MONITORING REPORT

CO2Bio PROYECTO 2

Document prepared by Fundación Cataruben

Date of Issue (Version 1.3. 02/07/2025)

Monitoring Report template (Version 3.4)[1]	
Name of project	*CO2Bio Proyecto 2*
BCR Project ID	*PCR-CO-635-141-002*
Registration date of the project activity	*13/01/2022*
Project holder	*Fundación Cataruben*
Contact	***María Fernanda Wilches*** *General Manager* ***Jose Luis Rodriguez*** *SuperLeader of Carbon Projects* ***Daniel Eduardo Ospina*** *Project Leader* *co2bio@cataruben.org* *www.cataruben.org* *Tel. 3204690315 / 3203108839* *Carrera 20 # 36 - 04 Yopal - Casanare*
Version number of the Project Document applicable to this monitoring report	*Version 2.2* *(02/07/2025)*

[1]

Monitoring Report template (Version 3.4)[1]	
Applied Methodology	*Methodological Document AFOLU Sector / BCR0002 Quantification of GHG Emission Reductions from REDD+ Projects. Version 3.1. September 15, 2022.* *Methodological Document AFOLU Sector / BCR0004 Quantification of GHG Emissions Reduction and Removals - Activities that prevent land use change in inland wetlands. Version 2.0 23 June 2022.*
Project Location (Country, Region, City)	*Colombia, Orinoco region:* *Department of Arauca: Arauca, Cravo Norte.* *Department of Casanare: Hato Corozal, Maní, Paz de Ariporo, Orocué, Pore, San Luis de Palenque, Tauramena, Trinidad and Yopal.* *Department of Meta: Puerto Gaitan.* *Department of Vichada: Cumaribo, La Primavera, Puerto Carreño and Santa Rosalía.*
Project starting date	*06/05/2016*
Quantification period of GHG reductions/removals	*06/05/2016 - 05/05/2046* *Forests: 01/01/2018 to 05/05/2046* *Wetlands: 06/05/2016 to 05/05/2046*
Monitoring period number	*Third monitoring period*
Monitoring period	*Forests: 01/01/2022 to 12/31/2023* *Wetlands: 01/01/2023 to 12/31/2023*
Amount of emission reductions or removals achieved by the project in this monitoring period	507.429tCO2e

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Contribution to the Sustainable Development Goals	*SDG 5: Gender Equality* *SDG 6: Clean Water and Sanitation* *SDG 13: Climate Action* *SDG 15: Life of Terrestrial Ecosystems*
Special category, related to co-benefits	*Orchid*

Table of Contents

1. General description of the project.

CO2Bio Proyecto 2 is a climate change mitigation project being developed in Orinoquia in the departments of Arauca, Casanare, Meta and Vichada in Colombia. The project seeks to reduce greenhouse gas emissions caused by deforestation, forest degradation and land use change in the wetland ecosystem.

The project is led by the Fundación Cataruben and the landowners. Cataruben as the organization responsible for the project is in charge of leading the monitoring, reporting and verification management procedures, as well as ensuring the commercialization of carbon credits. While the landowners execute the necessary activities within their properties.

The main causes of deforestation, forest degradation, and land use change in the region are the expansion of the agricultural frontier and forest fires. The project implements forest conservation activities and promotes the sustainable use of forests and wetlands to reduce pressure on these ecosystems.

The project includes environmental and social co-benefits, thus certifying benefits in the Orchid category of the BCR standard. The project activities also contribute to Sustainable Development Goals 5, 6, 13 and 15.

This project achieved a reduction of 507.429 tons of greenhouse gases during the period from 2022 to 2023. To ensure the management of emission reductions, the methodological guidelines detailed in BCR Standard version 3.4, which establishes the principles and requirements applicable to the project, are implemented.

1.1. Sectoral scope and type of project

The Project is eligible under the scope of the BCR Standard by meeting one or more of the following conditions listed in Table 1.

Table 1. Scope of the standard.

The scope of the BCR Standard is limited to:	
The following greenhouse gases, included in the Kyoto Protocol: Carbon Dioxide (CO2), Methane (CH4) and Nitrous Oxide (N2O).	**X**
GHG projects using a methodology developed or approved by BioCarbon Registry, applicable to GHG removal activities and REDD+ activities (AFOLU Sector).	**X**
Quantifiable GHG emission reductions and/or removals generated by the implementation of	**X**

The scope of the BCR Standard is limited to:	
GHG removal activities and/or REDD+ activities (AFOLU Sector).	
GHG projects using a methodology developed or approved by BioCarbon Registry, applicable to activities in the energy, transportation and waste sectors.	
Quantifiable GHG emission reductions generated by the implementation of activities in the energy, transportation and waste sectors.	

Source: BioCarbon Registry, 2024.

1.1.1 Type of project

The Project is classified in the AFOLU sector, which includes GHG emission reduction activities through REDD+ activities.

1.2. Project start date

The start date of the Project is May 6, 2016.

For the Wetlands ecosystem since May 06, 2016 and for the Forests ecosystem since January 01, 2018.

The letters of intent for each property, specifying the project's start date, are available in The legal information of each property, including the letters of intent, can be found in: 2. Anexos / 1. Carbon Ownership.

1.3. Project quantification period

Start date: May 06, 2016.

Completion date: May 05, 2046.

Total years: 30 years

Table 2. Project verifications.

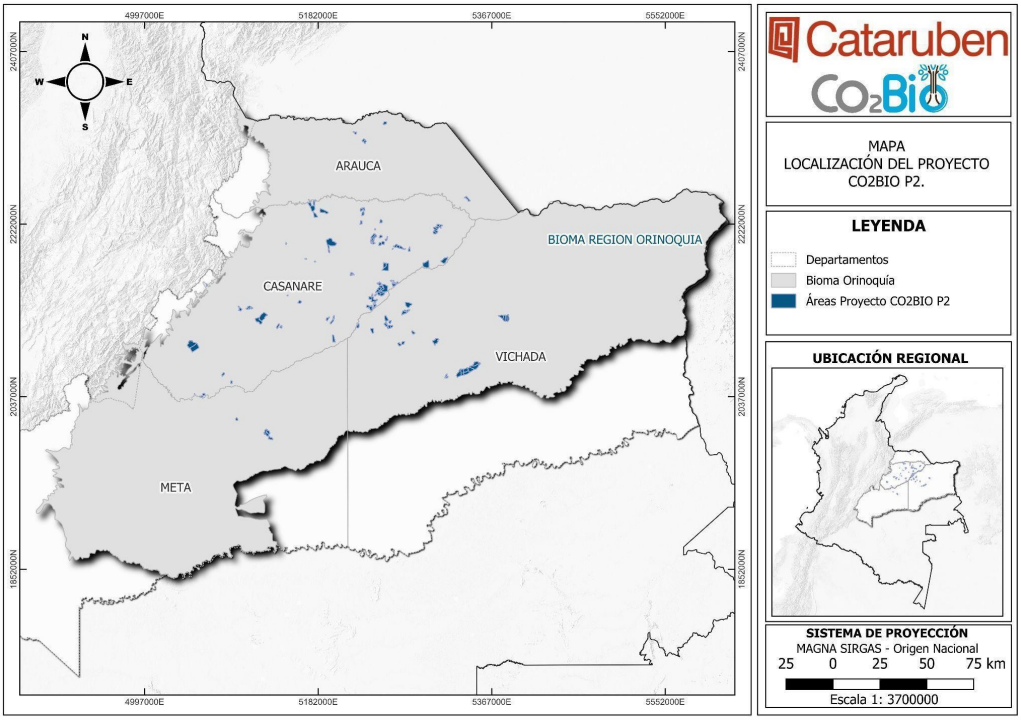
Verification	*Monitoring period*	
Verification 1	*2016 - 2020 Wetlands*	*2018 - 2020 Forests*
Verification 2	*2021 - 2022 Wetlands*	*2021 Forests*
Verification 3	*2023 Wetlands*	*2022 - 2023 Forests*

1.4. Project location and project boundaries.

The project is located in eastern Colombia in the Orinoquia biome, especially in the departments of **Arauca, Casanare, Meta and Vichada**, where ecosystems such as **flooded savannas and morichal forests** are found, characterized by their abundant biodiversity and their role in water regulation.

Floodplains, which cover large tracts of land, are ecosystems that experience seasonal flooding and play an essential role in water regulation. These ecosystems act as natural sponges that retain water during the rainy season and slowly release it during the dry season, which helps maintain river flows and sustain other bodies of water in the region (Humboldt, 2021). Morichales, characterized by the presence of the moriche palm (Mauritia flexuosa), provide habitats for many endemic species and act as refuge areas for fauna during dry seasons.

Image 1. Project location map



Source: Cartographic (IGAC)
Prepared by: Fundación Cataruben, 2023.

Below are the 124 enrolled properties of private landowners participating in the project, listed by department, municipality, vereda and property. In addition, the geographic

information can be found in the following folders: REDD cartographic information (see folder: 2. Annexes / 8. REDD / 8.1.1. Geodatabase_REDD+ / REDD_CO2BIO_P2 V3.gdb), cartographic information Wetlands (2. Annexes / 8. Geospatial / 8.2. Wetlands / 8.2.1. Geodatabase_Wetlands / WETLANDS_CO2BIO_P2 V3.gdb), Information Predios enrolled verification 3 (2. Annexes / 8. Geospatial / 8.1. REDD / 8.1.1. Geodatabase_REDD+ / Project Areas).

Table 3. Location of the properties enrolled in the project

DEPARTMENT	MUNICIPALITY	PROPERTY	LATITUDE	LENGTH
ARAUCA	ARAUCA	ALTAMIRA	06° 52' 33.71" N	070° 59' 44.85" W
		LAS MERCEDES	06° 57' 59.24" N	070° 42' 29.64" W
		PASTORA VIEJA	06° 46' 51.9" N	070° 54' 5.3" W
		PATEVACO	06° 48' 11.62" N	070° 54' 54.31" W
	NORTHERN CRAVO	POTOSI	06° 13' 10.9" N	069° 54' 59.32" W
Casanare	HATO COROZAL	CANTACLARO	06° 04' 6.92" N	071° 23' 3.21" W
		CUATRO VIENTOS	06° 08' 8.29" N	070° 55' 8.89" W
		EL CRISTAL	06° 11' 11.9" N	071° 23' 34.45" W
		LLANO LINDO	06° 07' 40.19" N	070° 56' 18.77" W
		NOME NOME	06° 10' 39.13" N	071° 26' 4.39" W
		PALMA RALAS	06° 07' 39.44" N	071° 24' 27.29" W
		SANTA TRINIDAD	06° 06' 24.82" N	071° 18' 12.87" W
		FLOR AMARILLO	06° 05' 9.74" N	070° 55' 25.36" W
	MANI	BRAMADEROS	04° 27' 30.41" N	072° 11' 36.49" W
		MIRALINDO	04° 31' 49.13" N	072° 16' 21.74" W
	OROCUE	GUADALUPE	04° 59' 33.86" N	071° 44' 41.9" W
		GUADALUPE2	04° 59' 47.84" N	071° 42' 55.09" W
		GUAFITAS 1	05° 02' 17.68" N	071° 55' 49.39" W
		LOTE 5 HATO LA PALMITA	04° 51' 34.21" N	071° 12' 37.62" W
		SAN FELIPE 1	05° 04' 0.52" N	071° 53' 25.19" W
	ARIPORO PEACE	AGUALUNA	05° 56' 18.05" N	070° 13' 35.3" W
		BARAKI	06° 00' 51.06" N	070° 45' 0.26" W
		CANAGUAY	05° 30' 26.6" N	071° 01' 34.11" W
		CANARIAS	05° 43' 34.78" N	071° 15' 15.32" W

		LOS CAÑOFISTOL	05° 45' 24.34" N	070° 38' 19.1" W
		COROCORA LOTE 3	05° 48' 31.29" N	071° 39' 51.64" W
		COROCORO	05° 47' 44.02" N	070° 45' 36.48" W
		EL ALCORNOCO	05° 57' 9.92" N	070° 12' 33.6" W
		EL CANARIO	05° 44' 20.91" N	070° 28' 45.64" W
		EL EDEN	05° 54' 49.61" N	070° 13' 19.85" W
		EL SALVADOR	05° 50' 29.23" N	070° 41' 52.03" W
		LA GAITANA UNO	05° 45' 35.87" N	070° 33' 22.38" W
		LA GAITANA DOS	05° 46' 8.28" N	070° 35' 7.72" W
		LA GAITANA TRES	05° 46' 30.35" N	070° 36' 39.65" W
		HATO SINAI	05° 47' 38.68" N	071° 14' 1.36" W
		LA ILUSION	05° 38' 11.85" N	071° 23' 13.82" W
		LA VICTORIA	05° 48' 36.05" N	070° 49' 21.67" W
		LA VIGIA	05° 54' 20.7" N	070° 14' 3.79" W
		LAS BRISAS	05° 45' 31.59" N	070° 31' 33.41" W
		PENJAMO I	05° 58' 25.39" N	070° 12' 0.15" W
		PLAYA BLANCA	05° 57' 34.86" N	070° 10' 39.63" W
		SAN ANDRES	05° 39' 50.21" N	071° 28' 33.05" W
		SAN PABLO	05° 34' 44.2" N	070° 18' 59.55" W
		SINALOA	05° 48' 56.07" N	070° 49' 53.52" W
		TORAIBA	05° 37' 7.85" N	070° 08' 29.2" W
		VILLA ESPERANZA	05° 30' 19.48" N	071° 02' 25.92" W
		CHAVIRIPA	05° 33' 8.85" N	070° 42' 4.49" W
		EL RUBI	05° 34' 22.84" N	070° 43' 0.09" W
		ENMANUEL	05° 48' 17.34" N	070° 43' 54.57" W
		CURIMAGUA	05° 52' 14.02" N	070° 45' 13.19" W
		LA ESPERANZA	05° 56' 54.34" N	070° 48' 26.91" W
		LA ESTACION	06° 00' 5.24" N	070° 56' 30.89" W
		GUAYANAS	05° 50' 5.65" N	070° 50' 45.78" W
		PLANETA RICA	05° 49' 26.9" N	070° 49' 23.27" W
		LEJANIAS	05° 51' 57.65" N	070° 49' 32.43" W
		ISRAEL	05° 49' 1.24" N	070° 49' 27.19" W
	SAN LUIS DE PALENQUE	ALBANIA	05° 11' 26.98" N	072° 01' 15.2" W
		EL DIAMANTE	05° 05' 1.41" N	071° 12' 28.21" W

		PALMITAS	05° 10' 43.22" N	072° 01' 10.49" W
		RNSC RANCHO NUEVO	05° 14' 15.17" N	071° 32' 5.26" W
		RNSC MATURI	05° 02' 12.12" N	071° 13' 30.85" W
		EL TAUTACO	05° 18' 32.41" N	071° 39' 2.77" W
		VILLA HERMOSA	05° 04' 1.91" N	071° 16' 2.57" W
	TAURAMENA	LA PERLA	04° 19' 40.76" N	072° 28' 45.63" W
		SAN FELIX	04° 20' 43.97" N	072° 27' 31.27" W
		VILLANUEVA	04° 21' 17.99" N	072° 32' 53.47" W
		BARLEY 2	04° 48' 20.27" N	072° 34' 46.99" W
		BARLEY 1	04° 45' 54.49" N	072° 32' 47.89" W
	TRINIDAD	EL BORAL	05° 18' 24.98" N	070° 43' 18.23" W
		BUENAVENTURA	05° 18' 41.09" N	070° 46' 23.43" W
		EL CAMPIN 2	05° 24' 0.36" N	070° 37' 27.64" W
		EL PELIGRO	05° 16' 30.55" N	070° 51' 22.24" W
		EL RETIRO	05° 11' 41.44" N	070° 52' 34.01" W
		LA CAMPECHANA	05° 18' 31.09" N	070° 48' 20.79" W
		LA CIEGA, LOS CARACOLES	05° 09' 54.25" N	070° 51' 8.18" W
		LA PALMITA	05° 24' 31.8" N	071° 36' 22.9" W
		MACARENA	05° 24' 35.03" N	070° 46' 4.42" W
		PADROTE 4	05° 10' 40.43" N	070° 49' 39.07" W
		RNSC QUINTO PATIO	05° 20' 2.54" N	070° 44' 55.06" W
		RNSC ALGARROBO	05° 21' 13.69" N	070° 44' 36.52" W
		RNSC BETANIA	05° 22' 46.59" N	070° 45' 8.57" W
		RNSC LAGUNAZO	05° 20' 19.37" N	070° 47' 10.96" W
		RNSC LOS MATAPALO	05° 21' 33.02" N	070° 46' 6.23" W
		RNSC VALLEDUPAR 1 Y 2	05° 17' 52.61" N	070° 50' 20.42" W
		VILLA RICA LOTE 13	05° 14' 54.11" N	070° 49' 24.65" W
		VILLA RICA LOTE 8	05° 14' 22.83" N	070° 48' 41.6" W
		LA MONTAÑA	05° 11' 56.11" N	070° 48' 50.61" W
	YOPAL	RNSC EL MADROÑO	05° 09' 58.11" N	072° 06' 34.72" W
		PARATEBUENO	05° 24' 16.86" N	072° 25' 43.85" W
META	PORT GAITAN	AIPE	03° 58' 3.27" N	071° 50' 26.18" W

		EL MIRADOR	03° 57' 1.04" N	071° 51' 0.58" W
		GALICIA	03° 57' 58.9" N	071° 51' 57.87" W
		DEVA	03° 54' 53.54" N	071° 49' 6.35" W
		EL SIARE 2	04° 06' 14.09" N	072° 08' 31.76" W
VICHADA	CUMARIBO	BERLIN	04° 30' 56.57" N	070° 00' 18.2" W
		LA CHIGUAGUA	04° 33' 46.07" N	069° 53' 49.5" W
		LA AMISTAD	04° 32' 2.72" N	069° 58' 29.33" W
		LA ESPERANZA LFAB	04° 33' 48.88" N	069° 56' 32.4" W
		LAS PALMERAS	04° 30' 31.96" N	070° 07' 20.83" W
		LA REFORMA	04° 32' 17.14" N	069° 56' 10.45" W
		VILLA CASTIN	04° 30' 35.12" N	070° 07' 52.89" W
		YARITAGUA	04° 37' 30.79" N	069° 50' 30.95" W
	SPRING	EL SILENCIO	05° 11' 32.58" N	070° 29' 30.26" W
		EL TURPIAL	05° 08' 31.8" N	070° 30' 59.53" W
		EL TURPIAL 2	05° 08' 36.91" N	070° 29' 43.46" W
		EL VAIVEN	04° 59' 52.72" N	070° 39' 9.83" W
		LA COMARCA	05° 00' 38.21" N	070° 42' 27.3" W
		LA ESPERANZA VALLEORIENTE	05° 03' 2.72" N	069° 32' 4.21" W
		LA PISCINA	05° 07' 18.91" N	070° 32' 2.14" W
		LAS COROCORAS	05° 03' 28.87" N	069° 34' 8.91" W
		LECHE MIEL	05° 04' 25.1" N	069° 35' 41.0" W
		LOS ALCARABANES	05° 03' 22.93" N	069° 33' 4.18" W
		MANAV KENDRA	04° 49' 24.69" N	070° 34' 39.85" W
	PORT CARREÑO	LAS CARMELITAS	04° 35' 23.52" N	069° 51' 12.21" W
		YOPITOS	04° 56' 15.21" N	070° 26' 42.42" W
	SANTA ROSALIA	EL BORINQUEN	05° 03' 51.31" N	070° 42' 14.9" W
		EL CARIBE	04° 59' 25.65" N	070° 40' 22.4" W
		LA VIRTUD	05° 02' 19.63" N	070° 40' 1.55" W
		LOS AZULEJOS	04° 59' 17.74" N	070° 41' 15.68" W
		EL RUBI	04° 56' 42.71" N	070° 50' 17.38" W
		LA BENDICION	04° 59' 59.08" N	070° 58' 32.22" W
		LA CASCADA	04° 50' 9.32" N	070° 32' 33.5" W
		LOS MERECURES	05° 01' 41.2" N	070° 42' 4.76" W

		TOMO GRANDE	04° 49' 42.96" N	070° 13' 46.72" W

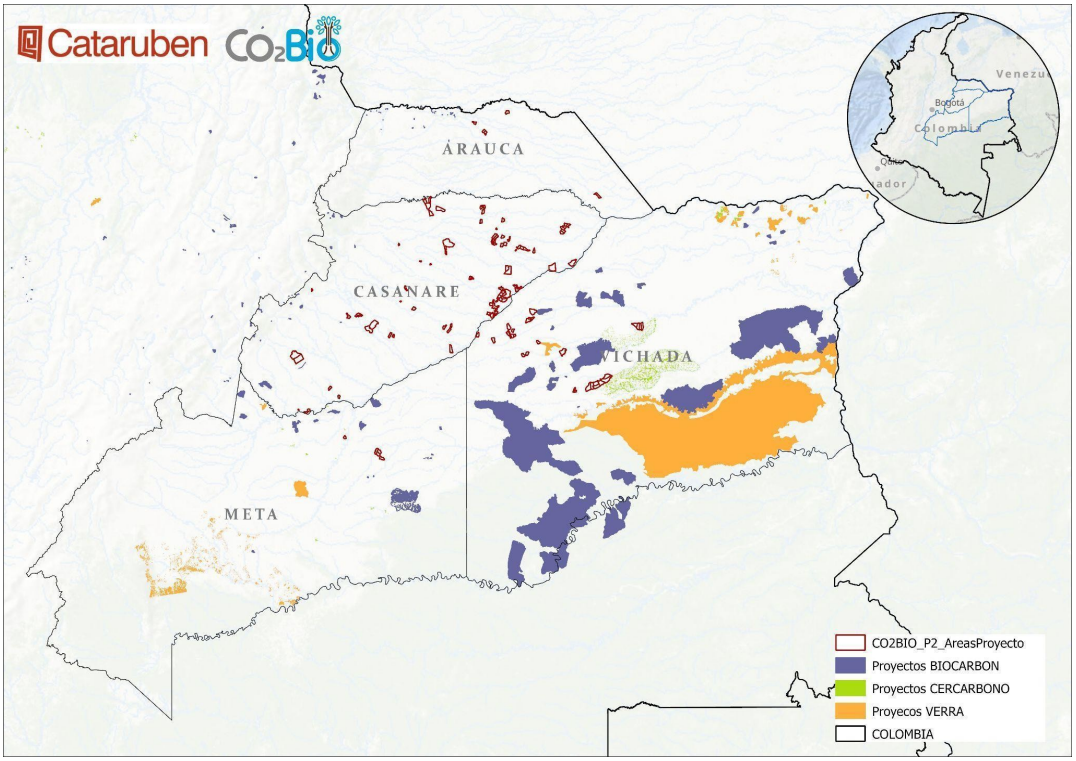
Source: *Fundación Cataruben, 2024.*

1.4.1 Area of influence of other projects in the area

In order to avoid double counting, the project holder performs spatial analysis actions to verify that the geographic boundaries associated with CO2Bio P2 do not overlap with other carbon projects. To perform this verification, vector information (Vector Data Projects) is downloaded from the official pages of the following Carbon Standards (Biocarbon Registry, Colcx, Cercarbon and VERRA), where nine (9) projects are located in the areas of influence (see folder: 2. Annexes / 8. Carbon Projects / 8.3.3. Projects Database). These data are integrated into a Geographic Information System (see folder: 2. Annexes / 8. Geospatial / 8.3. Geographic Information), in order to confirm conclusively that the areas enrolled in CO2Bio P2, do NOT overlap with other Carbon projects (see folder: 2. Annexes / 8. Carbon Projects / 8.3.2. Package).

Image 2 shows the spatial location of the carbon projects of the different standards as well as the geographical limits of the CO2Bio project areas (red color).

Image 2. Carbon projects in the CO2BIO P2 project areas.



Source: *Fundación Cataruben, 2023*

1.5. Summary description of project implementation status of the project

For the 2022 - 2023 monitoring period, project activities are under implementation. In section *13 Project Implementation,* the implementation status of the project activities is presented in detail. Below is a general description of the degree of implementation of each activity.

Table 4. Summary description of the implementation status of project activities.

ID	Description of the activity	Implementation dates	General progress of the activity
G1	Capacity building for men and women enrolled in the project, in the following components: technical-environmental, social and administrative-financial, in order to strengthen decision making in favor of the project's objectives.	The activity is currently under implementation. The operation of this activity began on May 06, 2016, with the construction of the capacity building plan.	G1.1: 26% G1.2: 60%
G2	Implementation of the territorial governance strategy for participatory decision-making on the sustainable management of strategic ecosystems.	The progress status of the activity is in execution. The strengthening of governance structures in the territory began on May 6, 2016.	G2.1: 30%
G3	Continuous monitoring of changes in forest area as a proportion of total area in project areas.	The activity is under implementation. The start date of the activity is May 06, 2016.	G3.1: 21,42 %
G4	Monitor environmental threats (fire) in the project area and/or possible management alerts.	The activity is under implementation. The start date of the activity is May 06, 2016.	G4.1: 21,42 %
G5	Promote the implementation of sustainable productive actions and practices at the farm and local levels to maintain carbon stocks and conserve biodiversity in strategic ecosystems.	The activity is currently under implementation. Implementation of the Activity commenced on May 6, 2016. Sustainable management practices implemented on the farms are reported for each monitoring period.	G5.1: 34,3%
B1	Participatory biodiversity monitoring	The activity is under implementation. Participatory monitoring will begin in 2016.	B1. 21,42 %

ID	Description of the activity	Implementation dates	General progress of the activity
B2	HCV monitoring	The activity is under implementation. As of 2016, the analysis of HCVs associated with the biodiversity component is being carried out.	B1.1: 21,42%
A1	Water Management Program	The activity is under implementation. The water management diagnosis will begin in 2021.	A1.1: 20%

For the period 01/01/2022 - 12/31/2023 for the forest ecosystem 385,989 tCO_2e reduced by avoiding deforestation and forest degradation and for the period 01/01/2023 - 12/31/2023 for the wetland ecosystem, 89,863 tCO_2e by avoiding changes in land use in wetlands. For a total of 511,640 tCO_2 e reduced in this monitoring period.

2. Title, reference and version of the baseline and follow-up methodology applied to the project

The project is based on the Biocarbon Registry voluntary standard version 3.4 of June 28, 2024 and its methodologies described below:

- Methodological document AFOLU sector BCR0002 Quantification of GHG Emission Reductions from REDD+ Projects. *Version 3.1. September 15, 2022.*
- Methodological Document Sector AFOLU / BCR0004 Quantification of GHG Emission Reductions and Removals - Activities that avoid land use change in inland wetlands. Version 2.0 23 June 2022.

In addition, the following tools provided by the BCR standard were used:

- Biodiversity toolbox for inland wetlands. Version 1.0 October 27, 2021.
- Tool to demonstrate compliance with REDD+ safeguards. Version 1.1 January 26, 2023.
- BCR Tool Monitoring, Reporting and Verification (MRV). Version 1.0 February 13, 2023.
- Sustainable Development Goals (SDGs) Tool Version 1.0, June 27, 2023.

- BCR Tool Avoiding Double Counting (ADC). Version 2.0, February 07, 2024.
- BCR Guidelines Baseline and Additionality. Version 1.3 March 01, 2024.
- BCR Permanence Risk Management Tool. Version 1.1 of March 19, 2024.
- Sustainable Development Safeguards Tool SDGs. Version 1.1 July 4, 2024.

3. Double Counting and Participation under Other GHG Programs.

The project has not been enrolled or registered in another GHG program. A review in other programs of GEI was done. See section 1.4.1.

4. Contribution to the Sustainable Development Goals (SDGs)

During the 2022-2023 monitoring period, CO2Bio Proyecto 2 implemented several activities such as capacity building, design of the governance strategy, monitoring of the forest area, monitoring of environmental threats, promotion of sustainable production practices, participatory biodiversity monitoring, analysis of high conservation values, water management program and monitoring of greenhouse gas emissions.

These activities contributed to actions such as ensuring women's participation and equal leadership opportunities, as well as the efficient use of water resources and the sustainability of production systems through resilient agricultural practices. In this way, it was evaluated that the activities implemented during this monitoring period, contribute to the Sustainable Development Goals, SDG 5: Gender Equality, SDG 6: Clean Water and Sanitation, SDG 13: Climate Action and SDG 15: Life of Terrestrial Ecosystems. This assessment was conducted in accordance with the criteria established in the BCR Standard "Empowering Sustainability, Redefining Standards", version 3.4 of June 28, 2024.

These activities had a significant impact on the Sustainable Development Goals, promoting environmental sustainability, gender equity and local development. In addition, they ensured the preservation of natural resources and encouraged the active participation of local communities in decision-making. This impact can be seen in the BioCarbon Standard's "SDG Tool" which allowed us to identify the enrolled link between the SDG targets and CO2Bio Proyecto 2 activities, as well as document its contribution, (See folder: 2. Annexes / 4. SDGs / SDG Tool).

The criteria for demonstrating this contribution to SDGs 5, 6, 13 and 15 were established in accordance with the requirements of the BioCarbon Standard's

"Sustainable Development Goals Tool" (SDGs Tool), version 1.0 of June 27, 2023. The following will detail how each activity contributed to the global targets of the Sustainable Development Goals during the 2022-2023 monitoring period.

4.1. SDG 5: Gender Equality.

Figure 1. SDG 5

Source: Taken from UN official website, 2024.

The activities implemented within the framework of CO2Bio Proyecto 2, on "Capacity building for men and women enrolled in the project, in the following components: technical-environmental, social and administrative-financial, in order to strengthen decision-making in favor of the project objectives", the "Consolidation of the governance strategy in territory, for participatory decision-making on the sustainable management of strategic ecosystems" and the "Predios that implement sustainable productive practices (PIP), actions and strategies for ecosystem conservation"; had the objective of strengthening decision-making in favor of the project objectives.

These activities directly contributed to meeting SDG 5 target 5.5, which aims to "Ensure the full and effective participation of women and guarantee equal opportunities for leadership at all decision-making levels of political, economic and public life", measured through indicator 5.5.2, which evaluates the "Proportion of women in leadership positions". During the development of these activities, spaces for participation and training were created that provided women with the necessary tools and knowledge to become actively involved in environmental management, resource administration and leadership in the governance of their properties, promoting their equitable and effective participation in decision-making.

4.1.1. Contribution to indicator 5.5.2 against the global target.

CO2Bio Proyecto 2 has 124 enrolled properties, which represent 155 ecosystem managers, 47 of whom are women, many of whom are owners and heads of households with crucial decision-making responsibility for their properties.

During the 2022-2023 period, the project activity focused on capacity building promoted training and learning spaces. In total, 3 training sessions were held with the participation of 60 ecosystem managers, including **18 women** (Carbon Monitoring and Measurement - **6** Women; Community Management of Threats in Illegal Logging - **4** Women; Importance of Wetlands for Biodiversity - **8** Women), and 5 knowledge exchanges with 132 participants, of which **58 were women** (Alternative Water Solutions - **8** Women; Importance of Meliponiculture - **4** Women; Biodiversity and Climate Change - **11** Women; Non-Timber Forest Products - **9** Women; and Importance of REDD+ Safeguards - **26** Women). Additionally, the III and IV Biodiversity, Carbon, and Water Forum was attended by 628 participants, with a notable representation of women (See folder: 2. Annexes / 4. SDGs / SDG 5 / Capacity Building).

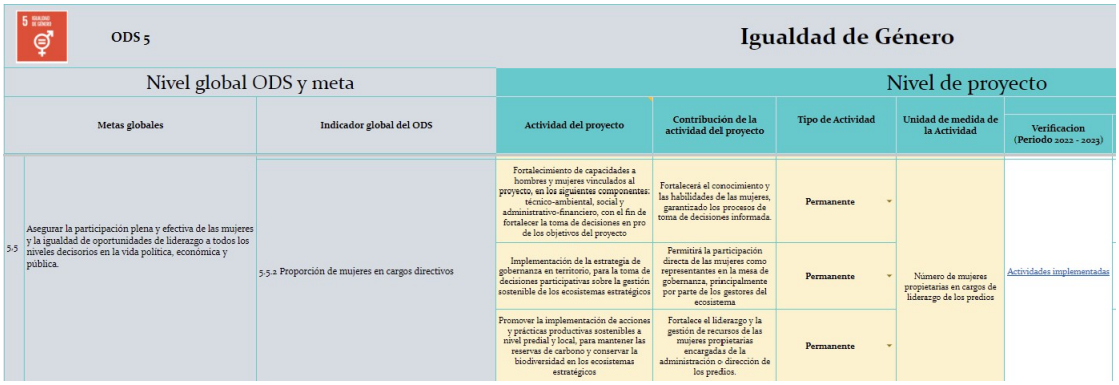
With the activity of executing the land implementation plans, the project encouraged the participation of 47 women, who contributed their knowledge and skills in the construction of these documents, demonstrating their leadership in the planning and management of natural resources (See folder: 2. Annexes / 4. SDG / SDG 5).

In this regard, during the 2022-2023 period, 47 women enrolled in the CO2Bio Project 2 have been impacted and have assumed leadership roles in the sustainable management of their properties. This group includes ecosystem managers who are private landowners, playing a key role in decision-making regarding the use and conservation of their lands.

Their active participation has contributed to strengthening the local economy and environmental conservation, increasing their presence in management positions within forest governance. Additionally, these spaces have provided opportunities to access new knowledge and enhance their capacities, enabling them to make active and informed decisions about the sustainability of their territories (See folder: 2. Annexes / 4. SDGs / SDG 5 / Target 5.5 / CO2Bio P2 Landowners).

The following figure shows the use of the SDG Tool, where the contribution of CO2Bio Proyecto 2 is documented on target 5.5, through indicator 5.5.2.

Figure 2. SDG 5, indicator 5.5.2.



ODS 5		Igualdad de Género				
Nivel global ODS y meta		Nivel de proyecto				
Metas globales	Indicador global del ODS	Actividad del proyecto	Contribución de la actividad del proyecto	Tipo de Actividad	Unidad de medida de la Actividad	Verificacion (Periodo 2022 - 2023)
5.5 Asegurar la participación plena y efectiva de las mujeres y la igualdad de oportunidades de liderazgo a todos los niveles decisorios en la vida política, económica y pública.	5.5.2 Proporción de mujeres en cargos directivos	Fortalecimiento de capacidades a hombres y mujeres vinculados al proyecto, en los siguientes componentes: técnico-ambiental, social y administrativo-financiero, con el fin de fortalecer la toma de decisiones en pro de los objetivos del proyecto	Fortalecerá el conocimiento y las habilidades de las mujeres, garantizado los procesos de toma de decisiones informada.	Permanente	Número de mujeres propietarias en cargos de liderazgo de los predios	Actividades implementadas
		Implementación de la estrategia de gobernanza en territorio, para la toma de decisiones participativas sobre la gestión sostenible de los ecosistemas estratégicos	Permitirá la participación directa de las mujeres como representantes en la mesa de gobernanza, principalmente por parte de los gestores del ecosistema	Permanente		
		Promover la implementación de acciones y prácticas productivas sostenibles a nivel predial y local, para mantener las reservas de carbono y conservar la biodiversidad en los ecosistemas estratégicos	Fortalece el liderazgo y la gestión de recursos de las mujeres propietarias encargadas de la administración o dirección de los predios.	Permanente		

Source: SDG Tool, 2024

The following table presents a summary of the impact on the indicator during the monitoring period.

Table 5. Summary of impact on target 5.5, indicator 5.5.2.

SDG Target	SDG Indicator	Project Activity	Contribution to SDG 2022-2023
5.5 Ensure the full and effective participation of women and guarantee equal opportunities for leadership at all decision-making levels of political, economic and public life.	5.5.2 Proportion of women in management positions	G1. Capacity building for men and women enrolled in the project, in the following components: technical-environmental, social and administrative-financial, in order to strengthen decision making in favor of the project's objectives. G2. Consolidation of the territorial governance strategy for participatory decision-making on the sustainable management of strategic ecosystems. G5. Farms that implement sustainable production practices (SPP), ecosystem conservation actions and strategies.	47 Women in leadership positions

Source: Fundación Cataruben, 2024

4.2. SDG 6: Clean Water and Sanitation.

Figure 3. SDG 6

Source: Taken from UN official website, 2024.

The activities implemented for the sustainable management of water resources in the enrolled rural properties seek to comply with Sustainable Development Goal 6 (SDG 6), which aims to ensure equitable access to water and its sustainable management. Within the framework of CO2Bio Proyecto 2, the development and execution of a "Water Management Program" was sought, which since 2021 has generated actions in support of this objective. Initially, it was proposed to contribute to goal 6.3, related to wastewater treatment, using indicator 6.3.1, which measures the "Proportion of wastewater safely treated".

For the current verification period, the target has been changed to 6.1, using indicator 6.1.1, which measures the "Proportion of the population with safely managed drinking water supply services". This decision was based on the characterization of the properties (See folder: 2. Annexes / 2. Project activities / A.1 / Annexes / A.1.1. General diagnosis of the use and management of water resources), where potentially critical issues were identified, which allowed identifying the significant percentage of ecosystem managers using septic tank systems for wastewater disposal, in contrast with the number of managers that have access to water suitable for human consumption. This indicator change not only provides a clearer picture of the current situation, but also highlights areas that require urgent attention to improve water management and ensure water quality and availability.

Through the project activity related to the development and implementation of a water management program, (See folder: 2. Annexes / 2. Project activities / A.1 / A.1 Water management program), a series of stages are aligned to meet indicators 6.1.1 and 6.4.1, contributing significantly to Sustainable Development Goal (SDG) number 6, which focuses on ensuring the availability and sustainable management of water. Through the phases of diagnosis, design, implementation and monitoring, the project addresses both equitable access to drinking water and improved efficiency in the use of water resources. Through the characterization of properties, the implementation of Water Efficiency and Saving Plans (PUEAA) and other activities that contribute to the overall goal of 20% in the 2022-2023 period, sustainable practices are promoted and landowners are trained in techniques that reduce water consumption, optimize its

management and guarantee its long-term conservation. This integrated approach not only improves water management at the local level, but also contributes to key SDG 6 indicators related to water access and efficiency as evidenced in the progress report on the development of the Water Management Program (See folder: 2. Annexes / 2. Project activities / A.1 / A.1.2.)

The criterion defined was that only those PUEAAs whose information was verified through Property Implementation Plans (PIPs) were considered valid, with the aim of ensuring traceability and technical reliability in water resource management. Accordingly, the first formal verification exercise was carried out on the total of 106 properties characterized to date, of which 67 have validated and sufficient information to formulate technically sound PUEAAs. This approach established a robust baseline for monitoring and periodically updating the plans, integrating technical, social, and environmental criteria that strengthen adaptive water resource management within the framework of the project.

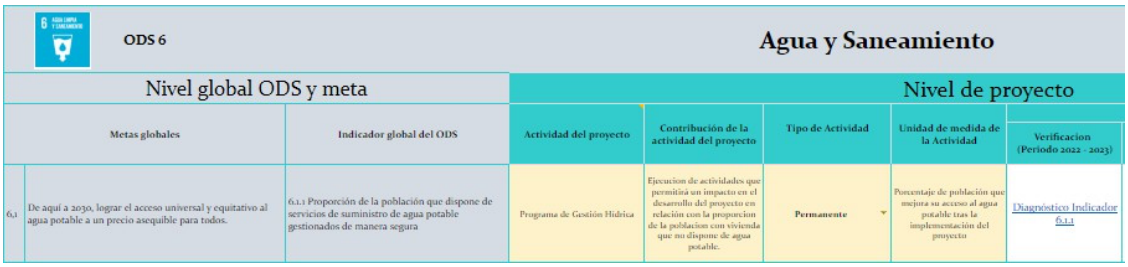
4.2.1. Contribution to indicator 6.1.1 against the global target.

Indicator 6.1.1, which measures the "Proportion of the population using safely managed drinking water supply services," is key to ensuring the sustainability of water resources in a context of growing demand and climate change. This indicator focuses on improving water use efficiency, promoting technologies and practices that optimize consumption, reduce waste and ensure safe access to drinking water. Its fulfillment not only implies implementing efficient management systems, but also educating and raising awareness among the population about the importance of responsible water use, in line with global sustainability goals.

During the 2022-2023 period, our contribution to indicator 6.1.1 in the framework of the Sustainable Development Goals has focused on the evaluation of water access and quality in the rural community, through a detailed diagnosis of 106 properties. Based on this analysis, we have designed and implemented 67 plans for efficient use and saving of water (PUEAA), which have information verified through the Property Implementation Plans (PIP), including workshops, training and delivery of chlorine purification tablet kits. These actions seek to optimize water management in the area with a focus on the 59 properties that have housing in the enrolled property, aligning with the global goal of ensuring universal and equitable access to safe drinking water, contributing in a sustainable way to improving the quality of life of the community (See folder: 2. Annexes / 4. SDG / SDG 6 / Target 6.1 / Diagnosis indicator 6.1.1) .

The following figure shows the use of the SDG Tool, where the contribution of CO2Bio Proyecto 2 is documented on target 6.1, through indicator 6.1.1.

Figure 4. SDG 6, indicator 6.1.1.



ODS 6		Agua y Saneamiento				
Nivel global ODS y meta		Nivel de proyecto				
Metas globales		Indicador global del ODS	Actividad del proyecto	Contribución de la actividad del proyecto	Tipo de Actividad	Unidad de medida de la Actividad	Verificacion (Periodo 2022 - 2023)
6.1	De aquí a 2030, lograr el acceso universal y equitativo al agua potable a un precio asequible para todos.	6.1.1 Proporción de la población que dispone de servicios de suministro de agua potable gestionados de manera segura	Programa de Gestión Hídrica	Ejecucion de actividades que permitirá un impacto en el desarrollo del proyecto en relación con la proporcion de la poblacion con vivienda que no dispone de agua potable.	Permanente	Porcentaje de población que mejora su acceso al agua potable tras la implementación del proyecto	Diagnóstico Indicador 6.1.1

Source: SDG Tool, 2024

The following table presents a summary of the impact on the indicator during the monitoring period, based on the assessment obtained from the 77 validated characterizations. It was identified that 39 properties have water suitable for human consumption, generating a positive impact on indicator 6.1.1 during the monitoring period. This result is evaluated in relation to the 124 properties linked to the project, allowing for an analysis of the scope and opportunities for improvement in the availability of safe water.

Table 6. Summary of impact on target 6.1, indicator 6.1.1.

SDG Target	SDG Indicator	Project Activity	Contribution to SDG 2022-2023
6.1 By 2030, to achieve universal and equitable access to safe drinking water at an affordable price for all.	6.1.1 Proportion of population using safely managed drinking water services	A1. Water management program	$\frac{39}{124} x100 =$ 31,5%

Source: Fundación Cataruben, 2024

4.2.2. Contribution to indicator 6.4.1 against the global target.

Since 2021, CO2Bio Proyecto 2 has sought to contribute to the fulfillment of Sustainable Development Goal (SDG) number 6, focused on sustainable water management. Within this framework, indicator 6.4.1, which measures "Change in water use efficiency over time", has been prioritized.

Starting in the 2022-2023 period, a detailed diagnosis of 106 properties and the delivery of 67 plans for efficient water use and water savings (PUEAA), which have information verified through the Property Implementation Plans (PIP), were carried out. Of these, 59 were designed specifically for residential properties, while the remaining 8 were adapted to the needs of purely agricultural properties, including educational workshops, training and follow-up. These actions seek to optimize water management in the area with a focus on the 124 properties enrolled in the project, aligning with the overall goal of ensuring universal and equitable access to safe drinking water, contributing in a sustainable manner to improving the quality of life of the community (See folder: 2. Annexes / 4. SDGs / SDG 6 / Target 6.4 / Diagnosis indicator 6.4.1).

In the implementation phase (taking into account the design and diagnostic work carried out), a strategy focused on two key components will be developed for each of the properties, taking into account that rural areas present additional challenges due to social, economic, technological and environmental factors. In these areas, where access to water depends on non-centralized sources such as wells, rivers or rainwater harvesting, measuring the volumes of water used efficiently requires a context-specific approach:

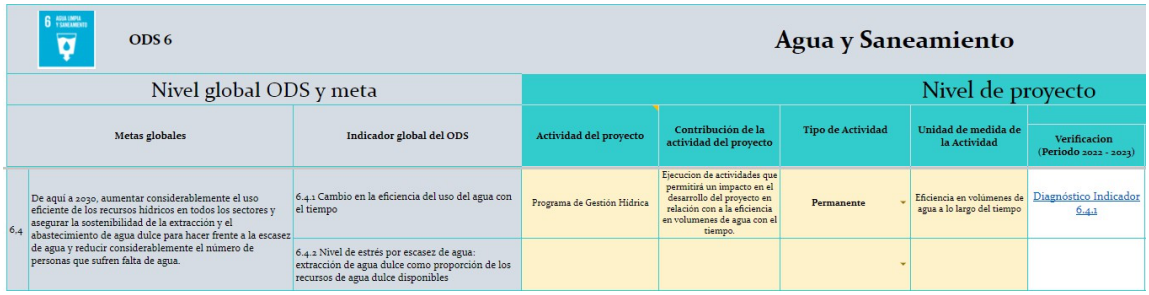
- **Estimation of water use**: This will be calculated based on the storage capacity of the catchment systems and the frequency of recharge, which will make it possible to estimate the volume of water available and its use by households.
- **Household surveys**: These surveys will facilitate the calculation of daily consumption per person or per household, taking as a reference the traditional storage containers used, thus adjusting to local conditions.

These adapted methodologies will be fundamental to effectively monitor efficient water use in rural areas, contributing directly to the fulfillment of indicator 6.4.1 and advancing towards SDG 6 targets.

Now, once the number of diagnosed and designed properties is 100% completed, the objective is to implement the indicator and its respective follow-up according to the diagnostic document of indicator 6.4.1 (See folder: 2. Annexes / 4. SDG / SDG 6 / Target 6.4 / Diagnosis indicator 6.4.1), which includes a process of knowledge transfer, addressing the management and protection of natural resources. This development process will be carried out in person and remotely at strategic points, responding to circumstances that have contributed to the deterioration of ecosystems. The aim is to halt the transformation of forests and savannas, promoting sustainable economic practices to preserve nature.

The following figure shows the use of the SDG Tool, which documents the contribution of CO2Bio Proyecto 2 on target 6.4, through indicator 6.4.1 (See folder: 2. Annexes / 4. SDG / SDG Tool).

Figure 6. SDG 6, indicator 6.4.1.



ODS 6		Agua y Saneamiento				
Nivel global ODS y meta		Nivel de proyecto				
Metas globales		Indicador global del ODS	Actividad del proyecto	Contribución de la actividad del proyecto	Tipo de Actividad	Unidad de medida de la Actividad	Verificacion (Periodo 2022 - 2023)
6.4	De aquí a 2030, aumentar considerablemente el uso eficiente de los recursos hídricos en todos los sectores y asegurar la sostenibilidad de la extracción y el abastecimiento de agua dulce para hacer frente a la escasez de agua y reducir considerablemente el número de personas que sufren falta de agua.	6.4.1 Cambio en la eficiencia del uso del agua con el tiempo	Programa de Gestión Hídrica	Ejecucion de actividades que permitirá un impacto en el desarrollo del proyecto en relación con a la eficiencia en volumenes de agua con el tiempo.	Permanente	Eficiencia en volúmenes de agua a lo largo del tiempo	Diagnóstico Indicador 6.4.1
		6.4.2 Nivel de estrés por escasez de agua: extracción de agua dulce como proporción de los recursos de agua dulce disponibles					

Source: SDG Tool, 2024

The following table presents a summary of the impact on the indicator during the monitoring period.

Table 7. Summary of impact on target 6.4, indicator 6.4.1.

SDG Target	SDG Indicator	Project Activity	Contribution to SDG 2022-2023
6.4 By 2030, significantly increase the efficient use of water resources in all sectors and ensure the sustainability of freshwater abstraction and supply to address water scarcity and significantly reduce the number of people suffering from water scarcity.	6.4.1 Change in water use efficiency over time.	A1. Water management program	Of the 124 properties linked to the project, 106 were diagnosed, and 67 water-use efficiency plans were delivered. The goal in the next stages is to reduce water consumption by at least 20% in the beneficiary households.

Source: Fundación Cataruben, 2024

4.3. SDG 13: Climate Action.

Figure 5. SDG 13

Source: Taken from UN official website, 2024.

Sustainable Development Goal 13 (SDG 13) focuses on integrating climate change measures into national policies, strategies and plans. In this context, CO2Bio Proyecto 2 in particular adopts an approach to reduce greenhouse gas (GHG) emissions by reducing deforestation and forest degradation as a result of the implementation of project activities.

Through the monitoring of greenhouse gas (GHG) emissions, CO2Bio Proyecto 2 contributed directly to the fulfillment of SDG 13 target 13.2, which aims to "Integrate climate change action into national policies, strategies and plans", measured through indicator 13.2.2, which evaluates the "Total greenhouse gas emissions per year".

4.3.1. Contribution to indicator 13.2.2 against the global target.

For the period 01/01/2022 - 12/31/2023, GHG emissions in the project area and leakage area were monitored, comparing their reduction in relation to the reference value calculated in the baseline.

Thus, although GHG emissions of 78,674 tCO2e were recorded, there was an 86.67% reduction in emissions compared to the annual average estimated in the baseline scenario. This represents a reduction of 511,640 tCO2e. Likewise, compared to the overall goal for the project's execution period, there is evidence of 21% progress.

The following figure shows the use of the SDG Tool, which documents the contribution of CO2Bio Proyecto 2, on target 13.2, through indicator 13.2.2.

Figure 6. SDG Tool (2023) - SDG 13 Climate Action.

ODS 13		Acción por el Clima				
Nivel global ODS y meta			Nivel de proyecto			
Metas globales		Indicador global del ODS	Actividad del proyecto	Contribución de la actividad del proyecto	Tipo de Actividad	Unidad de medida de la Actividad	Verificacion (Periodo 2022 - 2023)
13.2	Incorporar medidas relativas al cambio climático en las políticas, estrategias y planes nacionales.	13.2.2 Emisiones totales de gases de efecto invernadero por año	Cuantificar las emisiones y reducciones de GEI del proyecto	El monitoreo periódico a las emisiones de GEI en las áreas elegibles del proyecto y área de fugas permitirá identificar el impacto del desarrollo del proyecto en relación con la disminución de la deforestación y degradación forestal	Permanente	tCO2e reducidas	7. Monitoreo de emisiones

Source: SDG Tool, 2024

The following table presents a summary of the impact on the indicator during the monitoring period.

Table 8. Summary of impact on target 13.2, indicator 13.2.2.

SDG Target	SDG Indicator	Activity	Contribution to SDG 2022-2023
13.2 Incorporate climate change measures into national policies, strategies and plans.	13.2.2 Total greenhouse gas emissions per year	GHG emissions were monitored for the 2022-2023 period to evaluate compliance with the GHG emissions reduction target in relation to the baseline scenario.	511,640 tCO2e emission reduced Anexx: 7. Emissions_CO2BIO_P2_V3_ English.xlsx

Source: Fundación Cataruben, 2024

4.4. SDG 15: Life of Terrestrial Ecosystems.

Figure 7. SDG 15

Source: Taken from UN official website, 2024.

The conservation of terrestrial ecosystems is not only fundamental in its own right, but also plays a crucial role in achieving Sustainable Development Goal 15 (SDG 15). The "HCVs Monitoring (Conservation Value Analysis)" activity allowed us to identify critical and high value areas not only in terms of biodiversity, as addressed in HCV 1, but also in terms of their importance for ecosystem services, their preservation and associated cultural values. This helped us to understand the relevance of the various coverages within the study area. Thus this activity directly contributed to the fulfillment of SDG 15 target 15.1, which aims to "By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements", measured through indicator 15.1.1, which assesses "Forest area as a proportion of total area".

On the other hand, through the implementation of the activities "Monitoring of environmental threats (fire)" and "Continuous monitoring of changes in forest area", in which satellite tools were used to measure the amount of forest present in the properties and in the study area compared to the total area, we contributed, during the period 2022-2023, to the target of SDG 15.3, whose purpose is "By 2030, combat desertification, rehabilitate degraded land and soils, including land affected by desertification, drought and floods, and aim for a land degradation-neutral world", measured through indicator 15.3.1, which assesses the "Proportion of degraded land compared to the total area".

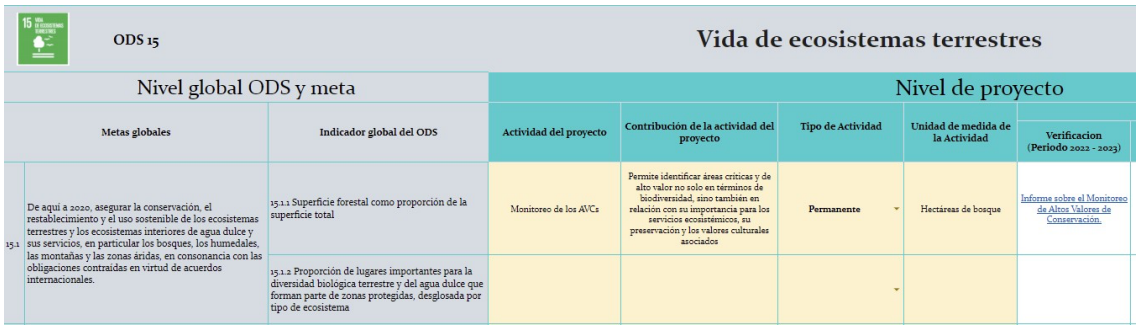
4.4.1. Contribution to indicator 15.1.1 against the global target.

Among the project activities, Conservation Value Analyses (CVA) were conducted to identify critical and high-value areas not only in terms of biodiversity, as addressed in HCV 1, but also in terms of their importance for ecosystem services, their preservation and associated cultural values. The objective was to understand the relevance of the various coverages within the study area.

During the period 2022-2023, CO2Bio Proyecto 2 covered a total of 137,193.53 total hectares versus 19,167.70 hectares of conserved forests (See folder: 2. Annexes / 4. SDGs / SDG 15 / Target 15.1 / Forest area as a proportion of total area). This together with what was found within the analysis of HCV's 2 which speaks of the structuring of the landscape and the coverages present we found a total of 14522.52 hectares in a high level of importance for the conservation of biological diversity, which demonstrates the presence of a high level of untransformed natural cover as well as in general for all HCV's, as a general impact for the participatory acoustic monitoring we found a total of 335 species of birds distributed in 63 families and 237 genera. Within 8045 audios, within these species, 312 are in the category of 'Least Concern' (LC), 15 have not been assessed (NE), 7 are listed as 'Near Threatened' (NT) and 1 is in 'Vulnerable' (VU). (See folder: 2. Annexes / 2.Project Activities/B1./ 1. CO2BIO P2 - V3 Informe Monitoreo bioacustico.pdf

The following figure shows the use of the SDG Tool, where the contribution of CO2Bio Proyecto 2 is documented on target 15.1, through indicator 15.1.1.

Figure 8. SDG 15, indicator 15.1.1.



ODS 15 — Vida de ecosistemas terrestres

Nivel global ODS y meta		Nivel de proyecto				
Metas globales	Indicador global del ODS	Actividad del proyecto	Contribución de la actividad del proyecto	Tipo de Actividad	Unidad de medida de la Actividad	Verificacion (Periodo 2022 - 2023)
15.1 De aquí a 2020, asegurar la conservación, el restablecimiento y el uso sostenible de los ecosistemas terrestres y los ecosistemas interiores de agua dulce y sus servicios, en particular los bosques, los humedales, las montañas y las zonas áridas, en consonancia con las obligaciones contraídas en virtud de acuerdos internacionales.	15.1.1 Superficie forestal como proporción de la superficie total	Monitoreo de los AVCs	Permite identificar áreas criticas y de alto valor no solo en términos de biodiversidad, sino también en relación con su importancia para los servicios ecosistémicos, su preservación y los valores culturales asociados	Permanente	Hectáreas de bosque	Informe sobre el Monitoreo de Altos Valores de Conservación.
	15.1.2 Proporción de lugares importantes para la diversidad biológica terrestre y del agua dulce que forman parte de zonas protegidas, desglosada por tipo de ecosistema					

Source: SDG Tool, 2024

The following table presents a summary of the impact on the indicator during the monitoring period.

Table 9. Summary of impact on target 15.1, indicator 15.1.1.

SDG Target	SDG Indicator	Project Activity	Contribution to SDG 2022-2023

15.1: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.	15.1.1 Forest area as a proportion of total area	B2. Monitoring of HCVs	19.167,70 ha of forest 137,193.53 ha total

Source: Fundación Cataruben, 2024

4.4.2. Contribution to indicator 15.3.1 against the global target.

The information presented corresponds only to the forested areas existing in each year of the analyzed period, and therefore differs from the project's eligible areas. This difference arises because the eligible area is defined as the forest present at the start of project activities and ten years prior to the project start date, also referred to as stable forest. In contrast, the present analysis quantifies only the forest actually present in the selected year or period.

The data used to develop the analysis of forest gain and Forest Area as a Proportion of Total Area are obtained from the Natural Forest Cover Surface Maps (reliable and nationally sourced inputs), produced by the Forest and Carbon Monitoring System – SMByC of IDEAM. These maps are an official scientific tool for the continuous monitoring of forest cover and deforestation in Colombia. This information is in raster format, with a pixel size of 30.26 * 30.72 m, and projected in MAGNA SIRGAS 2018 / National Origin EPSG:9377 (compatible with 1:100,000 scale) for the 2015–2023 period. The map includes the values and classes described in Table 1.

These maps are created through the interpretation of satellite images, identifying and assigning each pixel or observation unit to one of the following classes: Forest, Non-forest, or No Data. They mainly use LANDSAT images (TM, ETM+, and OLI sensors) taken between January 1 and December 31 of each year in the period. The methodology used to build the national map of natural forest cover corresponds to the “Digital Image Processing Protocol for the Quantification of Deforestation in Colombia V.2” (Galindo et al., IDEAM 2014). (8.1.3.1. Procedimientos)

The indicator "Proportion of area covered by natural forest" reflects the percentage of forest cover in the project area over time. At the 2023 verification, an increase of 0.22% in forest cover was observed compared to the initial area, a result that is documented in report 15.1.1 Forest area as a proportion of total area and complemented by report 15.1.2 Forest gain.

For the monitoring of natural hazards that could affect the eligible areas, floods and hot spots were prioritized. The monitoring of hot spots was carried out through the IDEAM's "Monitoring of hot spots in Colombia" portal, with the support of platforms such as NASA FIRMS and Google Earth Engine, which records thermal anomalies and allows spatial analysis. This analysis covered the period from January 1, 2022 to December 31, 2023. The effects are detailed in numeral 14.1.2 of the Risk Management Monitoring Report, where it is reported that 56.2 hectares were affected, distributed in 26.8 ha of forest and 29.4 ha of wetlands. Forest Cover Report 2022 - 2023*, 8.3.4. 1. Wetlands Decrease Report 2022 - 2023).*

In the fire component, six thermal anomalies were detected in forest areas enrolled in the project, concentrated in the months of January, March, November and December. The evaluation with LANDSAT satellite images using the Normalized Burned Area (NBR) vegetation spectral index showed that the severity of the burning was low in the affected area, with no evidence of significant damage to the forest cover.

Mapping of burned areas is done using false color composites (combining red, near infrared and green bands), sometimes in conjunction with a digital elevation model and a land cover classification that includes categories such as forest, urban areas and burned areas. The software generates a shapefile or map highlighting burned areas, useful for assessing damage and supporting restoration efforts. Burn severity is also analyzed using the Normalized Burn Ratio (*NBR*), which uses near infrared (NIR) and shortwave infrared (SWIR) bands. Complete information can be found in the document "*REDD+ Hotspot Monitoring 2022 - 2023.* Spatial Information".

The following figure shows the use of the SDG Tool, where the contribution of CO2Bio Proyecto 2 is documented, on target 15.3, through indicator 15.3.1.

5. Compliance with Applicable Legislation

The identification of applicable regulations and the continuous updating of the matrix that groups national and international legislation reflects a proactive attitude towards legal compliance. This constant monitoring and ability to adapt to regulations demonstrates effective risk management, helping to anticipate and resolve potential legal issues before they become significant obstacles to the projects led by the Fundación Cataruben.

The controls implemented by the Fundación Cataruben to strictly comply with regulations related to climate change and its associated areas reflect a strong commitment to responsible planning and execution of the Co2Bio Project. This commitment is evidenced in the regulatory matrix, which is periodically updated in

accordance with procedure GJP-14 Management of Legal and Other Requirements, thus ensuring the continuous alignment of the project with current regulations.

Thanks to this comprehensive approach, the Co2Bio Project not only ensures legal compliance, but also positions itself as an example of best practice in climate change mitigation. This strengthens trust among stakeholders and ensures that the project continues to make solid and structured progress towards its objectives.

6. Climate change adaptation

Table 10 describes compliance and annexes the verification supports of how the project activities lead to climate change adaptation actions.

Table 10. Adaptation to climate change.

Criteria	Compliance	Project activity in which the adaptation action is derived.	Activity progress in the monitoring period 2022 - 2023
Improve the conservation conditions of biodiversity and its ecosystem services in the areas of influence, outside the project boundaries (e.g. natural coverage in areas of special environmental interest, biological corridors, water management in watersheds, among others).	The project promotes and provides improvement actions for the conservation and safeguarding of biodiversity and its ecosystem services. In addition, it identifies and monitors HCVs within the geographical boundaries of the project, and manages the improvement of water resources within the properties.	**G5:** Promote the implementation of sustainable productive actions and practices at the farm and local levels to maintain carbon stocks and conserve biodiversity in strategic ecosystems.	**G5:** 19,03% Support link: G.5
		G3: Continuous monitoring of changes in forest area as a proportion of total area in the project areas...	**G3:** 7,14% Support link: G3
		G4: Monitor environmental threats (fire) in the project area and/or possible management alerts.	**G4**: 7,14% Support link: G4
		B1: Participatory Biodiversity Monitoring	**B1:** 7,14% Support link: B1
		A1: Development and implementation of water management program	**A1:**20% Support link: A1

Criteria	Compliance	Project activity in which the adaptation action is derived.	Activity progress in the monitoring period 2022 - 2023
Implements activities that contribute to sustainable low-carbon productive landscapes.	Complies. The project promotes the implementation of sustainable production systems and practices. The project strengthens the capacities of the project participants, with the purpose of empowering the communities in the development of responsible actions for the care and preservation of natural resources.	**G1:** Capacity building for men and women enrolled in the project, in the following components: technical-environmental, social and administrative-financial, in order to strengthen decision-making in favor of the project's objectives.	**G1.1**:124Number of properties impacted with training G1.2: 10 trainings Support link: G1
		G5: Promote the implementation of sustainable productive actions and practices at the farm and local levels to maintain carbon stocks and conserve biodiversity in strategic ecosystems.	**G5:** 19,03% Support link: G.5
		G2: Implementation of the territorial governance strategy for participatory decision-making on the sustainable management of strategic ecosystems.	**G2:** 20% Support link: G2
		B1: Participatory Biodiversity Monitoring	**B1:**7,14% Support link: B1
Design and implement adaptation strategies based on an ecosystem approach.	Complies. The project is based on the conservation and sustainable management of natural ecosystems, within nature-based solutions. Therefore, it is important to develop actions to strengthen the capacities of local communities to achieve compliance with conservation strategies	**G1:** Capacity building for men and women enrolled in the project, in the following components: technical-environmental, social and administrative-financial, in order to strengthen decision-making in favor of the project's objectives.	**G1.1:**124 Number of properties impacted with training G1.2: 10 trainings Support link: G1
		G5: Promote the implementation of sustainable productive	**G5:** 19,03% Support link: G.5

Criteria	Compliance	Project activity in which the adaptation action is derived.	Activity progress in the monitoring period 2022 - 2023
	for strategic ecosystems.	actions and practices at the farm and local levels to maintain carbon stocks and conserve biodiversity in strategic ecosystems.	
		A1: Development and implementation of water management program	**A1:** 20% Support link: A1
Strengthens the local capacities of institutions and/or communities to make informed decisions to anticipate negative effects derived from climate change (recognition of vulnerability conditions).	Compliant. The project includes the development of training for the transfer of knowledge with the local community, with the purpose of providing the necessary tools to make informed decisions on the management of the properties. These trainings are oriented towards climate change and conservation actions for strategic ecosystems. In addition, a governance strategy was implemented to coordinate the project's stakeholders.	**G1:** Capacity building for men and women enrolled in the project, in the following components: technical-environmental, social and administrative-financial, in order to strengthen decision-making in favor of the project's objectives.	**G1.1:**124 Number of properties impacted with training G1.2: 10 trainings Support link: G1
		G2: Implementation of the territorial governance strategy for participatory decision-making on the sustainable management of strategic ecosystems.	**G2:** 20% Support link: G2

7. Carbon ownership and rights

The identification and verification of land tenure is a key component to ensure that the rights to the benefits derived from carbon sequestration are well defined and distributed to the appropriate parties. This process, which is carried out both before the property is formally enrolled in the project and during its implementation, not only guarantees the protection of the areas involved, but also facilitates the efficient management of the

properties, which is essential for the continuity and success of the project in the long term.

In a context where Colombian legislation does not yet specifically contemplate carbon ownership, it is necessary to rely on the existing legal framework on private property to support real rights over the benefits generated by projects such as Co2Bio. This legal support takes the form of a series of formally recognized legal documents, such as the certificate of tradition and freedom, certificates of sound possession, public deeds, adjudication resolutions, purchase and sale contracts, and other instruments that confirm the ownership of the land. These documents not only allow us to prove ownership, but also ensure that the parties involved understand and assume the responsibilities and obligations derived from the bond contracts.

After an exhaustive analysis of these documents, the information collected is systematically organized in a document called "Title Study", an instrument that centralizes details on the ownership and type of tenure of each property. This document, signed by the legal professional in charge of the analysis, is integrated into the documentary folder of each property and is available for consultation and periodic verifications. We currently have 124 title studies that allow us to identify the ownership of the property and its general characteristics such as geographic location, area, boundaries, real estate registration, among others.

The legal information of each property, including the formalized linking contracts, can be found in 2. Anexos / 1. Carbon Ownership.

In accordance with the contractual provisions established in the project, the right of the owners of formally enrolled properties to request their voluntary withdrawal from the project is recognized. This mechanism is activated when a landowner decides to disengage, which gives rise to a formal process that includes the preparation of impact reports on the project, evaluating the consequences of that decision. Once the impacts have been evaluated, the withdrawal is contractually formalized, which guarantees the correct documentation and traceability of the process.

It is clarified that the voluntary withdrawal process is framed within the procedure FC-GPP_026. Procedure for Unlinking Properties from Climate Change Mitigation Projects.

Document GPP-026 establishes a comprehensive procedure for unlinking properties from climate change mitigation projects of the Fundación Cataruben. The key elements include:

- *Objective: To define a clear and transparent process for unlinking, ensuring that all parties understand the requirements.*
- *Scope: Covers the entire unlinking process, from the initial request to the formal unlinking and documentation filing.*
- *Associated Documents: The procedure references other essential documents, such as FC-GPP-19, FC-GPP-20 and FC-GIP-04.*
- *Definitions: Provides definitions of key terms to avoid ambiguities.*
- *Responsibilities: Details the roles and responsibilities of the departments involved in the unlinking.*
- *Procedure Description: Describes the step-by-step process, from receipt of the request to document filing.*

In conclusion, the Procedure for Unlinking Properties from Climate Change Mitigation Projects serves as a complete and detailed guide for unlinking properties from climate change mitigation projects. By providing a clear, transparent and legally sound process, it ensures that the unlinking is carried out efficiently and effectively, protecting the interests of both the Fundación Cataruben and the property owners

In this context, the properties listed in Table 11 below have opted to use this procedure, and therefore signed a contract termination agreement and formally disengaged.

Table 11. List of excluded properties

ITEM	NAME OF THE PROPERTY	LOCATION OF THE PROPERTY	
		Municipality	Department
1	Guarataro	Puerto Gaitan	Meta
2	El Morrocoy	Puerto Gaitan	Meta
3	El Tolima	Puerto Gaitan	Meta
4	Finca Palmarito	Puerto Gaitan	Meta
5	Puerta Colorada	Puerto Gaitan	Meta
6	Rancho Arecua	Puerto Gaitan	Meta
7	Bonanza	La Primavera	Vichada
8	Chaparral	La Primavera	Vichada
9	La Esperanza	La Primavera	Vichada
10	La Hermosa	La Primavera	Vichada
11	La Niña	La Primavera	Vichada
12	Muriva	La Primavera	Vichada

13	Yovereña	La Primavera	Vichada
14	El Condor	Santa Rosalia	Vichada
15	La Envidia Española	Santa Rosalia	Vichada
16	Flor Amarillo	Santa Rosalia	Vichada
17	Barley 3	Tauramena	Casanare
18	Cañas Bravas	San Luis de Palenque	Casanare
19	Palmarito 1	Orocue	Casanare

As a consequence of the above, the properties that signed the contract termination agreement to formalize their voluntary withdrawal from the CO2Bio project have been duly excluded from the current monitoring process, this exclusion implies that these properties will not be considered in the verification report nor will they contribute to the conservation activities or the generation of benefits derived from the reduction of emissions within the framework of the project. In accordance with contractual and regulatory provisions, the established procedure has been followed to formalize their withdrawal, ensuring transparency and proper management of the project in relation to the properties that remain active.

8. Environmental aspects

The holder of CO2Bio Proyecto 2 has assessed the environmental impacts generated by the implementation of its activities, following the guidelines of the "Sustainable Development Safeguards" tool (SDSs Tool), version 1.1 of July 4, 2024 of the BioCarbon Standard. This tool provides a comprehensive guide for assessing the environmental and social impact of projects. In the environmental component, areas such as efficiency in the use of resources such as land and water, protection of biodiversity and ecosystems, as well as climate change mitigation were evaluated.

In this context, a matrix was prepared to evaluate and report the environmental impacts of project activities during the 2022-2023 period. The results indicate that there are no high or medium negative impacts that will affect the use of resources such as land and water, biodiversity or climate change (See folder: 2. Annexes / 6. Environmental and Socioeconomic Aspects / Environmental Impact Assessment).

This absence of negative impacts is attributed to the project's design, which prioritizes the conservation of ecosystems and biodiversity. Activities are based on sustainable practices and are complemented by training that promotes environmental awareness among managers. In addition, all of the project's actions are geared towards environmental protection and greenhouse gas (GHG) reduction, reflecting a favorable

environmental perspective. Constant monitoring allows strategies to be adjusted in real time, ensuring that actions are aligned with sustainability objectives. The matrix also projected an assessment of potential environmental impacts for the next monitoring period.

9. Socioeconomic aspects

The holder of CO2Bio Proyecto 2 has assessed the socioeconomic impacts of its activities, following the guidelines of the Sustainable Development Safeguards Tool (SDSs Tool), version 1.1 of July 4, 2024, of the BioCarbon Standard. This tool provides a comprehensive guide for analyzing the social and environmental impacts of projects.

The social component considered aspects such as human rights in relation to labor and working conditions, gender equality and women's empowerment, land acquisition, land restitution and use, displacement and involuntary resettlement, as well as the rights of indigenous peoples and the preservation of cultural heritage. Issues related to corruption, the economy and forest governance were also assessed.

In this context, a matrix was prepared to evaluate and report the socioeconomic impacts of project activities during the 2022-2023 period. The results indicate that no high category negative impacts were recorded. However, a risk related to cultural barriers was identified, which is not a direct consequence of the implementation of project activities, but stems from the cultural background of the region. Although this risk did not materialize, it is considered a potential that could generate a moderate negative impact on the progress of the project. To prevent its materialization, specific actions have been established (See folder: 2. Annexes / 6. Environmental and Socioeconomic Aspects / Evaluation of Socioeconomic Impacts).

The absence of negative impacts on the social component is attributed to several factors. First, the project design incorporates principles of sustainability and equity, ensuring respect for the rights of the communities involved. In addition, consultation and participation mechanisms were implemented to allow local groups to express their concerns and contribute to decision-making, which has favored the building of trusting relationships and mitigated potential conflicts.

The project also includes training spaces that promote gender equality, encouraging women's participation and empowerment, and generating an inclusive environment that reinforces the rights of all participants. On the other hand, clear policies have been established that support the project's commitment to respect for individual and collective rights and sustainability. The matrix also projects an assessment of potential socioeconomic impacts for the next monitoring period.

10. Stakeholder consultation

To ensure continuous and effective communication with local stakeholders around the CO2Bio Proyecto 2, we have implemented a comprehensive mechanism that includes regular meetings, newsletters, events and workshops, as well as the use of digital platforms, participation in different conservation bodies and the implementation of a governance strategy. These activities have allowed us to maintain a constant and open dialogue with ecosystem managers, local community representatives, NGOs and government entities, ensuring their active participation in project initiatives. Through this collaborative approach, we have strengthened strategic alliances, promoted environmental education and facilitated continuous feedback, contributing to the success of our conservation and climate change mitigation goals.

Within the framework of the CO2Bio initiative, we have developed a number of key activities that demonstrate our ongoing commitment to conservation, climate change and sustainable natural resource management. Below are some of the main initiatives and collaborations we have carried out in recent years:

Since 2020, Fundación Cataruben has annually organized the Biodiversity, Carbon and Water Forum in commemoration of Earth Day. This event has become a key space to socialize the progress of our initiatives, present new proposals and be accountable to the community. The forum brings together experts in the areas of biodiversity, climate change and water resources, who share knowledge and experiences, thus strengthening our network of collaboration and continuous learning. See Safeguard B2: Meetings / G1. Capacity building / Section 5.9 and 5.10.

We also actively participate in the Municipal System of Protected Areas of the Orinoquia (SIRAPO). During the years 2022 - 2023, we were active members of the steering committee, contributing significantly to the planning and management of protected areas in the region. Our participation in SIRAPO has allowed us to coordinate efforts with other local entities, promoting conservation and sustainable use of natural resources.

During the years 2022 and 2023, we are part of the board of directors of the Colombian Association of Carbon Actors - ASOCARBONO. In this role, we have strategically engaged with various entities to promote and strengthen the carbon market in Colombia. This collaboration has been crucial to advance the implementation of policies and projects that support the reduction of emissions and mitigation of climate change in the country.

Through our communication strategy, we have given visibility to CO2Bio and kept ecosystem managers informed. We use various digital platforms and communication tools to share updates, achievements and opportunities for engagement, ensuring a constant flow of information among all stakeholders. See Safeguard B.

Finally, we have implemented a governance strategy that includes the formation of the Governance Board with the participation of ecosystem managers (carbon owners), LATAM Airlines as a strategic ally, and the Fundación Cataruben as the owner of the CO2Bio initiative. The steering committee of this roundtable aims to guide, articulate and promote the efforts of the participants of the initiative towards the implementation of climate change mitigation activities, capacity building, access to information, forest governance and the increase of social and environmental benefits. See Safeguard B4: Forest governance strategy.

11. REDD+ Safeguards

According to the environmental and socioeconomic impact assessment (see sections 8 and 9 of this document), it was found that CO2Bio Proyecto 2, during the period 2022-2023, did not affect the social, economic and environmental rights of the communities in the development area, nor did it incur negative impacts from the implementation of REDD+ activities. However, the Fundación Cataruben implemented REDD+ safeguards as a preventive measure to safeguard these fundamental rights, thus complying with the criteria established by the BCR Standard "Empowering Sustainability, Redefining Standards", version 3.4 of June 28, 2024 of the BioCarbon Standard, which establishes the obligation to demonstrate compliance with the aforementioned REDD+ safeguards, considering the national context and including the definition of indicators for monitoring, reporting and verification established in its tool.

In compliance with the guidelines established by the national government in Law 2294 of May 19, 2023, which requires the implementation of social and environmental safeguards defined by the United Nations Framework Convention on Climate Change (UNFCCC) and adopted by the country through the "National Interpretation of Social and Environmental Safeguards for REDD+ in Colombia" (Camacho, Lara and Guerrero, 2017). In this sense, a Safeguards Monitoring Plan was developed for CO2Bio Proyecto 2. This plan allows for the follow-up and monitoring of the implementation of the safeguards and is aligned with the structural criteria established in the Afolu Sector Methodological Document "Quantification of GHG Emission Reduction REDD+ Projects BCR0002", version *3.1. September 15, 2022*, developed by BioCarbon Standard.

During the current verification period, this Safeguards Monitoring Plan underwent a structural change to incorporate the fifteen elements of safeguards and classified into three categories: Institutional, Social and Cultural, Environmental and Territorial; defined in the "National Interpretation of Social and Environmental Safeguards for REDD+ in Colombia". Likewise, the monitoring indicators were modified to align them with the evidence of compliance required by the "Tool for Demonstrating Compliance with REDD+ Safeguards", version 1.1, dated January 26, 2023, also developed by BioCarbon Standard (See folder: 2. Annexes / 3. Compliance with Safeguards / REDD+ Safeguards Monitoring Plan CO2Bio Proyecto 2).

The following is a detailed report on the implementation of each of the REDD+ safeguards during the 2022-2023 period, guided by the documents mentioned above:

11.1. Safeguard A.

"The complementarity or compatibility of the measures with the objectives of national forest programs and international conventions and agreements.
on the matter".

11.1.1 A1 Correspondence with national legislation

To demonstrate the compatibility of the implementation of CO2Bio Proyecto 2 activities with the international agreements signed by Colombia, as well as with the legislation (Political Constitution, Laws and Decrees), national policies, programs and projects related to forest conservation, biodiversity and climate change, an exhaustive analysis has been carried out, documented in the Legal Compatibility Matrix (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard A / A1 / Legal Compatibility Matrix).

This matrix shows how each activity implemented in the 2022-2023 period is aligned with established regulations, highlighting conventions such as the Convention on Biological Diversity, the Paris Agreement, the Framework Convention on Climate Change and the Ramsar Convention, as well as the National Policy for the Integrated Management of Biodiversity and its Ecosystem Services and the National Policy on Climate Change, among other regulations.

Thus, it was evident that the project activities are aligned with the established objectives and goals, and were also consistent with the regulatory framework. This ensures that the project contributes positively to the conservation and sustainable management of natural resources.

Table 12. Approach and compliance with safeguard A.

SAFEGUARD A THEMATIC NATIONAL INTERPRETATION: INSTITUTIONAL		
Requirement "BCR tool to demonstrate compliance with REDD+ safeguards".	**National Interpretation Element Requirement**	**Compliance**
On compatibility: Demonstrate that the project activities are in accordance with these policies and are not contrary to them.	A1 Correspondence with national legislation: REDD+ policies, actions and measures must be aligned with international agreements signed by Colombia, national legislation and policies related to forest conservation, biodiversity and climate change. It is crucial to take into account the regulatory framework, as ignorance of it does not justify non-compliance.	A legal compatibility matrix was projected, in which each of the activities implemented in the framework of CO2Bio Proyecto 2 were related and aligned with national and international regulations (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard A / A1 / Legal Compatibility Matrix).

Source. Fundación Cataruben, 2024

Based on the table above, the following table shows the progress made with respect to the indicator established to demonstrate compliance with Safeguard A during the 2022-2023 period.

Table 13. Percentage of progress in compliance with Safeguard A, with respect to the Monitoring Plan.

SAFEGUARD A				
National Element	**Item**	**Name of Indicator(s)**	**(%) Progress 2021-2023**	**(%) Global Target Compliance**
A1. Correspondence with national legislation	1.1	Legal compatibility reports	7%	21%

Source. Fundación Cataruben, 2024

11.2. Safeguard B.

"The transparency and effectiveness of national forest governance structures, taking into account national legislation and sovereignty. Provide transparent and consistent information that is accessible to all stakeholders and regularly updated. Be transparent and flexible to allow for improvements over time. Build on existing systems, if any."

11.2.1 B2 Transparency and Access to Information

In order to ensure transparency in the development of CO2Bio Proyecto 2, it is registered in the National Registry of Greenhouse Gas Emissions Reduction "RENARE", a platform of the Ministry of Environment and Sustainable Development that records gas reductions in Colombia. Currently, the transition of the project from the formulation phase to the implementation phase is being managed, and the formulation phase is already registered, which demonstrates the commitment of the Fundación Cataruben to comply with regulatory requirements (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard B / B2 / Renare Registry).

During the 2022-2023 period, transparency and access to information was ensured through the Regional Beneficiary Center "CARBO", which is made up of a team of multidisciplinary professionals. This team managed both face-to-face and remote communication through various channels, such as WhatsApp, telephone line and email. In addition to serving as communication channels, these media facilitated the dissemination of information on programmed activities, requirements and the reception and resolution of requests, doubts and concerns. (See folder: 2. Annexes / 3. Safeguards Compliance / Safeguard B / B2 / Communication Channels / Means of Contact).

Given the location of the project in the Orinoquia region, these channels have proven to be the most effective in facilitating communication and access to information. Despite occasional difficulties with the internet signal, phone calls were made to address these cases. When it was not possible to establish contact, neighboring neighbors, proxies and representatives were contacted to ensure that the information reached them adequately.

As part of the effort to strengthen the communication process with beneficiaries and other project stakeholders, the use of the Requests, Complaints, Claims, and Suggestions (PQRS) System was actively promoted. This mechanism has enabled the efficient management and response to inquiries, requests, and observations received.

During the 2022-2023 period, the following PQRS cases were recorded and addressed:

- **In 2022:** 16 petitions, 6 complaints, and 1 claim were received.
- **In 2023:** 21 petitions and 11 complaints were managed.

All PQRS were addressed in a timely manner and are currently closed (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard B / B2 / PQRS System).

The Fundación Cataruben's website and the social networks Facebook, Instagram, LinkedIn and YouTube were used to disseminate information. Through these platforms, scheduled activities, progress and achievements of the project, as well as general information were shared. (See folder: 2. Annexes / 3. Safeguards Compliance / Safeguard B / B2 / Communication Channels / Media).

In addition, face-to-face and virtual meetings were held for training and interaction with organizations. These meetings allowed the transfer of knowledge and interaction with attendees, as well as the reception of their needs, concerns and contributions to community building (See folder: 2. Annexes / 3. Safeguards Compliance / Safeguard B / B2 / Meetings / Capacity Building).

Information was also disseminated through documents, publications, videos and reports that supported communication and shared relevant data on project implementation (see folder: 2. Annexes / 3. Safeguards Compliance / Safeguard B / B2 / Documents).

In summary, this strategy made it possible to provide clear, complete and updated information during the 2022-2023 period. The progress of the CO2Bio 2 Project ensured transparency, access to information and the effectiveness of forest governance structures.

11.2.2 B3 Accountability

As part of the implementation of CO2Bio P2, newsletters were prepared to communicate the progress, activities, results and achievements of the project to the Ecosystem Managers. These reports were delivered via email and the project's WhatsApp group. For the year 2022, two newsletters were projected, and for 2023, six newsletters (See folder: 2. Annexes / 3. Safeguards Compliance / Safeguard B / B3 / Management Reports).

In addition, during the face-to-face and virtual meetings, knowledge transfer spaces and forums were held to highlight the progress of the project.

On the other hand, in order to further strengthen the transparency process, The Ecosystem Managers were trained and received the Certificate Emissions Report., these documents allowed documenting the number of gender certificates each of the enrolled properties, and could have clarity on the carbon certificates generated by the property enrolled in the project during the previous verification. (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard B / B3 / Carbon Certificate Emission Reports).

Likewise, they were given the Account Statements, these documents allowed them to present the statement of account of the economic benefits acquired from the commercialization of the carbon certificates in their properties, as well as the verified movements and inventories of carbon certificates (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard B / B3 / Account Statements).

In addition, capacity building and other meetings were used to disseminate the results and progress of the CO2Bio P2 project.

11.2.3 B4 Recognition of Forest Governance Structures

Forest governance is based on the capacity of local people to make decisions on the management and use of their natural capital. Strengthening these local governance structures is crucial. Therefore, in the framework of the implementation of the "G2" project activity, a Governance Strategy has been designed to establish a legal framework, aligning the project's operations with institutional policies and the applicable regulatory framework. This strategy also contemplates an institutional framework to promote efficiency and transparency through participation and transparency mechanisms.

The objective of this strategy is to implement a governance model that provides the necessary tools and conditions so that those involved in the project can make informed and conscious decisions (See folder: 2. Annexes / 3. Safeguards Compliance / Safeguard B / B4 / Governance Strategy).

In addition, spaces were held with organizations such as Latam Airlines, USAID, Casa Lucker and Ecopetrol, within the framework of the III and IV Forum on Biodiversity, Carbon and Water. These spaces were key to exchange experiences, strengthen knowledge and recognize the value of traditional knowledge, as well as the forms of

governance in the territory (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard B / B4 / Capacity Building).

Cataruben also actively participated in the Municipal System of Protected Areas of the Orinoquia (SIRAPO) during the years 2022 and 2023, as a member of the steering committee. Its contribution has been significant in the planning and management of protected areas in the region. This participation has allowed coordinating efforts with other local entities, promoting conservation and sustainable use of natural resources (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard B / B4 / SIRAP).

Cataruben was also a member of the board of directors of the Colombian Association of Carbon Actors (ASOCARBONO). In this role, he established strategic relationships with various entities to promote and strengthen the carbon market in Colombia. This collaboration has been crucial to advance the implementation of policies and projects that support the reduction of emissions and mitigation of climate change in the country.

11.2.4 B5 Capacity building

As part of the implementation of the "G1" project activity on capacity building, three training sessions were held to strengthen the technical capacities of 60 ecosystem managers. These meetings focused on Carbon Monitoring and Measurement, Community Management of Illegal Logging Threats, and Importance of Wetlands for Biodiversity.

Additionally, five knowledge exchanges were held on Alternative Water Solutions, Biodiversity and Climate Change, Non-Timber Forest Products, the Importance of REDD+ Safeguards, and Meliponiculture, with a total participation of 132 ecosystem managers. These exchanges facilitated mutual knowledge enrichment among participants.

According to Activity Report G.1, titled "Capacity building for men and women linked to the project in the following components: technical-environmental, social, and administrative-financial, to strengthen decision-making in favor of the project's objectives", participation in these knowledge exchanges was detailed as follows:

- Alternative Water Solutions: 18 managers
- Meliponiculture: 17 managers
- Biodiversity and Climate Change: 22 managers
- Non-Timber Forest Products: 28 managers
- Importance of REDD+ Safeguards: 47 managers

In total, 132 ecosystem managers took part in these capacity-building activities.

Likewise, within the framework of the III and IV Biodiversity, Carbon, and Water Forum, spaces were held with organizations such as Latam Airlines, USAID, Casa Lucker, and Ecopetrol. The III Forum had 192 beneficiaries of climate change mitigation projects led by Fundación Cataruben, along with strategic partners who significantly contributed to the success of the event. The IV Forum gathered a total of 436 attendees, combining in-person and virtual participation, including ecosystem managers, strategic allies, and individuals interested in conservation. In total, 628 people attended both forums.

Attendance records can be found on pages 23 and 24 of the report. (See folder: 2. Annexes / 3. Safeguards Compliance / Safeguard B / B5 / Capacity Building).

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These spaces were key for the exchange of experiences and the strengthening of knowledge, recognizing both the value of traditional knowledge and local forms of governance. Through active and bidirectional participation, local knowledge was integrated with Cataruben's technical expertise in environmental, social and economic issues. This integrated approach seeks to enhance the capacities of participants and facilitate more informed and effective decision making, promoting the achievement of project objectives in a sustainable manner.

Table 14. Approach and compliance with safeguard B.

SAFEGUARD B THEMATIC NATIONAL INTERPRETATION: INSTITUTIONAL		
Requirement "BCR tool to demonstrate compliance with REDD+ safeguards".	**National Interpretation Element Requirement**	**Compliance**
Implement tools to ensure effective, transparent and efficient disclosure of information associated with project activities. To this end, a record shall be kept of the means used for disclosure.	B2. Transparency and Access to Information: Transparent, accessible and clear. Disseminate through workshops, documents and internet, adapting to the needs.	As part of the implementation of project activities (ID G1 and G2), the project was registered with Renare, as well as the use of communication and information dissemination channels, the PQRS system, and meetings with organizations (see folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard B / B2).
	B3. Accountability: Accountability for management and results.	Within the framework of the implementation of project activities (ID G1 and G2), management reports were issued, as well as carbon certificate emissions reports and the corresponding financial statements (See folder:

		2. Annexes / 3. Safeguards Compliance / Safeguard B / B3).
	B4. Recognition of Forest Governance Structures: Recognize and strengthen forest decision makers to participate in decision making.	As part of the implementation of project activities (ID G2), a governance strategy was designed in the territory (see folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard B / B4).
	B5. Capacity Building: Strengthen the capacities of stakeholders in technical, legal and administrative areas to improve decision making.	Within the framework of the implementation of project activities (ID G1), 3 training spaces, 5 knowledge sharing spaces and 2 forums were created (See folder: 2. Annexes / 3. Safeguard Compliance / Safeguard B / B5).

Source. Fundación Cataruben, 2024

Based on the table above, the following table shows the progress in compliance with Safeguard B and its indicators in relation to the overall goal.

Table 15. Percentage of progress in compliance with Safeguard B, with respect to the Monitoring Plan.

SAFEGUARD B				
National Element	**Item**	**Name of Indicator(s)**	**(%) Progress 2022-2023**	**(%) Global Target Compliance**
B2. Transparency and Access to Information	2.1	Implementation of suitable communication channels to deliver and share project information.	8%	11%
	2.2	PQRS system for addressing and attending to comments, questions, suggestions or complaints.	19%	
	2.3	Digital documents produced and disseminated within the framework of the project, such as brochures, posters, illustrative documents, guides, among others.	8%	
	2.4	Activities or documents carried out with organizations, associations, community action boards or interest groups.	7%	
	2.5	Project registration on the RENARE platform	7%	
B3. Accountability	2.6	Financial Accountability Report	25%	
B4. Recognition of Governance	2.7	Territorial governance strategy	7%	

Structures				
B5. Strengthening Training	2.8	Socializations, workshops, knowledge exchange, capacity building and other scenarios that contribute to building a participatory dynamic.	7%	

Source. Fundación Cataruben, 2024

11.3. Safeguard C.

"Respect for the knowledge and rights of indigenous peoples and members of local communities, taking into consideration relevant international obligations and national circumstances and legislation, and bearing in mind the United Nations General Assembly on the rights of indigenous peoples."

11.3.1 C6 Free Prior and Informed Consent (FPIC)

The consent of the communities enrolled in CO2Bio Proyecto 2 was managed through various spaces dedicated to capacity building, such as training, exchanges and forums. These meetings were previously communicated, detailing the scope of each activity. The participation of the Ecosystem Managers was free and voluntary in all cases (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard C / C6 / Capacity building).

A fundamental step in this process was the updating of the Predial Implementation Plans, in which the Ecosystem Managers formally reaffirmed their consent to continue with the conservation activities of the natural ecosystems. These plans not only consolidated the commitment to conservation planning, but also specified how conservation activities will be implemented on their properties throughout the project.

11.3.2 C7 Respect for traditional knowledge

In compliance with this requirement, the National Land Agency (ANT) requested detailed information on the legalized ethnic communities or in the process of legalization in the departments of Arauca, Casanare, Meta and Vichada. Based on this information, a precise inventory of these communities was prepared in order to avoid overlaps between the land enrolled in CO2Bio Proyecto 2 and these territories. This inventory includes maps that allow a clear and accurate visualization of their location (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard C / C7 / Communities).

Cataruben also strictly complies with national regulations related to private property, ensuring that no negative impacts are generated on the social fabric, traditional

knowledge or local forms of interaction with the territory.

Additionally, in order to avoid overlapping with collective territories, the Request for the Appropriateness and Timeliness of Prior Consultation was processed. In 2022, the National Prior Consultation Authority issued Resolution No. ST-0003, which determined that prior consultation with Indigenous, Black, Afro-Colombian, Raizal, Palenquero and Rom communities was not appropriate. During the 2022-2023 period, there were no territorial expansions of the project or significant changes related to the communities established or in the process of being established (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard C / C7 / Resolution No. ST-0003).

11.3.3 C8 Benefit sharing

The commercialization of the certificates issued and released in the two verifications of CO2Bio Proyecto 2 has generated economic benefits, which have been distributed equitably among the enrolled ecosystem managers. This distribution follows the ABC inventory management principle, applied in carbon projects, where the distribution of benefits is prioritized starting with the properties with the least amount of certificates generated. This ensures that the ecosystem managers receive significant payments, avoiding excessive fragmentation of the amounts and optimizing the administrative efficiency of the process.

In line with this approach, the Management Report is presented, detailing the results related to the issuance of certificates, the economic benefits derived from their commercialization, and the distribution of such benefits among the enrolled properties (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard C / C8 / Management Report).

Also included is the inventory of the delivery of economic benefits generated in the framework of the first and second verification (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard C / C8 / Inventory of delivery of economic benefits).

11.3.4 C9 Land rights

During this verification period, collective land ownership rights have been respected, as a guarantee of this, Resolution No. ST-0003 is presented, which determines that prior consultation is not appropriate for the ethnic communities present in the departments of Arauca, Casanare, Meta and Vichada, areas where the project is being executed (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard C / C9 / Resolution No. ST-0003).

In terms of individual ownership, the ecosystem managers enrolled in CO2Bio Proyecto 2 maintain their land tenure in accordance with the revision of updated legal documents. This process ensures that the communities' land rights are not affected and that the economic benefits generated by the project are distributed equitably among the carbon owners. The detailed analysis can be found in section 7, "Carbon Ownership", of this document.

Table 16. Approach and compliance with safeguard C.

SAFEGUARD C THEMATIC NATIONAL INTERPRETATION: SOCIAL AND CULTURAL		
Requirement "BCR tool to demonstrate compliance with REDD+ safeguards".	**National Interpretation Element Requirement**	**Compliance**
Recognize and respect the rights of the communities present in the territory, establishing working groups and other mechanisms that enrolled them in the project from the prefeasibility and structuring phase. In addition, it must integrate traditional ancestral knowledge and propose new forms of sustainable use of the territory.	C6. Free, Prior and Informed Consent (FPIC): Apply national provisions on consultation and FPIC, in accordance with legislation, jurisprudence and guidance from the Ministry of the Interior.	In the framework of the implementation of project activities (ID G1 and G5), 3 training sessions, 5 knowledge exchanges and 2 forums were organized. In addition, the documents of the Preliminary Implementation Plans were updated (see folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard C / C6).
	C7. Respect for Traditional Knowledge: Respect and promote the traditional knowledge and visions of the territory of ethnic peoples and communities.	In the framework of the project implementation, an inventory of the communities present was prepared and the resolution determining that prior consultation was not appropriate for the ethnic communities was processed (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard C / C7).
	C8. Benefit Sharing: Ensure the participation and fair distribution of derived benefits.	Within the framework of the implementation of project activities, ***14,572,925,881*** COP of economic benefits have been distributed (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard C / C8).
	C9. Territorial Rights: Respect the territorial, collective and individual rights of ethnic and local communities.	In the framework of the implementation of the project activities, the resolution that establishes the non-applicability of prior consultation for ethnic communities was managed. In addition, a legal analysis was conducted on the ownership of 124 properties (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard C / C9).

Source. Fundación Cataruben, 2024

Based on the table above, the following table shows the progress in compliance with Safeguard C and its indicators in relation to the overall goal.

Table 17 . Percentage of progress in compliance with Safeguard C, with respect to the Monitoring Plan.

SAFEGUARD C				
National Element	**Item**	**Name of Indicator(s)**	**(%) Progress 2021-2023**	**(%) Global Target Compliance**
C6. Free, Prior and Informed Consent (CLIPI)	2.1	Working groups held with the communities.	7%	8,5%
C7. Respect for Traditional Knowledge	2.2	Analysis of developed community mappings	7%	
C8. Benefit Sharing	2.3	To supervise and guarantee the adequate distribution of economic benefits.	13%	
C9. Land Rights	2.4	Legal analysis of land tenure	7%	

Source. Fundación Cataruben, 2024

11.4. Safeguard D.

"The full and effective participation of stakeholders, in particular indigenous peoples and local communities."

11.4.1 D10 Participation

Several mechanisms have been implemented to ensure the participation of ecosystem managers and stakeholders in the project. First of all, they had the opportunity to participate in the different scheduled meetings, both virtual and face-to-face, highlighting the III and IV Biodiversity, Carbon and Water Forum, as well as in training and knowledge exchange spaces. These spaces allowed managers to interact, express their opinions and strengthen their skills and technical capacities (See folder: 2. Annexes / 3. Safeguard Compliance / Safeguard D / D10 / Capacity Building).

Stakeholders also had the opportunity to learn about and interact with public content on various social networks, such as Facebook, Instagram and YouTube. (See folder: 2. Annexes / 3. Safeguards Compliance / Safeguards D / D10 / Dissemination Channels).

Likewise, participation was guaranteed through various communication channels, such as telephone lines, WhatsApp and email. In addition, they had the opportunity to be

heard through the PQRS system, where they could submit their requests, complaints and suggestions (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard D / D10 / Communication Channels).

In summary, through these mechanisms it was possible to guarantee the full and effective inclusion of all those involved in the project, ensuring equitable participation, which was fundamental for the success of the project during this monitoring period and to facilitate informed decision making.

Table 18. Approach and compliance with safeguard D.

SAFEGUARD D THEMATIC NATIONAL INTERPRETATION: SOCIAL AND CULTURAL		
Requirement "BCR tool to demonstrate compliance with REDD+ safeguards".	**National Interpretation Element Requirement**	**Compliance**
Demonstrate that you have clearly and effectively shared information with communities and that they had the opportunity to participate.	D10. Participation: Respect the right to full and effective participation of all stakeholders to ensure good governance and appropriate decision making on REDD+.	As part of the implementation of project activities (IDs G1, G2, G5, B1 and A1), various communication and information dissemination channels were used. In addition, participation in two forums, three training spaces, five knowledge exchanges and the use of the PQRS system were promoted. (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard D / D10).

Source. Fundación Cataruben, 2024

Based on the table above, the following table shows the progress made in complying with Safeguard D and its indicators in relation to the overall goal.

Table 19. Percentage of progress in compliance with Safeguard D, with respect to the Monitoring Plan.

SAFEGUARD D				
National Element	**Item**	**Name of Indicator(s)**	**(%) Progress 2022-2023**	**(%) Global Target Compliance**
D10. Participation	4.1	Means of communication for the transparent, clear, complete, inclusive and effective dissemination of information.	7%	7%
	4.2	Real and effective participation mechanisms from the feasibility and structuring phase of the project.	7%	

Source. Fundación Cataruben, 2024

11.5. Safeguard E.

"Compatibility of the measures with the conservation of natural forests and biological diversity, ensuring that the measures identified in paragraph 70 of this decision are not used for the conversion of natural forests, but instead serve to incentivize the protection and conservation of these forests and their ecosystem services and to enhance other social and environmental benefits."

11.5.1 E11 Conservation of forests and their biodiversity

CO2Bio Proyecto 2 activities are primarily designed to conserve forests and biodiversity. Through activity G.3, continuous monitoring of changes in forest area is carried out, ensuring that the ecosystem managers and the Fundación Cataruben have implemented effective conservation actions. To date, the project has protected 19,167.70 hectares of forest (See folder: 2. Annexes / 2. Project Activities / G.3/G.3.Monitoreo continuo de cambios en la Superficie forestal como proporción de la superficie total en las áreas de proyecto

In addition, activities B1 and B2, focused on biodiversity monitoring and High Conservation Values, promote community participation in the conservation of species in Arauca, Casanare, Meta and Vichada. As a result, 335 bird species distributed in 63 families and 237 genera have been identified (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard E / E11 / Biodiversity Monitoring).

11.5.2 E12 Provision of environmental goods and services

Through the capacity building spaces, we seek to gradually transform traditional or local practices, most of which are enrolled in socioeconomic factors. These practices have a direct impact on the management and responsible use of natural capital, promoting benefits for both the social fabric and the material well-being of the communities involved.

Similarly, activity A1, corresponding to the water management program, seeks to optimize the efficient use of water resources and improve their quality. This approach not only contributes to environmental sustainability, but also guarantees the availability of water in adequate conditions for the needs of communities and ecosystems (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard E / E12 / Water Management Program).

To ensure conservation and efficiency in environmental management, the Regional Environmental Corporations (Cormacarena and Corporinoquia) were asked for certifications of no environmental sanctions in the project areas. No violations were evidenced, which highlights Cataruben's commitment to the environment (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard E / E12 / CAR Certificates).

Table 19. Approach and compliance with safeguard E.

SAFEGUARD E THEMATIC NATIONAL INTERPRETATION: ENVIRONMENTAL AND TERRITORIAL		
Requirement "BCR tool to demonstrate compliance with REDD+ safeguards".	**National Interpretation Element Requirement**	**Compliance**
Conserve, protect, restore and sustainably use ecosystems. In addition, they must comply with environmental standards and demonstrate that no activities involving the conversion of natural forests have been carried out.	E11. Forest and Biodiversity Conservation: Support forest conservation and the implementation of measures established for this purpose.	During the implementation of project activities (ID G1, B1 and B2), the effectiveness in the execution of actions for forest conservation is demonstrated (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard E / E11).
	E12. Provision of Environmental Goods and Services: Support the provision and enjoyment of ecosystem services.	Within the framework of the implementation of the project activity (ID A1), the efficient and sustainable use of ecosystem services was promoted, guaranteeing their long-term preservation (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard E / E12).

Source. Fundación Cataruben, 2024

Based on the table above, the following table shows the progress made in complying with Safeguard E and its indicators in relation to the overall goal.

Table 20. Percentage of progress in compliance with Safeguard E, with respect to the Monitoring Plan.

SAFEGUARD E				
National Element	**Item**	**Name of Indicator(s)**	**(%) Progress 2021-2023**	**(%) Global Target Compliance**
E11. Participation	5.1	High Conservation Values Report.	13%	10%
	5.2	No forest conversion.	7%	

E12. Provision of Goods and Environmental Services	5.3	Cycles of training given to the community.	7%	
	5.4	Compliance with environmental regulations	13%	

Source. Fundación Cataruben, 2024

11.6. Safeguard F.

"The adoption of measures to address the risks of reversion."

11.6.1 F13 Environmental and territorial management

To ensure the long-term sustainability of the project, Cataruben carried out a review of the Departmental and Municipal Management Plans and socialized the project with these territorial entities. These actions were fundamental to ensure that the activities designed and implemented are consistent with territorial planning and development.

In addition, representatives of public and private entities participated in the III and IV Biodiversity, Carbon and Water Forum. The main objective with these organizations was to make known the conservation strategy for the project in forest and wetland ecosystems, thus ensuring alignment with the established regulatory guidelines and strengthening the organizations' environmental planning and management (See folder: 2. Annexes / 3. Safeguards Compliance / Safeguard F / F13 / Capacity Building).

In this context and according to the socio-cultural and environmental reality of the departments of Arauca, Casanare, Meta and Vichada, where the CO2Bio Proyecto 2 is being developed, a matrix was designed to analyze and show the project's reversion risk management.

Although this analysis was initially developed using version 1.1 of the “Risk and Permanence Management” tool dated March 19, 2024, it was updated using version 2.0 dated June 3, 2025. Based on this update, the CO2Bio Project 2 has implemented several strategies to ensure the permanence of project activities and benefits.

Following the assessment of the five risk categories (legal/tenure, environmental, financial/operational, governance/political, and social/stakeholder), the project obtained a final weighted average score of 1.13. This corresponds to a low-risk level, justifying a 10% contribution to the buffer pool, in line with the standard’s guidelines (scores ≤ 2.5) (2. Anexos / 9. Post-Registration Changes to the Project / PDD ACTUALIZADO / 9.1. Project Design Document Update / 9.1.1 Anexos DP / 10. Gestión del riesgo / Aneex 1. BCR_risk-and-permanence).

This outcome reflects effective risk management, including clear legal structures, low exposure to natural disturbances, financial and operational stability, and strong relationships with stakeholders. All these actions are aligned with REDD+ Safeguards.

Likewise, this non-permanence risk analysis and management matrix contemplates monitoring indicators and mitigation actions, complying with the criteria established in the AFOLU sector methodological document "Quantification of GHG Emissions REDD+ Project BCR0002", version 4.0 of the Biocarbon Standard, (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard F / F13 / Risk Analysis and Management; Aneex 1. BCR_risk-and-permanence).

In this framework, it is crucial to establish commitments through the project enrolled contract, which defines the specific obligations of the ecosystem managers, focusing on guaranteeing the permanence and monitoring of the conserved area. This establishes the "Reversion Risk" clause, in accordance with the criteria of the "Empowering Sustainability, Redefining Standards" version 3.4 of the Biocarbon Standard. This clause aims to ensure that conservation activities are maintained over time (See folder: 2. Annexes / 3. Safeguards Compliance / Safeguard F / F13 / Linkage Contract).

11.6.2 F14 Sectoral Planning

To continue with the implementation of CO2Bio Proyecto 2 activities, Cataruben conducted a characterization to understand the social, cultural and environmental context of the area where the project is being developed. This allows us to understand the territory and respect local traditions, as well as to improve conservation activities.

An analysis of the Departmental and Municipal Management Plans was also carried out to ensure that the activities designed and implemented are consistent with territorial planning and development.

In order to comply with local, regional, national and international criteria on conservation and biodiversity regulations, a legal compatibility matrix has been consolidated to demonstrate that the activities implemented are aligned with these criteria (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard F / F14 / Legal Compatibility Matrix).

Table 21. Approach and compliance with safeguard F.

SAFEGUARD F **THEMATIC NATIONAL INTERPRETATION: ENVIRONMENTAL AND TERRITORIAL**

Requirement "BCR tool to demonstrate compliance with REDD+ safeguards".	National Interpretation Element Requirement	Compliance
Take measures to reduce the risks of reversion.	F13. Environmental and Territorial Management: Support the consolidation of territorial and environmental management instruments provided for in the	As part of the implementation of the project activity (ID G1), the III and IV Biodiversity, Carbon and Water Forum was held. The Risk Analysis and Management Matrix was also designed, and contractual clauses were

	legislation, with a focus on conservation and sustainable forest management.	established (see folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard F / F13).
	F14. Sectoral Planning: Propose REDD+ actions based on environmental and territorial planning instruments, as well as legislation related to the conservation of forests and their biodiversity.	As part of the project implementation, a legal compatibility matrix was prepared. (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard F / F14).

Source. Fundación Cataruben, 2024

Based on the table above, the following table shows the progress made in complying with Safeguard F and its indicators in relation to the overall goal.

Table 22. Percentage of progress in compliance with Safeguard F, with respect to the Monitoring Plan.

SAFEGUARD F				
National Element	**Item**	**Name of Indicator(s)**	**(%) Progress 2022-2023**	**(%) Global Target Compliance**
F13. Environmental and Territorial Planning	6.1	Reversal risk analysis carried out within the framework of the project	7%	7%
F14. Sector Planning	6.2	Actions to ensure that the project is sustained over time	7%	

Source. Fundación Cataruben, 2024

11.7. Safeguard G.

"The adoption of measures to reduce emissions displacement."

11.7.1 G15 Forestry control and monitoring to prevent displacement of emissions

As part of the implementation of the CO2Bio Project 2, an analysis of the economic, social, and environmental context was conducted in the departments of Arauca, Casanare, Meta, and Vichada, where the project is being developed. According to this analysis, the leakage monitoring carried out within the framework of CO2Bio Project 2 confirms the absence of significant emissions attributable to the implemented REDD+ activities. For the 2022-2023 period, the analyses show that the recorded deforestation in the leakage area (18.85 ha/year) does not represent an increase in GHG emissions compared to the reference scenario. Likewise, no degradation processes affecting forest cover were identified, and land-use changes in wetlands were limited to the

herbaceous stratum without causing increases in carbon emissions. (See folder: 2. Annexes / 3. Safeguard Compliance / Safeguard G / Leakage Management Report).

Taking into account this context, an evaluation of leakage risk analysis and management was projected, which identifies the types of leakage by activity, market, geographic and indirect, as well as the sources of possible leakage and prevention and mitigation actions, among other aspects. Based on this evaluation, it was concluded that there are no leaks that could represent a significant risk for the project activities, (See folder: 2. Annexes / 3. Safeguards Compliance / Safeguard G / G15 / Leakage Identification and Assessment).

so it is not necessary to perform a quantification (See folder: 2. Annexes / 3. Compliance with Safeguards / Safeguard G / G15 / Graphic outputs).

Table 23. Approach to and compliance with safeguard G.

SAFEGUARD G THEMATIC NATIONAL INTERPRETATION: ENVIRONMENTAL AND TERRITORIAL		
Requirement "BCR tool to demonstrate compliance with REDD+ safeguards".	**National Interpretation Element Requirement**	**Compliance**
Identify and control leaks, minimize their impact and implement response protocols.	G15. Forest Control and Monitoring to Avoid Displacement of Emissions: Incorporate measures to reduce emissions displacement in its design and ensure timely monitoring and control when emissions displacement occurs.	As part of the implementation of the project activity, an assessment of potential socioeconomic activities that could trigger a risk of leakage was carried out. (See folder: 2. Annexes / 3. Safeguards Compliance / Safeguard G / G15).

Source. Fundación Cataruben, 2024

Based on the table above, the following table shows the progress in compliance with Safeguard G and its indicators in relation to the overall goal.

Table 24. Percentage of progress in compliance with Safeguard G, with respect to the Monitoring Plan.

SAFEGUARD G				
National Element	**Item**	**Name of Indicator(s)**	**(%) Progress 2021-2023**	**(%) Global Target Compliance**
G15. Forestry Control and Monitoring to Avoid	7.1	Analysis of leakage identification and its causes	13%	13%

Displacement of Emissions:				

Source. Fundación Cataruben, 2024

12. Special categories, related to co-benefits

CO2Bio Proyecto 2 generates additional benefits to the reduction and removal of GHG emissions, under the Orchid category. To monitor this category in the components of biodiversity conservation, community benefits and gender equity, a Co-benefits Monitoring Plan was developed. During the current verification period, this plan was restructured to clearly incorporate the criteria established by the BCR Standard "Empowering Sustainability, Redefining Standards", version 3.4 of June 28, 2024 of the BioCarbon Standard, which allows tracking each of the conditions and indicators established and demonstrating compliance (See folder: 2. Annexes / 5. Cobenefits / Cobenefits Monitoring Plan).

During the 2022-2023 period, 19,167.70 hectares of forests and 52,351.7 hectares of wetlands and 335 species have been conserved. Likewise, 10 spaces for participation were generated and 14,572,925,881 COP in economic benefits were delivered to the Ecosystem Managers. In addition, 48 women landowners occupy leadership positions in the sustainable management of their land and resources.

These benefits have not only improved the quality of life of the communities enrolled in the project, but have also promoted their inclusion and empowerment. The participatory spaces have strengthened the social fabric and increased awareness of the importance of conservation, while the economic benefits have provided stability and opportunities for families. Women's leadership in sustainable management has been instrumental in promoting gender equity, fostering inclusive decision-making and sustainable project development. Together, these impacts helped create more resilient communities committed to environmental protection, ensuring the long-term sustainability of the project.

13. Implementation of the project.

13.1. Implementation status of the project.

The CO2BIO P2 project started in 2016 with the objective of conserving carbon stocks by preventing deforestation and land use change. To achieve this purpose, several key activities have been implemented. The capacity of the men and women enrolled in the

project has been strengthened through training in the technical-environmental, social and administrative-financial components, in order to improve decision-making that contributes to the project's objectives.

A territorial governance strategy has also been developed to promote participatory decision-making for the sustainable management of strategic ecosystems. This governance ensures the integration of different stakeholders in the planning and execution of conservation activities.

In terms of monitoring, changes in the forest area are continuously tracked, evaluating the proportion of forest in relation to the total area within the project areas. In addition, environmental threats, such as fires, are monitored and early warnings are issued for effective management.

The implementation of sustainable production practices is promoted at both the farm and local levels, with the aim of maintaining carbon stocks and conserving biodiversity in ecosystems. Participatory monitoring of biodiversity and HCVs (Areas of Conservation Value) is also carried out to ensure the protection of these spaces.

Finally, a water management program has been implemented to improve the administration and conservation of water resources in the project area.

The implementation status of the activities and their respective indicators is presented below:

13.1.1 Progress of project activities

Table 25. Status of implementation of Activity G.1

ID Activity	G.1: Capacity building for men and women enrolled in the project, in the following components: technical-environmental, social and administrative-financial, in order to strengthen decision-making in favor of the project's objectives. Improved income for landowners generated by the sale of carbon credits.					
Methodology applied	BCR0002 BCR0004					
Indicators for reporting the progress of the activity						
ID Indicator	**Indicator Name**	**Type**	**Overall goal**	**Unit of measure**	**Frequency of monitoring**	**Responsible for measurement**

G-1.1	Impacted properties strengthened in the three components (technical-environmental, social and administrative-financial).	Result	124	No. of properties	Annual	Fundación Cataruben
G-1.2	Trainings implemented in the three components (technical-environmental, social and administrative-financial).	Result	30	No. of trainings	Annual	Fundación Cataruben
Activity progress						
ID Indicator	**Indicator result (2022-2023)**	**General compliance**		**Documents to support the information**	**Remarks**	
G-1.1	124	26%		G.1	Successful progress	
G-1.2	10	60%		G.1	Successful progress	

Table 26. Status of implementation of activity G.2

ID Activity	G.2: Implementation of the territorial governance strategy for participatory decision-making on the sustainable management of strategic ecosystems.					
Methodology applied	BCR0002 BCR0004					
Indicators for reporting the progress of the activity						
ID Indicator	**Indicator Name**	**Type**	**Overall goal**	**Unit of measure**	**Frequency of monitoring**	**Responsible for measurement**
G-2.1	Progress of the governance roundtable	Impact	100	Percentage	Biannual	SOC Unit/Fundación Cataruben
Activity progress						
ID Indicator	**Indicator result (2022-2023)**	**General compliance**		**Documents to support the information**	**Remarks**	

G-2.1	20%	30%	G.2	Successful progress

Table 27. Status of implementation of activity G.3

ID Activity	G.3: Continuous monitoring of changes in forest area as a proportion of total area in project areas.					
Methodology applied	BCR0002 BCR0004					
Indicators for reporting the progress of the activity						
ID Indicator	**Indicator Name**	**Type**	**Overall goal**	**Unit of measure**	**Frequency of monitoring**	**Responsible for measurement**
G-3.1	Rate of change of coverage	Result	14	Report	Biannual	Fundación Cataruben
Activity progress						
ID Indicator	**Indicator result (2022-2023)**	**General compliance**	**Documents to support the information**	**Remarks**		
G-3.1	7,14	21,43	Report	Successful progress		

Table 28. Status of implementation of activity G.4

ID Activity	G.4: Monitor environmental threats (fire) in the project area and/or possible management alerts.					
Methodology applied	BCR0002 BCR0004					
Indicators for reporting the progress of the activity						
ID Indicator	**Indicator Name**	**Type**	**Overall goal**	**Unit of measure**	**Frequency of monitoring**	**Responsible for measurement**

G-4.1	Thermal anomalies/land cover fire monitoring	Impact	14	Report	Biannual	Fundación Cataruben
Activity progress						
ID Indicator	**Indicator result (2022-2023)**	**General compliance**		**Documents to support the information**	**Remarks**	
G-4.1	7,14	21,43		Report	Successful progress	

Table 29. Status of implementation of activity G.5

ID Activity	G.5: Promote the implementation of sustainable productive actions and practices at the farm and local levels to maintain carbon stocks and conserve biodiversity in strategic ecosystems.					
Methodology applied	BCR0002 BCR0004					
Indicators for reporting the progress of the activity						
ID Indicator	**Indicator Name**	**Type**	**Overall goal**	**Unit of measure**	**Frequency of monitoring**	**Responsible for measurement**
G-5.1	Farms that implement sustainable production practices (SPP), ecosystem conservation actions and strategies.	Impact	124	Report	Annual	Fundación Cataruben
Activity progress						
ID Indicator	**Indicator result (2022-2023)**	**General compliance**		**Documents to support the information**	**Remarks**	
G-5.1	19,03%	34,03%		G.5	Successful progress	

Table 30. Status of implementation of activity B.1

ID Activity	B.1: Participatory Biodiversity Monitoring

Methodology applied	BCR0002 BCR0004					
Indicators for reporting the progress of the activity						
ID Indicator	**Indicator Name**	**Type**	**Overall goal**	**Unit of measure**	**Frequency of monitoring**	**Responsible for measurement**
B.1	Percentage of Co2Bio initiative properties with progress in the monitoring stages implemented (1. baseline, ii. biodiversity monitoring and iii. closing socialization of results).	Result	14	Report	Biannual	Fundación Cataruben
Activity progress						
ID Indicator	**Indicator result (2022-2023)**	**General compliance**		**Documents to support the information**	**Remarks**	
B.1	7,14%	24,42%		Biodiversity participatory acoustic monitoring report	Successful progress	

Table 31. Status of implementation of activity B.2

ID Activity	B.2: HCV Monitoring					
Methodology applied	BCR0002 BCR0004					
Indicators for reporting the progress of the activity						
ID Indicator	**Indicator Name**	**Type**	**Overall goal**	**Unit of measure**	**Frequency of monitoring**	**Responsible for measurement**

B.2	Areas of Conservation Value (HCV) indicator report, for the different components HCV1 Species Richness, HCV2 Landscape, HCV3 Important Ecosystems and HCV4 Eco-system Services.	Result	12	Report	Biannual	Fundación Cataruben
Activity progress						
ID Indicator	**Indicator result (2022-2023)**	**General compliance**	**Documents to support the information**	**Remarks**		
B.2	7,14%	24,42%	B.2	Successful progress		

Table 32. Status of implementation of activity A.1

ID Activity	Water Management Program					
Methodology applied	BCR0002 BCR0004					
Indicators for reporting the progress of the activity						
ID Indicator	**Indicator Name**	**Type**	**Overall goal**	**Unit of measure**	**Frequency of monitoring**	**Responsible for measurement**
A.1	Percentage of CO2BIO initiative properties with diagnosis, design, implementation and monitoring of water management.	Result	100	Report	Percentage	Fundación Cataruben
Activity progress						
ID Indicator	**Indicator result (2022-2023)**	**General compliance**	**Documents to support the**	**Remarks**		

			information	
A.1	Percentage of CO2BIO initiative properties with diagnosis, design, implementation and monitoring of water management.	20%	A1: Programa de gestión hídrica	Successful progress

13.1.2 Risk Management Monitoring

As part of the monitoring of the REDD+ CO2BIO P2 project, a detailed analysis of leakage areas in viable properties was conducted to identify the factors responsible for forest cover loss during the 2022-2023 period. A spatial approach based on **Google Earth Engine** was used, allowing the correlation of flood areas with zones of forest loss. The analysis revealed that **recurrent floods** act as an **external agent of forest disturbance**, causing forest cover loss in areas where the project's control mechanisms cannot mitigate these natural effects. In Table **2 of the Forest Cover Loss Report 2022-2023**, reported that the total forest loss in leakage areas amounted to **37.7 hectares**, of which **26.8 hectares** were affected by recurrent floods.2. Anexos / 8. Geospatial / 8.1 REDD / 8.1.5 Informe / 8.1.5.1.1.Report Forest Cover 2022 - 2023).

In the CO2BIO P2 project, wetland cover loss was assessed, focusing on areas vulnerable to flooding and external pressures. Using Google Earth Engine, flood-prone modeled areas were correlated with documented losses, showing that the main cause of degradation is hydrological return and seasonal fluvial dynamics. In leakage areas outside the project's control, the loss is exacerbated by human activities such as agricultural expansion and illegal logging.

According to **Table 2 of the Wetland Reduction Report 2022-2023**, wetland cover decreased by **52.6 hectares**. Of this loss, **29.02 hectares** were converted into cultivated areas, while **23.64 hectares** became dunes and beaches due to hydrological return cycles in the region (2. Anexos / 8. Geospatial / 8.2 Humedal / 8.2.4 Informe / 8.2.4. 1. Wetland Decrease Report 2022 - 2023).

13.1.3 Leakage and non-permanence risk management

To analyze and evaluate the risks of leakage, a matrix was developed to identify the types of leakage according to activity, market, geographic context and indirect sources. In addition, actions were defined to prevent the displacement of actors and mitigate potential leakage that could generate additional GHG emissions. This risk management was carried out in accordance with the criteria of the environmental and social

safeguard "G" for REDD+ projects, which establishes the identification, control and minimization of leakage, in addition to the reduction in the displacement of emissions (see folder: 2. Annexes / 3.)

Upon detection of a possible leak, the response protocol is activated, which includes the communication channels established to report the displacement of activities. The existence of the displacement is then verified by satellite analysis to determine the significance of the displacement of emissions. If the leak is confirmed, it is quantified and the relevant mitigation mechanisms are activated. All management is documented in the leakage control report (see folder: 2. Annexes / 3. Safeguards Compliance / Safeguards F / F13 / Risk Analysis and Management).

Regarding the risk of reversal, which could compromise the permanence of the project, a risk assessment matrix was developed considering five categories: legal/tenure, environmental, financial/operational, governance/political, and community/stakeholder. This matrix was created in accordance with the criteria established in the updated “Risk and Permanence Management” tool, version 2.0 dated June 15, 2025, as defined by the BioCarbon Standard. Based on the assessment of these five categories, the project achieved a final weighted average score of 1.13. This qualifies as low risk, justifying a 10% buffer pool contribution, according to standard guidelines (scores ≤ 2.5). The result reflects effective risk management, including clear legal structures, low exposure to natural disturbances, financial and operational stability, and strong stakeholder relationships. These actions align with REDD+ Safeguards (2. Anexos / 9. Post-Registration Changes to the Project / PDD ACTUALIZADO / 9.1. Project Design Document Update / 9.1.1 Anexos DP / 10. Gestión del riesgo / Aneex 1. BCR_risk-and-permanence).

In addition, the non-permanence risk analysis and management matrix includes monitoring indicators and mitigation actions, in compliance with the methodological guidelines of the AFOLU sector in the document "Quantification of GHG Emissions REDD+ Project BCR0002", version *3.1. September 15, 2022* of the BioCarbon Standard. In the risk analysis for the 2022-2023 period, no high or medium category risks were identified that could compromise the permanence of the project in the long term (see folder: 2. Annexes / 3. Safeguards Compliance / Safeguard F / F13 / Risk Analysis and Management).

13.1.4 Uncertainty management

Under the guidelines of methodologies BCR0002 (section 13.1) and BCR0004 (section 15), *"uncertainty management is determined by the accuracy of the maps used to estimate activity data, and the application of discounts in emission factors"*. In this context, during the present monitoring period, uncertainty management was applied to

the data sources used to calculate activity data and emission factors as follows:

13.1.4.1 Activity Data Uncertainty

For activity data, the maps used are required to be more than 90% accurate. In this context, for the REDD+ component, the area covered by natural forest was modeled for the year 2023. forest validation was carried out through AcATaMa, a QGIS add-on designed specifically for this purpose (AcATaMa Instructions; Procedure Inventory design and classification model validation from field data). This validation process corresponds to a comparison between the results of the forest classifications and a set of reference data, ranging from in situ observations to high resolution images, or in their absence, of a higher resolution than those used to generate the classification.

For the year evaluated, AcATaMa generated a confusion matrix that facilitates the calculation of various metrics for evaluating the classification, including Accuracy, which determines the level of accuracy achieved in the classification; for the map of area covered by natural forest it reached 96.0%.

For the wetlands component, the confusion matrix was used, a method similar to AcATaMa but specially designed for the 2023 land cover map (see folder: 2. Annexes / 8. Geospatial / 8.2. Wetlands / 8.2.3. Cover Validation Matrix / Validation of the land cover classification model). The computer-aided interpretation was contrasted with in situ observations and high resolution images from sensors such as WorldView 2 (spatial resolution 0.30m/pixel) and Sentinel 2 (spatial resolution 10 m/pixel). The accuracy result was 98.8%.

13.1.4.2 Uncertainty of emission factors

In the case of the emission factors, the same values initially validated and applied in the previous verifications were used, in which an uncertainty of less than 10% was estimated. The procedures for calculating the uncertainty in the emission factors are described in the DpoP, section 3.5.

13.2. Changes after the GHG project registration.

13.2.1 Temporary deviations

During the monitoring period, no temporary deviations occurred in the registered monitoring plan, the applied methodologies, or other regulatory documents of the BCR. Therefore, it was not necessary to implement alternative monitoring mechanisms or apply more conservative values in accordance with the BCR Standard Operating Procedures.

13.2.2 Permanent changes

13.2.2.1 Corrections

The project completion date has been updated from December 31, 2045, to May 5,

2048.

13.2.2.2 Permanent Changes in the Monitoring Plan, BCR Program Methodologies in Use, or Other Regulatory Documents Related to BCR Program Methodologies

No permanent changes were identified in the registered monitoring plan, the applied methodologies, or other regulatory documents of the BCR program during this monitoring period.

13.2.2.3 Changes in the GHG Project Design

During this monitoring period, two changes were made to the GHG project design:

Project Area Update: This change was due to the removal or addition of one or more sites within the multi-site GHG project, in compliance with section 14.5.2.3 (f) of the Standard Operating Procedures (SOP), Version 1.3. The modification reflects the update of project areas resulting from the voluntary withdrawal of properties.

Activity Reporting Plan: A modification was made to the Activity Reporting Plan to consolidate the monitoring plans for activities related to forests and wetlands, optimizing the integration and monitoring of both ecosystems.

Both changes are included in this monitoring report with the required technical details and justifications, adhering to the guidelines established in the BCR program's Standard Operating Procedures.

Below is a detailed description of each deviation:

Table 33. List of changes applied to this follow-up period.

Component	Description of deviations
Project Areas Update	During this monitoring period, the voluntary withdrawal of 19 properties was formalized, leading to a modification in the project's total area. These properties, once excluded, no longer participate in conservation activities nor contribute to the expected emission reduction benefits within the project framework. The exclusion of these properties has been recorded and will be reflected in the corresponding verification reports. See: ___.Section, 16. Quantification of GHG emission reductions/removals and Section 7 Carbon Ownership and Rights.. *The project areas have been updated. The forest area has changed from 19,823.74 ha to 18,437.1 ha(Annexes / 8. Geospatial / 8.1. REDD / 8.1.1. Geodatabase_REDD / REDD CO2BIO P2 V3.gdb / Area_de_Proyecto / Bosque_AP_Monitoreo_2020_2021_V2.shp), and the*

	wetland area has changed from 62,383 to 52,553.5 (Annexes / 8. Geospatial / 8.2. Wetland/ 8.2.1. Geodatabase_Humedales / HUMEDALES CO2BIO P2 V3.gdb / Area_de_Proyecto / Humedales_AP_Monitoreo_2020_2022_V2.shp). Also, the number of properties linked to the project has been reduced from 143 to 124.
Updating the formats and tools of the project document.	The PDD was updated to version 2.0, transferring the information to the updated project document format template. The updated tools were also incorporated and tools were integrated to show the progress of the project activities In this sense, monitoring plans for forests and wetlands, previously managed independently, were consolidated. This adjustment was deemed appropriate as both plans shared similar objectives, methods, and expected outcomes. This unification simplified monitoring and improved coherence in data collection. Activities, indicators, and targets for the project's accreditation period (30 years) were adjusted accordingly. These updates are reflected in Version 3 of the Project Activity Monitoring Plan, detailing the consolidated activities along with new indicators and targets. The consolidation of activities was conducted through an exhaustive and meticulous review, ensuring that the combined activities maintained coherence and achieved synergies that not only simplify monitoring but also enhance the effectiveness of implemented actions. This deviation is considered appropriate for the following reasons: Operational Efficiency: Consolidation reduces redundant efforts, enabling more efficient management of human and financial resources. Clarity and Focus: Grouping similar activities facilitates tracking and evaluating components, providing a clearer and more focused view of progress and results. Improved Information Management: The reduction in activities allows for better data collection and analysis.

Source: Fundación Cataruben, 2024.

13.3. Notification or request for approval of changes

Notification or Request for Approval of Changes: In compliance with the guidelines of the BioCarbon Registry (BCR) standard and the provisions in the Standard Operating

Procedures (SOP) Version 1.3 regarding changes after the registration of GHG projects, Fundación Cataruben notified BioCarbon via email of the withdrawal of properties from the project. As part of this verification exercise, these changes are included for evaluation. Supporting documents and corresponding annexes are organized in the following folder, See: Post- Registration changes to the Project.

14. Grouped projects

The Project does not consider the inclusion of new areas after validation.

15. Monitoring system

15.1. Description of the follow-up plan

Sections 15.2 and 16 of this monitoring report detail both the data and the procedures used to quantify the baseline or reference scenario. In addition, the methods used to calculate the greenhouse gas (GHG) emissions from the project and due to leakage, which were recorded during the monitoring period, are presented.

15.2. Data and parameters for quantifying emission reductions

The quantification of baseline, project and leakage emissions requires the definition of activity data and emission factors. Thus, the data and parameters used for their estimation are described below:

15.2.1. Data and parameters determined in the registry and not monitored during the monitoring period, including default values and factors.

Data/Parameter	***Total biomass in forests***
data unit	*t/ha*
Description	*Plant biomass contained in forest ecosystems (Orinoco Biome). It is estimated from the sum of aboveground biomass (BA) and belowground biomass (BS).*
Source of data	*Ministry of Environment and Sustainable Development - IDEAM (2019)*
Values	*412,66*
Indicate what the data is used for (Baseline/Project/Le	- *Carbon emission factor in total biomass.*

akage Emission Calculations)	- *Calculation of baseline deforestation emissions.* - *Calculation of emissions from deforestation in the scenario with the project.* - *Calculation of emissions from deforestation in leakage areas.*
Justification for the choice of data or description of the measurement methods and procedures applied.	*The value is taken from the evaluated proposal of the national reference emission level (NREF), so it represents a conservative value, according to the national context for the estimation of GHG emissions.*
Additional comments	*N/A*

Data/Parameter	***Mean difference in aboveground biomass***
data unit	*t/ha*
Description	*Changes in aboveground biomass stocks between fragmentation classes (Core - Patch and Perforated - Patch).*
Source of data	*Ramirez-Delgado et al. (2018) - Estimating Colombia's forest degradation through fragmentation analysis, in their Annex 2.*
Values	*Core - patch transition = 117.46* *Perforated - patch transition = 83.23*
Indicate what the data is used for (Baseline/Project/Leakage Emission Calculations)	- *Emission factor for degradation* - *Calculation of baseline degradation emissions.* - *Calculation of emissions due to degradation in the scenario with the project.* - *Calculation of emissions due to degradation in leakage areas.*
Justification for the choice of data or description of the measurement methods and procedures applied.	$$\Delta BA_{perforated-patch} = BA_{perforado} - BA_{parche}$$ *Where:* $\Delta BA_{núcleo/perforado-parche}$ *= Changes in aboveground biomass stocks between fragmentation classes.* $BA_{núcleo}$ *= Average aboveground biomass in the core class*

	$BA_{perforado}$ = Average aboveground biomass in the Perforated class BA_{parche} = Average aboveground biomass in patch class
Additional comments	*Selection of values according to the type of forest.*

Data/Parameter	***Soil organic carbon in forests***
data unit	*tC/ha*
Description	*Cumulative soil carbon content in forest ecosystems*
Source of data	*Ministry of Environment and Sustainable Development - IDEAM (2019)*
Values	*65*
Indicate what the data is used for (Baseline/Project/Leakage Emission Calculations)	- *Soil carbon emission factor (COS)* - *Calculation of baseline deforestation emissions.* - *Calculation of emissions from deforestation in the scenario with the project.* - *Calculation of emissions from deforestation in leakage areas.*
Justification for the choice of data or description of the measurement methods and procedures applied.	*The value is taken from the evaluated proposal of the national reference emission level (NREF), so it represents a conservative value, according to the national context for the estimation of GHG emissions.*
Additional comments	*N/A*

Data/Parameter	***Total biomass in wetlands***
data unit	*t/ha*
Description	*Plant biomass contained in wetland ecosystems. It is estimated from the sum of aboveground biomass (BA) and belowground biomass (BS).*
Source of data	*Own data*
Values	*Herbaceous stratum = 14.43* *Aquatic Stratum = 14.79* *Dispersed stratum = 79.44*

Indicate what the data is used for (Baseline/Project/Leakage Emission Calculations)	- *Definition of the carbon emission factor in total biomass for herbaceous and sparse strata in wetlands.* - *Calculation of emissions in baseline forest ecosystems.* - *Calculation of emissions in forest ecosystems in project areas.* - *Calculation of emissions in forest ecosystems in leakage areas.*
Justification for the choice of data or description of the measurement methods and procedures applied.	*Sampling was conducted according to nationally validated methodologies and was carried out in eligible project areas.*
Additional comments	

Data/Parameter	***Soil organic carbon in wetlands***
data unit	*t/ha*
Description	*Carbon content of soils in wetland coverages*
Source of data	*Own data*
Values	*Herbaceous stratum = 274.2* *Aquatic Stratum = 767.9* *Dispersed stratum = 350.3*
Indicate what the data is used for (Baseline/Project/Leakage Emission Calculations)	- *Definition of the soil carbon emission factor for herbaceous and sparse strata in wetlands.* - *Calculation of emissions in baseline forest ecosystems.* - *Calculation of emissions in forest ecosystems in project areas.* - *Calculation of emissions in forest ecosystems in leakage areas.*
Justification for the choice of data or description of the measurement methods and procedures applied.	*Sampling was conducted according to nationally validated methodologies and was carried out in eligible project areas.*
Additional comments	

15.2.2. Monitored data and parameters

Data/Parameter	***Eligible forest area***
data unit	*Hectares*
Description	*Areas within the geographical boundaries of the project that correspond to the forest category, according to the national definition of forest. Year 2023.*
Source of data	*Forest and Carbon Monitoring System*
Values	*18,347.7 hectares*
Indicate what the data is used for (Baseline/Project/Leakage Emission Calculations)	- *Calculation of emissions in forest ecosystems in project areas.* - *Calculation of emissions in forest ecosystems in leakage areas.*
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	*ArcGISV3.2 and QGIS V3.28 software, Google Earth Engine. Accuracy Atacama = 96.0*
Measuring/reading/recording frequency	*Annual*
Calculation method (if applicable)	*Eligible areas monitoring procedure*
Quality control procedures applied	*AcATaMa procedure*

Data/Parameter	***Eligible Wetlands Area***

data unit	*Hectares*
Description	*Areas within the geographical boundaries of the project that correspond to the category of wetlands (herbaceous, aquatic, and dispersed), according to the national definition of wetlands.*
Source of data	*Sentinel 2 remote sensor satellite imagery, 10-meter spatial resolution, 10-day temporal resolution, supported by in situ observations. Planet imagery and Sentinel 1 radar support.*
Value(s) of the monitored parameter	*52,312 hectares*
Indicate what the data is used for (Baseline/Project/Leakage Emission Calculations)	- *Calculation of emissions in eligible wetland ecosystems - project areas.* - *Calculation of emissions in wetland ecosystems in leakage areas.*
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	*ArcGISV3.1 and QGIS V3.28* *Accuracy Land Cover Maps 2023. 0.98 Confusion Matrix.* *The description of the information used is found in 8.2.7. Satellite Images Corine Interpretation, and 8.2.8. Geospatial Information Management BCR0004.*
Measuring/reading/recording frequency	*Annual*
Calculation method (if applicable)	*Eligible areas monitoring procedure*
Quality control procedures applied	*Formats for on-site observations and field coverages* *Procedure Confusion Matrix* *Characterization of cartographic inputs* *Instructions for land cover interpretation under the Corine Land Cover methodology adapted for Colombia, scale 1:100-000.*

16. Quantification of GHG emission reductions/removals

16.1. Baseline emissions

The quantification of reference emissions was performed according to the guidelines of the BCR0002 (Version *3.1. September 15, 2022*) and BCR004 (*Version 2.0 23 June 2022*) methodology. In this sense, a general description of the formulas and values used are described below.

16.1.1. Baseline emissions from forest deforestation

The calculation of the activity data was based on the historical change in forest area recorded in the reference region, applying the following equation:

$$FSC_{yr} = \left(\frac{1}{t_2 - t_1}\right) x \left(A_1 - A_2\right)$$

Where:

FSC_{yr}	Annual change in the surface covered by forest in the reference region; ha
t_1	Initial year of reference period; year
t_2	Final year of reference period; year
A_1	Forest surface in the reference region in the initial moment; ha
A_2	Forest surface in the reference region in the final moment; ha

According to the historical trend of deforestation in the reference region, the change in forest area in the eligible area of the project was projected. For the period of analysis, there was an adjustment in the eligible area, so the projection of $FSC_{proyect,\,yr}$ was adjusted according to the new conditions (section 1.4 describes in detail the adjustments applied).

With respect to the emission factors, the BCR0002 methodology establishes that the validated values can be applied in the estimation of monitored emissions. Therefore, the same values were used for this monitoring period.

In this sense, the following equation was applied to quantify emissions from deforestation in the reference scenario:

$$AE_{bl,yr} = AD_{bl,yr} \; x \; TCO_{2eq}$$

Where:

$AE_{lb,yr}$ Annual emission in the baseline scenario; tCO /ha$_2$

$AD_{bl,yr}$ Historical annual deforestation in the baseline scenario; ha

TCO_{2eq} Total carbon dioxide equivalent; tCO_{2e} /ha

On the other hand, for the estimation of the annual change in forest areas in the reference scenario, a deforestation rate of 0,0116 was estimated based on the historical average recorded for the area. Likewise, an adjustment for national conditions was made to the FSC, according to the values estimated in the most recent version of the NREF. [2]

Table 34 shows the projected changes in the without-project scenario and the calculation of baseline GHG emissions due to forest deforestation.

Table 34. Reference emissions from forest deforestation during the monitoring period.

Year	Adjustment for national circumstances (%CN)	FSCIb + %CNN (ha)	CTeq (tCO2e/ha)	GHG emissions in the baseline scenario (tCO2e/year)
2022	53,55%	352,67	723,1	255.010
2023	25,90%	268,94		194.465

Source: Fundación Cataruben.

The step-by-step calculations can be reviewed in *Annex 7. Emission monitoring / 1. Emissions_CO2Bio_P2_V3*

16.1.2. Reference Emissions from Forest Degradation

The quantification of emissions due to forest degradation in the reference scenario considered the effects on carbon stocks between the transitions from core forest to patch and perforated forest to patch. Thus, the calculation of baseline activity data was carried out using the following equations:

[2] For the year 2022, the values reported in the NREF 2028 - 2022 were used and for the year 2023, the new proposed NREF 2023 - 2027 was used.

$$PFD_{bl,yr} = \left(\frac{1}{t_2 - t_1}\right) x \left(A_{core,bl} - A_{c-p,bl}\right)$$

Where:

$PFD_{bl,yr}$	Annual historical primary forest degradation in baseline scenario; ha
t_2	Final year of the reference period; year
t_1	Initial year of the reference period; year
$A_{core,lb}$	Area in core class of the reference region, in the start of the reference period; ha
$A_{core-pat,lb}$	Reference region area that changes from the core to patch in the final year of the reference period; ha

And,

$$SFD_{bl,yr} = \left(\frac{1}{t_2 - t_1}\right) x \left(A_{perforated,bl} - A_{perforated-pat,bl}\right)$$

Where:

$SFD_{bl,}$	Annual secondary forest degradation in baseline scenario; ha
t_2	Final year of the reference period; year
t_1	Initial year of the reference period; year
$A_{perforated,lb}$	Area in a perforated class of the reference region, in the initial year of the reference period; ha
$A_{per-par,bl}$	Area in the reference region that change from perforated to patch in the final year of the reference period; ha

Subsequently, the activity data was multiplied by the equivalent carbon value contained in the difference of total biomass between fragmentation classes for the two types of degradation (primary and secondary), applying the following equation:

$$AE_{fd,bl,yr} = \left(PFD_{bl,yr} xDTBCO_{2eq,1}\right) + \left(SFD_{bl,yr} xDTBCO_{2e,2}\right)$$

Where:

$AE_{fd,bl,yr}$	Annual emission due to degradation, in the baseline scenario; tCO2/ha
$PFD_{bl,yr}$	Annual primary degradation in the baseline scenario; ha
$SFD_{bl,yr}$	Annual secondary degradation in the baseline scenario; ha
$DTBCO_{2eq,1}$	Carbon dioxide equivalent in the difference of total biomass per hectare, in the class of primary degradation ; tCO2e/ha
$DTBCO_{2eq,2}$	Carbon dioxide equivalent in the difference of total biomass per hectare, in the class of secondary degradation ; tCO2e/ha
1,2	Degradation type; 1-primary degradation, 2.secondary degradation

Table 35 presents the quantification of baseline GHG emissions due to forest degradation, contemplating the period 2022 - 2023.

Table 35. Reference emissions from forest degradation, for the monitoring period.

Year	Type of degradation	FD,bl,yr (ha)	DTBCO2,i (tCO2e/ha)	GHG emissions in the baseline scenario (tCO2e/year)
2022	Core - Patch (Primary)	75,61	251,85	19.052
2022	Perforated - Patch (secondary)	0,06	177,86	
2023	Core - Patch (Primary)	66,53	251,85	16.760
2023	Perforated - Patch secondary)	0,02	177,86	

Source: Fundación Cataruben, 2024

The step-by-step calculations can be reviewed in *Annex 7. Emissions monitoring / 1. Emissions_CO2Bio_P2_V3 /*

16.1.3. Baseline emissions from changes in land use in wetlands

The calculation of emissions due to changes in the natural cover of the wetland and emissions in the project area during the monitoring period was performed using the equation:

$$CNVC_{BL} = \left(\frac{1}{t_2 - t_1} ln \frac{A2}{A1}\right) x\, Ap$$

Where:

$CNVC_{BL}$	change in the area with natural vegetation cover in the baseline scenario, in the reference region (ha/year).
t_1	beginning year of the reference period in which the changes are analyzed
t_2	ending year of the reference period in which, the changes are analyzed
A_1	area in natural vegetation cover in the reference region in t1; (ha)
A_2	area in natural vegetation cover in the reference region in t2 ; (ha).
Ap	eligible area for the project (ha)

and,

$$AE_{BL} = LUC_{BL}\left(BCF_{eq} + cos_{eq}\right)$$

Where:

AE_{BL}	Annual emission in the baseline scenario; tCO /ha/year$_{2e}$
LUC_{BL}	Historical changes in the baseline scenario (ha/year)
BCF_{eq}	Carbon dioxide equivalent contained in total biomass; tCO /ha$_{2e}$
COS_{eq}	Carbon dioxide equivalent contained in soils; tCO /ha$_{2e}$

Table 36. Describes the baseline emissions for each stratum.

Table 36. Baseline emissions from land use change in Wetlands, in the period 2023.

Stratum	Year	CSCN*bl (ha/year)*	CTeq (tCO2e/ha)	GHG emissions in the baseline scenario (tCO2e/year)
Herbaceous	2023	1271,74	75,1	95.767
Aquatic	2023	0,26	166,3	42
Dispersed	2023	45,83	201,1	9.218
Total				105.026

Source: Fundación Cataruben, 2024.

The step-by-step calculations can be reviewed in *Annex 7. Emissions monitoring / 1. Emissions_CO2Bio_P2_V3 /*

16.2. Project emissions/removals

The estimation of project emissions during the monitoring period was carried out in accordance with the guidelines for emissions monitoring established in BCR 0002 (section 14.5) and BCR 0004 (section 16.5) methodologies.

Thus, only activity data was monitored. The emission factors applied correspond to those initially validated and used for the baseline calculations.

16.2.1. Emissions from forest deforestation

The estimation of deforestation in the project area involved the analysis of the change from forest to non-forest area during the monitoring period. Subsequently, the change value was related to the emission factor to calculate the GHG emissions in the project area. The following equations were applied to perform the analyses:

$$FSC_{REDD+project,yr} = \left(\frac{1}{t_2 - t_1}\right) x \left(A_{REDD+project,1} - A_{REDD+project,2}\right)$$

Where:

$FSC_{proj,yr}$ Annual change in the area covered by forest in the project area; ha

t_2 Final year of the reference period; yr

t_1	Initial year of the reference period; yr
$A_{REDD+project,1}$	Forest surface in the project area at the beginning of the monitoring period; ha
$A_{REDD+project,2}$	Forest surface in the project area at the end of the monitoring period; ha

And,

$$AE_{REDD+project,yr} = AD_{REDD+proj,yr} xTCO_{2eq}$$

$EA_{REDD+project,yr}$	Annual emission in the project area; tCO2/ha
$AD_{REDD+project,yr}$	Annual deforestation in the project area; ha
TCO_{2eq}	Total carbon dioxide equivalent; tCO2e/ha

For the 2022 - 2023 period, an average annual forest cover loss of 44.70 ha/year was recorded in the project areas. This corresponds to 32,321 tCO2e per year (Table 37). This behavior is mainly due to natural causes that compromise forest cover, such as flood return periods during monitoring (8.1.5.1.1.Report Forest Cover 2022 - 2023).

Table 37. Project emissions from deforestation, for the period 2022 - 2023.

Year	FSCproject,yr (ha/year)	TCOeq (tCO2e/ha)	Project GHG Emissions (tCO2e)
2022	44,7	723	32.321
2023	44,7		32.321

Source: Fundación Cataruben, 2024

The step-by-step calculations can be reviewed in *Annex 7. Emission monitoring / 1. Emissions_CO2Bio_P2_V3 /*

16.2.2. Emissions from forest degradation

The estimation of annual degradation in the project area was estimated with the following equations:

$$PFD_{REDD+proj,yr} = \left(\frac{1}{t_2 - t_1}\right) x \left(A_{core} - A_{c-p}\right)$$

Where:

$PFD_{REDD+project,yr}$	Annual primary forest degradation in the project area; ha
t_1	Initial year of the monitoring period; yr
t_2	Final year of the monitoring period; yr
A_{core}	Area in core class in the project area, in the year of the start of the monitoring period; has
A_{c-p}	Project area that changes from the core to patch in the final year of the monitoring; ha

And,

$$SFD_{REDD+project,yr} = \left(\frac{1}{t_2 - t_1}\right) x \left(A_{perforated} - A_{perforado-patch}\right)$$

Where:

$SFD_{REDD+proj,yr}$	Annual secondary degradation in the project area; ha
t_1	Initial year of the monitoring period; yr
t_2	Final year of the monitoring period; yr
$A_{perforated}$	Area in perforated class in the project area, in the initial year of the monitoring period; ha
$A_{perforated-patch}$	Area in the project area that changes from perforated to patch in the final year of the monitoring period; ha

The annual emission due to degradation in the project area is estimated as follow:

$$AE_{fd,REDD+project,yr} = (PFD_{REDD+project,yr} \; x \; DTBCO_{2eq,1}) + (SFD_{REDD+project,yr} \; x \; DTBCO_{2eq,2})$$

Where:

$AE_{fd,REDD+project,yr}$	Annual emission due to degradation in the project area; tCO2 ha-1
$(PFD_{REDD+project,yr}$	Annual primary forest degradation in the project area; ha
$(SFD_{REDD+project,yr}$	Annual secondary degradation in the project area; ha
$DTBCO_{2eq,1}$	Carbon dioxide equivalent in the difference of total biomass per hectare, in the class of primary degradation; tCO2e ha-1
$DTBCO_{2eq,2}$	Carbon dioxide equivalent in the difference of total biomass per hectare, in the class of secondary degradation; tCO2e ha-1
1,2	Degradation type; 1-primary degradation, 2-secondary degradation

During the monitoring period, alterations in forest area due to primary degradation were observed in the year 2022. For the period 2023, no changes were observed, therefore, annual emissions for the period 2023 are considered zero (0) (Table 38).}

Table 38. Project emissions by degradation, for the period 2022 - 2023.

Year	Type of degradation	FD project, year (ha/year)	DTBCOi (tCO2e/ha)	Project GHG Emissions (tCO2e)
2022	Core - Patch (Primary)	0,05	251,85	12
2022	Perforated - Patch (Secondary)	0,00	177,86	
2023	Core - Patch (Primary)	0,00	251,85	

2023	Perforated - Patch (Secondary)	0,00	177,86	

Source: Fundación Cataruben, 2024

The step-by-step calculations can be reviewed in *Annex 7. Emission monitoring / 1. Emissions_CO2Bio_P2_V3*

16.2.3. Emissions from land use change in wetlands

The calculation of emissions due to changes in the natural cover of the wetland and emissions in the project area during the monitoring period was performed using the equation:

$$LUC_P = \left(\frac{1}{t_2 - t_1}\right) x \left(A_1 - A_2\right)$$

Where:

LUC_P	Change in the area with natural vegetation cover in the project area; ha/yr.
t_1	Year of beginning of the monitoring period
t_2	Final year of the monitoring period
A_1	Area in natural vegetation cover in the project area at the beginning of the monitoring period; ha
A_2	Area in natural vegetation cover in the project area at the end of the monitoring period; ha.

and,

$$AE_P = CNCV_P \, x \left(CBF_{eq} + cos_{eq}\right)$$

Where:

AE_P	Annual emission in project area; tCO /ha/year$_{2e}$
$CNVC_P$	Change in the area with natural vegetation cover in the project area; ha/year
CBF_{eq}	Carbon dioxide equivalent contained in total biomass; tCO /ha$_{2e}$
COS_{eq}	Carbon dioxide equivalent contained in soils; tCO /ha$_{2e}$

For the monitoring period (2023), changes in land use registered 240.7 ha for the herbaceous stratum and 0.8 ha in aquatic stratum. This corresponds to 18,218 tCO2e/year emitted (Table 39).

Table 39. Emission monitoring of the project in wetland areas, in the period 2023.

Stratum	Year	LUCp (ha)	CTeq (tCO2e/ha)	Project GHG emissions (tCO2e/year)
Herbaceous	2023	240,72	75,1	18.085,4
Aquatic	2023	0,80	166,3	133,0
Dispersed	2023	0,00	201,1	0,0

Source: Fundación Cataruben, 2024.

The step-by-step calculations can be reviewed in *Annex 7. Emission monitoring / 1. Emissions_CO2Bio_P2_V3 /*

16.3. Leakages

To identify the leakage area, a spatial proximity analysis is performed with respect to the deforestation hotspots in the baseline, with the objective of determining the optimal region where deforestation events (BCR0002) and transformation of natural vegetation cover (BCR0004) occur and where emissions are likely to be displaced by the presence of the project. It should be noted that the analysis considers the environmental drivers/detriment in the generation of emissions displacement, also excluding areas with restricted access to deforestation agents and transformation of natural vegetation cover. For more information review the Safeguard G folder where the leakage area and respective supports are identified.

From the above, for BCR0002 a leakage belt is defined with a buffer of 100 meters from the edge of the property, this belt has an area of 10,673.4 hectares, within which all forest areas are quantified for the temporal limits of the baseline and the monitoring period. The leakage belt is defined by the file Cinturon_Fugas_REDD.shp (located in 2. Anexos/ 8. Geospatial / 8.1. REDD / 8.1.1. Geodatabase REDD / REDD CO2BIO_P2_V3.gdb) and its dataset Area_de_Fugas. This file delimits the area used to quantify forest changes. Within this dataset are the shapefiles Bosque_AF_Monitoreo_2020_2021_V2 (2593.7 ha) and Bosque_AF_Monitoreo_2021_2023_V3 (2556.0 ha).

While for BCR0004, a leakage belt is delimited with a buffer of 100 meters from the edge of the property, this belt has an area of 10,461 hectares.

The geodatabase "HUMEDALES CO2BIO P2 V3.gdb", located in the path 2. Anexos / 8. Geospatial / 8.2 Humedales / 8.2.1 Geodatabase_Humedales, includes the dataset **Area_De_fugas**. Within this dataset, the shapefile **Cinturon_Fugas_Humedales.shp** delimits the polygon of the leakage area used to calculate coverage changes. Another shapefile, **Humedales_AF_Monitoreo_2020_2022_V2.shp**, indicates a total area of 4,359.0 ha for the period 2020-2022, distributed in the Disperso (96.85 ha), Herbáceo (3,967.3 ha), and Acuático (294.8 ha) strata. For its part, **Humedales_AF_Monitoreo_2022_2023_V3.shp** updates the monitoring for the period 2022-2023, reporting 4,306.5 ha distributed in Disperso (96.85 ha), Herbáceo (3,914.7 ha), and Acuático (294.8 ha). All this surface data is detailed in the **monitoreo** field of the attribute table of each shapefile.

within which are quantified all natural vegetation covers that according to the methodology item 10.3 meet the eligibility criteria, for the temporal limits of the baseline and the monitoring period.

16.3.1 Emissions from deforestation in the leakage area

The calculation of emissions from forest deforestation in the leakage area was made taking into account the following equations:

$$FSC_{lk,yr} = \left(\frac{1}{t_2 - t_1}\right) x \left(A_{lk,1} - A_{lk,2}\right)$$

Where:

$FSC_{lk,yr}$	Annual change in the surface covered by forest in the leakage area; ha/year
t_1	Initial year of the reference period; yr
t_2	Final year of the reference period; yr
$A_{lk,1}$	Forest surface in the leakage area at the beginning of the monitoring period; ha
$A_{lk,2}$	Forest surface in the leakage area at the end of the monitoring period; ha

and,

$$AE_{lk,yr} = \left(AD_{lk,yr} \; x \; TCO_{2eq}\right) - AE_{bl,lk,yr}$$

Where:

$AE_{lk,yr}$ Annual emissions in the leakage area; tCO /ha$_2$

$AD_{lk,yr}$ Annual deforestation in the leakage area; ha

TCO_{2eq} Total carbon dioxide equivalent; tCO /ha$_{2e}$

$AE_{bl,lk,yr}$ Annual emission in the leakage area, in baseline scenario; tCO$_2$/ha

Thus, for the period 2022 - 2023 in the leakage area, an average annual forest deforestation of 18.85 ha was recorded, representing 13,630 tCO2e emitted annually. However, when comparing this record with the baseline emissions scenario, it does not represent an increase in GHG emissions as a result of the implementation of the project's REDD+ activities.

Table 40. Monitoring of emissions from forest deforestation in the leakage area for the period 2022-2023.

Year	FSC lk,yr (ha/year)	TCO2eq (tCO2e/ ha)	GHG emissions in the leakage area (tCO2e)	GHG emissions in the leakage area in baseline (tCO2e)	GHG emissions attributable to leakage due to project activities (tCO2e)
2022	18,85	723,08	13.630	23.035	-9.405
2023	18,85		13.630	23.035	-9.405

Source: Fundación Cataruben, 2024.

The step-by-step calculations can be reviewed in *Annex 7. Emission monitoring / 1. Emissions_CO2Bio_P2_V3 /*

16.3.2. Emissions from forest degradation in the leakage area

The estimation of annual degradation in the leakage area was estimated by applying the following equations:

$$PFD_{lk,yr} = \left(\frac{1}{t_2 - t_1}\right) x \left(A_{core,f} - A_{c-p}\right)$$

Where:

$PFD_{lk,yr}$	Annual primary forest degradation in leakage area; ha
t_1	Initial year of the monitoring period; yr
t_2	Final year of the monitoring period; yr
$A_{core,f}$	Area in core class in the leakage area, in the year of the start of the monitoring period; ha
A_{c-p}	Leakage area that changes from the core to patch in the final year of the monitoring; ha

And,

$$SFD_{lk,yr} = \left(\frac{1}{t_2 - t_1}\right) x \left(A_{perforated,lk} - A_{perforated-patch,lk}\right)$$

Where:

$SFD_{lk,yr}$	Annual secondary forest degradation in the leakage area; ha
t_1	Initial year of the monitoring period; yr
t_2	Final year of the monitoring period; yr
$A_{perforated,lk}$	Area in perforated class in the leakage area, in the initial year of the monitoring period; ha
$A_{perforated-patch,lk}$	Area in the leakage area that changes from perforated to patch in the final year of the monitoring period; ha

The annual emission by degradation in the leakage area is calculated, following the equation:

$$AE_{fd,lk,yr} = (PFD_{lk,yr} \; x \; DTBCO_{2eq,1}) + (SFD_{lk,yr} \; x \; DTBCO_{2eq,2})$$

Where:

$AE_{fd,lk,yr}$	Annual emission due to degradation in the project area; tCO2 ha-1
$PFD_{lk,yr}$	Annual primary forest degradation in the leakage area; ha
$SFD_{lk,yr}$	Annual secondary degradation in the leakage area; ha
$DTBCO_{2eq,1}$	Carbon dioxide equivalent in the difference of total biomass per hectare, in the class of primary degradation; tCO2e ha-1
$DTBCO_{2eq,2}$	Carbon dioxide equivalent in the difference of total biomass per hectare, in the class of secondary degradation; tCO2e ha-1
1,2	Degradation type; 1-primary degradation, 2-secondary degradation

Similar to what occurred in the project area, there was no evidence of degradation processes affecting the forest cover in the leakage area. Therefore, annual emissions for the period 2022-2023 are considered zero (0) (Table 38).

Table 38. Emissions from degradation in the leakage area, for the period 2022 - 2023.

Year	Type of degradation	FDi f, year (ha/year)	DTBCO2, i (tCO2e/ha)	GHG emissions attributable to leakage (tCO2e)
2022	Core - Patch (Primary)	0,00	251,85	0,00
2022	Perforated - Patch (Secondary)	0,00	177,86	
2023	Core - Patch (Primary)	0,00	251,85	
				0,00

2023	Perforated - Patch (Secondary)	0,00	177,86	

Source: Fundación Cataruben, 2024

The step-by-step calculations can be reviewed in *Annex 7. Emission monitoring / 1. Emissions_CO2Bio_P2_V3*

16.3.3. Emissions from wetland transformation in the leakage area

The quantification of GHG emissions that occurred in the wetland leakage area, due to the implementation of project activities during the monitoring period, were calculated by applying the following equations:

$$LUC_L = \left(\frac{1}{t_2 - t_1}\right) x \left(A_{L,1} - A_{L,2}\right)$$

Where:

LUC_L	Change in the area with natural vegetation cover in the leakage area; ha/yr.
t_1	Year of the beginning of the monitoring period
t_2	Final year of monitoring period
$A_{L,1}$	area in natural vegetation cover in the leakage area at the beginning of the monitoring period (ha).
$A_{L,2}$	area in natural vegetation cover in the leakage area at the end of the monitoring period (ha).

and,

$$AE_L = \left[CNCV_L \, x \left(CBF_{eq} + SOC_{eq}\right)\right] - AE_{L,BL}$$

Where:

AE_L	Annual emission in leakage area; tCO /ha/year$_{2e}$
$CNCV_L$	Change in the area with natural vegetation cover in the leakage area; ha/yr.
CBF_{eq}	Carbon dioxide equivalent contained in total biomass; tCO /ha$_{2e}$
SOC_{eq}	Carbon dioxide equivalent contained in soils; tCO /ha$_{2e}$

$EA_{f,lb}$ Annual emission in leakage area in the baseline scenario; tCO_{2e}

As a result, for the monitoring period, changes in wetland land use were recorded, only in the herbaceous stratum (Table 39). with 52.6 ha transformed annually; however, when compared to the baseline values, they do not represent an increase in GHG emissions in the leakage area, at the time of applying the equation, the values recorded as negative were taken as zero (0) in the final calculations, therefore, the annual emissions for the period 2023 are considered zero (0).

Table 39. Monitoring of emissions from wetland transformation in the leakage area for the period 2023.

Stratum	Year	CNCVL (ha/year)	CTeq	AEL	EAL,BL	GHG emissions attributable to leaks due to project activities *(tCO2e)*
Herbaceous	2023	52,60	75,1	-3.599	7.551	0,00
Aquatic	2023	0,00	166,3	-4	4	0,00
Dispersed	2023	0,00	201,1	-1.058	1.059	0,00

Source: Fundación Cataruben, 2024.

The step-by-step calculations can be reviewed in *Annex 7. Emission monitoring / 1. Emissions_CO2Bio_P2_V3*

16.4. Net GHG emission reductions/removals

The quantification of emissions reduced by avoided deforestation and degradation during the monitoring period is the result of the relationship between emissions in the baseline scenario, emissions during the project and emissions due to leakage, applying the following equations:

- ***Emissions reductions - Deforestation***

$$ER_{DEF,REDD+project} = (t_2 - t_1) x (EA_{DEF,bl,yr} - EA_{DEF,REDD+project,yr} - EA_{DEF,lk,yr})$$

Where:

$ER_{DEF,REDD+project}$ Emission reduction due to avoided deforestation, monitoring period; tCO2e

t_2 Final year of the monitoring period; yr

t_1 Initial year of the monitoring period; yr

$EA_{DEF,bl,yr}$ Annual emission by deforestation in the baseline scenario; tCO2e

$EA_{DEF,REDD+project,yr}$ Annual emission by deforestation in the project area; tCO2 ha-1

$EA_{DEF,lk,yr}$ Annual emission by deforestation in the leakage area; tCO2 ha-1

- ***Emissions reductions - Forest Degradation***

$$ER_{FD,REDD+project} = (t_2 - t_1) x (EA_{FD,bl,yr} - EA_{FD,REDD+project,yr} - EA_{FD,lk,yr})$$

Where:

$ER_{FD,REDD+project}$ Emission reduction due to avoided Forest degradation monitoring period; tCO2e

t_2 Final year of the monitoring period; yr

t_1 Initial year of the monitoring period; yr

$EA_{FD,bl,yr}$ Annual emission by forest degradation in the baseline scenario; tCO2e

$EA_{FD,REDD+project,yr}$ Annual emission by forest degradation in the project scenario; tCO2 ha-1

$EA_{FD,lk,yr}$ Annual emission by forest degradation in the leakage area; tCO2 ha-1

- ***Emissions reductions - Wetlands***

$$ER_{P,mp} = (t_2 - t_1) x (AE_{bl} - EA_p - EA_L)$$

Where:

$ER_{P,mp}$ Reduction of emissions by avoiding changes in the natural vegetation cover of the wetland, in the monitoring period (tCO2e/ha/year

t_2 Final year of the monitoring period; yr

t_1 year of the beginning of the monitoring period; yr

$EA_{BL,}$ emission from changes in the natural vegetation cover of the wetland in the baseline scenario (tCO2e/ha/year)

EA_P Emission from changes in the natural vegetation cover of the wetland in the project area for the monitored period (tCO2e/ha/year)

EA_L Emission from changes in the natural vegetation cover of the wetland in the leakage area for the monitored period (tCO2e/ha/year)

For the monitoring period, there was no significant increase in GHG emissions in the area of leakage due to deforestation and forest degradation, and wetland transformation, so to avoid overestimations at the time of applying the equation, the values recorded as negative were taken as zero (0) in the final calculations.

Thus, during the third monitoring period of the project, a reduction of 507,429 tCO2e was recorded (Table 40), of which 384.833 is attributed to avoided deforestation, 35.788 to avoided forest degradation and the remaining 86.808 1 to avoid transformation in wetlands.

Table 40. GHG emissions reduction report for the period 2022 - 2023.

Verification	Year	GHG emissions in the baseline scenario (tCO2e)	Project GHG Emissions (tCO2e)	GHG emissions attributable to leakage (tCO2e)	Net GHG reduction (tCO2e)
THIRD	01/01/2022 - 31/12/2022	274.062	32.333	0	241.729
	01/01/2023 - 31/12/2023	316.251	50.551	0	265.700
	Total	590.313	82.884	0	507.429
	Annual average	295.157	41.442	0	253.715

Source: Fundación Cataruben, 2024

16.5. Comparison of actual emission reductions with the estimates in the project document

The actual net emissions reductions recorded during the 2022 - 2023 monitoring period showed differences compared to the ex-ante estimate, presenting a variation of approximately 47.24%, higher than initially projected (Table 41).

These differences are mainly due to the decrease in degradation and transformation events in both the leakage area and the project area, being lower than those projected in the baseline scenario. Thus, GHG emissions in the with-project scenario were lower, which directly impacts the total project emissions reduction.

Table 41 Comparison of estimated and reported GHG emission reductions for the monitoring period (2022-2023)

Year	Estimated net GHG reduction *(tCO2e)*	Net GHG reduction observed *(tCO2e)*	Difference
2022	148.728	241.729	62,53%
2023	195.902	265.700	35,63%
Total	**344.629**	**507.429**	47,24%

Source: Fundación Cataruben, 2024

16.6. Remarks on the difference with the estimated value in the recorded project document

The differences presented between the baseline scenario and the monitoring are mainly influenced by the behavior of GHG emissions for the leakage area. The above, taking into account that a 10% increase in emissions had been projected due to the implementation of project activities; however, the monitoring shows that in the period 2022 - 2023 the changes in land use in forests and wetlands in the leakage areas did not intensify, so emissions are equivalent to zero (0). Furthermore, in the current period, the reduction in deforestation (89.52%) significantly exceeded the ex-ante projection of 60.6% (%DD).

Regarding forest degradation, the changes in forest area attributed to primary and secondary degradation events that were recorded were insignificant, both in the project area and in the leakage area. In this sense, emissions during the monitoring period were zero, which implies a 100% reduction.