently reports a declining global population trend for the species, with a suspected 30% decline over the past three generations (45 years), projected to continue at a similar rate over the coming three generations.
Without-project Scenario	In the absence of project activities, *Lagothrix lagothricha* populations in the project zone would face two compounding and synergistic threats. First, continued deforestation driven by agricultural frontier expansion would progressively eliminate the mature forest habitat on which woolly monkeys depend. Second, subsistence hunting represents a direct and

[72] íbid.
[73] Stevenson, P. R. 2018. Abundancia de primates diurnos y otros elementos de fauna en el Parque Nacional Natural Tinigua, sierra de La Macarena, Meta, Colombia: comparación de métodos y variación anual en los años 1990. Pp. 307-329. En: Lasso, C. A., M. A. Morales-Betancourt e I. D. Escobar-Martínez (Eds.). V. Biodiversidad de la sierra de La Macarena, Meta, Colombia. Parte I. Ríos Guayabero medio, bajo Losada y bajo Duda. Serie Editorial Fauna Silvestre Neotropical. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Bogotá, D. C., Colombia. https://scispace.com/pdf/biodiversidad-de-la-sierra-de-la-macarena-meta-colombia-57cf7tv2lf.pdf
[74] IUCN. *Lagothrix lagothricha ssp*. Lagothricha. https://www.iucnredlist.org/species/11175/179072201

	severe mortality driver: Maldonado (2012)[75] documented that hunting pressure alone reduced woolly monkey densities from 12.8 individuals/km² in a low-hunting-pressure community to 1.1 individuals/km² in a high-hunting-pressure site within the same landscape (a reduction of over 90%). Applying this lower bound of density under high hunting pressure (1.1 individuals/km²) to the estimated suitable forest area within the project zone, the local population could decline from the current estimate of 1,200–2,400 individuals to as few as 130–175 individuals — a reduction of 85–93% — driven by the combined effects of deforestation and uncontrolled hunting.
With-project Scenario	The project will implement the following measures to maintain and enhance the *Lagothrix lagothricha* population within the project zone: (i) conservation of more than 40,000 hectares of continuous native forest connected to the PNN Sierra de La Macarena and PNN Tinigua, preserving the high fruit productivity piedmont forests that support the exceptional densities documented by Stevenson (2018); (ii) no-hunting agreements with landowners and local communities across all four municipalities, directly addressing the primary direct mortality driver; and (iii) population monitoring through line transect distance sampling surveys. Assuming that forest conservation stabilises current densities and allows partial recovery across the 30–40% of the project area that constitutes optimal habitat and applying a moderate recovery density of 20–25 individuals/km², the project zone is estimated to sustain between 2,400 and 4,000 individuals of L. lagothricha by the end of the project period.

Source: Karbon-X

Table 42. *Pteronura brasiliensis* population trends

Trigger Species	*Pteronura brasiliensis*
Population Trend at Start of Project	The giant river otter is confirmed present in the broader Güejar-Ariari-Guayabero-Guaviare fluvial system that encompasses the project area. In Colombia, the species has been recorded in the Arauca, Casanare, Meta, Guayabero, Guaviare, Putumayo and Caquetá river basins[76]. The most recent field study conducted in the Meta department was carried out by Parra-Mendoza (2025) at the Reserva ProAves El Jaguar, located on the Río Guaviare in the municipality of Mapiripán, in the same river system that forms the eastern boundary of the project zone. That study recorded 16 individually identified giant otters distributed across two waterbodies: a group of eight individuals in Laguna Encanto, a group of six and two dispersers in Caño Evaristo, yielding a relative abundance of 0.79 individuals per kilometre

[75] íbid.
[76] Parra-Mendoza, Y. N. 2025. Presencia de la Nutria gigante en la reserva ProAves El Jaguar (Mapiripán-Meta) y su relación con las comunidades locales. Conservación Colombiana, 30(1), 32-41pp. https://doi.org/10.54588/cc.2025v30n1a4

	surveyed, consistent with values reported for El Tuparro National Park (0.5 ind./km) and the Río Apaporis (0.8 ind./km). The presence of two dispersing individuals in the Mapiripán study is indicative of active group formation dynamics, suggesting a demographically functional population in the subregion. Giant otter groups are composed primarily of a breeding pair and their offspring, typically ranging from four to ten individuals, occupying home ranges exceeding 12 km² . The IUCN Red List does not provide a current total global population estimate, and overall population trends remain uncertain at the species level[77]. Partial surveys suggest the species is declining in some areas, such as western Colombia and the Madre de Dios department in Peru, due to habitat loss and human activities. In Colombia specifically, the Plan de Manejo para la Conservación de las Nutrias en Colombia[78] identifies the Orinoco and Amazon basins as priority areas for the species, and confirms presence in the Guaviare and Guayabero rivers, the main drainage axes of the project zone. Given the highly irregular and patchily distributed occurrence of Pteronura brasiliensis across its range, the low overall density of social groups per unit of river length, and the absence of systematic surveys specifically within the project boundary, it is not possible to provide a reliable population estimate for the project area at this time.
Without-project Scenario	In the absence of project activities, giant otter populations in the project zone and the adjacent fluvial system would face multiple compounding threats, several of which are already documented in the project area or its immediate surroundings. The IUCN assessment[79] estimates that accelerating habitat destruction, degradation and exploitation have caused a population decline of more than 50% over the past 25 years (three generations) and projects an equivalent future reduction over the next 25 years under current trends. At the landscape level, the primary threat in the project zone is the continued deforestation of riparian and gallery forest along the Güejar, Ariari and Guayabero rivers, driven by the expansion of the agricultural and livestock frontier. The IUCN explicitly identifies the destruction of riparian habitat as the leading structural threat to the species across its range. Loss of gallery forest eliminates den sites, resting areas and the shallow, vegetated bank microhabitats that the species requires for reproduction and daily activity. Direct human-wildlife conflict represents a second critical threat in the project zone. Giant otters are highly conspicuous, social and diurnally active, making them easy targets for persecution. Fishers frequently

[77] IUCN. Pteronura brasiliensis. https://www.iucnredlist.org/species/18711/244867206
[78] Trujillo, F., Caicedo, D., Rodríguez, L. H., Mosquera, F., Botero-Botero, Á., Cañon, S., Rodríguez, M. V., Durán Prieto, C., Sierra, A., Guerra Galván, L., Lasso, L., Tucano Miraña, G., Anzola, F., Ospina-Posada, V., Sierra Vargas, F., & Baptiste, M. F. (2016). Plan de manejo para la conservación de las nutrias (Lontra longicaudis y Pteronura brasiliensis) en Colombia. Ministerio de Ambiente y Desarrollo Sostenible, Dirección de Bosques, Biodiversidad y Servicios Ecosistémicos; Fundación Omacha. Bogotá, Colombia. https://www.minambiente.gov.co/wp-content/uploads/2021/10/Plan-de-manejo-para-la-conservacio%CC%81n-de-las-nutrias-en-Colombia-2016.pdf
[79] IUCN. Lagothrix lagothricha ssp. Lagothricha. https://www.iucnredlist.org/species/11175/179072201

	perceive them as competitors for fish resources and blame them for depleting stocks, leading to retaliatory killing. Giant otters are additionally vulnerable to accidental drowning in fishing nets and traps. Contamination of water bodies is an emerging threat of particular relevance given the documented presence of artisanal and illegal gold mining in the Guaviare and its tributaries. Mercury used in gold amalgamation contaminates fish and has been found at concentrations exceeding tolerable levels for mustelids in areas near major Amazonian national parks. Even a decade after mining activity ceases, affected areas show depleted fish populations and remain uncolonised by otters (IUCN 2021). The use of pesticides and agrochemicals in the agricultural areas adjacent to the project zone represents an additional, poorly understood contamination pathway. Without the conservation measures proposed by this project, the combination of riparian deforestation, fishing conflict, contamination and disease would progressively degrade and eliminate the gallery forest habitat and water quality conditions on which *Pteronura brasiliensis* depends, with a high probability of local population decline or extirpation in the watercourses of the project zone within the project timeframe.
With-project Scenario	The project will implement the following measures to maintain and enhance *Pteronura brasiliensis* populations within the project zone and the adjacent fluvial system: (i) conservation of more than 40,000 hectares of native forest, with priority protection of riparian and gallery forest strips along the Güejar, Guapaya and Ariari rivers and their tributaries — the primary denning and foraging habitat of the species in the project area; (ii) community agreements with landowners and local fishers to reduce retaliatory killing and fishing conflicts; (iii) environmental education with local communities, following the participatory approach demonstrated to be effective by Parra-Mendoza (2025) in Mapiripán, where education activities successfully transformed community perceptions of the species from negative to conservation-oriented; and (iv) systematic population monitoring through boat-based transect surveys and individual photo-identification. Conservation of riparian forest and reduction of hunting and fishing conflict are expected to maintain current population levels and facilitate natural recolonization of suitable watercourses within the project zone over the project period. A quantitative estimate will be incorporated into the monitoring plan following the first systematic survey.

Source: Karbon-X

Table 43. *Inia geoffrensis humboldtiana* population trends

Trigger Species	*Inia geoffrensis humboldtiana*

Population Trend at Start of Project	The subspecies inhabiting the Orinoco system faces an undetermined but declining population trend[80]. Monitoring programs along the Orinoco and its tributaries report heterogeneous densities: ranges values in the Guavire basin are 0.7 - 6.3 ind/km, and the Meta basin are 0.57–1.96 ind/km in the main channel; up to 9.29 ind/km in confluence habitats.[81] . A population estimate of approximately 1,016 individuals was reported for the Rio Meta in 2008, 370 individuals in Guavire (2016) and 15 in Guayabero / Losada (2016)[82]. Regarding project area, community biodiversity workshops and field records compiled under the Sur del Meta project synthesis document confirm the presence of *I. g. humboldtiana* across the Guéjar-Ariari river system and associated water bodies. Sightings are reported as frequent in the Vista Hermosa municipality, with additional records from Puerto Rico and Puerto Lleras[83]. Mosquera-Guerra et al. (2015) calculated a freshwater ecosystem degradation index of 6.2–6.5 (scale 0–8.5, where ≥4 = high degradation) for the middle Meta basin. The principal anthropogenic stressors identified are: oil extraction activities (rated 3/high; expected to increase), artisanal and commercial fishing (rated 2–3/medium-high), boat traffic (rated 2/medium; increasing), mining (rated 3/high; increasing), and tourism pressure around Puerto Gaitán.[84]
Without-project Scenario	Under the without-project land-use scenario, the population o*f I. g. humboldtiana* in the Sur del Meta project area is projected to decline or remain at critically low densities, driven by the following interacting threats: 1. Continued deforestation and riparian forest loss; 2. Intensification of commercial and artisanal fishing; 3. Targeted killing linked to Calophysus macropterus fishery: The intentional killing of river dolphins for use as bait in the piracatinga (Calophysus macropterus) fishery. In the Brazilian Amazon (Mamirauá Reserve), this practice drove an average annual decline of 6.7% in Inia encounters between 2000 and 2017, implying a population halving each decade[85]. Without project intervention, similar dynamics may develop or intensify in the Orinoquian range. 4. Hydrocarbon extraction and contamination 5. Infrastructure development and habitat fragmentation. The projected outcome without project is continued or accelerating population decline of I. g. humboldtiana in the project area; loss of

[80] IUCN. *Inia geoffrensis*. https://www.iucnredlist.org/species/10831/50358152
[81] Trujillo-González, F., Mosquera-Guerra, F., & Franco, N. (2019). Delfines de río: especies indicadoras del estado de salud de los ecosistemas acuáticos de la Amazonia y la Orinoquia. Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales, 43(167), 199–211. https://doi.org/10.18257/raccefyn.765
[82] íbid.
[83] ALLCOT/KARBON-X, 2021. Documento Técnico- Síntesis de Revisión de información secundaria. Listado de especies potenciales a escala regional y municipal. Selección de especies con altos valores de conservación Talleres de biodiversidad. Propuesta de monitoreo participativo.
[84] Mosquera-Guerra, Federico; Parra, Carlos; Trujillo, Fernando; Jiménez-Ortega, Alex Mauricio; Mantilla-Meluk, Hugo. Valoración estacional de las amenazas contra la conservación de Inia geoffrensis humboldltiana (Cetartiodactyla Iniidae) en la cuenca del Río Meta, Colombia. Therya, vol. 6, núm. 2, mayo, 2015, pp. 371-387. Asociación Mexicana de Mastozoología. Baja California Sur, México. https://www.researchgate.net/publication/279159990_Valoracion_estacional_de_las_amenazas_contra_la_conservacion_de_Inia_geoffrensis_humboldltiana_Cetartiodactyla_Iniidae_en_la_cuenca_del_Rio_Meta_Colombia
[85] IUCN. Inia geoffrensis. https://www.iucnredlist.org/species/10831/50358152

	confluence hot spots due to combined pressure from fishing, deforestation and oil activities; progressive functional extinction from key river segments within and adjacent to the project zone.
With-project Scenario	The project will implement a set of integrated conservation measures specifically designed to address the threat drivers identified in the without-project scenario, and to maintain and progressively enhance the population status of *Inia geoffrensis humboldtiana* within the Güejar-Ariari-Guayabero fluvial system. The primary conservation measure is the protection of more than 40,000 hectares of continuous native forest, with particular emphasis on riparian and gallery forest along the Güejar, Ariari and Guayabero rivers and their tributary network. Conservation of the forest buffer along watercourses within the project zone is therefore a necessary condition for maintaining functional dolphin habitat in the project area. Here is the revised version: The second measure addresses fishing conflict and the risk of targeted killing through community engagement and environmental awareness. The project will promote dialogue with fishing communities operating on the Ariari, Güejar and Guayabero rivers within and adjacent to the project zone, with the aim of building awareness of the ecological role of the river dolphin and fostering coexistence between fishing activities and dolphin conservation. This will include environmental education activities, targeted outreach campaigns and capacity-building sessions that communicate the conservation status of *Inia geoffrensis humboldtiana,* the threats it faces, and the ecological services it provides as a top predator and indicator of aquatic ecosystem health. The third measure addresses hydrocarbon contamination risk. The project will document and report any evidence of hydrocarbon spills or contamination events in the fluvial systems within the project zone, in coordination with CORMACARENA and the Autoridad Nacional de Licencias Ambientales (ANLA). While the project cannot directly control hydrocarbon extraction operations, the conservation agreements with landowners and the systematic river monitoring programme will create a documented baseline of water quality and dolphin presence that strengthens the evidentiary basis for regulatory intervention in the event of contamination events. The biodiversity monitoring programme will include systematic boat-based transect surveys for *Inia geoffrensis* on all major watercourses within and adjacent to the project zone. Individual photo-identification of dorsal fin and body markings will be implemented where feasible to track population composition and detect changes in group structure over time. Given the absence of a species-specific population baseline for the project zone, a quantitative end-of-project population estimate cannot be reliably provided at this stage. However, with full implementation of riparian forest conservation, fishing conflict reduction and systematic monitoring, the project is expected to maintain current dolphin

	presence in the Güejar-Ariari-Guayabero system, prevent the functional extinction from key river segments that represents the most likely without-project outcome, and contribute to the documented recovery of the humboldtiana subpopulation within the broader Orinoquian corridor.

Source: Karbon-X

Table 44. *Tapirus terrestris* population trends

Trigger Species	*Tapirus terrestris*
Population Trend at Start of Project	The *Tapirus terrestris* is confirmed present in the project zone, with particularly notable reports of multiple individuals in Vista Hermosa, given its direct adjacency to the PNN Sierra de La Macarena and the broader AMEM. Community biodiversity workshops conducted in the four project municipalities documented abundant sightings of the species in Vista Hermosa, and the species is listed in the mammal inventories for all four municipalities[86]. Published density estimates for T. terrestris across its Neotropical range vary from 0.06 ind/km² in heavily hunted areas to 1.6 ind/km² in undisturbed tropical forests without hunting pressure. In the Colombian Orinoquia-Amazonia region, comparable densities in areas with moderate hunting pressure range from 0.30 to 0.52 ind/km², based on studies in the Peruvian and Brazilian Amazon under analogous conditions[87]. Applying a conservative density estimate of 0.30–0.40 ind/km² to the approximately 300–406 km² of suitable forest habitat within the project area (defined as continuous primary and secondary forest with access to water bodies, riparian corridors and natural mineral licks), the population at the start of the project is estimated at between 90 and 160 individuals. The IUCN currently classifies the species as Vulnerable with a declining population trend globally.[88]
Without-project Scenario	In the absence of project activities, *Tapirus terrestris* populations in the project zone would face multiple compounding threats. First, continued deforestation driven by cattle ranching expansion along the agricultural frontier would progressively reduce and fragment the forest habitat on which the species depends, tapirs require large, continuous tracts of forest for foraging, refuge from predators, and protection of their young during the extended parental care period. Studies on home range requirements indicate that individual tapirs use areas of approximately 2,000 ha in the Atlantic Forest of Brazil, and population viability analyses estimate that approximately 82,600 ha of continuous habitat

[86] ALLCOT/KARBON-X, 2021. Documento Técnico- Síntesis de Revisión de información secundaria. Listado de especies potenciales a escala regional y municipal. Selección de especies con altos valores de conservación Talleres de biodiversidad. Propuesta de monitoreo participativo.

[87] Montenegro, O. (2005). Programa Nacional para la conservación del Género Tapirus en Colombia. Ministerio de Ambiente, Vivienda y Desarrollo Territorial, Dirección de Ecosistemas. ISBN 958-97548-2-1. https://www.minambiente.gov.co/wp-content/uploads/2021/10/Programa-Nacional-para-la-conservacio%CC%81n-del-Ge%CC%81nero-Tapirus-en-Colombia-2005.pdf

[88] IUCN. Tapirus Terrestris. https://www.iucnredlist.org/es/species/21474/45174127

	are required to sustain a minimum viable population of 150 individuals.[89] Second, subsistence hunting represents the most significant direct mortality source for the species in the Orinoquia and Amazonia regions. Tapirs are preferentially targeted at natural mineral licks, where hunters exploit their predictable visitation patterns. In the middle Caquetá River region, hunting records documented up to 120 tapirs taken by a single community in 11 months. As a large-bodied herbivore with an extremely slow reproductive rate (a gestation period of 385–400 days, a single offspring per birth, and an inter-birth interval exceeding two years) *T. terrestris* populations cannot recover from even moderate levels of extraction[90]. Third, competition with expanding cattle herds degrades and displaces tapirs from foraging areas, particularly in riparian zones and transitional habitats. Studies in Amazonian forests subjected to high hunting pressure document densities as low as 0.06–0.11 ind/km². Applying this lower density range to the suitable habitat within the project area, the local *T. terrestris* population could decline to between 18 and 45 individuals, well below the threshold for long-term population viability, and placing the species at risk of local extinction.
With-project Scenario	The project will implement the following measures to maintain and enhance the *Tapirus terrestris* population within the project zone: (i) conservation of more than 40,000 hectares of continuous native forest functioning as a critical connectivity matrix between the PNN Sierra de La Macarena, the DMI Ariari-Guayabero and the DMI Macarena Norte, preserving the large, structurally intact forest blocks, riparian corridors and natural mineral licks required for viable tapir populations; (ii) community participatory monitoring, enabling continuous assessment of tapir detection frequency and habitat use across the four municipalities; (iii) reduction of hunting pressure through environmental education programs, no-hunting agreements with landowners and local communities, and early-warning alert systems coordinated through village committees; and (iv) deforestation monitoring via satellite imagery to prevent habitat loss within the project boundaries. Assuming that forest conservation and reduced hunting pressure stabilize current densities and allow gradual recovery toward the levels documented in undisturbed Amazonian forests (0.40–0.52 ind/km²), the project zone is estimated to sustain between 120 and 210 individuals of *T. terrestris* by the end of the project period, approaching the minimum viable population threshold and ensuring the species' long-term persistence as a key seed disperser and ecosystem engineer within the landscape.

Source: Karbon-X

[89] Montenegro, O. (2005). Programa Nacional para la conservación del Género Tapirus en Colombia. Ministerio de Ambiente, Vivienda y Desarrollo Territorial, Dirección de Ecosistemas. ISBN 958-97548-2-1. https://www.minambiente.gov.co/wp-content/uploads/2021/10/Programa-Nacional-para-la-conservacio%CC%81n-del-Ge%CC%81nero-Tapirus-en-Colombia-2005.pdf

[90] Ibid.

Table 45. *Speothos venaticus* population trends

Trigger Species	*Speothos venaticus*
Population Trend at Start of Project	The bush dog ("perro vinagre") is globally classified as Near Threatened (NT) by the IUCN, on the basis of an estimated population decline of 20–25% since 2005 to 2017 years driven by habitat loss, prey reduction, predation by domestic dogs and disease transmission from canids associated with human settlements[91]. The bush dog is recognized as naturally rare throughout its range, from Costa Rica to Argentina. In Colombia, published data on the species are extremely scarce; it is absent from any national threat category in the Red Book of the Mammals of Colombia, and the IUCN notes the species' status as rare or unknown in most countries within its distribution. Direct confirmation of its presence in the Meta department comes from camera-trap records obtained by Rodríguez-Castellanos et al. (2017) in the Llanos Orientales (Meta Department) in July 2013 and in the Serranía de la Lindosa (Guaviare Department) in November 2012, both located within the Orinoco basin and in the geographic vicinity of the project zone. Detection rates in these surveys were 0.10 and 0.18 captures per 100 trap-nights respectively, among the highest reported for any camera-trap study involving this species across its range, reflecting the species' inherently low detectability rather than high abundance. Published density estimates for *S. venaticus a*re among the lowest documented for any Neotropical canid: 0.04 ind/km² in the Pantanal and São Paulo state of Brazil, 0.025 ind/km² in partially fragmented cerrado in Mato Grosso, and as low as 0.001 ind/km² in fragmented southern Amazonia. The IUCN calculates that a continental suitable area of approximately 11,000,000 km² at an average density of 0.01 ind/km² would predict roughly 110,000 individuals range-wide, acknowledging that fragmentation, degree of protection and distributional variability make this a significant overestimate[92]. Applying the most contextually appropriate density of 0.025 ind/km² to the estimated 300–406 km² of suitable continuous forest and gallery forest habitat within the project area, the population present at the start of the project is estimated at between 7 and 10 individuals, likely corresponding to one or two social groups of 2–10 members each.
Without-project Scenario	In the absence of project activities, several compounding threats would accelerate the decline or local disappearance of *S. venaticus* from the project zone. First, continued expansion of the agricultural frontier would progressively reduce and fragment the forested matrix on which the species depends. Progressive deforestation would eliminate

[91] Rodríguez - Castellanos, Paola & Garrote, Germán & Trujillo, Fernando. (2017). New camera-trap records for bush dog (Speothos venaticus) in Colombia. Galemys. 29. 10.7325/Galemys.2017.N1. https://www.researchgate.net/publication/319188482_New_camera-trap_records_for_bush_dog_Speothos_venaticus_in_Colombia
[92] IUCN. Speothos venaticus. https://www.iucnredlist.org/species/20468/9203243

	movement corridors, isolate groups between forest remnants, and reduce the genetic connectivity between subpopulations that is already documented as limited in fragmented landscapes elsewhere in the range [93]. Second, the reduction of prey populations (particularly the paca-*Cuniculus paca*) would diminish the food resource base sustaining bush dog groups[94]. Third, disease transmission from domestic dogs represents a potentially catastrophic threat given the bush dog's gregarious social structure. Field evidence documents the death of entire family groups from Campylobacter and mange contracted from domestic dogs; the species is additionally susceptible to parvovirus, canine distemper, rabies and Leishmania[95]. In the productive rural landscapes of southern Meta, where non-vaccinated hunting dogs regularly enter forest areas, the risk of pathogen exposure is high and would increase in direct proportion to habitat fragmentation and the resulting overlap between bush dog home ranges and human-dominated areas. Under the without-project scenario, applying the lower density bounds documented in fragmented Amazonian systems (0.001 ind/km²) to the available habitat, the local population of *S. venaticus* could decline to fewer than 5 individuals. The probability of detecting the species via conventional camera-trap methods would approach zero, and any groups persisting in the area would face severe inbreeding and demographic stochasticity given the isolation from the nearest confirmed populations.
With-project Scenario	The project will implement the following measures to maintain and enhance conditions for the persistence of *Speothos venaticus* within the project zone: (i) Conservation of more than 40,000 hectares of native forest functioning as a critical connectivity corridor between the PNN Sierra de la Macarena, the DMI Ariari-Guayabero and the DMI Macarena Norte, maintaining the large, structurally continuous forest blocks and riparian gallery forest corridors along the Guejar-Ariari watershed that are essential for bush dog movement, group home range integrity and inter-group genetic connectivity. (ii) Systematic camera-trap monitoring enabling the first quantitative assessment of detection frequency and habitat use for this species within the project boundaries. (iii) Reduction of hunting pressure on prey populations through no-hunting agreements with the participating families, environmental education programs coordinated through the municipal corporations, and early-warning alert systems for hunting incidents within the project zone.

[93] Paviolo, Agustín; Varela, Diego (2019). Speothos venaticus. En: SAyDS-SAREM (eds.) Categorización 2019 de los mamíferos de Argentina según su riesgo de extinción. Lista Roja de los mamíferos de Argenta. http://doi.org/10.31687/SaremLR.19.128
[94] Íbid
[95] Íbid

	Under the with-project scenario, assuming that forest conservation and reduced threat pressure stabilize current occupancy and allow gradual recolonization or consolidation of groups within the project zone, the area is estimated to sustain between 7 and 10 individuals, equivalent to one to two social groups, by the end of the project period.

Source: Karbon-X

APPENDICES

Appendix 1: Stakeholder Identification Table

Stakeholder	Rights, Interest and Overall Relevance to the Project
Farmers, ownership and land tenure	The central actors of the project are the families of the owners and landowners, who are committed to the conservation of their forests. Their role is that of participating partners. The participating partners were identified and linked to the project since the different moments of socialization and participation of the actors were carried out hand in hand with the social organizations with which commercial agreements were signed. The main rights of this group of actors are freedom of expression, participation, access to information, access to natural resources, work, safety and health at work, food, access to land, conservation and preservation of the environment, water, social rights, security, health, housing, education – training, culture, consultation, women's participation rights, access to health and social security services, education, among others, and standard of living linked to social safeguards.
Productive associations and community action boards	Representing the landowners are nine (9) associations and 38 Community Action Boards CAB (JAC, in Spanish) that signed commercial contracts with the project proponent. However, they were replaced by the Corporations.
Territorial entities	The territorial entities, the mayors' offices of four municipalities and the governor's office of Meta, within the framework of their competencies, define territorial planning and therefore regulate land use. In addition, by executing public policies in their territories through development plans, they can be co-financiers of community initiatives within the framework of the REDD+ project. The main rights that this group of actors seeks to safeguard are freedom of expression, participation, access to information, conservation and preservation of the environment. access to water, social rights. security, health, housing, education – training, culture, consultation, participation rights of women, access to health services and social security, education, among others, and standard of living.
Environmental national system entities	The regional environmental authority (Cormacarena) defines the environmental determinants for land use planning and implements programs and projects aimed at conservation and sustainable development in the region of La Macarena and the entire department of Meta. Initially it was identified as a strategic actor, especially for its goals associated with the promotion and strengthening of green businesses, with which synergies could be made in sustainable productive projects, but given the contradictions that became evident in the territory and the criticism that the local population has towards this corporation, the decision of the project's partner farmers

	to maintain the relationship with this entity, mainly for compliance with regulations and norms, is respected. The main rights that this group of actors seeks to safeguard are freedom of expression, participation, access to information, conservation and preservation of the environment, access to water, social rights, education – training, culture, consultation, participation rights of women, and improvement of quality of life.
Indigenous communities	There are no indigenous communities within the project area. There are two indigenous in Resguardo La Sal and Naexil Put. None of them are inside the project area. The first one does not have project areas within 10 km and is not considered an interested party. In the case of the Naexil Put reservation of the Jiw Ethnic Group, it has a property called Luna Roja in the village of Florida (385 ha + 1,140 m^2), with 217 registered people, grouped into 25 families. It is outside the reference region, and separated by the Guayabero River from some of the project areas. These communities depends on small agriculture, fishing and hunting. They have suffered violence and displacement by illegal actors. The indigenous communities did not participate in the meetings although an invitation was sent through the Mayor's Office.

Appendix 2: Project Risks Table

Identify Risk	Potential impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk
Phenomena of natural and anthropic origin	The main climatic risks that partners and ecosystems may be affected by are forest fires, floods and droughts. For its part, the Third National Communication on Climate Change - TCNCC points out "there is evidence of a high risk in the lower Amazon and southern Orinoquía region" in relation to risks due to climate change (Anex Risk analysis) The vulnerability to the climatic impacts generated by human activities are related to the current management practices of the soil, the forest and the productive systems managed in a traditional way related to cultural practices rooted by generations and the lack of governance of the territory.	According to the high risk of climate change, the municipalities of Puerto Lleras, Puerto Rico and Vista Hermosa present a high risk and Puerto Concordia between low and medium, therefore "priority attention should be directed to adaptive management of the territory" according to the TCNCC. Productive reconversion and the implementation of sustainable production systems will be worked on within the project with training activities and capacity building with partners and communities to mitigate the effects of climate change.
Public order and security	With regard to the risks generated by risky conditions for public order and security, this could lead to the suspension of the project in some areas and the objectives, goals and activities set not being met. Biodiversity: When public risk problems are generated, they could have two consequences; One is that in isolated areas, since the owners do not have access to their properties, important areas of forests are preserved, taking into account the guidelines of the groups outside the law to manage the forests sustainably, or two, the logging is intensified given the same conditions of use. access and that people outside the territory buy important extensions of forests and cut them down for livestock or other uses.	The project activities have social consensus and work has been done with local actors, organizations and formal institutions that act in the territory, therefore the activities of governance, training and productive projects are designed to adapt to changes in climate and social conditions, however, if public order problems arise, risk assessment is carried out, work is focused on low-risk areas and temporary suspension of the project by public order in medium and high risk areas, while identifying solutions with leaders and partners.
Leaks, felling of trees	Risk to biodiversity. In this sense, two cases can be presented: 1) the owners will use the areas outside the	The monitoring of forest areas linked to the project, for which the Community Action Boards have an important role, will be part of

	forests involved in the project for forest exploitation to avoid intervention in these areas. 2) The owners will use wood from the project's forest area for activities such as firewood and wood for construction or home improvement.	the control of extractions in a manner. Another aspect to take into account as a control measure is that through Decree 1791 of October 4, 1996, which regulates forest use in Colombia, so that owners can extract wood from the areas surrounding the The project must apply for a forest use permit from the resource administrator Corporation, in this case Cormacarena. The Decree classifies the uses as unique, persistent and domestic, the latter are those that are made exclusively to satisfy vital domestic needs without their products being marketed. The norm indicates that a domestic use will not require a use permit and that it is classified as domestic if it does not exceed 20 m3 per year. Therefore, if the logging activities for the consumption of firewood and housing arrangement are transferred to other forests of the owner, it is expected that this will not affect the biodiversity of the forest ecosystem thanks to a sustainable use that is the norm.
Carbon market fluctuations	There are risks in the carbon markets since they can fluctuate and not meet expectations in relation to the desired income, which would have the following impacts: In the community since it would continue with the current trend in relation to deforestation and ways of life. In the climate: CO_2 emissions would remain according to the current trend or increase taking into account that there is no mechanism that allows incentives to conservation or a process of governance and cultural change. In biodiversity: the forests and ecosystems present in the region would disappear or be degraded, losing the flora and fauna of the region and environmental goods and services offered by the ecosystem.	The uncertainty generated by the fluctuation of the carbon markets is solved by guaranteeing the resources during the formulation and implementation until the expected income is received and by formulating projects to manage resources with private companies and cooperation organizations through calls. Sustainable actions do not only expect to be financed with carbon credits. The project has the necessary financial resources before the project reaches breakeven.

Dilation and impact on the implementation of the training program	Difficulties for the implementation of training caused by the pandemic, weather, or public order, which leads to modifying the methodology and schedule of activities.	Structure flexible training programs and methodologies for members according to their resources and availability. The project will maintain communication with the partners informing in time about changes and status.
Corruption	Information manipulation and limitations.	Application of the Code of Conduct, proper handling of information, limitation of handling of sensitive information
Communication	Channels and mechanisms not adequate enough to guarantee information, communication and participation of all project partners.	Establish a communication strategy between several levels in a reciprocal way; Project proponent, Implementing entity, Coordinating Committees, village nuclei, villages and leaders. Having open media, motivated and trained people. socialize and popularize the mechanism for citizen participation and attention.
Non-permanence of results	Emission reductions can be lost, therefore the established commitments are not met, either due to future deforestation or due to natural causes such as forest fires.	Constant training that remembers that this is generated by results, each year it will be measured. The same population is in charge of “valuing" the standing forest. 22% buffer