PROJECT DESIGN DOCUMENT

Proyecto REDD+ PAZCÍFICO

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1. DEFINITIONS AND ACRONYMS

Definition / Acronym	Description
DANE	National Statistics Department
IAvH	Alexander von Humboldt Institute
IDEAM	Institute of Hydrology, Meteorology and Environmental Studies of the Ministry of Environment and Sustainable Development of Colombia
IGAC	Agustín Codazzi Geographic Institute
INCORA	Colombian Institute of Agrarian Reform
MADS	Ministry of Environment and Sustainable Development
MININTERIOR	Ministry of the interior
SDG	Sustainable Development Goals

Source: CO2CERO SAS (2020)

2. PROJECT DETAILS

2.1 Project Description

This chapter describes the general aspects of the project, which allow understanding of the initiative characteristics, such as location, description, activities, and ownership.

2.1.1 Project Name

The project developed below is called "REDD+ PAZcífico," which groups administratively and geographically communities according to territorial limits, which classify the project as grouped, given the instances defined in community councils comprising it.

2.1.2 Project Description Summary

The REDD+ PAZcífico project involves the community councils of Unicosta, Prodefensa del Río Tapaje, Guapi Abajo, and Cuenca del Río Iscuandé to improve their natural, social, and cultural capital through conservation activities and protection of the natural forest in their jurisdiction, based on a participatory and autonomous approach. In turn, this community construction will contribute to the national goals of reducing greenhouse gases in the atmosphere and will improve the subsistence practices implemented in the territory, aiming at a lower impact on the environment, reduction of deforestation and degradation, and community forest management. In addition, the project seeks to generate positive externalities on biodiversity and the socio-economic environment of the community through connectivity among areas, the flow of resources, and the design of new production alternatives aligned with conservation, forest management, and mangrove protection.

The REDD+PAZcífico project involves a total area of 287,779.22 ha, of which 272,785.86 ha (94.79%) are stable forests over time, distributed in the municipalities of Guapi, Santa Bárbara (Iscuandé), El charco, La tola, and Magüí (Payán) in the departments of Nariño and Cauca. The territories involved in the project have been awarded through a legislative act (Resolution) by INCORA and INCODER. They are home to approximately 17,320 families, who have participated in the project under different roles, guaranteeing transparency, legitimacy, and free, prior, and informed consent of community councils. REDD+PAZcífico seeks to reduce a total of 7,821,579 tCO2e over a 20-year timeline.

2.1.2.1 Project Activities

The activities developed within the project limits to reduce deforestation and degradation were divided into strategic lines in Table 1 .

Table 1 Strategic Lines of the REDD+PAZcífico Project

Strategic Line	Investment Line	Activity
Line 1. Natural Resources Management	Reforestation and Restoration	Activity 1.1 Establishment of a tree nursery for native species
		Activity 1.2 Reforestation of areas devoid of vegetation
		Activity 1.3 Restoration of areas with coverage degradation actions
	Vegetation Diagnosis	Activity 1.4 Spatial diagnosis of areas subject to reforestation and restoration
		Activity 1.5 Monitoring of forest cover
Line 2. Community Development	Sustainable Production	Activity 2.1 Design of sustainable production chains
		Activity 2.2 Sustainable management of productive activities generating forest degradation
	Productive Strengthening	Activity 2.3 Equipment improvement to develop community work and activities.
Line 3. Governance and Capacity Building	Enhancing Environmental Capacities	Activity 3.1 Training in Vegetation Monitoring
		Activity 3.2 Training in Conservation and Sustainable Natural Resource Management
	Governance	Activity 3.3 Training in Best Practices in Governance and Leadership
	Environmental Development	Activity 3.4 Investment Management in the co-financing fund for conservation projects and sustainable production of community councils.
	Transparency and Citizen Participation	Activity 3.5 Creation of socio-environmental and financial control and surveillance initiatives

Source: CO2CERO S.A.S. (2020)

2.1.2.2 Start Date

The REDD+ PAZcífico project began activities to reduce deforestation and degradation in 2015. The different activities are described in Table 2 (See *7_Start date).*

Table 2 Support Documents REDD+ PAZcífico Project Start Date.

Date	Description	Description
2014	Community Council the Cuenca del Río Iscuandé affidavit.	Deforestation is prohibited around the water of the Juan Ventura, Iscuandesito, and Matambi streams.
March 17, 2014	Association contract between Corponariño and Foundation Mundos Posibles.	Restoration of mangrove areas affected by logging, promotion of conservation, and protection of the mangrove ecosystem.
December 18, 2014	Cooperation agreement between CRC and the social organization of black communities Angela Davis.	Support for the Management of Coastal Zones Committee, Cauca (MIZC) operation and actions developed for the recovery of mangrove areas in the territories of the community councils of the Pacific Coast of Cauca municipalities.
2015	Environmental management plan UAC LIAS	Institutional and community management for the implementation of the management plan for the The coastal environmental unit alluvial plain of the Colombian South Pacific AUC-LIAS.
April 14, 2015	Institutional actions for the mangrove ecosystem conservation on the Pacific Coast of Cauca	The Regional Autonomous Corporation of Cauca and its section of Environmental Management presented in Popayán a series of restoration activities based on the National Mangrove Program, carried out in Guapi Abajo Community Council.
May 29, 2015	Inter-administrative agreement CRC IIAP	Management of participatory environmental processes on the Pacific coast of Cauca, enhancement of local capacities for the conservation, recovery, and use of the mangrove ecosystem.

Source: CRC, IIAP, Agroimpulso Foundation (2021).

The activities involving the start date provided spaces for citizen participation and conservation education, restoration, and reestablishment of deteriorated areas, mainly mangroves, as well as the strengthening of capacities for conserving and restoring degraded ecosystems.

2.1.2.3 REDD+ Developed Activities and Events

The activities that have been carried out to date, within the limits of the REDD+ PAZcífico project, are presented below, considering the community's commitment to reducing deforestation and environmental degradation based on different sustainable actions for conserving its cultural, social, and economic capital. It is essential to clarify that this initiative

and the activities to reduce deforestation and environmental degradation have been designed under the principles of respect for the environment, social interest, and maintenance of the cultural heritage of the territories under the single paragraph of article 49 law 70 of 1993.

Activity 1.2 Reforestation of Areas Devoid of Vegetation

According to the historical dynamics of deforestation, some communities have identified the effects on some of their economic activities or associated ecosystem services. To reverse these scenarios, reforestation activities have been implemented in the deforested areas identified by the community, thus increasing carbon reservoirs and improving the provision of goods and services generated by forest cover. Additionally, dual-purpose species have been planted mainly for logging purposes or with restoration potential, contributing to environmental and socio-economic development. Currently, the logging activity is for subsistence purposes without any management or control by the environmental authorities. The community intends to guide the forestry activity under sustainable practices and regulate it by its power.

Illustration 1 Reforestation carried out in the Chico Pérez sector (Unicosta Community Council). Source: Agroimpulso Foundation (2021).

The community has developed some projects resulting from the optimal provision of ecosystem services, such as regulating water resources and improving its quality, including the preliminary project to design a biodegradable bottled water processing plant. In addition, some communities have identified the influence of external parties from the

neighboring community councils in deforestation, mainly mangroves, and the acquisition of valuable species. For this, spaces for conciliation among communities have been generated autonomously, according to the institutional absence.

Activity 1.3 Restoration of Areas with Coverage Degradation Actions

In collaboration with SENA and the Colombian Pacific Research Institute (IIAP), community councils have acquired technical tools and skills in the field that have allowed them to recognize the importance of increasing carbon reservoirs within their territory. Once the knowledge was obtained, the communities appropriated the improvement of forest cover through the restoration of mangrove areas as the beginning of actions to reduce deforestation and environmental degradation within the community councils that constitute the REDD+ PAZcífico project, being the community council of Guapi Abajo, the promoter of these initiatives with the support of the Regional Autonomous Corporation of Cauca (CRC) since 2015.

Illustration 2 Mangrove restoration and recovery activities in the Unicosta community council. Source: Agroimpulso Foundation (2021).

The acquisition and management of the plant material necessary for restoration have come from capturing seedlings on site, generating sustainable management, controlling the activity of the plant population, and guaranteeing persistence over time through special care of the plants from early stages. The community council of Prodefensa del Río Tapaje has

implemented, recovery and restoration activities in Estero Martínez (see Illustration 3). In contrast, the community council of Unicosta has taken action on degraded mangrove areas affected by neighboring community councils and external parties from other municipalities.

Illustration 3 Recovery activities of the Estero Martínez (Prodefensa del Rio Tapaje). Source: Agroimpulso Foundation (2021).

Through article 21 Law 70 of 1993, the community councils have preserved, maintained, and regenerated the vegetation protecting water resources on collective property territories and have guaranteed the fragile ecosystems permanence, such as mangroves and wetlands, at the same time protecting and preserving threatened or endangered species of wild flora and fauna, such as the three-toed sloth or parakeet (*Bradypus tridactylus*).

Activity 1.5 Monitoring of Forest Cover

Training and education on forest cover measurement were given to recognize the state of the natural forests within the project areas. The community monitored the vegetation in transects of 0.1 and obtained data from large adult trees, adult trees, and seedlings, applying some measurements mainly of diameter within the plots (see Illustration 4). The enhancement of capacities in technical monitoring and measurement of vegetation was consolidated. Additionally, the information collected favors the estimation of existing biomass, reducing uncertainty about the behavior of forests and their emission rates.

Illustration 4 Monitoring of forest cover within the community councils of REDD+ PAZcífico. Source: Agroimpulso Fundation (2021).

Activity 2.1 Design of Sustainable Production Chains

Currently, difficulties have been identified in developing and improving working conditions and economic activities' performance. There is still evidence of illicit activities such as coca planting and illegal logging. This diagnosis influences the design of alternative production chains, which guide the community's economic performance and reduce exposure to illegality and violence from external actors.

Currently, the community council Prodefensa del Río Tapaje is designing the rice production chain in previously established areas for legal and illegal agricultural activities involving production and first transformation. Additionally, market studies are being carried out, guiding the production to its parameters.

The production chain design and the sustainable management seek to support community councils in compliance with article 19 law 70 of 1993, regarding the guarantee of persistence of natural resources used for community welfare, maintaining, and increasing their quantity and quality, without detriment to the environment in which they develop.

Activity 2.2 Sustainable Management of Productive Activities

By their economic potential, the community councils have created production chains where knowledge and skills are involved, mainly in establishing and harvesting coconut, vanilla, and achiote. According to the state of development of each production chain, adjustments

have been made to it or improvements to its links, evidenced in *AUDITORIA_VV_2021|2_Co beneficios|Evidencias ODS*, in file *1.1._20 .12.21_Evidencia_ODS_89.pdf* as a plan seeking the implementation of production units for coconut, vanilla, and cardamom.
It has been intended to improve income and employability in community councils with the development of these activities, as well as align economic activities caring for environmental goods and services to guarantee sustainable and peaceful development, away from adverse effects on the ecological, social, and economic context.

Illustration 5 Coconut marketing chain
Source: Agroimpulso Foundation (2021).

The initiatives have been conceived with the support of the Agroimpulso Foundation, which has acquired the personnel and knowledge necessary to transmit the essential tools for improving the production of defined areas, aligning with traditional and cultural understanding. In addition to generating appropriation of traditional knowledge, it has been an environment that creates employment, economic alternatives, and diversification of production in that area, enabling new commercial horizons and redirecting traditional production activities that have generated degradation of forest cover and effects on the environment.

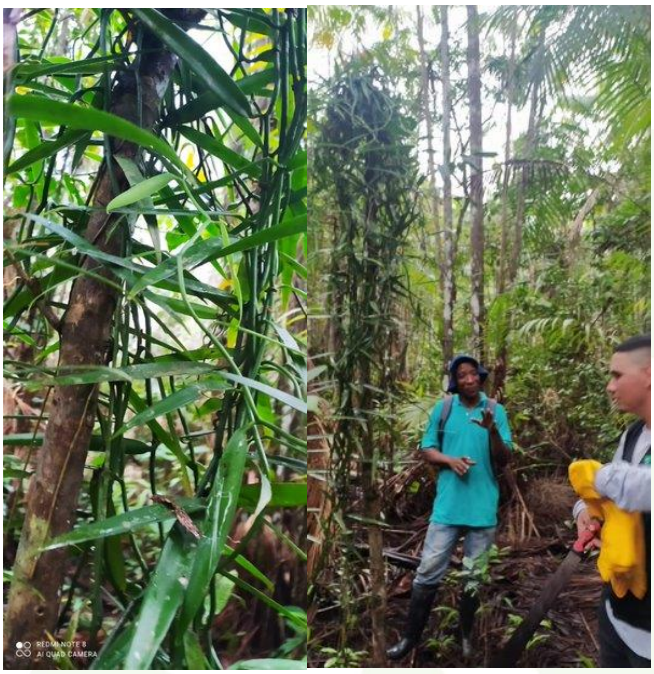


Illustration 6 Field training on vanilla production by members of the community.
Source: Agroimpulso Fundation (2021).

Activity 3.1 Training in Vegetation Monitoring

The appreciation of natural resources is essential when it is necessary to protect and improve their condition. In the case of forest cover, this procedure requires forest inventories. The communities have enhanced their capacities in measuring trees through field training by experts collecting forest information, whose purpose is to generate communities' self-management of the forest.

Illustration 7 Field training on vegetation monitoring and measurement. Source: Agroimpulso Foundation (2021).

Vegetation monitoring within the influence area of the PAZcífico project aimed to reduce the uncertainty about the information managed at the national level for forest cover in the Pacific region, coupling the communities with the natural resources they lived in and depended on, and contributing to the knowledge of biodiversity. The recognition activities were based on the instruction and technical training in measuring forest cover. The community activities supported by experts are presented in the document "*Informe metodología inventario REDD.pdf*" (*AUDITORIA_VV_2021|12_Reporte de monitoreo*), described in "*Reporte Salida Campo.pdf"* (see *AUDITORIA_VV_2021|8_Informacion campo*) and displayed in " *Soporte_CapacitacionCampo.mp4*" (see *AUDITORIA_VV_2021|11_Anexos*).

The enhancement of capacities in the REDD+ PAZcífico project turns to the right of communities and ethnic groups to education at their different levels, mainly, for the preservation and management of the natural resources of their property, under article 68 of the political constitution of Colombia "*The members of ethnic groups shall have the right to an education that respects and develops their cultural identity*.".

Activity 3.5 Creation of Socio-environmental and Financial Control, and Surveillance Initiatives

Issues related to the administration and management of both natural and economic resources in the different jurisdictions involved the coordination actions of various community councils. The community councils have understood the importance of supervision and control meetings with the support of the Agroimpulso Foundation and CO2CERO SAS, which allows for verifying the effectiveness of the actions of each population

restoration and conservation project. This, in turn, led to a perception of economic benefits obtained through payment for results subject to administration and control, guaranteeing the effectiveness of the investment.

Illustration 8 Seminars for coordination and internal organization of community councils.
Source: Agroimpulso Foundation (2021).

This activity was in line with the fulfillment of article 58 of the political constitution of Colombia, in which case the owners of a collective property must fulfill their obligations to protect the environment and renewable natural resources, as well as contribute to the authorities or under their autonomy in defense of this heritage.

On September 17, 2021, CO2CERO SAS and Agroimpulso Foundation discussed the community's commitments to the conservation and reduction of deforestation, as well as improving living conditions from sustainable economic activities to the environmental authorities and legal representatives. (See *11_Anexos\Asistencia_SocializacionAutoridad.pdf).*

Illustration 9 Discussion of the project cycle to environmental authorities and legal representatives. Source: CO2CERO SAS (2020)

2.2 Project Objectives

To reduce deforestation and forest degradation emissions within the four community councils that are part of the project.

- To evaluate the emissions avoided by the community councils through their conservation, restoration, and sustainable management actions.
- To identify the activities reducing and preventing the deforestation and degradation growth factors at the local level.
- To guarantee compliance with the regulatory and socio-environmental framework related to the REDD+ PAZcífico project.
- To generate transparent and equitable benefits distribution according to the resources obtained from commercializing avoided GHG emissions within the project's limits.

2.3 Project Proponents

The community councils that propose the REDD+ PAZcífico project are described below. The approaches of the Managing Partner Agroimpulso Foundation allowed the four councils to be consolidated into a single REDD+ PAZcífico initiative.

Organization	Cuenca del Río Iscuandé Community Council
Resolution	Resolution 2432 of December 1, 2005
TIN	900.163.922-1
Legal Representative	Fernando Paz
Telephone number	313 724 91 31

Organization	Guapi Abajo Community Council
Resolution	Resolution 1121 of May 16, 2001
TIN	817.002.431-4
Legal Representative	Teodoro Montaño Diaz
Telephone number	313 411 95 96

Organization	Prodefensa del Río Tapaje Community Council
Resolution	Resolution 1500 of August 1, 2005
TIN	900.231.305-7
Legal Representative	Iter Javier Olaya
Telephone number	311 701 54 74

Organization	Unicosta Community Council
Resolution	Resolution 0158 of February 9, 1998
TIN	840.000.387-2
Legal Representative	Luz Mirley Montano
Telephone number	313 647 94 67

The initiative and its results are property of these community councils, without the legal representation exceeding or circumventing the legitimacy, fairness, and consent of each one of the members of the community.

2.4 Project Property and Involved Parties

The parties defined as the initiative owners and its benefits are described below.

2.4.1 Project Proponents

The reduction of the quantified emissions within the limits of the project is the sole and exclusive property of the community councils, members of the REDD+ PAZcífico initiative, corresponding to:

1. Guapi Abajo Community Council
2. Cuenca del Río Iscuandé Community Council
3. Prodefensa del Río Tapaje Community Council
4. Unicosta Community Council

Additionally, the benefits generated by implementing actions to reduce deforestation and degradation are also the property of said community councils. In ratification of this, the different association agreements are defined in the paragraph of clause six (see *1_Acuerdos|02_Contrato comunidad*) as follows:

> ***"THE COMMUNITY COUNCIL*** *will deliver to AGROIMPULSO the proper authorizations for the marketing of the carbon offsets, understanding that the ownership of the carbon offsets belongs to the community and the right to commercialization rests with Agroimpulso."*

Also, it is determined in the contract between the technical and managing partner in clause eight (see *1_Acuerdos|01_Contrato Asociado técnico|01_Contrato_CO2CERO_AGROIMPULSO*) that:

> ***"CLAUSE EIGHT, OWNERSHIP RIGHTS OVER CARBON OFFSETS AND PDD DOCUMENT*** *The ownership and rights on the issued carbon offsets corresponding to the properties covered by the Contract shall be the property of the Community Councils of PRODEFENSA DEL RÍO TAPAJE, CUENCA DEL RÍO ISCUANDÉ, UNICOSTA, AND GUAPI ABAJO, as well as the Project Design Document (PDD) that CO2CERO SAS will deliver."*

Based on the previous clause, it is documented that the project's property belongs to the community councils. Any transaction or movement on these must be authorized and disseminated with each of them. Considering that the REDD+ PAZcífico project seeks to comply with the principles of article 3 law 70 of 1993, determined as follows:

> *"3. The participation of black communities and their organizations, without detriment to their autonomy, in the decisions that affect them and in those of the entire Nation on an equal footing, under the law.*
>
> *4. Protecting the environment considering the relationships established by black communities with nature."*

Article 5 law 70 of 1993 states the functions of the community councils within the territories assigned to them as collective property as follows:

> *"In addition to those provided for the regulations, the functions of the Community Councils are to delimit and assign areas within the adjudicated lands; ensure the*

> *conservation and protection of collective property rights, the preservation of cultural identity, the use, and conservation of natural resources; choose the legal representative of the community as a legal person, and act as friendly mediators in internal conflicts that are feasible for conciliation."*

Finally, article 6 of that law states that the land and forests will be adjudicated to black communities under the law, whose ownership is exercised in a social function and an ecological function is inherent to it. For its use, the parameters are defined as follows:

> *"a) Both the use of forests exercised by the Ministry of Law and forest exploitation for commercial purposes must guarantee the persistence of the resource. The latter requires authorization from the competent entity for forest resource management.*
>
> *b) Land use will be made considering the ecological fragility of the Pacific Basin. Consequently, the awardees will develop conservation and management practices compatible with ecological conditions. For this purpose, appropriate production models such as agroforestry or similar ones will be developed, designing the proper mechanisms to stimulate them and discourage environmentally unsustainable practices."*

REDD+ PAZcífico project has been designed to satisfy parameter (b) in article 6 law 70 of 1993, ratifying its optimal land use responsibility, the preservation of the natural resources, and sustainable forest cover management balancing the culturally developed productive uses. REDD+ initiatives seek to satisfy the established regulations expositions on rural communities based on stimulating carbon reservoirs conservation, preservation, managing, and expansion.

Understanding the regulations and legal support the communities have, they are granted ownership over the avoided GHG emissions within the territory, as well as decisions about the subsequent processes of commercialization, negotiation, and certification of the avoided emissions determined within the project limits.

2.4.2 Land Tenancy

Law 70 of August 27, 1993 "*Has the purpose of recognizing the black communities occupy uncultivated lands in the rural riverside areas of the Pacific basin, following their production traditions and collective property rights. It also seeks to establish mechanisms to protect the cultural identity and the rights of the black communities as an ethnic group promoting their economic and social development to guarantee these communities to obtain equal conditions of opportunity as the rest of Colombian society."*

The community councils involved in the development of the REDD+ PAZcífico project are mentioned in Table 3 , as well as their influence area at the administrative level,

corresponding to the departments of Cauca and Nariño, in the municipalities of Guapi, Santa Barbara (Iscuandé), El Charco, La Tola, and Magüí (Payán).

Table 3 Community Councils involved in the REDD+ PAZcífico Project

Community Council	Department	Municipality	Regulations
Guapi Abajo	Cauca	Guapi	Resolution 1121 of May 16, 2001
	Nariño	Santa Barbara (Iscuandé)	
La Cuenca del Río Iscuandé	Cauca	Guapi	Resolution 2432 of December 1, 2005
	Nariño	El Charco	
		Santa Barbara (Iscuandé)	
Prodefensa del Río Tapaje	Nariño	El Charco	Resolution 1500 of August 1, 2005
		La Tola	
		Magüí (Payán)	
		Santa Barbara (Iscuandé)	
Unicosta	Cauca	Guapi	Resolution 0158 of February 9, 1998
	Nariño	Santa Barbara (Iscuandé)	

Source: CO2CERO SAS (2020)

The land ownership of these community councils was awarded to INCORA (Guapi Abajo and Unicosta) and INCODER (The Cuenca del Río Iscuandé and Prodefensa del Río Tapaje) under Article 8 law 70 of 1993, which determines the process for the awarding territories to afro-descendant communities. The awarding results for the community councils involved in the initiative are described below:

A total of 43,196 ha with 8,066 square meters were awarded for **Guapi Abajo**. Walberto Banguera Montaño, as the legal representative of the community council of Guapi Abajo, began the title deed and registration process on May 20, 1998, through Law 70 of 1993 and Decree 1745 of 1995. INCORA was requested collective titling deeds as "Lands of black communities" under Resolution 01121 of May 16, 2001, INCORA.

The community council **Unicosta** in Santa Barbara de Iscuandé (Nariño) requested on November 8, 1996, by the legal representative on duty Florentino Carvajal Tenorio, 16,063 ha were awarded and approved by INCORA.

The community council of **Cuenca del Río Iscuandé** was awarded at the request of Héctor Toloza Estupiñán, a legal representative on duty. The request was filed on March 5, 2002, in the INCORA branch in Cauca. The territory is 77,269 ha with 9,205 m^2 under the jurisdiction of the municipality of Santa Barbara de Iscuandé (Nariño).

The community council **Prodefensa del Río Tapaje** was awarded lands of black communities at the request of Mr. Sandro Estupiñan Portocarrero on July 31, 2000. The

request was filed in the INCORA branch in Cauca. The collective territory has 149,994 ha with 9,081 m^2.

From the above, it is possible to ratify the ownership of the nation's wasteland granted to each community council under provisional article 55 of the Colombian political constitution on the right to collective property of the wastelands traditionally occupied by them. In the same way, Decree 1745 of 1995 complies with the procedure to make effective the collective title deed of territories of black communities under the authority of INCORA or the entity acting for it.

2.5 Other Entities Involved in the Project

The entities, other than the proponent, linked to the execution of the REDD+ PAZcífico project are presented below.

2.5.1 Managing Partner

Agroimpulso Foundation held the role of managing partner in the REDD+ PAZcífico project. It aimed to provide practical tools for the sustainable development of community projects, establishing partnerships with entities, institutions, and companies that contribute to the progress and quality of life in the regions where it operates. Its main activities were the following:

- Structuring environmental projects and providing technical support for social and productive entrepreneurship.
- Executing compensation projects for environmental services (Carbon offsets and GHG reduction initiatives).
- Creating productive and environmentally and financially sustainable projects and environmental management plans to promote the region's and its residents' development.

Activities management with the community, approaching authorities and other relevant actors, financing support in disseminating activities, designing and formulating the project were part of the commitment and responsibility to the initiative. It also created the communication channels to achieve the information and requirements for developing the REDD+ initiative.

2.5.2 Technical Associate

CO2CERO SAS was the technical associate for the REDD+ PAZcífico project. It is a private company offering innovative solutions to different actors in Colombia's environmental and agricultural sectors. Services provided include carbon projects in the forestry sector, land uses, sustainability consultancies in sowing, green markets, carbon footprint calculation, environmental education, and support in sustainability certifications.

It contributed as a technical associate to the project. Its main responsibilities were the execution of technical activities involved in designing, formulating, and structuring the project document and its specific requirements, such as cartography, image analysis, and

analysis of deforestation factors, among others. Additionally, it has financial responsibility for the project in its different phases. The technical associate can represent the project before external parties who assess its relevance, covering all the elements to be accepted, according to the choice of the most appropriate program for the national, regional, and local context.

2.5.3 Environmental Authorities

The process of the initiative was disseminated to the environmental authorities with jurisdiction within the territory to create a reference framework at the regional and local levels, among which are the following:

2.5.3.1 Rural Development Agency (RDA)

This agency's fundamental task is to execute the agricultural and rural development policy with a territorial approach formulated by the Ministry of Agriculture and Rural Development. As well as strengthening associativity and improving the living conditions of rural inhabitants, the country's competitiveness and building a future for the countryside. It is an ally for the country's agricultural products promoting rural businesses, structuring, co-financing, and executing Comprehensive Agricultural and Rural Development Plans.

Within the REDD+ PAZcífico project, activities have been proposed for the sustainable management and design of effective practices, which are related to culturally implemented economic activities at the local level. The support of entities associated with the rural environment and its development was sought within the promotion and leverage expected to have on these activities to obtain management, development, and strengthening alternatives, achieving a scope more significant than that proposed in the REDD+ project.

2.5.3.2 Regional Autonomous Corporation

The municipalities in the REDD+ project have jurisdiction in the Regional Autonomous Corporation of Nariño (Corponariño) and the Regional Autonomous Corporation of Cauca (CRC). Its purpose is the execution of the policies and portfolios on the environment and renewable natural resources, as well as the timely application of the legal provisions on their requirements, administration, management, and use under the regulations and guidelines of the Ministry of Environment. Some of the functions of the Regional Autonomous Corporation are the following:

1. Executing national policies, plans, and programs on environmental matters approved in the National Development Plan, National Investment Plan, and Ministry of Environment, as well as those approved at the regional level following the law.
2. Exercising as the highest environmental authority in its jurisdiction under the criteria and guidelines outlined by the Ministry of Environment.
3. Promoting and developing community participation in activities and programs for environmental protection, sustainable development, and proper management of natural resources.

4. Promoting and carrying out studies and research on the environment and renewable natural resources jointly with the national agencies linked to the Ministry of Environment and the technical and scientific support entities of the National Environmental System (SINA).
5. Assessing, controlling, and monitoring the environmental uses of water, soil, air, and other renewable natural resources.

Considering the role of this entity within the project, as the highest environmental authority at the regional level, the existence of the initiative was made known to it, likewise, the willingness of the community councils to establish a common scenario in which the environmental objectives and responsibilities of both parties were achieved.

2.5.3.3 Colombian Agricultural and Livestock Institute (ICA)

The Colombian Agricultural and Livestock Institute works for agricultural, health, and food safety in the Colombian countryside. In addition, its purpose is to contribute to the sustained development of the agricultural, fishing, and aquaculture sector through the prevention, surveillance, and control of sanitary, biological, and chemical risks in animal and plant species, thereby ensuring trade conditions and consumer health. Some ICA's functions are the following:

1. Researching and transferring technology activities associated with an individual or legal entity.
2. Planning and performing actions to protect agricultural production from pests and diseases that may affect the country's animal or plant species (or activities associated with the same purposes).
3. Performing technical control of the production and marketing of agricultural inputs, animal genetic material, and seeds for planting to prevent risks affecting agricultural health and food safety in primary production.
4. Adopting the Sanitary and Phytosanitary Measures, by law, is necessary to effectively control animal and plant health and prevent biological and chemical risks.

The REDD+ PAZcífico project promoted sustainable agricultural development on economic activities traditionally developed by community councils. However, improving these processes required the intervention and support of entities with experience and recognition of the subject. In addition, implementing production chains that import and export products were expected to establish foresight on the developed initiatives, which required the entity's approval. The entity was informed of the avoided emissions initiative within the jurisdiction of the community councils as an alternative link with other actors to fulfill reciprocally institutional and community functions.

2.5.3.4 Departmental Governments

The governments of Cauca and Nariño had jurisdiction over the project's limits, playing an essential role in the assignments and administration of resources at the territorial level. The

economic, social, and environmental foci were fundamental and strategic features in implementing the REDD+ PAZcífico project mission, which aimed to improve the community's well-being in these contexts. The government's plan, manage, and promote the population's economic, social, environmental, and cultural development based on transparency, social awareness, and efficient public administration. The functions related to the initiative are the following:

1. Formulating portfolios that effectively meet territorial needs
2. Enhancing capacities within the territory based on productivity, competitiveness, and sustainability at the institutional level.
3. Implementing actions meeting the goals of institutional improvement.
4. Satisfying the population with timely attention to their requirements.

It was intended that the governments identify the potential of the REDD+ PAZcífico project to improve the quality of life of the inhabitants of the region, guaranteeing active participation with social, economic, and environmental focus actions, and promoting spaces for inter-institutional cooperation to create links for the development and fulfillment of goals at the institutional and territorial level, based on the approaches established within the initiative.

2.5.3.5 Municipal Mayor's Office

Five Municipal Mayor's Offices, at project level, were identified with jurisdiction on Guapi, Santa bárbara (Iscuandé), El Charco, La Tola and Magüi (Payán). In general, the Municipal Mayor's Office is a territorial entity in charge of developing the necessary conditions to provide community public and social services through the planning and development of all sectors, promoting citizen participation in the community, management of the municipality, promoting peace, and improving the quality of life. The fundamental axes of the municipal mayor's functions are the following:

1. Reconciliation, coexistence, and peacebuilding.
2. Equity and social inclusion to overcome poverty.
3. Infrastructure for integration and competitiveness.
4. Green growth, productive transformation, and revenue-generating.
5. Regional integration for territorial development.
6. Territorial governance for good government.

REDD+ initiatives seek to strengthen different strategic axes at the territorial level based on community characteristics essential to satisfy some needs within the areas of coexistence, peacebuilding, equity, improvement of competitiveness, green growth, sustainability, and territorial governance. The project has designed actions allowing a social context improvement, reducing violence, conflict, and inequality. It also seeks to generate environmental sustainability by improving economic activities and administering natural resources. Finally, the related institutions recognize governance, dimensioning the

importance of establishing fair principles and values at the community level. A cooperation scenario is foreseen from the financial, legal, or administrative point of view.

2.5.3.6 Ministry of Environment and Sustainable Development

The Ministry of Environment and Sustainable Development is the public entity in charge of the environmental policies promoting the recovery, conservation, protection, organization, management, and use of renewable natural resources, ensuring sustainable development and citizens' right to enjoy a healthy environment. The functions related to the initiative are the following:

1. Managing the environment and renewable natural resources.
2. Guiding and regulating the environmental planning of the territory.
3. Directing the National Environmental System (SINA) to ensure portfolios that guarantee compliance with the duties and rights of the state regarding the environment and natural heritage.
4. Participating with the Ministry of Foreign Affairs outlining international policies on environmental matters, defining cooperation instruments and procedures.
5. Preparing with the Planning National Department (DNP) the environmental and renewable natural resources portfolios.
6. Evaluating the scope and economic effects of environmental factors, their incorporation into the market value of goods and services, and their impact on the development of the national economy.
7. Settling disagreements caused by the functions carried out by the associated research institutes, establishing criteria and decisions regarding the applicable regulations for the management and use of the environment or renewable natural resources.
8. Carrying out control and surveillance actions on the Regional Autonomous Corporations.
9. Coordinating, promoting, and guiding research actions on the environment, renewable natural resources, and alternative models of sustainable development.

Based on what has been described, it is essential to highlight the role of the Ministry of Environment in developing the REDD+ initiative. Its participation influenced the technical and socio-environmental contexts. The intervention of different research institutes was an essential support to determining the emissions avoided in terms of deforestation within the territory, the identification of early warnings of deforestation, and the regulations designed for its reversal. Likewise, its control and verification function on the actions of other entities and institutional support to the project to guide its requests of cooperation for different entities such as regional autonomous corporations, mayors, and governorates. Additionally, the recognition granted by the Ministry to initiatives that reduce deforestation and forest degradation, as well as improve the well-being of communities, was vital since it contributed to the mitigation goals set at the national level.

2.5.3.7 Institute of Environmental Studies (IDEAM)

IDEAM is the public entity in charge of providing technical and scientific support to the National Environmental System, generating knowledge, and producing reliable, consistent, and timely information on the conditions and dynamics of the environment and natural resources. Facilitating the definition and adjustments of environmental policies and decision-making by the public, private sectors, and the general public. Some of its functions are the following:

1. Providing knowledge, data, and environmental information required by the Ministry of Environment and other entities of the SINA.
2. Managing scientific and technical information and surveys on the ecosystems that are part of the country's environmental heritage.
3. Establishing technical bases to classify and zone the use of the national territory for planning and ordering purposes.
4. Obtaining, storing, analyzing, studying, processing, and communicating basic information on biophysical aspects, soils, and plant covers for managing and using biophysical resources.
5. Monitoring the biophysical resources of the Nation, especially concerning its contamination and degradation, is necessary for the decision-making of the environmental authorities.
6. Performing studies and research on natural resources, especially forest resources and soil conservation.
7. Directing, coordinating, and operating the Environmental Information System in collaboration with the scientific entities linked to the Ministry of the Environment, the Corporations, and other entities of the SINA.

The IDEAM is a technical complement in developing avoided emissions initiatives since its extensive knowledge in the investigation of forest resources, guiding the calculation of parameters, indicators, and variables necessary within the analysis required. The REDD+ PAZcífico project has worked with the IDEAM guidelines regarding the estimation of emissions avoided, reducing uncertainty about the calculations. Complying with the requirements of the GHG reduction program.

2.6 Presence of Other Groups or Initiatives

The following subchapter presents the ethnic groups, initiatives, plans, or programs involved with the REDD+ PAZcífico project, understanding the importance of avoiding double counting or incompatible overlapping.

2.6.1 Projects and Neighboring Communities

REDD+ initiatives focus on well-being strengthening environmental, social, and economic factors through sustainable actions linked to reducing deforestation and degradation. Additionally, it is essential to promote equality and reduce conflicts between initiatives or neighboring communities, understanding the existence of territorial limits and natural

resources assigned to each community. Based on the above, the identification of surrounding communities and projects was carried out (see Table 4), where there are eight reservations of the Eperara Siapidara Trua, Eperara Siapidara, Embera Katío, and Eperara Siapidara people, as shown in Figure 1.

Table 4 Indigenous reservations are surrounding the REDD+ PAZcífico project.

Name of Indigenous Reservation	Town	Department	Municipality
San Juan de Pampón	EPERARA SIAPIDARA TRUA	Nariño	La Tola
Quebrada Grande	EPERARA SIAPIDARA	Nariño	Santa Barba de Iscuandé - El Charco
La Floresta, Santa Rosa, and San Francisco	EMBERA KATIO	Nariño	Olaya Herrera
Río Satinga	EMBERA KATIO	Nariño	La Tola - Olaya Herrera
Morrito	EPERARA SIAPIDARA	Nariño	El Charco
Sanquianguita	EPERARA SIAPIDARA	Nariño	Mosquera – Olaya Herrera
Integrado El Charco	EPERARA SIAPIDARA	Nariño	El Charco
Maíz Blanco	EPERARA SIAPIDARA	Nariño	El Charco

Source: Shapefile Indigenous Reservations, Ministry of the Interior (2020).

When verifying other ethnic groups, the presence of sixteen community councils surrounding the project was identified (see Table 5), as shown in Figure 1.

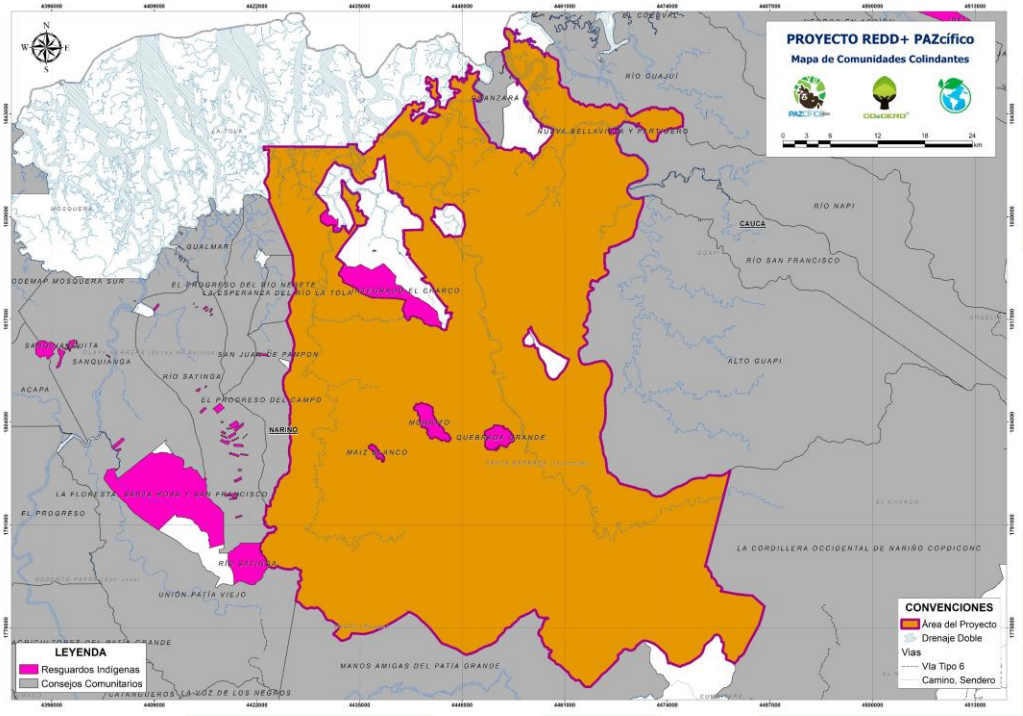


Figure 1. Map of indigenous reservations and neighboring community councils to the project area. Source: CO2CERO S.A.S. (2021).

Table 5 Community councils surrounding the REDD+ PAZcífico project.

Department	Municipality	Community Council
Cauca	Argelia	The Western Range of Mountains of Nariño COPDICONC
		Río Napi
	Balboa	The Western Range of Mountains of Nariño COPDICONC
	Guapi	Alto Guapi
		Chanzará
		The Western Range of Mountains of Nariño COPDICONC
		La Cuenca del Río Iscuandé
		Río Guajuí
		Río Napi
	Timbiquí	Río Guajuí
		Río Napi
Nariño	Cumbitara	The Western Range of Mountains of Nariño COPDICONC
	El Charco	Alto Guapi

Department	Municipality	Community Council
Nariño		Alto Río Sequihonda
		El Progreso del Campo
		El Progreso del Río Nerete
		The Western Range of Mountains of Nariño COPDICONC
		La Esperanza del Río la Tola
		Manos Amigas del Patía Grande
	El Rosario	The Western Range of Mountains of Nariño COPDICONC
	La Tola	El Progreso del Campo
		El Progreso del Río Nerete
		La Esperanza del Río la Tola
		Río Satinga
		Union Patía Viejo
	Leiva	The Western Range of Mountains of Nariño COPDICONC
	Magüí (Payán)	Manos Amigas del Patía Grande
		Río Satinga
		Union Patía Viejo
	Olaya Herrera (Bocas de Satinga)	El Progreso del Campo
		El Progreso del Río Nerete
		Río Satinga
		Union Patía Viejo
	Policarpa	The Western Range of Mountains of Nariño COPDICONC
	Roberto Payán (San José)	Union Patía Viejo
	Santa Barbara (Iscuandé)	Alto Guapi
		Alto Río Sequihonda
		Chanzará
		The Western Range of Mountains of Nariño COPDICONC

Source: Shapefile blackCommunities titled deed(2020)

The project borders the Sanquianga National Natural Park in the northern sector. When analyzing the territory, it is not found an overlap within its administrative limits with the National Natural Park. El Comedero Regional Natural Park is approximately 10 kilometers away in the northeast sector, and the Gorgona National Natural Park is 36 km northwest (see Figure 18).

When verifying the existence of Biotic Environment Compensation, 1% investment, and other investments, there is no activity of this type registered by National Authority of

Environmental Licenses (ANLA) within the limits of the REDD+ PAZcífico project, as shown in Figure 2 . Finally, the existence of national reserve areas was verified by law 2 of 1959. 184,432 ha were defined under resolution 1926 of 2013 as areas with a prior regulation decision (see Figure 18).

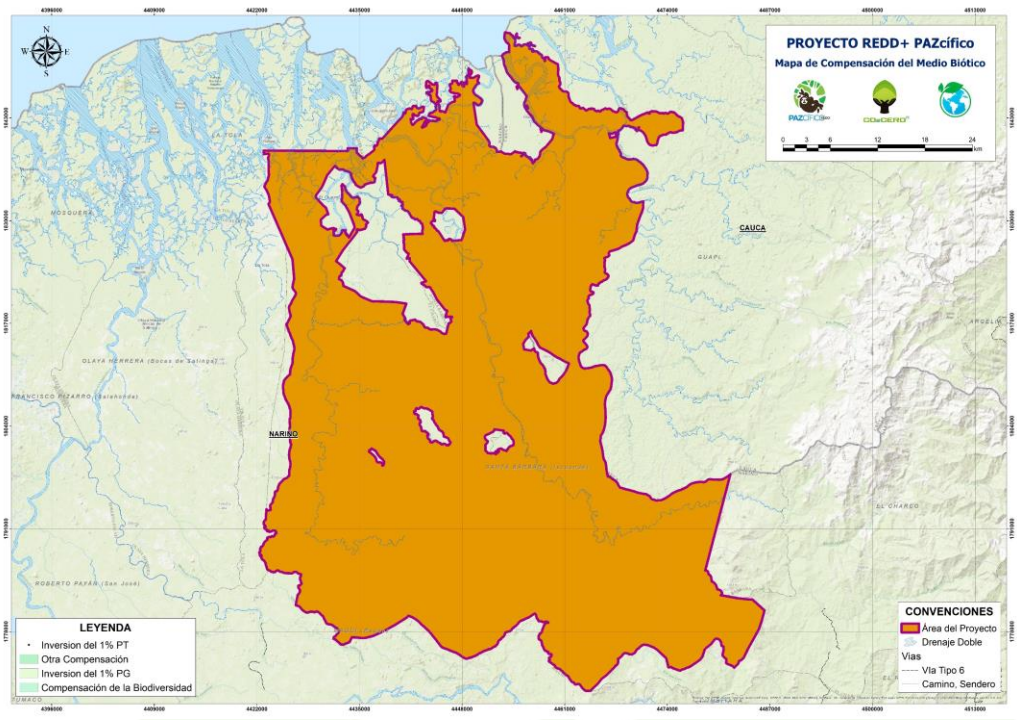


Figure 2 . Map of the Biotic Environment Compensation bordering the project area. Source: CO2CERO S.A.S. (2021).

2.6.2 Presence of Other Climate Change Mitigation Initiatives

Colombia has promoted the implementation of initiatives to reduce emissions and remove GHG from the atmosphere, according to the value of natural and planted forest cover as an effective carbon sink, in addition to committing as a country to the contribution to mitigating the effects of climate change at the global level. The Forest Reference Emissions Level proposed the potential of Colombia as a carbon sink at the national level, due to its tropical forest environment, with wide biological diversity worldwide, and its extensive forest cover, this being 52% of the territory (IDEAM & MinAmbiente, 2019). Which makes it attractive from the national and international point of view to favor actions on the effects of climate change.

When verifying possible projects surrounding the initiative through the cartographic system of the National Emissions Reduction Registry (RENARE), it was established that the REDD+ PAZcífico project did not overlap with any climate change mitigation initiative within the national territory (see Figure 3). There were nearby initiatives, including the REDD+ Acapa, Bajo Mira, and Frontera Project in Nariño, the REDD+ Cajambre Project in Valle del Cauca, and the REDD+ Concosta Project in Choco.

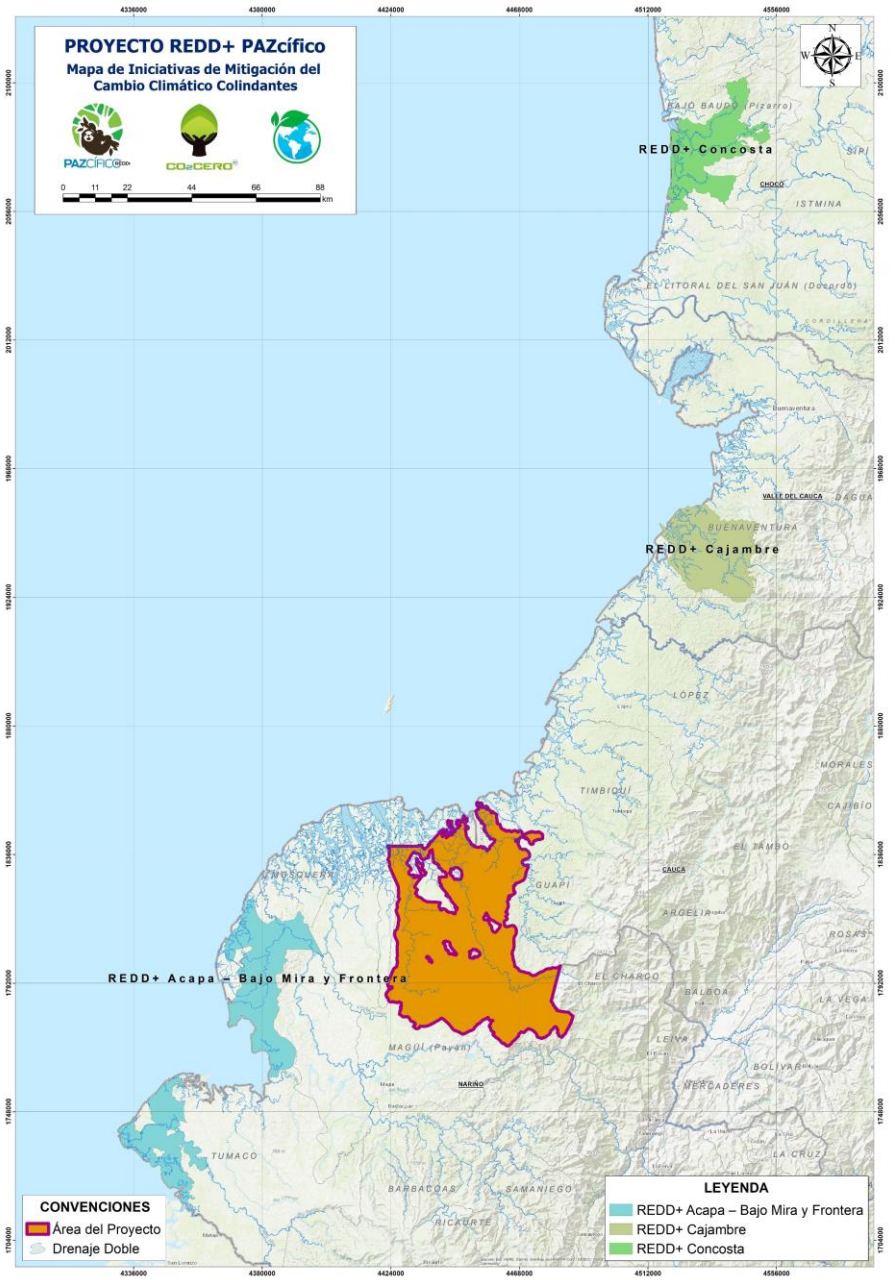


Figure 3 . Map of neighboring climate change mitigation initiatives.
Source: CO2CERO S.A.S. (2021).

2.7 Conditions Before Start the Project

The following chapter describes the physical and biotic diagnostic conditions of the influence area of the REDD+ PAZcífico Project.

2.7.1 1 Pacific Subregion

A description of the Pacific subregion was made below.

2.7.1.1 Generalities

The Colombian Pacific is in the west of the country from the south of Panama in the Tapín del Darién to the North of Ecuador, delimiting the national borders of both countries, from the northeast with Urabá of Antioquia, and to the west with the Pacific Ocean, with an approximate area of 116,000 km^2 of Colombian territory.

The Pacific Region is part of the biogeographic Choco, which covers the western territory of Panama, Colombia, and Ecuador with an approximate area of 175,000 km^2. At the national level, it contains four departments, with Choco being the most representative, along with Valle del Cauca, Cauca, and Nariño Colombiano (Defensoria del Pueblo Colombiano, 2016). The region has four subregions, as shown in Table 6.

Table 6. Pacific Subregions

Subregion	Description
Pacific Coastal Plains	Pacific coastal plains include areas bordering the Pacific Ocean in western Colombia, with mangrove, flooded forests, swamp vegetation, and coasts ecosystems. It has a vast landscape and cultural diversity, with social development in fishing activities, logging harvesting, and artisanal mining.
Serrania del Baudó	Serranía del Baudó is a low mountainous system located at the north of the mouth of the Baudó River, into the Pacific Ocean, to the Serranía del Limón, Colombian-Panamanian province of Darién, with a peak elevation of 1,400 meters above sea level at the Alto del Buey.
Alluvial valleys of the Atrato and San Juan rivers	An alluvial valley is a humid place distinguished by high rainfall, proximity to the coast, and the confluence with the mountainous areas creating the valley, favoring the presence of endemism and tall plant biodiversity. It ends by connecting with the Micay River.
Andean, Pacific	Andean, Pacific has a warm to a dry temperate climate, steep to broken relief, and some formations of volcanic origin due to the western mountain range. It houses the main conurbation of the region and economical business activities associated with sugar production chains.

Source: Delgado et al. (2007) & Hernández *et al.* (1992).

It has a great variety of ecosystems with 13 biomes with coastal ecosystems, mountain ranges, flooded forests, ecosystems with altitude gradients in Andean, sub-Andean and high Andean forests, and broad and flooded valleys (Galindo *et al.*, 2009).

2.7.1.2 Geology

The basin of the Colombian Pacific coast is a convergence zone of the Nazca, South American, and Caribbean plates bordering the Pacific Ocean on the western side and the Pacific platform and the mountain of the west range on the eastern side, with relatively flat

relief, characteristic elevations that generate igneous and sedimentary rocks mainly, and thrust and strike faults (IGAC, 2001).

Its evolution results from a continuous process of subduction and accretion at the edge of the South American plate, generating basins ahead of the volcanic arc. (Agencia Nacional de Hidrocarburos, 2006)

The region's geology is distinguished in different ways according to its geomorphology. In the plain areas, sedimentary material is dominant, with a significant presence of Plio-Pleistocene deposits. The Andean-Pacific zone comprises volcanic and metasedimentary rocks from the cretaceous with quartz diorite plutons from the tertiary and volcanic activity in Nariño (Delgado *et al.*, 2007).

In the alluvial valleys and depressions, sedimentary rocks are dominant from the Tertiary, with the presence of igneous rocks from the Plio-Pleistocene (Delgado *et al.*, 2007). The Serranía del Baudó has UVA formation, on the western border of the Pacific with the alluvial-type sedimentary material, alluvial terraces, homoclinal ridges, and (IIAP, 2015) conglomerate sandstone.

2.7.1.3 Hydrography

The Pacific Macro-basin longitudinally covers an approximate distance of 740 km, with a greater area in the natural basin of the Patía River. The average flow of the Pacific Rivers basin corresponds to 9,419 m^3/s (IIAP, 2013). It has 78 second-order basins. Several of them discharge into the sea, six release their waters into the Atlantic Ocean (Atrato, León, Sinú, Acandí, Tolo, and Mulato), and twenty-one drain into the Pacific Ocean (some such as Baudó, San Juan, Mira, Patía, San Juan del Micay) which are established as fundamental for planning the territory (IIAP, 2016).

The Pacific watershed is fed by water from the western mountain range, from the Pacific hydrographic zone, containing the Atrato, San Juan, Baudó, Mira, Patía, and San Juan de Micay rivers. The Mira River has 827.06 m^3/s and the Patía has 213.5 m^3/s with the more average flow, while the Blanco has 3.39 m^3/s with the lowest flow. Allowing to identify a reduction of 13% according to historical data from 1988 to 2003 (Delgado *et al.*, 2007).

The basins of the 240 rivers and tributaries of the region are short and mighty rivers rich in minerals such as gold, magnesium, nickel, and tin, among others, which are widely exploited. A body of water comprises the hydrography area with lagoons, estuaries, and mangroves. Lagoons such as Telpis, Santo Domingo, Verde, and La Cocha, among others, the latter considered a Ramsar wetlands. The water network is a vital transport and communication system between communities as the principal means for transportation, marketing, mobilization, and cultural exchange (IIAP, 2015).

2.7.2 Biomes

The project area has three large and five regular biomes, as shown in Table 7. The moist tropical Zonobiome is more representative, equivalent to 166,477.04 ha (57.85%).

It should be noted that the information base Shapefile generated by the IDEAM (2017) presented some areas without interpretation within the project limits. Due to this, the interpretation of the missing biomes from the dynamics of double drainages was associated with the areas with information gaps. In this way, the double drainages layer was intersected with the Continental Ecosystems layer, identifying that 98.00% of the areas coincide with the Tropical Moist Zonobiome's Pedobiome of the Hydrobiome Biome. According to the IAvH, the Biome level was 97.73% of the regions corresponding to the Pacific of Nariño-Tumaco Hydrobiome, coinciding with the description of the closest interpreted polygons. In this way, the missing area was added to these categories.

Table 7. Biomes in the Project Area

Large Biome	Biome	Area (ha)	Area (%)
Moist Tropical Zonobiome's Orobiome	Subandean Orobiome	6,319.23	2.20%
Moist Tropical Zonobiome's Pedobiome	Halobiome	21,221.05	7.37%
	Helobiome	84,452.50	29.35%
	Hydrobiome	9,309.40	3.23%
Moist Tropical Zonobiome	Moist Tropical Zonobiome	166,477.04	57.85%
Total		**287,779.22**	**100%**

Source: IDEAM (2017).

The second most representative biome was the Helobiome with 84,452.50 ha (29.35%), followed by the Halobiome with 21,221.05 ha (7.37%), Hydrobiome with 9,309.40 ha (3.23%), and the last one, the Sub-Andean Orobiome with 6,319.23 ha (2.20%). The Alexander von Humboldt Institute (IAvH) classified nine biomes within the project area, as shown in Table 8 and graphically in Figure 4 .

Table 8. Biomes in the Project Area According to IAvH

Biome	Area (ha)	Area (%)
Halobiome Micay	29.89	0.01%
Pacific of Nariño Halobiome Tumaco	21,191.16	7.36%
Helobiome Micay	520.34	0.18%
Pacific of Nariño Halobiome Tumaco	83,932.17	29.17%
Micay Hydrobiome	27.68	0.01%
Pacific of Nariño Hydrobiome Tumaco	9,281.72	3.23%
Pacific of Nariño Sub-Andean Orobiome Tumaco	6,319.23	2.20%
Moist Tropical Zonobiome Micay	1,747.77	0.61%
Pacific of Nariño Moist Tropical Zonobiome Tumaco	164,729.27	57.24%
Total	287,779.22	100.00%

Source: IDEAM (2017).

The biome of the Pacific of Nariño moist tropical zonobiome Tumaco had 164,729.27 ha (57.24% of the total area), and the greater extension; the Pacific of Nariño helobiome Tumaco had 83,932.17 ha (29.17%), while the Pacific of Nariño halobiome Tumaco was less representative with 21,191.16 ha (7.36%), the Pacific of Nariño hydrobiome Tumaco has 3.23%, the Pacific of Nariño sub-Andean orobiome Tumaco had 2.20 %, and with less

than 1% the moist tropical zonobiome Micay, helobiome Micay, halobiome Micay, and finally the hydrobiome Micay.

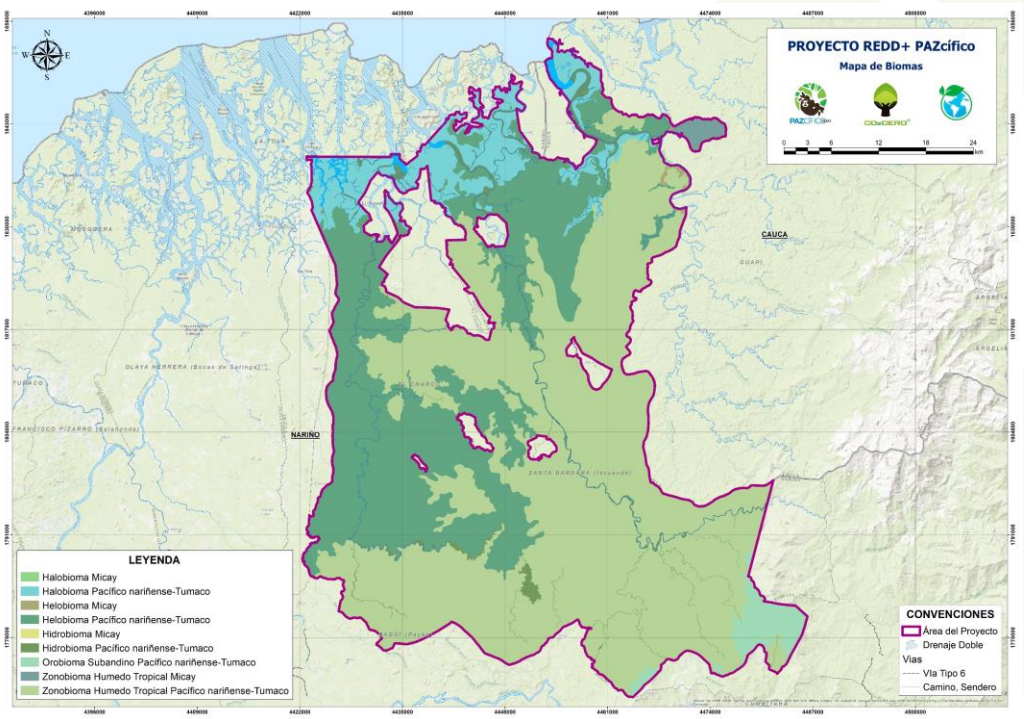


Figure 4 . Biomes Map according to IAvH within the Project.
Source: CO2CERO S.A.S. (2021).

2.7.3 Ecosystems

According to the information in the Shapefile of Continental, Maritime, and Coastal Ecosystems of Colombia generated by IDEAM in 2017, the natural woodland ecosystem was the most extensive, with 208,727.15 ha (72.53% of the total area), the second one was vegetation with 54,795.20 ha (19.04%), and the third one was the heterogeneous agricultural areas with 16,038.42 ha (5.57%,) as presented in Table 9 .

Table 9 . Ecosystems in the Project Area

Ecosystem	Area (ha)	Area (%)
Heterogeneous Agricultural Areas	16,038.42	5.57%
Urban Areas	2.37	0.00%
Natural Woodland	208,727.15	72.53%
Coastal Herbaceous and Shrubby	16.40	0.01%
Coastal Lagoons	3,250.55	1.13%
Mangrove	4,949.13	1.72%
Secondary Vegetation	54,795.20	19.04%
Total	**287,779.22**	**100%**

Source: IDEAM (2017).

The mangrove ecosystem was 4,241.24 ha (1.72%), while the coastal lagoons were 3,250.55 ha (1.13%). Among the least representative ecosystems, less than 1% of the area was herbaceous and shrubby coastal, and urban areas, as presented graphically in Figure 5 .

To cover some information gaps in the shapefile of Continental, Maritime, and Coastal Ecosystems of Colombia generated by IDEAM in 2017, the intersection of the double drainages layer with the Continental Ecosystems layer was made with 34.63 % of the area, coincides with the ecosystem of coastal lagoons and the description of the interpreted polygons closest to the regions without interpretation, in this way the missing area to interpret was added to said category.

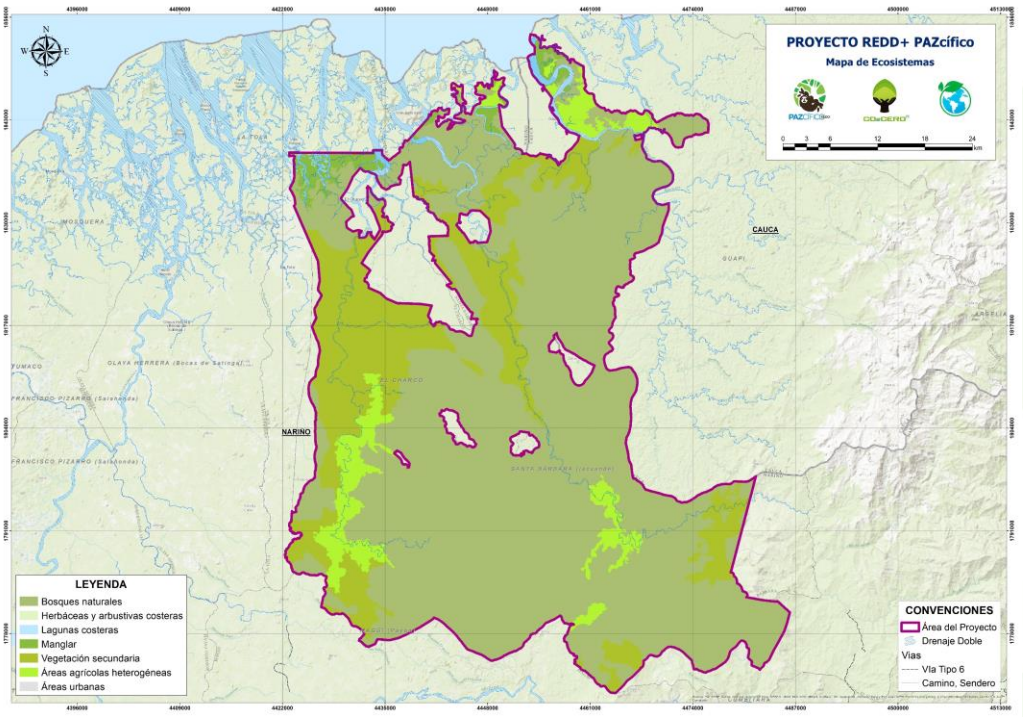


Figure 5 . Ecosystems map in the project area
Source: CO2CERO S.A.S. (2021).

2.7.4 Vegetation

The IDEAM reported information in the 2018 Land Cover shapefile. The most extensive coverage was dense forest with 231,187.31 ha (80.33%); the second one was the secondary vegetation or in transition with 13,771.91 ha (4.79%), and the third one was the fragmented forest with 11,227.28 ha (3.9%), as shown in Table 10 and Figure 6.

Table 10. Coverages, according to Corine Land Cover in the Project Area

.Biome	Area (ha)	Area (%)
Continuous Urban Fabric	19.00	0.01%

.Biome	Area (ha)	Area (%)
Discontinuous Urban Fabric	4.06	0.00%
Clean Pastures	443.98	0.15%
Wooded Pastures	102.21	0.04%
Weedy Grasses	113.98	0.04%
Crop Mosaic	127.88	0.04%
Pastures and Crops Mosaic	1,203.89	0.42%
Mosaic of Crops, Pastures, and Natural Spaces	9,185.63	3.19%
Mosaic of Pastures with Natural Spaces	4,931.80	1.71%
Mosaic of Crops with Natural Spaces	5,858.04	2.04%
Dense Forest	231.187,31	80.33%
Open Forest	253.41	0.09%
Fragmented Forest	11,227.28	3.90%
Grassland	2,012.79	0.70%
Exposed Sediments at Low Tide	27.21	0.01%
Mining Extraction Zones	680.10	0.24%
Secondary or Transition Vegetation	13,771.91	4.79%
Permanent Tree Crops	292.27	0.10%
Rivers	6,336.47	2.20%
Total	**287,779.22**	**100.00%**

Source: IDEAM (2018).

The Mosaic of crops, pastures, and natural spaces had 9,185.63 ha (3.19%), rivers had 6,336.47 ha (2.20%), the mosaic of crops with natural spaces had 5,858.04 ha (2 .04%), and the mosaic of pastures with natural spaces had 4,931.80 ha (1.71%). While the others in Table 10 and Figure 6 represented less than 1%. The 2018 IDEAM Land Cover Shapefile presented some project areas without interpretation. An adjustment was made to the missing land covers (19.49 ha), adding them to the most representative category and the homologation of visual patterns.

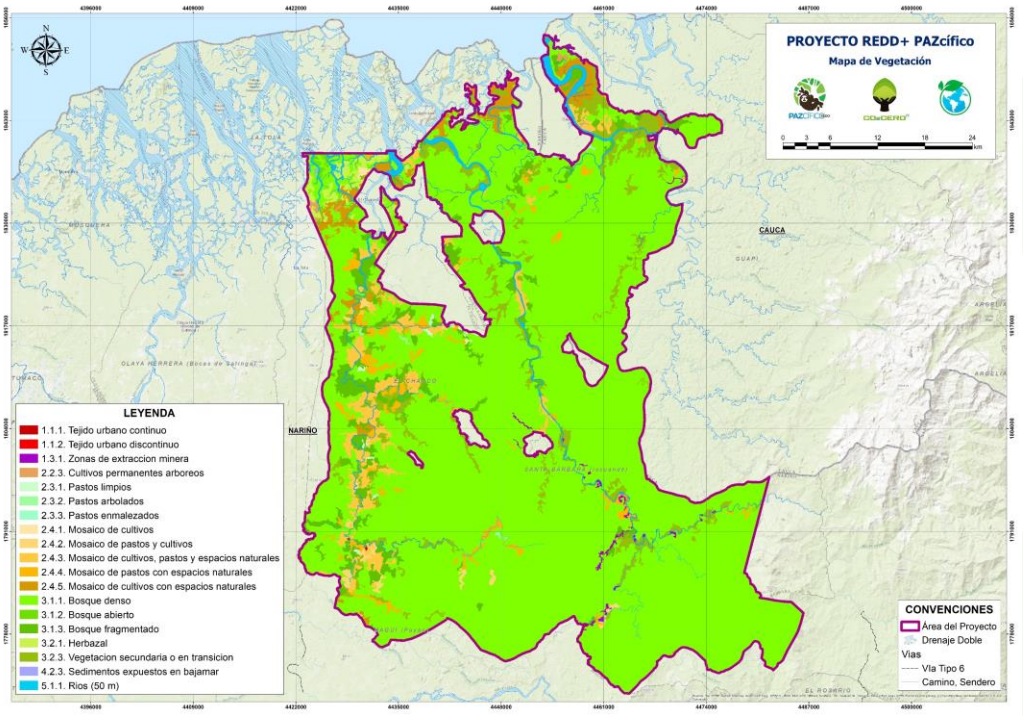


Figure 6. Map of land covers in the project area according to Corine Land Cover. Source: CO2CERO S.A.S. (2021).

According to INVEMAR *et al.* (2003), some forest species identified within the dense, open, and fragmented forests are in Table 11. Additionally, the threat state was established according to IUCN, finding two species in a vulnerable state (*Mora megistosperma* and *Pelliciera Rhizophora*) and *Pterocarpus officinalis* were listed as near threatened, while the remaining majority as least concern.

Table 11. Forest species identified in dense, open, and fragmented forests

Scientific Name	Common Name	Conservation Status
Mora megistosperma	Mora	Vulnerable
Pelliciera rhizophorae	Tea Mangrove	Vulnerable
Rhizophora spp.	Red Mangrove	Least concern
Protium heptaphyllum	Anime	Not assessed
Alchornea obtusifolia	Balsomach	Not assessed
Abarema jupumba	Barbasquillo	Least concern
Hirtella racemosa	Carbonero	Least concern
Matisia idroboi	Castaño	Least concern
Goupia glabra	Chaquiro	Least concern
Cocos nucifera	Coconut Tree	Not assessed
Otoba gracilipes	Cuangare	Not assessed
Swartzia amplifolia	Cuna	Not assessed
Pourouma chocoana	Guagay	Not assessed
Symphonia globulifera	Machare	Least concern
Ardisia manglillo	Manglesillo	Not assessed

Scientific Name	Common Name	Conservation Status
Tapirira myriantha	Manteco	Not assessed
Isertia pitteria	Mapan	Not assessed
Calophyllum longifolium	María	Least concern
Euterpe oleracea	Naidi	Not assessed
Cespedesia macrophylla	Pacora	Not assessed
Hieronyma chocoensis	Pantano	Not assessed
Apeiba membranacea	Peinemono	Least concern
Andira inermis	Purga	Least concern
Terminalia amazonia	Oak	Least concern
Campnosperma panamense	Sajo	Least concern
Brosimum utile	Sande	Least concern
Vismia macrophylla	Sangre gallina	Least concern
Pterocarpus officinalis	Suela	Near threatened
Carapa guianensis	Tangare	Least concern
Aniba puchury	Jigua pava	Least concern

Source: INVEMAR et al. (2003).

2.7.5 Physiography

The IDEAM 2017 issued the Continental, Maritime, and Coastal Ecosystems of Colombia Shapefile with physiographic information. The alluvial plain had 137,571.25 ha (47.80%), the greater extension on terrace relief. Rolling hills had 86,971.38 ha (30.22%) with greater relief evidence of hills and slopes, hills and hillsides, as shown in Table 12.

Table 12. Landscapes and Reliefs in the Project Area

Landscape	Relief	Area (ha)	Area (%)
Rolling Hills	Hills	26.15	0.01%
	Hills and Hillsides	42,570.93	14.79%
	Hills and Slopes	44,374.30	15.42%
Mountain	Rows and beams	721.35	0.25%
	Hills and Hillsides	29,658.46	10.31%
N/A	N/A	9,309.40	3.23%
Alluvial Plain	Flood Plain	5,654.07	1.96%
	Terraces	55,445.08	19.27%
	Terraces - Level 1	76,472.08	26.57%
Fluvial Marine Plain	Flood Plain	7,422.95	2.58%
Marine Plain	Deltaic Floodplain	1,203.32	0.42%
	Mudflat	13,899.14	4.83%
Valley	Flood Plain	1,022.00	0.36%
Total		**287,779.22**	**100%**

Source: IDEAM (2017).

The Mountain landscape had 30,379.81 ha (10.56% of the total area) with greater relevance to the hills and hillsides relief. Less significant were the areas of marine plain (5.25%), fluvial marine plain (2.58%), and Valley (0.36%), as shown in Figure 7 . Areas without information were classified as N/A-associated areas with bodies of water in which it was impossible to define a relief.

The base Shapefile of Continental, Maritime, and Coastal Ecosystems of Colombia generated by IDEAM in 2017 presented some areas without interpretation within the project. For this, the missing landscapes were adjusted, understanding that the absence of data occurred in areas with double drains on the project's northern limits. The double drainages layer was superimposed over the layer of Continental Ecosystems, identifying 98.00% of the areas that coincide with the N/A landscape. This matched the description of the interpreted polygons closest to the areas without information. In this way, the missing area to interpret was added to said category.

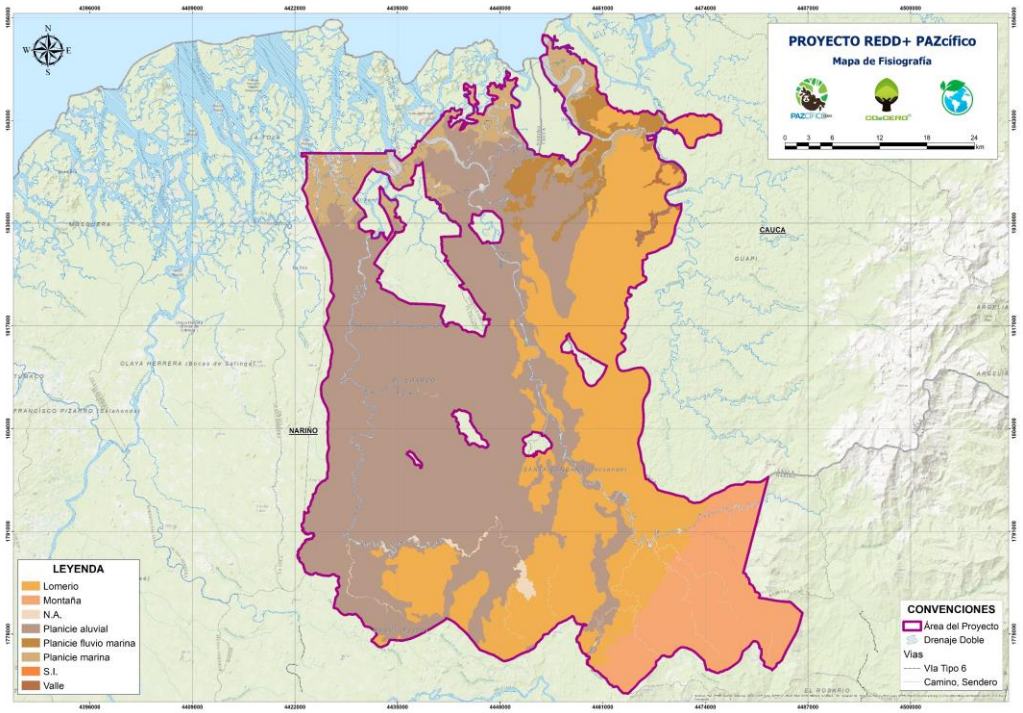


Figure 7 . Physiography map in the project area.
Source: CO2CERO S.A.S. (2021).

2.7.6 Climate Classification

According to the climate classification of Caldas-Lang (2012) generated by the IDEAM, it was evident that the warm super-humid climate dominated the project area (mainly the central sector) with 203,664.42 ha (70.77%), followed by the warm humid climate with 67,305.06 ha (23.39%), (located mainly in the northwestern zone), as shown in Table 13.

Table 13. Climates according to Caldas Lang in the Project Area

Ecosystem	Area (ha)	Area (%)
Warm Humid	67,305.06	23.39%

Warm Semi-arid	49.49	0.02%
Warm Semi-humid	935.00	0.32%
Warm Super-humid	203,664.42	70.77%
Temperate Humid	6,498.01	2.26%
Semi-arid Temperate	970.15	0.34%
Semi-humid Temperate	8,357.08	2.90%
Total	**287,779.22**	**100%**

Source: IDEAM (2012).

In a smaller area, the semi-humid temperate climate was at 8,357.08 ha (2.90%), humid temperate at 6,498.01 ha (2.26%) and less than 1%, the semi-arid temperate climate, semi-humid warm and semi-arid warm, was concentrated in the southwestern part of the project, as shown in Figure 8.

The Caldas-Lang Climate Classification Shapefile (2012) generated by IDEAM had some areas without interpretation within the project. Therefore, the missing climatic regions were adjusted. Thus, the double drainage layer was superimposed with the climatic classification layer. 72.51% of the areas had a warm super-humid climate, while 27.49% had a warm humid climate, coinciding with the closest interpreted polygons to the areas without information. In this way, the uninterpreted area was adjusted according to the area of influence of the surrounding polygons.

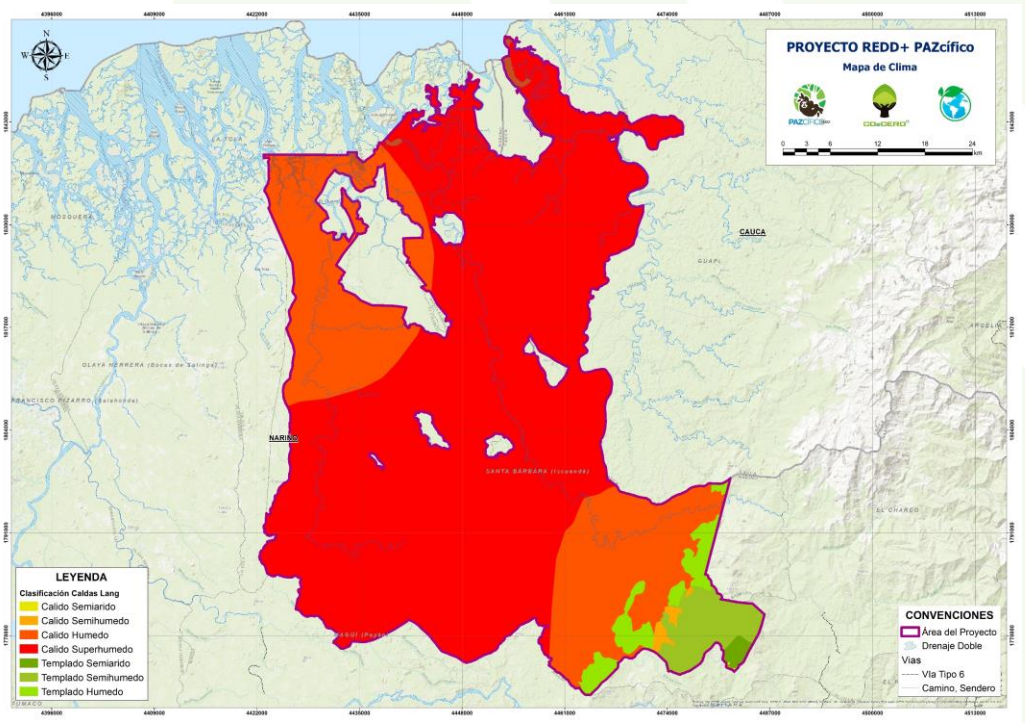


Figure 8. Caldas-Lang climatic zoning for the project area
Source: CO2CERO S.A.S. (2021).

2.7.7 Precipitation and Temperature

According to the total annual precipitation shapefile generated by IDEAM in 2012, within the project area, seven precipitation categories oscillated within 1000 to 7000 mm ranges per year (see Table 14), with a precipitations decrease as it approached the South East part of the project as shown in Figure 9 .

Table 14. Annual Precipitation for the Project Area

Precipitation Categories	Area (ha)	Area (%)
1000-1500mm	2,638.62	0.92%
1500-2000mm	4,777.28	1.66%
2000-2500mm	4,724.02	1.64%
2500-3000mm	7,979.89	2.77%
3000-4000mm	56,567.96	19.66%
3000-4000mm	129.591.05	45.03%
3000-5000mm	81,500.41	28.32%
Total	**287,779.22**	**100%**

Source: IDEAM (2012).

In Table 14 The precipitation category presenting the greatest dominance within the project area was between 4000-5000 mm with 129,591.05 ha (45.03% of the total project area); in second place, precipitations areas of 5000-7000 mm with 81,500.41 ha (28.32%); and in third place, 3000-4000 mm precipitations areas with 56,527.96 ha (19.66%).

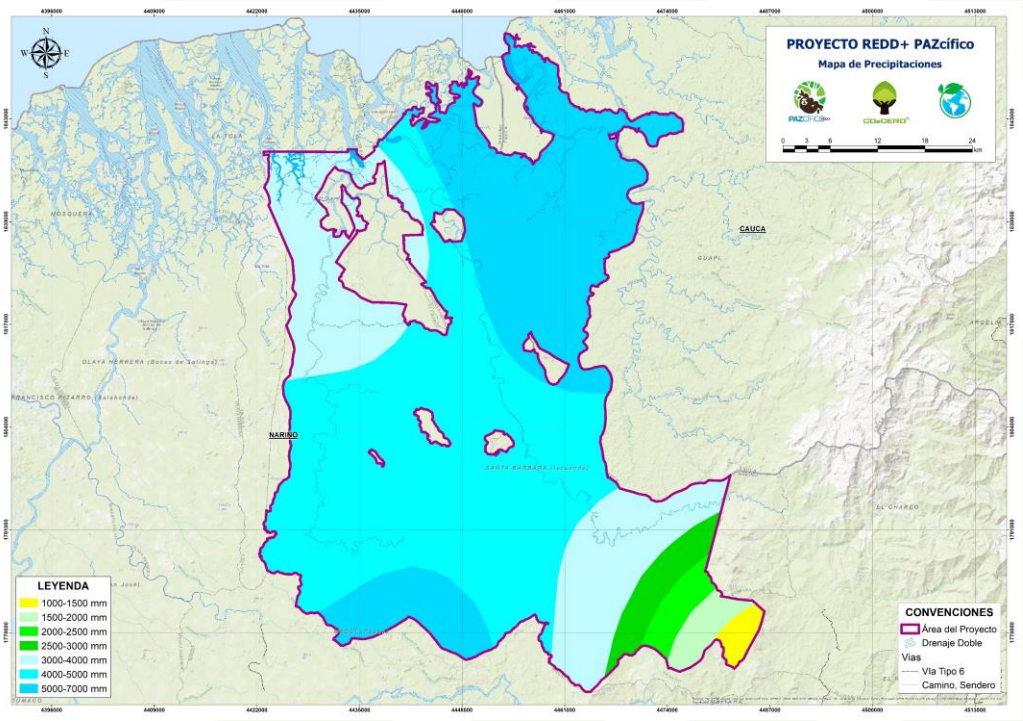


Figure 9 . Precipitation map for the project area
Source: CO2CERO S.A.S. (2021).

The other categories of precipitations were less than 3% of the areas, corresponding to less than 3000 mm per year. Regarding the average annual temperature shapefile generated by the IDEAM in 2012, there were two most representative categories corresponding, the one greater than 25°C in 271,953.93 ha (94.50 % of the area) while from 18 to 24°C in 15,825.29 ha (5.50%), as shown in Figure 10.

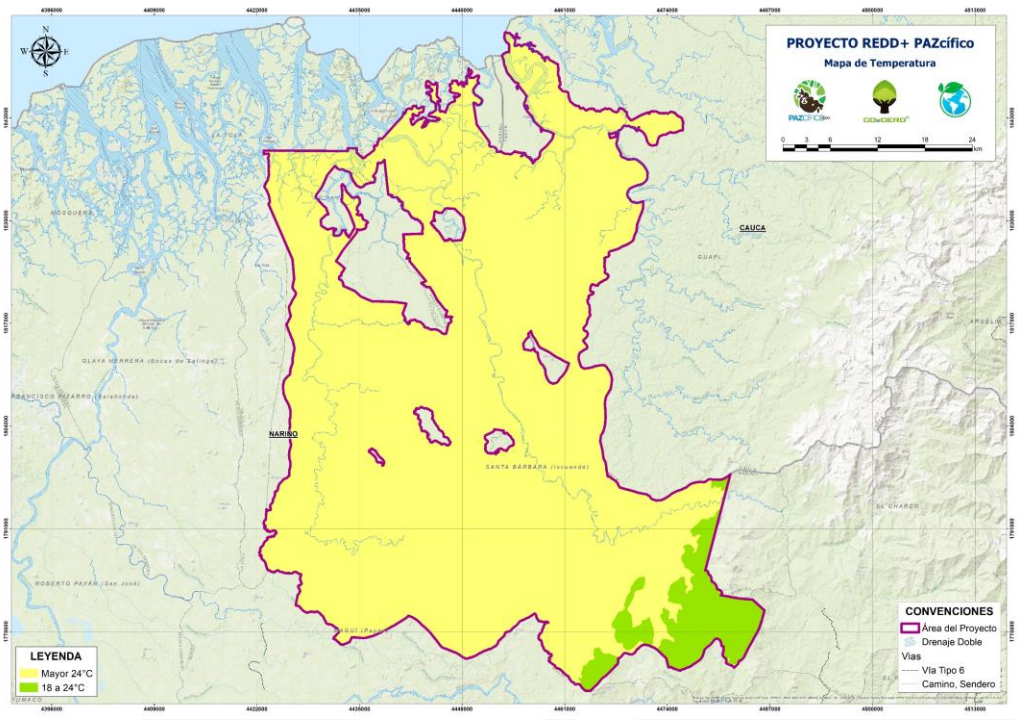


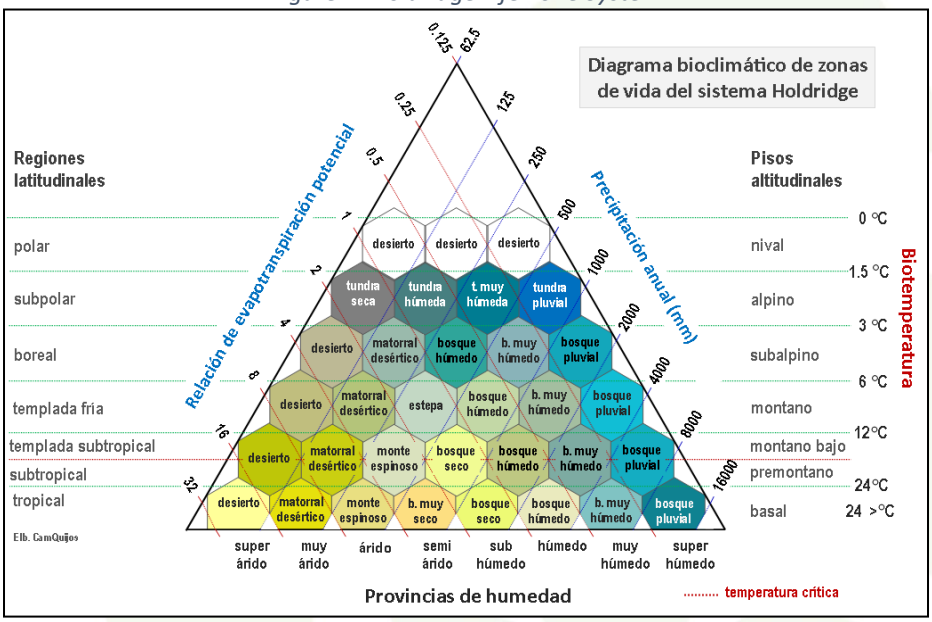
Figure 10. Temperatures map in the project area
Source: CO2CERO S.A.S. (2021).

The total annual precipitations and average annual temperature shapefile generated by IDEAM in 2012 presented areas without interpretation within the project's limits. For this, the missing precipitations and temperatures were interpreted, superimposing the double drainage layer with the corresponding temperature and precipitation layers. 42.85%, 31.88%, and 25.27% of the areas coincided with the following precipitations 5000-7000 mm, 4000-5000 mm, and 3000-400 mm, respectively. Thus, the missing area was defined according to the influence percentage of these categories. 100% of the intercepted areas corresponded to temperatures greater than 24°C, distributing the remaining area in this category.

2.7.8 Bioclimatic Zoning

According to the classification of life zones proposed by Holdridge (1967), he classified the areas according to the annual precipitation conditions (mm) and mean annual temperature (°C) (see Figure11). They are classified into five bioclimatic categories presented within the project area, as shown in Table 15 .

Figure11 Holdridge Life Zone System



Source: Holdridge (1967)

The tropical wet forest (wf-T) represents the largest land percentage with 211,091.46 hectares, equivalent to 73.35% of the total land, in areas with precipitation between 4,000 and 8,000 mm and temperatures greater than 24 °C. In second place comes the tropical moist forest (mf-T) with 60,810.52 hectares, corresponding to 21.13% of the total area. Precipitation levels are between 2,000 and 4,000 mm and temperatures are greater than 24 °C.

Table 15 . Bioclimatic Scheme Categories

Bioclimatic Scheme Categories	Area (ha)	Area (%)
Premontane Moist Forest	7,363.95	2.56%
Tropical Moist Forest	60,810.52	21.13%
Premontane Wet Forest	8,461.34	2.94%
Tropical Wet Forest	211,091.46	73.35%
Tropical Dry Forest	51.94	0.02%
Grand Total	**287,779.22**	**100%**

Source: CO2CERO S.A.S. (2021).

The other bioclimatic categories represent less than 3% of the total area. This is the case of the premontane wet forest (wf-PM), the premontane moist forest (mf-PM), and some small relicts of tropical dry forest (df-T) (See Figure 12). It should be noted that the maps

generated by IDEAM show some areas without interpretation within the project. For this reason, the missing bioclimatic zones were adjusted. In this way, the double drainage layer was superimposed on the climatic classification layer. It was identified that 74.73% of the areas coincide with the tropical wet forest, while 25.27% coincide with the tropical moist forest. In turn, they coincide with the description of the interpreted polygons surrounding the areas without information. Thus, the missing area was defined according to the influence percentage of these categories.

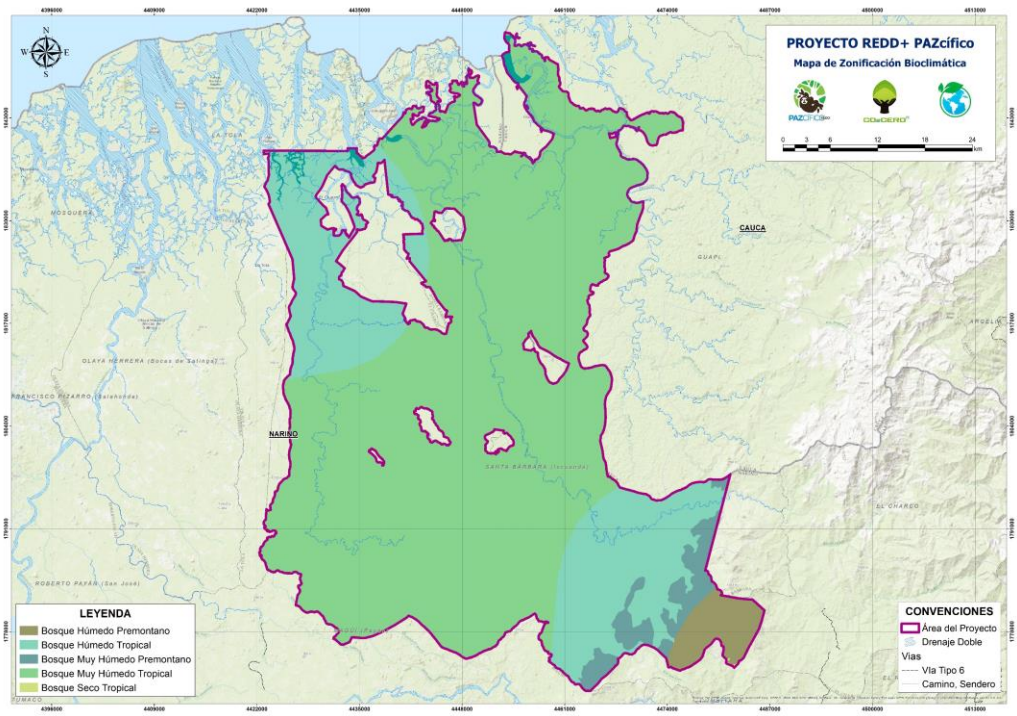


Figure 12 . Map of Biogeographic Zones within the Project Area.
Source: CO2CERO S.A.S. (2021).

2.7.9 Soil

Within the project area, the soil associations represented in Table 16 are identified. The most representative association is Fluvaquentic Endoaquepts, Typic Humaquepts, Vertic Endoaquepts, covering 82,198.11 hectares (28.56%). It is followed by Oxic Dystrudepts, Xanthic Hapludoxs, Plinthic Haplaquox with 46,552.38 hectares (16.18%). In third place comes the Typic Dystrudepts, Lithic Dystrudepts, Lithic Udorthents association with 44,374.30 hectares (15.42%). Then, the Humic Dystrudepts with 39,660.21 hectares (13.78%). Finally, the Typic Dystrudepts, Typic Udorthents comes in fifth place with 29,658.46 hectares equivalent to 10.31% of the total area.

Table 16 . Soil Associations Present in the Project Area

Bioclimatic Scheme Categories	Area (ha)	Area (%)
Acrudoxic Hapludands, Alic Hapludands, Aquic Eutrudepts	8,892.70	3.09%
Fluvaquentic Endoaquepts, Typic Fluvaquents, Fluvaquentic Dystrudepts	8,613.97	2.99%
Fluvaquentic Endoaquepts, Typic Humaquepts, Vertic Endoaquepts	82,198.10	28.56%
Fluventic Dystrudepts, Typic Fluvaquents, Fluventic Eutrudepts	1,022.00	0.36%
Humic Dystrudepts	39,660.21	13.78%
Humic Dystrudepts, Typic Udorthents, Lithic Udorthents	721.35	0.25%
Inceptic Hapludoxs, Typic Hapludults, Oxic Dystrudepts	1,319.53	0.46%
N/A	9,309.40	3.23%
Oxic Dystrudepts, Xanthic Hapludoxs, Plinthic Haplaquox	46,552.38	16.18%
Typic Dystrudepts, Humic Dystrudepts, Lithic Dystrudepts	1,617.35	0.56%
Typic Dystrudepts, Lithic Dystrudepts, Lithic Udorthents	44,374.30	15.42%
Typic Dystrudepts, Typic Udorthents	29,658.46	10.31%
Typic Hydraquents, Hydric Haplohemists, Typic Fluvaquents	13,839.49	4.81%
Grand Total	**287,779.22**	**100%**

Source: IDEAM (2017).

Representing less than 4%, there are a total of nine (9) edaphological associations: Fluvaquentic Endoaquepts, Typic Fluvaquents, Fluvaquentic Dystrudepts; Fluventic Dystrudepts, Typic Fluvaquents, Fluventic Eutrudepts; Humic Dystrudepts, Typic Udorthents, Lithic Udorthents, and Inceptic Hapludoxs, Typic Hapludults, Oxic Dystrudepts, among others. The distribution of soils and their corresponding taxonomy can be seen in Figure 13 .

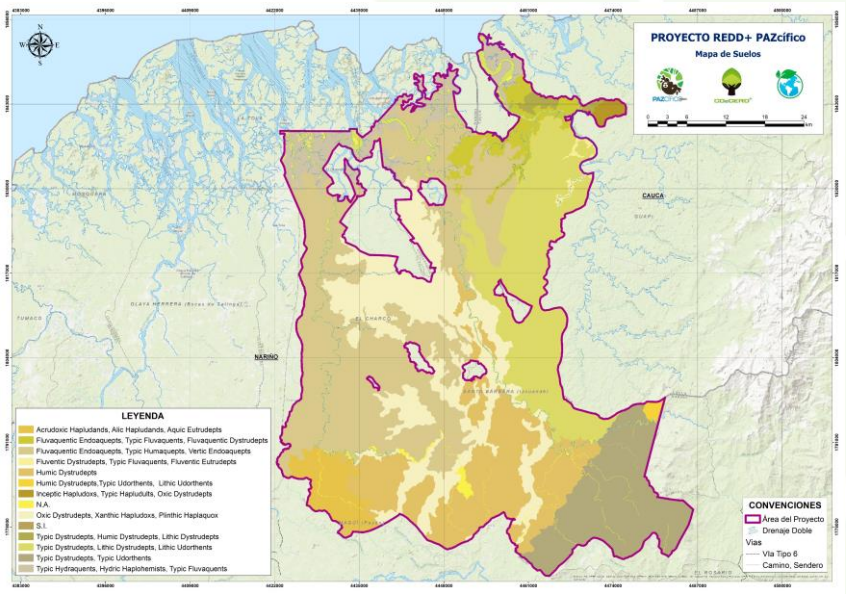


Figure 13 . Map of Soil Associations Present in the Project Area.

The base Shapefile of Colombian Continental, Maritime, and Coastal Ecosystems generated by IDEAM in 2017 presents some non-interpreted areas within the project. Thus, the interpretation of the missing soil associations was based on the presence of double drainages in the northern boundary of the project. The layer of double drainages was superimposed on the layer of Continental Ecosystems. Thus it was identified that 98.00% of the areas coincide with the N/A category, according to the absence of soils due to the presence of double drainages. This in turn matches the description of the interpreted polygons closest to the areas without information. In this way, the missing area to interpret was added to said category.

2.7.10 Fauna

Within the project area, there is highly diverse fauna, associated with the presence of strategic ecosystems, ideal habitats, and forest protection. It also has cultural relevance of the communities associated with the consumption, commercialization, and protection of some of these. The groups of fauna identified within the boundaries of the project are described below.

2.7.10.1 Ichthyofauna

According to *INVEMAR et al. (2003),* the confluence of rivers and seas generates particular habitat conditions, which are related to the availability of food and shelter for different fish (in fresh and seawater), mollusks, and crustaceans.

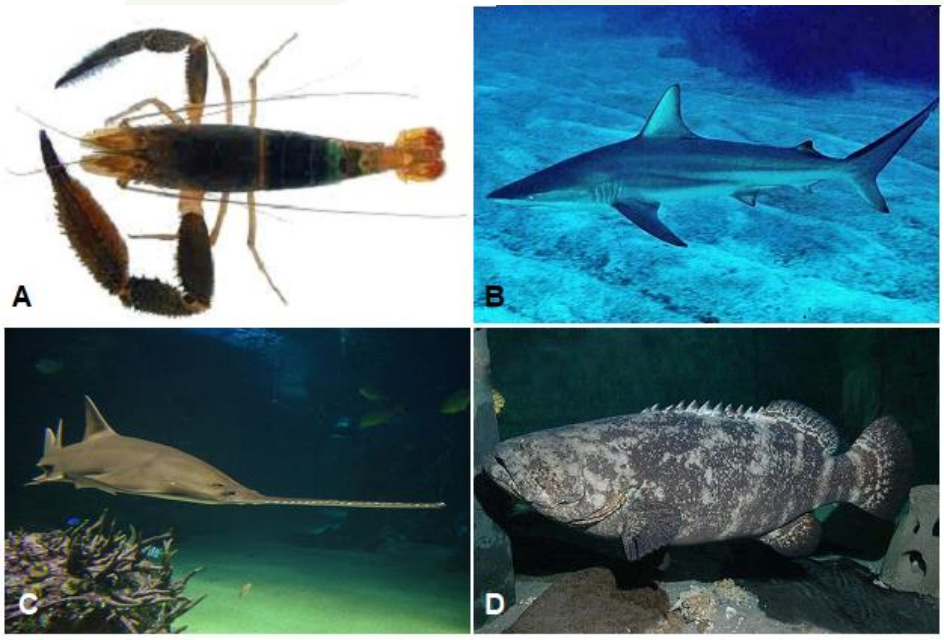


Illustration 10 . Threatened Ichthyofauna Associated with the Project Area
Taken from: Naturalista CR (2019), Smithsonian Institute (2018), García et al (2013).
A: Macrobrachium panamense, B: Carcharhinus limbatus, C: Pristis pectinata, D: Epinephelus itajara

Table 17 and Illustration 10 show the most abundant and important animals for the communities of the municipalities of Guapi and Santa Barbara de Iscuande.

Table 17. Ichthyofauna of the Area and Conservation Status

Scientific Name	Common Name	Conservation Status
Macrobrachium panamense	Chambero shrimp	Least concern
Lolliguncula panamensis	Squid	Data deficient
Arius planiceps	Flathead sea catfish	Least concern
Arius multiradiatus	Box sea catfish	Least concern
Caranx spp.	Jack mackerel	Least concern
Centropomus spp.	Snook	Least concern
Diapterus peruvianus	Peruvian mojarra	Least concern
Lutjanus sp.	Snapper	Least concern
Polydactylus approximans	Blue bobo	Least concern
Peprilus sp.	Butterfish	Least concern
Gymnura sp.	Butterfly ray	Near threatened
Carcharhinus limbatus	Blacktip shark	Vulnerable
Pristis pectinata	Smalltooth sawfish	Critically endangered
Epinephelus itajara	Itajara	Vulnerable
Cetengraulis mysticetus	Pacific anchovy	Critically endangered

Source: INVEMAR et al. (2003) & Conservation International Colombia (2011).

2.7.10.2 Mammalian Fauna

Two large groups of animals can be found within this category. The first group is comprised by those susceptible to hunting and community subsistence utilization. The second one is related to the care and protection of the environment. Some species are highly abundant, while others have been decimated by the decrease in their habitat (INVEMAR *et al.,* 2003). Among the priorities of the community councils is the protection of fauna, bearing in mind the impacts in their habitat due to deforestation and degradation activities, as well as excessive affectation on their populations. Similarly, family sustainability in some cases depends on the mammalian fauna or other taxonomic groups, but this has been transformed into illegal and trafficking actions. These actions do not represent the essence of the communities as managers of natural resources and the biotic component.

Illustration 11 . Threatened Mammalian Fauna Associated with the Project Area
Taken from: Payan et al (2015), Mosquera et al. (2018), Naturalista (2019) & Ecosbosque (2019).
A: Panthera onca, B: Lutra longicaudis, C: Alouatta palliata, D: Felis concolor

It is evident that the most diverse and abundant group corresponds to bats. Table 18 and Illustration 11 show some species present in the area.

Table 18 . Mammalian Fauna of the Area and Conservation Status

Scientific Name	Common Name	Conservation Status
Dasypus novemcinctus	Nine-banded armadillo	Least concern
Tamandua mexicana	Collared anteater	Least concern
Cyclopes didactylus	Silky anteater	Least concern
Bradypus variegatus	Brown-throated sloth	Least concern
Mazama americana	Red brocket	Data deficient
Panthera onca	Jaguar	Near threatened
Felis concolor	Puma	Least concern
Felis pardalis	Ocelot	Least concern
Felis yagouaroundi	Jaguarundi	Least concern
Lutra longicaudis	River otter	Near threatened
Sciurus granatensis	Red-tailed squirrel	Least concern
Alouatta palliata	Mantled howler monkey	Vulnerable
Didelphis marsupialis	Southern opossum	Least concern
Proechimys semispinosus	Tome's spiny rat	Least concern

Source: INVEMAR et al. (2003).

2.7.10.3 Ornithofauna

The country is categorized as having the most diversity in birds. The Pacific area is no exception; however, as well as with mammalian fauna, hunting and illegal extraction reduce diversity and abundance in the area. Some species of this group are presented in Table 19 and Illustration 12 .

Table 19 . Ornithofauna of the Area and Conservation Status

Scientific Name	Common Name	Conservation Status
Tigrisoma mexicanum	Bare-throated tiger heron	Least concern
Fregata magnificens	Magnificent frigatebird	Least concern
Quiscalus mexicanus	Great-tailed grackle	Least concern
Pelicanus occidentalis	Brown pelican	Least concern
Tringa sp.	Tattler	Least concern
Thalasseus maximus	Royal tern	Least concern
Phalacrocorax olivaceus	Cormorant	Not assessed
Anas sp.	Duck	Least concern
Crax sp. Paujil	Blue-billed curassow	Least concern
Penelope purpurascens	Crested guan	Least concern
Phalacrocorax olivaceus	Cormorant	Least concern
Amazona farinosa	Southern mealy amazon	Near threatened
Ramphastos swainsonii	Chestnut-mandibled toucan	Least concern
Tinamus major	Great tinamou	Near threatened
Aramides wolfi	Brown wood rail	Vulnerable
Capito quinticolor	Five-colored barbet	Vulnerable

Source: INVEMAR et al. (2003)

Illustration 12 . Threatened Ornithofauna Associated with the Project Area
Taken from: Palacio (2012), Arango (2017), InaturalistPa (2019) & Arango (2015).
A: Amazona farinosa, B: Tinamus major, C: Aramides wolfi, D: Capito quinticolor

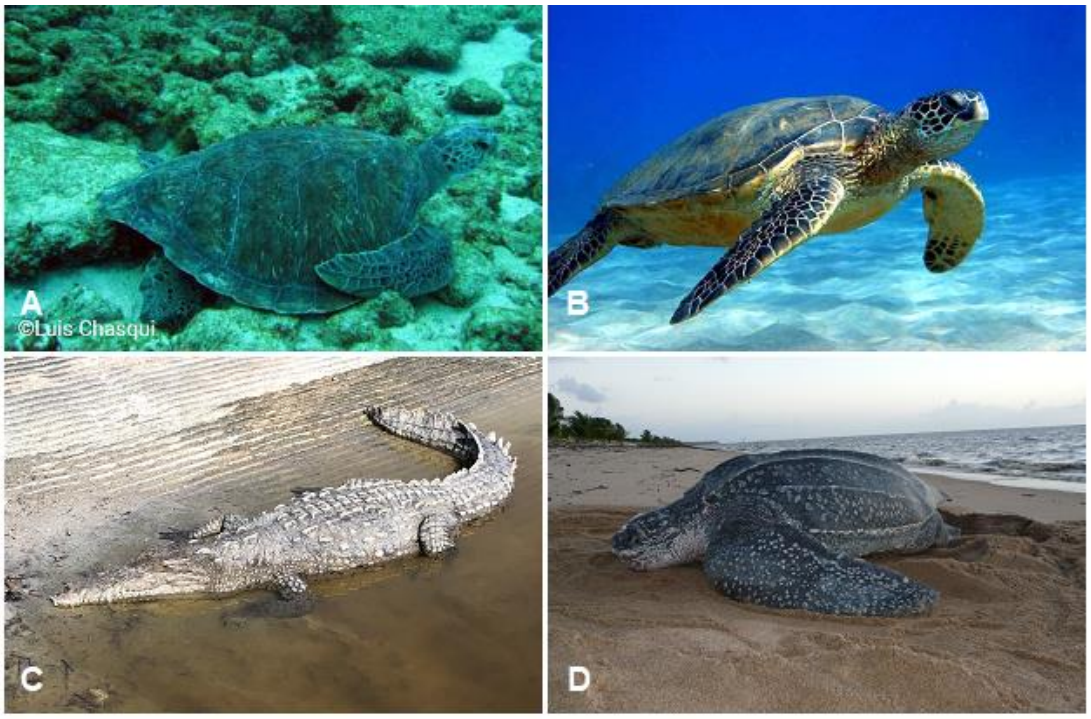
2.7.10.4 Herpetofauna

High humidity and precipitation levels within the region promote the habitat of herpetofauna, creating a niche in the area. In addition, the presence of mangroves encourages specific spaces for the reproduction and development of some species. As other categories of fauna, hunting and illegal extraction reduce the diversity and abundance of herptile species in the area. Some species of this group are presented in Table 20 .

Table 20 . Herpetofauna of the Area and Conservation Status

Scientific Name	Common Name	Conservation Status
Eretmochelys imbricata	Hawksbill sea turtle	Critically endangered
Lepidochelys olivacea	Pacific ridley	Vulnerable
Dermochelys coriacea	Leatherback sea turtle	Critically endangered
Boa constrictor	Boa	Least concern
Iguana iguana	Common green iguana	Least concern
Caiman crocodylus	Spectacled caiman	Least concern
Crocodylus acutus	American crocodile	Endangered
Rhinoclemmys melanosterna	Wood turtle	Near threatened
Chelydra serpentina	Common snapping turtle	Least concern
Kinosternon leucostomun	White-lipped mud turtle	Least concern
Rhinoclemmys melanosterna	Wood turtle	Near threatened

Source: INVEMAR et al. (2003) & Conservación Internacional Colombia (2011).



Ilustration 13. Threatened Herpetofauna Associated with the Project Area
Taken from: INVEMAR (2018), Naturalista (2017), Barameda (2018) & Naturalista (2015).
A: Amazona farinosa, B: Tinamus major, C: Aramides wolfi, D: Capito quinticolor

2.7.11 Social, Cultural, and Economic Aspects of the Community

The social, cultural and economic aspects that represent the community councils of Guapi Abajo, Cuenca del Río Iscuande, Comunitario Prodefensa del Río Tapaje, and Unicosta are described as follows.

2.7.11.1 Social Aspects

Relevant social aspects of the communities involved in the REDD+ PAZcífico project are presented. These communities are Guapi Abajo, Cuenca del Río Iscuande, Prodefensa del Río Tapaje, and Unicosta. The community councils are associated to ASOCOETNAR, an organization that acts as a group of neighboring community councils that maintain the relationship between man and nature (Organizaciones y Consejos Comunitarios del Sur del Pacífico *et al.*, 2015).

Guapi Abajo

The community council is made up of 16 communities distributed in three areas.

- Upper area: Boca de Napi, Calle Honda, Buena Vista, Partidero, and La Pampa.
- Middle area: Codicia, Temuey, Parcelas, and Penitente.

- Lower area: El Carmen, La Sabana, Santa Rosa, Chamón, Chamoncito, and Playa Obregones.

The general assembly is made up of the community council with all its inhabitants. Each community delegates 10 assembly members, who elect the board of directors, starting with the legal representative. The council board is made up of one participant from each community, as follows:

- Legal representative: Boca de Napi
- Auditor: Calle Honda
- Secretary: Partidero
- Voting members: La Pampa, Codicia, Sansón, Penitente, Las Parcelas, La Sabana, Santa Rosa, Buena Vista, Chamón, and Chamoncito
- Vice president: Temuey
- Treasury: El Carmen
- Warehouse keeper: El Penitente

This structure may vary, but it is possible to record the current one in a document. The community expresses its close social, political, cultural and religious ties with all neighboring communities. The area shows high relevance in forced displacement due to armed conflict. It is ratified as one of the most painful moments in the lower area of the community, according to the study carried out there. Clashes between armed groups and the national army led to the displacement of the community of El Carmen (Ministerio de Interior, 2017).

Cuenca del Río Iscuande

The community council is adjudicated by Resolution No. 2432 of December 1, 2005, of INCORA. With greater local representation in the municipality of Santa Barbara de Iscuandé. The general assembly elects the board of directors headed by the president or legal representative, a vice president, three auditors, a treasurer, a secretary, and four voting members. All communities are represented. Minor councils are made up of three people per community, who carry out planning and social work.

The community council is made up of approximately 980 families, with about 3,920 people within the territory according to the 2020 Internal Census. Located in the upper area of the river, in the townships of Santa Rita, San Rosco, Chivatillo, Pueblo Nuevo, Regadero, Santa Rosa, San Antonio, Isla del Gallo, Palomino, Chontaduro, Bella Vista, Guayabal, Piscindé, Isla Larga, Caimanes, La Fragua, La Loma, Vuelta Larga, La Quinta, Sandamia, Morongo, Limones, El Placer, Las Marías, Boca San Luis, Milagros, El Ají, Playa Grande, Buga, Guadual, El Alto, Vayanviendo, Cocurugua, Bartulita, Montaño, El Payaso, San José, Las Cejas, Juan Ventura, San Andrés, Pie Salto, and Santos de Guabina.

The conflicts generated by armed activities have fostered serious difficulties within the community council, with victims such as Sócrates Paz Patiño, who acted as the legal

representative of the community council. He was assassinated on May 29, 2013, and the act was attributed to hitmen related activities concerning illegal mining. Apart from Socrates, the threats and forced displacement of social leaders is a difficult situation for the council (Semana, 2013).

Prodefensa del Río Tapaje

The community council is adjudicated by Resolution 1500 of August 1, 2005, from INCORA. The municipality of El Charco holds the greatest local representation. The general assembly is made up of groups of people with full representation of the communities that make up the council. The structure is as follows:

- A president or legal representative.
- A vice president
- A secretary
- A treasurer
- An auditor
- Five voting members

The community council represents 65 townships, that make up all of their communities, with representation of minor councils. In Table 21 , the minor councils are shown with the townships that make them up.

Table 21 . Minor community councils of the Prodefensa del Río Tapaje community council

Minor Community Councils	Townships	
Unión y Lucha	San José	Mercedes
Progreso Con Justicia y Paz	Matapalo (Del Cuil micro-basin) Espabe Isupi	Santa Catalina (Catalina micro-basin) El Cuil
Promingas Tapajeña	Carmelo Recorito Playa Grande Boco de Nutria Pambilero	Boca de Agua / Prieta Barro Colorado Balzal Milagrosa Pintora
Integración Medio Tapaje	Maíz Blanco Alteron Morrito	Isla Morrito La Vega
Tribuna del Pueblo	Guajarija Perolindo Bellavista	Tribuna Californea Pueblo Nuevo
El Liberador	Tribiño Castigo Bola Bolita Salta Magdalena	Magdalena Brazo Seco Rosario Quebraita
Unión Tarijeña	Guabillo	Martin Galbe

Minor Community Councils	Townships	
	San Francisco Chachajo San Rafael	Chapilero Brazo Taija
Esperanza Tapajeña	Alfonso Lopez Hojal Monte Alto	Arenal Banguela
Socio Tapaje	Guayaquil Barranquillita	Hilario Lopez Hormiguero
El Porvenir	Mero Capilla	Campo Alegre
Despertar de Esteros y Manglares	Esteros Martinez Yasal Afuera Boca de Sequionda	Santa Rosa Los Domingos

Source: Prodefensa del Río Tapaje Community Council (2016)

The main social difficulties that affect the community council are related to the armed conflict, such as forced displacement, terrorist acts, homicides, and threats, among others. With an estimated 19,602 people affected by 2016, corresponding to 85% of the victimized inhabitants (DANE, 2016, Taken from the Prodefensa del Rio Tapaje community council, 2016). According to the MIRE (2020), the population has social problems associated with the availability of basic utilities; since they do not have energy services, they get combustion plants. They do not have an aqueduct and sewage company, and communications are unstable.

Unicosta

The community council is adjudicated by Resolution 0158 of February 9, 1998, from INCORA. The municipality of Santa Barbara de Iscuandé holds the greatest local representation. The general assembly is made up of groups of people with full representation of the communities that make up the council. The structure is as follows:

- A legal representative.
- A president
- A vice president
- A secretary
- A treasurer
- An auditor
- Three voting members

The UNICOSTA community council was the first council to be granted collective land in the Nariño department (Baquero, 2014). The community council is made up of approximately 480 families, 1,163 men and 1,126 women for a total of 2,289 community members according to the 2014 internal census. According to Defensoría del Pueblo (2020), the community council presents risks associated with threats from the armed conflict. There is

the presence of dissidents from the FARC-EP and Gaitanista self-defense groups from Colombia -AGC, with about 2,300 members from these groups.

2.7.11.2 Cultural Aspects

According to the Organizaciones y Consejos Comunitarios del Sur del Pacífico *et al.* (2015), the ASOCOETNAR associated communities present a great cultural, gastronomic and knowledge heritage, which are depicted in parties, dances, and meetings, among others; however, there is a fear associated with the loss of cultural identity due to the influence of foreigners related to armed conflict activities present within the territory.

Guapi Abajo

In the upper area of the community, there are meeting spaces. These take place mainly in its festivals such as the patron saint festival of the Virgen de las Lajas, Holy Week, Christmas and family festivals, which are held to the beat of traditional bass drum, guasa, guitar and bottle music; thus, maintaining their traditions. Rituals such as "veleña" to the dead with praises, songs and night prayers are also performed. In the middle area, socioeconomic, cultural and religious relations are carried out with 16 communities that make up the lower area. Among the traditional spaces are Holy Week, Feast of the Immaculate Conception on December 8, and Christmas. In the community's middle area stand out traditions such as: folk music, knowledge and permanence in the territory, wakes, and traditional midwives. Clashes between state and illegal armed forces caused the displacement of communities in the lower Guapi Abajo area.

In general terms, the community council of Guapi Abajo expresses the loss of cultural traditions due to the presence of armed groups, restricting activities such as fishing, hunting, sowing, and meetings between community members. Protection over children and young people by their families causes them to lose traditions and the community's own identity, as they cannot transmit much of their practices due to the social limitations generated by these armed groups. The lower area of the community expresses its frustration in the face of events of forced displacement, community economic crises, and lack of attention from the state. Among its milestones is the gestation period of projects for the community (See Table 22).

Table 22 Families by Community Inside and Outside the Territory.

CONSEJO COMUNITARIO	COMUNIDAD	N° DE FAMILIAS DENTRO	N° DE FAMILIAS POR FUERA
GUAPI ABAJO - CAUCA	TEMUEY	80	17
GUAPI ABAJO - CAUCA	CALLE HONDA	12	72
GUAPI ABAJO - CAUCA	PARTIDERO	0	38
GUAPI ABAJO - CAUCA	BOCA DE NAPI	20	50
GUAPI ABAJO - CAUCA	BUENA VISTA	18	41
GUAPI ABAJO - CAUCA	LA PAMPA	50	15
GUAPI ABAJO - CAUCA	LAS PARCELAS	26	20
GUAPI ABAJO - CAUCA	PLAYA OBREGONES	0	50
GUAPI ABAJO - CAUCA	SANSÓN	60	45
GUAPI ABAJO - CAUCA	EL CARMEN	70	10
GUAPI ABAJO - CAUCA	PENITENTE	52	22
GUAPI ABAJO - CAUCA	CHAMONCITO	15	45
GUAPI ABAJO - CAUCA	SANTA ROSA	100	11
GUAPI ABAJO - CAUCA	LA SABANA	50	30
GUAPI ABAJO - CAUCA	CHAMÓN	48	120
GUAPI ABAJO - CAUCA	CODICIA	0	61
GUAPI ABAJO - CAUCA	CHAMONCITO	15	45
GUAPI ABAJO - CAUCA	SANTA ROSA	100	11
GUAPI ABAJO - CAUCA	LA SABANA	50	30
GUAPI ABAJO - CAUCA	CHAMÓN	48	120
GUAPI ABAJO - CAUCA	CODICIA	0	61

Source: Taken from Ministerio del Interior (2017).

Cuenca del Río Iscuande

One important historical and cultural event was the finding of two anchors on the banks of the Iscuandé River. They mark the beginning of the passage of ships through the river port of Iscuandé (Artesanías de Colombia, 2002). Cultural heritage is related to the Animas religious group, present within the municipal Catholic parish since colonial times. They hold municipal festivals with more than 300 years of heritage (Alcaldía Municipal de Santa Barbara de Iscuandé, 2020).

Among the most outstanding cultural activities that take place in the municipality are the Santos Inocentes holiday in December, the Elderly Week in August, the intermunicipal meeting of the Pacific in October and the patron saint festivities in December. They include marimba musical acts and traditional songs from the south Pacific region (Alcaldía Municipal de Santa Barbara de Iscuandé, 2020).

Due to the loss of cultural identity for the community inhabitants exposed to the armed conflict, the community council has tried to revitalize the cultural identity through activities

of self-recognition as an ancestral popular cultural community (Hernández, 2014). The mechanisms of action are based on the following actions:

- Mechanism of action by orality and memory by older inhabitants and experts/scholars of the area.
- Knowledge of the constitutional jurisprudence for the protection of black communities, knowing law 70 of 1993.
- Training for the elaboration of social projects for the communities to present what they wish to carry out to strengthen management skills.

Prodefensa del Río Tapaje

Within the municipality there is a cultural heritage associated with singing and music activities through traditional instruments such as the marimba, Pacific dances and ancestral traditions. The main festivities and associated celebrations take place in the municipal carnivals and the Sequihonda River festival (Alcaldía municipal de El Charco, 2020).

The formulation to the conservation of the cultural identity associated with the territory is meant to be instilled and consolidated through the execution of training and outreach programs of the knowledge of the elderly of the community council. It is based on the construction of the cultural center.

Unicosta

The name and origin of the municipality of Santa Barbara de Iscuandé is given by the Sindagua indigenous community. The name of "Iscuandé" was taken for the inhabitants of the riverside areas of the (Artesanías de Colombia, 2002)River. The presence of cultural expressions is associated with dances such as arrullo, patron saint festivals, traditional songs with marimba and stories, among others. The most important events in the community are related to the gastronomic carnival of fisherman's day and the Petronio Álvarez festival.

In order to strengthen the community council's cultural identity, and therefore the municipality's, efforts should be focused on having a cultural house with musical instruments to encourage their use in cultural events (Alcaldía Municipal Santa Bárbara de Iscuandé, 2016); thus, promoting the rescue of historical memory, recognizing traditional and cultural identity. Another project that focuses on the recovery of cultural identity is the construction of a municipal library in order to recognize the history of the territory. It is called *educational infrastructure within the framework of the construction of Peace* (Alcaldía Municipal de Guapi, 2019) .

2.7.11.3 Economic Aspects

According to the results of the 2014 National Agricultural Census, it is possible to identify Agricultural Production Units (APU) and Non-Agricultural Production Units (NAPU) within the areas of influence of the project. In Table 23 the Agricultural Production Units are presented

within the municipalities present in the project, based on the census of the territories of ethnic groups.

Table 23 NAPU and APU Results of Dispersed Rural Area Censused in Territories of Ethnic Groups

Municipality	With Non-Agricultural Productive Activity	No Observed Activity	Residential Use Only
Guapi	255	32	3,145
Santa Bárbara	334	173	1,453
El Charco	320	1,928	1,308
La Tola	53	432	1,190
Magüí (Payán)	254	113	1,295

Source: DANE (2014)

According to the previous result, it is clear that the agricultural units evaluated do not involve evident agricultural activity, translating into the performance of other sectors. In some cases, the residential use was the most representative. In Table 24 , the APUs and their performance in specific commercial activities are presented, confirming the absence of agricultural activities within the APUs.

Table 24 NAPU and APU Results of Economic Activities in Dispersed Rural Area Censused in Ethnic Territories

Municipality	APU			
	Transformation of Agricultural Products	Industry	Trade	Services
Guapi	101	105	55	78
Santa Bárbara	128	166	45	50
El Charco	395	3	76	41
La Tola	13	-	18	35
Magüí (Payán)	103	135	14	19

Source: DANE (2014)

According to this result, UPAs in ethnic territories are associated with activities of transformation of agricultural products; however, sectors such as industry, trade, and services are also evidenced within the territory, except for the industry sector in the municipality of La Tola. Table 25 presents the APU and NAPU focused on different activities of transformation of agricultural products, this being the most representative economic activity within the territory according to the censused units.

Table 25 APU Results of Activities for the Transformation of Agricultural Products in Dispersed Rural Area Censused in Ethnic Territories.

Municipality	APU					
	Transformation of Agricultural Products	Transformation of Forest Products	Transformation of Livestock Products	Production of Food and Alcoholic Beverages	Crafts	Biofuels
Guapi	1	59	1	39	-	1

Municipality	APU					
	Transformation of Agricultural Products	Transformation of Forest Products	Transformation of Livestock Products	Production of Food and Alcoholic Beverages	Crafts	Biofuels
Santa Bárbara	18	52	42	12	3	1
El Charco	8	22	179	186	-	-
La Tola	4	5	-	4	-	-
Magüí (Payán)	65	3	1	29	5	-
NAPU						
Guapi	18	52	42	12	3	1

Source: DANE (2014)

Within the municipality of Guapi, the transformation of forest products is evidently the main activity. It is followed by the production of food and alcoholic beverages. In the case of Santa Bárbara, APU associated with the transformation of forest products is evident, followed by the transformation of livestock products, and transformation of agricultural products. In the case of El Charco, the production of food and alcoholic beverages is relevant, followed by the transformation of livestock products, and the transformation of forest products. This evidences a reduction in forestry activity compared to the other municipalities. A similar situation is identified in Magüi (Payán), with the transformation of agricultural products being relevant, followed by the production of food and alcoholic beverages, while crafts, transformation of forest products and livestock products are less representative. In the case of the municipality of La Tola, there is a low representation of APU in transformation economic activities, evidencing some in the transformation of agricultural products, transformation of forest products, and the production of food and alcoholic beverages.

Table 26 APU Results of Trading Activities in Dispersed Rural Area Censused in Ethnic Territories

Municipality	APU	
	Trading of Food and Alcoholic Beverages	Trading of Products Other than Food and Alcoholic Beverages
Guapi	18	37
Santa Bárbara	2	43
El Charco	24	52
La Tola	6	12
Magüí (Payán)	11	3

Source: DANE (2014)

Table 26 shows how trading activities of products other than food and alcoholic beverages are representative in the APUs of the different municipalities involved in the project. El Charco has the largest number of APUs under this activity, followed by Santa Bárbara and Guapi; in a less representative way, La Tola and Magüi. In terms of trading of food and alcoholic beverages, El Charco and Guapi are the municipalities with the highest representation of APU, while La Tola and Santa Bárbara are less representative.

Table 27 APU Results of Service Activities in Dispersed Rural Area Censused in Ethnic Territories

Municipality	Support for Agricultural Activity	Tourism, Accommodation, Lodging and Other	Education	Healthcare	Religious	Recreational	National Security	Environmental Activities
Guapi	69	1	6	-	1	1		-
El Charco	27	1	3	-	6	2	2	-
La Tola	29	2	4	-	-	-	-	-
Magüí (Payán)	14	1	2	1	1	-	-	-

Source: DANE (2014)

Regarding the services present within the municipalities involved in the project, Table 27 shows the APUs associated with this activity, where support for agricultural activities has the greatest significance. Guapi holds the largest number of associated UPAs, followed by La Tola, El Charco and, to a lesser extent, Magüi. The other services are less significant, with education in second place, followed by tourism services and, less representatively, recreational services and national security. It is important to highlight that the municipality of Santa Bárbara does not run any services. Also, none of the municipalities has environmental services.

Table 28 APU Results of Industrial Activities in Dispersed Rural Area Censused in Ethnic Territories

Municipality	Oil	Licensed Mining Operation	Unlicensed Mining Operation	Gas, and Power Generation and Transmission	Manufacturing of Plastics, Metallurgy, Chemical Substances and Products
Guapi	1	4	92	6	2
Santa Bárbara	1	11	143	9	2
El Charco	-	2	-	-	1
Magüí (Payán)	-	5	130	-	-

Source: DANE (2014)

Table 28 shows the industrial activities identified within the censused APUs. Unlicensed mining operation is significantly the most representative activity in Guapi, Santa Bárbara

and Magüi. The municipality of El Charco presents low unlicensed mining, and only one APU in the production of plastics, metallurgy, etc. Guapi has some APUs in gas or power generation and transmission, licensed mining, production of plastics, metallurgy, and oil. Santa Bárbara has a greater number of APUs in licensed mining compared to Guapi. It is followed by gas or energy transmission, production of plastics, and only one UPA with oil. Less significantly, El Charco evidences low industrial development involving two APUs in licensed mining, and one in production of plastics, metallurgy, etc. Magüi has two industrial activities: unlicensed mining being relevant, and, in a very low proportion, licensed mining.

Guapi Abajo

The 2016 – 2019 Territorial Development Plan indicates that the economic dynamics of the municipality gives relevance to the selective extraction of wood by Guapi cutters, mainly in the communities of Temuey, Codicia and La Pampa, harnessing carpentry activities. Among other relevant activities are agriculture, fishing and mining. Agricultural activities include growing products such as coconut, corn, chontaduro, rice, and taro. In the livestock sector, raising of poultry and pigs show up, with fishing standing out as the main economic activity of the community council given the variety of species of fish, crustaceans, and mollusks. Finally, gold and platinum mining activities in areas along the rivers as a traditional activity among the communities.

The analysis that the community council underwent shows that it maintains subsistence crops through manual planting or with handmade tools. Among its main products are rice, plantain, bananas, "chivo" bananas (also called "bocadillos"), and African palm. The latter was grown by an INCORA project. The community of plots owes its name to the family organization that the families with plots of African palm had. Among the most unfortunate events recorded by the community are the failure of the African Palm project, and the displacement of the population due to armed conflict. Their forms of production were organic, using methods such as "minga" and "mano cambiada". In addition to the absence of state support and the effects of armed conflict, some fumigation events have led to a reduction in crop productivity, mainly due to environmental damage. This has led to a major loss of crops, damage to products, and low harvest likelihood due to fear of displacement or assaults in fields (Ministerio de Interior, 2017).

Fishing is a very important activity in the communities present in Guapi due to its location between the riparian zone of the Guapi River and the Pacific Ocean. The agricultural census determines that 56% of those surveyed take on fishing activities: 37.6% in the river, 46.7% in the swamp, 23.7% in the sea, 0.2% in a reservoir or lake, and 1% in estuaries. The 16 communities that inhabit the Guapi Abajo area are engaged in artisanal fishing, generating family subsistence income. Fishing is a complementary activity for 20.6% of the surveyed population. 28.1% define it as influential at certain times of the year, 48.5% use it for self-

consumption, and 19% carry it out for commercial purposes. The hook and the trammel net are the most used methods, with 34.3% and 34.9%, respectively (Ministerio de Interior, 2017).

Another relevant activity in the territory is mining, where 99.9% develops it unlicensed. The communities of El Carmen and Penitente practice artisanal mining. Guapi Abajo presents five (5) requests for a direct mining concession on the collective territory. The communities recognize their concern for the environmental damage caused by illegal mining practices within the area, reducing agricultural and fishing activities.

Cuenca del Río Iscuande

There are three major economic activities: mining, agricultural and logging activities. Logging activities focus on the use of the natural forest, with primary transformation of wood. The agricultural activity takes place with the coconut, sugarcane, yuca, chontaduro, borojó, and banana crops. However, these activities present difficulties in the transport of the feedstock.

Within the area of the council, large-scale open pit mining projects are being developed, prompted by the ideologies of the current neoliberal economic model, driven by ICTs. The community council seeks to direct the economy to a friendly model with the environment, through projects and/or processes that may be viable according to the public policies given in the zone (Hernández, 2014). Mining development in the area presents a gap in technological development, productive and technical forces, offering buyers raw material, without any degree of transformation (Artesanías de Colombia, 2002).

Fishing is also important for the communities living near the riverbanks. It works as a basic means of subsistence through self-consumption and retail trade of prawns, tuna, and sardines (Artesanías de Colombia, 2002). In the search of better economic opportunities, the development of legal mining activities by the community is dazzled as an option to improve life. Thus, the community council has decided to develop clubs and societies with jewelers from Tumaco in association with Artesanías de Colombia S.A. Through the logistical, technical and academic support for the specialization of the products offered, greater economic benefits can be obtained (Artesanías de Colombia, 2002).

Prodefensa del Río Tapaje

According to the MIRE (2020), the population of El Charco satisfies its economic needs through subsistence crops, fishing, logging, and informal jobs generated by small businesses. The development of agriculture is based on banana, coconut, and cocoa crops. Logging is strongly associated with the presence of mangroves and coastal ecosystems of water confluence between brackish and fresh water, in addition to pigeon peas under primary transformation systems (Alcaldía municipal de El Charco, 2020).

The mining of precious metals (gold), is the activity with the greatest presence within the council, making use of both licensed and unlicensed artisanal mining. Some technological applications are dredges and motor pumps; in some areas, machinery such as backhoes, slab of arms and dragons. To a greater extent, with practices such as Mazamorreo, Barequeo and Palero (Organizaciones y Consejos Comunitarios del sur del Pacifico *et al.*, 2015).
Low educational, technical and technological development has restricted agricultural and marketing activities due to the absence of production processes that generate added value to the products offered. In this way, they are transported as raw material to nearby cities, posing a challenge to meet when building an economic stability of the municipality (Alcaldía municipal de El Charco, 2020).

Unicosta

Within the municipality of Santa Barbara de Iscuandé, the most representative economic activity is associated with the gold mining sector, carried out in the upper part of the municipality. This product is sold to intermediaries, which generates a decrease in the benefit perceived by the community. Another activity is associated with the fishery developed along the coast of the Iscuandé River with about 250 small-scale professional fishermen, who use traditional instruments such as hook fishing and net fishing (Alcaldía Municipal de Santa Barbara de Iscuandé, 2020).
In flat areas, the main natural resource is forestry. The exploitation of wood resources constitutes the main source of income and local labor. The primary transformation of wood through local sawmills, accounts for the exported raw material from the area. The most used species are Sajo, Cuangare, Cedar, Mangrove trees, Monkey Comb, and Andiroba, among others (Artesanías de Colombia, 2002).
For the improvement of the community economy, the development of territorial plans is proposed, which improve the activities that make use of natural resources. In the case of developed mining, the plan is to reduce the impact on nature, through legislative mechanisms that guarantee legality; thus, improving the productive system both technically and technologically, and work safety (Artesanías de Colombia, 2002). The basic organization chart proposed by the community for mining cooperatives is shown in Illustration 14 .

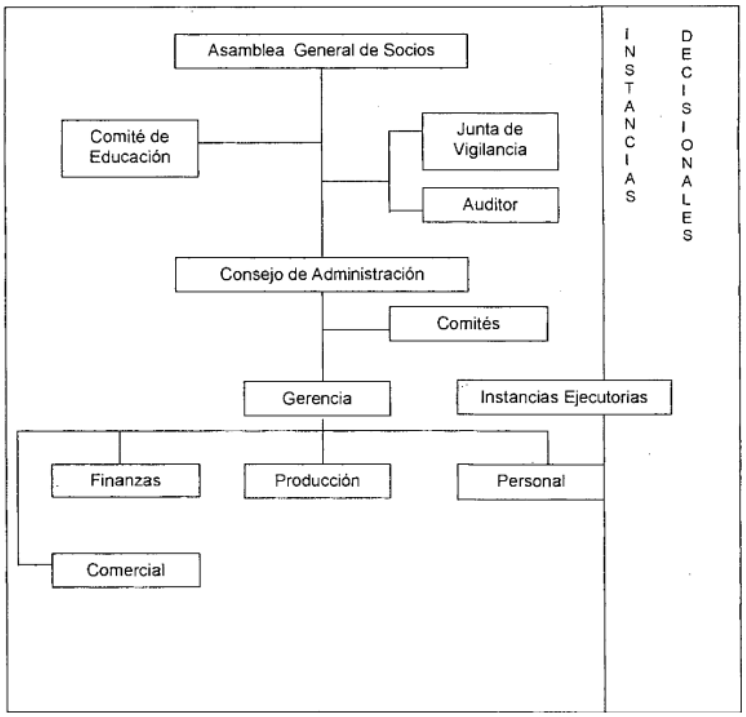


Illustration 14 Proposed Basic Organizational Chart for a Mining Cooperative
Source: (Artesanías de Colombia, 2002) (Artesanías de Colombia, 2002).

2.7.12 Context of the Project

The REDD+ PAZcífico project arises from an antecedent and historical social, economic and environmental context that has configured the current territorial dynamics. In order to justify the existence of alternatives that reduce effects on forest cover, mainly in deforestation and degradation. In Figure 14 , the causes and effects resulting from the phenomenon of deforestation and degradation are presented within the community councils of Guapi Abajo, La Cuenca del Río Iscuandé, Prodefensa del Río Tapaje and
Unicosta. The data of this analysis arises from the perspectives and community experiences obtained in processes of socialization, interviews, and determination of deforestation drivers, using tools such as participatory diagnosis and social mapping.

The lower part of the diagram shows the main and secondary causes that lead to deforestation and forest degradation within the limits of the project. The central part reflects the central problem that the REDD+ PAZcífico project requires solving. In the upper part, the multiple effects generated by the combination of a huge amount of causes are showcased, understanding the concatenated relationship of all the negative economic,

environmental and social factors that lead to the materialization of damage to natural capital.

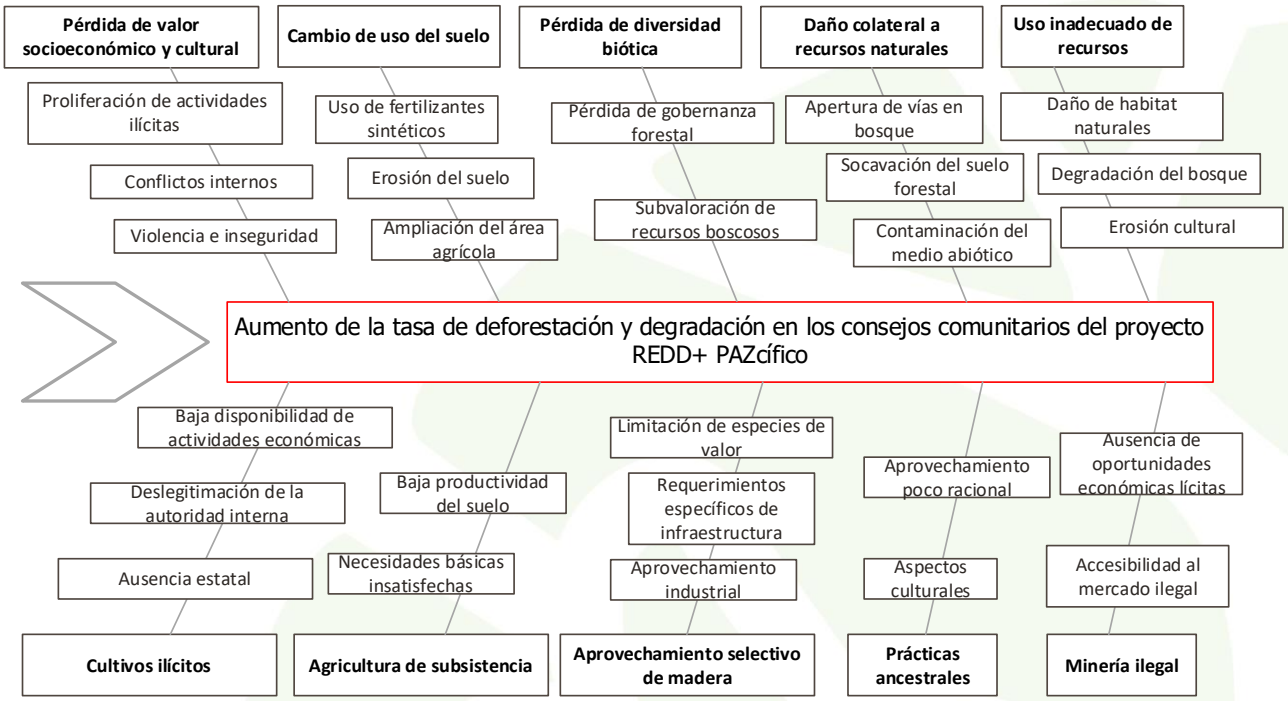


Figure 14 Ishikawa Diagram for the REDD+ PAZcífico Project.
Source: CO2CERO S.A.S (2021).

The main causes of deforestation defined by the community councils of the project correspond to the establishment of illicit crops, subsistence agriculture, selective use of wood, use of specific species for cultural practices, and illegal mining. Within these main causes, it is possible to determine some underlying phenomena that motivate their representation: the limitation in economic activities, loss of governance and governability, absence of the state, unsatisfied basic needs, industrial exploitation, and access to the illegal market.

From the identification of main and underlying causes and the derived effects, it is possible to propose alternatives that avoid, mitigate or eliminate the damage caused by the manifestation of these phenomena. They encompass the social, environmental, economic and cultural context. These scenarios are proposed from the identification of local needs embodied in their current territorial dynamics, the diagnoses made by external institutions, and the information consolidated in the field workshops.

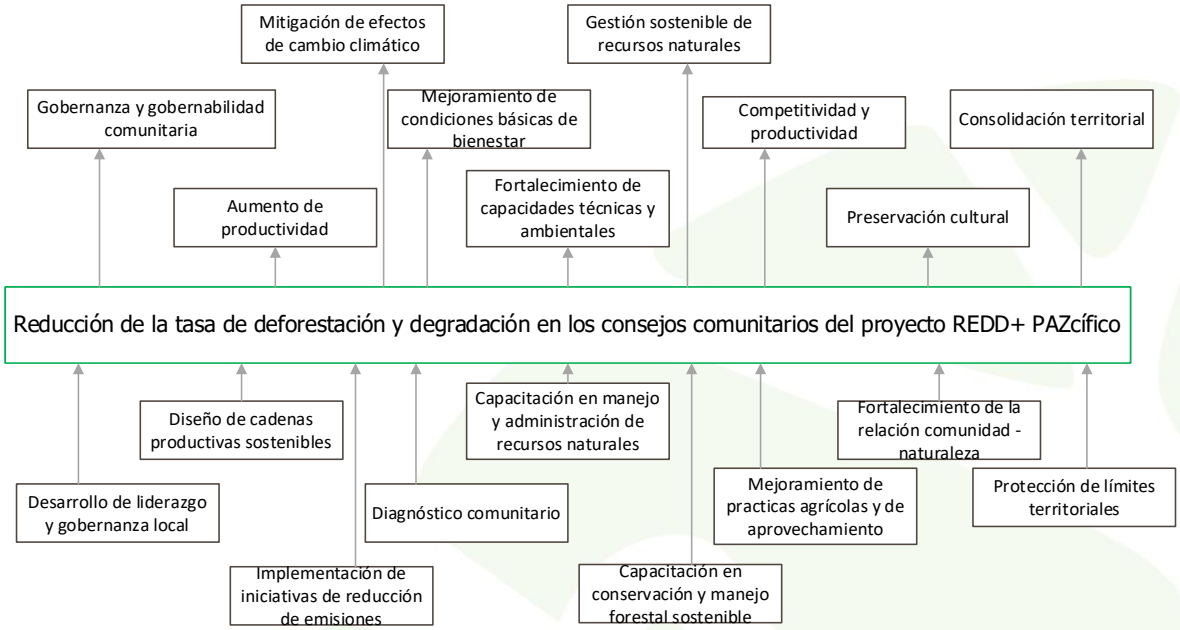


Figure 15 Objective Tree for the REDD+ PAZcífico Project.
Source: CO2CERO S.A.S (2021).

The central objective of the PAZcific REDD+ project is to reduce the rate of deforestation and degradation within the community councils that make it up. A series of alternatives that involve community participation at all times were proposed. Among these are the development of leadership and local governance skills, design of sustainable production chains, strengthening of environmental, administrative and technical skills, improvement of subsistence and exploitation practices, and protection of territorial limits.

The implementation of these activities leads to specific achievements within the community councils, according to the particularities that involve them. In general terms, the project seeks governance and governability of the territory, mitigation of the effects of climate change, improvement of well-being, sustainable management of natural resources, preservation of cultural habits, increased commercial competitiveness and productivity, and the consolidation of the territory as a management, provision, and control unit. These objectives seek to be fulfilled with the REDD+ activities designed and implemented within the territory, responding to the social, environmental and cultural needs of the community councils that propose the initiative. Additionally, it is sought that these activities can evolve to the extent that they encompass community self-management.

2.8 Crediting Period of the Project

The accreditation period of the project corresponds to twenty (20) years, between January 1, 2015 (See *7_Start date*) to December 31, 2034, equivalent to 19 years, 12 months and 31 days.

2.9 Project Location

The Cuenca del Río Iscuande, Guapi Abajo, Prodefensa del Río Tapaje, and Unicosta community councils are located in the south-west of the country, north of the Nariño department, and west of the Cauca department. In terms of municipalities, the project is located in Magüí (Payan) in the south, Santa Barbara (Iscuandé) in the center-east, La Tola in the west, El Charco in the center-west (in Nariño), and Guapi in the north-east (in Cauca), as shown in Figure 16 .

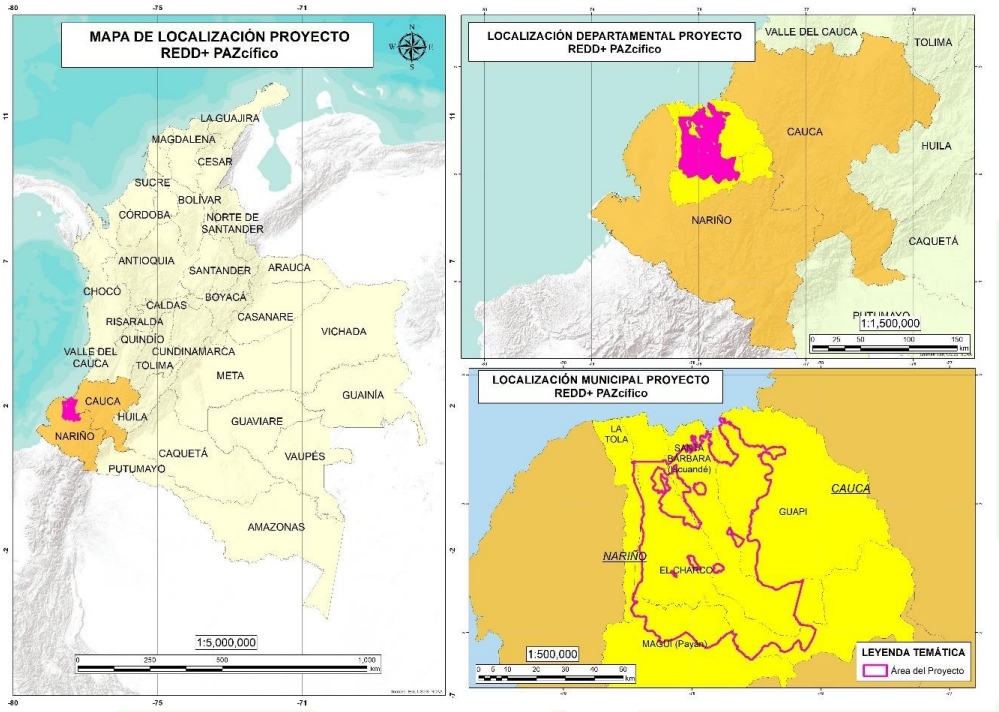


Figure 16 General Location of the PAZcífico Project.
Source: CO2CERO S.A.S. (2021).

The project area limits to the north with protection areas (Type A) of the Pacific Forest Reserve established in Law 2 of 1959 and the Chanzará community council. To the south, with the community council Manos Amigos del Patía Grande. To the west, with the Embera Katío Río Santiga Integrated indigenous reservation, and the community councils of Río Santiga, El Progreso del Campo, La Esperanza del Río La Tola, and El Progreso del Río Nerete. To the east, with the community councils of Río Napi, Río San Francisco, Alto Guapi and Cordillera Occidental de Nariño Copdiconc. To the northwest, with the Sanquiangua National Natural Park. To the northeast, with the Río Guajuí community council, and to the southwest, with the Unión Patía Viejo community council. The extraction zones within the project area are due to the presence of the Eperara Siapidara indigenous reservations with the El Charco, Morrito, Quebrada Grande and Maíz Blanco Integrated indigenous

reservations. Also, some protection areas (Type A) of the Forest Reserve of the Pacific established in Law 2 of 1959.

2.10 Intervention Area in Hectares

Table 29 presents the intervention areas involved in the REDD+ PAZcífico project, according to the delimitations made in its design and structuring.

Table 29 Intervention Area Involved in the REDD+ PAZcífico Project.

Type of Intervention Area	Area (ha)
Total Project Area	287,779.22
Project Stable Forest Area (2015)	275,032.12
Project Stable Forest Area (2021)	272,785.86
Reference Region	1,764,410.55
Stable Forest Area of the Reference Region (2015)	1,520,878.66
Potential Leakage Area (Leakage Belt)	20,012.92
Stable Forest Area of the Potential Leakage Area (2015)	19,302.43
Leakage Management Area	97.86
Stable Forest Area of the Leakage Management Area (2015)	95.31

Source: CO2CERO S.A.S. (2021).

The total project areat is structured by the four community councils that are part of the legalized community councils project until 2021 in the National Land Agency. The stable forest areas come from the model proposed by Hansen. The reference region, together with the Potential Leakage Area come from the analysis carried out by CO2CERO S.A.S. The leakage management area corresponds to areas with mangrove restoration activities within the reference area. The geographical information of the project is presented in the MAGNA-Sirgas reference system in the Single Origin in accordance with the provisions of the Agustín Codazzi Geographical Institute in its Resolution 471 of 2020. For the quantification of GHG emission reductions due to deforestation and degradation, the areas taken into account correspond to those that present stable forest for the defined baseline period.

Taking into account the eligible area of the project, Table 30 describes it broken down by community council associated with the project, together with a coordinate of the midpoint of each council.

Table 30 . Eligible Area by Community Council

Community Council	Eligible Area (ha)	Latitude	Longitude
Prodefensa del Río Tapaje	146,330.48	2°12'32.20"N	78°5'39.23"W
La Cuenca del Rio Iscuandé	71,363.87	2°31'17.68"N	77°59'11.82"W
Guapi Abajo	43.062,43	2°14'1.12"N	77°52'42.41"W
Unicosta	14,275.34	2°27'31.03"N	77°50'41.79"W
Total	**275,032.12**		

Source: CO2CERO S.A.S. (2021)

2.11 Emission Sources and Carbon Sinks

The sinks considered for the REDD+ Pazcífico project are described in Table 31 .

Table 31 . Sinks Considered for the REDD+ Pazcífico Project.

Sink	Included	Justification
Aerial biomass (Tree vegetation)	Yes	It is the main sink since it represents the changes in the carbon stock in the forest cover of the project area.
Below-ground biomass	Yes	The sink is included since it is a component for the calculation of the Emission Factor according to the methodological reconstruction of the National RFs
Snags	Yes	According to the methodology, this sink is taken into consideration.
Litterfall	Yes	According to the methodology, this sink is taken into consideration.
Wood products	No	Wood extraction is limited to occasional domestic use. This reservoir is not representative for the project and will be reflected in the values of deforestation and degradation monitored from the start date of the project.
Soil organic carbon	Yes	The sink is included since it is a component for the calculation of the Emission Factor according to the methodological reconstruction of the National RLs

Source: CO2CERO S.A.S. (2021)

Regarding emission sources, those present in Table 32 are considered.

Table 32 . Considered Emission Sources for the REDD+ PAZcífico Project

Emission Source	GHG	Included	Justification
Elimination or burning of biomass due to degradation and deforestation processes	CO_2	Yes	They are reflected within the changes in sinks of aerial biomass.
	CH_4	No	The sink is excluded as it is not a significant source in the project area.
	N_2O	No	The sink is excluded as it is not a significant source in the project area.

Source: CO2CERO S.A.S. (2021).

2.12 Project Eligibility

Eligibility determines the areas that are suitable to include in the REDD+ PAZcífico project. They must comply with the premise that the project area has "areas in which it corresponds to the forest category at least ten (10) years before and at the beginning of the project (Also defined as stable forest)."

The definition of forest will correspond to the characteristics and parameters determined in the definition proposed by the SMByC and the definition of Cercabono as a minimum area of forest, tree height, and crown coverage level. It is defined as "land occupied mainly by trees that can contain shrubs, palms, guaduas, herbs and lianas, in which tree cover predominates with a minimum canopy density of 30%, a minimum canopy height (in situ) of 5 m at the time of identification, and a minimum area of 1.0 ha". The tree cover of commercial forest plantations, palm crops, and trees planted for agricultural production are excluded. Permanent water bodies, crops and urban areas present in reliable national geographic information were discounted.

The quantification of the forest cover was carried out through Landsat images of Forest – Non-Forest of Hansen *et al.* (2010) and Hansen *et al.* (2013) compiled from the Google Earth Engine platform of the United States Geological Survey, because the information from the IDEAM of the SMByC could not be considered due to the high presence of areas without information owing to cloudiness. Deforestation and degradation for the reference period (Baseline 2005 - 2015) were quantified with these images. The historical deforestation and degradation process is also revealed, and the monitoring periods throughout the implementation of the REDD+ project actions.

Landsat images of Forest – Non-Forest from Hansen *et al.* (2010) and Hansen *et al.* (2013), present forest and non-forest information, with a spatial resolution of 30 m. In general terms, the Google Earth Engine platform offers satellite images processed with atmospheric corrections, calibrations and radiometric normalizations, allowing the desired accuracy together with the incorporation of experts for visual verification of forest changes in the desired periods. It is important to call attention to the several publications that highlight the importance of the Hansen model for the quantification of deforestation by complying with the IPCC principles[1].

From this information, the corresponding geoprocessing is carried out to calculate the forest and non-forest area of the years of interest to determine the stable forest area within the limits of the project. They will be later be defined as the project eligible areas. The evaluated

[1] Applicability of the Hansen Global Forest Data to REDD+ Policy Decisions. Nature Conservancy. Available in: https://www.conservationgateway.org/ConservationPractices/ClimateChange/ForestCarbon/Pages/redd_hansen.aspx

reference period to determine the behavior of historical deforestation corresponds to 2005 and 2015, as shown in Table 33 .

Table 33 . Non-forest Forest within the Project Area Present in the Years of Interest

Type	Year 2005	Year 2015
Forest	277,649.00	275,032.12
Non-forest	10,130.22	12,747.1
Grand Total	**287,779.22**	**287,779.22**

Source: CO2CERO S.A.S. (2021).

Those areas that have passed from the forest to the non-forest category will be called deforested areas. Those that change from non-forest to forest are regenerated areas, and those that remain in the non-forest category are areas without forest. These categories are not considered eligible.

275,032.12 hectares of stable forest are identified between the start date (2015) and 10 years before the start date (2005), corresponding to the eligible areas of the project, as shown in Figure 17 .

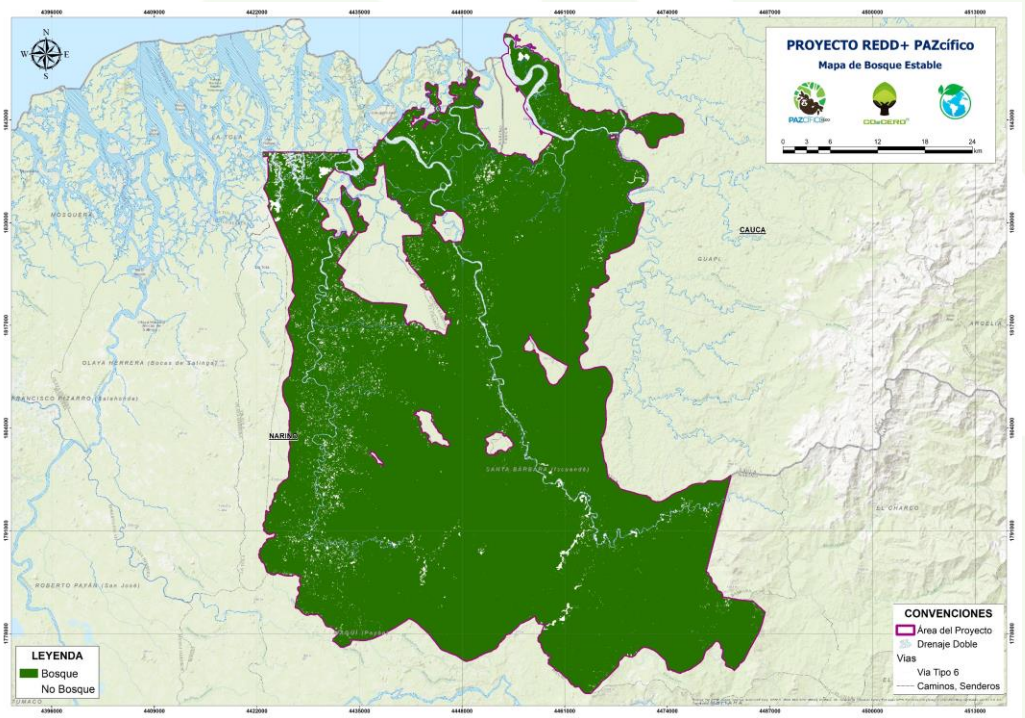


Figure 17 Eligibility Map of the Areas within the Project.
Source: CO2CERO S.A.S. (2021).

2.13 Compliance with Laws, Statutes, and Other Regulatory Frameworks

Initiatives to reduce emissions due to deforestation and forest degradation are related to a regulatory context: resolution 1447 of 2018, resolution 471 of 2020, national interpretation of social and environmental safeguards for REDD+ in Colombia, and the Reference levels proposal for forest emissions from deforestation of natural forests. The regulatory and legislative relevance of the project is described below.

2.13.1 Law and Land Use

In Colombia, the rights of black communities to collective ownership of territory are recognized in Law 70 of 1993. It develops transition article 55 of the 1991 Constitution, in which black communities that have occupied uncultivated land, rural areas and riverbanks of the Pacific Basin rivers, or with traditional production models in other areas of the country, will be granted recognition of their existence, through the right to collective property over the areas determined by law.

The right to collective property establishes a mechanism for protecting cultural identity, fostering economic and social development as an ethnic group, recognizing a high degree of autonomous politics in the decisions that affect them. Land ownership is mostly described in the Land chapter, in accordance with the statutes that regulate the allocation of land to these community councils.

The REDD+ PAZcífico project links the Guapi Abajo, La Cuenca del Río Iscuandé, Prodefensa del Río Tapaje and Unicosta community councils, which fully comply with Article 5 of Law 70 of 1993, which is defined as follows:

> ***"ARTICLE 5.****In order to receive the adjudicated lands as collective property, each community will form a Community Council as a form of internal administration, whose requirements will be determined by the regulations issued by the National Government.*
>
> *In addition to those provided in the regulations, the functions of the Community Councils are: to delimit and assign areas within the adjudicated lands, to ensure the conservation and protection of collective property rights, to preserve cultural identity, to use and conserve natural resources, to choose the legal representative of the community as a legal person, and to act as friendly mediators in internal conflicts that are feasible for conciliation."*

All community councils have the necessary regulations to obtain the title deed, evidencing the existence of a legal representation, a legitimate community, and a territory that favors its development by means of an assignment resolution. All requests were approved by INCORA, as the entity in charge at the time.

2.13.2 REDD+ in the Colombian National Context

At the COP 9 held in Bonn (Germany) in 2008, Colombia joined the initiative of the Convention on Biological Diversity called "Zero deforestation in the Amazon by 2020," which was an input to the development of the national REDD + strategy.

The United Nations framework convention on Climate Change (UNFCCC) recognized during the Conference of the Parties (UNFCCC-COP 13), held in Bali in 2007, the reduction of emissions from deforestation and degradation as a valid mechanism for mitigating effects on climate change. REDD+ is constituted as the reduction of emissions derived from deforestation and forest degradation, together with the conservation, sustainable management, and improvement of carbon reserves in forests of developing countries.

The 2010-2014 National Development Plan includes the formulation of the National Plan for Adaptation to Climate Change, which seeks to reduce the risk and socioeconomic impacts associated with climate change and variability. In turn, the Ministry of the Environment and Sustainable Development implements the national policy for the Integrated Management of Biodiversity and its Ecosystem Services, ensuring social development and environmental conservation. The two fundamental strategies in terms of GHG mitigation are:

a) The "Colombian Low Carbon Development Strategy (ECDBC)," and
b) The "National Strategy for the Reduction of Deforestation and Degradation of REDD+."

Colombia is a member country of the World Bank. Since 2013 it has been part of the UN-REDD+ system, as an international alliance to establish and strengthen the development of programs and projects at national and subnational levels to reduce emissions from deforestation and forest degradation. It is based on the analysis of the specific context of each of the nations with their potential in terms of carbon reservoirs, favorable regulatory and legislative scenarios, and social opportunities.

2.13.3 Decrees and Laws

Table 34 presents the normative and legislative instruments related to the REDD+ PAZcífico project.

Table 34 Regulatory and Legislative Instruments Applicable to the REDD+ PAZcífico Project.

Legislation	Description
Decree 2372 of 2010	The National System of Protected Areas, the management categories that comprise it and the general procedures related to it are regulated. Defining the zoning of protected areas and the categorization agrees to the type of use established in the IUCN.
Law 1454 of 2011	By which organic regulations on territorial planning are dictated, and other provisions are modified.
Decree Law 3573 of 2011	Which creates the National Environmental Licensing Agency.
Decree 2041 of 2014	By which Title VIII of Law 99 of 1993 on environmental licenses is regulated.

Legislation	Description
Decree 1076 of 2015	Single Regulatory Decree on the Environment and Sustainable Development. To demonstrate that the project complies with the environmental restriction zones described in this decree of the Ministry of Environment and Sustainable Development (See Figure 18 on special protection areas such as RUNAP or National Forest Reserves).
Decree 1397 of 2016 of the Ministry of Environment and Sustainable Development	By which the conditions for the assembly, installation and start-up of the zones of the national territory are established for the temporary location of members of armed organizations outside the law in the framework of a peace process.
Decree 870 of 2017	of the Ministry of Environment and Sustainable Development "By which guidelines are established for the payment of environmental services".
Decree 893 of 2017	"By which Development Programs with a Territorial Approach are created: DPTA" Which creates the DPTA as a rural planning and management instrument.
Decree 926 of 2017	Belonging to the Ministry of Finance and Public Credit that determines modifications regarding national carbon tax matters.
Resolution 1447 of 2018	From the Ministry of Environment and Sustainable Development "By which the system for monitoring, reporting and checking mitigation actions at the national level is regulated, which is dealt with in article 175 of Law 1753 of 2015, and other provisions are issued"
Resolution 831 of 2020	From the Ministry of Environment and Sustainable Development which modifies in terms of issues of the VVB, RENARE and methodological issues concerning carbon credit projects.
CONPES 4021 of 2021	The so-called National Policy for the control of Deforestation and Sustainable Forest Management provides guidelines to substantially counteract deforestation and promote sustainable forest management. It proposes deforestation goals for the year 2030.

Source: CO2CERO S.A.S. (2021).

Taking into account the multiple legislative context that involves the initiative and REDD+ projects in general, in the folder *9_Legislacion ambiental*, the regulatory instruments applicable at national, regional and local scale are presented.

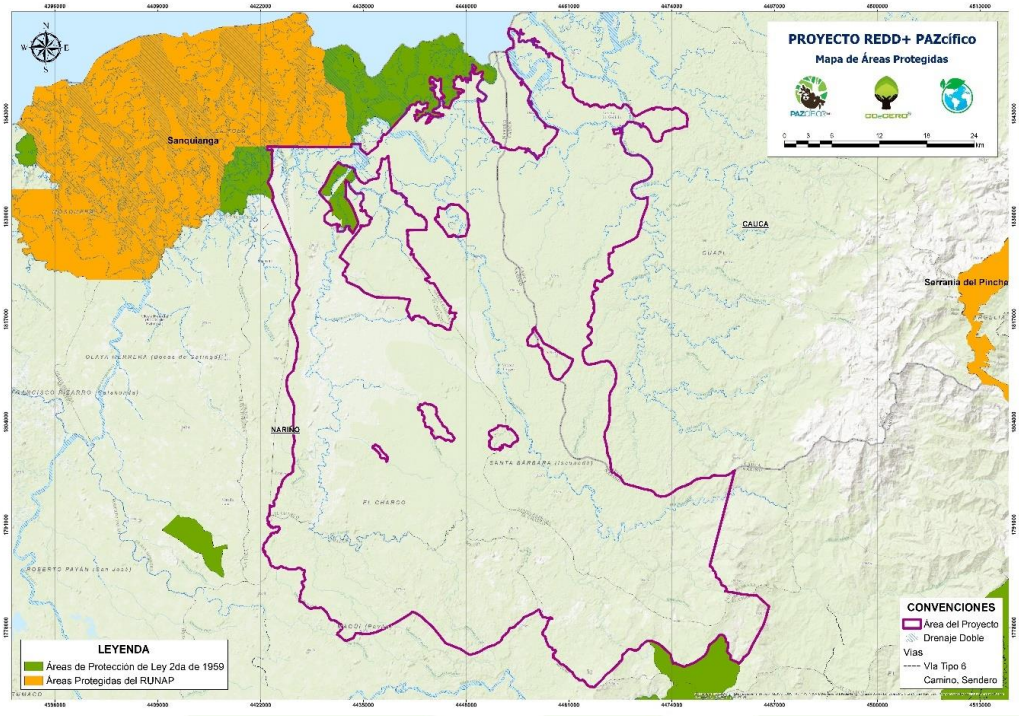


Figure 18 Map of Environmental Restriction Zones.
Source: CO2CERO S.A.S. (2021).

2.13.4 Resolution 1447 de 2018

Next, an analysis of resolution 1447 of 2018 is carried out, "*By which the system for monitoring, reporting and checking mitigation actions at the national level is regulated, which is dealt with in article 175 of the Law 1753 of 2015, and other provisions are issued.*" Also, its applicability within the project.

2.13.4.1 Relevance of the Project

Section 2 of the resolution, related to REDD+ projects, describes the necessary aspects for the development of climate change mitigation initiatives related to natural forests and the reduction of deforestation and degradation within them. Next, the applicability of these parameters with the REDD+ PAZcífico project is verified.

Article 39. *Use of Methodologies for the Formulation and Implementation of REDD+ Projects*, determines the characteristics of the appropriate methodologies for estimating emissions avoided in REDD+ initiatives. The owner of the REDD+ project must use methodologies that meet the following characteristics:

1) Following the guidelines issued by the UNFCCC related to REDD+

The United Nations Framework Convention against climate change has determined the responsibilities that the parties must adopt to: reduce emissions from deforestation and

forest degradation, protect forest reserves, promote sustainable forest management, and seek to increase carbon reserves. These are the main activities of REDD+. The project was structured with a focus on reducing emissions generated by deforestation, evidencing the actions of protection, conservation and improvement of socioeconomic activities that have historically affected the available forest in the territory. In addition, it strives for the conservation of forest carbon reserves, determining the presence of forest cover typical of the tropical wet forest, and the importance of protecting it given its ecological relevance and high rate of biodiversity. This makes it a sacred and essential territory for the survival of communities.

As a result of the design of the project, new commitments and activities were proposed that seek to reduce deforestation and guide the conduct of the community councils around the impacts on the ecosystem. These activities seek to be comprehensive by increasing carbon reserves through the sustainable management of forests, using forest management models, reforestation, and restoration actions. According to decision 18 of COP 16, these five activities are essential for the development of a REDD+ approach aimed at equity, sustainability, and well-being of all the actors involved in the initiative. According to the particularities of each nation, REDD+ projects must cover four (4) essential elements within their implementation:

A. **National Strategy or Action Plan**: The country is in the process of designing the National Strategy for the Reduction of Emissions from Deforestation and Forest Degradation REDD+, and the Colombian Strategy for Low Carbon Development. For this end, it is strengthening platforms and databases that allow recording progress in terms of its strategies. Additionally, it is part of the World Bank's member countries, and since 2013 it is part of the UN – REDD+ system. The REDD+ PAZcífico project encompasses in its development the guidelines set forth by these strategies, which are linked to the basic principles of REDD+ set forth by the UNFCCC.

B. **Forest Surveillance and Monitoring System**: At the national level, the Forest and Carbon Monitoring System has been established. It is defined as a set of tools, procedures, and resources responsible for generating information that allows the spatial and temporal identification of the causes of changes in the forest surface and its carbon contents. Among the information used for the baseline analysis and the ex-ante and ex-post emissions are the Forest - Non-Forest layers of IDEAM, and the changes in coverage for the reference periods involved in the development of the project. These were obtained by analyzing satellite images with adequate resolution and supervision of systematized geoprocessing.

C. **National Reference Levels of Removals or Emissions**: Colombia has submitted for evaluation before the UNFCCC the proposal of forest reference emissions level for payment for REDD+ results. It is a second proposal for estimating forest emissions, which involves the entire national territory, given its potential in terms of variability of biomes and natural regions, to reduce emissions from deforestation and increase carbon reserves, geared towards meeting climate change mitigation goals set at the national level. The proposal is currently undergoing technical evaluation and aims to generate the baseline to measure the performance of the implementation of the activities indicated in decision 1 of the COP 16 regarding the Cancun agreements. The REDD+ PAZcífico project developed its estimates and projections of avoided GHG emissions based on the reconstruction of this methodological proposal.

D. **Information System on Safeguards**: In accordance with the commitments made by the parties at COP 16 on the implementation of social and environmental safeguards, the country presents the second summary of safeguards as a preview of the activities carried out to date. Within the national proposal that covers the safeguards, it is evaluated that the implementation of the initiative includes general principles such as: transparency; free, prior, and informed consent; participation of the actors involved; protection of biodiversity and ecosystem services; respect for local Afro, Indigenous, or other recognized minority communities, as well as other risks related to ecological and environmental integrity. This project bases its safeguards' evaluation on the seven (7) principles established at the national level, which are the basis for designing the actions, resources, and characteristics that ratify their manifestation and compliance.

2) Having a mechanism to manage the risk of leakage of GHG emission reductions.

The project has determined this mechanism through Leakage Potential areas, based on a spatial diagnosis, analysis of deforestation factors, mobility, and areas of special ecosystem importance surrounding the project, which determines its spatial distribution. With this area, it is intended to relate the current reality in terms of territory and the possible dynamics that may arise after prioritizing conservation and restoration activities of the ecosystems involved. The Potential Leakage Area is created with the aim of focusing the activities mobilized by the implementation of the initiative, and generating an alternative for the execution of daily actions that are modified due to the commitment of the community councils with the conservation, preservation, and improvement of forests.

3) Having a mechanism to manage the non-permanence buffer of GHG emission reductions and removals.

The proposal for a reference forest emissions level covers an estimate of the error, understanding the uncertainty that any group of projected data possesses. For the case of the current project, quantification methodologies and reference parameters less prone to error were used. For example, cartographic sources with academic and research recognition such as Hansen *et al.* (2013), SIAC, Ministry of the Environment. Likewise, the projections of avoided GHG emissions into the atmosphere are based on data from the coverage present in the project limits, and adjusted in accordance with the methodological reconstruction indicated in the proposal.

In turn, the Reference Levels use the logistic function to set the parameter of net emissions by natural region with the least uncertainty. It is complemented by the quantitative analysis of the mean square error and the mean percentage of absolute error. Additionally, in order to reduce the effect of events outside the limits of the project and their possible manifestation—affecting the reduction of GHG emissions and the reduction of projected emissions—the project developer—under the characteristics of the certification program—establishes a percentage deduction on the total avoided GHG emissions quantified for the project, complying with the non-permanence buffer management requirement corresponding to the required conservatism.

4) Having a mechanism to manage uncertainty in the quantification of the baseline and mitigation results

The determination of the baseline was based on the use of information sources with academic and research recognition to measure an adequate forest area reduction rate, which is used for the projection of the future dynamics of change in the land use due to deforestation and/or forest degradation. Such sources include the high-resolution global maps of forest cover change by Hansen *et al.* (2013), which accurately guarantee the phenomena of deforestation and land cover change. Additionally, by applying the most up-to-date methodological reconstruction of Reference Levels (RLs), the reduction of the intrinsic error obtained for these parameters through field sampling and data quality verification is involved; thus, determining growth models appropriate to the conditions of the forest, which are an accepted means for managing uncertainty within the design of the RLs proposal.

Similarly, for the definition of the mitigation results, the methodological reconstruction is based on the data proposed in the RLs, so that it is adjusted and verified with the uncertainty management proposed by IDEAM and the Ministry of the Environment. Finally, the program under which the REDD+ initiative is proposed has a categorization of the information according to the origin of its information. Greater uncertainty generates greater deductions on avoided GHG emissions, calculated within project limits.

Article 40. *Maximum GHG Mitigation Potential for REDD+ Projects,* involves all initiatives that have generated results between January 2016 and December 2019, and whose baseline has been validated prior to the issuance of resolution 1447 of 2018. Otherwise, the mitigation projects with validation after January 2020, will accept the most updated Reference Levels. In accordance with the previous statement, the project includes the period that involves the use of the most updated reference level, which in this case was based on the methodological reconstruction proposed in the Reference Level Proposal issued by the national government (IDEAM and Ministry Environment). It develops the pertinent methodological reconstruction to establish the projections of avoided emissions in the defined reference period.

Article 41 referring to the *Establishment of Baselines for REDD+ Projects* defines that the owner of the REDD+ project will establish its baseline from the most updated RLs that have been formally submitted by Colombia and evaluated by the UNFCCC. This condition is met through the projection of the deforestation dynamics in the project area and its corresponding reference region, based on the methodological reconstruction of the Reference Levels proposal established for Colombia. Its consistency with the information provided is taken into account by the SMByC: the definition of forest, emission factors by forest type, and methods for estimating emissions and projection over time (*See 2.12 Project* Eligibility). This discussion is further developed in 2.13.4.2 Determination of the Baseline Scenario.

According to **Article 42.** *Establishment of Mitigation Goals for REDD+ Projects,* GHG emission reduction projections were based on the aforementioned methodological reconstruction. The project makes a projection of its mitigation goals through an ex-ante scenario, starting its projection in the year 2015, and assuming an adequate behavior of the actors involved in the reduction of deforestation and degradation dynamics. The avoided GHG emissions are proposed in accordance with the Comprehensive Strategy for the Control of Deforestation and Forest Control, which in turn contributes to the fulfillment of the goals set out in the RDC. In turn, they are expected to influence the biotic and abiotic factors related to the forest ecosystems to be conserved and their respective ecosystem services.

Article 43. *Additionality Criteria in REDD+ Projects* allows establishing the differentiating factors that make the REDD+ PAZcífico project the appropriate alternative for the net reduction of GHG emissions emitted into the atmosphere, and which could not be obtained if it were not implemented. This analysis is presented in more detail in ***¡Error! No se encuentra el origen de la referencia.***.

2.13.4.2 Determination of the Baseline Scenario

Article 41 of resolution 1447 of 2018 on the *establishment of baselines for REDD+ Projects*, by which the owner of the project must establish their baseline from the most updated RLs that have been formally submitted by Colombia and evaluated by the UNFCCC, including the geographical area of the project, as well as REDD+ activities, periods and carbon deposits in which the initiative is intended to be implemented. It corresponds to the proposal of the forest reference emissions level submitted to the UNFCCC for its approval. It identifies that all the biomes of the country are involved, and that the necessary technical elements are granted to generate a methodological reconstruction to project with low uncertainty the reduction of emissions carried out in the limits of initiatives distributed at the national level. In the same way, verified and tested information by different entities is used, in order to find results appropriate to the reality of the vegetation cover and its associated dynamics (*See 2.12 Project* Eligibility).

The determination of the baseline with adequate parameters and variables according to what is required in the second paragraph of Article 41 can be verified in the reference scenario proposed for the REDD+ PAZcífico project. This is done by observing the use of data as an area of the community councils, stable forest under cartographic and spatial analysis, reference region, Potential Leakage Area, and carbon content approved by the RLs. They were taken into account and corroborated through information gathering in the field, carrying out a methodological reconstruction based on the guidelines of IDEAM and the Ministry of the Environment.

Regarding Paragraph 2 of this article, *"The owner of the REDD+ Project that has validated their baseline prior to the issuance of this Resolution must adjust and validate their baseline from the most updated RLs*." The adjustment of the baseline effectively consists of the methodological reconstruction of the most updated Reference Levels (RLs) developed by the environmental entities in charge at the national level and applicable to the project, while covering the geographical area where it is developed. These RLs were built and proposed by the Ministry of Environment and Sustainable Development, and IDEAM in December 2019. They have been applied in accordance with its technical and methodological parameters to this initiative, in order to align with current regulatory requirements.

2.13.4.3 Additionality Criteria

The project complies with the current regulations of the National Registry of Emissions Reduction, Resolution 1447 of 2018, in relation to Article 43 " ***Additionality Criteria in REDD+ Projects.*** *The owner of the REDD+ Project must demonstrate a net benefit to the atmosphere in terms of reduced or removed GHG emissions. In addition, proof must be provided of mitigation not having occurred in the absence of the initiative."* Therefore, the project involves the following scenarios:

"GHG removals due to carbon dioxide sequestration by the natural forest that remains as natural forest are not considered additional, and consequently they are not eligible for national accounting."

The project evinces compliance with this section through the result obtained in the eligibility analysis, especially in Table 33 , which demonstrates the reduction of areas lost to deforestation compared to the baseline scenario. This shows the existence of sectors with a land use other than natural forests and whose actions to reduce deforestation covered by community councils have generated its natural forest areas reduction.

"*The reductions in GHG emissions or removals resulting from compensation activities of the biotic component derived from the impacts caused by projects, works or activities within the framework of environmental licenses, concessions, requests for permits for the sole use of the forest resource due to change in land use, and the request for definitive subtractions from national and regional forest reserves are not considered additional*."

Within the limits of the project, no activities framed in compensation of the biotic component have been developed. As evidence, the compensations registered by the National Agency for Environmental Licenses (ANLA) in the Colombian Environmental Information System (SIAC) are verified. The information is presented in geographic layers composed of three (3) shapefiles with polygonal geometry—as shown in Figure 2 —together with the limits of the project. As seen, there is no overlapping of any activity related to compensation for biodiversity, compensation of 1%, or any other compensations.

"GHG emission reductions or removals resulting from preservation and restoration activities in strategic areas and ecosystems for which payments are made for environmental services of GHG reduction and capture are not considered additional as per the provisions in Chapter 8, Title 9, Part 2, Book 2, Decree 1076 of 2015".

Compliance with this condition is evinced by the analysis carried out in the section of Decrees and Laws , mainly **Decree 1076 of 2015**. Single Regulatory Decree on the Environment and Sustainable Development, where the absence of environmental restriction areas within the limits of the project is verified. Figure 18 shows that there are no areas such as "Zones registered in the RUNAP and/or Forest Reserves" established by Law 2 of 1959, with its exclusions as of 2018, within the limits of the project.

Given the criteria for determining the baseline scenario in accordance with the methodological document, the REDD+ PAZCífico project is based on compliance with criterion C.

C. Changes in carbon stocks, at the project boundaries, identifying the most likely land use, at the beginning of the project.

The proof was conducted according to the analysis of the most probable land uses identified through spatial analysis, field diagnoses, and information regarding the socioeconomic dynamics of the different community councils. In order to demonstrate the principle of additionality of the REDD+ PAZcífico project, considering the guidelines of the methodological document, the following sequence is followed:

Start date of the REDD+ project

The date on which activities to reduce emissions from deforestation and degradation within the project limits are initiated is evinced. Evidence of mangrove restoration and monitoring activities in the community council of Guapi Abajo since 2015 is attached hereto. Later, with the support of the IIAP and other institutions external to the community councils, actions for the conservation, protection and maintenance of vegetation cover are promoted.
The start date is described in 2.1.2.2 Start Date and is documented in the *7_Start date*folder.

Identification of Land Use Alternatives

The most probable land use scenarios are identified according to the territorial dynamics of the community councils involved in the REDD+ PAZcífico project. As a result of the community diagnosis, analysis of deforestation factors and verification of satellite information (see Project Eligibility) and secondary information related to environmental and socioeconomic factors of the population (see *Social, Cultural, and Economic Aspects of the* Community), probable land uses are determined in Table 35.

Table 35 Analysis of Possible Land Use Scenarios within the Territory

Land Use	Evidence	Trend	Feasibility
Mining	Mining is the main activity for the subsistence of the councils. Mining occurs as an illegal artisanal practice.	As the basic livelihood of the councils, and the most relevant factor of deforestation, if mining illegally occurs on a large scale within the project area, it does not classify as an environmentally sustainable process, nor a factor of large-scale economic development, due to the finite nature of the mineral resource (gold), the lack of technological development, and	Mining is not viable given that its economic development factors are illegal. Illegal mining does not support an environmentally sustainable development, while the geographical and logistical difficulties make technological development impossible.

Land Use	Evidence	Trend	Feasibility
		transportation, in addition to an illegal commercial structure.	
Agriculture	Agriculture is a basic livelihood of the community. It is present in the form of family agricultural units, determined between 1 and 6 hectares per family nucleus.	By being one of the main activities as an agent of deforestation and degradation, if the trend occurs within the territory, it improves the availability of food for the community, but it is not considered as a factor of economic development, associated with little technology and road development.	Agriculture is not feasible given that the economic development factors are low in view of the geographical, communication and logistical difficulties. In addition, the reduction of GHG occurs at a low level due to its low capture capacity
Illicit Crops	Illicit crops are external to the community; promoted and managed by external actors on the part of armed groups.	Through initiatives of the national government managing strategies for restructuring, substitution, and eradication of illicit crops, aiming at a massive reduction of this activity. Additionally, illicit crops are illegal and therefore they are not accepted as an economic activity within the national territory.	Illicit crops are not viable because they are illegal and eradication actions are established nationwide. Additionally, they are not a recurrent activity and they are not endorsed by the community.
Production Forestry	This is an auxiliary activity for the development and welfare of the community. Production forestry is based on the use of resources in primary materials for infrastructure and local development.	The increase in wood extraction contributes to an increase in GHG emissions due to deforestation and/or degradation. In turn, it has not been explored as a market or development opportunity, as it lacks logistics, technology development, and medium to large-scale market niches.	Production forestry does not generate a net benefit to the atmosphere by reducing GHG emissions. It increases the rate of deforestation and therefore its associated emissions. Production forestry does not have adequate logistics and industrial development,

Land Use	Evidence	Trend	Feasibility
			reducing the availability of the product to foreign markets.
Sustainable Forestry Management and Conservation (REDD+)	The territory has a wide forest cover that makes up the moist and very moist forest. Additionally, the community understands the goods and services that derive from it, promoting its protection and conservation.	The design of strategies for the improvement, increase and conservation of carbon reservoirs will reduce the effects on biodiversity, natural resources, and the livelihood of the communities. Additionally, the project establishes new financial mechanisms on the communities that pay off in terms of results linked to the improvement of well-being, coexistence and community development.	The conservation, increase and improvement of carbon reservoirs in conjunction with other activities to reduce deforestation and degradation, generate a net benefit to the atmosphere by favoring carbon capture rates and conserving emissions already integrated within sinks in community councils.

Source: CO2CERO SAS, 2021.

Consistency of Land Use Alternatives

Once the probable land uses within the project limits have been determined, their consistency with normative and legislative factors is determined. Additionally, their correlation with the environmental, social, technological and economic contexts is verified, according to the dynamics identified in the field. All those factors were discussed and shaped by the community during the workshops on the analysis of deforestation (See folder *11_Anexos|cartografía social*.) A quantification analysis of the viability of the land use defined regarding these contexts is used. The aim is to determine which alternative is adequate and additional within the territory, besides generating the greatest net benefit to the atmosphere in terms of emission reduction.

Table 36 Land Uses Feasibility Rating

Land Use	Political - Legal	Environmental	Social	Technology	Economy	Results
Mining	2	1	2	2	3	10
Agriculture	3	2	3	1	1	10
Illicit Crops	1	1	1	2	3	8
Production Forestry	3	2	3	1	1	10
REDD+	2	3	3	3	3	14

Source: CO2CERO SAS, 2021.

The quantification of the impact is given according to the viability of the land use with respect to the political, environmental, social, technological and economic context, where values are assigned, as follows:

(1) Context with no feasibility for this land use
(2) Context that provides basic elements for land use to manifest
(3) Aspect that provides all the necessary elements for land use to be carried out.

The results of the analysis are shown in Table 36 . There is evidence that the most attractive land use is the development of a REDD+ project complying with the parameters of additionality of Resolution 1447 of 2018, defining it as an initiative that demonstrates reductions of GHG emissions or removals derived from its implementation, generating a net benefit to the atmosphere. Similarly, it is observed that all alternative land uses outside the REDD+ project have logistical limitations due to navigable conditions, in economic terms due to the lack of identification and development of market infrastructure and, regarding the legal case, the legal aspect is unfavorable for illicit crops as this activity is promoted by groups outside the law.

Additionality

Once the factors of relevance, correspondence and traceability have been identified in relation to the regulatory framework, criteria and land uses necessary to demonstrate the additionality of the project, a rationale is created using the parameters proposed by the Cercarbono tool to demonstrate the additionality of climate change mitigation initiatives, and how it is fulfilled.

Additionality seeks to comprehensively guarantee the environmental and financial balance of climate change mitigation initiatives. To that purpose, we must show that the initiative would not have occurred in the absence of the carbon market or that the initiative is part of climate change mitigation. The REDD+ PAZcífico project is part of the Avoidance of GHG Emissions activity through conservation, restoration and improvement tasks upon the existing carbon reservoirs within the corresponding community councils and for the natural forests of their property. The emissions avoided by the REDD+ activities framed and developed within the project have been calculated and displayed in the 3_Carbono folder, in which the ex-ante and ex post analysis corresponding to the behavior of GHG emissions within the area are presented.

The REDD+ PAZCífico project has been registered and determined to be used in contexts of a specific subnational nature, mainly for the Non-Incurrence of the Carbon Tax in Decree 926 of 2017 (See *1_Acuerdos|01_ContratoAsociadotécnico|01_Contrato_CO2CERO_AGROIMPULSO.pdf|Paragraph Clause six|Means of payment)*, as per Colombian regulations, which in turn is linked to Resolution 1447 of 2018, determining the net benefit to the atmosphere by implementing this initiative.

y Estudios Ambientales Instituto de Hidrología, Meteorología	PY REDD+	REDD+ PAZcífico	Formulación

Illustration 15 Status of registration of the REDD+ PAZcífico project on RENARE. Source: CO2CERO SAS (2021)

By verifying the evidence of additionality for alternatives other than the final use of carbon offsets, we can say that the income of the project comes only from the commercialization of GHG emissions avoided by deforestation and degradation, which is determined at the contractual level in folder *1_Acuerdos|01_Contrato Asociadotécnico|01_Contrato_CO2CERO_AGROIMPULSO.pdf|Paragraph Clause six|Means of payment,* is ratified in the cash flow analysis (See *11_Anexos|Anexo Proyección de Costos actividades REDD+.xlsx*) and shown in *2_Co beneficios|Distribución de beneficios.pdf_V2.pdf*, explaining how these benefits are distributed among the actors involved in the initiative. Similarly, the initiative to reduce emissions from deforestation and degradation, as well as its project limits, are not part of compliance with mandatory standards or regulations, nor are they part of an environmental compensation scheme (See *4_SIG|MAPAS|Mapa_CompensacióndelMedioBiótico).*

2.14 Deforestation and Degradation Analysis

The following chapter presents the analysis of deforestation and degradation factors, carried out within the limits of the REDD+ PAZcífico project, involving the members of the community councils that comprise it.

The analysis of the factors of deforestation and degradation was carried out in person at the community councils, through participatory diagnosis, in which underlying causes, central factors of deforestation and degradation, actors and mobilization of deforestation and degradation activities were identified at territorial level (See Folder 11_Anexos\cartografia social and 11_Anexos\Asistencias). In addition, deforestation and degradation events relevant to the community are spatially identified through social mapping. With these results, the activities to reduce deforestation are guided, considering if the agent or the underlying causes or the effects are acted on, depending on the development status. In addition, the coverage affected within the limits of the project was verified.

The processes of socialization and rapprochement with the community allow acquiring precise information, effectively approaching the reality of the territory, providing tools applicable to the recognition, diagnosis, planning, execution and evaluation of natural resources. In the case of REDD+ projects, participatory diagnoses allow the identification of solutions to specific problems within the community based on their perception of the current state, while their objectives are guided, so that they are favorably acquired by the community and lead to a good fulfillment of the commitments acquired within it.

2.14.1 Methodology

The activities to analyze the factors and causes of deforestation and degradation were carried out in two moments, as follows:

2.14.1.1 Prior Review of Deforestation and Degradation Factors

The acquisition of information at regional level allows a first approach to the state of deforestation and degradation factors, and their evidence in the territory. This information will be later refined and filtered to adjust to local conditions, through interviews with regional and local actors, and identification of factors and causes of deforestation and degradation, according to the criteria given by the community through a field workshop and subsequent verification.

Secondary information related to deforestation and degradation was consulted within the limits of the project or neighboring sectors, allowing an approach to the existence of deforestation and degradation factors or their historical existence. To search for information, bibliographic resources available from official environmental entities or reports of activities within the region are used. This search allows us to approach the causes and agents involved in deforestation and degradation processes, which are subsequently ratified with primary information from regional and local experts. Among the resources involved we count on university studies, articles from environmental magazines, and sections in the websites of mayors and governors. Some of the search patterns used include -deforestation/degradation Nariño/Cauca-, -deforestation/degradation [Community councils]-, -Characterization [community councils]-, -Conservation of forests Nariño/Cauca-.

2.14.1.2 Workshops on the analysis of deforestation and degradation factors

The analysis of deforestation and degradation factors at local level was carried out using the participatory diagnosis[2] and Participatory Action Research methodologies. We considered that the population knows their territory and their circumstances the most. Guidance has been provided on the causes of deforestation and degradation, the importance of their analysis, and the representativeness of the results generated. Additionally, the interaction of the community with the project ratifies transparency and full participation—relevant axes to compliance with the social and environmental safeguards of the REDD+ project. The workshops on the analysis of deforestation and degradation factors were conducted along with the activities below.

[2] Participatory diagnosis is the process and methodology through which a conscious participation of the community is obtained. Such activities lead to self-knowledge of its reality and the organization of its inhabitants in representative and stable social structures for the undertaking of transformative actions and within the reach of sustainable development (Martinez, 1995).

Creation of Work Team

In order to establish the necessary information to transmit and conduct the workshop to analyze the factors and causes of deforestation and degradation, we train the management team, who will later conduct the workshops. The roles played while conducting the workshops are described and organized in a logical manner to later transfer information and obtaining results.

Table 37 Roles and Responsibilities for the workshops on the analysis of deforestation and and Degradation factors

Role	Description
Instructor	Opening workshop to diagnosis and analysis of deforestation and degradation factors. Generates team cohesion and debrief the work plan and methodology. Controls time, guaranteeing order during the activities Debriefs the results and guides conclusions based on the different phases of the workshop.
Facilitator	Supports the work groups for the correct identification of factors and causes of deforestation and degradation. Guides those involved in the execution of the methodology to generate affinity with the activities.
Secretary	Takes attendance Delivers materials to facilitators Supports additional requirements for the smooth conduction of the workshop

Source: CO2CERO SAS, 2020.

Workshop Development

Once the roles have been assigned and the participants are available, activities focus on identifying the causes and factors of deforestation and degradation within the framework of the PAZcific REDD+ project. Workshops were developed in three (3) moments, as follows:

The **first** is an introduction to concepts useful to analyze the causes and factors of deforestation and degradation, such as drivers of deforestation and degradation, main causes of deforestation and degradation, underlying causes of the events, and identification of actors and drivers of deforestation and degradation. In addition, the use of the participatory diagnosis tool is explained to find the concepts above within the dynamics of the territory.

The **second** moment allows the intervention of the entire community regarding their opinions on the factors of deforestation and degradation, as well as the causes and actors involved. opinions are expressed based on their experiences within the territory, as well as on the development of their own economic activities. This allows establishing a first approach to the territorial dynamics and the perception of community. In this space, social

mapping takes place to identify the location of the events of deforestation and degradation and how they occur according to the distribution of the members of the community.

The **third** moment is designed to group people according to their community role, considering the criteria of women, older adults, and younger people. In this differentiated way, we intend to recognize the effects perceived by the individuals from their own perspective and the implications of the activities each one performs. At the same time, it is possible to highlight the importance of each of the roles in the implementation of actions to preserve and protect natural resources, as well as the scope of each factor within the execution of the REDD+ project.

Socialization of Results

Once the activities to identify the causes and factors of deforestation and degradation have been conducted, spaces for the socialization of results are generated, based on the findings obtained by each focus group, as well as the initial conclusions generated by the technical team. In this phase, the results of the three moments are consolidated. The land use and the main activities that generate deforestation and degradation within the community—and therefore, in the limits of the project—are ratified.

2.14.2 Identification of Deforestation and Degradation Factors

According to the analysis of events and factors of deforestation and degradation, obtained by consulting secondary information, some results are presented below in order to identify the causes, drivers, and actors involved within the territory.

In general terms, IDEAM has determined that the main causes of deforestation and degradation at national level are the expansion of the agricultural frontier, the illegal extraction of minerals, the expansion of infrastructure, the extraction of wood, and forest fires. On the other hand, the underlying causes include technology and economic factors such as illegal markets and economies, state incentives, and costs of production and consumption. Political and institutional factors are included, such as sectoral and territorial policies, institutional presence, land property rights, and armed conflict (ONU REDD, 2018).

In the Pacific region, the fundamental causes of deforestation and degradation have also been determined, including the growth of illicit crops, extraction of wood in volumes greater than authorized, illegal exploitation of minerals, agricultural activities and forest fires. In the context of the REDD+ PAZcífico project, it was concluded that the main causes of deforestation and degradation are illegal mining, illegal logging, coca monoculture, and subsistence agriculture.

"Productive activities, ancestral knowledge, family relationships, food autonomy, cultural values and solidarity as an expression of the ethnicity of black people" (Suarez, 2018)

2.14.2.1 Extractive Sector

The threats and displacement of social leaders is a difficult situation that the council of Guapi Abajo faces. This situation is mainly promoted by hired assassins linked to illegal mining activities (Semana, 2013). In the evaluation of the results of industrial activities, it is evident that the mining activity without titles is the most representative activity in Guapi, Santa Bárbara and Magüi, in some areas of the municipality of Guapi there is mining titled (DANE, 2014).

In Guapi Abajo 99.9% develops mining unlicensed. The communities of El Carmen and Penitente practice artisanal mining. Guapi Abajo presents five requests for a direct mining concession on the collective territory. The communities recognize their concern for the environmental damage caused by illegal mining practices within the area, reducing agricultural and fishing activities.

The ideologies of the current neoliberal economic model, exporter, promoted by FTA drive to develop large-scale open-pit mining projects in the Cuenca del Río Iscuandé sector(Ministerio de Interior, 2017).

The mining of precious metals (gold), is the activity with the greatest presence within the Prodefensa del Río Tapaje community council, making use of both licensed and unlicensed artisanal mining. Some technological applications are dredges and motor pumps; in some areas, machineries such as backhoes, slab of arms and dragons. To a greater extent, with practices such as Mazamorreo, Barequeo and Palero(Organizaciones y Consejos Comunitarios del sur del Pacifico, MinMinas & IIAP, 2015).

Within the municipality of Santa Barbara de Iscuandé, the most representative economic activity is associated with the gold mining sector, carried out in the upper part of the municipality. This product is sold to intermediaries, which generates a decrease in the benefit perceived by the community(Hernández, 2014).

In Table 38 the narratives of some actors involved in analyzing deforestation factors in the Pacific, are compiled.

Table 38 Narrative on Factors of Deforestation and Degradation in the Pacific.

Deforestation and Degradation Factor	Direct Cause	Description
Illegal and criminal mining	Illicit minerals mechanized extraction	"It is developed with heavy machinery, open-pit and using chemicals such as mercury, which currently has high levels of bioaccumulation of this toxic in species and humans."

Deforestation and Degradation Factor	Direct Cause	Description
Illegal logging	Illegal extraction of wood for sale	"It is developed for commercial purposes, often using falsified permits or without a forest exploitation permit issued by the environmental authority."
Coca leaf monoculture	Agricultural frontier expansion: Coca agricultural production	"This type of practice requires large areas of cleared land and use agrochemicals to obtain good harvests, combined with the glyphosate spraying to control this type of crops impacts ecosystems, biodiversity, and the communities quality of life."
Subsistence agriculture	Establishment of crops for family self-sufficiency	"For self-consumption, people create small areas of agricultural production. In some cases, excesses may arise for marketing."

Source: CO2CERO SAS (2021) adapted from (ONU REDD, 2018).

2.14.2.2 Agricultural sector

According to the 2014 National Agricultural Census, a good part of the agricultural and non-agricultural production units is involved in transformation activities of agricultural products, allowing to determine that agricultural activity has a high relevance at the rural level. However, the increased transformation areas indicate that the gross yield is not competitive, leading to a continuous expansion of its borders within the territory (DANE, 2014). In the Cuenca del Río Iscuandé, the agricultural activity is crops of Coconut, Sugarcane, Yucca, Chontaduro, Borojó, and Banana. However, these activities have difficulties in transporting the raw material.

The Guapi Abajo sector's relevant activities are agriculture, fishing, and mining. Agricultural activities include growing products such as coconut, corn, chontaduro, rice, and taro. In the livestock sector, raising poultry, pigs, and fishing stands out as the main economic activity of the community council given the variety of species of fish, crustaceans, and mollusks. Finally, gold and platinum mining activities in areas along the rivers as a traditional activity among the communities. (Alcaldía Municipal de Guapi, 2019)

The community council's analysis established that it maintains subsistence crops through manual planting or artisanal tools. Its main products are rice, plantains, bananas, goats, and African oil palm, the latter given by an INCORA project. The plots' community owes its name to the family organization with African palm plots (Ministerio de Interior, 2017). According to MIRE (2020), the population of El Charco satisfies its economic needs through food crops, fishing, wood exploitation, and informal jobs generated by small businesses. According to the analysis by(ONU REDD, 2018) the African oil palm began in the Colombian Pacific in the department of Nariño in 2000.

Some activities are engines generating effects on other resources such as water and air, following the reduction of some flora and fauna species used for self-consumption and commercialization, which leads to the migration of activities involving deforestation and forest degradation.

2.14.2.3 Conflict and Violence

The Guapi Abajo community council is losing cultural traditions due to the presence of armed groups, generating restrictions on activities such as fishing, hunting of wild animals, meetings between members of the community, and planting (Ministerio de Interior, 2017). Leading to a displacement and modification of economic activities, within which logging and crops constitute an adequate alternative.

In addition to the absence of state support and the effects of armed conflict, some fumigation events have reduced crop productivity, mainly due to environmental damage. This has led to a major loss of crops, product damage, and low harvest likelihood due to fear of displacement or assaults in fields (Ministerio de Interior, 2017). Illicit crops began in the Colombian Pacific in 1995 and expanded during this period through the department of Nariño (ONU REDD, 2018).

2.14.2.4 Forest Exploitation

The 2016 – 2019 Territorial Development Plan indicates that the municipality's economic dynamics give relevance to the selective extraction of wood by Guapi cutters, mainly in Temuey, Codicia, and La Pampa communities harnessing carpentry activities. (Alcaldía Municipal de Guapi, 2019)

In the Guapi and Santa Barbara de Iscuandé sectors, there is evidence of extensive activity in the transformation processes of forest products, which may be related to the extensive use of wood within the area's natural forests. When evaluating economic activities based on services, the support for agricultural activities is the most relevant activity for the municipalities with jurisdiction in the project, associating itself with a broad dynamic of agricultural production.

Illustration 16 Forest product transformation activities.
Source: Agroimpulso Foundation (2021).

The forest exploitation and processes of primary transformation of wood are the main activities in the Cuenca del Río Iscuandé. Prodefensa del Río Tapaje community council strongly associates logging with mangroves and coastal ecosystems of water confluence between clean water and fresh water, in addition to pigeon peas under primary transformation systems (MIRE, 2020).

The main resource is forest exploitation in the Prodefensa del Río Tapaje community council's flat areas. The exploitation of wood constitutes the main source of income and local labor. The primary transformation of wood through local sawmills accounts for the exported raw material from the area. The most used species are Sajo, Cuangare, Cedar, Mangrove trees, Peinemono, and Tangare, among others (Ministerio de Interior, 2017).

The Pacific sector showed concerned deforestation figures in 2019 of 7,454 to 14,120 ha, double what was reported between 2018 and 2019, concentrating 9% of the national total. The alerts occurred mainly in the Municipalities of Rio Sucio, Río Atrato (Department of Chocó), and the limits between the departments of Nariño and Cauca, in the southwestern part of the country (Lizcano, 2020). In a deforestation analysis for the Pacific region between 2019 and 2020, it was a reduction in the Orinoquia region, finding 12,261 ha deforested. However, it contributed 7.1% of the total deforestation for that year.

At the departmental level, Nariño showed an increase in deforestation, reaching 4,911 hectares by 2020. Likewise, Cauca also indicated an increase in its deforestation figure, with 3,048 ha. The IDEAM analysis determines the main deforestation causes for the year 2020 corresponded to "praderización" [illegal deforestation] for land grabbing, bad practices in extensive cattle ranching, unplanned transport infrastructure, illicit crops, illegal minerals extraction, illegal logging, and agricultural frontier expansion. 0.3% of deforestation at the national level was concentrated in the South Pacific and 1.8% in the North Pacific (IDEAM, 2021).

2.14.2.5 Underlying Causes

The approach carried out by UN REDD (2018) established the underlying and indirect causes of deforestation in the Pacific region. These are consolidated in Table 39 .

Table 39 Description of Underlying Factors Identified by the Pacific Community Councils.

Underlying Cause	Description
Inter-institutional Dismantling	There is no compatibility among the regulations generated by the different ministries, finding opposition among the development scheme policies of the Ministry of Environment, the Ministry of Agriculture, and the Ministry of Mines.
Weakness of Local, Regional, and Environmental Authorities.	There is no appropriation of responsibility in conservation by environmental authorities. In many cases, corruption and conflict of interest oppose it.
Ineffectiveness of Environmental Control Agencies	There are ineffective interventions with insufficient and poorly trained personnel. Additionally, there is no rapprochement with the communities that are the object of intervention.
Limitation to Productive Models	Without the consent of the related actors, outsiders carry out large-scale activities, in some cases damaging natural resources and harming the community's economic development. In addition, conflicts and disturbances of public order also reduce the mobilization of actors and their economic activities.
Extractive Economy	In environmental and social terms, harmful models attack the existence of natural resources, their conservation, governance, and territorial protection structures evading prior consultation and community approval, in addition to intervening in cultural practices.
Non-inclusive Education	The cultural and social aspects the students develop are not considered. The models and contexts taught are far from the local reality, leading to a loss of a sense of belonging and territorial projection.
State Absence	There is no national support evaluating favorable commercial alternatives following the needs of the community councils, which leads to an economic development stagnation of the population.
Presence of Armed Groups	There are ideals imposition and political approaches unrelated to the internal regulations of black people, forced displacements, deaths, and weakening of community organizations. Promoting illicit crops, illegal mining, and extortion.

Underlying Cause	Description
National and International Market Dynamics	The increased price of gold has led to a large-scale proliferation without specifying the impacts and effects generated on natural resources. Additionally, the state does not regulate the actions of national and international companies carrying out illegal activities.
Violation of Ancestral Rights	The social, cultural, and political construction of black communities' foundations like identity, territory, development, and unity are not considered. Government structures and external economic activities go beyond these community values and act without respect for them.
Lack of Profitable Productive Alternatives	Economic activities within the region are scarce, additionally, the population concentration in their performance leads to an oversupply in market terms, overexploitation in terms of resources, and an undervaluation of the production effort involved.

Source: CO2CERO SAS (2021) adapted from (ONU REDD, 2018).

2.14.3 Analysis of Deforestation and Degradation Factors at the Community Level

After approximating the factors of deforestation at the territory level with secondary information, it was ratified with primary sources, like field workshops mentioned in the methodology. The workshops to identify the factors of deforestation and degradation were distributed in different villages of the community councils to cover the context from different spatial and social perspectives. Table 40 Dates and places of the deforestation factor analysis workshops under the supervision and accompaniment of the Agroimpulso Foundation. The consolidated results by the community council can be found in *8_Informacion campo|Factores de deforestación.xlsx*

Table 40 Deforestation workshops held in the community councils of the PAZcific REDD+ Project.

Community Council	Location	Date
Cuenca del Río Iscuandé	Vereda El Hormiguero	January 20, 2020
Cuenca del Río Iscuandé	Vereda Magdalena	January 21, 2020
Cuenca del Río Iscuandé	Vereda San José	January 22, 2020
Cuenca del Río Iscuandé	Vereda La Loma	February 02, 2020
Prodefensa del Río Tapaje	Bocas de Chanzará	February 03, 2020
Guapi Abajo	Guapi Abajo	February 05, 2020

Source: Agroimpulso Foundation (2021).

According to the information obtained in the deforestation and degradation analysis workshops, the community expresses its perception of deforestation and degradation events, either because they were generators of them (actors of deforestation) or because they indirectly benefit or were harmed by deforestation and/or degradation events

(underlying Causes). Additionally, they determined a series of indirect factors promoting the manifestation of drivers, actors, and causes of degradation and deforestation. The social mapping obtained during the project can be found in *11_Anexos|Catografia social.*

Illustration 17 Workshops analyzing factors of deforestation and degradation in the different community councils of the REDD+ PAZcífico Project.
Source: Agroimpulso Foundation (2021).

The deforestation and degradation results consolidation in shared knowledge and related experiences by the community councils are in Illustration41.

Illustration41 Results of workshops analyzing factors of deforestation and degradation in the different community councils of the REDD+ PAZcífico Project.

Deforestation and Degradation Event	Intervention Areas	Actors	Manifestation Year	Status
Subsistence agriculture	PRT, ISC, UN, GAB.	General community	1970	Active
Mining	ISC, GAB.	General community	1975	Active
Illicit Crops	PRT, ISC, UN, GAB.	General community	2000	Active
Wood use for subsistence	PRT, ISC, UN, GAB.	Sawmills	1970	Active
Commercial timber harvesting	PRT, ISC,	Sawmills General community Pacific bark company Mangrove industry	1970	Active

PRT: Prodefensa del Río Tapaje; UN Unicosta, ISC: Cuenca del Río Iscuandé and GAB: Guapi Abajo. Source: CO2CERO SAS (2021)

2.14.3.1 Illegal Logging

Factors associated with deforestation in areas with massive extraction and multiple species, revealing, deforestation at a plant population level. It also manifests as selective logging applied only to some species within the evaluated area, generating degradation processes. Within the deforestation and degradation factors specified by the REDD+ PAZcífico project community councils were due to exploitation of illegal commercial wood on specific species, as follows:

- Prodefensa del Río Tapaje: Mangrove, Nato, Cedar, Tangare, Cuangare, Sajo, and Sande.
- Cuenca del Río Iscuandé: Cedar, Tangare, Cuangare, Sajo, Sande, and Machare.
- Unicosta: Mangrove, Nato, Cedar, Tangare, Cuangare, Sajo, Sande, and Machare.
- Guapi Abajo: Mangrove, Nato, Cedar, Tangare, Cuangare, Sajo, Sande, and Machare.

Some of these species are commercialized and exported to Ecuador, while others are transported via the riverbank to be received at border ports of neighboring countries.

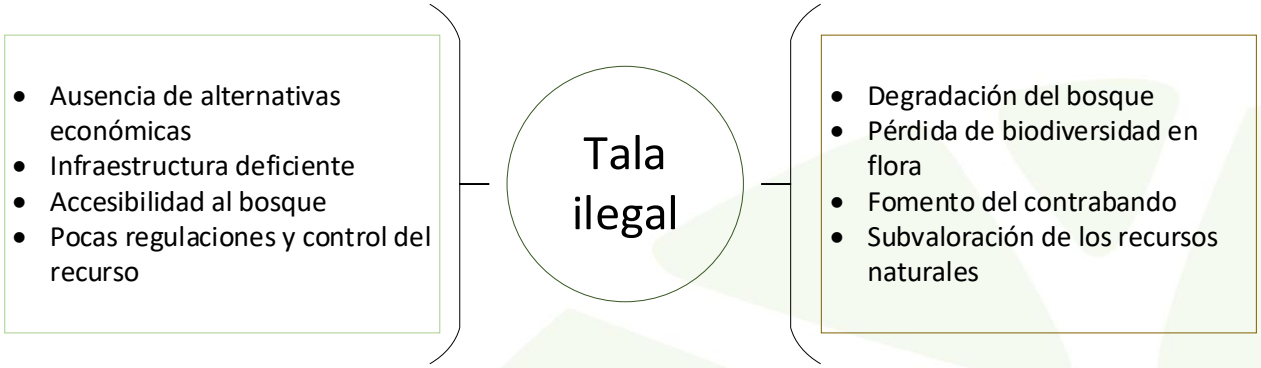


Figure 19 Diagram of cause-effect for the factor of deforestation and degradation illegal logging.
Source: CO2CERO SAS (2021)

Illustration 18 Deforestation and degradation of mangroves by outsiders of the community council.
Source: Agroimpulso Foundation (2021).

2.14.3.2 Subsistence Agriculture

In representative areas, mainly banana, rice, and coconut crops were a generator of deforestation processes. In smaller areas, family agricultural units adjusted spaces within the forest for each household crop. The community accepted this deforestation factor due to traditional practices using fertile lands in natural areas or forests, improving the productivity of these crops.

Land use for subsistence agricultural activities occurred by producing plantain, achiote, coconut, rice, corn, naidí, and vanilla at the family level, linking mainly the adults of each family, occasionally there was youth intervention. Also, they used forest species for subsistence and infrastructure improvement within the community council. Within this activity, the valuable timber species' selective use and the industry's benefit significantly impact the flora populations within the territory.

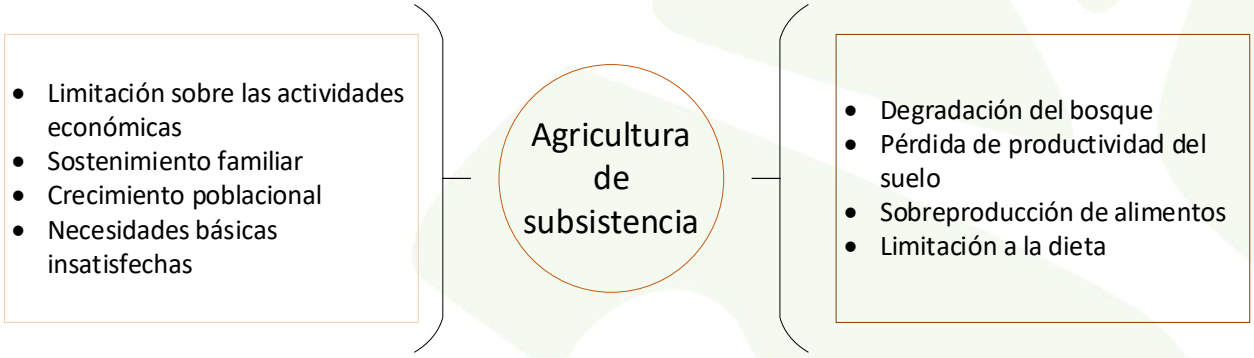


Figure 20 Cause–effect Diagram for Subsistence Agriculture Deforestation Factor.
Source: CO2CERO SAS (2021)

An absence of optimization practices and adequate management in the agricultural zone was identified where agriculture constitutes a relevant factor regarding food security and family sovereignty. This will involve implementing good agricultural practices and improving production chains, reducing the forest areas and vegetation cover expansion. Similarly, the link between producers from different places is proposed to complement the demand in areas with lower particular food productivity, generating food association and reducing the effects on natural forests and geographically isolated marketing chains.

2.14.3.3 Illicit Crops

This factor was associated with deforestation within the project limits. Coca crops are one of the most impacting factors at the socioeconomic level, given the conflict degree involved in the territory. Additionally, it generates crucial effects on the crop area due to the need for areas devoid of vegetation and synthetic inputs for the soil. Residual factors are evident in all natural resources, the ground lost properties and productivity, the water reduced availability and quality, and no fauna associations were found, in addition to the impact caused by glyphosate spraying for the government eradication initiative.

Figure 21 Cause-effect diagram of illicit crop deforestation factor.
Source: CO2CERO SAS (2021)

Illustration 19 Deforestation and degradation of vegetation cover due to coca-growing.
Source: Agroimpulso Foundation (2021).

2.14.3.4 Illegal Mining

This factor involves deforestation and degradation processes associated, in some cases, alleys and borders for material mobility, or only roads for people transportation, which influences the impact on forest cover. The mining activity influences the Prodefensa del Río Tapaje, Cuenca del Río Iscuande, and Guapi Abajo community councils. Among the highlighted factors by the community are the effects on health due to loss of water quality, use of harmful reagents to life, and reduction of some animal populations suitable for the

subsistence of the community. In environmental terms, the soils lose their quality to cultivate, vapor emissions pollute the air, and there is a loss of ecosystem connectivity, affecting the development of fauna populations.

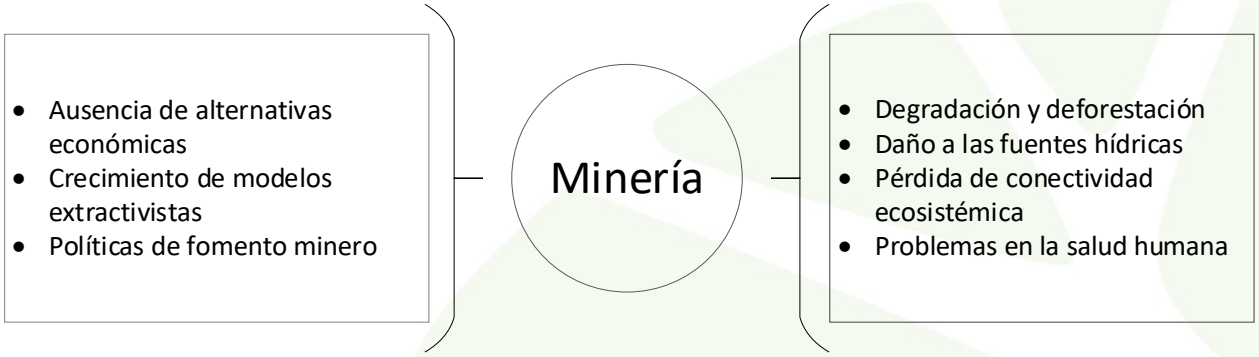


Figure22 Cause-effect diagram of mining deforestation factor.
Source: CO2CERO SAS (2021)

Illustration 20 Mining activity in rivers of community councils.
Source: Agroimpulso Foundation (2021).

3. ESTIMATES AND QUANTIFICATION

The following chapter presents the Ex-Ante estimates of the REDD+ PAZcífico project and the methodological development of the quantified Ex Post emissions.

3.1 Application of the Methodology

The subchapter describes the methodology applied to estimate the reduction of Ex-Ante emissions following the parameters defined by the certification program.

3.1.1 Title and Methodology Reference

The project applies the M/UT-REDD+01 Methodology for executing REDD+ projects consistent with the reference levels presented by Colombia to the UNFCCC. CERCARBON V 1.

3.1.2 Methodology Applicability

The project complies with the conditions of methodologies applicability, as follows:

i) The project complies because it is part of the GHG reduction emissions due to the development of REDD+ activities

ii) The project is carried out in areas meeting the national definition of forest, which involve:
   a. Minimum area of 1 hectare
   b. Minimum height of 5 meters
   c. 30% Canopy cover

iii) Forest and non-forest areas are identified by analyzing deforestation and degradation activity data.

iv) Carbon sink and mandatory emission sources are to be considered within the project evaluation under the provisions of the methodology.

Finally, the project meets the location conditions (physiography, hydrology, soils, etc.) and deforestation and degradation threat characterized by a historical trend of the last decade and patterns in terms of agents, drivers, and underlying causes of deforestation and degradation.

3.1.3 Project Area

The project will monitor the changes in the carbon stocks of the aerial and underground biomass of stable forests within the political limits of the four community councils in two temporary periods comprising ten years before the beginning and at the beginning of the project until the initiative's validity term. Monitoring the Possible Leakage Area will also allow determining the incidence of displacement of deforestation and degradation actors. In Table 42 , the time limits and the chronological plan related to the REDD+ PAZcífico project.

Table 42 Temporary limits of the REDD+ Project

Chronological Plan	
Project Start Date	January 01, 2015

Chronological Plan	
Record Term	January 01, 2005 to December 31, 2014
Projection Term	January 01, 2015 – December 31, 2034
Results period	January 01, 2015 – September 15, 2021
Project Duration	20 years
Verification Times	Three-year verifications are proposed with a maximum of 5 years.

Source: CO2CERO SAS (2021)

3.1.4 Reference Scenario

The reference scenario or reference region allows the estimates' identification of deforestation and degradation that could occur in the project area without the GHG mitigation initiative. Presenting a similarity with the project area in access, agents of deforestation, type of forest, land ownership, and post-deforestation land uses.

The determination of the reference region was performed considering the guidelines proposed by the methodology "M/UT-REDD+01 for the execution of REDD+ projects consistent with the reference levels presented by Colombia to the UNFCCC" with the deforestation and degradation actors and drivers that can access the project area. There is interest in doing so with land ownership figures similar to the project area and the exclusion of areas with restricted access for deforestation and degradation actors.

3.1.4.1 Delimitation of the Reference Region

The delimitation of the reference region was carried out through the combination of geospatial data, similar to conditions in the project area, using the information on slopes, precipitation, micro-basins, and temperature, generating similarities with climatic and geographic conditions.

It was considered the reference region will include part of the project area. Deforestation and degradation agents and drivers identified and analyzed in the reference region could access the project area and be of interest to them through information from interviews and discussions in the field, presence on roads, and bodies of water. The project area and the reference region's characteristics were compared among them. The reference region meets the necessary similarities, obtaining a total area of 1,764,410.55 ha, as shown in Figure Figure 23 .

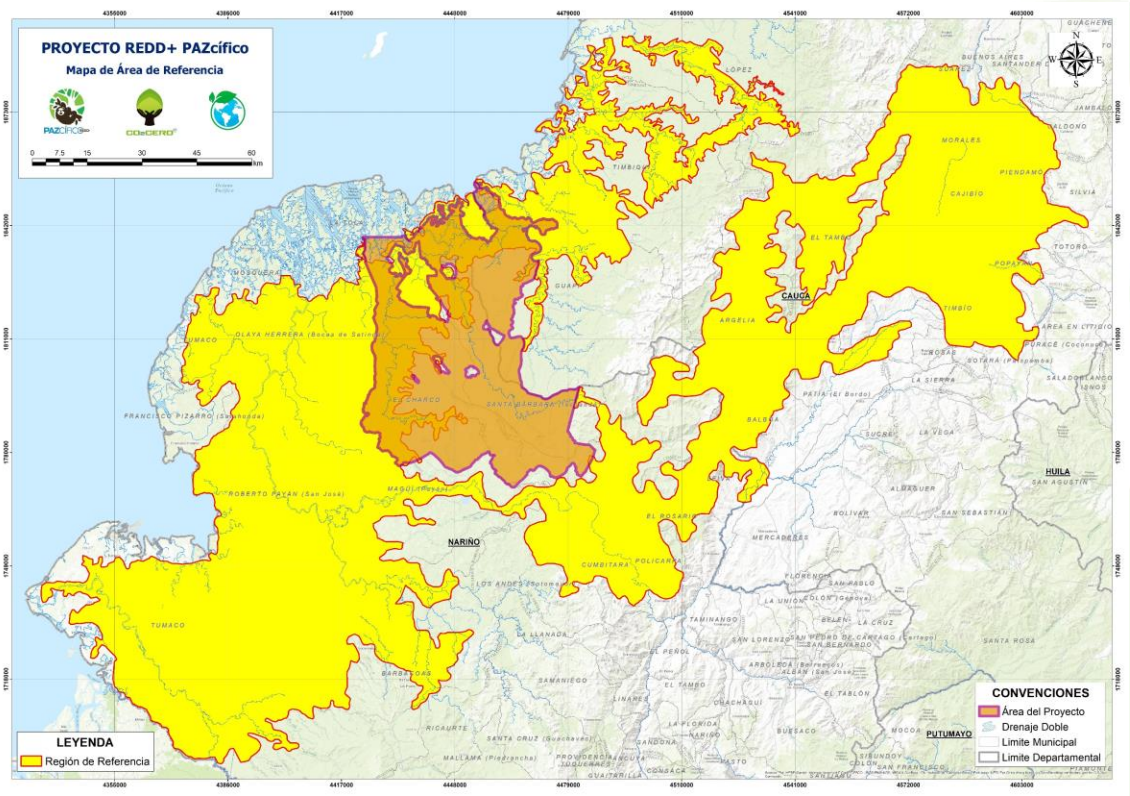


Figure 23 Reference Region Map
Source: CO2CERO S.A.S. (2021).

3.1.5 Possible Leak Area

The leakage belt or leakage area is adjacent to the project boundary, where displacement of deforestation and degradation activities encountered prior to the project within the project boundary. Delimited in forest areas close to mobility ranges of deforestation and degradation actors defined in section 2.14.

Using the mobility analysis method established the identification of the leakage area of the project, associating the access points to the forest given the proximity to navigable rivers. This is because, in the territory, there are no roads to travel. Still, instead, they are rivers, mobility vectors, urban centers, and the edge of the forest susceptible to being deforested or degraded. The mobility analysis allowed us to identify the possible activities of deforestation and degradation of the leakage area, highly linked to the proximity of navigable rivers and urban centers.

The factors of the mobility analysis and values were modified to the conditions of the surrounding area of the project, based on those exposed by the GHG mitigation project "*Forest Management project to reduce deforestation and deterioration in the Shipibo Conibo*

and Cacataibo indigenous communities, in Ucayali Region." Identifying the mobility range in meters by class, relative weight, and its subsequent spatial analysis for the delimitation of the leakage area through a multicriteria analysis of the ArcGIS Pro® Software, based on the determination of Euclidean distances of each mobility factor.

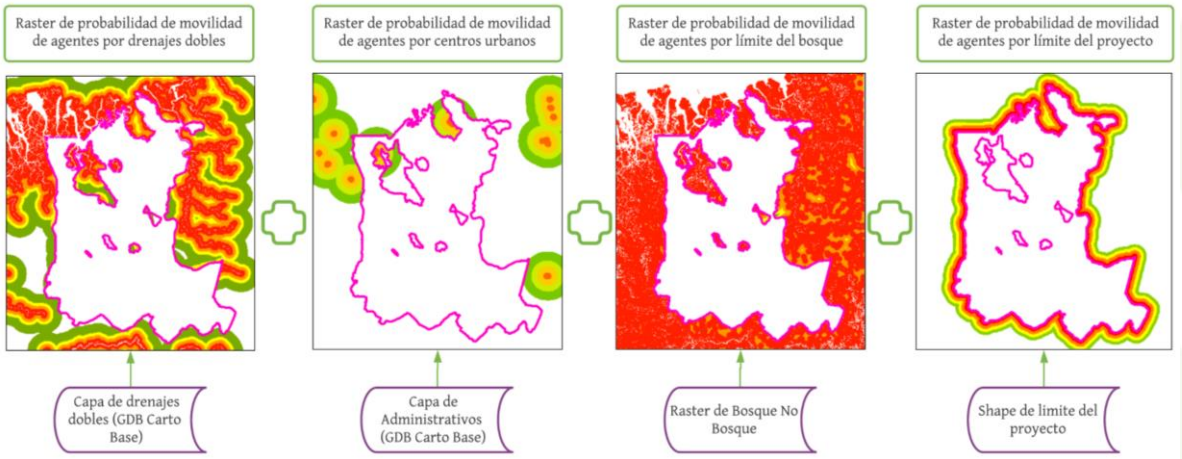


Illustration 21 Methodology for defining areas susceptible to agent mobility
Source: CO2CERO S.A.S. (2021).

The key factors determining the areas susceptible to deforestation and degradation due to the agents' mobility were based on a multicriteria analysis of the proximity to double drainages as navigable rivers, urban centers, the non-forest limit, and the project limit outside the project area (See Illustration 21). Relative weight was given to each factor according to the Euclidean distances of proximity to these, generating a Raster (see Figure 24) with the classification values as shown in Table 43 . The proximity to the variables increases the relative weight value with red coloration, as the coloration gradient decreases, it tends to be green-white.

Table 43 Assessments of Key Factors of Agent Mobility

Assigned relative weight	Variables			
	Limit of non-forest (m)	Project limit (m)	Navigable rivers (m)	Urban centers (m)
0	> 4000	> 4000	> 6000	> 8000
1	3000 – 4000	3000 – 4000	3000 – 6000	5000 - 8000
2	2000 – 3000	2000 – 3000	2000 – 3000	3000 - 5000
3	1000 – 2000	1000 – 2000	1000 – 2000	1000 – 3000
4	1 – 1000	1 – 1000	1 – 1000	1 - 1000

Modified from: Forest Management project to reduce deforestation and deterioration in the Shipibo Conibo and Cacataibo indigenous communities, in Ucayali Region

The sum of the relative weights of each key factor generates a range of 16 probable values of agent mobility. In this way, the areas with the 5 highest values bordering the project area present high susceptibility to the activities' displacement of deforestation associated with ecosystem equivalence of the project area, adjacent micro-watersheds, and stable forest areas are the Possible Leakage Area, as in Figure 25 .

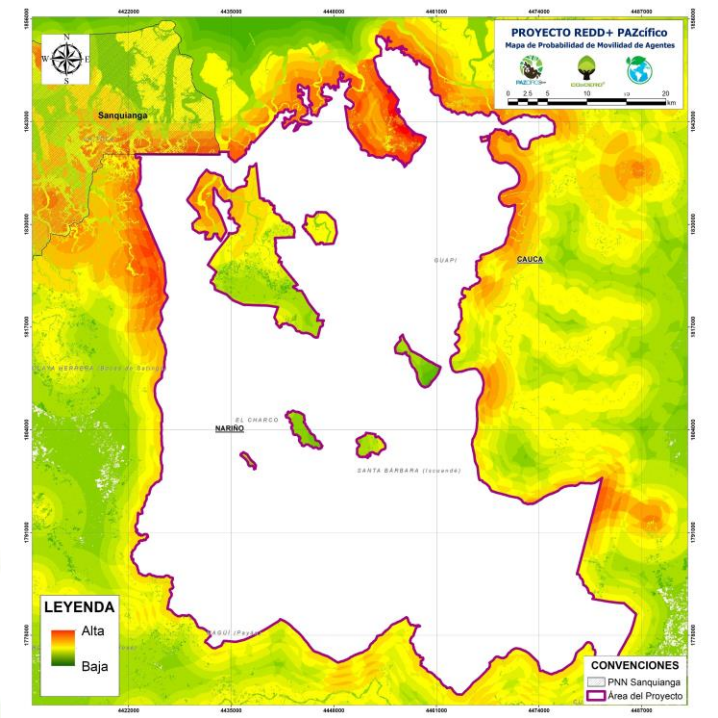


Figure 24 Agent Mobility Probability Map
Source: CO2CERO S.A.S. (2021).

The Possible Leakage Area is in six different polygons bordering the project area and the reference region, with a total area of 20,012.92 ha susceptible to degradation and deforestation. The area with a high potential probability of mobility to the northwest will not be considered due to PNN Sanquianga jurisprudence outside the community councils.

The leakage management area consists of 97.86 ha near the area with mangroves and forest cover, with high protection according to its coverage conditions, associated with the REDD+ activities for mangrove restoration, governance, and governability implemented by the inhabitants of the Unicosta community council.

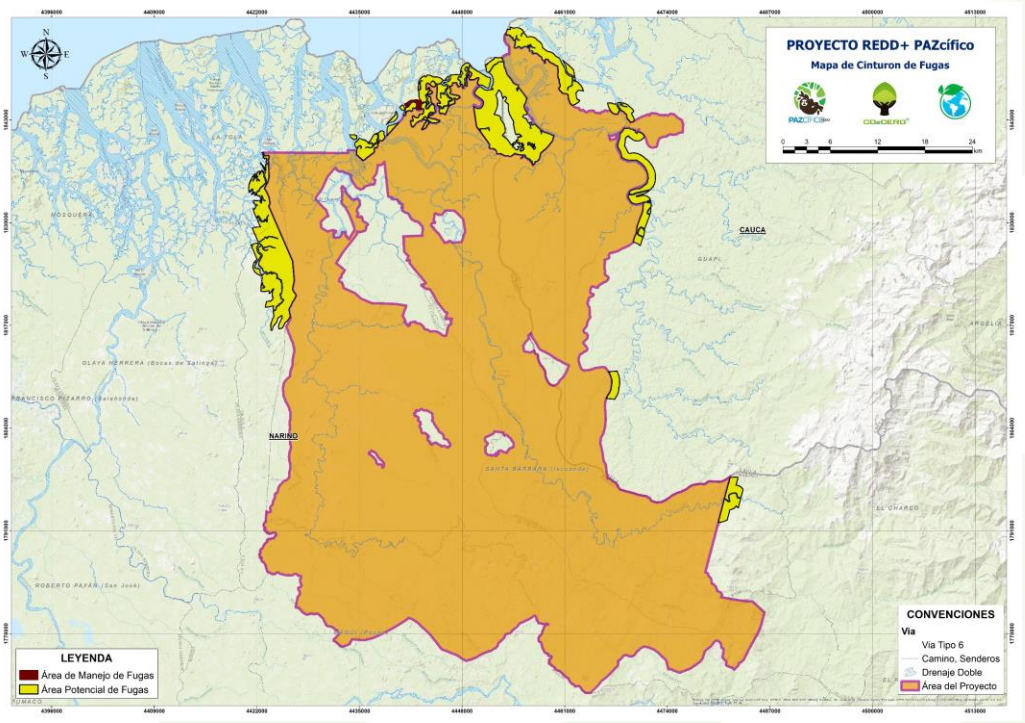


Figure 25 Map of potential area and leakage management of the project
Source: CO2CERO SAS (2021).

3.1.6 Methodological Deviations

A methodological deviation from the RFs was made to estimate the project's emission factor, achieving a consistent value with the IPCC principles.

3.1.6.1 Emission Factor

To determine the current state of the forest cover of the project to determine the emission factor for the baseline and the performance of the REDD+ activities, a field sample allowed us to compile data on the structure and composition of the forest.

3.1.6.1.1 Selection of the number of representative plots

The *Protocol for the national and subnational estimation of biomass-carbon in Colombia* by Yepes *et al.* (2011) was the base for the number of plots. Using annex 3, which represents the number of plots required to obtain an error value of less than 10% for a non-seasonal tropical moist forest.

Considering the values of the plots with an area of 0.0625 ha and 0.25 ha. Both sizes of number of plots met the required sampling error. Additionally, a sampling area of 0.1 ha (100 m x 10 m) was defined to improve data collection and availability in the field.

From this, the 40 plots inventoried within the project's limits fulfilled the required sampling error, obtaining a sampling value of 9.13%, as evidenced in

AUDITORIA_VV_2021\3_Carbono\FE REDDPAZcifico_04022022.xlsx\Pestaña "Error de muestreo.".

3.1.6.1.2. Field Sampling Methodology

On the project area (including surrounding areas), 40 sampling points (plots) were used to measure the different stages in the delimited forest area (seedling, adult trees, and large adult trees). Each plot covers an area of 0.1 ha, arranged in a rectangular shape of 100 x 10 meters. The ArcGIS ® Software randomly chose the plot's location by creating random points, prioritizing the proximity to water bodies that favor displacement. Data collection in those difficult access areas due to public order factors. The plots' verification within the forest area guaranteed that at least one of the most representative forest cover plots was presented (see Figure 26). This corresponds to what was done in the RFs under a simple random sampling scheme.

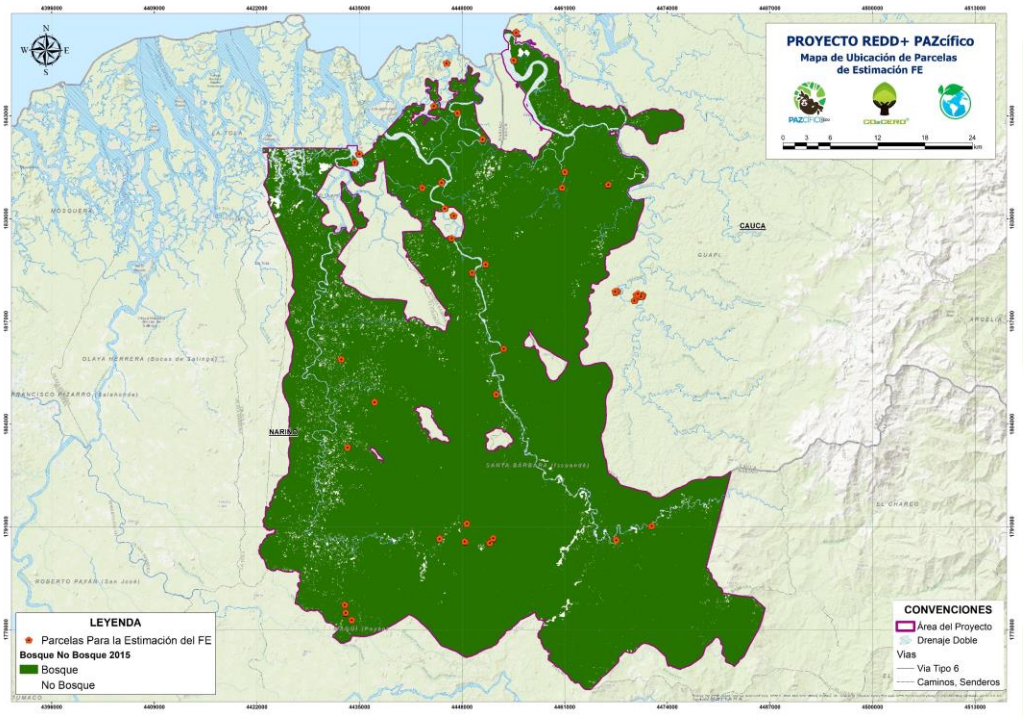


Figure 26 Location Map of Sampling Plots
Source: CO2CERO S.A.S. (2021).

All the species belonging to each forest cover were identified based on their respective scientific name and family. Subsequently, the measurements corresponding to the variables' diameter at breast height (DBH) and total height (only 33% of the individuals monitored) were made.

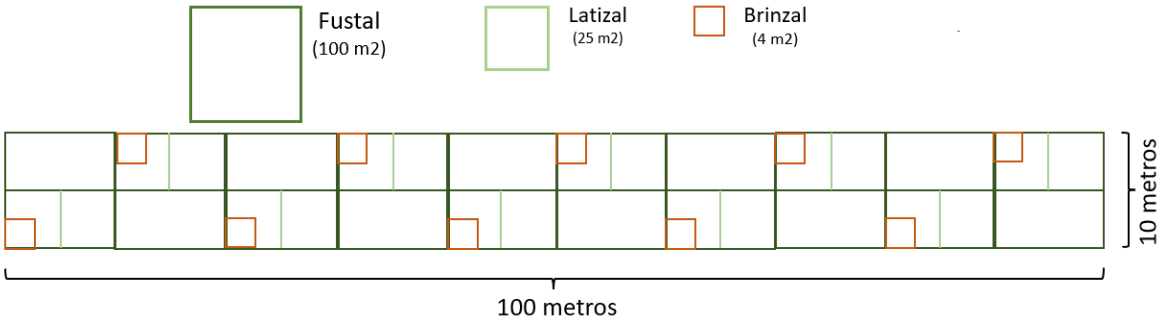


Figure 27 Diagram of plots established in the field.
Source: CO2CERO SAS (2022)

The measurements and the numbering of the large adult trees within the plot were made by subdividing the width of the plot every 10 meters. The adult trees were measured in 5 x 5 meters subplots within each subdivision of the large adult tree's measurement. Within these subplots were 2x2 meter subplots where seedlings were evaluated. (see *AUDITORIA_VV_2021\12_Reporte de monitoreo\Informe metodología inventario REDD.pdf*).

3.1.6.1.3. Data Processing

From the data collected, each of the procedures developed by the National RLs was used consistently, as follows:

1. Calculate missing heights from regression models developed for each data group (linear, exponential, GAM, GAMM, among others), identifying those that best fit the data obtained in the first instance. It is essential to clarify that each one of the height models found is its construction elaborated from the data taken in the field using the RStudio ® software (See AUDITORIA_*VV_2021\3_Carbono\Regresiones Altura\Regresiones Altura.xlsx*)
2. Use of the Global Wood Density Database to provide each identified species with a value for this attribute. The following sub-steps were carried out for each of the species reported in the forest inventory attribute, considering the availability of information:
    a) This value is used if there is information within the database pertaining to the species.
    b) If there is no specific information for the species in question, a value's average corresponding to the same botanical genus reported in the forest inventory is made. If the genus is not found, an average is applied to all the genera belonging to the same reported botanical family.
    c) Finally, suppose a corresponding value is not found for the botanical family. In that case, the value of 0.64 reported by Álvarez *et al.* (2012) is used for the biome in which the REDD+ PAZcífico project is located.

Note: The deviation obtained from the densities of each of the species recorded in the inventory (see Illustration 22) agreed with the confidence limits presented in the study of Álvarez *et al*. (2012) for the corresponding life zone (Tropical Humid Forest), which demonstrates the validity of the procedures implemented for assigning densities.

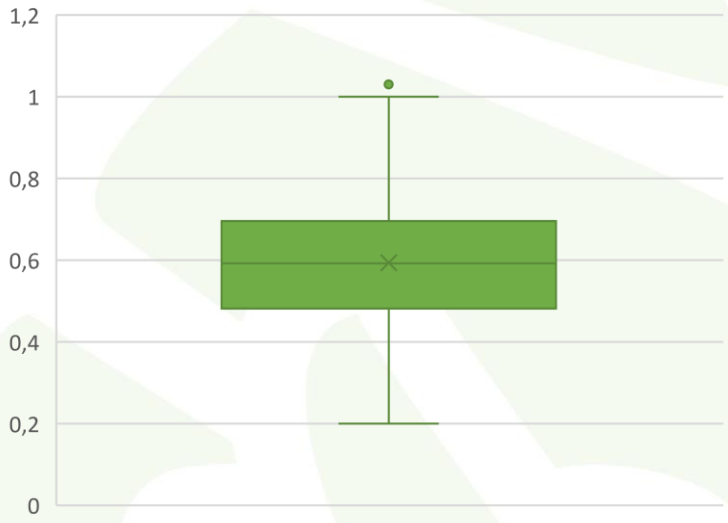


Illustration 22 Boxplox Wood Densities

3. Application of the formulas determined by RFs for the calculation of Aerial Biomass (AGB), Below-ground Biomass (BRG), Soil Organic Carbon for 20 years ($COS_{20years-i}$), and finally the corresponding Emission Factor.

3.1.6.1.3. Determination of the Emission Factor

The adjustment to the emission factors was consulted and approved by the RENARE Administration, the Deputy Director Office for Environmental Studies, and the Institute of Hydrology, Meteorology and Environmental Studies - IDEAM (See *5_Metodologias|NREF|Consulta ajuste FE_RENARE.msg)*. From the procedure explained above, the results on Table 44 .

Table 44 . Results for the Emission Factor

Variable	Unit of measurement	Value
AGB	(tC/ha)	243.19
BRG	(tC/ha)	54.60
BT	(tC/ha)	297.80
Carbon Fraction	%	47

Variable	Unit of measurement	Value
CBF	(tC/ha)	139.96
CBFeq	(tCO_2e/ha)	513.20
$COS_{20years-i}$	(tC/ha)	4.6
COS_{eq}	(tCO_2e/ha)	16.87
Emission Factor	(tCO_2e/ha)	530.07

Source: CO2CERO S.A.S. (2021).

The above is presented in the file *AUDITORIA_VV_2021|3_Carbono|FE REDD PAZcifico_04022022.xlsx.* It is necessary to point out that the above values correspond to the individuals of large adult trees and adult trees, which meet the DAP characteristics indicated in the RLs.

3.2 Quantification of GHG emission reductions

Next is quantifying the GHG emission reductions presented within the REDD+ PAZcífico project. It should be noted that the non-permanence buffer value corresponds to 15% of the emission reductions, following resolution 1447 of 2018. Additionally, this uncertainty is in numeral *8.13 Risks, Uncertainty, and Non-permanence,* requirement (f) regarding the reserve of 15% of the total carbon offsets obtained by the project. Its relevance is assessed with an evaluation matrix of uncertainty (See *11_Anexos|Anexo 2_ Análisis de Incertidumbre.xlsx*).

3.2.1 Reference Emissions

The emissions quantification generated in the project area, in the absence of this, are considered as those developed in the baseline scenario. This way, quantifying the emissions generated by deforestation and degradation activities is established.

3.2.1.1 Deforestation

After calculate the baseline from the Emission Factor (see 3.1.6.1 Emission Factor), a total of 10,521,749 tCO_2e was obtained for all the years within the project area (see Table 45).

Table 45 Estimated Emissions from Deforestation in the Baseline within the Project Area

Year	Emission factor (tCO_2e/ha)	$ECO2def_{LBt,f}$ (tCO_2e)	
		Annuallly	Accumulated
2015	530.07	533,154	533,154
2016	530.07	531,066	1,064,220
2017	530.07	528,986	1,593,206
2018	530.07	631,194	2,224,400
2019	530.07	661,215	2,885,615
2020	530.07	687,188	3,572,803
2021	530.07	708,309	4,281,112
2022	530.07	724,066	5,005,178
2023	530.07	469,703	5,474,881

Year	Emission factor (tCO_2e/ha)	$ECO2def_{LBt,f}$ (tCO_2e)	
		Annuallly	Accumulated
2024	530.07	467,863	5,942,744
2025	530.07	466,030	6,408,774
2026	530.07	464,205	6,872,979
2027	530.07	462,386	7,335,365
2028	530.07	460,575	7,795,940
2029	530.07	458,771	8,254,711
2030	530.07	456,974	8,711,685
2031	530.07	455,184	9,166,869
2032	530.07	453,401	9,620,270
2033	530.07	451,624	10,071,894
2034	530.07	449,855	10,521,749
TOTAL	-	**10,521,749**	

Source: CO2CERO SAS (2021)

In which: *ECO2defLBt,f (tCO2e)* are the CO2e emissions from deforestation in the baseline scenario.

3.2.1.2 Degradation

Calculating the baseline for the primary (core to patch) and secondary (perforated to patch) degradation areas according to the fragmentation analysis based on the Emission Factor (see 3.1.6.1 Emission Factor) (Ramírez *et al.*, 2018) and considering the loss values for each class of degradation proposed by Ramírez *et al.* (2018) for biomass area, armenteras, *et al.* (2016) and below-ground biomass, in order not to overestimate the carbon content of the areas corresponding to the degradation class and the values of dead wood and soil organic carbon were consistent with those of deforestation (see Table 46). This way, the value of the emission factor obtained will be considered in the absolute quantification of emission reductions due to degradation (See *3_Carbono|Carbono_Degradacion_REDDPAZcifico_V2)*.

Table 46 Equivalent Carbon Content by Type of Degradation

Type of Degradation	Mean Difference		Emission factor (tCO_2e/ha)
	Biomass area (t/ha)	Below-ground Biomass (t/ha)	
Primary	228,79	40,58	422,53
Secondary	170,21	32,60	318,88

Source: CO2CERO SAS (2021)

The primary and secondary degradation areas estimation was made using the *Landscap Fragmentation Tool* tool available for the ArcGIS®software. This tool determines the area in hectares corresponding to each class of fragmentation. Subsequently, it identifies the rate of exchange or transition between them according to the type of degradation (see Table 47). To obtain greater accuracy in the quantification of degraded areas, modeling an

intermediate year of the reference period (2010) was carried out, which would show the transition between classes of degraded areas over the years during the reference period presented appropriately.

For the correct handling of the *Landscap Fragmentation Tool* , the reference area was divided into eight parts, performing the modeling for each of the parts in the tool and later joining the results obtained into a single result for the entire reference area.

Table 47 Fragmentation Analysis Degradation Data for Baseline

Area Type	Term 2005 to 2015		Annual Degradation
	Type of Degradation	Area (ha)	Area (ha)
Reference region	Primary	871.25	87.13
	Secondary	2,114.10	211.41
Possible Leak Area	Primary	4.48	0.45
	Secondary	0.75	0.07

Source: CO2CERO SAS (2021)

In this way, for all the years of the project in the baseline scenario, a total was 2,084,520 tCO2e (see Table 48).

Table 48 Carbon Stocks due to Degradation in the Baseline

Year	ECO2degLB,t,dp	ECO2degLB,t,ds	ECO2degLB	
	Annuallly	Annuallly	Annuallly	Accumulated
2015	36,813	67,414	104,226	104,226
2016	36,813	67,414	104,226	208,452
2017	36,813	67,414	104,226	312,678
2018	36,813	67,414	104,226	416,904
2019	36,813	67,414	104,226	521,130
2020	36,813	67,414	104,226	625,356
2021	36,813	67,414	104,226	729,582
2022	36,813	67,414	104,226	833,808
2023	36,813	67,414	104,226	938,034
2024	36,813	67,414	104,226	1,042,260
2025	36,813	67,414	104,226	1,146,486
2026	36,813	67,414	104,226	1,250,712
2027	36,813	67,414	104,226	1,354,938
2028	36,813	67,414	104,226	1.459.164
2029	36,813	67,414	104,226	1.563.390
2030	36,813	67,414	104,226	1.667.616
2031	36,813	67,414	104,226	1.771.842
2032	36,813	67,414	104,226	1.876.068
2033	36,813	67,414	104,226	1,980,294
2034	36,813	67,414	104,226	2,084,520
TOTAL	**736,254**	**1,348,271**	**2.084,520**	**2.084,520**

Source: CO2CERO SAS (2021)

In which:

- *ECO2degLB,t,dp*: CO2e emissions from primary degradation in baseline
- *ECO2degLB,t,ds* CO2e emissions from secondary degradation in baseline
- *ECO2degLB* Total CO2e emissions due to degradation in the baseline scenario.

3.2.2 Emissions avoided Ex-Ante

Quantifying the reduction of emissions generated by the project in an Ex-Ante scenario estimated that would be presented by the project implementation and its actions to mitigate deforestation and degradation.

3.2.2.1 Deforestation

A projection made adding a value of 35% reduction in GHG emissions during the project implementation period to estimate the ex-ante emission reductions in the project area. This value was obtained from the monitoring of forest cover during the initial seven years of the project. The ex-ante emissions estimated for the project area are in Table 49 .

Table 49 Reduction of ex-ante emissions from the project due to deforestation

Year	ECO2Ptx		EfdefM		MEAdef		Buffer		REDD+	
	Annuallly	Accum	Annuallly	Accum	Annuallly	Accum	Annuallly	Accum	Annuallly	Accum
2015	169,113	169,113	33,990	33,990	364,041	364,041	54,606	54,606	309,435	309,435
2016	168,882	337,995	33,857	67,847	362,184	726,225	54,327	108,933	307,857	617,292
2017	168,651	506,646	33,724	101,571	360,335	1,086,560	54,050	162,983	306,285	923,577
2018	168,421	675,067	33,592	135,163	462,773	1,549,333	69,415	232,398	393,358	1,316,935
2019	168,190	843,257	33,461	168,624	493,025	2,042,358	73,953	306,351	419,072	1,736,007
2020	167,961	1,011,218	33,330	201,954	519,227	2,561,585	77,884	384,235	441,343	2,177,350
2021	167,731	1,178,949	33,199	235,153	540,578	3,102,163	81,086	465,321	459,492	2,636,842
2022	167,502	1,346,451	33,069	268,222	556,564	3,658,727	83,484	548,805	473,080	3,109,922
2023	167,273	1,513,724	32,939	301,161	302,430	3,961,157	45,364	594,169	257,066	3,366,988
2024	167,044	1,680,768	32,810	333,971	300,819	4,261,976	45,122	639,291	255,697	3,622,685
2025	166,816	1,847,584	32,682	366,653	299,214	4,561,190	44,882	684,173	254,332	3,877,017
2026	166,588	2,014,172	32,554	399,207	297,617	4,858,807	44,642	728,815	252,975	4,129,992
2027	166,360	2,180,532	32,426	431,633	296,026	5,154,833	44,403	773,218	251,623	4,381,615
2028	166,133	2,346,665	32,299	463,932	294,442	5,449,275	44,166	817,384	250,276	4,631,891
2029	165,906	2,512,571	32,173	496,105	292,865	5,742,140	43,929	861,313	248,936	4,880,827
2030	165,679	2,678,250	32,047	528,152	291,295	6,033,435	43,694	905,007	247,601	5,128,428
2031	165,453	2,843,703	31,921	560,073	289,731	6,323,166	43,459	948,466	246,272	5,374,700
2032	165,226	3,008,929	31,796	591,869	288,175	6,611,341	43,226	991,692	244,949	5,619,649
2033	165,001	3,173,930	31,672	623,541	286,623	6,897,964	42,993	1,034,685	243,630	5,863,279
2034	164,775	3,338,705	31,548	655,089	285,080	7,183,044	42,762	1,077,447	242,318	6,105,597

Year	ECO2Pt$_x$		EfdefM		MEAdef		Buffer		REDD+	
	Annuallly	Accum	Annuallly	Accum	Annuallly	Accum	Annuallly	Accum	Annuallly	Accum
TOTAL	**3,338,705**		**655,089**		**7,183,044**		**1,077,447**		**6,105,597**	

Source: CO2CERO SAS (2021)

In which:

- *ECO2Ptx:* CO2e emissions from deforestation within the project boundary for the ex-ante scenario.
- *EfdefM:* CO2e emissions from deforestation in the leakage belt
- *MEAdef:* Reduction of total CO2e emissions from deforestation in the ex-ante scenario.
- *Buffer:* Reserve for risk of non-permanence buffer for the scenario of emissions reduction scenario from deforestation ex-ante.
- *REDD+*Reduction of net CO2e emissions from deforestation in the ex-ante scenario.

3.2.2.2. Degradation

For the reduction of Ex-Ante emissions estimation due to degradation, a decrease projection was made due to the activities of the project, under the determination of the transition area for each type of degradation from the year 2015 to 2021, for the project area and the Potential Leakage Area, as shown in Table 50 Table 50 (see *3_Carbono|Carbono_Degradacion_REDDPAZcifico_V2)*.

Table 50 Fragmentation analysis degradation data for the Ex-Ante scenario

Area Type	Term 2015 to 2021		Annual Degradation
	Type of Degradation	Area (ha)	Area (ha)
Project Area	Primary	8.96	0.89
	Secondary	45.93	4.59
Possible Leakage Area	Primary	0.19	0.02
	Secondary	1.66%	0.17

Source: CO2CERO SAS (2021)

This way, the reduction obtained from the ex-ante emissions of the project due to the degradation activities considering the net project emissions estimated by the implementation, as shown in Table 51 Table 51.

Table 51 Reduction of ex-ante emissions of the project due to degradation

Year	ECO2Pt$_x$		EfdegM		MEAdeg		Buffer		REDD+	
	Annuallly	Accum	Annuallly	Accum	Annuallly	Accum	Annuallly	Accum	Annuallly	Accum
2015	3,072	3,072	213	213	100,941	100,941	15,141	15,141	85,800	85,800
2016	3,072	6,144	213	426	100,941	201,882	15,141	30,282	85,800	171,600
2017	3,072	9,216	213	639	100,941	302,823	15,141	45,423	85,800	257,400
2018	3,072	12,288	213	852	100,941	403,764	15,141	60,564	85,800	343,200

Year	ECO2Pt$_x$		EfdegM		MEAdeg		Buffer		REDD+	
	Annuallly	Accum	Annuallly	Accum	Annuallly	Accum	Annuallly	Accum	Annuallly	Accum
2019	3,072	15,360	213	1,065	100,941	504,705	15,141	75,705	85,800	429,000
2020	3,072	18,432	213	1,278	100,941	605,646	15,141	90,846	85,800	514,800
2021	3,072	21,504	213	1,491	100,941	706,587	15,141	105,987	85,800	600,600
2022	3,072	24,576	213	1,704	100,941	807,528	15,141	121,128	85,800	686,400
2023	3,072	27,648	213	1,917	100,941	908,469	15,141	136,269	85,800	772,200
2024	3,072	30,720	213	2,130	100,941	1,009,410	15,141	151,410	85,800	858,000
2025	3,072	33,792	213	2,343	100,941	1,110,351	15,141	166,551	85,800	943,800
2026	3,072	36,864	213	2,556	100,941	1,211,292	15,141	181,692	85,800	1,029,600
2027	3,072	39,936	213	2,769	100,941	1,312,233	15,141	196,833	85,800	1,115,400
2028	3,072	43,008	213	2,982	100,941	1,413,174	15,141	211,974	85,800	1,201,200
2029	3,072	46,080	213	3,195	100,941	1,514,115	15,141	227,115	85,800	1,287,000
2030	3,072	49,152	213	3,408	100,941	1,615,056	15,141	242,256	85,800	1,372,800
2031	3,072	52,224	213	3,621	100,941	1,715,997	15,141	257,397	85,800	1,458,600
2032	3,072	55,296	213	3,834	100,941	1,816,938	15,141	272,538	85,800	1,544,400
2033	3,072	58,368	213	4,047	100,941	1,917,879	15,141	287,679	85,800	1,630,200
2034	3,072	61,440	213	4,260	100,941	2,018820	15,141	302,820	85,800	1,716,000
TOTAL	**61,440**		**4,260**		**2,018,820**		**302,820**		**1,716,000**	

Source: CO2CERO SAS (2021)

In which:

- *ECO2PtX:* CO2e degradation emissions within the project limit for the ex-ante scenario.
- *EfdegM*CO2e deforestation emissions in the leakage belt
- *MEAdeg*Reduction of total CO2e deforestation emissions in the ex-ante scenario.
- *Buffer:* Reserve for risk of non-permanence buffer for the scenario of emissions reduction from ex-ante deforestation.
- *REDD+*Reduction of net CO2e deforestation emissions in the ex-ante scenario.

3.2.2.3. Total Ex-ante Emissions Reduction

Considering the carbon sink deposits selected in the project (Deforestation and Degradation), a total of 7,821,597 tCO_2e is obtained for the project for all the years within the project area (see Table 52) (see *3_Carbono|Carbono_Total_REDDPAZcifico_V2)*.

Table 52 . Reduction of emissions Ex-ante of the project

Year	ECO2Pt$_x$		EfdefM + EfdegM		MEAdef + MEAdeg		Buffer		REDD+	
	Annuall ly	Accum	Annuall ly	Accum	Annuall ly	Accum	Annuall ly	Accum	Annuall ly	Accum
2015	172,185	172,185	34,203	34,203	464,982	464,982	69,747	69,747	395,235	395,235

Year	ECO2Ptx		EfdefM + EfdegM		MEAdef + MEAdeg		Buffer		REDD+	
	Annually	Accum	Annually	Accum	Annually	Accum	Annually	Accum	Annually	Accum
2016	171,954	344,139	34,070	68,273	463,125	928,107	69,468	139,215	393,657	788,892
2017	171,723	515,862	33,937	102,210	461,276	1,389,383	69,191	208,406	392,085	1,180,977
2018	171,493	687,355	33,805	136,015	563,714	1,953,097	84,556	292,962	479,158	1,660,135
2019	171,262	858,617	33,674	169,689	593,966	2,547,063	89,094	382,056	504,872	2,165,007
2020	171,033	1,029,650	33,543	203,232	620,168	3,167,231	93,025	475,081	527,143	2,692,150
2021	170,803	1,200,453	33,412	236,644	641,519	3,808,750	96,227	571,308	545,292	3,237,442
2022	170,574	1,371,027	33,282	269,926	657,505	4,466,255	98,625	669,933	558,880	3,796,322
2023	170,345	1,541,372	33,152	303,078	403,371	4,869,626	60,505	730,438	342,866	4,139,188
2024	170,116	1,711,488	33,023	336,101	401,760	5,271,386	60,263	790,701	341,497	4,480,685
2025	169,888	1,881,376	32,895	368,996	400,155	5,671,541	60,023	850,724	340,132	4,820,817
2026	169,660	2,051,036	32,767	401,763	398,558	6,070,099	59,783	910,507	338,775	5,159,592
2027	169,432	2,220,468	32,639	434,402	396,967	6,467,066	59,544	970,051	337,423	5,497,015
2028	169,205	2,389,673	32,512	466,914	395,383	6,862,449	59,307	1,029,358	336,076	5,833,091
2029	168,978	2,558,651	32,386	499,300	393,806	7,256,255	59,070	1,088,428	334,736	6,167,827
2030	168,751	2,727,402	32,260	531,560	392,236	7,648,491	58,835	1,147,263	333,401	6,501,228
2031	168,525	2,895,927	32,134	563,694	390,672	8,039,163	58,600	1,205,863	332,072	6,833,300
2032	168,298	3,064,225	32,009	595,703	389,116	8,428,279	58,367	1,264,230	330,749	7,164,049
2033	168,073	3,232,298	31,885	627,588	387,564	8,815,843	58,134	1,322,364	329,430	7,493,479
2034	167,847	3,400,145	31,761	659,349	386,021	9,201,864	57,903	1,380,267	328,118	7,821,597
TOTAL	**3,400,145**		**659,349**		**9,201,864**		**1,380,267**		**7,821,597**	

Source: CO2CERO SAS (2021).

In which:

- *ECO2PtX:* CO2e deforestation and degradation emissions for the ex-ante project scenario.
- *EfdegM + EfdegM:* CO2e deforestation and degradation emissions in the leakage belt.
- *MEAdef + MEAdeg:* Reduction of total CO2e deforestation and degradation emissions in the ex-ante scenario.
- *Buffer:* Reserve for risk of non-permanence buffer for the scenario of emissions reduction scenario from deforestation and degradation ex-ante.
- *REDD+*Reduction of total CO2e deforestation and degradation emissions in the ex-ante scenario.

3.2.3 GHG Avoided Emissions During the Monitoring Term

The reduction of emissions generated by the project in the monitoring term was quantified annually during the years of project implementation to date.

3.2.3.1 Deforestation

Forest changes in the project area are obtained by monitoring data year by year and calculating the emissions avoided by deforestation during the project's period. Those records can be consulted in section 5.3.1 of the Monitoring Report (see *12_Monitoring Report| REDD Monitoring Report + PAZcfico_V5)*.

3.2.3.1.1 Deforestation of Mangrove Ecosystem

Mangrove ecosystems have high carbon capture rates due to the large proportion of roots and below-ground biomass reported in these areas. In addition, these ecosystems are more vulnerable to impacts because of their interaction with terrestrial and aquatic environments (Silveira & Hernández, 2017). Similarly, there is a large difference between the carbon stocks that are present in terrestrial soils because there are chemical properties in coastal systems that increase their carbon capture. However, if those properties are not managed properly, they could become a significant source of GHG emissions. Following the idea mentioned above and considering that the project area has 4,241 hectares covered by mangroves in 2021 —corresponding to 1.53% of the total area evaluated, which is vulnerable due to multiple impacts (see 2.14 Deforestation and Degradation Analysis), it is essential to evaluate the project's capacity to reduce the identified emissions.

The biomass quantification of the existing soil in mangrove ecosystems was based on the figures reported by IPPC[3]. It established a value of 471 tC/ha for organic soils covered by mangroves that is widely supported by significant sources, such as Adame et al., (2012); Breithaupt et al., (2012); Chmura *et al.,* (2003); Donato *et al.*, (2011); Kauffman *et al.,* (2011); Osborne *et al.,* (2011); Vegas-Vilarrúbia *et al.,* (2010). The Intergovernmental Panel on Climate Change (IPCC) uses this value to check the soil organic carbon in mangrove ecosystems.

The carbon released by mangrove areas when deforested is total year by year. On the other hand, soil organic carbon in other areas is reported partially because the IPCC (2013) describes that an immediate default value of zero (0) tC/ha is obtained after activities that affect the maintenance of these areas. The layers provided by IDEAM (2017) were used for delimiting the mangrove areas within the project. Hansen et al. Model (2010) and *Hansen et al. Model* (2013) were used for delimiting deforested areas within this reservoir. Based on the values mentioned above and those obtained in the reference area, the expected loss of mangrove coverage was estimated inside the project's area during the verification period, the actual losses were monitored since the project execution, and the deforestation reduced emissions in mangrove ecosystems were quantified. These emissions can be seen in section 5.3.2 of the Monitoring Report (See *12_Reporte de monitoreo|Reporte de Monitoreo REDD+ PAZcífico_V5)*. In the project's area, there are

[3] https://www.ipcc-nggip.iges.or.jp/public/wetlands/pdf/Wetlands_separate_files/WS_Chp4_Coastal_Wetlands.pdf

4,241 hectares of mangrove that represents 1.53% of the total area. On the other hand, the forest has 272,786 hectares, corresponding to 98.47% of the total area. Table 53 and Figure 28 28 and it corresponds to 2021.

Table 53 . Proportion of Forest versus Mangrove in the Project's Area

Geographical Coverage	Area 2021 (ha)	Area (%)
Forest	272,786	98.47%
Mangrove	4,241	1.53%
Total	**277,027**	**100%**

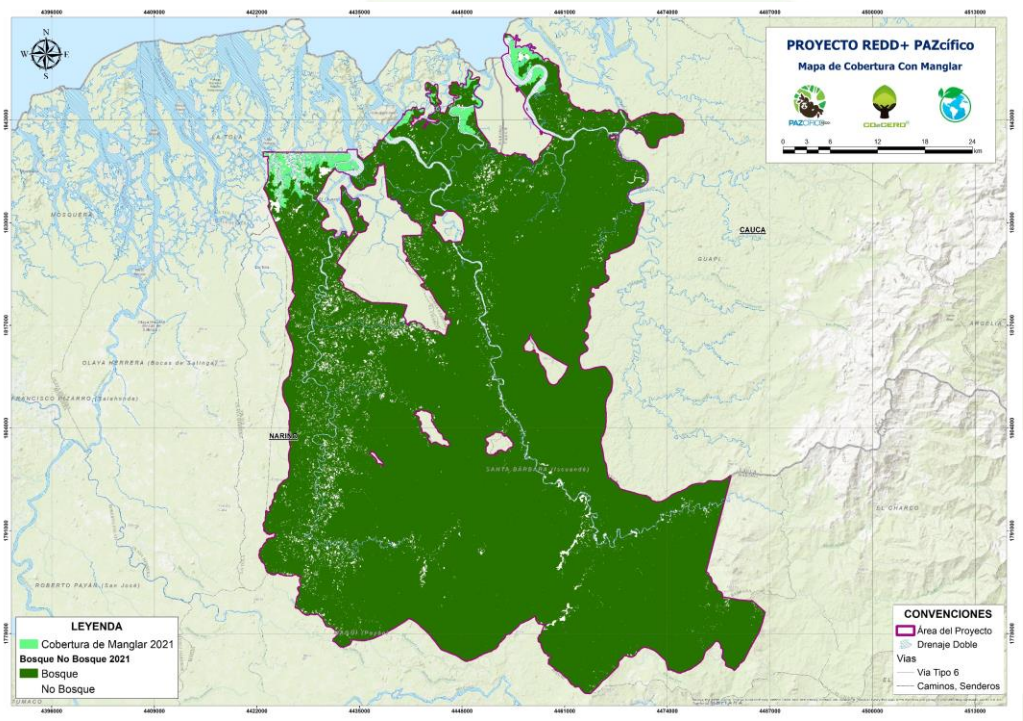


Figure 28 28 . Forest versus Mangrove Map in the Project's area

3.2.3.2 Degradation

The annual decrease because of the project's activities was determined to estimate the reduction of ex-post emissions generated by degradation. This estimation was made by determining the transition zone for each type of degradation that was evaluated for the project's area and Potential Leakage Zone in annual periods during the initiative term. The emission reduction in the Potential Leakage Area occurred when the degraded area was greater than the one outside the project, understanding that there was a real positive increase since the beginning of the initiative where the values were lower. Those values can

be seen in section 5.3.3 of the Monitoring Report (See *12_Reporte de monitoreo|Reporte de Monitoreo REDD+ PAZcífico_V5)*.

In this way, the ex-post emission reduction produced by degradation was obtained considering the annual net emissions generated by the project. Those annual net emissions can be seen in section 5.3.3 of the Monitoring Report (See *12_Reporte de monitoreo|Reporte de Monitoreo REDD+ PAZcífico_V5)*.

3.2.3.3 Total Emission Reduction

Taking into account the carbon sinks chosen in the project (deforestation, deforestation of mangrove ecosystems, and degradation), the total emissions avoided during the implementation term were decreased due to the Non-Permanence Buffer. That total can be seen in section 5.3.3 of the Monitoring Report (See *12_Reporte de monitoreo|Reporte de Monitoreo REDD+ PAZcífico_V5)*.

4. SAFEGUARDS AND CO-BENEFITS

The following chapter describes Cancun's safeguards in accordance with the decisions of the UNFCCC and the co-benefits on the social, environmental, economic, and political context of the community councils. Those co-benefits were seen as positive results generated by the REDD+ PAZcífico Project.

4.1 SAFEGUARDS

Compliance with safeguards is based on processes of community participation and consent under the guidance of Cancun's safeguards identified in decision 1 of COP 16.

4.1.1 Effective Participation

The community participation is crucial in the processes and activities that involve decision-making at the territorial level in order to guarantee transparency, legitimacy, and belongingness during the development of the REDD+ PAZcífico Project. The participation spaces, administration structures, and traceability during the project design are shown below.

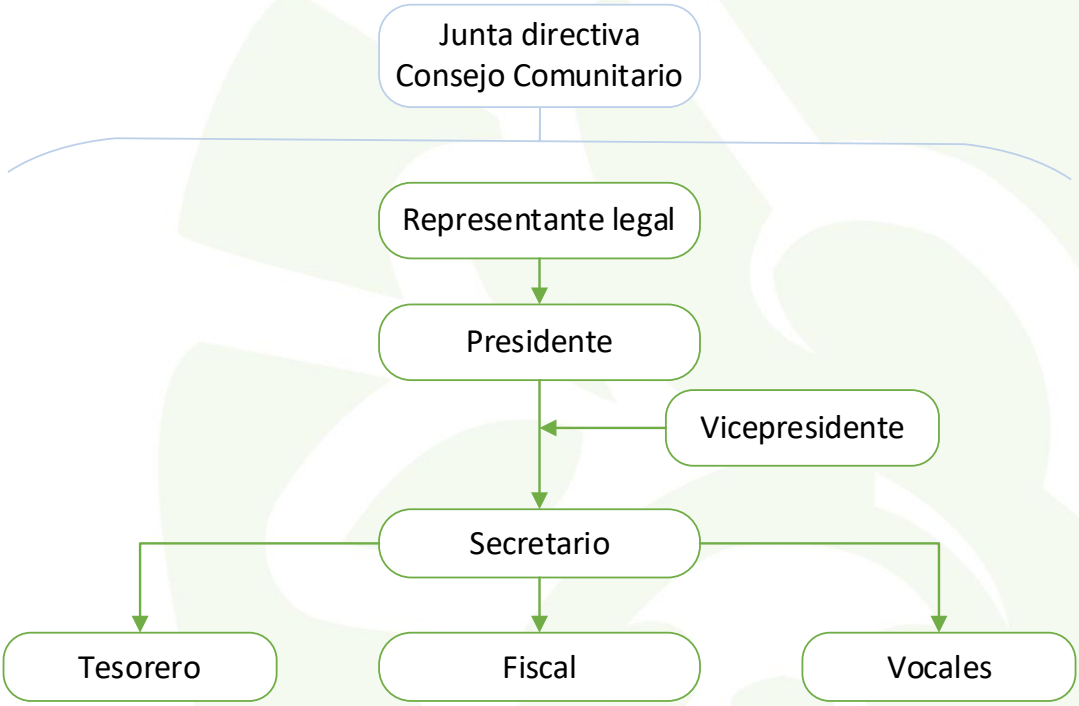


Image23 Administrative Structure of the Community Councils.
Source: Taken from (Moreno & Arboleda, 2016)

The administrative structure of the community councils is established by hierarchical levels, where decisions are approved on each one. The legal representative is at the top as the greater authority for the final decision on the consulted processes. Then, there is the president and her(his) respective vice-presidency, where the decisions come studied and

determined by the chief of staff based on the treasurer, attorney, and members' perceptions. Each role has been chosen in a democratic manner, guaranteeing the participation of the majority of inhabitants.

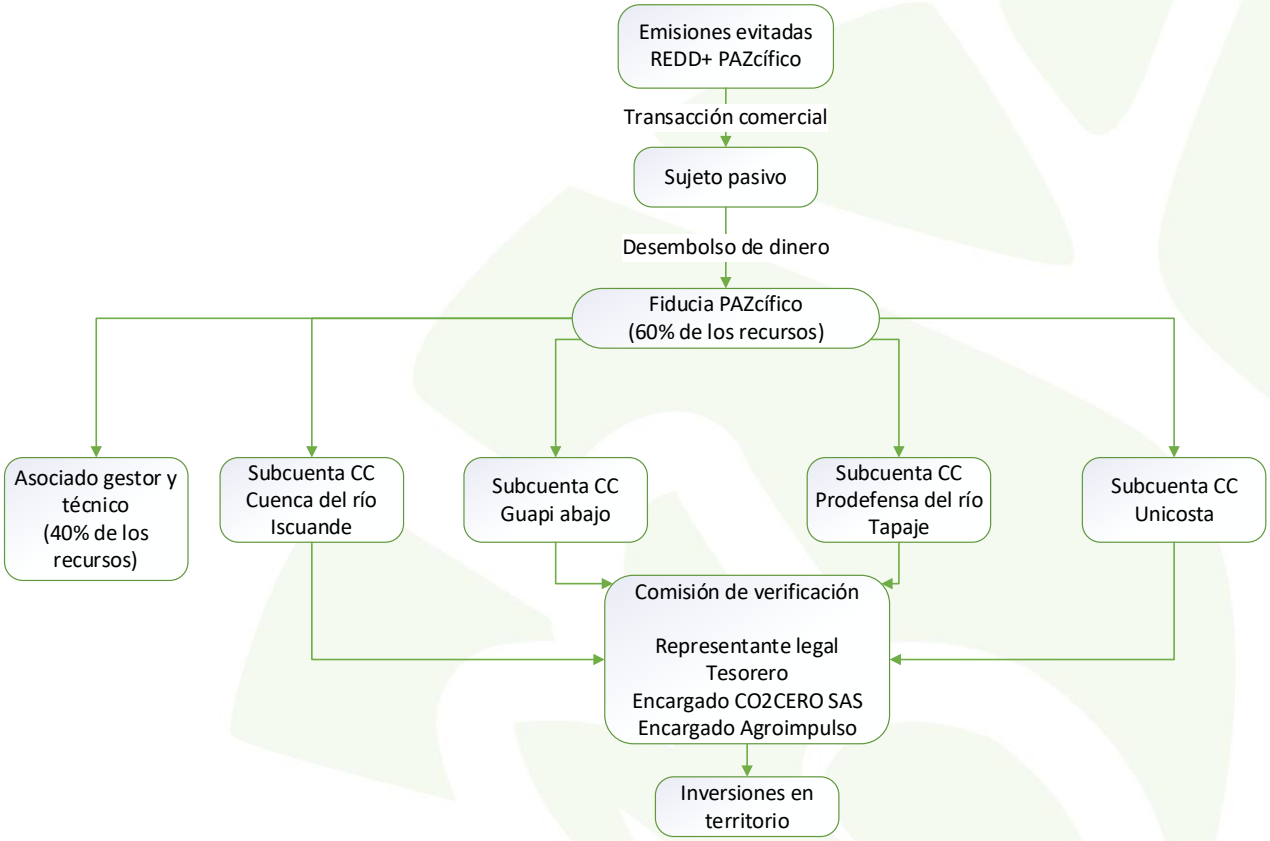


Image24 Monetary resources management in the REDD+ PAZcific project. Source: CO2CERO S.A.S (2021)

Monetary resources management implies a mixed structure, where internal and external actors of the different community councils are involved. They participate in the transactions, made on resources, that were produced by the commercialization of avoided emissions within the community council. The verification commission applies processes for the approval of community's investments. Decisions around the REDD+ initiative were made in person, guaranteeing the greatest participation. The attendance to these spaces can be checked in *11_Anexos|Asistencias*, demonstrating the traceability of the agreement processes.

Fundación Agroimpulso is committed to be the effective means of communication between the external parties involved in the initiative development and the inhabitants. During those discussions, they are able to request spaces for further explanation and accountability at any time and according to their needs. Accountability is mandatory and must be carried out at least once a year.

The elements required in the effective participation process on the certificate program are described in *2_Co beneficios|Distribución de beneficios REDD+ PAZcífico.docx*. Likewise, consents and agreements signed by the community councils within their unanimous decision about participating in REDD+ projects can be seen in *1_Acuerdos|02_Contrato comunidad* and *11_Anexos|Consentimiento REDD.*

4.1.2 AFOLU-specific Safeguards

InTable 5454, Cancun's safeguards determined for the REDD+ PAZcifico project are presented according to decision 1 of COP 16.

Table 5454 REDD+ PAZcifico's Safeguards

Aspect	Cancun's Safeguards	Safeguard Elements	Applicability
Institutional	A. Consistent with the objectives of national forest programs and relevant international conventions and agreements	1. In accordance with the national legislation	• Sustainable Development Goals (SDGs) • Comprehensive Strategy for Deforestation Control • National Adaptation Plan for Climate Change • Convention on Biological Diversity • National Forest Development Plan • National Restoration Plan • Cancun Agreement • Paris Agreement • Resolution 1447 of 2018 • Law 70 of 1993
	B. Transparent and effective national forest governance structures	2. Transparency and access to information	Fundación Agroimpulso, as Managing Partner, will provide all the information obtained during the initiative's structuring and execution phases, as convened during the socialization and agreement stages with community councils. Likewise, CO2CERO S.A.S is authorized to share documents related to the project, co-benefits, and estimates of avoided emissions. Finally, transactions related to avoided GHG emissions will be registered and socialized in later accountability phases, which the initiative owners may request according to their needs.
		3. Accountability	Transactions on avoided GHG emissions estimated on the community council's jurisdiction limits will be socialized by the verification commission (led by Fundación Agroimpulso), using supporting documents and related billing. Additionally, the community councils will demonstrate, through their legal representatives and treasurers, the investments made in their territory in accordance with the project document and the investment lines determined for the initiative. This information is

Aspect	Cancun's Safeguards	Safeguard Elements	Applicability
			open to all members of the community councils, considering their role as owners of the initiative.
		4. Acknowledgement of Forest Governance Structures	Community councils have created spaces for discussion related to natural resources management, considering their impact on economic activities. At the same time, community councils have conducted spatial and state diagnoses of forest cover to consolidate action plans that reduce the adverse effects revealed in its limits and favor territorial forest performance.
		5. Enhancing Capacities	Community councils have capacity-building spaces for conservation, development of mitigation initiatives, and design of production chains. Also, within the project design, coverage monitoring, governance, and sustainable resource management activities are defined and determined in the investment lines of benefit sharing. Regarding forest management, community councils have been trained in collecting dendrometric information and collaborating in the execution of monitoring activities suggested by the REDD+ project.
Social and Cultural	C. Respect for traditional knowledge and rights of the local communities' members.	6. Free, Prior, and Informed Consent (FPIC)	REDD+ project activities involve the community in their different phases. They include initial approaches, socio-environmental diagnoses, awareness of REDD+ activities, agreement on the execution of the REDD+ project, validation and verification of the initiative, and sharing results. Each activity should include the entire population or proof the power of the legal representatives to deliver a concept or make decisions on behalf of the community. Attendance to the activities completed in the community related to the REDD+ project can be found in *11_Anexos*. Additionally, it is possible to identify the commitments made with community councils and the roles assigned for the initiative, such as technical associate and managing partner, in *1_Acuerdos|Acuerdos comunidad* .
		7. Respect for Traditional Knowledge	REDD+ activities have been designed based on traditional economic practices of community councils, considering their cultural value preserved over time. Their species include Achiote, Açaí , Rice, and Coconut. Community knowledge has been applied in monitoring vegetation, providing field support, species identification, and spatial orientation. Additionally, the project structure is

Aspect	Cancun's Safeguards	Safeguard Elements	Applicability
			based on cultural identity and its application to manage strategic ecosystems.
		8. Benefit Sharing	The REDD+ PAZcífico project has established benefit-sharing mechanisms based on agreements with community councils, where the lines of investment, the approximate percentages of allocation, and the community approval are defined. This tool aims to guarantee transparency in the transfer of resources to the communities, showing the effective use of resources in the territory, the optimal territorial investment, and its link with the community's cultural and environmental values. A supervision team evaluates this document to confirm if it meets the requirements to be applied in the territory. The REDD+ PAZcífico project agrees to grant 60% of the net emissions avoided to the community councils. Those emissions are determined in *2_Co beneficios|Distribución de beneficios REDD+ PAZcífico.docx.* and *11_Anexos|Consentimiento REDD.*
		9. Territorial Rights	The project's design considered the internal regulations of each community council to be aligned with their rights, commitments, and responsibilities. In addition, communities were consulted about the agreements derived from the initiative design and implementation, allowing spaces for discussion. Thus, discussions will focus on the territory's characteristics that will be impacted and constitute strategic axes within territorial development.
	D. Full and Effective Participation	10. Participation	All community councils were essential to the initiative's profiling, design, and structuring phases. During these processes, the aim is to guarantee that all social roles, such as young people, older adults, and women, receive information and make related decisions. Similarly, REDD+ activities were designed holistically so that all social roles could participate. Attendance to the activities completed in the community related to the REDD+ project can be found in *11_Anexos*.
Environmental and Territorial	E. Conservation and Benefits	11. Forests and Biodiversity Conservation	The project's design includes a social, environmental, and economic diagnosis to identify the benefits obtained from ecosystem management and the rational use of resources. Identifying a correlation between the forest and the territorial performance in all its dimensions guides project

Aspect	Cancun's Safeguards	Safeguard Elements	Applicability
			activities toward conservation and increasing existing carbon reservoirs through the implementation of direct and indirect actions. For example, community forest management and sustainable agricultural production. Similarly, species identification is carried out based on the communities' knowledge applied at a territorial level during the vegetation monitoring phases. The purpose is to identify the natural wealth in the forested masses of the Pacific.
		12. Provision of Goods and Environmental Services	The diagnostic activities and the continuous implementation of community development actions show a correlation between community councils and natural resources within their jurisdiction. At the same time, negative impacts caused by internal and external actors' resource misuse over time are identified. These findings require outlining actions for natural resources conservation, management, and regulation to reflect an optimal performance of supply, regulation, and support services. Some communities have found an opportunity for development in ecosystem services, which is the basis for designing REDD+ activities related to water resource management, sustainable production of fruits, and improvement of fauna habitats through forest conservation.
	F. Addressing Reversion Risks	13. Environmental and Territorial Planning	REDD+ PAZcific project includes remote and on-site analysis to identify potential areas for the development of sustainable, productive activities, vulnerable areas that require restoration and reforestation, and suitable areas that can be preserve, surveillance, and control. In addition, the analysis of deforestation dynamics allows identifying points causing adverse effects on the territory that generate social conflicts and underlying environmental problems. Finally, the initiative confirms the territorial limits to recognize and appropriate them. The responsibility that involves owning natural resources within their jurisdiction allows the design of strategies for surveillance, control, and defense.
		14. Sector Planning	Analyzing normative, administrative, and socioeconomic contexts allows the development of activities aligned to the needs of different frames of reference. It also allows different perspectives on the territory to frame a common goal and cross-

Aspect	Cancun's Safeguards	Safeguard Elements	Applicability
			cutting objectives involving compliance impacting at a local, regional, and national scale. Besides, the project aims to propose internal governance schemes that strengthen belongingness and the defense of territorial rights in different political and administrative scenarios.
	G. Avoid Emission Displacement	15. Forest Control and Surveillance to Avoid Emission Displacement	The spatial analysis of the REDD+ PAZcífico project has identified project limits, leakage zones, and mobility regions of deforestation factors. Based on those findings, routes of management, control, and surveillance of deforestation actions, as well as a monitoring economic activity that impact ecosystems and strategic areas of the territory, can be proposed. Legal representatives of the community councils have identified the actors that generate emissions from deforestation and degradation within their territory. These findings have facilitated spaces for conflict resolution, territorial defense processes, and awareness about the impacts of this type of actions. Finally, REDD+ project aims to redirect the execution of some activities that cannot be removed because they integrate the communities' culture, although they have caused deforestation and degradation. Therefore, it seeks alternatives of greater productivity, the concentration of agricultural lands for better care, and market alternatives that do not impact current activities and lead to a replacement process.

Source: CO2CERO S.A.S. (2021).

4.2 CO-BENEFITS

According to the certificate program, co-benefits are the results of the REDD+ PAZcífico activities implementation that positively influence social, environmental, economic, or political contexts. Co-benefits are shown in line with the REDD+ activities in *2_Co beneficios|Monitoreo_CobeneficiosPAZcífico.xlsx.* There, the expected co-benefits, their indicator, and the frequency of measuring are evidenced. Co-benefits can also be outlined based on the specific context in which they are developed. REDD+ activities seek to cover multiple co-benefits for the community and the additional beneficiaries to identify the value of the actions carried out. The description of the co-benefit identified groups is shown in the following image.

Investment line / Co-benefits	Sustainable Production Chains	Enhancing Capacities	Ecosystem Conservation	Improvement of Ecosystem Services	Equity and Inclusion	Governance and Governability
Reforestation and Restoration	x	x	x	x		
Vegetation Diagnosis		x	x	x		x
Sustainable Production	x	x	x	x	x	
Productive Strengthening	x	x			x	x
Enhancing Environmental Capacities		x	x	x	x	x
Governance		x			x	x
Transparency and Citizen Participation		x			x	x

Image 25. 25 Influence of the REDD+ PAZcífico 's Investment Lines on the Co-benefit Identified Groups. Source: CO2CERO S.A.S (2021)

4.2.1 Sustainable Production Chains

Food security is a fundamental axis on the healthy development of rural communities and the continuous provision of food and final goods that are an essential part of well-being and survival. The maximization of productive benefits could be achieved if the degradation and deforestation effects on the areas of family production are reduced. Therefore, it is vital to combine community, technical, and financial efforts to achieve an effective restoration and ensure the activity's viability, guaranteeing positive results for the future(Durrel, 2018).

The community identified an alternative to reduce the forest degradation, without affecting its economic activities: to design and improve production chains with market's common products as intervention of new products based on coconut, açaí, rice, and vanilla. Community councils have worked on action and resources management to design sustainable production chains suitable to internal needs. During this process, potential opportunities should be identified for marketing, export, and product quality improvement.

Image 26. 26 Sustainable Production Chains Developed within the REDD+ PAZcífico Project. Source: Fundación Agroimpulso (2021).

4.2.2 Enhancing Capacities

This co-benefit seeks to improve technical capacity and strengthen participation mechanisms in order to guide its objectives to the achievement of natural ecosystem's conservation, preservation, and restoration. This purpose favors the implementation of activities to reduce deforestation and forest degradation (REDD). The aim of those actions is to generate technical information for implementing conservation and REDD+ activities, demonstrate the

importance of strengthening internal governance structures and empowering the actors involved in the administration of natural resources, coordinate spaces for discussions about the community's environmental development activities, and improve decision-making on sustainable development strategies within the territory(PNUD, 2021). The PAZcífico REDD+ project suggests spaces for enhancing capacities in three strategic axes: information gathering in the forest cover monitoring, leadership, and good governance and environmental conservation practices. Contents are taught to everybody in the community, taking into account the importance of including women, young people, and older adults in the transmission of information related to REDD+ initiatives and sustainable development. This involvement is essential due to the different roles' experience and perspective within the community and the impact generated by active participation.

Image 27. 27 Spaces for Enhancing Capacity in Community Councils. Source: Fundación Agroimpulso (2021).

4.2.3 Ecosystem Conservation

The REDD+ PAZcífico project's region has ecological characteristics of Choco's biogeography, the Pacific's piedemonte costero, the Andes, and the Amazon's upper foothills. This strategic location has cultural and biological wealth(Montenegro, Delgado, Pantoja, Calderon, & Noguera, 2019).

Due to these ecosystem characteristics, it is crucial to contribute to the conservation and preservation of flora and fauna significant species. Also, it is necessary to increase the area

of natural coverage, favoring connectivity and mobilization of biological resources. The conservation and increase of carbon reservoirs within its area of influence through restoration and reforestation of degraded forest and mangrove systems is one of the REDD+ PAZcífico project's initiatives. Besides, the project also proposes the establishment of a tree nursery with native species suitable to local conditions and spatial diagnosis for reforestation and restoration. Its purpose is to guarantee effective action implementations with additional results at social, economic, and environmental levels.

4.2.4 Improvement of Ecosystem Services

The implementation of restoration and reforestation activities is an efficient alternative to improve goods, services, and ecological processes provided by forests. Ecosystem services are classified in provision, support, regulation, and cultural. They are widely applied in rural contexts, where natural resources are varied according to the territory's dynamics. Forest resources are a good example: They provide wood and fruits for self-consumption and commercialization. These resources also support ecosystem processes, landscaping, and regulate other resources, such as water and air (Durrel, 2018).

In order to extend the relationship between the community and natural resources, suitable alternatives are designed to favor the community's economic and ecological performance in —for example— the sustainable production of products for commercialization, training on conservation and management of natural resources, increase of carbon reservoirs, and protection of strategic ecosystems. Community councils recognize their dependence on natural resources and how their economic and cultural dynamics are based on obtaining different materials and services from them. After an adequate management, people can get some benefits, such as water resources, water flows, fruits, and the preservation of habitat for species like the mangrove cockle (which has a high commercial value).

Image 28. 28 Ecosystem Service Improvement Activities. Source: Fundación Agroimpulso (2021).

4.2.5 Equity and Inclusion

The effects on natural ecosystems come from multiple and underlying causes that should be considered in different communities, inadequate practices, the development of other economic alternatives, conservation areas, population growth, and social organization. (Ayala, Gutierrez, & Zapata, 2016) It is possible to obtain that information by perceiving all perspectives in the territory through the inclusion of minorities.

Processes of deforestation, forest degradation, conservation, and sustainable management have involved minorities —such as women, youth, and older adults— in the execution of REDD+ initiatives. Their participation is essential because the diagnosis requires the experience of all the community's roles. The REDD+ PAZcífico project has involved the entire community in activity and REDD+ benefit sharing, consultation, and monitoring.

Image 29. 29 Focus Groups Involved in the REDD+ Project Implementation. Source: Fundación Agroimpulso (2021).

Each role's perspective allows to consolidate objectives based on lines of action that recognize equality according to all territorial needs. Likewise, all parties' commitment in the activity execution for reducing deforestation and degradation is obtained if the whole community is willing to contribute. The activities carried out in the project avoid discrimination and inequality because this behavior leads to detrimental and distrustful scenarios.

4.2.6 Governance and Governability

Governance and governability delimit REDD+ projects within the political approaches and positive incentives for reducing emissions from deforestation and degradation (Petkova, Larson, & Pacheco, 2011). Therefore, it is necessary to strengthen those groups responsible for leading the management of natural resources. The strategy's design for preserving and protecting natural resources is based on the need to avoid the damaging use of land for the community's well-being. For example, stockbreeding, mining, extensive agriculture, and large-scale infrastructure. However, an adequate, political, and governance position is required to intervene these protected areas and establish tools, such as dialogue, autonomy, and deliberation. Also, it is essential to implement actions, recognizing the importance of keeping the territory intact and including minority groups.

Image 30. 30 Discussion Spaces and Local Governance. Source: Fundación Agroimpulso (2021).

Community councils are willing to establish authority figures and government in their territories with the purpose of validating their traditions and institutions before external, public, or private actors that intervene positively or negatively the territory. Therefore, the project has stablished some processes to strengthen leadership capacities and good governance practices, and raise awareness and consistency of territorial rights on community councils.

4.2.7. Sustainable Development Goals (SDGs)

The Sustainable Development Goals are global objectives to eradicate poverty, protect the planet, and ensure humanity's well-being in10 years and demonstrate tangible results in 2030. Sustainability is fundamental for implementing actions that are suitable in the three pillars of these objectives. Besides, it proposes equity in social, environmental, and economic contexts based on the identification of community needs. The REDD+ PAZcífico initiative is proposed as an alternative to the national context, rural communities' needs, and the

compliance with some of the SDGs. Also, its foundation is to achieve conservation, community development, and belongingness.

The activities designed for the REDD+ PAZcifico Project contribute to the achievement of some sustainable development goals, guaranteeing the local and national population's quality and permanence. These goals complement social, environmental, and economic co-benefits (vee *4.2 CO-BENEFITS* and folder *2_Co beneficios*). According to the project's land use, contributions comply with 6 of the 15 objectives agreed by the UN. The objectives of Table 55.55 are related to the REDD+ activities established for this project. They are linked to forest conservation and preservation actions that are shown in sections 4.2.1 and 4.2.7, sustainable production chains, and enhancing capacities. Those actions generate social, economic, and environmental benefits of greater community impact.

Table 55.55 SDGs Applied in REDD+ Activities.

SDG 1 No Poverty: The productive projects seek to satisfy the internal demand for work, access to income, and replacement of ineffective traditional activities. Also, management alternatives are proposed to generate new spaces for socioeconomic development.
Activity 2.1 Design of Sustainable Production Chains Activity 2.2 Sustainable Management of Productive Activities that Generate Forest Degradation Activity 3.4 Investment Management in the Co-financing Fund for Conservation Projects and Community Councils' Sustainable Production
SDG 2 Zero Hunger: The REDD+ PAZcífico project has designed sustainable production chains with common products in the communities and chains that maximize work benefits, giving access to the purchase of food. Additionally, this project proposes an alternative for managing financial resources to promote entrepreneurship with local products and sustainable agricultural activities.
Activity 2.1 Design of Sustainable Production Chains Activity 2.2 Sustainable Management of Productive Activities that Generate Forest Degradation
SDG 5 Gender Equality: Activities consider women's manifestation as a contribution to the communities' social and economic development. The processes carried out seek women's involvement in different roles, confirming their participation at multiple scales. Both men and women are involved in the training processes, strengthening their capacities equally.
Activity 3.1 Training on Vegetation Monitoring Activity 3.2 Training on Conservation and Sustainable Management of Natural Resources Activity 3.3 Training on Best Practices in Governance and Leadership Activity 3.4 Investment Management in the Co-financing Fund for Conservation Projects and Community Councils' Sustainable Production Activity 3.5 Creation of Socio-environmental and Financial Control and Surveillance Initiatives
SDG 6 Clean Water and Sanitation: The project has created some production chains based on the drinking water needs in different community councils. It has identified some possibilities of getting this service by studying the community's water sources and the populations near to them. Also, this project seeks to generate employment and centralize water availability in the territory.
Activity 2.1 Design of Sustainable Production Chains
SDG 8 Decent Work and Economic Growth: All activities aim to address employment, equity, and benefits, creating a vision of development to the community. Sustainable production chains

and existing economic activities aim to improve through the evaluation of their productivity, processes, and goals achieved.
Activity 1.3 Restoration of Areas with Coverage Degradation Actions
Activity 2.1 Design of Sustainable Production Chains
Activity 2.1 Design of Sustainable Production Chains
Activity 2.2 Sustainable Management of Productive Activities that Generate Forest Degradation
SDG 13 Climate Action: This project establishes processes of increase, conservation, and improvement of existing carbon reservoirs. This action favors carbon capture, microclimate and habitat generation for sensitive species, and the mitigation of adverse effects or natural phenomena associated with tides and wetlands.
Activity 1.2 Reforestation of Areas Without Vegetation
Activity 1.3 Restoration of Areas with Coverage Degradation Actions
Activity 1.4 Spatial Diagnosis for Reforestation and Restoration
Activity 3.1 Training on Vegetation Monitoring
Activity 3.2 Training on Conservation and Sustainable Management of Natural Resources
SDG 15 Life on Land: This project encourage the establishment of important, threatened, and endangered species in the territory. Likewise, it verifies the ecosystems required to guarantee the permanence of those species.
Activity 1.1 Establishment of a Tree Nursery for Native Species
Activity 1.2 Reforestation of Areas Without Vegetation
Activity 1.3 Restoration of Areas with Coverage Degradation Actions
Activity 1.4 Spatial Diagnosis for Reforestation and Restoration
Activity 1.5 Forest Cover Monitoring
Activity 2.2 Sustainable Management of Productive Activities that Generate Forest Degradation
Activity 3.2 Training on Conservation and Sustainable Management of Natural Resources

Source: CO2CERO S.A.S (2021)

2_Co beneficios/ Herramienta_CERCARBONO_Reporte_ODS_PAZcifico presents the sustainable development goal, SDG indicator, target of the indicator, type of activity, PMCC's contribution, evidence, and causal link.

5. APPROXIMATE COSTS

The costs associated with REDD+ activities are determined by the investment percentages defined in the benefit sharing acquired from the sale price of GHG emission avoidance. Those profits will be allocated proportionally to each community council. The community council will make investment decisions according to the strategic lines proposed, such as reforestation, restoration, sustainable production, training, enhancing capacities, and the territory's governance and sovereignty. It is important to clarify that these lines are based on socioeconomic diagnosis and primary information from the beneficiary population.

Table 56. 56 Approximate Investment for REDD+ Activities

Activity	% Aggregate Investment	Approximate Investment (COP)
Activity 1.1 Establishment of a Tree Nursery for Native Species	80%	$ 261,075,000
Activity 1.2 Reforestation of Areas Without Vegetation		$ 1,695,048,790
Activity 1.3 Restoration of Areas with Coverage Degradation Actions		$ 1,864,588,350
Activity 1.4 Spatial Diagnosis for Reforestation and Restoration		$ 94,000,000
Activity 1.5 Forest Cover Monitoring		$ 228,055,200
Activity 2.1 Design of Sustainable Production Chains		$ 3,842,530,904
Activity 2.2 Sustainable Management of Productive Activities that Generate Forest Degradation		$ 10,159,569,931
Activity 2.3 Equipment Improvement to Develop Community Work and Activities		$ 101,149,000
Activity 3.1 Training on Vegetation Monitoring	20%	$ 116,600,000
Activity 3.2 Training on Conservation and Sustainable Management of Natural Resources		$ 120,000,000
Activity 3.3 Training on Best Practices in Governance and Leadership		$ 311,750,000
Activity 3.4 Investment Management in the Co-financing Fund for Conservation Projects and Community Councils' Sustainable Production	20%	$ 66,200,000
Activity 3.5 Creation of Socio-environmental and Financial Control and Surveillance Initiatives		$ 79,600,000
Total	**100%**	**$ 18,940,167,175**

Source: CO2CERO S.A.S (2021) and Fundación Agroimpulso (2021).

According to the decisions made by the community councils, it was defined that activities related to training, enhancing capacities, and the territory's governance and sovereignty will

have an investment of approximately 20%, while reforestation, restoration, and sustainable production require an investment of 80%. The prices assigned in this document can vary and depend on the input, resources, and materials dynamics. In all cases, these investments will be verified by an internal commission to ensure the effective investment on the defined activities. When the investment is less than the budget, the verification commission will review the reinvestment in another strategy or it will save the money for investments that cannot be made immediately and should be done gradually. *11_Anexos\Anexo Proyección de Costos actividades REDD+.xlsx* presents the cash flow of REDD+ activities over the project's vision (20 years). It identifies a total investment of $ **48,442,784,091** distributed in thirteen (13) REDD+ activities, which are executed gradually and according to the community councils' needs. It is important to clarify that income distribution will be made based on the balance sheets of the previous period, considering that not all the money is projected to be invested immediately. When there is a positive balance, the positive amount is saved for the project's management and unforeseen events. The REDD+ project will have a positive Net Present Value of **COP 3,118,347,433 with an Opportunity Interest Rate of 10%.** This result shows that the revenue received from the sale of carbon offsets is sufficient for the execution of the activities proposed and it boosts initiatives that seek the community councils' development.

6. MONITORING

The following chapter presents the elements and parameters that should be monitor in the REDD+ PAZcfico project. Find more information in *12_Reporte of monitoreo ReporteMonitoreo-REDDPAZcifico_CERCARBONO.xlsx*

6.1 Data and Parameters Available in Validation

The subchapter presents the variables related to the initiative's validation process, taking into account that its execution timeline is 20 years. These parameters evaluate the project's generality related to deforestation: monitoring deforestation and degradation actions in the forest cover. All parameters will be gathered in the audit folders according to the certifications provided. Thus, it will manage information and data preservation.

6.1.1 General Parameters

Data/Parameter	Forest Map – No Forest on the reference region and leakage zones 2005 - 2015
Unit of Measurement	Hectares
Description	Forest location map at the beginning of the reference period in the reference area and leakage zones.
Source of the Information	IDEAM from Landsat images, Hansen *et al.* (2010), Hansen *et al.* (2013)
Reason to Choose Information or Description of the Procedures Applied	Geoprocessing performed on official country information published by IDEAM
Information Purpose	To determine the forest cover within the reference area and the potential leakage zones.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Comments	-

Data/Parameter	Forest Map – – No Forest on the project's area and potential leakage areas 2015 - 2021
Unit of Measurement	Hectares
Description	Forest location map at the beginning of the monitoring period in the project's area and potential leakage areas.
Source of the Information	IDEAM from Landsat images, Hansen et al.(2010), Hansen et al. (2013)
Reason to Choose Information or Description of the Procedures Applied	Geoprocessing performed on official country information published by IDEAM

Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine the forest cover within the reference area and the potential leakage zones.
Comments	-

Data/Parameter	Carbon Fraction
Unit of Measurement	%
Description	Default value for carbon fraction in biomass
Source of the Information	Literature (IPCC 2003. Good practice guidance for land use, land-use change and forestry)
Applied Value	0.47
Reason to Choose Information or Description of the Procedures Applied	Default Values from Globally Accepted Literature
Monitoring Frequency	Permanently. Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	A constant used for the calculation of equivalent carbon content (tCO_2e)
Comments	If more recent and suitable information becomes available, it will be used in a subsequent baseline period.

Data/Parameter	Molecular Ratio C/CO_2
Unit of Measurement	Dimensionless quantity
Description	Default value for carbon fraction in biomass
Source of the Information	Literature (IPCC 2006. Guidelines for National Greenhouse Gas Inventories Volume 4, AFOLU)
Applied Value	44/12
Reason to Choose Information or Description of the Procedures Applied	Default Values from Globally Accepted Literature
Monitoring Frequency	Permanently. Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	A constant used for the calculation of equivalent carbon content (tCO_2e)
Comments	IPCC standard value

Data/Parameter	$Mmdef_f$ $Mmdeg_i$
Unit of Measurement	tC/ha

Description	Baseline scenario of snags and detritus in degradation and deforestation for monitoring.
Source of the Information	Literature (IPCC 2006. Guidelines for National Greenhouse Gas Inventories Volume 4, AFOLU)
Applied Value	2%
Reason to Choose Information or Description of the Procedures Applied	Values from globally accepted literature for life zones.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To quantify the carbon stored in each reservoir for determining the emissions avoided by the project.
Comments	IPCC standard value

Data/Parameter	$Cosdef_f$ $Cosdeg_i$
Unit of Measurement	Dimensionless quantity
Description	Baseline scenario of soil organic carbon in degradation and deforestation for monitoring.
Source of the Information	Literature (IDEAM & MINAMBIENTE, 2019. Propuesta de Referencia de las emisiones por deforestación en Colombia para pago por resultados de REDD+ bajo la CMNUCC)
Applied Value	92 tC/ha
Reason to Choose Information or Description of the Procedures Applied	Values from nationally accepted literature inventoried in the field.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To quantify the carbon stored in each reservoir for determining the emissions avoided by the project.
Comments	Value for pacific biome

6.1.2 Deforestation

Data/Parameter	$TFD = \left(\frac{1}{X_2 - X_1} \times Ln\frac{A_2}{A_1}\right) \times 100$
Unit of Measurement	Hectares
Description	Puyravaud formula (2003) to calculate the deforestation rate in the baseline.
Source of the Information	Result of formula usage with the Project's historical deforestation data.

Reason to Choose Information or Description of the Procedures Applied	Results of the analysis of section 7.10.1 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine the deforestation rate in the project's baseline scenario.
Comments	-

Data/Parameter	$AdefLB_{t,h}$
Unit of Measurement	Hectares
Description	Baseline scenario of annual deforested area and potential leakage areas.
Source of the Information	Geoprocessing based on the model of Hansen *et al.* (2010), Hansen *et al.* (2013)
Reason to Choose Information or Description of the Procedures Applied	Results of the analysis of section 7.10.1 in metodología M/UT-REDD+01 CERCARBONO.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine the project's baseline scenario.
Comments	-

Data/Parameter	$FEBsdef_f$
Unit of Measurement	tCO_2and
Description	Emission factor of below-ground biomass.
Source of the Information	Land lots established in the project area with processed information according to MINAMBIENTE & IDEAM, 2019 .
Reason to Choose Information or Description of the Procedures Applied	Determination of section 7.10.1 in metodología M/UT-REDD+01 CERCARBONO.
Monitoring Frequency	Permanently. Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine emissions in the baseline scenario and during the monitoring period.
Comments	-

Data/Parameter	$FECosdef_f$
Unit of Measurement	tCO_2and
Description	Organic carbon emission factor in the project area.

Source of the Information	Literature (IDEAM & MINAMBIENTE, 2019. Propuesta de Referencia de las emisiones por deforestación en Colombia para pago por resultados de REDD+ bajo la CMNUCC)
Reason to Choose Information or Description of the Procedures Applied	Values from nationally accepted literature inventoried in the field.
Monitoring Frequency	Permanently. Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	A constant used for the calculation of equivalent carbon content (tCO_2e)
Comments	Value for pacific biome

Data/Parameter	$ECO2defLB_{t,f}$
Unit of Measurement	$tCO_2$and
Description	Annual emission caused by deforestation in the scenario without any project.
Source of the Information	Processing of spatial information and emission factor.
Reason to Choose Information or Description of the Procedures Applied	Results of the analysis of section 7.10.1 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine the project's baseline
Comments	-

Data/Parameter	$ECO2defP_{t,g}$
Unit of Measurement	tCO_2e
Description	Annual emissions caused by avoided deforestation in the project's scenario (ex-ante).
Source of the Information	Processing of spatial information and emission factor.
Reason to Choose Information or Description of the Procedures Applied	Results of the analysis of section 8.9.1 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine the project's baseline
Comments	-

Data/Parameter	$ECO2defLB_{cf,t}$

Unit of Measurement	tCO_2e
Description	Annual emission of deforestation in the baseline scenario and potential leakage areas.
Source of the Information	Processing of spatial information and emission factor.
Reason to Choose Information or Description of the Procedures Applied	Results of the analysis of section 8.10.1in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine the project's baseline
Comments	-

Data/Parameter	$MTdef$
Unit of Measurement	tCO_2e
Description	Emissions from avoided deforestation due to project implementation.
Source of the Information	Processing of spatial information and emission factor.
Reason to Choose Information or Description of the Procedures Applied	Results of the analysis of section 7.10.1, 8.9.1 y 8.10 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To identify emissions reduced by avoided deforestation in the project area.
Comments	-

6.1.3 Degradation

Data/Parameter	$AdegLB_{dp}$ $AdegLB_{ds}$ $AdegLBF_{dp}$ $AdegLBF_{dp}$
Unit of Measurement	Hectares
Description	Area annually degraded in a primary and secondary manner in the reference region and potential leakage areas.
Source of the Information	Spatial information geoprocessing with *Landscape Fragmentation Tool* from Hansen *et al.* (2010), Hansen *et al.* (2013)
Reason to Choose Information or Description of the Procedures Applied	Results of the analysis of section 7.10.2 in M/UT-REDD+01 CERCARBONO methodology.

Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine the project's baseline
Comments	-

Data/Parameter	$FEdeg_{dp}$ $FEdeg_{ds}$
Unit of Measurement	tCO_2e
Description	Emission factor of above-ground biomass and snags for primary and secondary degradation area.
Source of the Information	Land lots established in the project area with processed information according to Armenteras *et al.* (2016).
Reason to Choose Information or Description of the Procedures Applied	Result of reduction ranges interpretation of the biomass in degradation and the analysis of section 7.10.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Permanently. Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine emissions in the baseline scenario and during the monitoring period.
Comments	-

Data/Parameter	$FEBsdeg_{dp}$ $FEBsdeg_{ds}$
Unit of Measurement	tCO_2e
Description	Emission factor of below-ground biomass for primary and secondary degradation area.
Source of the Information	Land lots established in the project area with processed information according to Ramirez*et al.* (2018) & Armenteras *et al.* (2016).
Reason to Choose Information or Description of the Procedures Applied	Result of reduction ranges interpretation of the biomass in degradation and the analysis of section 7.10.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Permanently. Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine emissions in the baseline scenario and during the monitoring period.
Comments	-

Data/Parameter	$FECosdeg_{dp}$ $FECosdeg_{ds}$
Unit of Measurement	tCO_2e
Description	Organic carbon emission factor for the primary and secondary degradation area.
Source of the Information	Literature (IDEAM & MINAMBIENTE, 2019. Propuesta de Referencia de las emisiones por deforestación en Colombia para pago por resultados de REDD+ bajo la CMNUCC)
Reason to Choose Information or Description of the Procedures Applied	Values from nationally accepted literature inventoried in the field.
Monitoring Frequency	Permanently. Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	A constant used for the calculation of equivalent carbon content (tCO_2e)
Comments	Value for pacific biome

Data/Parameter	$ECO2degLB$
Unit of Measurement	tCO_2e
Description	Annual emission caused by degradation in the scenario without any project.
Source of the Information	Processing of spatial information and emission factor.
Reason to Choose Information or Description of the Procedures Applied	Results of the analysis of section 7.10.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine the project's baseline.
Comments	-

Data/Parameter	$ECO2degP$
Unit of Measurement	tCO_2e
Description	Annual emissions of degradation in the project scenario, (ex-ante)
Source of the Information	Processing of spatial information and emission factor.
Reason to Choose Information or Description of the Procedures Applied	Results of the analysis of section 8.9.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.

Information Purpose	To determine the project's baseline.
Comments	-

Data/Parameter	$ECO2degLB,F$
Unit of Measurement	tCO_2e
Description	Annual emission of deforestation in the baseline scenario and potential leakage areas.
Source of the Information	Processing of spatial information and emission factor.
Reason to Choose Information or Description of the Procedures Applied	Results of the analysis of section 8.10.1in M/UT-REDD+01 CERCARBONO metholodogy.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine the project's baseline.
Comments	-

Data/Parameter	$MTdeg$
Unit of Measurement	tCO_2e
Description	Emissions caused by avoided degradation due to the project implementation in the ex-post scenario.
Source of the Information	Processing of spatial information and emission factor.
Reason to Choose Information or Description of the Procedures Applied	Results of the analysis of section 7.10.2, 8.9.2 and 8.10 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To identify the project's actual emissions from the start date.
Comments	-

6.2 Monitored data and parameters

6.2.1 General Parameters

Data/Parameter	Deforested and degraded area. Period: 2015-2021
Unit of Measurement	Hectares
Description	The project's total area based on the geographic information systems (GIS).
Source of the Information	Forest boundary review in the project area, vehicle tours, and cover inspection stations.

Monitoring Methods	Global Positioning System (GPS)
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Monitoring Frequency	At the beginning of the project's sharing, during follow-up visits, validation and each verification.
Information Purpose	To monitor project boundaries.

6.2.2 Deforestation

Data/Parameter	Emission Factor
Unit of Measurement	tCO_2e
Description	Emission factor of the project area.
Source of the Information	Land lots established in the project area.
Monitoring Methods	Result of the National RLs's methodological reconstruction using local data.
Monitoring Frequency	Permanently. Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine emissions in the baseline scenario and during the monitoring period.
Comments	-

Data/Parameter	$AdefP_{t,g}$ $AdefLB_{t,f}$
Unit of Measurement	Hectares
Description	Area annually deforested in the baseline scenario, reference region, and potential leakage areas.
Source of the Information	Spatial information geoprocessing based on Hansen et al.(2010), Hansen et al. (2013)
Monitoring Methods	Results of the analysis of section 10.5.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine the project's baseline scenario.
Comments	-

Data/Parameter	$EfdefM_t$
Unit of Measurement	tCO_2e
Description	Annual emission in the potential leakage areas during the monitoring period.

Source of the Information	Processing of spatial information and emission factor.
Monitoring Methods	Results of the analysis of section 10.5.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To identify the project's actual emissions caused by deforestation from the start date.
Comments	-

Data/Parameter	$ECO2defE_{TX}$
Unit of Measurement	tCO_2e
Description	Annual emission caused by deforestation in the project's scenario.
Source of the Information	Processing of spatial information and emission factor.
Monitoring Methods	Results of the analysis of section 10.5.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To identify the project's actual emissions from the start date.
Comments	-

Data/Parameter	$MTdef$
Unit of Measurement	tCO_2e
Description	Emissions from avoided deforestation due to project implementation.
Source of the Information	Results of the analysis of section 10.5.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Methods	Results of the analysis of section 10.5.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To identify the project's effective mitigations from the start date.
Comments	-

6.2.3 Degradation

Data/Parameter	$AdegE_{dp}$ $AdegE_{ds}$ $AdegEF_{dp}$

	$AdegEF_{dp}$
Unit of Measurement	Hectares
Description	Area annually degraded in a primary and secondary manner in the project area and potential leakage areas (ex-post).
Source of the Information	Spatial information geoprocessing with *Landscape Fragmentation Tool* based on Hansen *et al.*(2010), Hansen *et al.* (2013)
Monitoring Methods	Results of the analysis of section 10.5.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To determine the project's monitored scenario.
Comments	-

Data/Parameter	$EfdegM_{dp}$ $EfdegM_{dp}$
Unit of Measurement	tCO_2e
Description	Annual emission in the potential leakage areas during the monitoring period.
Source of the Information	Processing of spatial information and emission factor.
Monitoring Methods	Results of the analysis of section 10.5.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To identify the project's actual emissions from the start date.
Comments	-

Data/Parameter	$ECO2degE_{TX}$
Unit of Measurement	tCO_2e
Description	Annual emission caused by degradation in the project's scenario (ex-post).
Source of the Information	Processing of spatial information and emission factor.
Monitoring Methods	Results of the analysis of section 10.5.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.

Information Purpose	To identify the project's actual emissions from the start date.
Comments	-

Data/Parameter	$MTdeg$
Unit of measurement	tCO_2e
Description	Emissions caused by avoided degradation due to the project implementation in the ex-post scenario.
Source of the Information	Processing of spatial information and emission factor.
Monitoring Methods	Results of the analysis of section 10.5.2 in M/UT-REDD+01 CERCARBONO methodology.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To identify the project's effective mitigations from the start date.
Comments	-

6.2.4 Leakage Management Area

Data/Parameter	Mangrove restoration areas
Unit of measurement	Hectares
Description	Areas with mangrove restoration activities.
Source of the Information	CAR's local or official sources of information with jurisdiction in the area.
Monitoring Methods	Geoprocessing based on local or official information.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.
Information Purpose	To identify effective leakage-control activities.
Comments	-

Data/Parameter	Mangrove Monitoring Land Lots
Unit of measurement	Number
Description	Mangrove land lots under permanent monitoring.
Source of the Information	CAR's local or official sources of information with jurisdiction in the area.
Monitoring Methods	Geoprocessing based on local or official information and local data gathering.
Monitoring Frequency	Each time the project is verified (triennial), maximum every 5 years.

Information Purpose	To identify effective leakage-control activities.
Comments	-

6.3 Monitoring Plan

The monitoring plan developed for the REDD+ PAZcífico project will determine the effectiveness of the projects' actions to reduce emissions caused by deforestation and degradation. The project ensures compliance with its objectives through the implementation of multiple activities that should be monitored during validation and verification phases. Table 57.57 presents the index of objectives' achievement. These indexes are grouped with other monitored variables in different stages, such as eligibility, co-benefits, contributions to SDGs, and monitoring plan.

Table 57.57 Index of objectives' achievement.

Objective	Index
To evaluate the emissions avoided by the community councils through their conservation, restoration, and sustainable management actions.	• Update on deforested areas in each verification. • Use of approved parameters to estimate avoided emissions. • Verification of the vegetation monitoring units.
To identify the activities reducing and preventing the deforestation and degradation growth factors at the local level.	• Participatory diagnosis execution. • Activity implementation. • Investment control. • Creation of verification committees for the activities that will be implemented.
To guarantee compliance with the regulatory and socio-environmental framework related to the REDD+ PAZcífico project.	• Compliance with social and environmental safeguards. • Respect for the community councils' traditions and culture. • Respect for the life plan.
To generate a transparent and equitable benefits distribution according to the resources obtained from commercializing avoided GHG emissions within the project's limits.	• Accountability spaces. • Investment control by managing and technical partner. • Benefit Sharing Annex Update • Control and oversight training.
To strengthen forest governance structures within community councils.	• Creation of internal control and oversight committees. • Generation of public accountability. • Investment reports and accounting activities.

Source: CO2CERO S.A.S (2022)

6.3.1 Purpose

The monitoring plan's purpose is to gather the required information and resources to estimate correctly the emission reductions caused by deforestation and degradation decrease in the community councils during 2015 – 2021.

The project's monitoring activities include two phases:

- Secondary information evaluation in the office. This evaluation includes spatial (satellite imagery and official georeferenced information of the country) and non-spatial data (vegetation studies, regulations, reference levels).
- On-site evaluation of descriptive variables.

Synergy between both sources of information allows the project's estimates and results to be aligned with the M/UT-REDD+01 methodology for implementing CERCARBONO REDD+ projects. Also, these estimates and results follow the reference levels submitted by Colombia to UNFCCC V1.1.

The plan's main objective is:

- To monitor net changes in carbon and GHG stock in the project area.
- To monitor net changes in carbon and GHG stock in the project area.
- To calculate (ex-post) the reduction of GHG emissions caused by deforestation and degradation decrease.
- To verify compliance with the project's conditions of applicability.

6.3.2 Technical Description of Monitoring Tasks

To check the changes in land use in order to favor the forest to non-forest transition in the project area and potential leakage areas. This task should be done by getting information from remote sensing and GIS in Sentinel 2 and Landsat 8 satellite imagery. Another task is to measure deforestation and degradation areas in hectares. This information is confirmed by random inspection points.

Besides, the information should comply with the methodology of deforested areas' selection and determination. Also, it should use the same model to determine degradation by fragments and obtain standardized information.

6.3.3 Description of the Information Gathered

Each monitored parameter and index that measure the activity execution proposed in section 2.1.2.3 REDD+ Developed Activities and Events in the project) are listed in Table 5858 .

Table 5858 . REDD+ PAZcifico Project Monitoring Plan

Parameter	Unit of Measurement	Source of data	Methodology	Monitoring Frequency	¿Who Is In Charge?
Forest-No Forest	Hectare	IDEAM, Hansen et al. (2010, 2013)	md-m	Annually	CO2CERO S.A.S
Roads	Hectare	IGAC	m	Annually	CO2CERO S.A.S
Forest Exploitation	Hectare	IDEAM, Hansen et al. (2010, 2013)	md-m	Annually	CO2CERO S.A.S
Rivers and Drainage Systems	Hectare	IGAC	m	Annually	CO2CERO S.A.S
Forest Degradation	Hectare	IDEAM, Hansen et al. (2010, 2013)	md-m	Annually	CO2CERO S.A.S
Mangrove Areas	Hectare	IDEAM, Hansen et al. (2010, 2013)	md-m	Annually	CO2CERO S.A.S
potential leakage areas	Hectare	IDEAM, Hansen et al. (2010, 2013)	md-m	Annually	CO2CERO S.A.S
Urban Areas	Hectare	IGAC	m	Annually	CO2CERO S.A.S
Illicit Crops	Hectare	Satellite imagery	c	Annually	CO2CERO S.A.S-Communities included in the project
Land Use and Occupation	Hectare	Satellite imagery	c	Annually	CO2CERO S.A.S-Communities included in the project
Population's Information	-	Local and Official Documentation (DANE)	m	Annually	Agroimpulso-Communities included in the project
Discussion Workshops	Number of workshops	Fieldwork	m	Annually	Agroimpulso-Communities

Parameter	Unit of Measurement	Source of data	Methodology	Monitoring Frequency	¿Who Is In Charge?
					included in the project
Trainings during Project Activities	Number of Trainings	Fieldwork	m	Annually	Agroimpulso-Communities included in the project
Subsistence Economic Activities	-	Fieldwork	m	Annually	Agroimpulso-Communities included in the project
Areas with Mangrove Restoration Activities	Hectare	Local and Official Documentation (CARs)	m	Annually	Agroimpulso-Communities included in the project
Mangrove Monitoring Land Lots	-	Local and Official Documentation (CARs)	m	Annually	Agroimpulso-Communities included in the project

m: Measured, c: Calculated, md: Model

Source: CO2CERO S.A.S (2021)

The gathered information should comply with traceability by trained staff, the community, Fundación Agroimpulso, and CO2CERO S.A.S. Community involvement is essential to know the territory and gather information. The gathering information is mainly managed by Fundación Agroimpulso. It acts as managing partner and means of communication with territories. Then, the processing of that information is transferred to the technical partner in Bogotá.

Once the information gathered through fieldwork or external parties has been organized and analyzed, it will be possible to verify compliance with emission reduction activities by degradation and deforestation in the project area and potential leakage areas. Also, evidence of the social and environmental safeguards and co-benefit achievements by CO2CERO S.A.S. could be obtained.

6.3.3.1 Information Management

The information is arranged according to the internal documentary characterization made by the developer. The purpose is to have transparency, traceability, and connection in the certificate program. 13_Gestion de la información\Caracterizacion documental REDD_V2.pdf describes the project's information: necessary, technical, legal, and documentary elements.

Likewise, the information generated in each phase of the project guarantees compliance with quality according to the tolerance levels established in the project and certificate program. In addition, quality reviews are carried out to present them before the external entities involved in the initiative, such as validation, verification, and certifying organizations and the community (*See 13_Gestion de la información*).

6.3.4 Monitoring of the Leakage Management Area

The leakage management area is described in section 3.1.5 Potential Leakage Area identified during the execution of activities to reduce deforestation and degradation outside the project area. It was also identified within the agent ranges and the reference area. Mangrove restoration and monitoring activities area carried out in permanent land lots near the Unicosta Community Council (See *2.1.2.3 Actividades y eventos REDD+ desarrollados* y *2_Reporte de monitoreo|Reporte de Monitoreo REDD+ PAZcífico_V5*).

The same methods to monitor deforestation and degradation in the project area will be established (See 6.1. Data and Parameters Available in Validation) focused on lost and degraded forest areas. Likewise, the areas with mangrove restoration activities and permanent monitoring land lots will be monitored annually or whenever verification activities are carried out. The organization in charge of information gathering will be Agroimpulso conjointly with the project's communities. The sources of information available are local or official CAR's with jurisdiction in the area.

The monitoring results should demonstrate a reduction associated to the activities carried out.

6.3.5 Monitoring Natural Disturbance Impacts and Other Catastrophic Events

The natural disturbances that could affect the project development are defined in Table 59.59, considering the project's context, the proximity to water bodies, and the large forest area.

Table 59.59 Parameters Monitored for Impact Quantification due to Natural Disturbances

Disturbance	Source of data	Source	Frequency
Flood	Geoprocessing of satellite imagery	Sentinel-1 Images	Annually
Fires	Geoprocessing of satellite imagery	Fire Information for Resource Management System (FIRMS)	Annually

Source: CO2CERO S.A.S (2021)

According to the Territory's Environmental Vulnerability Map (2011-2040, IDEAM), the project's eligible area has a medium and high impact. Therefore, disturbance monitoring will be carried out annually to identify the possible impacts within the project. However, this classification takes into account social and economic aspects that influence the shown zoning.

Additionally, it is determined that the project area is classified as low flood susceptibility based on the layer developed by IDEAM named Flood Susceptible Zones at scale 1:500,000 in 2010. Nevertheless, periodic monitoring will be carried out to detail this phenomenon's behavior in the project area, taking into account what is described in Table 59.59. Similarly, the disturbance report made by the community will be consider as a guarantee of the community's participation in control and monitoring of natural resources within its jurisdiction.

6.3.6. Monitoring of the Project's Activities and Objectives

When the project is finished, Unicosta, Prodefensa del Río Tapaje, Guapi Abajo, and Cuenca del Río Iscuande community councils will have improved their natural, social, and cultural capital through conservation and protection activities in their jurisdiction. These activities will be promoted by the community councils' treasurers and legal representatives through investments from the co-benefits received. Table 60 60 presents the investment lines, objectives, goals, and type of monitoring.

Table 60 60. Monitoring Plan of the Project's Activities and Objectives

Investment line	Objective	Goal	Type of Monitoring	Monitoring Frequency
Reforestation and Restoration	To implement reforestation activities on deforested areas.	To increase carbon reservoirs.	Intervention areas (ha) determined by Agroimpulso	Triennial
		To improve the provision of ecosystem goods and services.		Triennial
	To protect and preserve fragile ecosystems, such as mangroves and wildlife.	To restore degraded mangrove areas.	Intervention areas (ha) determined by Agroimpulso	Triennial
		To ensure the permanence of endangered wildlife, such as the three-toed sloths or parakeets.		Triennial
Vegetation Diagnosis	To recognize the forests' conditions in the project areas.	To educate the community about the importance of forest preservation through training spaces and technical training in measuring forest cover.	Number of trainings carried out by CO2CERO S.A.S and Agroimpulso	Triennial
Sustainable Production	To design alternatives to sustainable production chains.	To foster the community's economic performance.	Number of trainings carried out by Agroimpulso	Triennial
		To reduce exposure to illegality and violence encouraged by external actors.		Triennial

Investment line	Objective	Goal	Type of Monitoring	Monitoring Frequency
		To design the rice production chain in agricultural areas.	Production areas (ha) determined by Prodefensa del río Tapaje	Triennial
Productive Strengthening	To strengthen agricultural production chains with historical and cultural development.	To improve the establishment and harvesting activities of Coconut, Vanilla, and Achiote.	Number of trainings carried out by Agroimpulso	Triennial
		To strengthen links and marketing.		Triennial
		To improve income and employability in community councils.		Triennial
Enhancing Environmental Capacities	To recognize the protection of natural resources.	To empower communities in awareness-raising activities to respect the forest in their role as forest owners.	Number of trainings carried out by Agroimpulso	Triennial
		To reduce uncertainty about nationally managed information for forest cover in the Pacific region.		Triennial
Governance	To manage natural and financial resources.	To manage and invest correctly the resources generated by results in activities to reduce deforestation.	Number of trainings carried out by CO2CERO S.A.S and Agroimpulso	Triennial
		To conduct oversights to verify the effectiveness of each population's actions.		Triennial

Source: CO2CERO S.A.S (2021)

Similarly, the REDD+ PAZ project, based on the market where its reduced emissions will be placed, will contribute to the national targets for reducing greenhouse gases in the atmosphere, the achievement of the Nationally Determined Contribution (NDC), and the implementation of the Comprehensive Strategy for Deforestation and Forest Control to preserve ecosystem services.

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