

26. MONITORING REPORT (2016-2020)

The following is the monitoring report designed to evaluate changes in project boundaries, the execution of activities, socio-environmental effects, project permanence and project emissions, based on the established methodological guidelines, in order to generate accurate and quality information in the verification process.

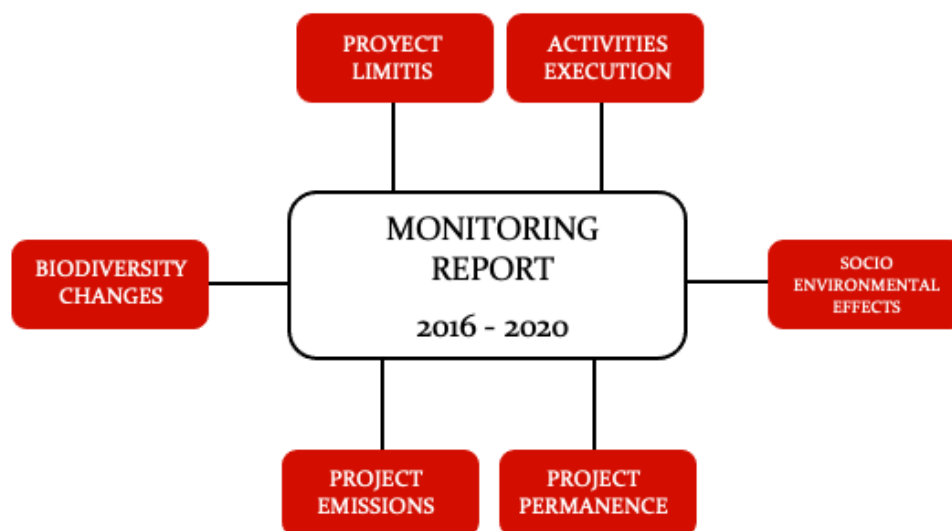


Figure. 27 Wetland ecosystem monitoring plan design, period 2016-2020.

Source: Cataruben Foundation, 2021

26.1. PROJECT BOUNDARY MONITORING

26.1.1. Project area

The project boundaries were monitored in the period 2016-2020 by means of a CLC cover change analysis, subsequently the categories were grouped according to the project strata following the methodology guidelines. As a result, the change from natural cover to transformed cover was determined for each project stratum. Table 34 summarizes the changes during the analysis period. The negative sign indicates a reduction of areas with regarding to the previous year.

Table 34. Changes in the analysis period in the project area (2016 - 2020).

Stratum or Coverage	Change in land use during the Monitoring Period in the project area				Transformed Area (Ha)
	t1	t2	A1	A2	
<i>Herbaceous</i>	2015	2020	58.678,3	58.061,9	-616,4
<i>Aquatic</i>	2015	2020	3.940,9	3.940,9	0
<i>Dispersed</i>	2015	2020	709,3	709,3	0

Source: Cataruben Foundation, 2021

26.1.2. Leakage area

For the leakage areas, the same procedure is used as for the project boundaries, where only the areas in the monitoring period, i.e., for the years 2016 - 2020, are quantified. Table 35 summarizes the changes in the analysis period. The negative sign indicates a reduction of areas regarding to the previous year.

Table 35. Changes in the analysis period in the leakage area (2016 - 2020).

Stratum or Coverage	Change in land use during the Monitoring Period in the leakage area				Transformed Area (Ha)
	t1	t2	A1	A2	
<i>Herbaceous</i>	2015	2020	4.692,6	4.507,6	-184,8
<i>Aquatic</i>	2015	2020	267,4	354,5	+87,1
<i>Dispersed</i>	2015	2020	47,7	47,7	0,0

Source: Cataruben Foundation, 2021

26.2. MONITORING THE IMPLEMENTATION OF PROJECT ACTIVITIES

Of the 10 indicators proposed for the execution of project activities, 100% compliance was achieved for 7 indicators, with the following aspects standing out;

For activity 1. Training cycle to strengthen knowledge on wetland conservation and sustainability to prevent the expansion of the agricultural frontier. This activity had an impact on 543 people directly involved in the project, public and private actors in the Orinoquia Region, due to biodiversity conservation strategies based on climate change mitigation projects, regulations applied to the projects and the exchange of successful experiences in generating carbon credits. In addition, 21 properties were identified as promoting sustainable production practices, including sustainable livestock raising, beekeeping, nature tourism, permaculture, forest isolation, nurseries and live fences.

For activity 2. Characterization and implementation of sustainable productive practices. For this activity, 115 properties were characterized at the socioeconomic level linked to the project; as well as the accompaniment in the implementation of sustainable practices to 120 properties, in order to ensure sustainability in terms of GHG reductions and the non-transformation of wetland ecosystem cover.

For activity 3. Participatory monitoring for biodiversity conservation and HCVs in the project area. During the period 2016 - 2020, the first stage of participatory biodiversity monitoring was implemented in which the biodiversity baseline was established, focal groups or species, HCVs and areas of conservation importance (CSNR and AICAS) were identified. In this way, the biodiversity sampling design was established, having the group of birds and aquatic plants as focal groups for the first field sampling.

For activity 4. Strengthening of governance structures in the territory. Within the project's operational framework, CATARUBEN has managed to lead (2) governance processes at Regional

and Departmental level (COTACLIMA¹⁴ & SIRAP¹⁵) of the (3) proposed, which implies greater recognition of the project at public and private level, promotion of the implementation of sustainable practices and the declaration of protected areas. Regarding governance activities and number of participants, 100% compliance was achieved, as evidenced in the annexes: Evidence by property.

For activity 5. Recognition of conservation and environmental management areas and figures for biodiversity conservation. In the framework of compliance with this activity, (4) conservation figures were identified in (8) properties in the project area, highlighting the declaration of AICAS, WHSRN, CSNR and RESNATUR. Additionally, 19 properties have been declared as Civil Society Nature Reserves, which implies a greater strengthening of land management in the project area.

The progress of the activities carried out in the 2016-2020 period can be seen in the following table Monitoring report 2016-2020.

¹⁴ Casanare Climate Change Committee - COTACLIMA

¹⁵ Regional System of Protected Areas

Table 36. Monitoring of project activities

No.	ID Activity	ID Indicator	Indicator name	Type	Goal	Unit of Measurement	Monitoring methodology	Frequency of monitoring	Result of the indicator in the reporting period (2016-2020).	Documents supporting the information	Remarks
1	Training cycle to strengthen knowledge on wetland conservation and sustainability to prevent the expansion of the agricultural frontier.	1.1	Number of people trained	Capacity building and environmental education	56	Unit	Attendance records and photographic evidence	One cycle per year	543	Attendance records and photographic evidence	The proposed goal is 100% met, which indicates a greater strengthening not only for the stakeholders involved, but also for the community in general.
		1.2	Number of properties with implemented activities		21	Properties		Every five years	21	Photographic evidence	100% compliance with the proposed goal, highlighting restoration and conservation processes in ecosystems of interest.
2	Characterization and implementation of sustainable production practices.	2.1	Characterized properties	Accompaniment and support in best practices	140	Properties	Preparation of property plans, socioeconomic data sheets, management plan sheets, visit logs and photographic registers	Every five years	115	Documents: property plans, socio-economic and property records	The proposed goal was met by 83%, highlighting the characterization of 115 properties linked to the project.
		2.2	Productive practices implemented			Properties			120	Visit logs, management plan sheets and photographic evidence	The proposed goal was met by 86%, highlighting the characterization of 120 properties linked to the project.

3	Phased participatory biodiversity and HCV monitoring	3.1	Number of stages implemented	Inland Wetlands Biodiversity Conservation	3	Stages	Progress report on the execution of the stages of the biodiversity monitoring program.	Every five years	1	Document and photographic evidence	The proposed goal of 100% execution of the first stage of the monitoring program has been met.
4	Strengthening of governance structures in the territory	4.1	Number of governance structures strengthened	Governance	3	Unit	Technical committee meetings or meetings	Every five years	2	Committee minutes	67% of the proposed goal has been met, participating in spaces where
		4.2	Number of governance activities carried out in the project area		6	Activities	Visit to properties, recording of governance activities	Each year	6	Photographic record	100% of the proposed goal is met, highlighting governance activities (signage of areas, insulation, sunlight, deep wells, drinking troughs, live fences, among others).
		4.3	Number of stakeholders involved		6	Unit	Committee meetings or meetings	Every two years	6	Committee minutes	100% of the proposed goal is met
5	Recognition of areas and figures of conservation and environmental management for biodiversity conservation.	5.1	Number of environmental management figures declared	Strengthening of Land Management	4	Unit	Documents	Every two years	4	Supporting documents	100% of the proposed goal was met, identifying 4 conservation figures in the project area (AICAS, WHSRN, CSNR, RESNATUR) for 8 properties.
		5.3	Number of properties declared as conservation areas		27	Properties			19	Supporting documents	70% compliance with the proposed goal, identifying 19 properties with wetland areas eligible for CSER in

26.3. PERMANENCE MONITORING

Of the 8 indicators proposed for the 3 types of risks (physical, social and economic), the following aspects are identified;

Risk 1 - Fire. It is categorized as medium risk for the project area, taking into account the silvicultural management given in the project area; however, during the monitoring period, there were no fires that affected the natural tree cover present in the project area.

For risk 2 - Flooding. During the monitoring period, there were no severe floods in the eligible areas of the project, nor were homes affected by this climatic event.

For risk 3 - Conservation agreements. The project is categorized as medium risk, taking as a reference the absence of initiatives that establish obligations to conserve natural ecosystems and their biodiversity, avoiding the transformation of land cover; however, during the monitoring period no non-compliance with contractual obligations with landowners was identified.

For risk 4 - Social ownership of the project. During the monitoring site, CATARUBEN promoted the development of the first biodiversity and carbon forum, involving landowners and the community in general, thus strengthening the importance of these initiatives at regional and national level. In addition, it generated a presence in social networks in order to report results of the project's impact.

For risk 5 - Land tenure dispute. Considering that the project links (2) natural ecosystems, of the 141 properties linked to 136 with wetland ecosystems, ownership studies were conducted to establish ownership and carbon rights.

For risk 6 - Non-ownership of stakeholders. It is categorized as medium risk for the project, however, during the monitoring site there were no conflicts between the project proponents (CATARUBEN-PROPERTY OWNERS-NATURAL WEALTH PROGRAM).

For risk 7 - Monitoring of indicators. CATARUBEN guarantees the good development and execution of the projects, incorporating qualified and knowledgeable professionals of the region, in order to guarantee the main objective of the project.

For risk 8 - Governance deficit. The respective follow-up has been carried out in order to guarantee governance in the 136 properties with wetland ecosystems; identifying the constant presence of owners in the properties, the implementation of deep wells, the isolation of ecosystems, the implementation of live fences and the execution of conservation and mitigation activities.

Table 37. Permanency monitoring report

NO	Activity	Type of Risk	Risk	Indicator	Risk Classification		PROCEDURE	INLAND WETLANDS	
					Value	Level		Monitoring results 2016 - 2020	Remarks
1	Fire	PHYSICAL	Loss of forest or wetland ecosystem due to fire	# of fires present in the eligible project area.	2	Medium	Fire monitoring is carried out with the help of the "Global Forest Watch" platform, which allows us to upload data from the project areas and create alerts for fire detection using VIIRS (Visible Infrared Imaging Radiometer Suite) technology. In addition to satellite monitoring, the impact of the fires was corroborated by field visits.	0	During the monitoring period, there were no fires in the natural cover of the wetland ecosystem in the eligible area of the project and the leakage area.
2	Flooding	PHYSICAL	Substrate and plant material washed away, loss of life, infrastructure, and agricultural crops	# of unusual flooding reports	1	Low	Constant communication is maintained with the owners; in the event of flooding with major impacts, a report will be made by filling out a form, in order to proceed with the measures to be taken.	0	During the monitoring period, there were no severe floods in the eligible areas of the project, and no households were affected by this climatic event.
3	Conservation agreement	ECONOMIC	The owner fails to comply with its obligations under the contract.	# of Reports of non-compliance recalls	2	Medium	Conservation activities are monitored in compliance with the stipulations of the contract signed by the owners.	0	During the monitoring period, no non-compliance with contractual obligations with owners was identified.

4	Social ownership of the project	SOCIAL	That the Cataruben Foundation has no credibility in the project.	# of people reached through social networks and events promoted by the Foundation.	1	Low	The following documents are verified: citizenship card, public deed document, INCODER resolution, the certificate of tradition and freedom, the cadastral certificate and the title study of each property with its contract of connection with the CO ₂ Bio project.	493	During the monitoring site, CATARUBEN promoted the development of the first biodiversity and carbon forum, involving landowners and the community in general, thus strengthening the importance of these initiatives at regional and national level. In addition, it generated a presence in social networks to report on the project's impact results.
5	Land tenure dispute	SOCIAL	Loss of the property	# of properties with possession or tenure of the land	1	Low	The following documents are verified: citizenship card, public deed document, INCODER resolution, the certificate of tradition and freedom, the cadastral certificate and the title study of each property with its contract of connection with the CO ₂ Bio project.	135	Considering that the project integrates two natural ecosystems, of the 141 properties linked to 135 that have wetland ecosystems, ownership studies were carried out to establish ownership and carbon rights.
6	Non-ownership of project stakeholders	SOCIAL	If either party fails to fulfill its obligations under the contract.	# of conflicts between the different parties involved	2	Medium	PQRS management procedure	0	There were no conflicts between the project proponents during the monitoring site.
7	Indicator monitoring	ECONOMIC	Lack of adequate monitoring personnel	# of non-compliance reports in monitoring.	1	Low	PQRS management procedure	0	CATARUBEN guarantees the proper development and execution of the projects, incorporating qualified and knowledgeable professionals of the region, in order to guarantee the main objective of the project.

8	Governance deficit	SOCIAL	Abandonment of the properties, noncompliance with governance activities	# of acknowledgements of forest governance structures	1	Low	Follow-up on the indicator of safeguard #4, which establishes the indicators to determine the level of implementation of governance in the properties.	The respective monitoring has been carried out in order to guarantee governance in the 136 properties with wetland ecosystems, based on the constant presence of owners in the properties, the implementation of deep wells, the isolation of ecosystems, the implementation of live fences and the execution of conservation and mitigation activities.
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Source: Cataruben Foundation, 2021

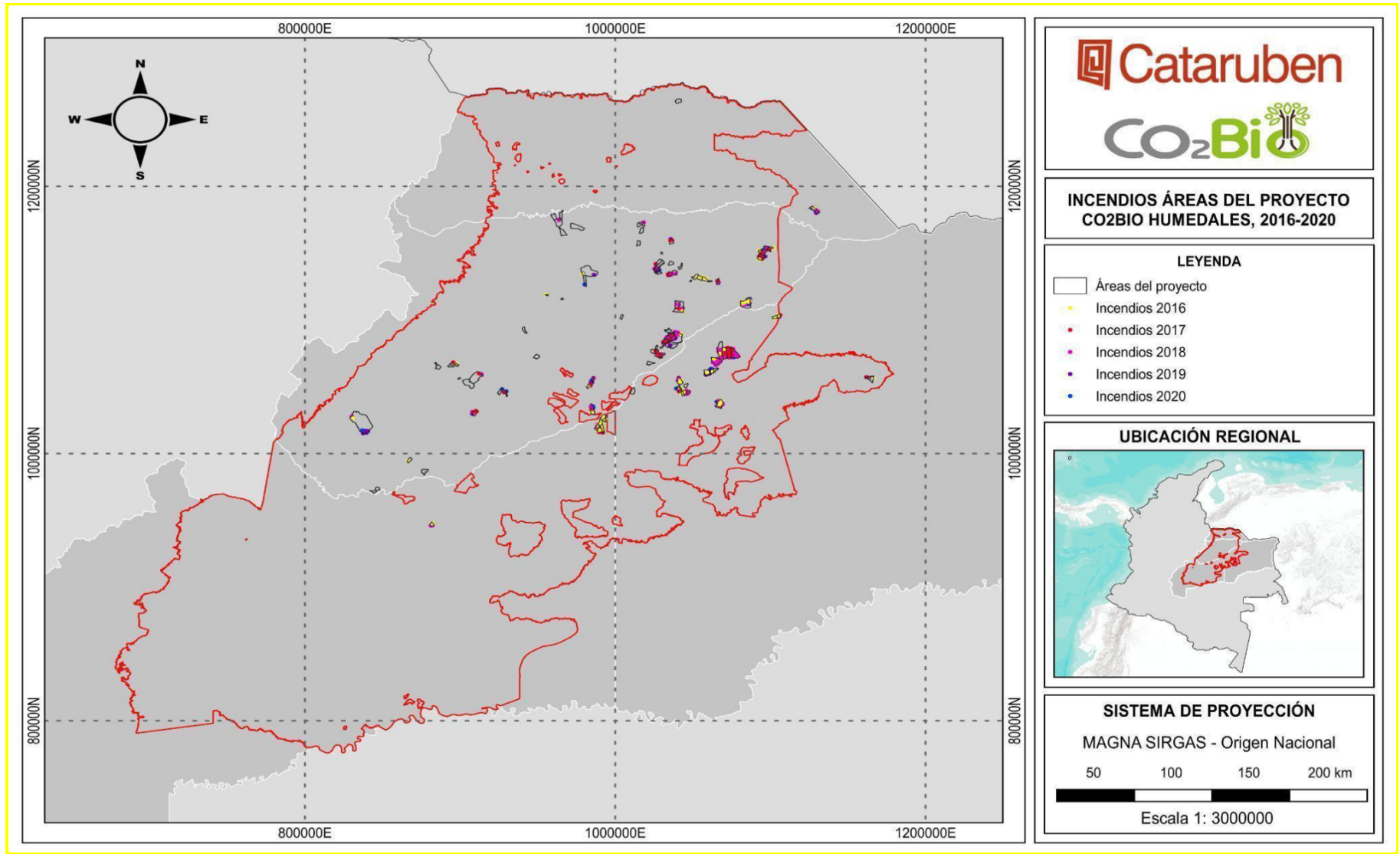


Figure. 28 Fire map of the Continental Wetlands project area.

Source: Cataruben Foundation, 2021

26.4. EMISSIONS MONITORING

Emissions were monitored from the activity data resulting from the project boundary monitoring and according to the formulas established in the methodology in Section 18.5 "*Project Emissions Monitoring*", Table 38 summarizes the emission reductions in the 2016-2020 monitoring period.

Table 38. Emissions monitoring

Emissions Reduction					
REpmp(tCO _{2e})	t ¹	t ²	EAlb(tCO _{2e} /year)	EAp (tCO _{2e} /year)	EAf (tCO _{2e} /year)
82.238,2	2.015	2.016	122894,2	9262,1	-9725,2
123.045,7	2.016	2.017	122653,4	9262,1	-9654,4
122.735,3	2.017	2.018	122413,2	9262,1	-9584,2
122.425,9	2.018	2.019	122173,5	9262,1	-9514,5
122.117,6	2.019	2.020	121934,2	9262,1	-9445,4

572.563 TOTAL MONITORING PERIOD

Source: Cataruben Foundation, 2021

Detailed calculations can be found in the spreadsheet Annex 2.5.3.1. Calculations: [3. Monitoring_2020](#)

26.4.1. MONITORING REPORT ON CHANGES IN BIODIVERSITY ASSOCIATED WITH INLAND WETLANDS

During the period 2016 - 2020, the first stage of participatory biodiversity monitoring was executed in which the biodiversity baseline was established, focal groups or species, HCVs and areas of conservation importance (CSNR and AICAS in Spanish) were identified. In this way, the biodiversity sampling design was established, having the group of birds and aquatic plants as

focal groups for the first field sampling. The sampling design, procedures, data collection and sampling results are detailed in the [Annex Monitoring report of birds and aquatic plants](#).

Additionally, project beneficiaries participated in at least 14 activities associated with the characterization and conservation of biodiversity, led by entities such as Calidris, Fundación Cunaguaro, Fundación Orinoquía Biodiversa (FOB), among others. The results of these initiatives were compiled and can be consulted in the [Biodiversity Monitoring Evidence Annex](#).

It is important to mention that these initiatives included a wide variety of activities that mitigate pressures on biodiversity and promote the conservation of endangered species. Among these are the restoration of morichal forests, recognizing the *Mauritia flexuosa* species as a key species for the flooded savannah. In addition, one of the strategies that has been of greatest interest to the community is the community monitoring of felines with camera traps, which helps to reduce the conflict with these species.

26.5. MONITORING OF SOCIOECONOMIC IMPACTS

The reporting of socioeconomic effects in the project area allows us to monitor the expected social and environmental impacts in the project area and mitigate potential risks.

Table 39. Socioeconomic Effects Monitoring Report

Project activities	Positive effect	Indicator	Possible negative effect	Corrective action (negative effect)	Indicator	Frequency of monitoring	Follow-up methodology	Result of implemented actions
Training cycle to strengthen knowledge on wetland conservation and sustainability to prevent the expansion of the agricultural frontier.	Increased educational skills of project beneficiaries in the face of climate change.	Number of people with characterized socioeconomic level	Conflict between traditional and scientific knowledge	To learn about cultural traditions in production and design strategies for dialogue between knowledge that include traditional techniques that are positive for sustainable production.	Number of beneficiaries with new knowledge on climate change mitigation and natural ecosystems conservation	Annual	Training attendance lists	543 people trained in the conservation of strategic ecosystems and sustainable production
Characterization and implementation of sustainable production practices.	Contribute to sustainable rural development	Number of farms with improved sustainable production practices as a result of technical assistance	Difficulty in improving practices due to lack of economic resources of the beneficiaries.	Finding suitable and simple ways to make productive practices sustainable, as well as generating strategic alliances to help their insertion in these models.	Number of sustainable practices implemented	Annual	Photographic record of the implemented sustainable practices	120 farms with sustainable production activities implemented

Participatory monitoring for the conservation of biodiversity and HCVs in the project area.	Conservation of regulating, provisioning and cultural ecosystem services	Number of hectares conserved	Poor management of High Conservation Values	Identification of High Conservation Values in the project area and establishment of a management plan for them together with key stakeholders.	Number of hectares assessed as having High Conservation Values	Annual	Resolutions of declaration of Civil Society Nature Reserves	23,955 ha conserved through the Civil Society Nature Reserve and Identification of High Conservation Values in part of the project area.
Strengthening of governance structures in the territory	Improvement and creation of governance mechanisms	Number of governance mechanisms	Lack of stakeholder participation for natural resource management	Participate in decision making through the mechanisms that manage natural resources.	Number of governance mechanisms strengthened	Every 5 years	SIRAP Technical Committee Meeting Minutes	2 strengthened governance mechanism (Regional System of Protected Areas and COTA CLIMA) with the main stakeholders for decision making regarding natural resources and climate change mitigation.
Recognition of areas and figures of conservation and environmental management for biodiversity conservation.	Improvement of ecosystemic conditions and quality of life indicators	Number of families characterized and users of ecosystem services	None	Not applicable	Not applicable	Every 5 years	Socioeconomic and environmental characterization sheets	116 families and properties characterized at a socioeconomic and environmental level to determine the conditions at the beginning of the project.

CHAPTER 3. REDD+ PROJECT

In this chapter 8 numerals are listed based on the Methodological Document AFOLU Sector / Quantification of GHG Emissions Reductions of REDD+ Projects of ProClima. Version 2.2. 5 February 2021; in order to demonstrate GHG reductions for the issuance of carbon certificates for the forest ecosystem.

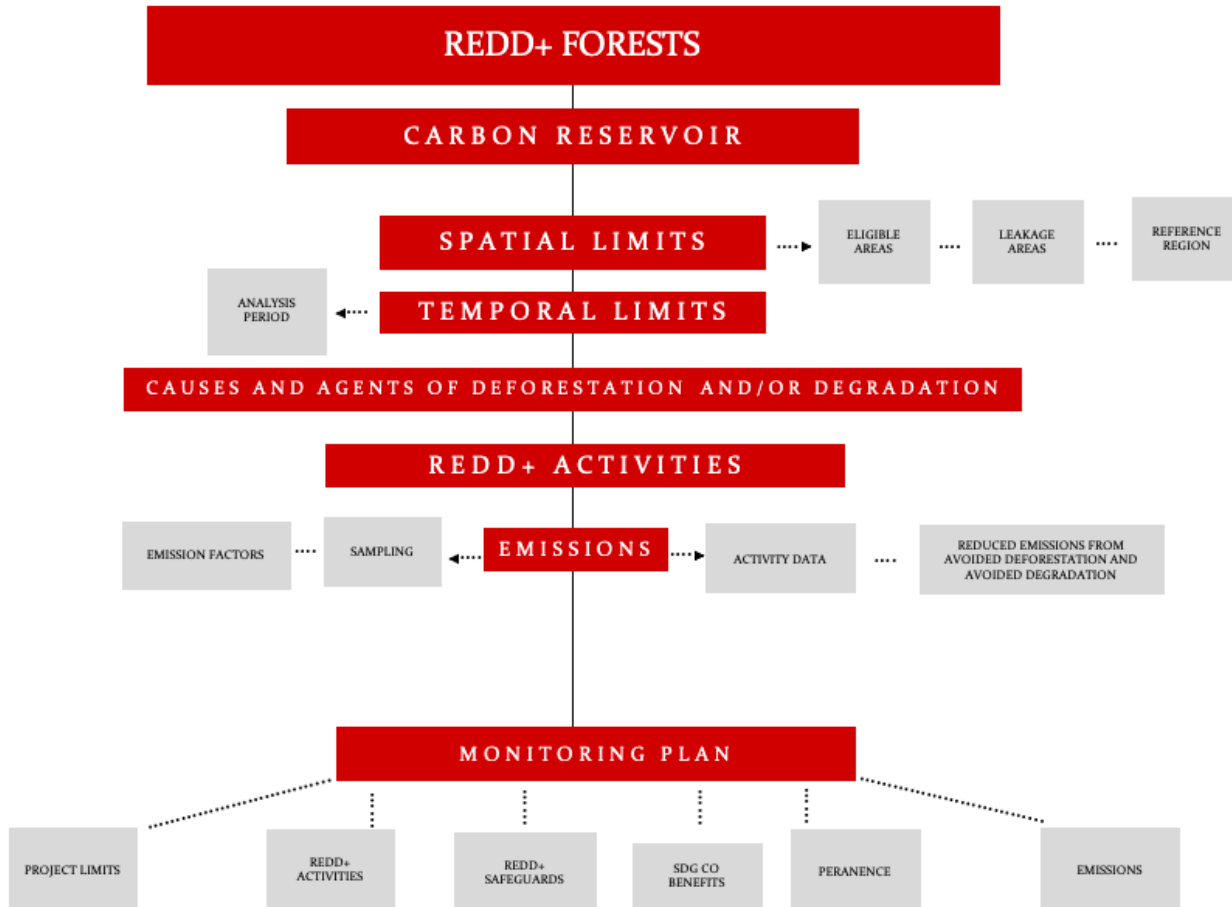


Figure. 29 Basic structure of the REDD+ chapter

Source: Cataruben Foundation

27. CARBON RESERVOIRS AND GHG SOURCES

For forest areas, the GHG reservoirs and sources described in the REDD+ methodology are taken into account.

27.1. CARBON DEPOSITS

The following table shows the carbon pools used to account for the carbon stocks in the project, which were taken from the IPCC good practices (2003, 2006), and taken from IDEAM (2011) taking into account the 5 carbon pool compartments that can be measured and that have representative quantities for the project:

Table 40. Carbon pools applied to the REDD+ project

COMPARTMENT		DEPOSIT SELECTION	JUSTIFICATION OF CHOICE
Living Biomass	Aerial biomass	including	Considering that it is the deposit that undergoes the greatest change as a consequence of anthropogenic activities
	Subway biomass (Roots)	including	Its total value is representative of carbon stocks, taking into account roots larger than 2 mm in diameter.
Dead Organic Matter	Dead wood detritus	excluded	Its total value is not representative of carbon stocks.
	leaf litter	excluded	Its total value is not representative of carbon stocks.
Soils	Soil organic matter	including	Considering the carbon sequestration in mineral and organic soils in the project area is representative.

Source: Cataruben Foundation

27.2. SOURCES OF GHG

The sources of GHGs associated with the forest ecosystem for REDD+ activities are:

Table 41. REDD+ GHG sources

SOURCE	GGM	SOURCE SELECTION	JUSTIFICATION OF CHOICE
Woody biomass combustion	CH ₄	including	Emissions will be taken into account if fires occur in the project areas during the monitoring period.
	N O ₂	including	Emissions will be taken into account if fires occur in the project areas during the monitoring period.

Source: Cataruben Foundation

28. SPATIAL AND TEMPORAL LIMITS

28.1. SPATIAL LIMITS

Considering that it is a grouped project and the spatial limits are determined, they are established following the guidelines of the Proclima standard and those of the methodology, in the item of applicability conditions.

In this sense, the spatial limits for REDD+ activities are described below:

28.2. REDD+ Eligible Area

Eligible areas for REDD+ activities are those areas that correspond to forest cover according to the national definition established by IDEAM and that meet the condition of being permanent forest at the start date of the project and 10 years before ([ANNEX 3.3 GIS - 2. GEODATABASE](#)).

As land eligibility criteria for the REDD+ project, those project areas were taken into account that were covered by forest at the beginning of the project and that proved to be covered by forest for at least 10 years prior to this date. To verify this, the forest and non-forest maps reported by the Forest and Carbon Monitoring System (SMBByC) for the years 2010 and 2017 were used, these maps categorize the national territory into three classes, forest, non-forest and without information, the latter correspond to areas that due to cloud cover or shadows could not be classified.

These maps were processed with the support of geographic information system software, through a comparative analysis between them to find the areas that conserved the forest class during the reference period, these correspond to eligible areas, while the ineligible areas were those that went from forest to non-forest (deforestation) and those that remained under the "non-forest" class.

The following table shows the eligible areas within the project boundaries and Figure 30 shows their spatial distribution.

Table 42. Eligible REDD+ Project Areas

Eligibility	Area (ha)	Percentage (%)
Eligible	20,206	16%
Not Eligible	106,756	84%
Total	126,962	100%

Source: Cataruben Foundation

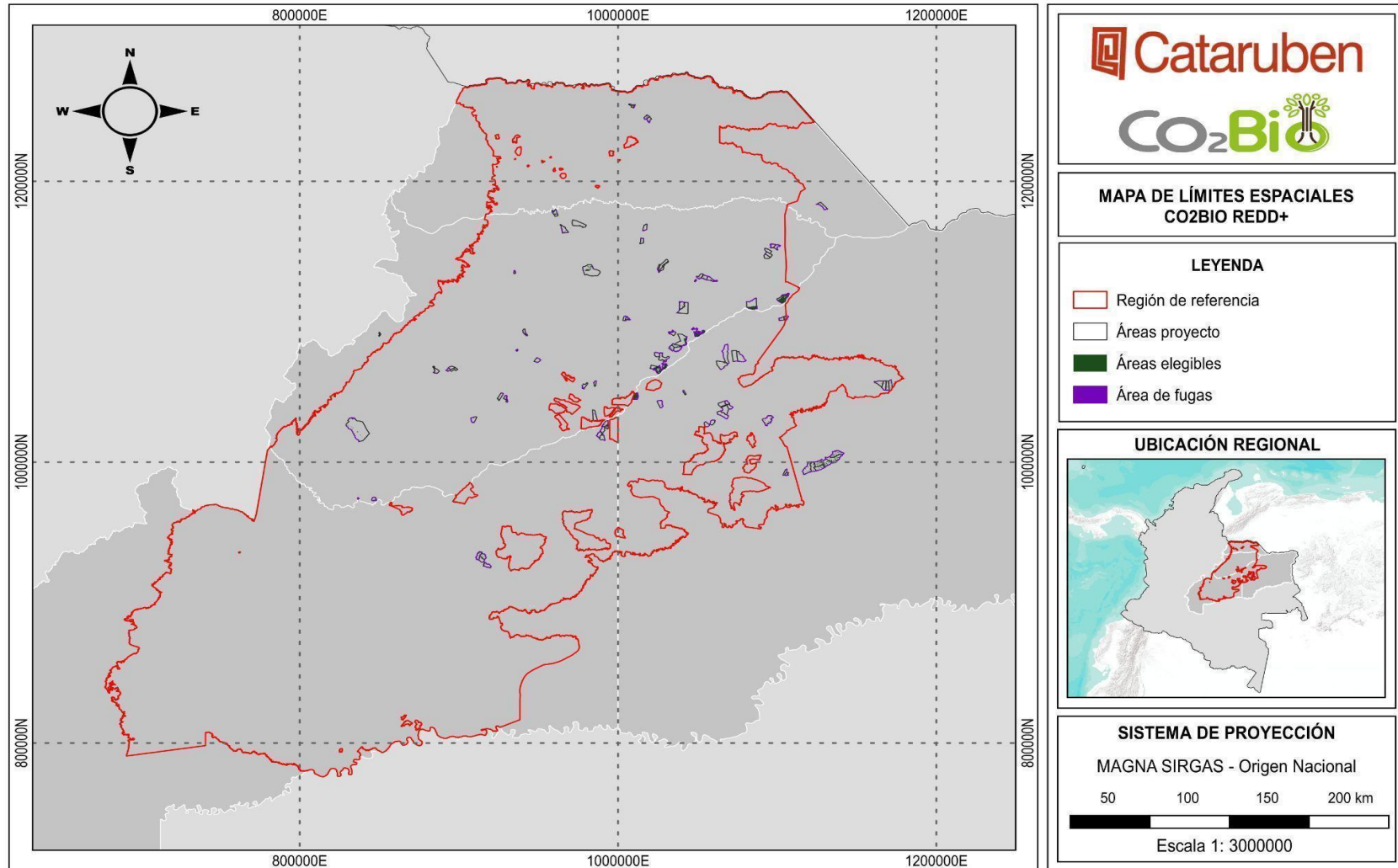


Figure. 30 Map of spatial limits of the CO₂Bio project.

Source: Cataruben Foundation

28.2.1. Addition of areas to the project after validation

The addition of new REDD+ eligible areas for the project will be done in future verifications, and will be defined as new phases of the project, following what is described in the Proclima Standard V3.0 in item 10.17. Grouped projects, complying with the grouping conditions for the AFOLU sector:

- Identify the area of expansion of the initiative or project during the validation process and define the criteria for the addition of new areas;
- Comply with the guidelines of the Certification and Registration Program for GHG Mitigation Initiatives and other Greenhouse Gas Projects, in its most recent version;
- Comply with all applicable PROCLIMA methodological documents, in their most recent version;
- Include emission reductions only for validated project activities;
- Implement the GHG emission reduction or removal activities described in the validated project document;
- Demonstrate that baseline scenario, land tenure and additionality considerations are consistent and valid for new areas;
- Submit evidence of the start date of activities in the new areas, demonstrating that this date is after the start date of GHG removal activities in the areas included in the validation;
- Demonstrate that the causes and agents of deforestation/degradation and the reference scenario are consistent with the characteristics validated for the initial project areas.

28.3. Reference Region

The reference region for REDD+ actions corresponds to the area in which the analysis of deforestation, degradation and study of agents and drivers of deforestation and degradation is conducted ([ANNEX 3.3 GIS - 2. GEODATABASE V2](#)). The geographic limits of this region were delimited taking into account the criteria established in the PROCLIMA methodology for the quantification of GHG emission reductions or removals from REDD+ projects. These criteria are described below:

To be consistent with the national reference level (FREL) submitted by Colombia to the UNFCCC in 2019, the Orinoquia biome was selected, excluding the areas defined in Annex 2 of the FREL "*Adjustment for National Circumstances*", which correspond to :

- Overlap corresponding to other REDD+ forestry projects.
- National park areas.
- Indigenous reserves

Thus, the reference region, whose determined extension is 11,699,109 hectares, is delimited as follows:

- To the north it borders the neighboring country of Venezuela, to the south with the Selva Mataven, Saracure - Cada, Alto Unuma and El Tigre indigenous reserves in the department of Vichada, to the southwest with the department of Guaviare and the

Serranía de la Macarena National Natural Park, and to the west with the eastern mountain range.

As mentioned, in order to determine the reference region, restricted access areas such as national natural parks and indigenous reserves located in the jurisdictions of the departments in question were excluded, see Figure 31 reference region.

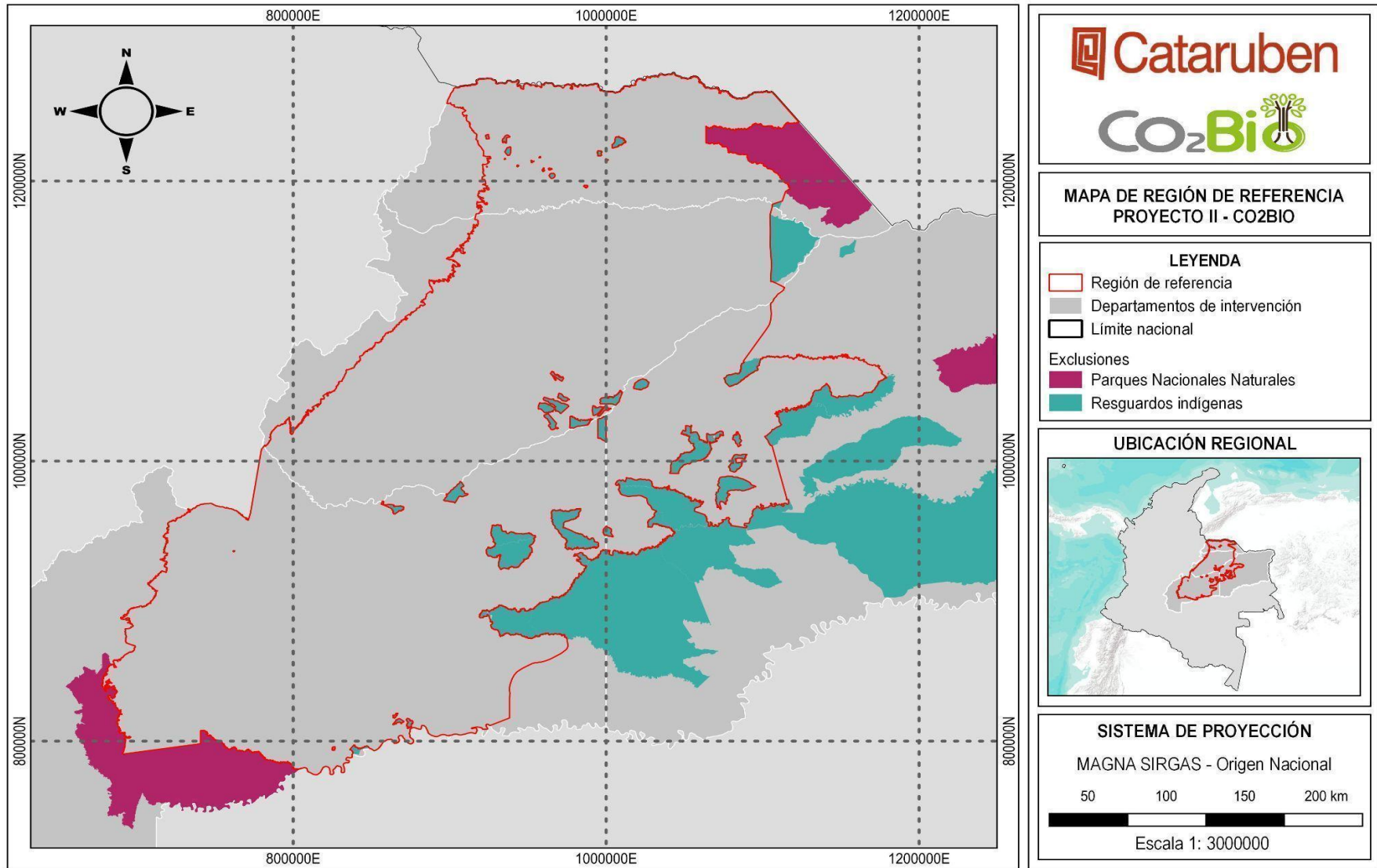


Figure. 31 Reference region Project II - CO₂BIO.
Source: Cataruben Foundation

The abiotic characteristics of the selected reference region are described below.

28.3.1. Geographic Information

This section describes, at the level of the reference region, characteristics of the terrain such as elevation ranges, slopes and main watersheds that bathe the territory.

- **Terrain Slopes**

The slope map is the result of the slope analysis tool, it is a raster file, which from the DEM calculates the degree or percentage of slope. For the reference area the Slope is represented in percentage according to FAO (2009), being divided into 5 classes (0% -3%, 3% -15%, 15% -30%, 30% -60% and >60%). To obtain the product, the DEM input obtained from the SRTM was used, which showed that the dominant slope is in the 0 - 3% range, with a 74% dominance of the territory (see Figure 11 in the Inland Wetlands chapter).

- **Terrain Elevation**

The Digital Elevation Model (DEM, from now on), determines the height in meters above mean sea level (masl). This product is obtained through the SRTM Downloader Plugin v3.1.15 in the *Quantum GIS* platform (QGIS, from now on). The raster values have a cell resolution of 30 m x 30 m, typical of the Shuttle Radar *Topography Mission* (SRTM *Shuttle Radar Topography Mission*). According to the DEM, the reference region has an elevation range between 88 and 1000 meters above mean sea level (see figure 12, chapter Continental Wetlands).

- **Hydrography**

The region of reference contains part of the great Orinoco river basin, a territory full of diversity of life, landscapes and cultures, extensive plains that change from temporary deserts to large wetlands.

The main hydrographic basins that bathe this portion of the territory are: Cusiana River Basin, Cravo Sur River, Pauto River, Casanare River, Cravo Norte River and Meta River, among others.

28.4. Leakage Area

The leakage area was determined according to: the characteristics of the project grouped in the private properties that are scattered in the Orinoquia area, and finally, it is established taking into account the following criteria:

- a). All areas in forest that are within the range of mobility of the agents identified in section 10.14 should be included.
- b). Exclude areas of restricted access to agents of deforestation and degradation.

These areas have similar characteristics in terms of slope, climate, forest type, elevation, mobility of deforestation and degradation agents (rivers, roads, etc.) ([ANNEX 3.3 GIS - 2. GEODATABASE V2](#)).

Considering the above, it is determined that the eligible area of the project is 20,206 ha and the leakage area is 3,641 ha, therefore, the proportion of the leakage area regarding to the eligible areas is 18%.

Table 43 shows the hectares corresponding to the forest area at the start date of the project.

Table 43. Eligible and Leakage Areas of the REDD+ Project

ELIGIBLE PROJECT AREAS 2010 - 2017	LEAKAGE AREAS 2010 - 2017
20.206	3.641

Source: Cataruben Foundation

28.5. TIME LIMITS PERIOD OF ANALYSIS

Since 2015, the Cataruben Foundation has been constantly approaching private landowners interested in conservation actions for natural ecosystems in the Orinoquia, including forests, wetlands and natural grasslands.

For this reason, the CO₂Bio 2 project began conservation and mitigation activities on private properties in the Orinoco region as of May 6, 2016, ratifying this link with the signing of letters of intent by the owners and their willingness to carry out actions to ensure the conservation of biodiversity and strengthen the governance of the properties.

Under this context, for the Wetland ecosystem, such actions were made effective as of May 6, 2016, avoiding the transformation of natural wetland cover and managing the reduction/removal of GHG; otherwise for the Forest ecosystem, which from 2018 effective actions are demonstrated, in order to avoid deforestation and degradation of Forests in the floodable savannah of the Orinoquia, to demonstrate GHG reductions/removals.

Thus, it is determined that:

- REDD+ Phase 1 verification period: January 1, 2018 - December 31, 2020.
- Accreditation period: May 6, 2016 - December 31, 2045.

Historical period of deforestation and degradation: the estimation of degradation and deforestation by the historical average method in the reference region and the leakage area was carried out for the period 2010 - 2017, taking into account the information on forest cover available in national databases and as established in the methodological document "*Quantification of GHG emission reductions from REDD+ projects*", section 13.2.

29. CAUSES AND AGENTS OF DEFORESTATION AND/OR DEGRADATION

Based on the importance of determining the anthropic dynamics that develop in the territory and their influence on the environment, the causes and agents of deforestation and historical degradation in the reference area of the project are identified, whose main purpose is to describe these actions involved in the loss of forest cover and reduction of carbon stocks within these forest areas, which added to this, allows clarity for the implementation of policies that effectively mitigate damage to ecosystems.

This observation was carried out under the IDEAM methodology "Conceptual and methodological guidelines for the characterization of causes and agents of deforestation in Colombia" using particularly the conceptual guidelines for a Medium Characterization Scenario (ECM).

29.1. SPATIAL AND TEMPORAL DIMENSIONS

The first step is to define the space and time, which is delimited in item 28 and a period of 10 years prior to the start date of the project, collecting with primary and secondary information the possible activities that cause deforestation and forest degradation in the specified area.

29.2. CONTEXT

The following is a description of the territorial, socio-cultural, economic and historical context, which allows us to determine the causes and agents of deforestation.

29.2.1. Territorial Context

The reference region is distributed in the departments of Casanare, Arauca, Meta and Vichada, which belong to the Orinoquia region that represents 33% of the national territory. The population in these four departments is approximately 1'830,208 inhabitants, where 50.71% are men and 49.29% are women. It is important to highlight that 29.57% of the inhabitants of these four departments are located in populated and dispersed rural centers (DANE, 2018).

The project area, which is included in this reference region, is characterized by a great wealth of natural resources, consisting mainly of two subregions, the floodable savannah and the highlands. The floodable savannah (4.5 million hectares) predominantly in the departments of Arauca and Casanare is an area dedicated to livestock (they contribute 7% of the country's

livestock production), and in the altillanura (13.5 million hectares) of Meta and Vichada, it is estimated that less than 3% of its extension has agricultural, livestock or forestry potential (Hernandez, 2018) .

However, these two subregions have in common that they have large hydrocarbon reserves and whose exploitation since 1990 has been increasing, in addition its inhabitants have allocated their land, for the planting of oil palm, rice, rubber, soybeans and corn and other agricultural activities, taking advantage of the large extensions that characterize the Orinoquia region (Hernández, 2018).

As described above, it has become evident that the accelerated and disorganized growth of these activities has affected various ecosystems that function as habitats for wildlife, including 210 species of mammals and 682 species of birds, as well as the numerous environmental goods and services provided by the region's environmental wealth.

29.2.2. Socio-cultural context

In the Colombian Orinoco, before the Spanish Conquest process, the territories were inhabited by various indigenous peoples, among which the Mitua, Bare, Guayape, Guahibos and Maipure stand out (Cf. Vilorio de la Hoz, 2009:4). The first conquistadors arrived from Venezuela, traveling mainly through the territories of the eastern plains.

After Emperor Charles V handed over the exploration and exploitation of the Llanos to the German House of Welser, the first German conquistadors began to arrive, such as Jorge Spira, who arrived in 1537 on the banks of the Guape River and founded the town of Nuestra Señora de la Asunción.

Currently, the Colombian Orinoco region has a heterogeneous population, mainly composed of indigenous communities, Afro-Colombians and llanero farmers (ODDR, 2013).

Regarding peasant communities, in general the region has undergone considerable transformations since the late 1960s that have greatly changed their quality of life. In particular, the distribution of the savanna by the Instituto de la Reforma Agraria - Incora, changed the traditional communal tenure system of the savanna, altering the livestock management patterns and the social organization that supports it (Correa et al., 2006).

Simultaneously, oil exploration and exploitation, intensified since the 1980s, led to the adoption of a developmentalist economic and social model based on the replacement of workers from the lowlands with higher-yield productive technologies. The demographic growth of the settlements near the oil wells, the arrival of new actors related to this type of exploitation and the migration of peasants to enlist in the oil work has generated that the trade of the plain work, transmitted from generation to generation, has lost weight at the present time.

The presence of armed groups has put pressure on land and resource management, contributing to the forced displacement of peasants to the cities.

A special social category are the people known as "vegueros", who are also part of the rural groups of the Orinoco basin. These are peasant farmers located on the banks of the rivers whose subsistence is based on farming methods such as slash and burn agriculture during the summer to plant corn, rice, beans, topocho, among others.

Within the group of Andean peasants, in recent decades extractive activities have determined the emergence of new economic and social dynamics.

29.2.3. Economic Context

According to FEDESARROLLO (2018), the Orinoco region registered during the period 2010-2016 the highest average growth in its GDP among the regions of the country with 5.4%, as a result of the impact of hydrocarbon extraction, especially in the departments of Meta and Casanare. The strong economic expansion presented by this region in recent years contributed to the reduction in the incidence of monetary poverty, which in 2016 was 24.5% , the second lowest among the country's regions, after the Central region .

When considering the contribution by branch of activity to the region's value added, the results reflect the great importance of mining and quarrying, with a contribution of 56.2% in 2016, followed by agriculture, livestock, forestry and fishing with a contribution of 11.2% (FEDESARROLLO, 2018).

Around 30% of the country's agricultural products are produced in the region in question. However, according to research anthropologist Diego Medrano of the Center for Orinoquia Studies at the Universidad de los Andes, land use, land informality, lack of infrastructure and access to financing are some of the possible obstacles faced by the Orinoquia to exploit its potential as the country's star pantry (Polanco, 2019).

The main economic activities in the region are oil exploitation, cattle ranching, agriculture, services and commerce. Livestock represents a large percentage of the Orinoco economy. During 2010, 242,665 head of cattle were slaughtered, representing 6.7% of the national total. Livestock activity is focused on breeding, raising and fattening cattle for commercialization with neighboring departments, and agricultural production is mainly aimed at satisfying local demand (ODDR, 2013).

29.2.4 Historical Context

The historical context that hosts the productive and socio-cultural present of the landowners is described by CORPORINOQUIA (2015) and can be summarized in five stages described below:

- Ancestral occupation of the indigenous peoples: the orinoco originally populated by hunters and gatherers associated with the use of the forest, dedicated to the cultivation of corn, yucca and other agricultural activities complementary to hunting, fishing, gathering fruits and tubers from the forest.
- Livestock colonization process: as a result of pre-Hispanic occupation, colonization, urban expansion, Spaniards and American slaves, a new cultural scenario was formed in the basins. Cattle ranching determined the settlement of the territory, the forms of social organization typical of the region and the growth of the economy. Likewise, the war of independence generated the expansion of the cattle ranch, stripping the land from the peasants, indigenous and mestizos, who were incorporated as labor force, at the service of the colonists who appropriated the savannahs and the cattle ranching, strengthening the Hato.
- Intensive agricultural activity (rice-palm): Rice cultivation transformed ecosystems, being an activity restricted to specific and geographically limited areas, in addition to the implementation of technologies in land adequacy to obtain intensive water consumption and as the only criterion for displacement the depletion of the resource irreversibly. Palm cultivation has been predominant in municipalities such as Villanueva, Maní and Orocué Casanare, and this type of crop has drastically changed the territory, where the trace of the "llaneridad" is blurred by the absence of the typical landscapes of estuaries and wetlands, bushes and extensive gallery forests.

- Incursion of oil exploration and exploitation projects: the famous "oil boom" since 1980 has modified the region's landscape and sociocultural identity, considerably influencing the four departments that belong to the reference area. These changes are reflected in the arrival of people from other regions of the country, who are only interested in the hydrocarbon resource, ignoring the traditions of the plains, subjecting the locals to changes in their modes of production and acceptance of economic activities that are alien to their cultural patterns.
- Agricultural and agro-industrial development presented for the Altillanura: According to national projections, grain, oil palm, forestry, rubber and sugar cane crops have great potential in the seven municipalities that belong to the Altillanura, which are: Cumaribo, Puerto López, Puerto Gaitán, Mapiripán, Puerto Carreño, La Primavera, and Santa Rosalía.

29.3. KEY STAKEHOLDERS, INTERESTS AND MOTIVATIONS

The process of deforestation and degradation involves multiple official actors, non-governmental organizations and civil society, among others. Within the actors, there are both the agents of deforestation and degradation, as well as those actors that promote the processes of forest transformation.

The following is a description of the stakeholders, their interests and motivations that influence decision making:

- Land grabbing for renting or land grabbing: this is related to large landowners who accumulate large areas of land, which have a great potential for medium or long term appreciation, and intend to rent or sell their land for the generation of infrastructure projects, injection of domestic or foreign capital, or areas of wealth in terms of natural resources.
- Another case is indirect agents such as absentee investors, who generate a change in land use and whose main purpose is to keep and maintain a high number of cattle, deforest the areas and after the productive cycle, these areas are put up for sale to expand the agricultural frontier and establish new fronts.
- Industrial or traditional agricultural producer for consumption and/or sale: Installation of common crops in the region, such as palm, rice, soybeans, forestry, and food crops such as cassava and plantain.
- Formal or informal builder of local, regional and national roads, roads are built to facilitate the movement of the population to other territories, in order to reduce mobility time or even achieve or have greater access to points where it is not available, making a change in land use directly and indirectly.
- Agent formally associated with oil pipelines, there are pipeline installations for the transport of oil and its derivatives over long distances, this can cause erosion in the area, and at the time of construction there may be changes in the quality of water sources.

- Agent formally or informally associated to electrical networks; their purpose is to supply electricity from suppliers to consumers, where the owner of the property is obliged to allow the passage, by aerial, subway or surface means, of the transmission and distribution lines of the electrical fluid.
- Population settled in rural and/or urban areas in expansion, for which it is required to make use of space and natural resources, taking into account its geographical position and the availability of connectivity. Being in a possible risk of citizenship deficit in terms of universal access to basic services and social protection.
- Wood extraction for self-consumption: with or without a forestry permit, this section generates the need for the owner to use wood for daily use on the farm, such as fences, firewood for cooking, construction (wind and heavy wood), ornamental use, among others.
- Timber harvester for sale: with or without a logging license, when harvesting high or low volumes of timber for sale, a forestry permit must be requested in order to do so in a sustainable manner, always taking care to do so in a planned manner, without affecting the ecosystem area.
- Agricultural and livestock producers, who carry out "controlled burns" are done intentionally with a specific purpose, in a planned manner and with good management, preparing the land beforehand with guardrails. Otherwise, forest fires can start, which can affect large areas of land.

29.4. ECONOMIC ACTIVITIES AND THEIR IMPORTANCE

The main economic activities in the region are oil exploitation, livestock, agriculture, services and commerce. In Arauca for 2009, the main activities or sectors included in the department's non-traditional exports were: agriculture, hunting, livestock and forestry; timber extraction and mining. For 2010, exports were led by the industrial sector (c.f. DANE, 2011:17). Since the beginning of oil exploitation, royalties have been an important source of resources for the department and its municipalities.

On the other hand, extensive cattle ranching is present throughout the Orinoquia plains; in the department of Casanare it is mainly found in the municipalities of Paz de Ariporo, Hato Corozal and Trinidad. These lands have traditionally been used for extensive cattle ranching, due to the low fertility of the Orinoquia savannas (ODDR,2013). This practice is closely related to traditional llanera culture, as these traditions are based on "llano work", as described by Francisca Reyes (2004):

To be a "llanero" always has to do with working the plains; with knowing the cattle; with riding a horse; with knowing how to chop a "rejo"; with knowing how to compose a cow and knowing the name of each of its parts; with making "cacheras", "sueitas marotas" and knowing how to use them; With dawn seeing savannah, and this in most cases is made possible in the herds, because the llanero far from owning land, cattle and beasts on a large scale that allow him to subsist economically, was formed since the seventeenth century as a peon, resigned to not find the plain deeded to his name and therefore not to find elements held as the basis of their

culture and therefore unable to exercise in their properties by small or nonexistent, all those things that make them feel llaneros (p.44)".

Meta's economy is not as dependent on oil extraction as Arauca and Casanare; this department has diverse economic activities, such as agriculture, livestock, services and oil activity. The agricultural sector and industry are the most important in terms of their participation in Meta's GDP. (ODDR, 2013)

As a result of the fall in oil prices in 2014, currently Meta, Casanare and Arauca have put greater efforts in the agro-industrial production of monocultures, especially the cultivation of oil palm, rice, soybeans and other cereals for domestic supply and some for export. This type of production has become the main bet of the national and departmental government to recover from the economic crisis and provide greater stability to the population, but this dynamic has caused the expansion of the agricultural frontier, becoming one of the main causes of deforestation and degradation of forests and wetlands.

29.5. DIRECT AND INDIRECT IMPACT

For each cause and agent of the project there is a differential impact, which can be qualitative or quantitative. When done quantitatively, it is estimated by means of a spatial analysis that determines the relationship between the cause that is identified and the calculated deforestation or degradation.

Deforestation, on the other hand, generally depends on the combined and synergistic impact of multiple factors, as shown in the following map:

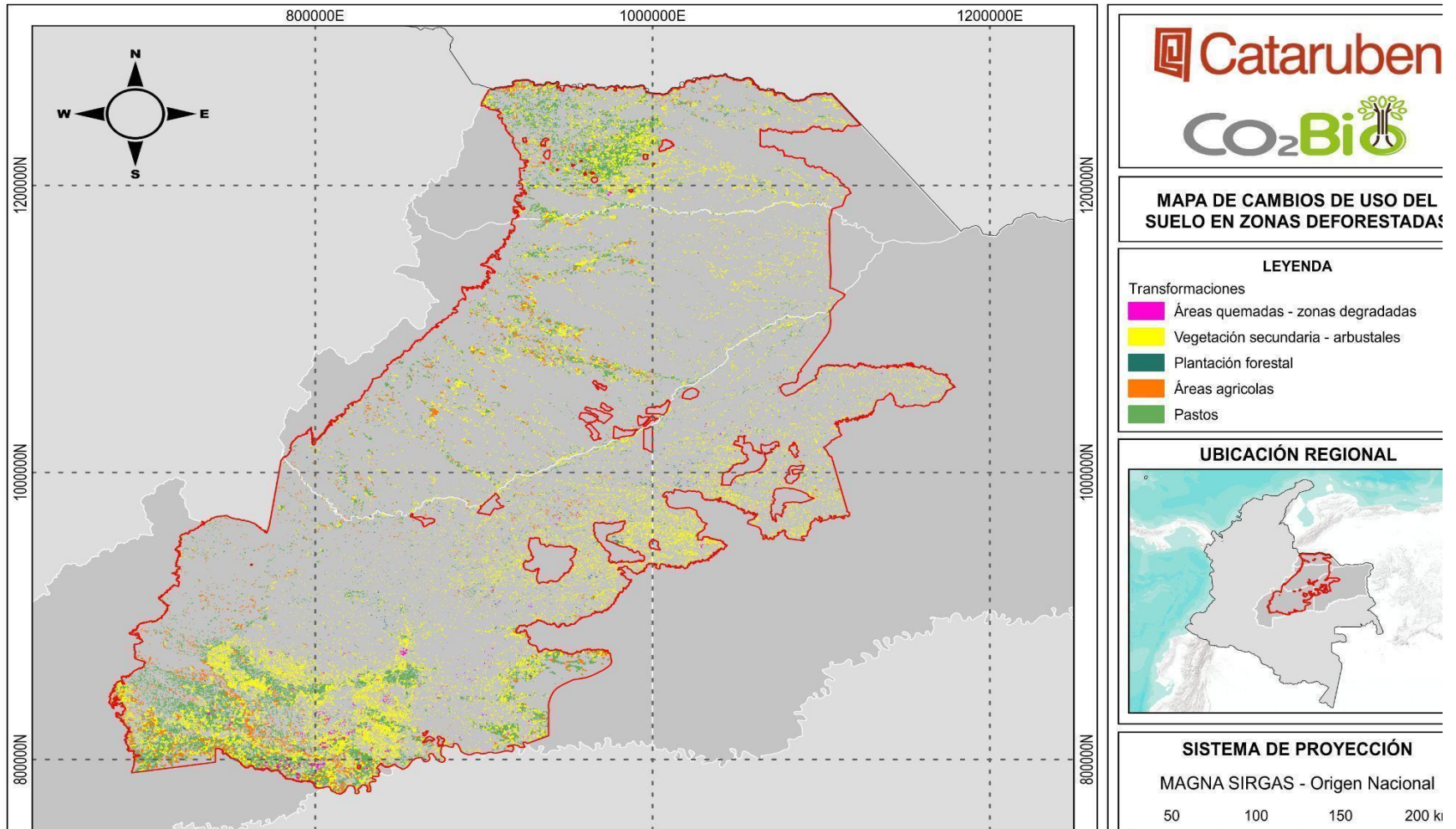


Figure. 32 Map of land use change in deforested areas.

Source: Cataruben Foundation

Between 2010 and 2017 approximately 94,537 ha were deforested in the reference region of which 47% were converted to clean pastures, 11% became grasslands, 10% mosaics of pastures with natural spaces and another 10% to secondary vegetation, (6%) became weeded pastures, another (6%) in mosaic of crops and pastures with natural spaces, a (3%) is evident for cereal crops and finally (1%) refers to permanent tree crops, see figure 33

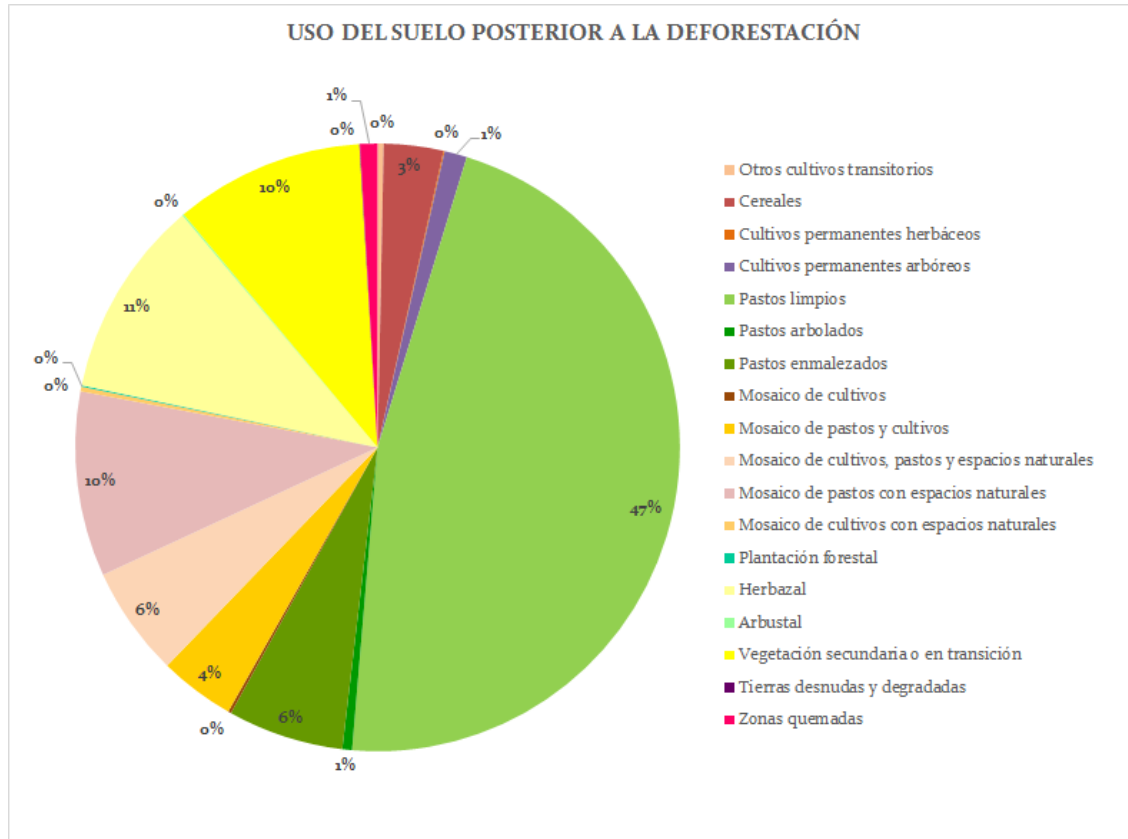


Figure. 33 Land use after deforestation.

Source: Cataruben Foundation.

29.6. RELATIONSHIPS AND SYNERGIES

Interactions and synergies are defined and analyzed among all the elements and actors of the project, to define the REDD+ activities established. It identifies how the actors respond to these activities and the positive interactions that fit each one, allowing to go beyond this characterization of causes and agents of deforestation, generating proposals for measures and actions.

For the project, the direct causes found for each of the established activities were listed in a range of 1 to 9, which are related to each other and analyzed according to their synergy and interaction, either in a strong or weak way, taking into account the underlying agents and factors involved. ([Annex 3.1. CAUSES AND DRIVERS OF DEFORESTATION](#))

Among the 9 direct causes, we can see that the forest clearing (1) is strongly related to settlements (6), hydrocarbons (5) and natural fires (8). The relationship (1, 6) is generated by

the need to deforest for a different land use (renting or land grabbing), for the expansion of infrastructure or population settled in rural and/or urban areas. There is a strong relationship between logging and hydrocarbons (1, 5), as easements for oil pipelines, for example, are identified within the project area, generating logging, and finally, there is a relationship with natural or arson fires (1, 8), as controlled burns are carried out to clear the soil to sell or rent land, with the risk of ending up in uncontrolled arson causing deforestation of the ecosystem.

Additionally, a strong synergy between (2,3, 7) and (4, 5) is analyzed. The first relationship is between livestock production (2) and agricultural production (3) with timber extraction (7), because areas are deforested for crops or extensive cattle ranching, which is driven by the search for higher or faster income from the sale of these products or self-consumption. The second relationship with a strong synergy is between transportation (4) and hydrocarbons (5), since deforestation is used to build roads in order to facilitate mobility and access to hydrocarbon extraction sites.

On the other hand, in terms of weak synergy, we found a relationship between agricultural production (3) and natural or provoked fires (8), since agricultural producers carry out controlled burns in order to prepare the soil for the implementation of crops. When livestock and agricultural production is carried out (2,3), the need to transport (4) these products for sale is identified. There is less synergy between the settlements and the hydrocarbons (5, 6) that exist in the area, which can be identified due to the proximity to this activity, identifying the presence of electrical grids, activities that sometimes require deforestation. Finally, land-use planning is of utmost importance, complying with the areas that are projected for population settlements (6). When these provisions are not complied with, there are cases of flooding that affect those groups that are established very close to water sources, deforesting certain settlements.

29.7. CHAIN OF DEFORESTATION AND DEGRADATION EVENTS.

The chain of events defined for the project area includes the main groups of agents and causes of deforestation and degradation, in order to expose the sequence of events that define this problem. For each activity that generates deforestation, the causes (3 links when required) and responsible agents are identified, as well as the underlying factors that result in the occupation of the territory ([Annex 3.1. CAUSES AND AGENTS OF DEFORESTATION](#)).

The direct causes of deforestation and degradation in this area can be seen in Annex 3.1 and are mainly defined in four activities: the expansion of the agricultural frontier, the expansion of infrastructure, timber extraction and different biophysical factors. This Annex also shows the agents that directly or indirectly influence the transformation of natural forests for the development of other types of activities, thus influencing the deforestation of the territory.

The expansion of the agricultural frontier is defined by three main reasons: Agricultural production (for self-consumption or sale), livestock production (sale or self-consumption) and praderization (for rent or land tenure). Regarding agricultural production, in the reference area, oil palm, rice, cocoa, cotton, banana, sorghum and soybean crops are grown, mostly for sale, however, there is also evidence of traditional crops on a smaller scale, for self-consumption or informal commercialization, activities that have accelerated deforestation in the territory

(Corporinoquia, 2014). This is due to the fact that locals change forest cover to crops, causing timber extraction in search of greater expansion or area for the development of this activity; driven by a need for subsistence and/or to obtain economic income.

Livestock production has traditionally been developed in the region under the system of cattle breeding and, to a lesser extent, fattening, an activity that can simultaneously provide security in daily sustenance, conserve ecosystems, promote wildlife conservation and satisfy cultural values and traditions. This, in turn, is associated with the third direct cause, and that is the praderization, either for renting extensions of land where extensive cattle raising is usually carried out, sowing pastures or due to land tenure effects, where under population dynamics, some landowners accumulate large areas of land, having a rational use of inputs, including grains (cereals, soybeans) and fertilizers. Small producers require for their development not only access to better and new technologies, but especially to innovations in production systems, which guarantee their access to markets and/or improve the contribution of self-consumption to food diet requirements (FAO, 2021).

On the other hand, infrastructure expansion is also a direct cause of deforestation in the reference area, due to activities associated with transportation, hydrocarbons or population settlements. In the first place, these transportation activities are related to the construction of roads, in this case regional or rural access roads. The hydrocarbon industry has taken hold in this area, modifying the socioeconomic characteristics and negatively altering biodiversity. And finally, population settlements are linked to the distribution and growth in the number of inhabitants in the region, which implies the construction of housing and other infrastructure necessary for the community, causing land use to change more and more in the rural sector.

Thus, timber extraction is the third direct cause of deforestation in the reference area, both for commercialization (sometimes illegal) and for self-consumption. Forestry activities in the defined area include the harvesting of species such as mosco, cedar, thorny cedar, carob, yopo, and pine, among others. Farmers are forced to clear more land in order to be able to buy inputs that would allow them to produce more on less land.

Finally, biophysical factors are defined as the fourth direct cause, referring to that natural capacity or predisposition for changes in use due to variables such as climate, soils, lithology, topography, relief, hydrology and vegetation; taking into account mass removals and forest fires, which, although they are not the focus or driver of deforestation, they are occasional in the reference area (Rozo, 2018). It is important to mention that, just as biophysical factors are in this case a direct cause of deforestation, it is also necessary to take into account other underlying causes of this problem, which are mainly: economic (increased production), demographic (population growth) and cultural (indigenous beliefs) factors, which influence the social dynamics and productive activities developed in the reference area.

In short, each of the activities described above generate deforestation; however, they are also the main causes (direct or indirect) of forest ecosystem degradation, with the expansion of the agricultural and livestock frontier, selective logging, timber or firewood extraction, and forest fires being the activities that mainly influence the loss of biomass and prevent the forest from regenerating. This expansion requires a sustainable approach to avoid increasing pressure on the region's natural resources and environment.

30. REDD+ ACTIVITIES

Project activities have been designed taking into account the problems present in the project area and working closely with the local community, owners and workers of the properties that are part of CO₂Bio, who as main agents since 2018, have participated in the identification of the main factors of land use change, deforestation and forest degradation and at the same time providing suggestions on the types of measures to mitigate the identified agents.

Below are the main project activities that are the fundamental basis for emission reductions, as they will help prevent or reduce deforestation and forest degradation, allow for the regeneration of deforested areas and through this the conservation of biodiversity:

1. Implement training and accompaniment processes through training cycles that strengthen the sustainable management of ecosystems and biodiversity conservation.
2. Consolidate and adapt governance principles for sustainable ecosystem management.
3. Promote forest legality.
4. Promote the delimitation and signaling of strategic ecosystems and natural protection areas.
5. Promote and improve agricultural production, livestock (on existing land) and tourism, through the implementation of good sustainable practices.
6. Generate alerts of changes due to deforestation, degradation and/or transformation of ecosystems in the project area and its surroundings.

[REDD+ ACTIVITIES](#) can be seen in Annex [3.2.1. REDD+ activities](#), its relationship with the direct causes of deforestation and degradation, the responsibility and roles of the actors involved, implementation schedule and measurement indicators for the monitoring plan.

31. REDD+ SAFEGUARDS

The project complies with social and environmental protection measures to avoid environmental risks and for landowners in the project area. This also increases the social, economic, and natural resource management benefits for the participants. The safeguards related to the institutional dimension are fully implemented by the project, as they are consistent with the legal, consultation and governance provisions required for REDD+ projects.

Social and cultural safeguards are applied through respect for traditional knowledge, the guarantee of benefit sharing, territorial rights, and the participation of landowners, many of whom are self-identified peasants. The only one that does not apply to the project is Free, Prior and Informed Consent (FPIC), because the project is not being carried out in the territory of ethnic communities or in areas that impact them.

With regard to environmental and territorial safeguards, the project applies measures for the conservation of forests and their biodiversity, the provision of environmental or ecosystem goods and services, environmental and territorial planning, and forest planning, control and monitoring. The following describes how these safeguards will be addressed, presenting the activities that will ensure compliance throughout the project. The follow-up indicators and monitoring information are presented below in Table 57 of section 34.3 (SEE [REDD+ SAFEGUARDS MONITORING PLAN](#)).

31.1. CORRESPONDENCE WITH NATIONAL LEGISLATION, INTERNATIONAL AGREEMENTS AND NATIONAL POLICIES

The project takes as its regulatory framework the national and international legislation that covers REDD+ projects in Colombia. Table 44 describes the regulations governing the initiative.

Given that some of the land included in the project will be declared a CSER and integrated management will be carried out under sustainability criteria that guarantee the conservation of natural ecosystems and environmental goods and services, the project is in direct accordance with Decree 1996 of 1999.

Table 44. Legislation and agreements corresponding to the project

REGULATION	APPLICATION CONTEXT
Decree 2811/1974	Compliance with Article 44, which establishes principles for the management of natural resources to promote a balance between economic development, environmental protection and the efficient use of resources.
Law 164 of 1994	The UNFCCC is ratified and, in accordance with national circumstances, measures are adopted to reduce emissions from deforestation and forest degradation.
Forestry policy (1996)	The overall objective is to achieve a sustainable use of forests to conserve them, consolidate the incorporation of the forestry sector into the national economy and improve the population's standard of living.

The Forest Reserves Law (Law 2 of 1959)	It establishes a classification and management regime for lands under its purview, including public lands, indigenous reserves and Afro-Colombian lands.
Green Plan 1998	Its main objective is the inclusion of agroforestry, conservation and ecological restoration in the environmental management of the territory and the recovery of degraded ecosystems.
Law 620 of 2000	Approving the Kyoto Protocol of the UNFCCC, which committed countries to stabilize GHG emissions, based on the principle of common but differentiated responsibilities.
Decree 3570 of 2011	Establishes functions for the Ministry of the Environment and its dependencies and affiliated institutions. Establishes that the Directorate of Forests, Biodiversity and Ecosystem Services is responsible for developing and coordinating the implementation of the National Forestry Development Plan.
Law 1753 of 2015	Guidance for the Implementation of the National Strategy for Reducing Emissions from Deforestation and Forest Degradation
Decree 926 of 2017	Its purpose is to regulate the procedure to make effective the non-payment of the national carbon tax.
Resolution 1447 of 2018	By which the system for monitoring, reporting and verification of mitigation actions at the national level is regulated, in relation to the GHG Emissions Reduction and Removal Accounting System, which includes REDD+ actions.
2030 Agenda for Sustainable Development	The Millennium Development Goals, focused on poverty eradication, and the Rio+20 process on Sustainable Development have resulted in the "2030 Agenda for Sustainable Development". This commitment was adopted by Heads of State and Government on September 25, 2015 during the 2015 United Nations Summit for Sustainable Development.
CONPES 3918	The Sustainable Development Goals (SDGs) are the product of a general global consensus on a measurable framework to achieve minimum levels that guarantee prosperity, the well-being of people and the conservation of the environment.
Decree 1996 of 1999	By which Articles 109 and 110 of Law 99 of 1993 on Civil Society Nature Reserves are regulated. The project complies with this decree to the extent that it supports the declaration of land as Civil Society Nature Reserves.

Source: Cataruben Foundation

In addition to the above, the project's REDD+ activities are articulated with the goals of the 2018-2022 Development Plan, as shown in the following tables.

Table 45. Lines of action in common with the National Development Plan 2018-2022.

GOVERNMENT COVENANTS	OBJECTIVES	PROJECT RELATIONSHIP
Sustainability pact: producing by conserving and producing by conserving	Sectors committed to sustainability and climate change mitigation	The project seeks to contribute to mitigating climate change by reducing greenhouse gases generated by deforestation and forest degradation for other activities, through the conservation of this ecosystem, which is susceptible to other anthropogenic activities.

	Biodiversity and natural wealth: strategic assets of the Nation	The direct relationship between forests and biodiversity in general allows the project to generate actions for the conservation of the ecosystem in general.
	Resilient Colombia: knowledge and prevention for disaster risk management and climate change adaptation	Among the project's activities is training the people who are part of the project on climate change issues and the importance of forest conservation in the face of this adaptation and mitigation challenge.
	Modern environmental institutions, social appropriation of biodiversity and effective management of socio-environmental conflicts.	By promoting the care of the forest ecosystem in private properties, and strengthening the intervention in participation mechanisms that bring together different landowners and the local community in general, it allows the appropriation of biodiversity to be important for these communities, and also strengthens community and state institutions related to the management of these conflicts.
Pact for the protection and promotion of our culture and development of the orange economy	We are all culture: the essence of a country that transforms itself from its territories	The conservation activities proposed in the project fully take into account the cultural and traditional knowledge of the communities belonging to the project region, constantly involving them in the actions that strengthen the project.
Women's equity pact	Equity for women in peace building	Nearly half of the owners of the properties that belong to the project are women, which in the first place reveals that land tenure is no longer only a matter of male gender, however, it also reveals that many of the activities that are developed in each property will be led by women, which favors gender equality. It is also expected to train not only women owners, but also those in charge of the properties and girls, in conservation issues. and preservation of forests, climate change, biodiversity conservation and other issues related to the project.
Plains-Orinoquia Region Pact: Connecting and enhancing the region's sustainable food pantry with the country and the world	To boost productivity and improve the efficiency of agricultural, agroindustrial and tourism clusters and value chains.	Directly, the project seeks to promote new economic activities such as eco-tourism in favor of the conservation of the forest ecosystem.

Source: Cataruben Foundation

Likewise, with regard to the chapters and objectives of the National Development Plan 2018-2022, the activities of the CO₂Bio 2 project to which it relates are mentioned below:

Table 46. Lines of action in common with the National Development Plan 2018-2022.

CHAPTER	OBJECTIVE	PROJECT ACTIVITIES
Equitable Colombia without extreme poverty	Objective 2: Reduce population gaps in terms of income	In general, the project carries out biodiversity conservation initiatives, especially in the forest ecosystem, which, in the market, functions as an economic income mechanism for the environmental services offered by these ecosystems, so that the owners of the land where these natural resources are located can receive economic values for their conservation.
Transformation of the field	Accelerate the emergence from poverty and the expansion of the rural middle class through a commitment to productive inclusion of rural dwellers.	Farmers who have an economic deficit even though they have land that they can take advantage of, find in the project, first of all, the possibility of acquiring economic resources for the conservation of the natural forest, however, they also find technical and scientific support to promote agriculture in existing areas, strengthening productivity from the respect for the zoning of the land.
Green growth	Objective 2: To protect and ensure the sustainable use of natural capital and improve environmental quality and governance.	The project is related to this objective because it protects natural capital by conserving, restoring and reducing forest degradation, which directly leads to the reduction of deforestation, strengthening the capacity of forests to be carbon sinks and providers of other ecosystem services.
	Objective 3: Achieve resilient growth and reduce vulnerability to disaster risks and climate change.	The project strengthens knowledge through training and workshops on issues related to climate change and its management in adaptation and mitigation measures.
Environment, agribusiness and human development: growth and wellbeing for the Plains	Objective 2: Manage the territory prospectively according to its environmental, agricultural, mining-energy and cultural vocation, by increasing institutional capacities throughout the region.	In accordance with the strategies of this objective, the project is related to the integral management of the forests, implementing strategies such as the declaration of Natural Reserves of the Civil Society, and other conservation initiatives.

Source: Cataruben Foundation

31.2. TRANSPARENCY AND ACCESS TO INFORMATION

To ensure access to information related to the project, Cataruben Foundation will use its website and social networks (Whatsapp Business, Twitter, Instagram, LinkedIn and Facebook) to publicize the positive environmental and social impact, as well as success stories about the implementation of conservation activities of natural ecosystems in the project area. Additionally, interested parties may submit Petitions, Complaints, Claims, Suggestions or Complaints (PQRSD) through our virtual portal or in person.

Regarding national reporting, Cataruben Foundation will register the project in the RENARE platform, in order to report the removals and/or reductions achieved by the project, and thus provide the public with access to the information.

31.3. ACCOUNTABILITY

The project will periodically hold an event called "Biodiversity and Carbon Forum", with broad participation of public and private entities, landowners and the general public, in order to report on the results and impact generated by the project in environmental, climate change mitigation, social and economic terms within the framework of its operation.

In this space, all concerns related to the operation of the project are received, in terms of time, economic resources, CO₂ removals achieved and areas impacted.

31.4. RECOGNITION OF FOREST GOVERNANCE STRUCTURES

For CO₂Bio project 2, it is essential to strengthen the principles of forest governance to the landowners, who are the first-line decision-makers about the forests and the biodiversity that inhabits the project area. This strengthening will be done through the recognition of key actors and the generation of a governance mechanism that will help strengthen the actions and articulate the actors that are part of the project.

This mechanism will consist of participatory sessions with representatives of the owners, the project owner and other key stakeholders, following the methodology of "structural analysis". This is a tool for structuring a collective reflection, which offers the possibility of describing the project and systematically planning its development, with the help of a matrix that relates all the constituent elements of the CO₂Bio 2 project, among these elements are both relevant stakeholders for the project and variables that make up the project or come from its environment.

31.5. CAPACITY BUILDING

The owners of the properties that belong to the project will be trained on the following topics and will be followed up on the implementation of the knowledge and skills in the execution of activities on their properties:

Table 47. Capacity building for project owners.

SUBJECT	DESCRIPTION	OBJECTIVES
Training in sustainable ecosystem management	Sustainable ecosystem management is defined as the practices that must be carried out in a responsible manner that contribute to the conservation of all existing ecosystems in order to guarantee their permanence over time.	<ul style="list-style-type: none"> - Encourage sustainable management practices of the resources present on the property that promote conservation. - Raise awareness among landowners that good management of the resources present on their properties can guarantee greater availability of these resources for future generations. - Emphasize the importance of adopting good practices for the development of activities on the property.
Biodiversity conservation training	Biodiversity conservation encompasses the protection of endangered species of fauna and flora, and the recovery of	<ul style="list-style-type: none"> - Promote conservation practices of fauna species found in forests. - Raise awareness among landowners that forests play a

	<p>degraded ecosystems due to the pressures we exert on our territory with actions such as the elimination of habitats for wildlife through deforestation, contamination of soils and aquifers due to the expansion of the agricultural frontier in an unsustainable manner, highlighting the forest unit as fundamental in the processes of conservation of fauna species and maintenance of biodiversity.</p>	<p>fundamental role in the maintenance of biodiversity. - Promote practices aimed at resolving human-animal conflicts.</p>
<p>Training in land planning</p>	<p>Farm planning is a strategy based on knowing the status and relationship of all the components of a farm, its strengths and weaknesses, in order to guide its development possibilities, define the actions to be undertaken and the order of implementation for each family.</p>	<p>Train owners, families, managers and workers in land planning, which allows them to have a clear idea of the past, present and future of the property, aiming to achieve the main objective of the project, which is based on the conservation of the forest ecosystem and its associated biodiversity. It is a tool to identify the different zones of the property and the natural resources associated with the land, as well as the shortcomings and aspects to be improved in terms of such zoning. On average, it defines: the location of houses, crops on each of the farms, rivers and bodies of water, access roads to the farms, water sources, deep wells, river catchment points; pastures for livestock and crops, forest areas, water tanks and reservoirs; corrals and stables; identify burning areas and septic tanks; storage areas.</p>
<p>Climate change trainings</p>	<p>Training whose main objective is to inform about the role and importance of citizen participation mechanisms, specifically those mechanisms that are exercised in the project's area of reference and that can contribute to the fulfillment of mitigation activities.</p>	<p>Train landowners on climate change and Greenhouse Gases (GHG), and the relationship with the project. Promote and strengthen knowledge on laws, organization, leadership, monitoring and inter-institutionalism, so that forest governance is exercised in the forest lands. Train owners and collaborators in sustainable livestock practices.</p>

Source: Cataruben Foundation

31.6. FREE, PRIOR AND INFORMED CONSENT

Within the CO₂Bio 2 project area, there are no ethnic communities, nor are there any activities that impact the collective territories of these communities, as these are only carried out in the area of the properties participating in the project. In this sense, the population involved in the project are only the owners of the land, their families, and the managers or day laborers who contribute to the execution of the activities on the land.

31.7. RECOGNITION OF TRADITIONAL KNOWLEDGE

In CO₂Bio, the ancestral knowledge of peasant communities and of the plains tradition is indispensable for the development of mitigation activities. Therefore, each of the activities will

be subject to the respect and recognition of the owners' and their families' own visions of the territory.

Within our activities to reduce emissions due to deforestation, in component 2 is "Implement training and support processes to strengthen sustainable forest management and biodiversity conservation", education is a key tool to give value and proper management to the environment, particularly forests and their biodiversity. Specifically, it seeks to embrace the ancestral and traditional knowledge of the peasant communities, to relate it to technical and scientific knowledge, resulting in better guidance in decision making around land use planning and sustainable forest management.

31.8. PROFIT SHARING

The implementation of the project's REDD+ activities will generate benefits for the communities and the environment in the project area, allowing the main objectives of the project in terms of community and biodiversity to be met. These benefits are related to the improvement of the social conditions of the landowners and their families, through the generation of complementary income from the sale of the first carbon credits, also ensuring an environmental benefit from the conservation of the forest, the associated biodiversity and the improvement of governance. The distribution of the economic benefits from the sale of the carbon credits will be distributed 70% to the beneficiaries and 30% to the project owner and the person in charge of ensuring compliance with the project activities.

In addition, REDD+ activities contribute to the development of economic activities and sustainable livelihoods by training the community in climate, forestry, agriculture and livestock issues to generate an increase in income from their productive activities. It will also contribute to improving the administrative capacity of the landowners, preserving the customs and cultural roots and environmental awareness, contributing to the increase of employment in the community to sustain the activities.

31.9. TERRITORIAL RIGHTS

Although the project does not develop its activities with ethnic communities, the local communities that participate are the peasants of the Orinoquia region, as well as the entire Colombian peasantry, this population has a series of rights that must be guaranteed, one of which is their right to land and territory, which is protected by the Political Constitution and the laws of the Colombian State.

With its activities, the project strengthens the fulfillment of these rights, especially the right to the adequacy of their lands thanks to the generation of income from the conservation of forests and their biodiversity, as well as helping to strengthen the right to the sustainability of land and territory, which contribute significantly to the protection of the environment, being sustainable, which contributes directly to ensure access to other rights such as education, food, work, a healthy environment, among others.

To this end, participatory land use plans will be developed, which will establish a plan for the sustainable use of land, production systems and the design of strategies that will help to promote the sustainable use of natural resources.

31.10. PARTICIPATION

The fundamental objective of the project is to guarantee the full participation of the landowners in the implementation of the activities, specifically to support the transmission of new knowledge and participatory dialogue in the decision-making process. To this end, meetings, workshops and forums will be held with the participation of all interested parties, guaranteeing the full participation of landowners and beneficiaries in project decision making, as well as promoting the participation of public and private entities working in biodiversity conservation, rural development and territorial planning.

In addition, communication strategies will be strengthened with landowners to encourage their participation in bodies such as the Regional System of Protected Areas (SIRAP in Spanish) of the Orinoquia region or the Municipal System of Protected Areas (SIMAP in Spanish) of San Luis de Palenque and Trinidad, municipalities where some of the project properties are located. In addition, they will integrate the 97 properties with their owners and families in a participatory monitoring of biodiversity through 5 study nuclei, according to the geographic distribution of the properties in the project area. The landowners will actively participate in each of the phases of this monitoring.

31.11. CONSERVATION OF FORESTS AND THEIR BIODIVERSITY

The CO₂Bio 2 project will contribute to biodiversity conservation in the region through a phased participatory monitoring strategy. This strategy will be structured according to three main objectives: i. Characterization of biodiversity in the project area, ii. Identification of HCVs (High Conservation Values) and iii. Mitigation of pressures on biodiversity.

The stages of the strategy correspond to the periods in which the activities that will help meet these objectives will be implemented, as shown below:

1st Stage (2018 - 2020)

- State of the art of biodiversity in the project area: Search and compilation of biodiversity information from official sources such as the Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH), SiB Colombia, GBIF, UICN, among others; and information from biological characterization activities, restoration and sustainable use of natural resources in the project area.
- Identification of potential HCVs in the project area.
- Characterization of environmental conditions of the property associated with biodiversity.

2nd Stage (2021 - 2023)

- Socialization of the objectives of the strategy and transfer of experiences and traditional knowledge about biodiversity elements.
- Identification of HCVs with the participation of the owners.

- Sampling design where the variables, methods and area to be sampled will be selected prioritizing the monitoring of the HCVs identified.
- Identification of pressures on biodiversity, especially those that threaten the permanence of HCVs.

3rd Stage (2023 - 2045)

- Implementation of participatory monitoring according to the sampling design established with the community.
- Design of mitigation measures for pressures on biodiversity and HCVs.
- Implementation of measures to mitigate pressures on biodiversity.
- Report on results and progress of the strategy.

31.12. PROVISION OF ENVIRONMENTAL OR ECOSYSTEM GOODS AND SERVICES

Forests contribute to the well-being of project beneficiaries because these ecosystems provide a wide range of goods and services that can be valued in economic, cultural, scientific and even spiritual terms. However, the provision of these ecosystem services is determined by the ecosystem integrity (EI) of the forest, which is directly related to biodiversity. This means that forests with higher EI have a greater capacity to support biodiversity at the level of communities and populations of organisms, as well as provide ecosystem services, regarding to degraded or intervened forests (Hansen, Noble, Veneros, *et al.*, 2021; Brockerhoff, *et al.*, 2017).

Considering that the provision of ecosystem services is based on complex ecological processes, the CO₂Bio 2 project can help beneficiaries to continue receiving these goods and services from forests. To this end, the EI of the forests must be assessed and the ecosystem services they are providing must be identified. To this end, remote sensing methodologies will be used to identify and map forest EI in the project area. This information will serve as the main input for participatory identification and monitoring of essential ecosystem services for project beneficiaries.

● Evaluation of IE with remote sensing

To assess forest EI, there are a large number of indices that can be estimated by remote sensing and *in situ* observations, which provide quantitative information on forest structure, function and composition. These indices have also been included in the Essential Biodiversity Variables (EBVs) system as they provide information on the ecological quality of the forest area evaluated (Hansen, Noble, Veneros, *et al.*, 2021). Accordingly, the following indices will be estimated:

- Forest Landscape Integrity Index (FLII).
- Biodiversity Intactness Index (BII).

Firstly, FLII functions as an indicator of the degree of forest intervention due to anthropic activity (Grantham, H.S., Duncan, A., Evanst, T. D., *et al.*, 2020). As for BII, it evaluates the composition of the forest by means of the average abundance of taxonomic groups determined in a specific geographic area, in relation to their reference populations (Scholes & Biggs, 2005).

- **Valuation and recognition of ecosystem services**

Based on the EI assessment, a socialization will be conducted with the beneficiaries of the properties in order to identify those ecosystem services that have greater importance and relevance. To this end, some type of value will be assigned to the ecosystem services identified, which may be economic, social, spiritual or other.

Knowing the importance or value of ecosystem services for the well-being of the beneficiaries, participatory recognition and valuation activities will be designed to determine the status and capacity of the forest to provide these services in the long term. The design of these activities will be in line with the development of the participatory monitoring strategy presented in safeguard 11. Conservation of Forests and their Biodiversity, especially regarding the mitigation of biodiversity pressures that may indirectly threaten the provision of ecosystem services.

31.13. ENVIRONMENTAL AND TERRITORIAL PLANNING

The activities and objectives of the project are consistent with the land use and biodiversity conservation vocation of the Land Management Plans. It is especially related to the Regional Environmental Plan 2013-2025 and the Regional Comprehensive Climate Change Plan for the Orinoquia. The project activities related to these objectives are presented below.

In addition, the Cataruben Foundation will participate in the Regional System of Protected Areas (SIRAP in Spanish) of the Orinoquia, the Departmental System of Protected Areas (SIDAP in Spanish) of Casanare, the Municipal System of Protected Areas (SIMAP in Spanish) of San Luis de Palenque, which integrate the Natural Reserves of the Civil Society of the region and have an impact on the actions to improve the conservation of forests and ecosystems of the properties that are also part of the project in this municipality.

Table 48. Lines of action in common with the Regional Environmental Plan 2013-2025.

Lines	Strategic component	Goals	CO ₂ Bio Activities
Strategic line 2	Formation of the regional system of protected areas.	Form the network of natural reserves of the Orinoco civil society	Promote the delimitation and signaling of strategic ecosystems and natural protection areas.
		Ecological restoration of degraded ecosystems strategic for biodiversity conservation.	Promote the delimitation and signaling of strategic ecosystems and natural protection areas.
Strategic line 5	Preparedness for environmental risk management	Raise awareness and train communities in climate change mitigation and adaptation practices in Corporinoquia's jurisdiction.	Implement training and accompaniment processes through training cycles that strengthen the sustainable management of ecosystems and biodiversity conservation.
Strategic line 6	Community stakeholders involved in the environmental processes of the territory	Consolidate a network of environmental allies in the jurisdiction's territory.	Consolidate and adapt governance principles for sustainable ecosystem management.
		Consolidate a citizen participation strategy focused on socio-environmental monitoring.	

Source: Cataruben Foundation

Table 49. Lines of action in common with PRICCO

Adaptation measures	CO ₂ BIO Activities
Recovery and rehabilitation of protective areas of water catchment areas	Promote the delimitation and signaling of strategic ecosystems and natural protection areas.
Recovery of riparian forest	Promote the delimitation and signaling of strategic ecosystems and natural protection areas.
Site-specific agriculture	Promote sustainable agricultural and livestock production and tourism, through the implementation of best practices.
Landscape connectivity	Implement training and accompaniment processes through training cycles that strengthen the sustainable management of ecosystems and biodiversity conservation.
Promotion of civil society reserve areas	Promote the delimitation and signaling of strategic ecosystems and natural protection areas.
Mitigation measures	CO ₂ BIO Activities
Programs and campaigns aimed at reducing deforestation	Monitor changes due to deforestation and ecosystem degradation in and around the project area
Landscape connectivity through biological corridors	Implement training and accompaniment processes through training cycles that strengthen the sustainable management of ecosystems and biodiversity conservation.
Natural regeneration in paddocks	Consolidate and adapt governance principles for sustainable ecosystem management.

Source: Cataruben Foundation

31.14. SECTORAL PLANNING

For the project, it is important to highlight the validity of the land tenure of each of the owners, as they have a public deed, a resolution verifying tenure for several decades, and additional documents such as certificates of title, property tax, and a title study. However, in most of the properties the current use of the land is not clear and there is limited awareness of the distribution and different uses that can be given to the property, in many cases affecting the natural resources present.

31.15. FOREST CONTROL AND SURVEILLANCE

The project will implement a series of activities to control and monitor the detection of changes in forest composition and structure in the project area. This is achieved through the establishment of an early warning system that will obtain reports on the status of forest cover. In addition to allowing timely decision making to minimize/mitigate risks associated with the degradation and subsequent deterioration of ecosystem services perceived by the forest.

The use of geospatial information (active and passive satellites) is ideal for monitoring the project's Essential Biodiversity Variables (EBV), especially in leakage areas; the use of geospatial tools for landscape-scale monitoring allows the calculation of deforestation and degradation

rates, multi-temporal analysis, time series and determination of pressures from hierarchical analysis processes, among other indices for biodiversity, soil, fire and water.

In addition to this monitoring measure, informative meetings will be held on the objectives of the project and the negative impacts of deforestation or forest degradation caused by the displacement of its agents and causes. Measures will also be designed to monitor the forest and its associated biodiversity, which are expected to involve landowners and their families. In addition, a community communication strategy is being designed to provide early warning of fires or other factors in the project area and in leakage areas.

32. REDUCTION OF GHG EMISSIONS

The project will reduce emissions by:

- Avoided Deforestation and Degradation (REDD+)

For phase 1, only reductions from avoided deforestation and degradation are included, using the guidelines of the Proclima International methodology in its version 2.2. Subsequent phases will include new areas in this ecosystem of the Orinoquia.

32.1. REDUCTION OF GHG EMISSIONS FROM REDD+ ACTIVITIES

Emission reductions from **deforestation** and **degradation** were estimated for the Phase 1 areas. For the areas of subsequent phases, the same methods will be used and will be integrated with the data from the accumulated phases, as well as the updates required by the most recent version of the Proclima standard and methodology, as well as national and international legislation.

In this regard, Resolution 1447 of 2018 mentions in Article 41 **Establishment of baselines for REDD+ projects**. *"The REDD+ Project holder shall establish its baseline from the most updated NREF that has been formally submitted by Colombia and evaluated by the UNFCCC, and that includes the geographic area of the project, as well as REDD+ activities, periods and carbon pools in which the initiative is intended to be implemented.*

The establishment of the REDD+ project baseline from the FREL consists of the methodological reconstruction of the NREF over the project area demonstrating consistency with the FREL. The methodological reconstruction is the calculation of the expected GHG emissions in the REDD+ Project area with the consistent use of the variables used in the FREL, based on the information provided by the SMyC: the definition of forest, global warming potentials, emission factors by forest type, historical deforestation data for the Project area and its method of estimating emissions and their projection over time".

The project is consistent with the FREL because it uses official data from SMyC in terms of activity data and data from historical periods of deforestation in the region where the project is being developed, as well as the projection over time of forest area change (BAC). In addition, to ensure greater accuracy in the project's own emission factor data and not to generate an underestimation or overestimation, the project decided to establish permanent sampling plots

in the project area following the guidelines of the document "*Protocol for the national and subnational estimation of biomass-carbon in Colombia*"¹⁶.

32.1.1. Uncertainty Management

Uncertainty is a classification attribute that reflects the degree of accuracy of the maps containing the activity data used for emissions calculations.

Under the PROCLIMA Program, uncertainty management is determined by the accuracy of the maps used to estimate activity data values and the application of discounts in emission factors. For activity data, the accuracy should be greater than 90%. The accuracy assessment should be made from the use of field observations or analysis of high resolution imagery. For emission factors, an uncertainty of 10% is acceptable for the use of average carbon values (assessment should be done per repository). If the uncertainty is greater than 10%, the lower value of the 95% confidence interval should be applied.

In this project we used the Forest - Non-forest maps for the years 2010, 2017 and 2020, developed by the IDEAM and its SMByC, which constitute official data of the forest cover in the national territory, which is why it **is not necessary to calculate the uncertainty for the activity data, i.e. for the quantification of the areas and the change in forest cover (CSB).**

On the other hand, for the calculation of the uncertainty of the emission factors, formula 15 of the tool "**Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities**" was used.¹⁷

$$u_C = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^M w_i^2 \times \frac{s_i^2}{n_i}}}{b_{TREE}}$$

¹⁶ 2011, Institute of Hydrology, Meteorology and Environmental Studies-IDEAM. All rights reserved. The texts may be used partially or totally quoting the source. Their total reproduction must be authorized by the Instituto de Hidrología, Meteorología y Estudios Ambientales-IDEAM. <http://www.ideam.gov.co/documents/13257/13548/Protocolo+para+la+estimaci%C3%B3n+nacional+y+subnacional.pdf/11c9d26b-5a03-4d13-957e-obcciaf8f108>

¹⁷ <https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-14-v4.2.pdf>

Where:

b_{TREE}	=	Mean tree biomass per hectare in the tree biomass estimation strata; t d.m. ha ⁻¹
w_i	=	Ratio of the area of stratum i to the sum of areas of tree biomass estimation strata (i.e. $w_i = A_i/A$); dimensionless
$b_{TREE,i}$	=	Mean tree biomass per hectare in stratum i ; t d.m. ha ⁻¹
u_C	=	Uncertainty in C_{TREE}
t_{VAL}	=	Two-sided Student's t -value for a confidence level of 90 per cent and degrees of freedom equal to $n - M$, where n is total number of sample plots within the tree biomass estimation strata and M is the total number of tree biomass estimation strata
s_i^2	=	Variance of tree biomass per hectare across all sample plots in stratum i ; (t d.m. ha ⁻¹) ²
n_i	=	Number of sample plots in stratum i .

The uncertainty analysis yielded a value of **9.76%**, therefore the average biomass value is accepted under the uncertainty management guidelines of the REDD+ methodology as it is below 10%.

UNCERTAINTY					
Uncertainty	B_{Tree}	t_{VAL}	W	S_2	n
9,76%	332,79	1,725	1	7451,727231	21

32.1.2. Reducing Emissions from Deforestation

The avoided deforestation reduction projection was made in the following steps:

Activity Data:

- Determination of the reference region (ha);
- Calculate the annual **CSB** (forest area change) in the reference region from the analysis between the periods 2010 and 2017 (ha);
- Projection of the trend of the reference region in the project area (ha) and the adjustment for national conditions (%**CN**¹⁸) The adjustment for national conditions was made by taking the national value submitted by Colombia to the UNFCCC, which is the most conservative;

¹⁸The proposed reference level of forest emissions from deforestation in Colombia for payment for REDD+ results under the UNFCCC considers a national circumstances adjustment calculation. The project holder may adjust the value of **CSB** following the guidelines in the annex for estimating the national circumstances adjustment (https://redd+.unfccc.int/files/31122019_annexo_circumstances_nref_nal_v7.pdf).

- Determine the area of Leakage and Calculate the annual **CSB** from the analysis between the periods 2010 and 2017 (ha);
- Calculate the **BSC** in the project area in the scenario with project (ha), projecting a **95%** reduction in deforestation, taking into account that the project activities are aimed at conserving the entire eligible forest area.
- Calculate the **CSB** in the Leakage area in the with-project scenario. (ha) a 10% increase in leakage area is projected due to project activities.

32.1.2.1. Emission Factors

- Aboveground and belowground biomass

To estimate the aerial biomass of the CO₂Bio 2 project, the procedure for the selection and survey of plots was followed and after this, through office work and with the data collected in the field, the allometric equations were used, in this case the one corresponding to the Tropical Rainforest developed by Alvarez et al. (2012), taking into account the Holdridge classification characteristics, all the plots are located in this life zone, characterized according to their temperature and life zones (Allometric equations used for the estimation of aboveground biomass in natural forests in Colombia).

It should be noted that in the procedure for the selection and survey of plots, additional data were taken in addition to those required for the calculation of biomass according to the allometric equation selected, taking into account possible changes or situations that may arise during the development of the project and that will represent cost overruns in the collection of field data; Thus, the height data of the individuals sampled were disregarded, since in the allometric equation, the aerial biomass (BA) models are only expressed as a function of the normal diameter (D) of the individuals and the basic density of the wood (ρ); The same happened with the estimates of dead organic matter, specifically for litter, which had been contemplated for sampling, but when the cost-benefit study was carried out with respect to obtaining biomass, its contribution was not significant; therefore, it was decided to exclude this compartment from the calculation of carbon stock.

Finally, the data obtained for the basic wood density (ρ), ([see annex BIOMASS DATA](#)), due to the complexity of its determination in the field, followed the guidelines of the protocol for the national and subnational estimation of potential carbon stocks stored in aboveground biomass in natural forests in Colombia, which proposes to use the databases reported by the IPCC (2003, 2006), Chave et al. among others for tropical species (all of them are available on the websites of the respective institutions). When wood density values are not available for a given species, the average of the higher taxonomic level (Genus or Family) should be used. For individuals without taxonomic information (e.g. indeterminate) the average of the density of the species found in the whole plot should be used, therefore, for the individuals, for which the specific wood density was not found, the guidelines described above were met.

$$BA = \text{Exp}^{((-2,406 + (1,289 \ln(D)) + (1,169 (\ln(D))^2) - (0,122 (\ln(D))^3) + (0,445 \ln(\rho)))}$$

Once the suitable allometric equation was selected, the aboveground biomass (AB) was calculated for each tree and the total aboveground biomass (TAB) for each plot. The latter is calculated as the sum of the biomass of all living trees. However, the aboveground biomass value is reported in units of tons per hectare (t ha⁻¹). For this, the value obtained per plot must be multiplied by the conversion factor according to the plot size used. Table 9 of the protocol for the national and subnational estimation of potential carbon stocks stored in aboveground biomass in natural forests in Colombia presents the conversion factors for each of the suggested plot sizes, in this case for the CO₂Bio 2 Project the correction factor of 4 was taken taking into account that the plot is 0.25 ha; after this, the resulting value is divided by 1000 to take it to tons (Equation 14) of the protocol.

$$BA = (\sum BA) * ((1 \text{ t}) / (1000 \text{ kg}))$$

Where, BA is the aerial biomass; kg is the unit of kilograms; t is the unit of tons, and FC is the conversion factor to be used according to the plot size used ([ANNEX 3.3 GIS - 2. GEODATABASE V2](#)).

Table 50 Location of plots

SUMMARY OF PLOTS			
Department	Municipality	Nº	PROPERTY
CASANARE	TRINIDAD	1	LA PALMITA
CASANARE	TAURAMENA	2	BARLEY 1
ARAUCA	ARAUCA	3	PASTORA VIEJA
ARAUCA	ARAUCA	4	PATEVACO
CASANARE	PAZ DE ARIPORO	5	VILLA ESPERANZA
VICHADA	LA PRIMAVERA	6	EL SILENCIO
CASANARE	TAURAMENA	7	SAN FELIX
CASANARE	SAN LUIS DE PALENQUE	8	VILLA HERMOSA
CASANARE	OROCUE	9	LOT 5(HATO LA PALMITA)
CASANARE	TAURAMENA	10	Villanueva
CASANARE	TAURAMENA	11	BARLEY 2
CASANARE	OROCUE	12	THE ARABIA
VICHADA	PRIMAVERA	13	VAIVEN
CASANARE	TRINIDAD	14	PELIGRO
VICHADA	SANTA ROSALIA	15	LA BENDICIÓN
META	PUERTO GAITAN	16	EL TOLIMA
VICHADA	SANTA ROSALIA	17	EL CONDOR
VICHADA	LA PRIMAVERA	18	LOS ALCARAVANES
VICHADA	LA PRIMAVERA	19	LAS COROCORAS

VICHADA	CUMARIBO	20	YARITAGUA
VICHADA	CUMARIBO	21	BERLIN

Source: Cataruben Foundation

From the data analysis and application of the equations mentioned above, the emission factor for the forest in the project area was determined as shown in Table 51 column TEF (Total Emission Factor), The soil organic carbon value was taken from the NREF of the Orinoquia Biome presented by Colombia in 2019.

Table 51. Emission Factors

EMISSION FACTORS						
BA t/ha	BS t/ha	BT t/ha	C t/ha	Coze t/ha	COSe t/ha	FET
332,79	79,87	412,66	193,95	711,16	11,90	723

Source: Cataruben Foundation

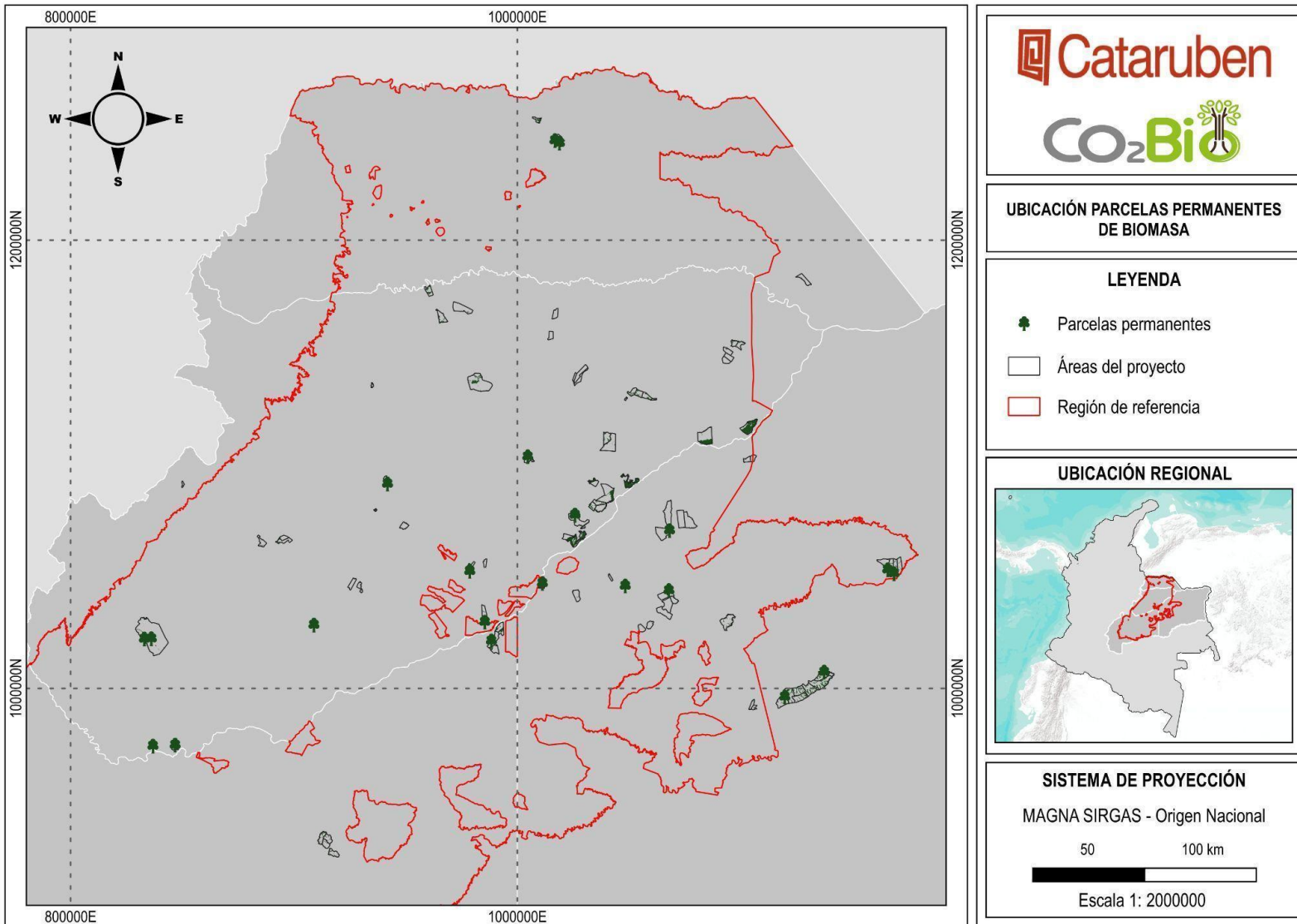


Figure. 34 Map of the location of REDD+ biomass plots.

Source: Cataruben Foundation

For the permanent monitoring plots, the protocol for the national and subnational estimation of biomass - carbon in Colombia (IDEAM 2011) was followed as established in section 3.1. Type, size and number of plots; Taking into account the above, the type of plot established corresponds to a permanent measurement, which is statistically more efficient and allows monitoring the changes registered in the carbon compartments of interest over time, as for the size of the plots according to the protocol, it is recommended to use plots of 0,25 ha (50 m x 50 m) because it is the most appropriate size to reach the required error in carbon estimates ($\pm 10\%$ with 95% confidence) in forestry projects and finally the number of plots which complies with the summary in Table 4 of the protocol (Plot size and number of sampling units to reach the required error (with 95% confidence) in carbon estimates.), finding that for a margin of error of ± 10 a minimum of 27 plots of 0.25 ha should be implemented, however, this information was verified with the decision tables in Annex 2, since, with this procedure any project developer dispenses with investing resources in pre-sampling, and omits the step of calculating the number of plots (n) described in section 4.3 of Chapter I of the protocol, therefore, in Annex 2 (Decision matrices for the selection of the number of plots according to the required size and error.) of Table 4 corresponding to the local analysis of seasonal tropical rainforest, with 21 monitoring plots of 50 X 50 The percentage error of 9.168 is identified, which is within the required range of $\pm 10\%$ with 95% confidence.

- COS defined in the most recent NRef for the Orinoquia Biome (tCO_{2e}/ha).

Table 52. Soil organic carbon (COS), COS_{20años} and COSeq for the five biomes of Colombia.

Bioma	COS (tC ha ⁻¹)	COS _{20años} (tC ha ⁻¹)	COSeq (tCO _{2e} ha ⁻¹)
Amazonía	74,0	3,7	13,6
Andes	125,0	6,25	22,9
Caribe	101,0	5,05	18,5
Orinoquia	65,0	3,25	11,9
Pacífico	92,0	4,6	16,9

Source: Methodological document AFOLU sector (2021)

32.1.2.2. GHG Emissions in the Project analysis period

Emissions in the project area and in the leakage area in the analysis period (tCO_{2e}/ha/year) can be seen in Annex [ANNEX 10. MONITORING > 4. EMISSIONS > PROJECT2>1.REED+> 1.Emissions_CO2BIO2_REDD+_v1.xlsx > 1.](#)

32.1.2.3. Reduction of GHG Emissions in the scenario with the project

The conservative projection of emission reductions from the difference between project emissions in the with-project scenario and project emissions in the without-project scenario, as follows:

$$RE = E_{ADEF, lb, year} - E_{ADEF, REDD + proj, year} - E_{ADEF, f, año}$$

Table 53 shows the results of the calculations, column 1 shows the projected reductions year by year for a period of 30 years, in total **3,482,267 tCO_{2e}** reduced. The projections are monitored and verified in the 2018-2020 monitoring report.

Table 53. Projected emissions reductions from deforestation in the analysis period 2018-2045 (30 years).

Reduced Emissions from Deforestation					
Project					
REDEF,REDD+proy (tCO2e)	t1	t2	EADEF _{,lb,year}	EADEF _{,REDD+proj,year}	EADEF _{,f,year}
109.747	2.017	2.018	223.059	87.974	25.339
116.728	2.018	2.019	234.587	92.521	25.339
121.997	2.019	2.020	243.287	95.952	25.339
126.151	2.020	2.021	250.147	98.657	25.339
129.096	2.021	2.022	255.010	100.576	25.339
128.033	2.022	2.023	253.255	99.883	25.339
126.950	2.023	2.024	251.466	99.178	25.339
125.874	2.024	2.025	249.689	98.477	25.339
124.805	2.025	2.026	247.924	97.781	25.339
123.744	2.026	2.027	246.172	97.090	25.339
122.690	2.027	2.028	244.433	96.404	25.339
121.644	2.028	2.029	242.706	95.723	25.339
120.606	2.029	2.030	240.991	95.046	25.339
119.574	2.030	2.031	239.288	94.374	25.339
118.550	2.031	2.032	237.597	93.708	25.339
117.534	2.032	2.033	235.918	93.045	25.339
116.524	2.033	2.034	234.251	92.388	25.339
115.522	2.034	2.035	232.595	91.735	25.339
114.526	2.035	2.036	230.952	91.087	25.339
113.538	2.036	2.037	229.320	90.443	25.339
112.556	2.037	2.038	227.699	89.804	25.339
111.582	2.038	2.039	226.090	89.169	25.339
110.614	2.039	2.040	224.492	88.539	25.339
109.654	2.040	2.041	222.906	87.914	25.339
108.700	2.041	2.042	221.331	87.292	25.339
107.753	2.042	2.043	219.767	86.676	25.339
106.812	2.043	2.044	218.214	86.063	25.339
105.878	2.044	2.045	216.672	85.455	25.339

3.287.383 TOTAL PROJECTED EMISSIONS REDUCED BY PHASE 1

Source: Cataruben Foundation

The step-by-step calculations can be reviewed in [Annex 3.2.3 EMISSIONS >2. Emissions REDD+ P2 v2.xlsx](#)

32.1.3. Reduction of Emissions from Degradation

For the projection of emissions reductions due to avoided degradation, we followed the guidelines of the methodology based on the IDEAM and SMByC document "Estimation of forest degradation in Colombia based on a fragmentation analysis"¹⁹.

Activity Data:

- Determination of the reference region (ha);
- The annual **PFD AND SFD**²⁰ (primary and secondary forest degradation) in the reference region were calculated from the analysis between the periods 2010 and 2017 (ha);
- Trend projection of the reference region in the project area.
- The area of Leakage was determined and the annual **PFD AND SFD** were calculated from the analysis between the periods 2010 and 2017 (ha);
- The **PFD and SFD** were calculated in the project area in the scenario with project (ha).
- The **PFD and SFD** were calculated in the Leakage area in the scenario with project (ha).

32.1.3.1. Emission Factors

The average difference of CO₂e in the biomass of the transition classes (core, perforated and patch) was calculated in **tCO₂e/ha**, based on the aerial biomass map by forest type; in our case **BHT** (Tropical Humid Forest).

32.1.3.2. GHG Emissions in the Project analysis period

Emissions in the project area and in the leakage area in the analysis period (tCO₂e/ha-year) were calculated by multiplying the activity data by the emission factors.

32.1.3.3. GHG Emission Reduction in the scenario with the project

The conservative projection of emission reductions from the difference between project emissions in the with-project scenario and project emissions in the without-project scenario is shown in the table below.

¹⁹ Ramírez-Delgado J.P., Galindo G.A., Yepes A.P., Cabrera E. Estimation of forest degradation in Colombia through fragmentation analysis. Institute of Hydrology, Meteorology and Environmental Studies - IDEAM, Ministry of Environment and Sustainable Development - MADS, UN-REDD+ Colombia Program. Bogotá, 2018

²⁰ The area reported as degraded is that with a degradation trend in the two periods of analysis. That is, areas that move from a primary to a secondary class in one period and then return to a primary class will not be considered degraded.

Table 54. Projected Emission Reductions from Avoided Degradation

13.5 GHG EMISSION REDUCTIONS IN THE PROJECT SCENARIO					
13.5.1. DEGRADATION					
Emission reductions from avoided degradation					
<i>REDEG, REDD+proy</i>	t1	t2	<i>EADeg, lb, year (tCO₂eq)</i>	<i>EADeg, REED+proy, year (tCO₂eq)</i>	<i>EADeg, f, year (tCO₂eq)</i>
33.991	2017	2018	40.806	5566	1250
29.660	2018	2019	35.619	4709	1250
25.799	2019	2020	30.910	3861	1250
22.500	2020	2021	27.049	3299	1250
19.631	2021	2022	23.749	2869	1250
17.119	2022	2023	20.881	2512	1250
14.913	2023	2024	18.369	2207	1250
12.972	2024	2025	16.162	1940	1250
11.265	2025	2026	14.222	1707	1250
9.764	2026	2027	12.515	1502	1250
8.442	2027	2028	11.013	1322	1250
7.279	2028	2029	9.691	1163	1250
6.256	2029	2030	8.528	1023	1250
5.355	2030	2031	7.505	901	1250
4.562	2031	2032	6.604	793	1250

3.865	2032	2033	5.812	697	1250
3.251	2033	2034	5.114	614	1250
2.711	2034	2035	4.501	540	1250
2.236	2035	2036	3.961	475	1250
1.818	2036	2037	3.485	418	1250
1.450	2037	2038	3.067	368	1250
1.126	2038	2039	2.699	324	1250
841	2039	2040	2.375	285	1250
590	2040	2041	2.090	251	1250
369	2041	2042	1.839	221	1250
175	2042	2043	1.619	194	1250
4	2043	2044	1.424	171	1250
- 146	2044	2045	1.253	150	1250

Source: Cataruben Foundation

The step-by-step calculations can be reviewed in [Annex 3.2.3 EMISSIONS >2. Emissions REDD+ P2 v2.xlsx](#)

32.1.4. Summary of REDD+ Emission Reductions

Table 55 shows the projected reductions from deforestation and degradation for the period 2018- 2045.

Table 55 Summary of REDD+ Emissions Reduction Phase 1 CO₂Bio 2 Project.

PROJECTED EMISSIONS REDUCTION PERIOD 2018-2045				
PERIOD	YEAR	REDEF,REDD+proj (tCO ₂ e	REDEG,REDD+proj	REDD+ total year
1	2018	109.747	33.991	143.738
2	2019	116.728	29.660	146.388
3	2020	121.997	25.799	147.796

4	2021	126.151	22.500	148.651
5	2022	129.096	19.631	148.728
6	2023	128.033	17.119	145.152
7	2024	126.950	14.913	141.862
8	2025	125.874	12.972	138.846
9	2026	124.805	11.265	136.070
10	2027	123.744	9.764	133.508
11	2028	122.690	8.442	131.132
12	2029	121.644	7.279	128.923
13	2030	120.606	6.256	126.861
14	2031	119.574	5.355	124.929
15	2032	118.550	4.562	123.113
16	2033	117.534	3.865	121.399
17	2034	116.524	3.251	119.775
18	2035	115.522	2.711	118.233
19	2036	114.526	2.236	116.762
20	2037	113.538	1.818	115.355
21	2038	112.556	1.450	114.006
22	2039	111.582	1.126	112.708
23	2040	110.614	841	111.455
24	2041	109.654	590	110.244
25	2042	108.700	369	109.069
26	2043	107.753	175	107.928
27	2044	106.812	4	106.816
28	2045	105.878	- 146	105.732
TOTAL		3.287.382,5	247.796,6	3.535.179,1

Source: Cataruben Foundation

As more hectares are included in each of the phases the projections will be adjusted.

33. DOUBLE COUNTING

The project will trade carbon reduction units in a single certification program and will be traded in the Colombian voluntary market and through PROCLIMA's platform and is expected to make use of the RENARE platform established in resolution 1447 of 2018 for the management of climate change project information. In the case of quantification calculations in carbon accounting, double counting or the use of overlapping areas is reduced to zero.

34. MONITORING PLAN

The following is the monitoring plan designed to evaluate changes in project boundaries, REDD+ activities, REDD+ safeguards, co-benefits and SDGs, project permanence and project emissions, based on the established methodological guidelines, in order to generate accurate and quality information in the verification process.

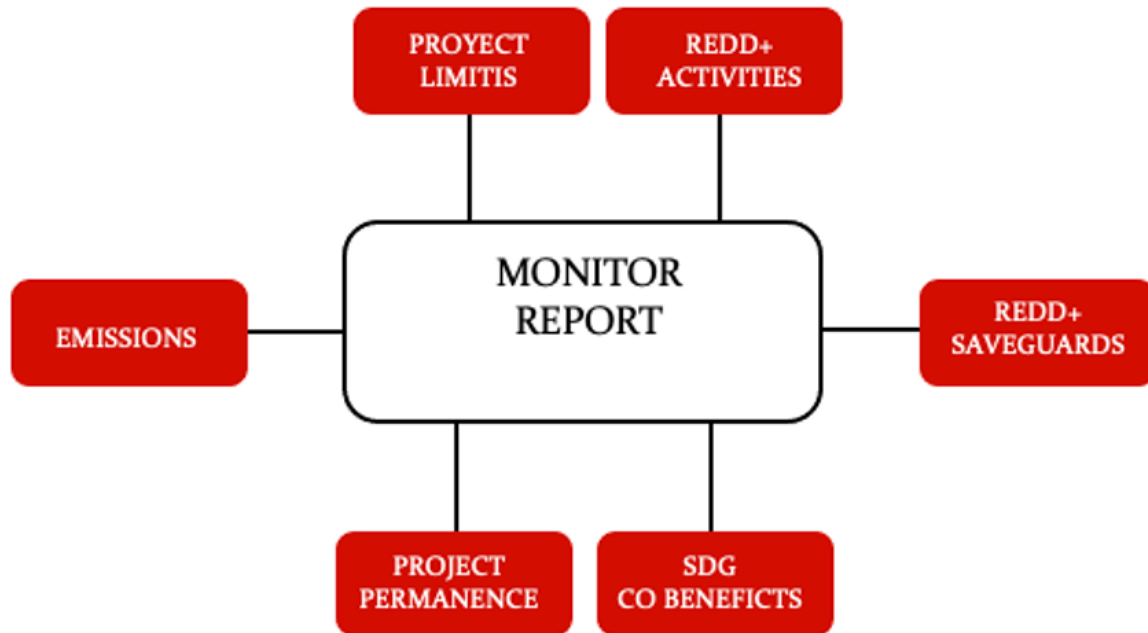


Figure. 35 Forest ecosystem monitoring plan, period 2018-2020.

Source: Cataruben Foundation

34.1. PROJECT BOUNDARY MONITORING

The methodology establishes the monitoring of the geographical limits of the project, this activity is developed in each verification, following a Geographic Information System (GIS) for the reference region, the total areas of the project, the eligible areas and the leakage belt ([ANNEX 3.3 GIS - 2. GEODATABASE V2](#)); the above according to the stipulated in numeral 28 (Spatial and Temporal Limits) of this document.

34.2. MONITORING PLAN FOR THE IMPLEMENTATION OF REDD+ ACTIVITIES

The REDD+ activities have a proposed implementation period from 2018 to 2045, which includes environmental, social and economic baseline surveys, as well as the implementation of action plans with deadlines agreed with the landowners. Table 56 shows the REDD+ activities with the proposed indicators, type, target and time for compliance, as well as the unit of measurement.

Table 56. REDD+ activities and their indicators for reporting measurement progress

ID	REDD+ ACTIVITIES	Indicator ID	Indicator name	Type	Goal	Unit of measure	Monitoring methodology	Frequency of monitoring	Responsible for measurement
1	Implement training and accompaniment processes through training cycles that strengthen the sustainable management of ecosystems and biodiversity conservation.	1.1	Number of people trained in the conservation and sustainable management of ecosystems and their biodiversity.	Strengthening of capacities in environmental management of farms	80	Unit	Application of training or workshops	Annual	Cataruben Foundation
2	Consolidate and adapt governance principles for sustainable ecosystem management.	2.1	Number of properties characterized	Socio-environmental survey of the properties	97	Properties	Characterization of properties by means of property characterization sheets, management plan, beneficiary households, among others.	Annual	Cataruben Foundation
		2.2	Number of follow-up reports on the implementation of activities to strengthen governance structures	Strengthening of forest governance structures	1	Document	Under the monitoring of the governance action plan, a report will be generated every 5 years, once the first verification has been carried out.	Every 5 years	Cataruben Foundation

3	Promoting forest legality	3.1	Number of forest harvesting permits	Accompaniment in the process of legal forest harvesting on the properties.	1	Document	Monitoring of eligible ecosystem areas for evidence of changes in coverage or at the request of a landowner.	Annual	Cataruben Foundation
4	Promote the delimitation and signaling of strategic ecosystems and natural protection areas.	4.1	Number of reports on the process of delimitation and marking of forest areas according to established guidelines.	Forest conservation	1	Unit	Visit to properties and photographic record	Annual	Cataruben Foundation
		4.2	Number of properties with implemented delimitation and signaling activities		97	Properties	Follow-up in the field and through evidence provided by the owners of the execution of activities once the first verification has been carried out.	Every 5 years	Cataruben Foundation
5	Promote and improve agricultural production, livestock (on existing lands) and tourism, through the implementation of good sustainable practices.	5.1	Number of properties with characterized productive activities	Implementation of sustainable production practices	97	Properties	Socio-productive recognition of the properties by means of a psychosocial and socioeconomic sheet and a survey of beneficiary households.	Annual	Cataruben Foundation
		5.2	Number of properties with implemented sustainable productive		97	Properties	Follow-up of evidence generated in the field or provided by the landowners	Annual	Cataruben Foundation

			activities						
6	Generate alerts of changes due to deforestation, degradation and/or transformation of ecosystems in the project area and its surroundings.	6.1	Number of properties with satellite analysis to identify changes due to deforestation, degradation and/or transformation of eligible areas.	Preventing deforestation, degradation and/or transformation of ecosystems	97	Properties	Coverage monitoring report	Annual	Cataruben Foundation

Source: Cataruben Foundation.

Annex 3.2.1. Monitoring of REDD+ Activities shows the monitoring methodology, monitoring frequency and the person responsible for measurement.

34.3. REDD+ SAFEGUARDS MONITORING PLAN

The CO₂Bio 2 project has designed a series of activities with their respective indicators to monitor compliance with the REDD+ social and environmental safeguards defined for Colombia. This has sought to prevent the environmental and social risks of the project, thus avoiding the impact on the social, economic and cultural rights of the landowners and their families. Table 57 establishes the monitoring plan with the projection of the indicators to be measured for each safeguard, followed by a description and evaluation of each of the 15 safeguards in the context of the project. The monitoring report section evaluates the progress of the goals for the period 2018 to 2020.

Table 57. REDD+ safeguards

Indicator ID	Indicator name	Type	Goal	Unit of Measurement	Monitoring methodology	Frequency of monitoring	Responsible
1.1	Percentage of land declared as Civil Society Nature Reserves (CSNR)	Contribute to and be consistent with national objectives	20%	Properties	Obtaining resolutions approving the declaration	Annual	Cataruben Foundation

2.1	Number of updates and registration in the RENARE platform	Contribute to guaranteeing the right to information.	1	Unit	Recording and updating in the RENARE platform of the activities carried out once the platform is operational.	Annual	Cataruben Foundation
3.1	Number of Biodiversity and Carbon Fora held	Strengthen transparency in the development of the project.	1	Forums	Forums held where a record of attendees and a report will be taken.	Annual	Cataruben Foundation
4.1	Percentage of properties whose governance activities have been characterized.	Identify the degree of implementation of activities that ensure governance	100%	Predios	Photos, logbooks, personnel contracts, housing on the properties, etc.	Annual	Cataruben Foundation
5.1	Number of people trained	Strengthen technical and legal skills in project-related issues.	59	Unit	Site visits and data collection	Annual	Cataruben Foundation
NOT APPLICABLE							
7.1	Number of properties with diagnosis of households, tradition of beneficiaries and follow-up on indicators	Integrating traditional knowledge into the implementation of REDD+ activities	59	Properties	Surveys and processing of results	Every 2 years	Cataruben Foundation
8.1	Percentage of properties with higher economic benefits resulting from	Contribute to making the project sustainable for the owners and their	100%	Properties	Carbon certificates traded per property	Every 5 years	Cataruben Foundation

	conservation	families.					
9.1	Number of properties characterized and with strengthened land planning	Contribute to guaranteeing the land rights of landowners.	97	Properties	Elaboration and updating of property plans	Every 5 years	Cataruben Foundation
10.1	Number of beneficiaries fully and effectively informed about the project	Ensuring full and informed participation of owners	97	Unit	Signing of the binding and updating contracts by both parties	Every 12 years	Cataruben Foundation
11.1	Percentage of implementation of the stages of the participatory biodiversity monitoring strategy (%).	Biodiversity conservation	100%	Stages	Follow-up of the execution of the strategy stages, reporting documents	every 2 years	Cataruben Foundation
12.1	Number of analyses of ecosystem integrity, structure and composition of the forest	Monitoring the provision of ecosystem services	6	Analyses performed	Remote sensing, attendance lists, photographic registration	Every 5 years	Cataruben Foundation
13.1	Number of instruments or mechanisms for protected area management strengthened	Contribute to regional environmental management	4	Unit	Relationship between the Regional Environmental Plan, PRICCO, the Regional System of	Annual	Cataruben Foundation

					Protected Areas (SIRAP) of the Orinoco and the REDD+ activities of the project.		
14.1	Number of properties in land legalization process	Contribute to the formalization of land ownership.	97	Properties	Follow-up process	Every 5 years	Cataruben Foundation
15.1	Number of spatial analyses to assess deforestation as a control of emissions leakage	Decrease potential displacement of emissions by displacement of land use change causes and agents.	30	Analyses performed	Spatial analysis and deforestation calculations	Annual	Cataruben Foundation

Source: Cataruben Foundation

34.4. SUSTAINABLE DEVELOPMENT GOALS MONITORING PLAN

The project seeks to contribute to three Sustainable Development Goals, these are: Climate Action (13), Life of Terrestrial Ecosystems (15) and Gender Equality (5). The specific target to which it contributes to the thirteenth goal on Climate Action is: (13.3) Improve education, awareness and human and institutional capacity for climate change mitigation, adaptation, mitigation and early warning.

To this end, the project will carry out training and support processes with landowners to strengthen sustainable forest management, as well as training on climate change, declaration of Civil Society Nature Reserves, strengthening the principles of forest governance and implementation of the management plan that will allow the preservation of this ecosystem. The procedure for the evaluation of this goal will be the follow-up of the attendance record to the training, the evaluation of the knowledge acquired and its subsequent implementation in the activities developed in each property.

The target to which the project contributes to the fifteenth objective on Life of Terrestrial Ecosystems is: (15.1) To ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and the services they provide, in particular forests, wetlands, mountains and drylands, consistent with obligations under international agreements.

To this end, the project will contribute to the declaration of Civil Society Nature Reserves (CSNR) in more than half of the participating properties, thus contributing to the protection and sustainable use of ecosystems and the ecosystem services they provide. The procedure for the evaluation of this goal will be to follow up on the issuance of CSER resolutions, the preparation or updating of management plans or property plans with the identification of ecosystem, biodiversity, socioeconomic and productive conditions, and the monitoring of compliance with conservation activities.

The project will contribute to the fifth objective on Gender Equality, especially to the target: (5.5) Ensure women's full and effective participation and equal leadership opportunities at all decision-making levels in political, economic and public life. This will be done through meetings with women owners and women members of the families, as well as their participation in workshops on strengthening project governance and training spaces for the appropriation of knowledge and skills on climate change mitigation, biodiversity conservation and sustainable production practices. The procedure for the evaluation of this goal will be the monitoring of the participation of the owners and other women beneficiaries, and the fulfillment of the objectives or activities of the project that are led by them.

The criteria and indicators defined for the contribution of the three Sustainable Development Goals (SDGs) are presented below:

Table 58. Monitoring plan for the Sustainable Development Goals.

Target	Objective goal	Indicator name	Goal	Unit of Measuret	Monitoring methodology	Frequency of monitoring	Responsible
(13) Climate action	(13.3) Improve education, awareness, and human and institutional capacity for climate change mitigation, adaptation, mitigation, and early warning.	Climate change mitigation trainings	20	Number of trainings conducted	Visits to the properties for training and information gathering	Every 5 years	Social Unit
(15) Life of terrestrial ecosystems	(15.1) Ensure the conservation, restoration, and sustainable use of terrestrial and inland freshwater ecosystems and the services they provide, in particular forests, wetlands, mountains, and drylands, consistent with obligations under international agreements.	Civil Society Nature Reserves	42	Number of properties declared as Natural Reserves of the Civil Society	Obtaining resolutions that approves the declaration	Annual	Social Unit and Biodiversity Unit
(5) Gender equality	(5.5) Ensure women's full and effective participation and equal opportunities for leadership at all decision-making levels in political, economic, and public life.	Women's participation in decision making	500	Number of women beneficiaries of the project participating in decision making spaces.	Creation of spaces and participation activities about the project with women beneficiaries.	Every 2 years	Social Unit

Source: Cataruben Foundation

34.5. CO-BENEFITS MONITORING PLAN

The procedures related to the monitoring of co-benefits and the special Orchid category are presented below, as well as the criteria and indicators defined to demonstrate the additional benefits and the measurement of the co-benefits of the Orchid category.

34.5.1. Biodiversity conservation

34.5.1.1 Biodiversity conservation and ecosystem services.

- **Declaration of Civil Society Nature Reserves (CSNR).**

The Cataruben Foundation, within the framework of the project, promotes the declaration of private properties as CSNR, as part of the strategy for the conservation of natural ecosystems and biodiversity. For this, we will provide technical and legal advice and support to landowners requesting the registration of their properties as CSNR before the National Natural Parks of Colombia (PNNC), as well as participating in each of the steps of the declaration process, which consist of:

- Identification, characterization and analysis of the biotic and abiotic components.
- Preparation of the environmental management plan.
- Follow-up of the registration process, accompaniment, or visit by PNN.

This process will be monitored on an annual basis, with follow-up and management of each of the previous steps, resulting in the final resolution of the declaration as a CSER.

- **Identify, recognize and evaluate Key Areas for Conservation (KBAs).**

In addition to the CSNR declaration, a KBA identification exercise will be carried out to determine if there are already identified KBAs in the project area or if there are potential areas to be designated as KBAs. To this end, each of the criteria established in The Global Standard for the identification of Key Biodiversity Areas, which aim to locate and highlight areas that contribute significantly to the global persistence of biodiversity (IUCN, 2016), will be evaluated. This identification process will be carried out only once, however the biological conditions of the identified KBAs will be monitored every 5 years.

34.5.1.2. Encourage the use of native species

As mentioned above, the project activities do not involve the use of invasive species. However, landowners may introduce this type of species into productive systems in search of greater efficiency or profit. In this regard, there will be a cycle of socializations about the impact of invasive species on biodiversity, as well as the use of native species in agroforestry systems, sustainable cattle ranching and restoration through revegetation or enrichment of forests, morichales and other palm groves, recognizing the benefits they generate.

34.5.2. Community Benefits

34.5.2.1. Identifies and strengthens mechanisms for social and community participation.

The indicator to be measured is the number of actions of the SIMAP (in Spanish) and SIRAP (in Spanish) Action Plan supported by the project and implemented through the strengthening of the participation of the different stakeholders. The procedure for annual monitoring of the strengthening of social and community participation mechanisms at the local and regional level will be carried out through meetings of the parties involved in the SIMAP and SIRAP and reports on the activities implemented to support the sustainability of the project mechanisms.

34.5.2.2. Benefits to small-scale production systems

Short-term benefits to small-scale productive projects with members of the communities in the project area will be measured through the percentage of income invested in optimizing the productive projects of the owners and their families. And the long-term benefits will be focused on measuring the increase in the sustainability of the productive projects, the indicator to measure it is: No. of hectares with sustainable productive management and conservation of ecosystem services provision. The procedure for annual monitoring of the indicators is through the activities carried out by the owners to make livestock farming sustainable, to establish green businesses, ecotourism or to declare the properties as Natural Reserves of the Civil Society that unite production with conservation.

34.5.2.3. Average net increase in income of local producers

The average net increase in the income of local producers from REDD+ activities will be measured through the difference between the average annual net income without the project and the amount of income taking into account the income received from the sale of carbon certificates and the profits from the investment in productive projects. The procedure for monitoring the indicator **is through** the reporting of income from landowners and investments in their productive systems that are derived from the increase in their income from the sale of carbon certificates resulting from REDD+ activities.

34.5.3. Gender Equity

34.5.3.1. Consider determinants set forth in the regulatory framework related to gender: (a) Law 731/02 on Rural Women

To measure the contribution and strengthening of the improvement of the quality of life of rural women through competencies for social entrepreneurship with a focus on gender, the number of women who participate and implement the competencies in this type of entrepreneurship in their productive activities will be quantified. The procedure to follow up on this is through attendance to training and workshops, as well as the accompaniment of the entrepreneurial activities of rural women who are part of the project.

34.5.3.2. Demonstrates that it considers determinants set forth in the normative framework related to gender: (b) Policy Guidelines for Women's Equity 2012.

The strengthening of processes that contribute to cultural transformation in favor of non-discrimination, raising awareness through training to eradicate stereotypes about the role of women in rural areas will be measured through the percentage of participation of women owners and women beneficiaries of the project, as well as through the number of men who recognize the importance of the work they perform in rural areas. The procedure for monitoring this is the control of attendance at workshops and the evaluation of knowledge in this regard, in addition to monitoring the empowerment of women through achievements in the educational and labor dimensions.

34.5.3.3. Ensures women's full and effective participation and equal leadership opportunities at all levels of decision-making at the project level.

The project's contribution to women's full participation and equal leadership opportunities in all areas of the project will be measured by the number of women owners and beneficiaries participating in the project's decision-making spaces, as well as the number of women leaders in the different units that make it possible to monitor project activities. The procedure to follow up on this is the attendance record of women participating in the project's decision-making spaces, as well as human resources management, through the monitoring of gender equity in recruitment and selection, professional development, training, remuneration, family-work life, environment, occupational health and risk, sexual and labor harassment. And through the external projection of the company, in the company's image and language in its institutional communication.

34.5.4. Adaptation to Climate Change

34.5.4.1. Consider any of the activities proposed in the National Climate Change Policy.

The activity proposed in the National Climate Change Policy that is considered in the project is "evaluation of the conservation status of ecosystems associated with areas of water supply, flooding and drought, and sea level rise, such as water sources and watersheds within priority watersheds, and mangroves in coastal areas". In the project area, the biological conditions of the ecosystems associated with water sources and water courses will be identified and characterized, describing their conservation status, diagnosing the tangible and intangible value of the ecosystem services they provide, and managing actions to maintain or improve their conservation.

This activity will be carried out periodically (every 5 years) in order to demonstrate changes or trends in biodiversity conditions and the provision of ecosystem services. For this purpose, remote sensing methodologies, official cartographic information of the project area (as updated as possible) and field visits will be used.

34.5.4.2. Implements activities that generate sustainable and low-carbon productive landscapes.

A cycle of trainings will be held where knowledge and experiences will be shared among beneficiaries, professionals and technicians of the project, about activities that generate sustainable productive landscapes and low carbon suitable for the project area. In this space, the protocol for the implementation of these activities will be designed in a participatory manner, which will include the methodology, implementation times, as well as a general evaluation of the benefits generated by these activities. In addition to this, whenever required, technical support and advice will be provided to the beneficiaries in the implementation.

It is important to mention that once the protocol for the implementation of sustainable and low-carbon productive activities (selected by the beneficiaries) is designed, new specific indicators will be established to monitor the implementation of these activities throughout the project.

34.5.4.3. Designs and implements adaptation strategies based on an ecosystem approach.

The beneficiaries of the properties will implement climate change mitigation activities based on an ecosystem approach related to mitigating the effects of the dry season. These activities correspond to fire control by means of fire breaks and shrub and bush management, which reduce the degradation of vegetation cover and soils caused by fire. On the other hand, the implementation of water harvesting ensures greater availability of water resources during the dry season through reserve systems that allow water to be stored during the rainy season.

The implementation of these activities will be carried out under the technical assistance of the group of professionals of the project, through training and continuous monitoring. Finally, the implementation of these activities will be monitored annually by following up on the establishment of the activities, as well as a report describing how they helped reduce the effects of fires and water shortages during the drought season.

34.5.4.4. Designs and implements adaptation strategies based on an ecosystem approach.

The implementation of activities to adapt to the dry season will be monitored, corresponding to guardrails, bush and shrub management and water harvesting. These activities must be implemented by the beneficiaries on an annual basis (only one or both activities can be implemented on the farms) according to the seasonality of the region. The monitoring of these activities includes a description of the implementation of the activity, and how it helped to reduce the effects of the dry season.

Finally, the monitoring plan of the co-benefits generated by the project corresponding to the Orchid category is summarized in the following table.

Table 59. Co-benefits monitoring plan

Category Orchid							
Components	Cobenefit	Indicator name	Goal	Unit of measure	Monitoring methodology	Frequency of monitoring	Responsible
Biodiversity conservation	Develops effective actions and measures to halt the loss of biological diversity, favoring that ecosystems continue to provide essential services.	CSNR Statement	50%	Percentage of properties declared as CSERs	Obtaining resolutions that approves the declaration	Annual	Biodiversity Unit
		Evaluation of KBA status	7	Report	Report describing the status of the KBAs in the project area.	Every 5 years	Biodiversity Unit
	Due to project activities, no invasive species have been introduced.	Assistance in the identification and management of invasive species	100%	Percentage of implementation of training and accompaniment programs carried out	Attendance lists, photographic record, progress report, etc.	Every 2 years	Biodiversity Unit
Benefits on communities	Identifies and strengthens mechanisms for social and community participation at the local and regional levels.	Protected area systems	4	Number of environmental management mechanisms strengthened	Minutes and progress in the action plans resulting from the project	Annual	Social Unit
	The initiative generates short- and long-term benefits to small-scale productive projects with members of the communities in the project area.	Sustainability in productive projects	70%	Percentage of farms with sustainable production practices	Changes recorded through field logs, evidence of sustainable production practices and their profitability.	Annual	Social Unit
	Activities under the GHG mitigation initiative produce an average net increase in income for local	Increased in producer income	100%	Percentage of homeowners with increased income	Changes in owners' equity in income from business activities	Every 2 years	Social Unit

	producers.						
Gender equity	It considers determinants set forth in the normative framework related to gender: (a) Law 731/02 on Rural Women (b) Women's equity policy guidelines	Women entrepreneurs	50%	Percentage of women participating and implementing entrepreneurship competencies with a gender perspective.	Attendance at trainings and workshops, as well as accompaniment of activities	Every 5 years	Social Unit
	Ensures women's full and effective participation and equal leadership opportunities at all levels of decision-making at the project level.	Valuation of rural women's work	100%	Percentage of women and men trained in avoiding gender discrimination and valuing women's work.	Attendance at workshops and evaluation of knowledge, and accompaniment of achievements in the educational and labor dimensions of women.	Every 2 years	Social Unit
Adaptation to climate change	Consider any of the activities proposed in the National Climate Change Policy.	Conservation of water sources	7	Number of evaluations performed.	Assessments of the status of ecosystems associated with water sources.	Every 5 years	Biodiversity Unit
	Implements activities that generate sustainable and low-carbon productive landscapes.	Follow-up on the implementation of the protocol for the establishment of activities that generate sustainable and low-carbon productive landscapes.	100%	Percentage of implementation of sustainable low-carbon productive activities, according to the designed protocol.	Record of evidence: photographs of the training, attendance lists, implementation protocol, visit logs.	Every 2 years	Biodiversity unit
	Design and implement adaptation strategies based on an ecosystem approach.	Implementation of fire breaks, brush and shrub management activities for fire control	80%	Percentage of properties that implement the strategy	Reporting	Annual	Biodiversity unit

		Implementation of water harvesting	50%	Percentage of properties implementing the strategy.	Reporting	Annual	Biodiversity unit
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Source: Cataruben Foundation

34.6. PERMANENCE MONITORING

In accordance with the PROCLIMA methodology (Version 2.2-2021), a reserve of 15% of the total GHG reductions or removals quantified for each verified period is deducted and maintained. This reserve is made in order to guarantee that if events occur that require the replacement of credits placed in the market, this 15% will be used to cover those affected.

Project permanence monitoring will be carried out at each periodic verification previously stipulated by the Project Owner, under the following indicators and following the established procedures:

34.6.1. Biophysical risks

Fires: account the geographical location - and climatic characteristics - of the project area, and the anthropic activities that take place there, such as the use of fire for burning biomass and expanding the borders for agricultural or livestock purposes, where these uncontrolled fires destroy vegetation cover, especially grasslands, pastures and natural forests and their respective degradation, forest fires are an issue of considerable relevance in the implementation of the CO₂Bio project.

Therefore, in the event that a forest fire is generated on a property and affects the project's REDD+ conservation areas, a written record must be generated, as well as photographs and testimonies to establish the procedure to follow, the affected areas must be included and the CO₂ and CH₄ emissions must be estimated and included in the quantification of emissions.

In this way, different activities were implemented on the properties that are in line with the conservation activities established in the contractual contract signed with the landowners, so from the REDD+ activities, the following prevention measures are shared to avoid a forest fire disaster:

1. Elimination of biomass that can be used as fuel in a fire
2. Establishment of firewalls
3. Implementation of guardrails
4. Avoid burning during critical summer periods

Floods: Floods are an issue of environmental concern in the forest ecosystem, since, they can affect ecological communities (both flora and fauna), either because they cover them or because they wash them away. The force of the water carries away part of the substrate and vegetation, as well as shallow seeds, which can affect the species' ability to resprout and therefore colonize. Another of the effects that floods can have on the environment is the dispersion of pollutants when they occur in areas where such substances are present.

However, it is important to mention that in the project area floods are periodic and very characteristic, so the negative impact on carbon stocks is reduced or null, however, such floods that may occur in areas where this risk was not foreseen, may affect the beneficiaries or those who live on the land, making access difficult or giving rise to large economic losses.

34.6.2 Socioeconomic Risks.

-Land tenure disputes: Land tenure and the exercise of forest governance is a priority issue in project implementation, since land tenure allows social, cultural and environmental practices to be centralized, sustainable and equitable, thus regulating the way in which communities relate to each other and to their environment in general. Weak governance has adverse effects on social stability, sustainable use of the environment, investment and economic growth.

As a prevention and mitigation plan in the first place, one of the requirements to be part of the project is compliance with legal requirements; whose main objective is to establish the legality of the properties, demonstrating the land tenure according to the provisions of CONPES 3859 of 2016, as owner (who holds the real right of the domain that appears in a real estate registration folio), possessor (who on a real estate of private nature acts with the spirit of owner with the conviction of being it, but without being able to demonstrate compliance with the requirements of the real estate tradition that legally validly accredits him as owner) or holder (who uses and enjoys a real estate property for which the existence of an owner is recognized), at least during the period of quantification of GHG reductions or removals.

The following documents demonstrate the veracity and legality of each of the project participants, as well as their properties, so that the following information can be corroborated in the documents attached to the validation process: citizenship card, public deed document, INCODER resolution, the certificate of tradition and freedom, the cadastral certificate and the title study of each property with its contract of connection with the project.

REDD+ activities also address the issue of forest governance, where knowledge about this exercise is strengthened through training, workshops and lectures.

-Project stakeholder conflicts : The main prevention measure to avoid conflict between the project stakeholders which are the Owners or beneficiaries, USAID, Cataruben Foundation and subsequent buyers of carbon certificates, is to manage the agreements, linkage contracts or alliances adhering to Colombian regulations, where they are properly socialized, understood and signed by the parties involved, so that there is full knowledge of the different stages and processes of the implementation of the CO₂Bio 2 project; what is generated outside the regulatory context, will be strictly dealt with by the legal area of each of the parties.

Non-ownership of project stakeholders: The main indicator of project implementation is compliance with REDD+ activities, which are described in the linkage contracts, clarifying annexes and other legal and technical documents; therefore, any failure to comply with the commitments described therein will be dealt with as specified in the contracts. However, another preventive measure is the monitoring of safeguards (social and environmental axis), where it is possible to have an overview of the possible leaks that may occur in the project, which allows exercising greater control in this type of project.

Governance Deficit: We diagnosed all the properties where we will determine the presence of personnel, if they have housing, and if it is in good conditions of habitability and sanitation, we will visit the properties and fill out various forms to see the progress in terms of the different levels of governance that are carried out in each property.

Table 6o. Permanency monitoring plan

NO	Activity	Type of Risk	Risk	INDICATOR	Impact	Probability	Rating (Probability Impact)	Risk Classification		MITIGATION ACTIONS	PROCEDURE
								Value	Level		
1	Fire	PHYSICAL	Loss of forest cover due to fire	# of fires present in the eligible project area.	2	2	4	2	<u>Medium</u>	1. Disposal of biomass that can function as fuel in a fire. 2. Establishment of firewalls 3. Implementation of guardrails 4. Avoid burning in critical summer seasons.	Fire monitoring is carried out with the help of the "Global Forest Watch" platform, which allows us to upload data from the project areas and create alerts for fire detection using VIIRS (Visible Infrared Imaging Radiometer Suite) technology. In addition to satellite monitoring, the impact of the fires was corroborated by field visits.
2	Flooding	PHYSICAL	Substrate and plant material washed away, loss of infrastructure, loss of agricultural crops, loss of crops.	# of unusual flooding reports	2	1	2	1	<u>Low</u>	Do not locate houses near water sources, keep control of the maximum flood levels that occur year after year in the properties.	Constant communication is maintained with the owners; in the event of flooding with major impacts, a report will be made by filling out a form, in order to proceed with the measures to be taken.
3	Preservation agreement	ECONOMIC	The owner fails to comply with its obligations under the contract.	# of Reports of non-compliance recalls	2	2	4	2	<u>Medium</u>	Socialize and agree with the owner on the contract, its scope in time and commitments, sign it and carry out constant	Monitoring of safeguards (social and environmental) and REDD+ activities is carried out in compliance with the contract signed by the landowners.

										follow-up	
4	Social ownership of the project	SOCIAL	That the Cataruben Foundation has no credibility in the project.	# of Complaints about credibility issues	1	2	2	1	Low	Make economic alliances for the development of the project with prestigious organizations with a high level of compliance guarantee.	PCC management procedure
5	Land tenure dispute	SOCIAL	Loss of the property	# of properties with possession or tenure of the land	1	1	1	1	Low	Perform title analysis prior to signing the contract, maintain constant communication with the owner regarding the legal status of the property, update the Certificate of Title and Freedom every 5 years.	The following documents are verified: citizenship card, public deed document, INCODER resolution, the certificate of tradition and freedom, the cadastral certificate and the title study of each property with its contract of connection with the CO2Bio project.
6	Non-ownership of project stakeholders	SOCIAL	If either party fails to fulfill its obligations under the contract.	# of conflicts between the different parties involved	2	2	4	2	Medium	Sign the contract jointly, knowing the limitations, commitments and benefits.	PCC management procedure
7	Indicator monitoring	ECONOMIC	Lack of adequate monitoring personnel	# of non-compliance reports in monitoring.	2	1	2	1	Low	The Cataruben Foundation is staffed by experts in monitoring issues.	PCC management procedure

8	Governance deficit	SOCIAL	Abandonment of the properties, noncompliance with governance activities	# of acknowledgements of forest governance structures	1	1	1	1	Low	Governance actions were implemented on the properties and their constant monitoring.	Follow-up on the indicator of safeguard #4, which establishes the indicators to determine the level of implementation of governance in the properties.
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Source: Cataruben Foundation

34.7. PROJECT EMISSIONS MONITORING

Project emissions are performed periodically according to the monitoring report analysis periods, updating the activity data and emission factors, based on the monitoring of the project limits.

The calculations follow the guidelines of Proclima's REDD+ methodology numeral 14.15.

35. REDD+ MONITORING REPORT (2018-2020)

The following is the monitoring plan designed to evaluate changes in project boundaries, REDD+ activities, REDD+ safeguards, Co-benefits, project permanence and project emissions and SDGs, this last activity is evaluated from the year (2016), the project start date; based on the established methodological guidelines, in order to generate accurate and quality information in the verification process.

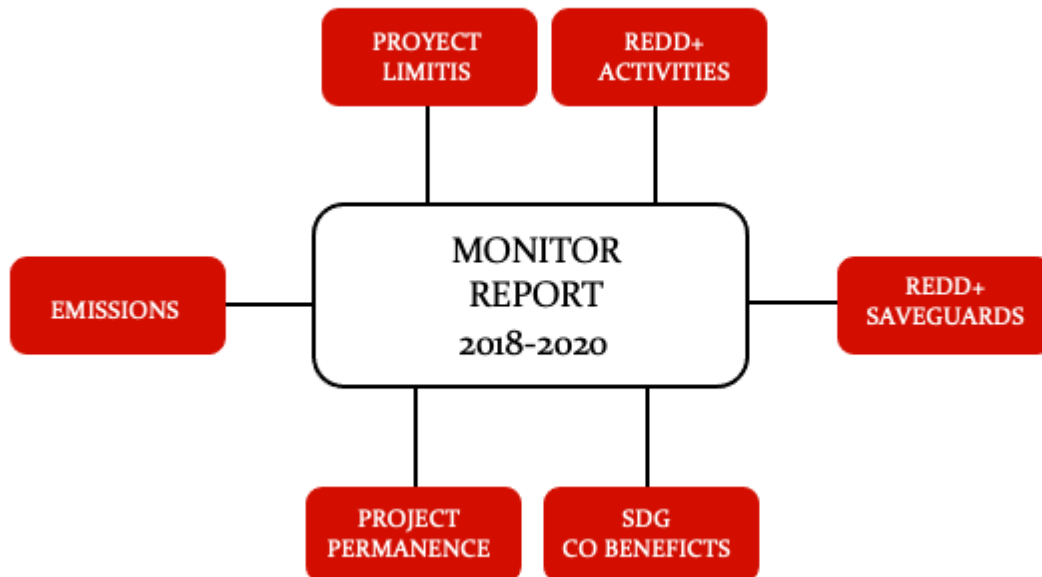


Figure.36 Forest ecosystem monitoring plan, period 2018-2020.

Source: Cataruben Foundation

35.1. PROJECT BOUNDARY MONITORING

35.1.1. Reference region

The boundaries of the reference region remained stable during the monitoring period, thus maintaining its extension of 11,699,109 ha.

35.1.2. Project area

During the monitoring period, no new properties were included in the project, so the project areas remained stable.

35.1.3. Eligible Areas

Eligible areas were updated, taking into account those that remained stable during the monitoring period.

Table 61. Eligible REDD+ areas

Eligibility	Area (ha)	Percentage (%)
Eligible	19,841	15.6%
Not Eligible	107,121	84.4%
Total	126,962	100%

Source: Cataruben Foundation

35.1.4. Leakage area

Leakage area monitoring was conducted under the same eligibility criteria, i.e., forest areas present in a 100 m buffer around the project areas.

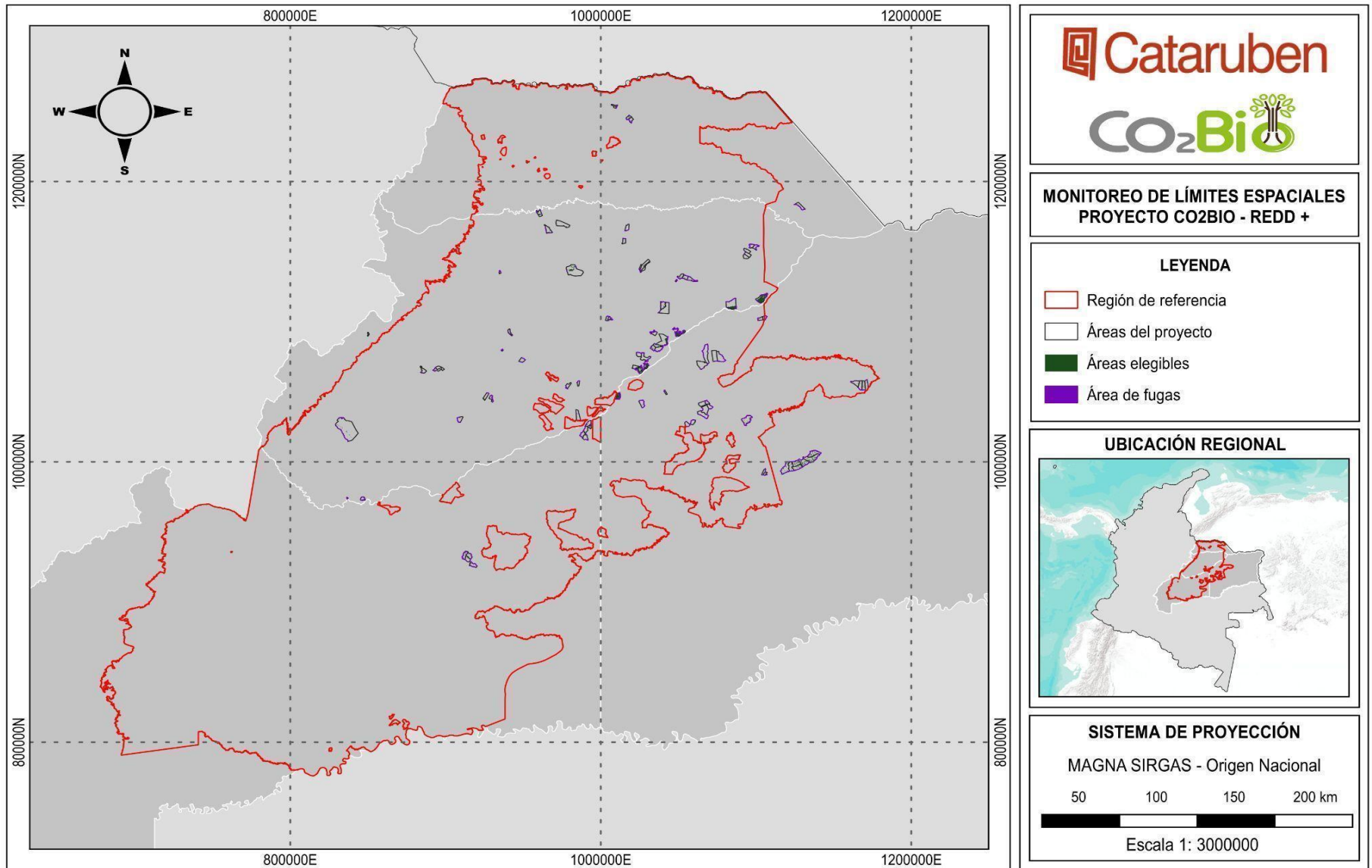


Figure. 37. Project boundary monitoring.

Source: Cataruben Foundation

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35.2. MONITORING OF THE EXECUTION OF REDD+ ACTIVITIES

The progress of activities executed from 2018 to 2020, it can be evidenced that:

For Activity 1. Apply training and support processes through training cycles that strengthen the sustainable management of ecosystems and biodiversity conservation, 547 people were trained in topics related to the objectives and scope of the CO₂BIO project, sustainable management of ecosystems and biodiversity conservation, land planning, among others.

For Activity 2. Consolidate and adapt the principles of governance for the sustainable management of ecosystems, strategic documents were obtained to recognize how governance exercises are being applied so far, and thus be able to generate an action plan to facilitate the strengthening of governance in the properties, having as a product the field logs and socio-environmental surveys.

In Activity 3. Promote forest legality. To date, most deforestation events have been caused by illegal loggers, so strategies have been implemented to increase vigilance in specific areas and prevent logging of forest resources. Thus, the indicator for forest harvesting permits has not yet been implemented because it is not yet required.

Activity 4. Promote delimitation and signaling in strategic ecosystems and natural protection areas: To generate a baseline for delimitation and signaling, two (2) documents specifically function as support. The first are the properties that have already been declared as RNSC and have a management plan or, failing that, other properties that have property planning because they have already carried out a zoning exercise on their properties. Finally, the Ecosystem Signage and Delimitation Manual provides a starting point for signage specifications.

Activity 5. Promote and improve agricultural production, livestock (on existing lands) and tourism, through the implementation of good sustainable practices: The economic characterization of the properties is carried out, including their productive activities, which allows understanding the context of the properties and thus the lines of action that will allow improving production and generally implementing good practices in their activities. The good agricultural, livestock, tourism and other practices developed with great effort by the landowners can be observed through the evidence they provide and describe in [Annex 4.1](#).

Activity 6. Generate alerts of changes due to deforestation, degradation and/or transformation of ecosystems in the project area and its surroundings: It has been essential to monitor forest cover in the properties in order to determine change alerts and to be able to follow up and analyze interactions.

Table 62. REDD+ activities monitoring report

ID	REDD+ ACTIVITIES	ID	Indicator name	Type	Goal	Unit of measure	Monitoring methodology	Frequenc y of monitoring	Responsibl e for measurement	Result reporting period (2018-2020)	Documents to support the information
1	Implement training and accompaniment processes through training cycles that strengthen the sustainable management of ecosystems and biodiversity conservation.	1.1	Number of people trained in the conservation and sustainable management of ecosystems and their biodiversity.	Capacity building in the environmental management of the farms	80	Unit	Application of training or workshops	Annual	Cataruben Foundation	547	List of 2020 trainings (54 people), Attendance at the Biodiversity & Carbon Forum (493 people).
2	Consolidate and adapt governance principles for sustainable ecosystem management.	2.1	Number of properties characterized	Socio-environmental survey of the properties	97	Properties	Characterization of properties by means of property characterization sheets, management plan, beneficiary households, among others.	Annual	Cataruben Foundation	97	Field logs and/or socio-environmental surveys.
		2.2	Number of follow-up reports on the implementation of activities to strengthen governance structures	Strengthening of forest governance structures	1	Document	Under the monitoring of the governance action plan, a report will be generated every 5 years, once the first verification has been carried out.	Every 5 years	Cataruben Foundation	0	Not applicable

3	Promoting forest legality	3.1	Number of forest harvesting permits	Accompaniment in the process of legal forest harvesting on the properties.	1	Document	Monitoring of eligible ecosystem areas for evidence of changes in coverage or at the request of a landowner.	Annual	Cataruben Foundation	0	Not applicable
4	Promote the delimitation and signaling of strategic ecosystems and natural protection areas.	4.1	Number of reports on the process of delimitation and marking of forest areas according to established guidelines.	Forest conservation	1	Unit	Visit to properties and photographic record	Annual	Cataruben Foundation	2	Properties declared RNSC - Property planning form and/or property plans
		4.2	Number of properties with implemented delimitation and signaling activities		97	Properties	Follow-up in the field and through evidence provided by the owners of the execution of activities once the first verification has been carried out.	Every 5 years	Cataruben Foundation	97	Photographs of the activities carried out on the properties and activity report.
5	Promote and improve agricultural production, livestock (on existing land) and tourism, through the implementation of good sustainable practices.	5.1	Number of properties with characterized productive activities	Implementation of sustainable production practices	97	Properties	Socio-productive recognition of the properties by means of a psychosocial and socioeconomic sheet and a survey of beneficiary households.	Annual	Cataruben Foundation	59	Psychosocial-Socioeconomic survey and beneficiary household survey

		5.2	Number of properties with implemented sustainable productive activities		97	Properties	Follow-up of evidence generated in the field or provided by the landowners	Annual	Cataruben Foundation	97	Photographic and other evidence. Monitoring Report 2018-2020/Monitoring of REDD+ Activities/5. Sustainable production and practices/5.2 SUSTAINABLE PRACTICES 2018-2020 (SECONDARY SOURCE).
6	Generate alerts of changes due to deforestation, degradation and/or transformation of ecosystems in the project area and its surroundings.	6.1	Number of properties with satellite analysis to identify changes due to deforestation, degradation and/or transformation of eligible areas.	Preventing deforestation, degradation and/or transformation of ecosystems	97	Properties	Coverage monitoring report	Annual	Cataruben Foundation	97	Calculation document. Annex. Calculations 2018-2020

Source: Cataruben Foundation

Taking into account that REDD+ activities have been with the main objective of reducing the causes of deforestation and forest degradation, below are some actions to highlight that the owners have carried out since 2016:

- To prevent the expansion of the frontier for cattle ranching use

Bearing in mind that the project is developed in a region where livestock activity is representative, the livestock producers initiate a common exercise where they perceive a direct relationship between the natural environment and the productivity and profitability of this economic activity.

Considering the above, strategies are implemented individually on each farm, or some owners form alliances with entities such as the Departmental Cattlemen's Committee or other non-governmental organizations that provide social and technical support to initiate sustainable production activities. Among these strategies, the following can be highlighted:

Table 63. Good practices recommended by the Departmental Livestock Committee.

STRATEGIES	ACTIVITY	SUBACTIVITY
Conserve and protect water resources, forests, fauna and flora, through sustainable use and an implementation plan to improve the environmental management of the properties.	Protect and expand areas of forests and strategic aquifers.	Establishment of nurseries.
		Transplanting and monitoring of seedlings planted.
		Adaptations for water harvesting.
		Establishment of shade in paddocks.
	Ecosystem conservation and protection training	Personalized and group training.
Apply sustainable production practices that generate better farm organization and livestock productivity in a biodiverse environment through an implementation plan that strengthens the productive management of the farms.	Organization of sustainable livestock activity applying GMP.	Elaborate information registers of the properties
		Establish a management plan.
		Establish a rational savanna burning plan to minimize impacts on flora and fauna.
		Training in the preparation of records and management plans.
To value the ancestral knowledge and cultural traditions of the llaneridad as a complementary support to GMP - GAP and food security, through the recognition and use of medicinal plants and technification of the conuco.	Participate in workshops, diploma courses or any other complementary training to improve the techniques adopted by the families.	Participate in the training programmed in the productive and environmental components.
	Technification of conuco	Adequacy of the conuco.

Source: Cataruben Foundation

Detailing this, we can highlight the implementation of sustainable livestock farming in farms such as El Madroño, a great example of activities implemented from 2010-2020, which can be summarized as follows:

- Installation of new electric fences, subdivision of paddocks and isolation of conservation areas.
 - Maintenance and reinforcement of old fences by replacing posts and forest wood with immunized post, metal post and or concrete post.
 - Installation of new drinking troughs and refurbishment of old drinking troughs, and installation of float closures. Rationalization of water resources.
 - Drilling of new water wells only in superficial aquifers.
 - Installation of tower with high water storage tank and conduction to water troughs with float closure.
 - Installation of solar water pumps and two second-hand windmills purchased from a neighbor.
 - Planting of native trees and watering of seeds collected at various sites of interest.
 - Installation of salt shakers in 50 cm high half-basins.
 - Transformation of the corral into a metallic tube with the installation of an electronic scale.
 - Construction of a steel tower to support water in a tank for barnyard collempaques.
 - Construction of warehouse and roof to work area in the corral.
 - Purchase of 5 bulls of Velasquez Colombian synthetic criollo breed.
 - Buy in company 50% Velasquez bull (partner victory).
 - Formation of an access alleyway in reinforced gravel and planting of trees in the same.
 - Construction of a corraleja and a jetty in the "el triángulo" paddock with access to the property.
 - Installation of natural gas and industrial stove. Eliminate the use of firewood.
 - Planting of forests of native species to evaluate their adaptability in an activity carried out with the STA TERESA DE PUNTO NUEVO school of agricultural and livestock baccalaureate students.
 - Elimination of chemical herbicides and ivermectins and incorporation of natural organic products.
 - Orderly collection, sorting and disposal of waste and garbage.
 - Planting of bread and fruit products.
- Sacha inchi pilot and information gathering for pre-feasibility study.
- Installation of two solar plants for electric energy with inverters of 2 kw each and change of lighting to 24 volt LED system, independent of the plant for operation of electric fences.

-Strengthening of boundary fences of direct responsibility with a greater number of electrified electric ropes to encourage cattle rustling, poaching and the movement of cattle to neighboring properties.

-Genetic improvement program in search of more and better adapted cattle to the untamed savannah, more efficient and productive through the inclusion of genes from "tauros" breeds, either native or subjected to natural selection in tropical conditions equivalent and applicable to ours. Note: it has been a total success.

-IATF programs with the initial support of ABS and the participation of professionals such as Antonio Chaparro, Oscar Ivan Correa, Alexander Camargo.

-Expansion and improvement of the loading pen with the possibility of installing a mobile electronic scale.

It is important to mention that not all owners implement the activities at the same pace, they do it according to their economic capacities and the time they can invest in their development, however, farms such as the Puerto Gaitán nucleus (Deva, Aipe, Mirador and Galicia), the Barley 1 farm in Casanare, and farms in the department of Vichada such as the Borinquen nucleus (Villa Lorena), also develop exemplary sustainable cattle raising activities.

2. Expansion of the agricultural frontier: Due to the flat terrain in the project area, it is common to see changes in land use for monoculture of large tracts of land, where landowners lease their land for the implementation of these activities. Another scenario is the low land use planning that in some cases is present in the properties, which influences decision making with low sustainability in forest management.

Consequently, it is important to establish actions that in the first place allow the organization and zoning of the property, which facilitates having a clear picture of the establishment of minor crops, as well as practices that increase their productivity. For this point, training and accompaniment are indispensable in order to potentiate knowledge and perceive results.

An example of these activities are the farms located in the municipality of Arauca, Arauca, such as Patevaco, Pastora la Vieja, Las Mercedes and Altamira, which with the support of the Neotropical Cuencas Foundation, have developed FAMILY ORGANIC FARMS AND COMPOSTING, where environmental education activities have been carried out on the topics of proper solid waste management, composting of organic waste and the importance of applying good agricultural practices, with a view to sustainable production.

In addition to the above, conservation, identification and biodiversity monitoring activities have also gained momentum over the years in most of the farms, where some of them started monitoring felines with Panthera Colombia, others with La Palmita, Centro de Investigación, and others on their own.

A clear example in the monitoring of fauna is the Buenaventura farm, which is carrying out a Predial, Participative Planning and Work Plan, with the Panthera Colombia Organization, whose main objective is to identify and prioritize conservation areas and areas of high vulnerability for cattle and horses, to reduce predation by big cats, in order to contribute to land

use planning. This allows reducing retaliatory hunting and creating regional examples of how big cats can coexist with productive systems.

Other activities include beekeeping, including the BARLEY farm, which is currently developing a study with a particular species of bee, creating a habitat for its special development on the farm.

Likewise, the activity of the TOMO GRANDE property located in the department of Vichada, which is a scientific and research station of riparian forests, and scientific publications have been made on species diversity, forest structure of the region compared to the country and South America, terra firme forest, flooded land forest. Research on the earwig species, primate behavior, and studies of reforestation processes in the savannah have shown that they are not very successful due to soil conditions, soil conditions and susceptibility to fire. Work has been carried out with the communities, environmental education on the Chigüiro, participation in territorial planning and prospecting of Vichada and Tomo Grande as a tourist attraction.

In this last point, ecotourism is also strong in the CO₂Bio 2 project properties, where the Hato Barley property can be highlighted as an attraction that allows observing the llanera tradition, conservation and productivity in the same place. Other properties that stand out in this item are the Buenaventura, Rascador, Santa Cruz and Campo Alegre properties.

Attached to this document is a folder with the evidence, where you can see an excel of forest cover change year 2018 vs 2020, where the main conclusion is the increase of forest areas in the project area.

It is important to mention that the above was the description of specific activities, and everything is supported under the letters of intent to belong to the CO₂Bio 2 project since 2016, and the declaration of the different Civil Society Nature Reserves throughout the process, which are exposed in the descriptive document of the project and the documents attached in C1. support of activities.

35.3. REDD+ SAFEGUARDS MONITORING

The monitoring report was conducted for the years 2018 to 2020 For compliance with safeguards, indicators and progress in their monitoring were determined, as evidenced in the following reporting table.

Table 64. REDD+ Safeguards Monitoring Report

ID Safeguard	ID Indicator	Indicator name	Type	Goal	Unit of Measurement	Monitoring methodology	Frequency of monitoring	Responsible	Indicator result in the reporting period	Documents to support the information
Correspondence with national legislation.	1.1	Percentage of land declared as Civil Society Nature Reserves (CSNR)	Contribute to and be consistent with national objectives	20%	Properties	Obtaining resolutions approving the declaration	Annual	Cataruben Foundation	15%	Resolutions or orders of initiation of RNSC or RESNATUR declaration
Transparency and access to information	2.1	Number of updates and registration in the RENARE platform	Contribute to guaranteeing the right to information.	1	Unit	Recording and updating in the RENARE platform of the activities carried out once the platform is operational.	Annual	Cataruben Foundation	1	Not applicable
Accountability	3.1	Number of Biodiversity and Carbon Forums held	Strengthen transparency in the development of the project.	1	Forums	Forums held where a record of attendees and a report will be taken.	Annual	Cataruben Foundation	1	Photographic evidence and attendance
Recognition of forest governance structures	4.1	Percentage of properties whose governance activities have been characterized.	Identify the degree of implementation of activities that guarantee governance	100%	Properties	Photos, logbooks, personnel contracts, housing on the properties, etc.	Annual	Cataruben Foundation	100%	Photographic record and logs
Capacity building	5.1	Number of people trained	Strengthen technical and legal skills in project-related issues.	59	Unit	Site visits and data collection	Annual	Cataruben Foundation	59	Registration of trained persons

Free, Prior and Informed Consent	NOT APPLICABLE									
Respect for traditional knowledge	7.1	Number of properties with diagnosis of households, tradition of beneficiaries and follow-up on indicators	Integrating traditional knowledge into the implementation of REDD+ activities	59	Properties	Surveys and processing of results	Every 2 years	Cataruben Foundation	59	battery indicators
Profit sharing	8.1	Percentage of properties with higher economic benefits resulting from conservation	Contribute to making the project sustainable for the owners and their families.	100%	Properties	Carbon certificates traded per property	Every 5 years	Cataruben Foundation	0	Not applicable
Territorial rights	9.1	Number of properties characterized and with strengthened land planning	Contribute to guaranteeing the land rights of landowners.	97	Properties	Elaboration and updating of property plans	Every 5 years	Cataruben Foundation	74	Management sheets for each property
Participation	10.1	Number of beneficiaries fully and effectively informed about the project	Ensuring the full and informed participation of owners	97	Unit	Signing of the binding and update contracts by both parties	Every 12 years	Cataruben Foundation	97	Contracts signed by the interested parties

Forest conservation and biodiversity	11.1	Percentage of implementation of the stages of the participatory biodiversity monitoring strategy (%).	Biodiversity conservation	100%	Stages	Follow-up of the execution of the strategy stages, reporting documents	every 2 years	Cataruben Foundation	100%	Safeguards reporting document 11 and 12
Provision of environmental or ecosystemic goods and services	12.1	Number of analyses of ecosystem integrity, structure and composition of the forest	Monitoring the provision of ecosystem services	6	Analyses performed	Remote sensing, attendance lists, photographic registration	Every 5 years	Cataruben Foundation	0,5	
Environmental and territorial planning	13.1	Number of instruments or mechanisms for protected area management strengthened	Contribute to regional environmental management	4	Unit	Relationship between the Regional Environmental Plan, PRICCO, the Regional System of Protected Areas (SIRAP) of the Orinoco and the REDD+ activities of the project.	Annual	Cataruben Foundation	2	RESPA, COTACLIMA
Sector planning	14.1	Number of properties in land legalization process	Contribute to the formalization of land ownership.	97	Properties	Follow-up process	Every 5 years	Cataruben Foundation	97	Analysis of property ownership

Forestry control and monitoring to prevent emissions displacement	15.1	Number of spatial analyses to assess deforestation as a control of emissions leakage	Decrease potential displacement of emissions by displacement of land use change causes and agents.	30	Analyses performed	Spatial analysis and deforestation calculations	Annual	Cataruben Foundation	5	Geodatabase and project calculations
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Source: Cataruben Foundation

35.4. MONITORING OF SUSTAINABLE DEVELOPMENT GOALS - REPORTING

This report corresponds to the period 2016 - 2020, in which the contribution to the Sustainable Development Goals (SDGs) targets was monitored through the implementation of activities and collection of evidence presented in table 65 and the respective annexes.

Table 65. Monitoring Sustainable Development Goals

Target	Objectives goal	Indicators name	Goal	Unit of Measure	Monitoring methodology	Monitoring Frequency	Indicator result (2016 - 2020)	Documents to support the information	Remarks
(13) Climate action	(13.3) Improve education, awareness, and human and institutional capacity for climate change mitigation, adaptation, mitigation, and early warning.	Climate change mitigation trainings	20	Number of trainings conducted	Visits to the farms for training and information gathering	Every 5 years	4	Photographic register and attendance list	Training for beneficiaries, their families, and farm workers, as well as training for the general public on climate change.
(15) Life of terrestrial ecosystems	(15.1) Ensure the conservation, restoration, and sustainable use of terrestrial and inland freshwater ecosystems and the services they provide, in particular forests, wetlands, mountains, and drylands, consistent with obligations under international agreements.	Civil Society Nature Reserves	42	Number of properties declared as Natural Reserves of the Civil Society	Obtaining resolutions approving the declaration	Annual	21	Annex: MONITORING OF SAFEGUARDS - 1.1 Safeguarding: Nature Reserves	The declaration and strengthening of Civil Society Natural Reserves is carried out by the different NGOs present in the Orinoquia region, these activities will be carried out during the time of project development, these properties once declared RNSC must carry out a process of creation and implementation of land or management plans, through which the CO2Bio 2 project will strengthen the objectives of the RNSC.

(5) Gender equality	(5.5) Ensure women's full and effective participation and equal opportunities for leadership at all decision-making levels in political, economic, and public life.	Women's participation	500	Number of women beneficiaries of the project participating in decision making spaces.	Creation of spaces and participation activities about the project with women beneficiaries.	Every 2 years	269	Photographic register and list of attendance and list of beneficiaries	Training for beneficiaries, their families, and farm workers, as well as training for the general public on climate change.
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Source: Cataruben Foundation

To contribute to a goal of the thirteenth objective: **Climate action**, the project carried out training and monitoring processes with landowners to strengthen sustainable forest management, as well as training on climate change. The procedure for the evaluation of this goal was the monitoring of attendance records for training and conservation activities.

For the contribution to the goal of the fifteenth objective: **Life of terrestrial ecosystems**, project participants contributed to the declaration of Natural Reserves of Civil Society (RNSC), so far 21 properties have been declared, thus contributing to the protection and sustainable use of ecosystems and the ecosystem services they provide. This is monitored through the issuance of CSER resolutions and the preparation or updating of management plans or property plans.

The project contributes to a target of the fifth SDG: **Gender equity, through** the creation of meeting spaces with the landowners and women members of the families, as well as the participation of other women interested in this project in the Biodiversity and Carbon forum. This goal was evaluated by monitoring the participation of landowners and other women beneficiaries and external project participants in training sessions generated by the project and the baseline evaluation of social conditions.

35.5. PERMANENCE MONITORING

For the monitoring period from 2018 to 2020, the possible activities that generate a risk of permanence for the project were followed up, evidencing the following results:

Table 66. REDD+ Risk Identification and Management Matrix

N O.	Activity	Type of Risk	Risk	Indicator	Risk Classification		PROCEDURE	FOREST	
					Value	Level		Monitoring results 2018 - 2020	Remarks
1	Fire	PHYSICAL	Loss of forest or wetland ecosystem due to fire	# of fires present in the eligible project area.	2	Medium	Fire monitoring is carried out with the help of the "Global Forest Watch" platform, which allows us to upload data from the project areas and create alerts for fire detection using VIIRS (Visible Infrared Imaging Radiometer Suite) technology. In addition to satellite monitoring, the impact of the fires was corroborated by field visits.	0	During the analysis period, there were no fires in the eligible project areas or in the leakage areas.
2	Flooding	PHYSICAL	Substrate and plant material washed away, loss of life, infrastructure, and agricultural crops	# of unusual flooding reports	1	Low	Constant communication is maintained with the owners; in the event of flooding with major impacts, a report will be made by filling out a form, in order to proceed with the measures to be taken.	0	During the analysis period, no unusual flooding occurred in the eligible project areas or in the leakage areas.
3	Conservation agreement	ECONOMIC	The owner fails to comply with its obligations under the contract.	# of Reports of non-compliance recalls	2	Medium	Conservation activities are monitored in compliance with the stipulations of the contract signed by the landowners.	0	During the period under analysis, there were no calls for attention or reports of non-compliance with conservation activities.

4	Social ownership of the project	SOCIAL	That the Cataruben Foundation has no credibility in the project.	# of people reached through social networks and events promoted by the Foundation.	1	Low	The following documents are verified: citizenship card, public deed document, INCODER resolution, the certificate of tradition and freedom, the cadastral certificate and the title study of each property with its contract of connection with the CO ₂ Bio 2 project.	493	During the monitoring site, CATARUBEN promoted the development of the first biodiversity and carbon forum, involving landowners and the community in general, thus strengthening the importance of these initiatives at regional and national level. In addition, it generated a presence in social networks to report on the project's impact results.
5	Land tenure dispute	SOCIAL	Loss of the property	# of properties with possession or tenure of the land	1	Low	The following documents are verified: citizenship card, public deed document, INCODER resolution, the certificate of tradition and freedom, the cadastral certificate and the title study of each property with its contract of connection with the CO ₂ Bio 2 project.	97	A title analysis was carried out for the 97 properties that are part of the CO ₂ Bio 2 project using the REDD+ methodology.
6	Non-ownership of project stakeholders	SOCIAL	If either party fails to fulfill its obligations under the contract.	# of conflicts between the different parties involved	2	Medium	PCC management procedure	0	During the analysis period, there were no conflicts between the project proponents.

7	Indicator monitoring	ECONOMIC	Lack of adequate monitoring personnel	# of non-compliance reports in monitoring.	1	Low	PCC management procedure	o	The cataruben foundation guarantees the professionalism, quality and good management of the data and the professionals involved in the project.
8	Governance deficit	SOCIAL	Abandonment of the properties, noncompliance with governance activities	# of acknowledgements of forest governance structures	1	Low	Follow-up on the indicator of safeguard #4, which establishes the indicators to determine the level of implementation of governance in the properties.	o	The respective monitoring of the safeguards has been carried out, without identifying a possible risk of noncompliance by any of the parties.

Source: Cataruben Foundation

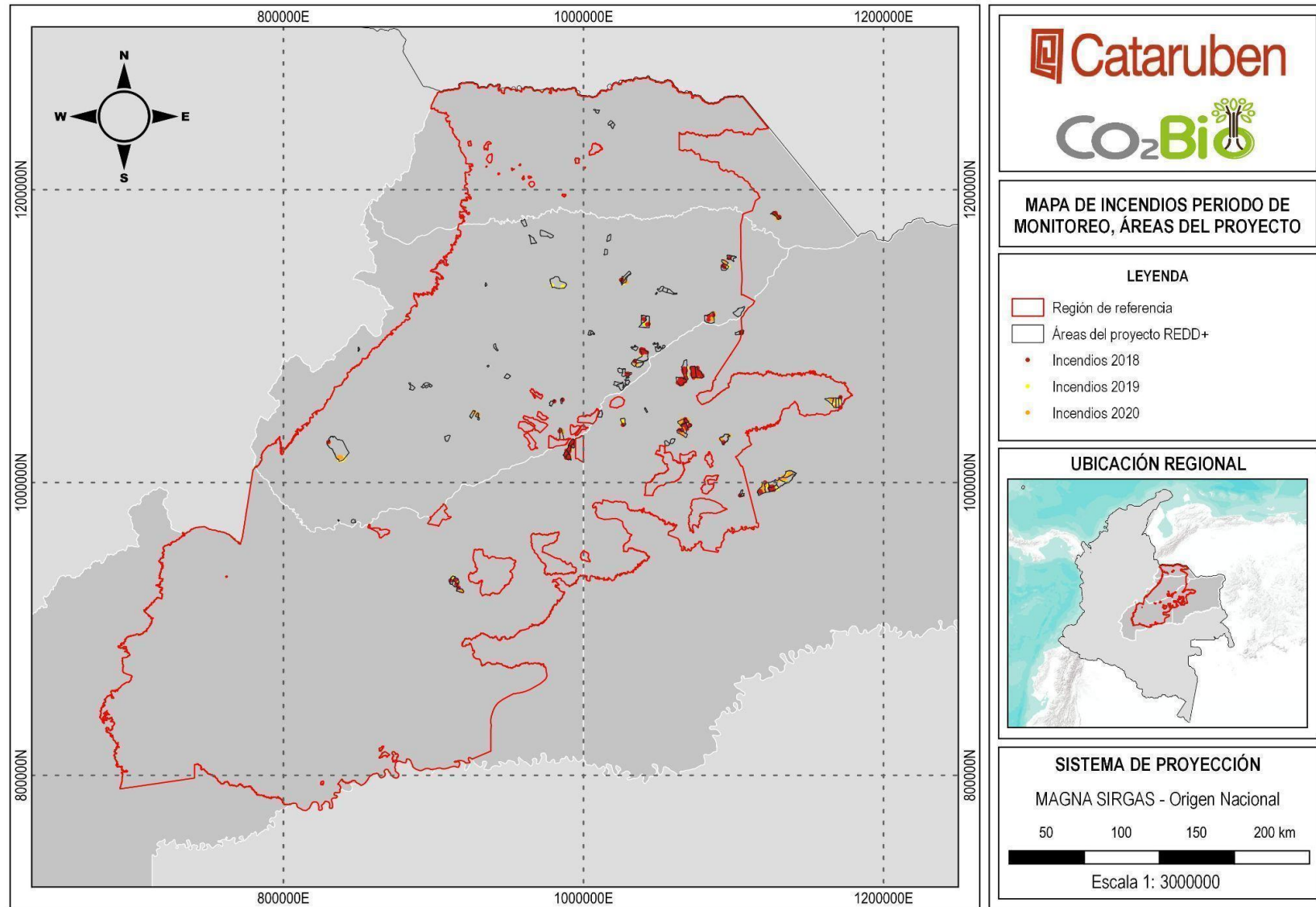


Figure.38 Fire map

Source: Cataruben Foundation

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35.6. PROJECT EMISSIONS MONITORING

Phase 1 of the project presents results of monitoring emissions from deforestation and degradation in the analysis period 2018-2020. Calculations were performed following the REDD+ methodology guidelines,

Table 67 summarizes the project's emissions for the current analysis period, a total of 521,619.2/CO₂e of avoided emissions from deforestation and degradation.

Table 67. REDD+ Project Emissions Monitoring

EMISSIONS REDUCTION MONITORING PERIOD 2018- 2020			
YEAR	REDEF,REDD+proj (tCO₂e)	REDEG,REDD+proj (tCO₂e)	RE Total year
2.018	134.982,0	33.333,5	168.315,5
2.019	146.509,9	28.146,5	174.656,4
2.020	155.209,8	23.437,5	178.647,3
Totals	436.701,7	84.917,5	521.619,2

Source: Cataruben Foundation

Step-by-step calculations can be reviewed in Annex 3.2.3 Emissions: [2. Emissions REDD+ P2 v2> 4. R_Monitoring_2020](#)

CHAPTER 4. PROJECT GHG REDUCTION AND/OR REMOVALS

In the fourth section, the results obtained from the first monitoring (2018-2020) for the eligible areas for the Forest ecosystem, in terms of CO₂ emission reductions and compliance with REDD+ activities are related. As well as the results of the first monitoring (2016-2020) for the wetland ecosystem, in terms of CO₂ emission reductions and removals and compliance with conservation and mitigation activities.

Table 68. Summary of project reductions and removals for Wetland and REDD+ areas.

EMISSIONS REDUCTION MONITORING PERIOD 2016- 2020				
YEAR	Wetlands	REDEF,REDD+proj (tCO₂e)	REDEG,REDD+proj (tCO₂e)	RE Total year
2.016	82.238,2			82.238,2
2.017	123.045,7			123.045,7
2.018	122.735,3	134.982,0	33.333,5	291.050,8
2.019	122.425,9	146.509,9	28.146,5	297.082,3
2.020	122.117,6	155.209,8	23.437,5	300.764,8
Totals	572.562,6	436.701,7	84.917,5	1.094.181,8

Source: Cataruben Foundation