SCHEME OF COMPENSATION FOR ECOSYSTEM SERVICES FOR FOREST MANAGEMENT AND CONSERVATION OF WATER SOURCES IN THE JURISDICTION OF CORPOCHIVOR

VCS GROUPED PROJECT

Corporación Autónoma Regional de Chivor

Document Prepared By

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iii. Project Proponent	Local Environmental Authority of Chivor (CORPOCHIVOR) Néstor Valero Fonseca nestor.valero@CORPOCHIVOR.gov.co PBX: (+57-8) 750 0771 Ext. 308
iv. Auditor	Instituto Colombiano de Normas Técnicas. ICONTEC Tel: (571) 607 88 88 Ext.: 1381 Ángela Duque E-mail: aduque@icontec.net
v. Project lifetime	Project start date: April 11, 2014 Project lifetime: 30 years and 0 months. GHG accounting period: start on April 11, 2014, and ends on April 10, 2044.
vi. CCB state history	Full validation
vii. CCB Standard Edition	Third edition

viii. Summary of climate, community and biodiversity benefits generated	***Climate benefits*:** The project has a potential reduction of 1,223,915 tCO_2e of GHG emissions in 30 years, with an average annual reduction of 40,797 tCO_2e (for this first instance), through the implementation of activities to reduce deforestation and degradation in more than 7,976 ha of natural forests. ***Community benefits:*** The project will generate community benefits through the strengthening of the economic activities of rural families, enhancing local governance, providing assistance to the development of alternative productive activities, and strengthen local administration. Also, leadership and environmental awareness will promote through training people from the community, with emphasis on the participation of women and protecting ecosystem resources, mainly the *páramos* and Andean forests as providers of water resources. This project is seeking to people appropriate their territory, know and defend it against any action or activity that threatens forests, water sources and the other ecosystem services. Education activities will be aimed at empowering children, youth and community about the importance of conservation of biodiversity, and workshops and training will also be aimed at families and producers, whose activity depends on the direct land use. The project seeks to implement agroecological family gardens, with family basic agricultural products consumption, including tubers, vegetables, herbs and fruits, able to meet basic household food needs, these activities will also allow people to reduce their dependence on regional markets and improve diet in their homes. For the first instance the project has involved more than 50 small landowners who have expressed their interest in participating in the program through the local stakeholder consultation process. ***Biodiversity benefits:*** to contribute to the conservation of diversity through project activities that reduce pressure on 7,976 ha of natural forests, which allows ecosystems to preserve their high conservation values associated with the structure, composition and functionality. The planned reforestation activities will establish native species as a priority. They will contribute to the recovery of ecosystems and improving biological corridors, to ensure the survival of endangered, endemic species and migratory species.

ix. **Gold Level Criteria**	**Climate benefits:** The group project region covers some wetlands in the Andean region, which are vital for water provisioning of all urban and rural centers that are part of the selected municipalities; these zones are part of the Red List of Terrestrial Ecosystems of Colombia. The activities designed by the project proponent help local communities adapt to climate change, diversifying revenues and livelihoods, and maintaining valuable ecosystem services such as hydrological regulation, soil fertility, and increasing habitat connectivity. These activities include protective-producer reforestation, demonstration plots in agroforestry systems, implementation of low impact productive systems, silvopastoral systems, strengthening of ecotourism and restoration and isolation of water sources areas. **Biodiversity benefits:** By protecting areas of intact forest the habitat and ecosystems of many endangered species such as *Pyrrhura calliptera* (Brown-breasted Parakeet), *Vultur gryphus* (Andean condor), *Tremartocs ornatus* (Andean bear) and *Centrolene petrophilum* (Boyaca Giant Glass Frog) are conserved.
x. Date of Completion of this Version and Version Number:	June 16, 2017 Version 01

GENERAL SECTION

G1. Goals, Design and Feasibility aspects of the Project long-term

Project synopsis

G1.1. Identify the main Project Proponent responsible for the design and implementation of the project, and provide contact details.

The main Proponent of the project "Scheme of Compensation for Ecosystem Services for Forest Management and Conservation of water sources in the jurisdiction of CORPOCHIVOR" is the Local Environmental Authority of Chivor (CORPOCHIVOR)[1].

Name of the organization	Local Environmental Authority of Chivor (CORPOCHIVOR).
Contact person	Néstor Valero Fonseca
Position	Forestry Project Coordinator Offer
Address	Carrera 5 No. 10 - 125 Garagoa - Boyacá (Colombia)
Telephone	Cell Phone: (+57) 312 4843658 PBX: (+57-8) 750 0771 Ext. 308
E-mail	nestor.valero@CORPOCHIVOR.gov.co

G1.2. Define the project's climate, community and biodiversity objectives.

Climate objectives: climate change mitigation through the implementation of activities to reduce deforestation and forest degradation under the jurisdiction of Corpochivor. These activities include the implementation of forest restoration, sustainable management of strategic ecosystems, silvopastoral systems, crops and marketing improvement, efficient stoves, strengthening education and citizen participation, etc (see section G.1.8). With the reduction of the expansion of the agricultural frontier, recovery of degraded forests through the implementation of agreements with project participants, it is expected to reduce GHG emissions and increase carbon stocks over time.

[1] In Spanish Corporación Autónoma Regional de Chivor - CORPOCHIVOR

Community objectives: To strengthen the economic activities of livelihoods of rural families, as they are defined by the SLF (Basic Sustainable Livelihoods Framework)[2]:

- Strengthening local governance through improvements in planning and implementing management practices of land use.
- Assistance to the development of alternative productive activities through training and technical assistance in agroforestry systems and their respective value chains.
- Strengthen local administration, leadership and environmental awareness through training people from the community.
- Contribution of resources to the community associated with project implementation.
- Strengthen social capital by strengthening existing institutions, such as associations and cooperative.
- Conservation of ecosystem resources, mainly the *páramos* as providers of water resources.

Biodiversity objectives: to contribute to the conservation of diversity through project activities that reduce pressure on natural forests, which allows ecosystems to preserve their high conservation values associated with the structure, composition and functionality.

G1.3. Indicate the location (national jurisdiction, subnational) and a brief description of the basic physical and social parameters of the project.

Grouped Region Expansion Project

The grouped project expansion region consists of 311,013 ha, located on the eastern cordillera in the south of the Department of Boyacá, Colombia (Figure 1), delimited by the coordinates: Min. X, Y 611,820,000; 553,680,000 and Max. X, Y 830,520,000; 77,820,000. It encompasses 25 municipalities that are under the jurisdiction of the Local Environmental Authority of Chivor -CORPOCHIVOR- bordering the departments of Casanare and Cundinamarca. This entity holds environmental authority over the municipalities of their jurisdiction, which are distributed in the following provinces:

- **Márquez:** is composed of the municipalities of Ramiriquí, Ciénega, Viracachá, Boyacá, Jenesano, Tibaná, Nuevo Colón, Turmequé and Úmbita.
- **Neira**: is composed of the municipalities of Garagoa, Chinavita, Pachavita, Macanal, Santa María and San Luís de Gaceno.
- **Oriente:** is composed of the municipalities of Guateque, Guayatá, Somondoco, Almeida, Chivor, Sutatenza, Tenza and La Capilla.
- **Centro:** The municipality of Ventaquemada although it belongs to the province center, territorially is part of the jurisdiction of CORPOCHIVOR and has a close relationship with the municipalities of the province of Márquez.
- **Lengupá:** The municipality of Campohermoso belongs to the Lengupá Province, but territorially is part of the jurisdiction of CORPOCHIVOR and has a close relationship with the municipalities of the province of Neira.

[2] Richards, M. and Panfil, S.N. 2011. Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects: Part 1 – Core Guidance for Project Proponents. Climate, Community & Biodiversity Alliance, Forest Trends, Fauna & Flora International, and Rainforest Alliance. Washington, DC.

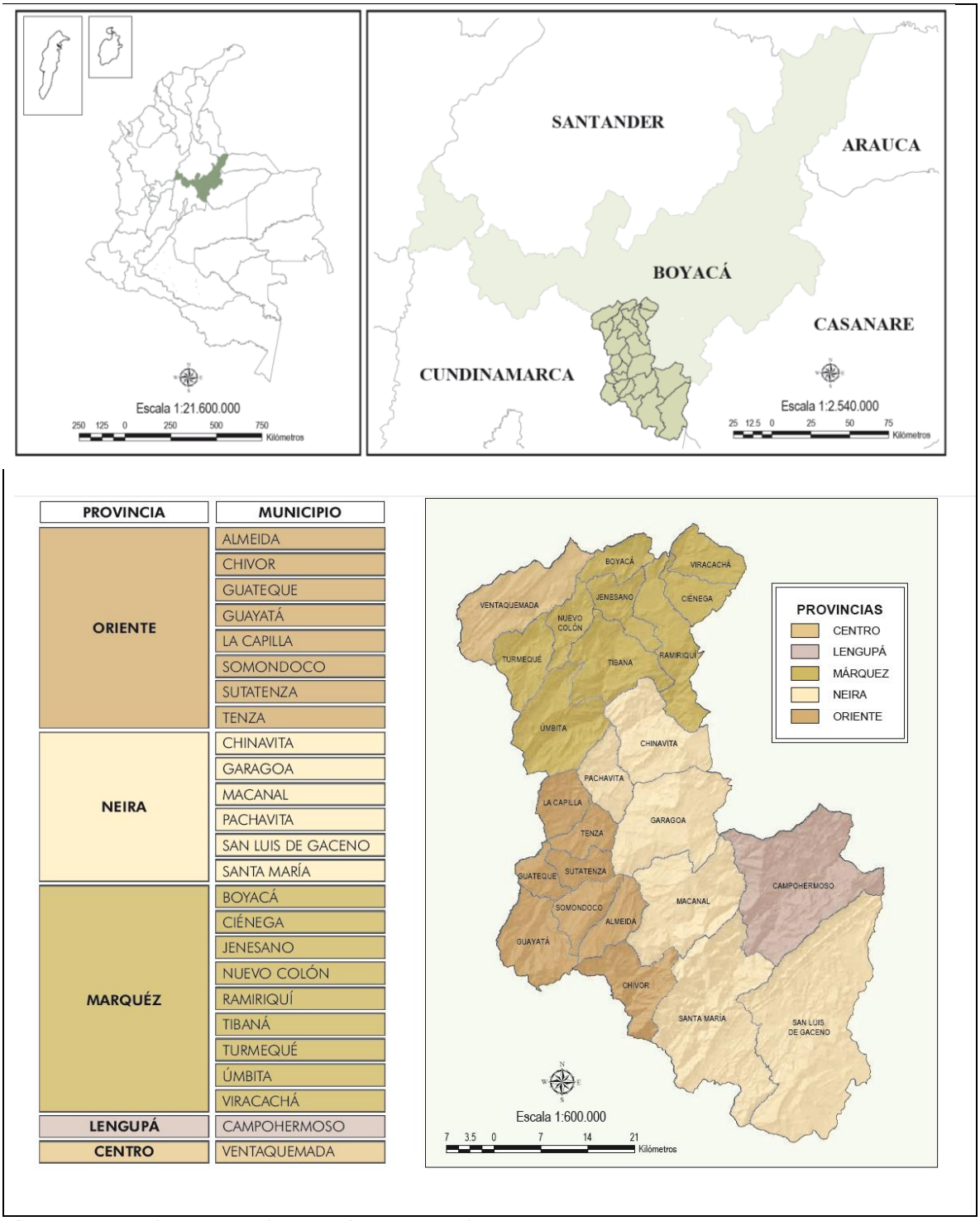


Figure 1: Location grouped expansion area project.

Table 1. Municipalities of the jurisdiction of CORPOCHIVOR. The municipalities that are part of the first instance are highlighted in blue.

Municipalities name		
Almeida	**Garagoa**	Ramiriquí
Chivor	**Macanal**	**Tibaná**
Guateque	Pachavita	Tumerqué
Guayatá	**San Luis de Gaceno**	**Úmbita**
La Capilla	**Santa Maria**	**Viracachá**
Somondoco	Boyacá	**Campohermoso**
Sutatenza	**Ciénega**	Ventaquemada
Tenza	Jenesano	
Chinavita	Nuevo Colón	

Physical Parameters

Table 2 presents the general description of the physical characteristics of the project expansion area. The description of the physical characteristics of the 25 municipalities are detailed in the supporting documents PGOF, Chapter III Characterization General CORPOCHIVOR[3] and Caracterización Biofísica[4].

Table 2. General description of the physical characteristics of the project expansion area (jurisdiction of CORPOCHIVOR)[5].

Physical parameters	Description
Hydrography	The region is bounded by the watersheds of rivers Garagoa, Súnuba, Guavio, Lengupa and Upía. The Garagoa and Súnuba rivers join to form the La Esmeralda Dam, which is part of Chivor hydroelectric system. These same waters are important tributaries of Upía River, which flows into the Meta river that finally brings its waters into the great basin of the Orinoco Colombian. In

[3]MINISTRY OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT, ENVIRONMENTAL & COMPENSATION FUND LOCAL ENVIRONMENTAL AUTHORITY OF CHIVOR-CORPOCHIVOR. 2013. General Forest Management Plan -PGOF- Chapter III: Characterization General Jurisdiction of CORPOCHIVOR.

[4] Esquema de Retribución por Servicios Ambientales (ERSA) para la Conservación de los Bosques y Gestión de Fuentes Hídricas en la jurisdicción de Corpochivor. Caracterización Biofísica, Objetivo 1.4.1.

[5] This table was created from information from the following sources:

- Local Environmental Authority of Chivor, CORPOCHIVOR. 2010. Atlas Geographic and Environmental CORPOCHIVOR.
- MINISTRY OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT, ENVIRONMENTAL & COMPENSATION FUND LOCAL ENVIRONMENTAL AUTHORITY CHIVOR-CORPOCHIVOR. 2013. General Forest Management Plan -PGOF- Chapter III: Characterization General Jurisdiction of CORPOCHIVOR.

Physical parameters	Description
	total the project area has 22 sub-basins, 265 micro-basins and 5 macro-basins (See Figure 3).
Topography	The topography of the area comprises rolling and steep, with heights ranging from 300 m reliefs, in the municipality of San Luis de Gaceno, to 3,500 meters above sea level in the municipalities of Viracachá and Ventaquemada (Figure 3)**.**
Temperature	Ranging from -8°C and 25°C.
Life zones	Within the jurisdiction of the project there are 10 life zones according to Holdridge: moist tropical forest, moist premontane forest, moist lower montane forest, moist montane forest, wet tropical forest, wet premontane forest, wet lower montane forest, wet montane forest, montane rain forest, premontane rain forest and low montane dry forest (Figure 4).
Geomorphology	In the project area two physiographic zones are presented: a zone of undulating topography, located in areas where outcrops of little consistency and whose heights range between 600 and 2,600 m.a.s.l area and a large cliffs with heights up to 3,600 m.a.s.l. formed by resistant rocks.
Soils	• Association Typic Hapludands - Andic Dystrudepts –Typic Dystrudepts. MKV symbol (of Andisols and Inceptisols orders). They are located in relief beams, hills and glacis, moderately to strongly broken and moderately steep topography, slopes between 12 and 75%; source rock type gneiss, schist, limestone and, in many sectors, by layers of volcanic ash. In some areas accumulation of rock fragments on the surface occurs, as removal processes occurring in mass as landslides, landslides, solifluction and creep. • Complex Lithic Udorthents – Typic Dystrudepts – Rocky outcrops. Symbol MLE (of Entisoles and Inceptisols orders). They are located in some municipalities in the province of Márquez, at altitudes ranging between 2000 and 2500 m.a.s.l. With reliefs in homoclinales ridges and outcrops, composed of interbedded sandstones and limestones and shales and in small areas, no presence of volcanic ash. The topography is moderately to strongly steep, slopes above 50%. Mass movements are manifested as landslides, rock falls and creep. • Complex Lithic Ustorthents – Humic Dystrustepts – Rocky outcrops. Symbol MME (of Entisoles and Inceptisols orders). The areas of these soils are found in the province of Márquez, especially in the municipalities of Turmequé, and Nuevo Colón, at an altitude of 2000-3000 meters. These areas correspond to homoclinales steeps ridge mainly to steep ridges and outcrops homoclinales moderate to strongly steep with slopes greater than 50%; its takes its origin from sedimentary rocks, siltstones, sandstones and

Physical parameters	Description
	shales, with inclusions of metamorphic rocks and volcanic ash layers, landslides and rock sectors. • Association Oxic Dystrudepts - Lithic Udorthents – Lithic Dystrudepts. Symbol MPE (Entisoles and Inceptisols orders). This unit is in reliefs of ridges and homoclinales crestones, located in the province of Neira and East, especially in the municipalities of Guateque, Tenza, Garagoa, Almeida, Guayatá, Chapel, Santa Maria and Sutatenza at altitudes between 1000 and 2000 meters. The soils have developed from sedimentary rocks (shales, shales and sandstones) and metamorphic (phyllites); are located in relief's homoclinales steep ridges and outcroppings homoclinales, moderately to strongly steep, with slopes greater than 50%. They are affected by movements (landslides), by the presence of rock fragments on the surface of the soil in the valleys, creeping up and solifluction widespread in many sectors. The forest cover occupies much of the study area, and the lowest proportion is occupied by pasture land. • Complex Andic Dystrudepts – Humic Dystrudepts – Typic Placudands. Symbol AHE. The soils of this association are in the Center province, municipality of Ventaquemada between 3000 and 3200 m.a.s.l. The soils have been originated from clastic sedimentary rocks silty clay and sandstone, coated in large sectors with volcanic ash. The type of relief is homoclinales crestones, with slopes greater than 50%. Lower slopes in no accumulation of rock fragments on the surface. • Association Melanudands – Humic Dystrudepts – Typic Hapludands. AHV symbol (of Andisols and Inceptisols orders). The soils of this association are located in the Center province, municipality of Ventaquemada at a higher altitude 3000 m. The soils have been originated from surface deposits of volcanic ash and sedimentary rocks in relief types of hills and glacis; They have strongly undulating topography to slightly steep, with slopes 12-25% and 25-50%, being affected by mass movements, especially solifluction. • Association Typic Udifluvents - Fluvaquentic Endoaquepts – Typic Udipsamments. VUK symbol (of Entisoles and Inceptisols orders). The Association is presented in the provinces of Neira and Lengupa, especially in the municipalities of San Luis de Gaceno and Campohermoso at an altitude of 400 meters. They are located in an alluvial terrace aggradational (recent terrace), originating from surface deposits hidrogenics clastic, mixed, transported by the river Upía. The topography is slightly flat, with slopes 1-3%; some sectors are affected by rock fragments on the surface and within the profile.
Suitability of the soils	In the jurisdiction of CORPOCHIVOR, there is a wide variety of soils; the best fertility is located in the municipalities of Ventaquemada, Turmequé, Nuevo Colón**, Ciénega, Úmbita**, Ramiriquí and Jenesano, i.e., those that are located in areas of flat and slightly sloping topography; medium fertility soils are located in the municipalities of Boyacá, Viracachá, Tibaná, Chinavita, Garagoa,

Physical parameters	Description
	Pachavita, La Capilla, Tenza, Sutatenza, Somondoco, Almeida, Guayatá, Guateque, Macanal, Chivor and Campohermoso; and low agricultural capacity are in the municipalities of Santa Maria and San Luis de Gaceno.

The Unified Soil Classification System (USCS) used in the present description consists of three types: associations, consociations and miscellaneous. CORPOCHIVOR jurisdiction is composed of forty-five (45) different associations, three consociations and two miscellaneous (Figure 2).

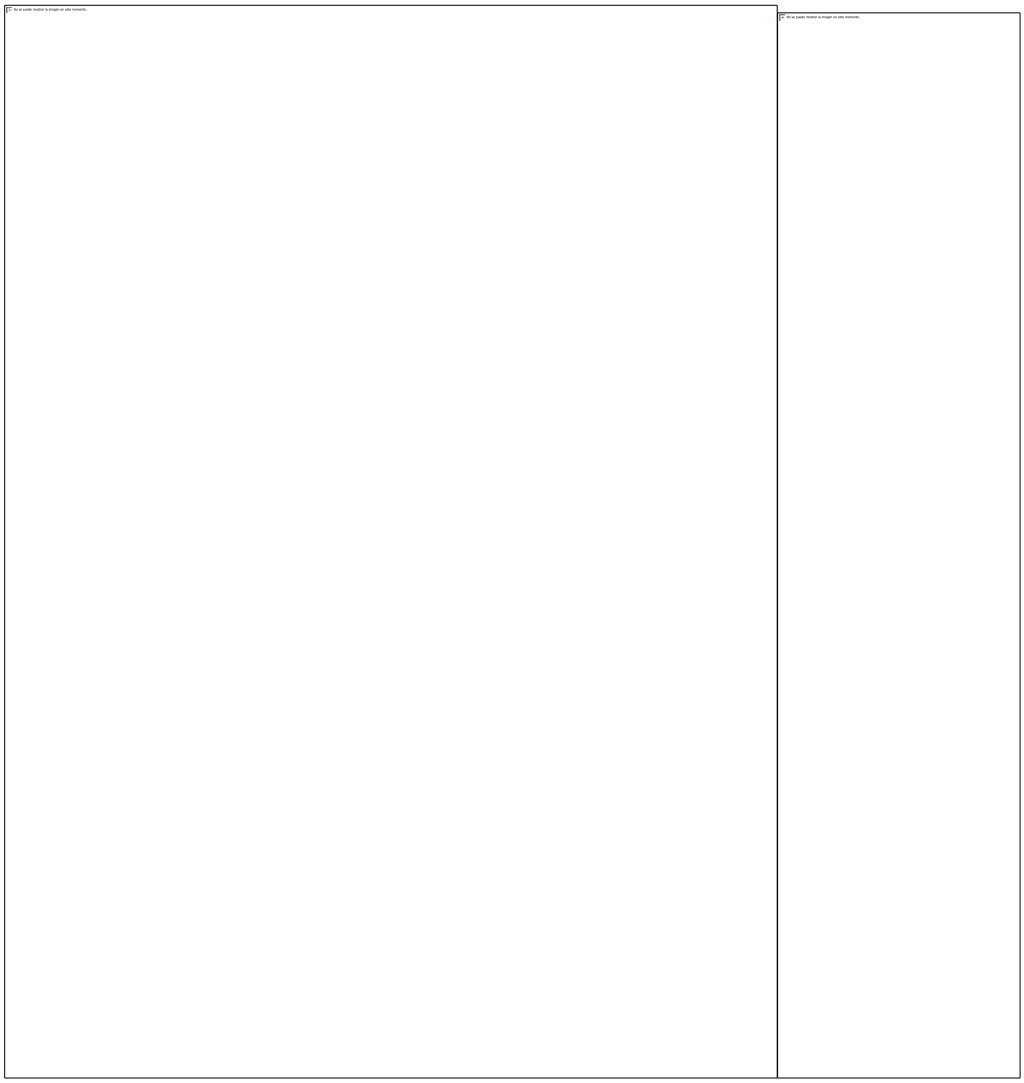


Figure 2. Map of soil associations in the municipalities of the jurisdiction of CORPOCHIVOR.

IGAC (2007)[6] defines these USCS as follows:

Association (A): Unity composed of several dominant soils (75% or more) and similar soils and one or more inclusions of dissimilar soils unit, which together must not exceed 25%. It is a grouping of two, three or more different soils (each belongs to a different taxonomic unit), associated usually geographically, according to a defined proportional distribution, so that, if necessary, they can be separated in a more detailed study.

Consociations (C): Unity composed of a dominant soil (50% or more) and similar soils, and one or more inclusions of dissimilar soils, which together must not exceed 25% unit. In consociationalism, 70% or more of the soil units that are fit within the limits of variation of the taxonomic class describing and identifying the population of defined soils, and inclusions of different soils may occur in small proportions.

Miscellaneous (M): These are areas where there are hardly no soil and, therefore, have severe restrictions for agricultural use. Most often they require strong recovery practices in order to be used again. The most common miscellaneous are: urban, rocky outcrop, swampy, debris, bad land, beaches, quarries, alluvial channel deposits, dunes[7].

All mapping units within the area in the region of CORPOCHIVOR are presented in Table 3.

Table 3. Cartographic soil units present in the area of jurisdiction of CORPOCHIVOR. A: Association, C: Consociation, M: Miscellaneous.

Mapping unit	Area (ha)	Association	Area (ha)
A. La Mesa	34,963.87	A. San Ignacio	3,204.66
A. Chivor	28,808.36	A. El Volador	3,201.67
A. Agua Caliente	26,834.82	A. El Reposo	3,180.38
A. Rucha	22,670.46	A. Degolladera	2,933.00
A. Rondón	21,176.30	A. Los Galindos	2,880.38
A. Rosal	19,227.65	A. Macanal	2,601.76
A. Represa	13,085.97	A. Icarina	2,597.57
A. El Común	12,708.46	C. Quebradas	2,549.10
A. Quebradas	11,171.35	A. La Isla	1,586.50
A. Valle Grande	7,266.62	A. Bijagual	1,580.30
A. Jabonera	6,747.49	A. Salinas	1,571.90
A. Piedra Candela	6,555.49	M. Páramo[8]	1,544.12
A. Los Toyes	6,536.67	A. Pueblo Viejo	1,498.43
A. Crucero	6,443.22	M. Rocoso[9]	1,403.23
A. Santa María	5,830.03	A. Palma Baja	1,091.93
A. San Francisco	4,923.19	A. Tiavita	966.64
A. Tierra Negra	4,627.19	A. Piedra Larga	953.24

[6] Geographic Institute Agustín Codazzi (IGAC). 2007 Branch Agrology. General soil survey and land zoning department of Antioquia. Bogotá: National Press of Colombia.
[7] Local Environmental Authority of *Valle del Cauca* (CVC). (2014). Quick Guide for Salinity user SIG- soil.
[8] It covers the Aliso and Butaga region located in mountains with jagged slopes of 200-300 m with glacial modeling montane tropical and *Subandino* humid climate.
[9] No soil, rocks appear on Surface.

Mapping unit	Area (ha)	Association	Area (ha)
Ríos, Lagos Y Barras	4,269.16	A. Laureles	780.11
A. Jurpa	4,167.68	A. Jotas	615.81
A. El Toro	4,014.98	C. Centro	473.86
A. Lengupa	3,639.77	A. Venecia	277.76
A. Pena Blanca	3,605.55	A. Palo Blanco	211.06
A. Chinavita	3,561.60	A. Barzal	198.61
A. Ramiriquí	3,437.09	A. Pozo Hondo	134.89
A. Santa Teresa	3,343.97	A. Frontera	104.93
A. Ropaguata	3,273.61		

Some concepts used for describing soils in the region are described below. These definitions were established by CORPOCHIVOR in its General Forest Management Plan (PGOF, 2013)[10].

- **Parent material and dominant rocks:** In the area there are mainly materials of sedimentary origin (sandstones and shales) influenced by volcanic ash from the central and western mountain ranges, which was deposited in areas of influence of the jurisdiction of CORPOCHIVOR, several hundred thousands of years ago. It contributed to the evolution of the soils in the area**.**

- Depth Soil: The main limiting depth in the jurisdiction of CORPOCHIVOR are gravel or stone fragments, it can touch the hard rock or be very near of the phreatic level.

- **Texture:** The texture types in the area are: clay (particles less than 2 microns), silt (particles between 2 and 20 microns), sandy (above 20 microns), and smooth (there is an equilibrium amongst the particles size).

The most representative associations in the region of CORPOCHIVOR are described below[11]:

- **Association *La Mesa*:** soils derived from sandstones and clays, of smooth texture to smooth-sandy, fast-draining, very acidic and moderate to low fertility. 11.2% of soils in the region belongs to this association and are located mainly in the municipalities of San Luis de Gaceno and Santa Maria.

- **Association *Chivor*:** soils derived from shale, moderately deep, well-drained, moderately eroded and of smooth texture to smooth-clayey. 9.3% of the land belongs to this association mainly located in the municipalities of Chivor, Macanal, Campohermoso and Tibaná.

- **Association *Agua Caliente*:** soils derived from sandstones and shales, with depths from very shallow to moderately deep, sandy, loamy or clay loam to smooth, fast-draining, very acidic and moderate fertility. 8.6% of the soils in the region belongs to this association, located mainly in the municipalities of Campohermoso, Santa María and San Luís de Gaceno.

[10] 2013, Local Environmental Authority of Chivor -CORPOCHIVOR; Ministry of Environment, Housing and Territorial Development, Environmental Compensation Fund; District University of Bogotá. Formulation of planning tools for forest management CORPOCHIVOR's jurisdiction. Garagoa-Boyacá, Colombia.
[11] The descriptions are based on the unified legend for soils in the river basin Garagoa. Source: Márquez, G., & Suarez, N. (2005). Management Plan and Environmental Management of River Basin Garagoa. CORPOCHIVOR-Corpoboyacá-Universidad. Nacional de Colombia-Institute for Environmental Studies.

- **Association *Rucha*:** soils derived from shales and limestones, usually deep, free or clayey textures, fast-draining, acidic in most cases, low to moderate fertility. 7.3% of soils in the region belongs to this association, located mainly in the municipalities of Tenza, Sutatenza, Guateque, Somondoco, Garagoa, Macanal and La Capilla.

- **Association *Rondón*:** soils derived from sandstone soils. They are moderately deep or deep, sandy loam texture smooth-clayey, generally very acidic and moderate to high fertility. These types of soil are located mainly in the municipalities of Chinavita, Garagoa, Pachavita and La Capilla and represent about 6.8% of all soils in the region.

- **Association *Rosal*:** soils derived from sandstones and shales, moderately deep and profound but sometimes shallow, clay or smooth-clayey texture, variable drainage, highly acidic and low to moderate fertility. 6.2% of the soils within CORPOCHIVOR belongs to this association, distributed mainly in the municipalities of Campohermoso, Macanal Almeida, Guayatá, Somondoco and Chivor.

- **Association *Represa*:** soils provided from sandstone soils, moderate depth to very shallow, smooth or sandy loam texture, and fast-draining, slightly acidic or very acidic and low fertility. 4.2% of soils in the region is grouped in this association, distributed mainly in the municipalities of Santa Maria, Chivor and Macanal.

- **Association *El Común*:** the parent material of the soil belonging to this association are gray shales intercalated with sandstones with volcanic ash influence. These soils are usually deep, sandy loam texture, rapid drainage, highly acidic acid and moderate to low fertility. 4.1% of soils in the region belongs to this association, located mainly in the municipalities of Úmbita and Ramiriquí.

- **Association *Quebradas*:** soils derived from shale, limestone and sandstone, of loam to smooth-clayey, medium or fast draining, very acidic and moderate to high fertility. About 3.6% of soils in the region belongs to this association and are located in the municipalities of Garagoa, Macanal, Guayatá, Tenza, La Capilla, Sutatenza and Guateque.

- **Association *Valle Grande*:** the parent material of these soils is clayey therefore these soils are clayey, medium drainage slow, almost neutral or acidic pH and moderate fertility. 2.3% of soils in the region belongs to this association, distributed mainly in the municipalities of Garagoa, Guateque, Tenza, Somondongo, Sutatenza and Guayatá.

The remaining mapping units are not described in this section because they represent each of them less than 2% in the area.

Figure 3. Hydrography and topography in the area of expansion of grouped project

Figure 4. Life zones in the area of expansion of grouped project

- **Land cover**

The predominant land cover are pasture comprising 43.71% of the region. Forested areas are the third largest land cover with a considerably smaller share (19.87%). Forested land is mainly located in the highlands of the municipalities of Garagoa, Ciénega, Viracachá and San Cayetano in the municipality of Guayatá, Negra in Chivor and Santa Maria, Guaneque in Macanal and Santa Maria, Calichana in Santa Maria, Buenavista in Campohermoso and San Agustin in Campohermoso and San Luis de Gaceno.

Santa Maria, Campohermoso and San Luis de Gaceno, have an area of 33,149 hectares of forested land, comprising 54% of the natural forests of the jurisdictio (See Figure 5)[12].

Table 4. Land cover in Jurisdiction of CORPOCHIVOR 2014.

Land Cover IPCC	Area (ha)	Percentage	Description according to CLC categories[13]
Grassland	135,529.60	43.71%	Pastures
Heterogeneus farmland	69,737.48	22.49%	Mosaic of pastures and crops
Forest land	61,608.84	19.87%	Forest
Cropland	24,100.21	7.77%	Crops
No data	15,135.6	4.88%	-
Other lands	3,981.12	1.28%	Urban fabric, industrial areas, bare soil, water bodies and rivers.
Total	**310,092.86**	**100%**	**-**

[12] MINISTRY OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT, ENVIRONMENTAL & COMPENSATION FUND LOCAL ENVIRONMENTAL AUTHORITY CHIVOR-CORPOCHIVOR. 2015. Identification of "hotspots" in deforestation and implementing strategies under the REDD + scheme, in forest ecosystems of the jurisdiction of CORPOCHIVOR.

[13] National legend of the land cover of Colombia, scale 1: 100,000, according to the methodology Corine (Coordination of Information on the Environmental) Land Cover, adapted for the country. Jointly by IDEAM, IGAC, Sinchi, IAvH and UAESPNN, with the collaboration of ASOCARS, INVEMAR, Pedagogical and Technological University of Colombia and CORMACARENA.

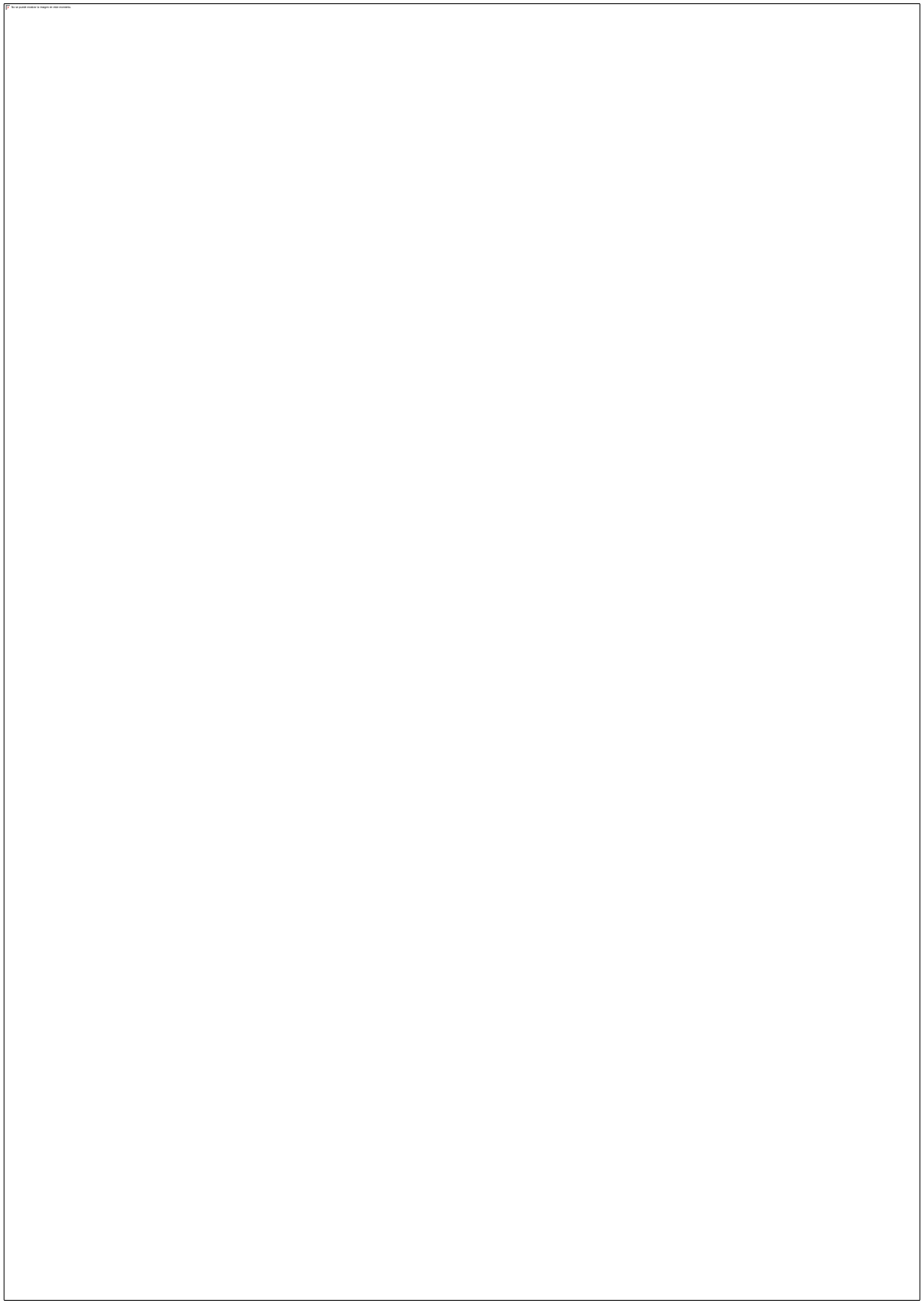


Figure 5. Land cover 2014 of the grouped project expansion area

The diametric structure of individuals was evaluated with the Forest Inventory of General Forest Management Plan (PGOF, *Plan General de Ordenación Forestal*) shows a typical trend of "J" inverted. This evaluation shows that 90% of the trees are in the lower diameter categories (10-20, 20-30). Furthermore, the altimetry structure determines that 39% of the trees are agglomerated in the category of up to 10 m. in height and 43% in the category of up to 15 meters.

Based on the above features, the cover land is highly degraded and show serious limitation for commercial forestry use. In addition, the area presents a very poor trade volume and harvestable volume of wood. Therefore, it should be managed only for recovery land through restoration and / or conservation.

- **Change in the land cover**

According to the analysis of land cover for the period 2005 - 2014, the main change that occurred in the jurisdiction of CORPOCHIVOR is the transition from forest cover to pasture and Heterogeneus farmlands. In **Figure 6** shows the distribution of the land cover that replaced the natural forest during this period. In total, 4,862 hectares (approximately 39% of deforested forests) became pasture for cattle use; 7,022 hectares (56% of the deforested area) went to heterogenous farmlands. Finally, approximately 4,3% of deforested forests (534 ha) became permanent crops (mainly coffee).

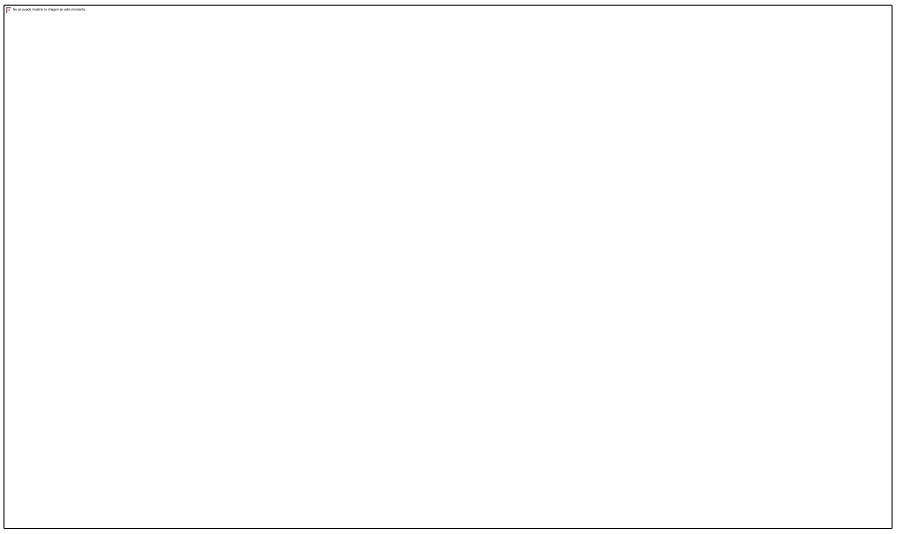


Figure 6. Distribution of the land covers that replaced the natural forest in the period 2005-2014.

The forest type most affected by deforestation activities was the wet tropical forest, which loss of 3,047 hectares went mainly to heterogenous farmlands. The moist premontane forest was also strongly affected due to conversion to pasture and heterogenous farmlands, losing about 2,071 hectares over the 9 years of evaluation. Similar situation occurred in the low montane rain forest, where 1,618 hectares went mainly to heterogenous farmlands and pastures.

Table 5. Cover land change matrix in the jurisdiction of CORPOCHIVOR in the period 2005-2014.

Forest 2005	Land cover 2014					
	Pastures	crops	Heterogenous famlands	Other lands	settlements	total
Bosque Húmedo Montano	171,8	39,61	342,87	0,27	0	555
Bosque Húmedo Montano Bajo	879,96	129,57	921,39	5,78	0	1,937
Bosque Húmedo Premontano	1033,56	295,55	1037,19	23,94	1,8	2,392
Bosque Húmedo Tropical	317,81	1,17	485,35	7,41	0	812
Bosque Muy Húmedo Montano	49,66	1,42	197,1	0	0	248
Bosque Muy Húmedo Montano Bajo	411,79	28,98	1206,24	0,72	0	1,648
Bosque Muy Húmedo Premontano	363,55	21,69	505,59	2,35	0	893
Bosque Muy Húmedo Tropical	1344,93	12,38	1650,06	39,11	0,72	3,047
Bosque Pluvial Montano	5,54	0	36,54	0	0	42
Bosque Pluvial Premontano	240,93	0,07	568,62	3,73	0	813
Bosque Seco Montano Bajo	42,3	3,43	70,86	0,18	0,27	117
TOTAL	**4861,83**	**533,87**	**7021,81**	**83,49**	**2,79**	**12503,79**

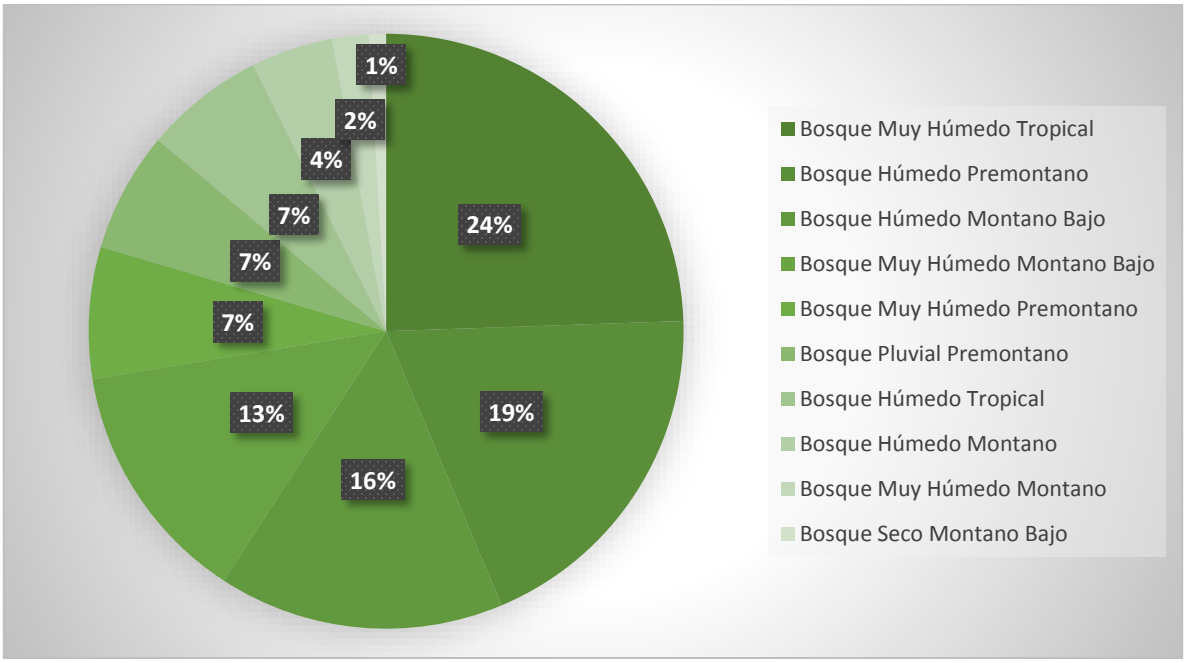


Figure 7. Deforestation by forest life zones affected in the jurisdiction of CORPOCHIVOR in the period 2005-2014.

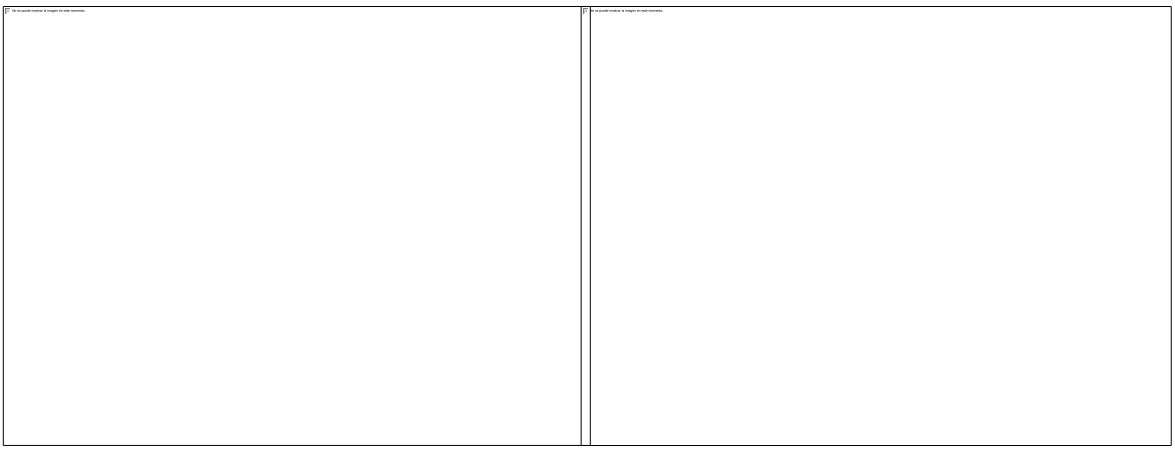
According to the analysis of deforestation presented by CORPOCHIVOR, for the historical reference period 2005-2014 the annual deforestation rate is 1.89%.

- **Conditions of vegetation and ecosystems:**

In the jurisdiction of CORPOCHIVOR there are ***Páramo* ecosystems, Andean Forest** (High Andean, Andean and Sub-Andean) and Piedemonte forest containing samples of flora and fauna of great importance. The *páramos ecosystems* presented within the jurisdiction of the project are mentioned below:

- Rabanal *Páramo* located in the municipality of Ventaquemada;
- Bijagual *Páramo* located in the municipalities of Ciénega, Ramiriquí, Tibaná and Viracachá;
- *Serranía de Mamapacha* located in the municipalities of Garagoa, Chinavita Tibaná and Ramiriquí;
- Castillejo *Páramo* located in the municipalities of Turmequé and Úmbita;
- Cristales *Páramo* located in the municipalities of Pachavita, Úmbita and La Capilla.

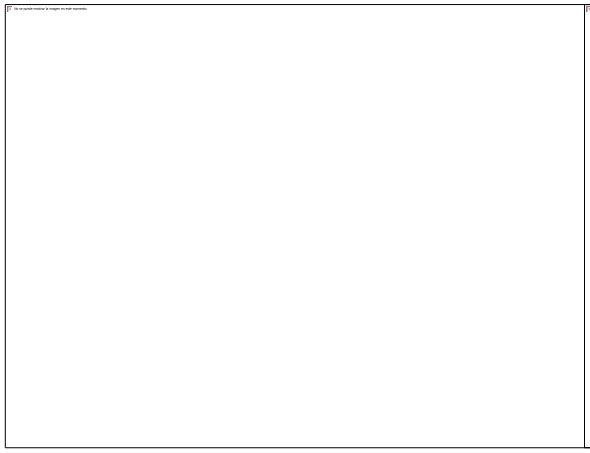
To describe the types of forest in the jurisdiction of CORPOCHIVOR, a physiognomic and physiographic classification of forests with notes on the floristic[14] composition was used. In total there are 10 types of forest that describe in general terms the vegetation in the region expansion project.



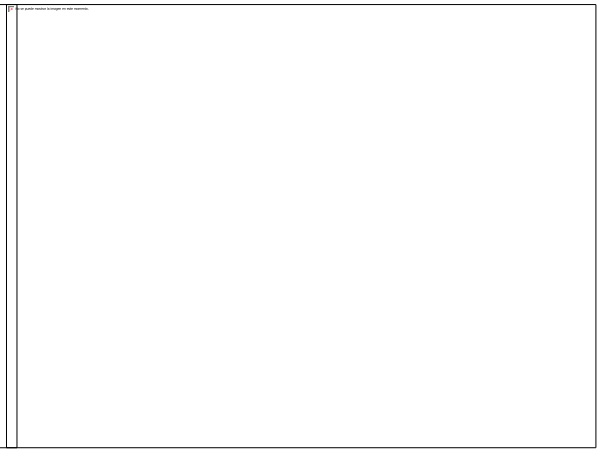
Accessible forest hills. Undisturbed forest, species heterogeneous. Trees have large variation in size and height; slopes between 25 and 50%.

Forested hills. Not accessible forest hills. It develops on steep slopes that are difficult to access and with discontinuity in the tops

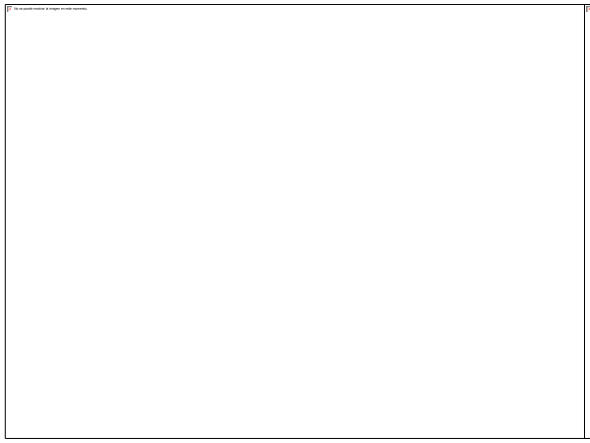
[14] Classification used in the PGOF, following the methodology of Rangel, J. O., Lowy, P. D., Aguilar, M. Garzon, A. "Types of Vegetation in Colombia, a better knowledge of the phytosociological, Fitoecológica Terminology and Common Use". Editorial Guadalupe Ltda. 1997. 436 p.



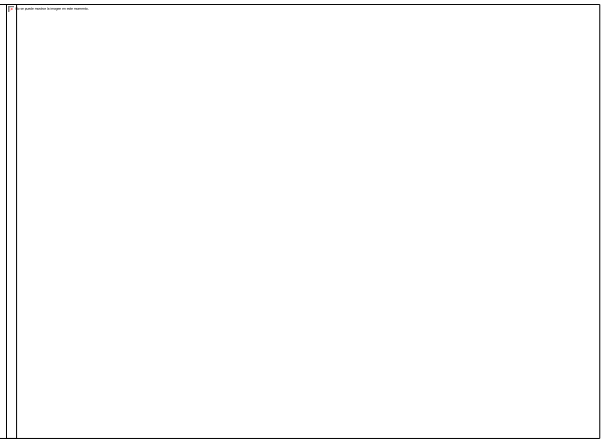
Forest on mountain chain and *serranía*. Forest with stunted trees and malformed, growing on slopes of ridges and hills with steep slopes greater than 75%.



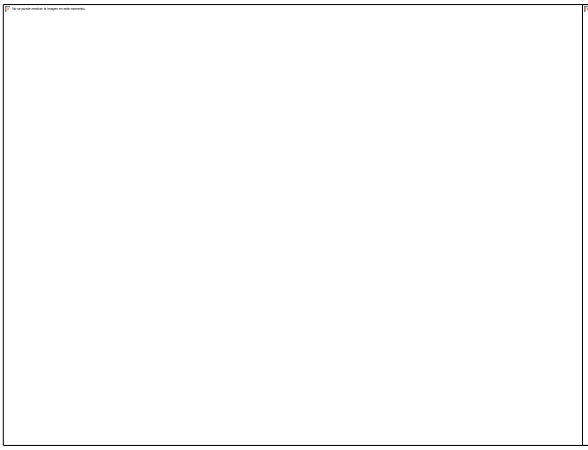
Forest on the slope of the mountain. Forest with trees of different diameters growing on the slopes of mountains with slopes less than 50%. In some cases a tendency to homogeneity in species according to certain climatic regimes is observed.



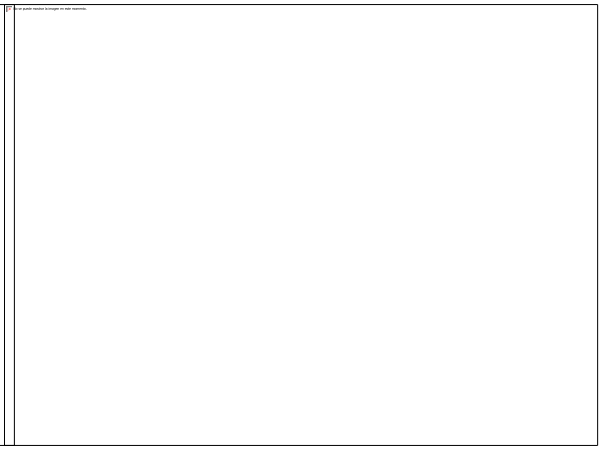
Forest Hills foothills. Vegetation type considered as a transition forest between the forest of the *Cordillera* and the *Sabana*.



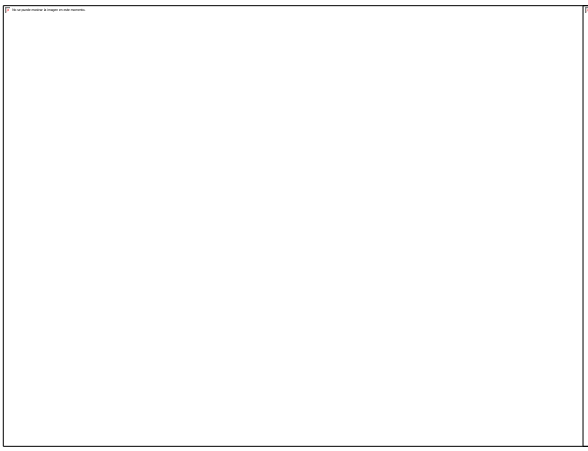
Mountain forest. Subtropical forest and temperate zone forest (Cloud forest). The lower altitudinal limit of subtropical is determined by the height of the condensate while the upper altitudinal limit of temperate forest is influenced by the critical temperature for the growth of trees.



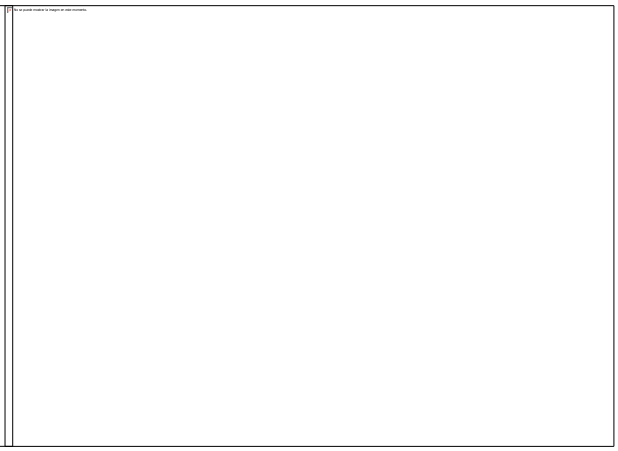
Foothills Forest. Highly disturbed. Nowadays, most of the forest have been deforested and have become large areas of crops and improved pasture grass, in some sectors pastures. It is characterized by being hydrophilic.



Foothill forest on a mountain chain. Highly disturbed. Remaining forest that grow on slopes of mountain ranges, with slopes greater than 50%.



Forest on the escarpments of the mountain chain. Forests unsuitable for logging, they grow on shallow soils, steep slopes susceptible to erosion. They are considered as typical forest for conservation.



In the foreground, ***Páramo* graminoid vegetation**. It occurs in adjacent areas to forests on the escarpments of the mountain chain, at heights in excess of 3000 m.

Figure 8. Types of forest in the expansion area project

- **Biodiversity**

Andean forest ecosystem provides the enabling environment for the establishment of epiphytic species such as bromeliads, orchids and fungi. In the high Andean forests the most abundant species are the *Tuno* (*Miconia sp.),* followed by *Cedrillo (Brunellia sp.), Granizo (Hedyosmum sp.), Gaque (Clusia sp.), Encenillo (Weinmannia sp.)* and *Escobo (Alchornea sp.).* The most abundant species in the sub-Andean forest are *Tuno (Miconia sp.), Colorado (Hieronyma sp.), Cedrillo (Guarea sp.),*

Escobo (Alchornea sp.), Guamo (Inga sp.), Chizo (Myrcia sp.), Amarillo (Ocotea sp.), Amarillo oloroso (Aniba sp.) and *Manzano (Clethra sp.),* among others.

Socioeconomic parameters

- **Economic activities**

CORPOCHIVOR jurisdiction is located in a region with agricultural vocation. This region has integrated traditional knowledge systems with vertical green economy. All of this related to a mountain topography with different heights that allowed developing a diversified food system, avoiding the development of enterprise market. The main centers of production and supply are the capital of the department of Boyacá and Bogotá.

The rural development has depended on the resilience of the communities given soil characteristics and climate. However, the application of new technologies has changed the ecological management of rural communities. This management was based on extensive knowledge of reproduction of ecosystem functional diversity, currently very degraded through the application of agrochemicals and agricultural monoculture model. This situation affects the sustainability of environmental supply and forces them to seek new productive areas, especially in areas highly fragile ecosystem [15].

The economy of scale has taken on new dimensions with the recent exploration and exploitation of mineral resources held in the jurisdiction of CORPOCHIVOR such as coal, emeralds and construction material. In conclusion, the only projects with significant financial dynamics are Chivor Hydroelectric Plant, the Central Pipeline and exploitation of emeralds. However, the level of coordination with the regional economy is very low, barely represented in transfers that these companies must make to the region, under the provisions of the law[16].

69% of the jurisdiction of CORPOCHIVOR sustains its economy in the livestock sector. Traditional forms of crops and grazing livestock are carried out. For this purpose, not only the parcel of land to be used for this objective, but a much larger area is cut. Products generated from these economic activities are usually for their own consumption and surpluses are sold in the local market [17].

In recent years, the agricultural sector has been affected. The main factors are: shortages in labor, both hired and family (because the working age population prefers to migrate to big cities in search of better living conditions and employment), increase in the cost of inputs for agricultural use, climate variability affecting crops, transport costs to the municipalities, constant variation in marketing prices, difficult access to credit and technical assistance, among others It is very common to find older adults living alone and in some cases have been abandoned [18].

[15] PGAR CORPOCHIVOR 2007 – 2019.
[16] PGAR CORPOCHIVOR 2007 – 2019.
[17] MINISTRY OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT, ENVIRONMENTAL & COMPENSATION FUND LOCAL ENVIRONMENTAL AUTHORITY OF CHIVOR-CORPOCHIVOR. 2013. General Forest Management Plan -PGOF- Chapter III.
[18] MINISTRY OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT, ENVIRONMENTAL & COMPENSATION FUND LOCAL ENVIRONMENTAL AUTHORITY OF CHIVOR-CORPOCHIVOR. 2013. General Forest Management Plan -PGOF- Chapter III.

According to the URPA[19] (the Office Planning Consultant of Cundinamarca), in 2012 the main crops of the region were: corn, peas, potatoes, tree tomato, carrot and gooseberry, mainly in the provinces of Márquez and Center; for its climatic characteristics in the province of East the main crops were: peas, beans, green beans and cucumber; in the region of Valle de Tenza: cocoa, coffee, sugar cane honey and citrus; in the municipalities of the province of Márquez: plum, passion fruit, peach, pineapple guava and apple. Other important economic activities in the region are presented in Table 6.

Table 6. Other economic activities of the Jurisdiction of CORPOCHIVOR[20].

Activity	Description
Mining Production and Extraction of Natural Resources	Mining is the second productive sector of the department after livestock activities. This mining activity is based on the exploitation of: clays, coal, emeralds, phosphates, sand quarries, gravel, copper ore, iron ore and gypsum.
Artisanal production	In some municipalities of the jurisdiction (especially the municipality of Boyacá), crafts activities are still made from *fique* fiber. Other craft products made in some municipalities in the region are: the loom fabrics such as ponchos, jackets and blankets in Ciénega; in Somondoco you can find handicrafts made of knitting in banana and corn; in Tenza basketry is made, the raw materials used are the *chin* or *caña de castilla*.
Agro industrial production	In most municipalities, the milk is processed to produce cheese farmer or fresh cheese for little scale production; usually without any technology. Delicious pastry, *arepas*, cane juice and cane honey are also produced. These products primarily employ family labor and are part of the culture and tradition of families in the region. Other industries in the region are coffee roasters, mills and threshing of grain, fruit and vegetable processing plants and sugar mills.
Forestry production	In the jurisdiction of CORPOCHIVOR, extraction of products associated with natural forests is characterized by the production of products such as firewood, timber for use in the farm and charcoal. Extraction and wood processing is done using traditional methods; most extractions are for domestic use as: firewood for cooking food, construction and maintenance of housing, construction of fences, cattle pens, fence posts and support, especially in rural areas.

[19] For more information: http://www.cundinamarca.gov.co/wps/portal/Home/SecretariasEntidades.gc/Secretariadeagricultura/Secagriculturadespliegue/asplanificacionurpa_contenidos/csecreagri_planificacionurpa

[20] MINISTRY OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT, ENVIRONMENTAL & COMPENSATION FUND LOCAL ENVIRONMENTAL AUTHORITY CHIVOR-CORPOCHIVOR. 2013. General Forest Management Plan -PGOF- Chapter III.

Level of transformation or value-added products:

- **Products with low added value** as are wheat, soybeans and corn, cereals processed in the two mills located in the municipality of Garagoa. These goods lack a link between production and final consumption.

- **Products with high added value**. In most municipalities, the milk is processed to produce cheese farmer or fresh cheese for little scale production; usually without any technology. Pastry, *arepas*, cane juice and cane honey are also produced. These products primarily employ family labor and are part of the culture and tradition of families in the region[21].

- **Products with very high added value.** In the municipalities of Tibaná, Guayatá, Garagoa Chivor and Chinavita there are the mills for grinding cane. As mentioned above, cane is one of the most representative crops in the region and is used almost in its entirety for the manufacture of brown sugar. In the municipality of Garagoa, there is a processor of fruits and vegetables that are part of micro processing fruits like plum, peach and Feijoa for making sweet jams and other products handcrafted.

Demographic aspects[22]

The largest rural population densities in the jurisdiction are presented in the municipalities of Guateque, Sutatenza (belonging to the province of Oriente), Boyacá, Jenesano and Nuevo Colón (belonging to the province of Márquez), with higher densities at 80 Hab / Km^2. As for average densities (40-80 Hab / Km^2) they are distributed in the municipalities of Viracachá, Ramiriquí, Úmbita, Somondoco, Turmequé, Tibaná, Tenza and Guayatá, the last two of the province of Oriente and other Márquez. As for the other municipalities, these have a lower density of 40 Hab / Km^2, being the lowest Ventaquemada and Santa María, with 7.8 and 6.5 Hab / Km2 respectively.

With regard to the concentration of population in the municipality's centers, it can be said that the only municipality in the jurisdiction that includes a large number of inhabitants is Garagoa with 16,195 inhabitants. This municipality has better utility infrastructure, health, education, banking and communication channels, providing a good choice for people in the region. Therefore, this municipality is considered a center of regional development. Another municipal center that stands out is Guateque, which, although it has adequate health and education, does not generate large numbers of jobs.

With regard to other municipalities, they have only basic household services and very few health and education services, limited employment opportunities and precarious development with low local attraction for its inhabitants. The municipalities with these conditions are with the smallest population,

[21] ALCALDÍAS MUNICIPALES, Esquemas de Ordenamiento Territorial de los Municipios de la Jurisdicción de CORPOCHIVOR
[22] Corporación Autónoma Regional de Chivor, CORPOCHIVOR. 2010. Atlas Geográfico y Ambiental de CORPOCHIVOR.

which do not exceed 500 people. These municipalities are Almeida, Viracachá, Boyacá and Pachavita.

Unsatisfied Basic Needs (NBI) per capita:

The index of unsatisfied basic needs (NBI) at the level of jurisdiction is 38.88%, higher than the departmental corresponding to 30.77% and the national level (27.78%). According to Unsatisfied Basic Needs Index (DANE 1995), the municipality most disadvantaged population is Sutatenza with an index of 57.7 and Boyacá with 49.91. Garagoa has the lowest indices with 23.28 and La Capilla with 25.3. However, it is important to bear in mind that the population density of the latter two municipalities is significantly greater than that of the municipalities of Sutatenza and Boyacá.

Land tenure:

The properties of most inhabitants correspond to properties in succession or without writings or acquired without registration. Typically, the property is represented by its holders, by family ties or purchase documents, which represents them legal problems when trying to sell. Tenure is characterized by many of the owners live outside the study area and are favored with obtaining natural resources and transformed, as are agricultural and livestock products[23].

Most of the territory of jurisdiction is made up of small farms with extensions under one hectare (55.56%), followed by land covering an area of less than 5 hectares (22.49%). They are registered only 175 farms with over 100 hectares extension (Figure 10)[24].

[23] Environmental Management Plan Regional District Integrated Management (DRMI), *Cuchillas Negras* and Guanque, CORPOCHIVOR, 2015
[24] *Ibid.*

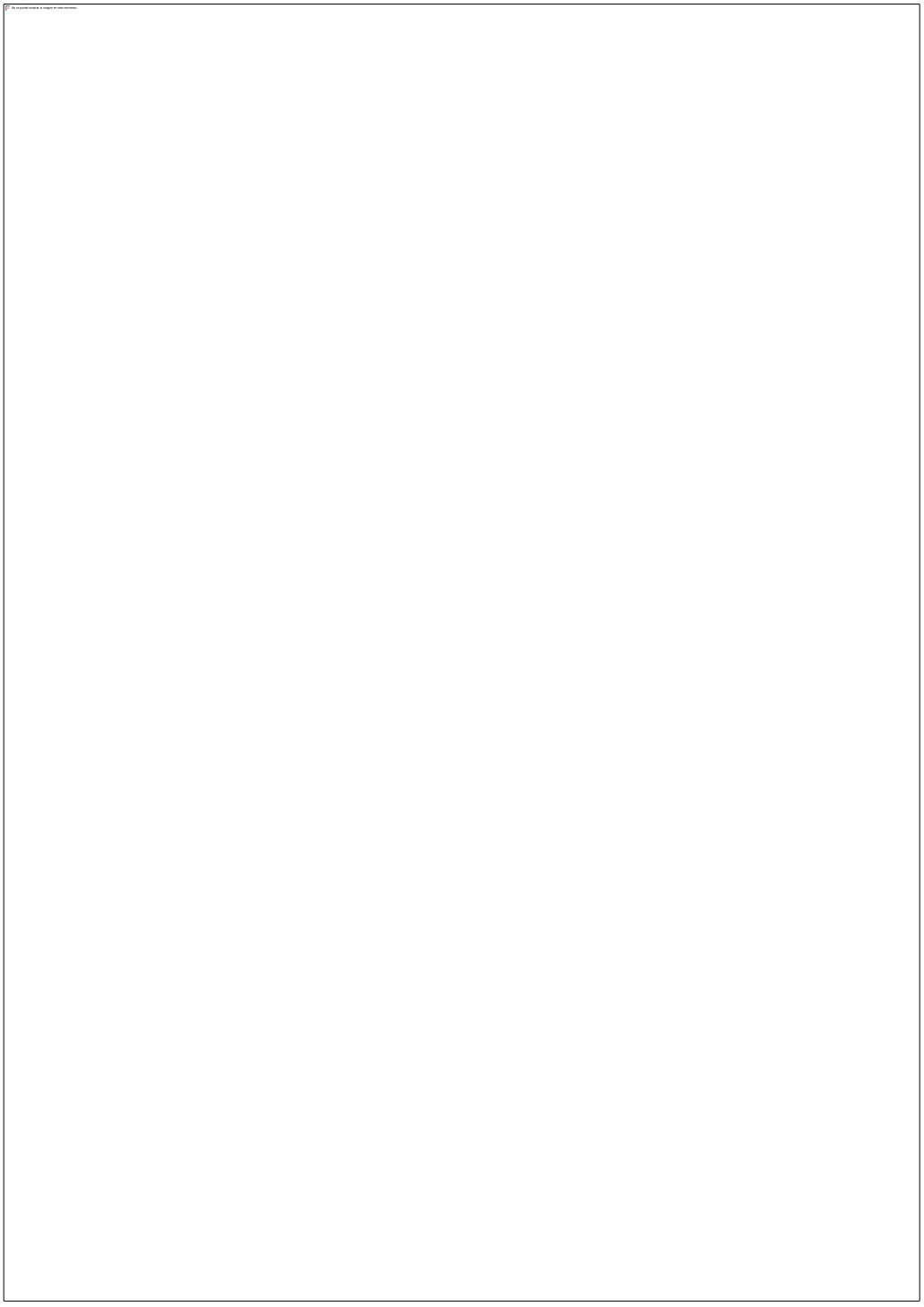


Figure 9. Kind of land tenure in the expansion area of the grouped project

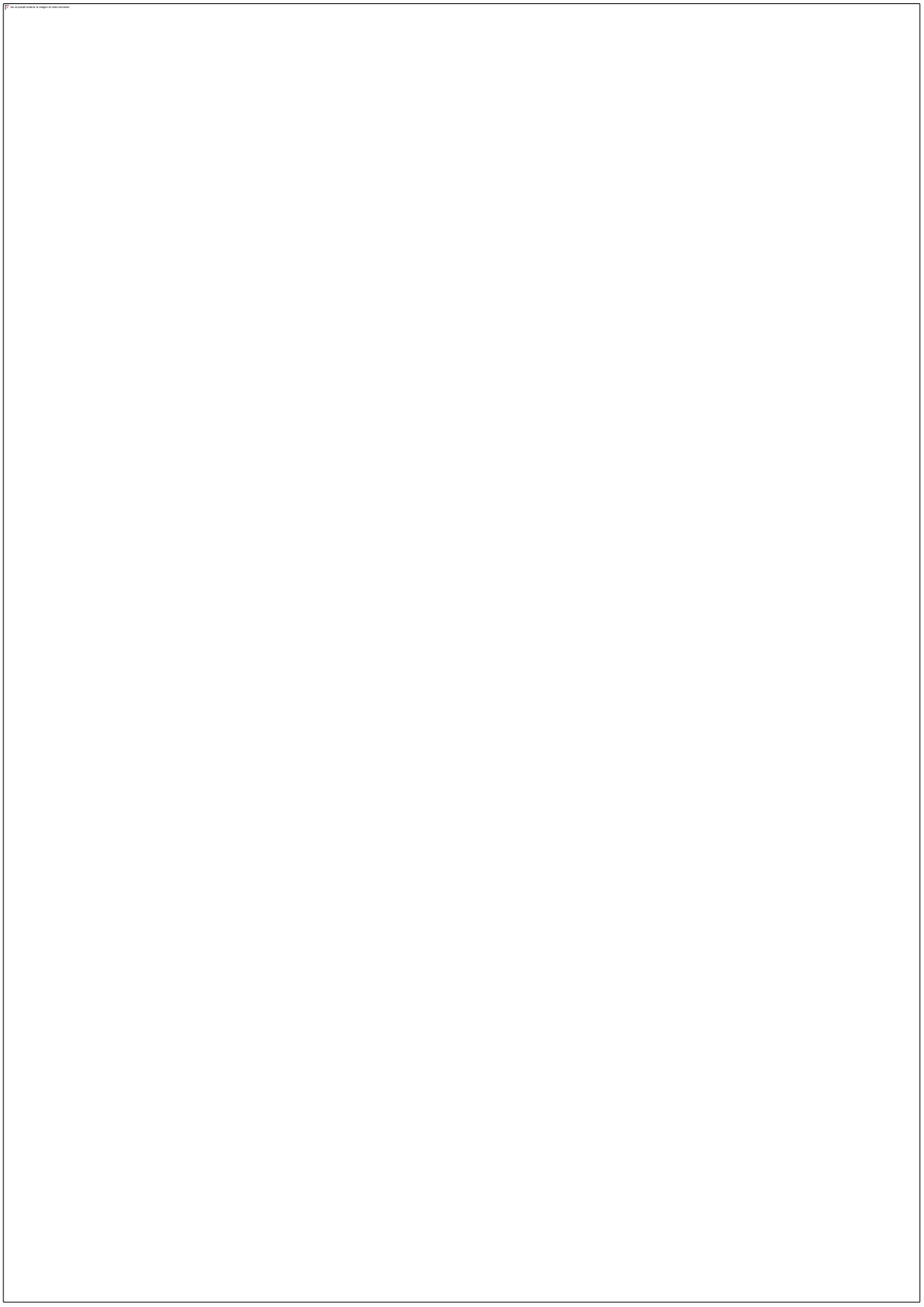


Figure 10. Property size in the expansion area of the grouped project.

- **Ethnic groups**

In the jurisdiction of CORPOCHIVOR, there is no presence of indigenous reserves. The only reservations in the department of Boyacá are located in the municipalities of Cubara and Guican.

- **Migration**

According to the official records of the Administrative Department for Prosperity[25], in the year 2011 240 families were registered under displaced status in the jurisdiction of CORPOCHIVOR.

First instance

Physical parameters:

- *Climate:*

The weather in the area is mainly temperate and cold weather, with annual temperatures vary between 18 ° C and less than 10 ° C respectively. Annual precipitation varies for the entire area between 1000 and 3000 mm. Climatological information presented below corresponds to the IDEAM statistical data obtained at stations located in different municipalities of the jurisdiction and documented in land management schemes in each municipality.

Table 7. Climate of the municipalities of the first instance.

Municipality	Climate
Campohermoso	The annual average precipitation is 3,180 mm, with a variation between 2,050 and 4,040 mm depending on the altitude. The rainy period starts in March and finishes on October. The annual average temperature is 21 °C. According to Holdridge, the municipality is classified as very humid premontane forest.
Chinavita	The annual precipitation is 1,600 mm and their distribution is mono-modal type. The annual average temperature is 17°C. The municipality is located between 1,900 and 2,150 meters. This municipality has very humid to semi-humid climate according to its biophysical conditions.
Chivor	The average annual precipitation is 2,900 mm. It has an average annual temperature of 18.2°C. According to Holdridge and taking into account the

[25] Source: SIGOT (Geographic information system for planning and land use planning), according to the Register of the Displaced Population (RUPD).

Municipality	Climate
	distribution of the height, the municipality has two types of climatic zones: Very Humid Forest Montano Low and Wet Forest Premontane.
Ciénega	The annual average precipitation is 1,509 mm. It has an average annual temperature of 16.4°C. According to Holdridge and taking into account the distribution of the height, the municipality has four bioclimatic units: Lower Montane Rainforest, Lower Montane Dry forest, lower montane rain forest and rain Paramo Subandino.
Garagoa	The annual average precipitation of this municipality is of 1,664 mm. It has an average annual temperature of 17.7°C. According to Holdridge and taking into account the distribution of the height, the municipality has four bioclimatic units: Humid Forest Montano Low, Low montane wet forest, wet forest and wet forest Premontane Montano.
Guayatá	The annual average precipitation is 1,325 mm. It has an average annual temperature of 17.7°C. According to Holdridge and taking into account the distribution of the height, the municipality has two bioclimatic units: Humid Forest Montano and Transition humid montane forest to dry forest Montano.
La Capilla	The annual average precipitation is 1261.8 mm. It has an average annual temperature of 17.9°C. According to Holdridge and taking into account the distribution of the height, the municipality has three bioclimatic units: Humid Forest Montano Under humid montane forest and wet forest Montano.
Macanal	The annual average precipitation in this municipality is 2,054 mm. The annual average temperature of the municipality of Macanal is 17.3°C. Four types of climates are presented: damp cold (at altitudes between 2,000 and 3,000 m.a.s.l, temperatures between 12°C and 18°C and precipitations between 1000 and 2000 mm); very wet cold (at altitudes between 1900 and 2900 m.a.s.l, temperatures between 12°C and 18°C and precipitations between 2000 and 3000 mm); temperate humid (at altitudes between 1000 and 2000 meters above sea level, temperatures between 18°C and 24°C and precipitation between 1000 and 2000 mm) and temperate very humid (at altitudes between 1000 and 2000 meters above sea level, temperatures between 18 ° C and 24 ° C and precipitations between 2000 and 4000 mm).
San Luis de Gaceno	The annual average precipitation is 4,026 mm, and their distribution is a mono-modal type. The monthly average temperature is 23°C with a maximum temperature of 25°C. The life zones present in the municipality according to Holdridge are humid tropical forest and humid premontane forest.
Santa María	The annual average precipitation is 4,890 mm, and their distribution is a mono-modal type. The monthly average temperature ranges between 22.9°C and

Municipality	Climate
	26.5°C. The life zones present in the municipality according to Holdridge are humid premontane forest and rain premontane forest.
Tibaná	The spatial distribution of precipitation is bimodal type with abundant precipitation between May and August with a maximum centered on July and a dry period at the end and the beginning of the year. The average annual precipitation in the municipality is 933 m.m. Tibana has two types of climate: wet cold (present at altitudes between 2,000 and 3,000 m.a.s.l), and with indice of humidity of 60 and 100% and Cold dry (at altitudes between 2,000 and 3,000 m.a.s.l, with an average temperature 12°C and 18°C) and with indice of humidity between 20 and 60%.
Umbita	The annual average precipitation is 1064.1 mm. It has an annual average temperature of 14.3°C. According to Holdridge and taking into account the distribution of the height, the municipality has four bioclimatic units: humid montane forest, montane rain forest Low, moist montane forest and Andean *paramo*.
Viracacha	The annual average precipitation is 1981.2 mm. It has an annual average temperature of 16.1°C. According to Holdridge and taking into account the distribution of the height, the municipality has four bioclimatic units: Low humid montane forest, montane wet forest and lower montane dry forest and montane wet forest.

- *Hydrogeology:*

In the project area there is a high presence of areas of infiltration of rainwater. These areas have significant amounts of surface water and areas of high potential for the development of projects using groundwater, especially in the municipalities of Ciénega, Ramiriquí, Tibaná, Úmbita and Viracachá, belonging to the province of Márquez. In this province, there are aquifers with highly productive.

In contrast, in the municipalities of Garagoa, Chinavita, Macanal, Chivor, Guayatá and La Capilla, *aquicludes* are in large percentage, which are not suitable for the use of groundwater. Currently, most of the water used is taken from surface sources; however, in some municipalities in the province of Márquez this resource is scarce, especially during the dry season, so communities have seen the need to make use of other sources of supply such as drilling wells.

- *Hydrography:*

The project area of the first instance is part of a network consisting of 4 water pipes, 420 water gorges and 9 rivers. It should be noted that the Garagoa River is the largest basin of the jurisdiction, covering 60.71% of the total area. This area is organized through joint commission with CORPOCHIVOR, the Local Environmental Authorities of Boyacá and Cundinamarca (CORPOBOYACÁ and CAR) from 1st September 2006.

The river Garagoa begins in the Rabanal *Páramo*, on the border of the municipalities of Samacá and Ventaquemada; it receives waters of the Juyasia, Albarracín or Turmequé, Bosque, Súnuba and Fusavita rivers. All the waters of this basin are deposited in the reservoir of La Esmeralda, which is used for the generation of electricity in the Chivor hydroelectric plant. This plant provides the country with 8% of its total energy consumption.

Socioeconomic parameters

Municipalities within the first instance, due to its location, have strategic and important factors at the departmental and national levels, such as the hydroelectric Chivor plant (La Esmeralda Dam) and the alternative pathway to *Los Llanos*. This route has served as communication to connect the Sabana of Bogotá with the Colombian Orinoquía (when problems occurs at the main road Bogotá – Villavicencio).

- *Economic activities*

A brief description of the state of the economy by sub-sectors is described below. The detailed information can be found in document Objetivo_1.4.2_C.Económica. The source of these data are the "Municipal Agricultural Assessments Regional Agricultural Planning Unit (URPA, in Spanish)" (attached to the Ministry of Agricultural Development of Boyacá in 2010). Production volumes, area planted, harvested and production by crop farms can be found in these data described above[26] (See supporting document "*Agricultural information*").

a) Agriculture:

Crops in the project area are different due to the variety of levels of altitude[27]. This situation has allowed them to adapt different varieties of agricultural seeds in the territory as the harvest time.

Table 8. Permanent and seasonal crops at the first instance.

	Crop	Scientific Names	Municipalities
Permanents Crops	Lulo	*Solanum Quitoense Lam*	Viracachá, Tibaná, Macanal Ciénega, Garagoa, Chinavita, La Capilla and Guayatá
	Tree tomato	*Cyphomandra Betacea*	Viracachá, Úmbita, Tibaná, Macanal, Ciénega, Garagoa, La Capilla, Guayatá and Chivor
	Sugar cane	*Saccharum officinarum*	Úmbita, Tibaná, Macanal, Garagoa, Chinavita, Guayatá and Chivor
	Coffee	*Coffea arabica*	Macanal, Garagoa, Úmbita, Chinavita, La Capilla, Guayatá and Chivor

[26]URPA, Municipal Agricultural evaluations, 2010, Secretary of Agricultural Development, Government of Boyacá
[27]Grötzbach 1988, López 2004, Monsalve 2006

Seasonal crops	Beans	*Phaseolus vulgaris*	Viracachá, Úmbita, Macanal, Ciénega, Garagoa, Chinavita, La Capilla and Chivor
	Peas	*Pisum sativum*	
	Potatoes	*Solanum tuberosum*	Viracachá, Úmbita, Tibaná, Ciénega, Garagoa y Chivor
	Other crops: beans, stuffing cucumber. Other Crops (less common): peas, passion fruit, gooseberry, sugarcane for honey, sago, parsnips, cassava, corn and traditional potato crops (seasonal crops).		

The seasonal potatoes are characterized as the predominant crop of the smallholder area in the department of Boyacá. This area has 40,000 producers who take their incomes from the production of this crop (Fajardo, 1984). Generally, municipalities dedicated to this crop have cold climate. Potatoes crop was the most planted and harvested crop (53% in total) in 2010.

b) Livestock sector:

In the project area and traditional and extensive livestock are very common practices. The expansion of livestock has affected forest areas located in areas with adequate slope for livestock.

According to EVAs[28], between 2010 and 2014 a variation in the extent of area dedicated to livestock (**Figure *11***) was presented. The growing trend was more visible in the municipalities of: La Capilla (3,512 ha), Ciénega (2,570 ha), Chivor (2,437 ha), Viracachá (1,408 ha) and Guayatá (540 ha). The municipalities with less livestock growth were: Tibaná (4,666 ha), Úmbita (4,558 ha), Macanal (1,335 ha), Chinavita (1,011 ha) and Garagoa (100 ha).

[28] Agricultural Assessments

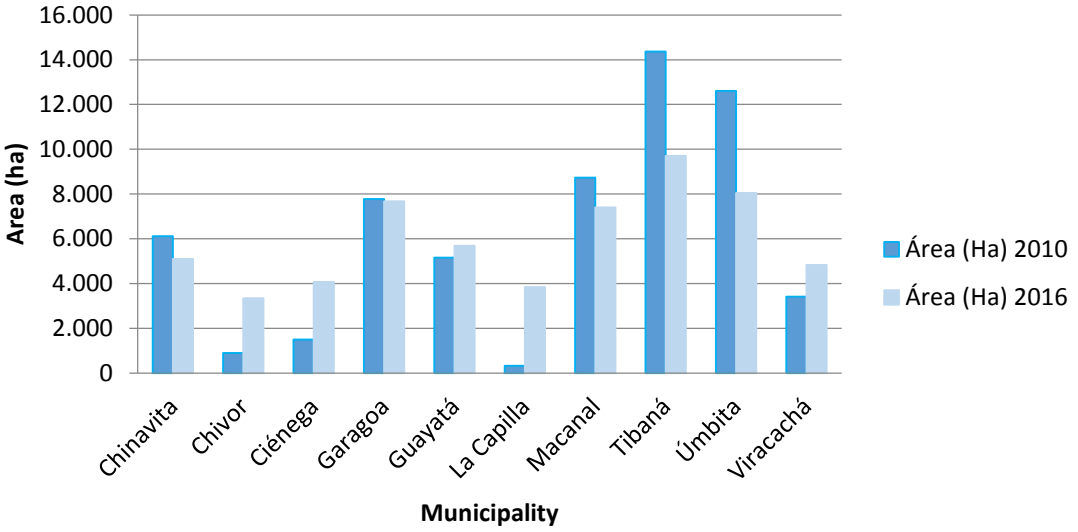


Figure 11. Area occupied by livestock in the municipalities in the first instance for the years 2010 and 2014.

In the project area there are presented five types of grazing: natural, improved, cutting, forage crop and silvopastoril. Natural grass is the most extensive grazing type presented in all municipalities. Improved pasture is the second most extensive, mainly in Macanal. Grass cutting has a great influence on Guayatá. The other types of grazing are not common and exist in small proportions.

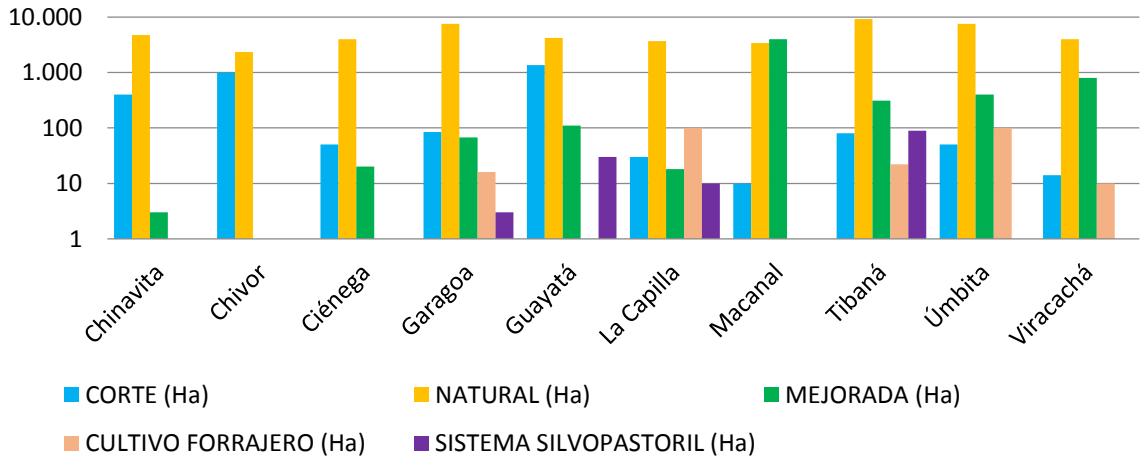


Figure 12. Participation of the types of grazing in the municipalities of the first instance in a period of time

Table 9. Types of livestock (purposes).

Municipality	Purpose	%	Main cattle breed or predominant breeds	Producing units
CHINAVITA	Milk	20.00	Normande	48
	Meat	15.00	Zebu	30
	Dual-purpose	65.00	Normande	251
CHIVOR	Milk	29.00	Zebu x half-breed	30
	Meat	46.00	Zebu x half-breed	48
	Dual-purpose	25.00	Zebu x Normande	26
CIENEGA	Milk	25.00	Normande x Native	
	Meat	25.00		
	Dual-purpose	50.00		
GARAGOA	Milk	36.00	Normande	389
	Meat	45.00	Brahman x Native	486
	Dual-purpose	19.00		205
GUAYATA	Milk	35.00	Normande	220
	Meat	60.00	Zebu	380
	Dual-purpose	5.00	Normande	75
LA CAPILLA	Milk			
	Meat	20.00	Native x Zebu	150
	Dual-purpose	80.00	Native x Zebu	360
TIBANÁ	Milk	10.00	Native x Normande	

Municipality	Purpose	%	Main cattle breed or predominant breeds	Producing units
	Meat	20.00	Native x Zebu	
	Dual-purpose	70.00		
ÚMBITA	Milk	67.00	Normande	700
	Meat	33.00	Normande	120
	Dual-purpose			
VIRACACHÁ	Milk	4.00	Holstein	8
	Meat	3.00	Normande	6
	Dual-purpose	93.00	Native x Normande	295

Mining sector:

In the first instance, coal mining occurs mainly in the municipalities of Úmbita and Tibaná and several neighboring villages; in most mines still artisanal [29]mining is used. This type of activity has generated over the years environmental problems and social conflicts. Mining activity is in production on a small scale and are in the process of legalization with INGEOMINAS or operates in a state of illegality at the environmental level.

Another type of mineral exploitation is mining emeralds in the municipalities of Chivor and Guayatá. In the case of Chivor, its economy is based largely on mining emeralds since 1537[30]. In the other municipalities in the region, the extraction of aggregates and construction materials for road maintenance activities is carried out.

Natural resources exploitation

AES CHIVOR Company S.A. E.S.P operates the hydroelectric plant La Esmeralda. This is a macro project affecting the municipalities of: Santa Maria, Macanal, Chivor, Almeida, Somondoco, Sutatenza and Garagoa.

- **Migration**

[29] Ibid.
[30] Territorial Municipality of Chivor, Land Management Scheme

According to the official records of the Administrative Department for Prosperity[31], in the year 2011 111 families were registered under displaced status in the municipalities of the first instance.

Design and limits of the project

G1.4. Define the limits of the Project Area where project activities seek to generate net climate benefits and Project Area where project activities are implemented.

Project area

According to the methodology (VM0015), the project area covers only areas of forest[32, 33] belonging to the owners involved in the project activities of the first instance. The project area is the first instance in the jurisdiction of the following municipalities: Chinavita, Chivor, Garagoa, Guayatá, La Capilla, Macanal, Tibaná, Úmbita, Viracachá, Campohermoso, San Luís de Gaceno and Santa María.

[31] Consultation by SIGOT, according to the Register of the Displaced Population (RUPD)
[32] Areas that meet the definition of forest of Colombia according to CDM: https://cdm.unfccc.int/DNA/index.html. They were included only the areas of natural forest. Forestry plantations and agroforestry systems that meet the definition of forest were excluded.
[33] Minimum area of land of 1.0 hectares (ha) with canopy (or equivalent stocking level) of more than 30% and trees that can reach a height of 5 meters (m) at maturity *in situ*. Source: Ministry of Environment, Housing and Territorial Development. Forest definition of project land use, land use change and forestry for the first commitment period - COLOMBIA.

Figure 13. Project area

Project zone

The project zone covers the entire area of the site of the project participants, including the areas of forest and non-forest areas. Project activities will be conducted in the areas of non-forest holdings. Moreover, being a grouped project, the project area can be expanded including new areas in the region expansion project. While the benefits of reducing deforestation activities can impact communities outside the farm boundary, the project area includes only the first instance areas where the project proponent is certain to conduct monitoring activities. All this because the configuration of land tenure in the region is private, which makes difficult access to monitoring.

Figure 14. Project zone

G1.5. Explain the process of stakeholder identification and analysis used to identify Communities, Community Groups and Other Stakeholders.

Communities involved in the project "Scheme of Compensation for Ecosystem Services for Forest Management and Conservation of water sources in the jurisdiction of CORPOCHIVOR" are farmers, owners of land with forest areas dedicated to agricultural subsistence activities. In order to involve the rural communities, representatives of groups such as the Community Action Boards (JAC) and the Boards of Aqueduct in villages were identified, some of them are groups of civil society and landowners. The leaders of every community were identified as well.

In the case of communities that are in the project area (but outside the project area), producer associations, trade associations and government institutions of the prioritized municipalities were identified.

Steps to identify the main stakeholders

The procedure followed for identifying stakeholders was established in several steps (See Figure 15). Firstly, in order to find the main stakeholders, and to obtain the main information from those who would participate in the project, an investigation of possible key stakeholders was developed through secondary sources of information.

Secondly, once identified the potential stakeholders, field work (surveys) were conducted, which allowed to know and characterize in-depth all the stakeholders, understand the internal logic of the communities in the project area and analyze the possible reactions facing the actions and / or activities to carry out.

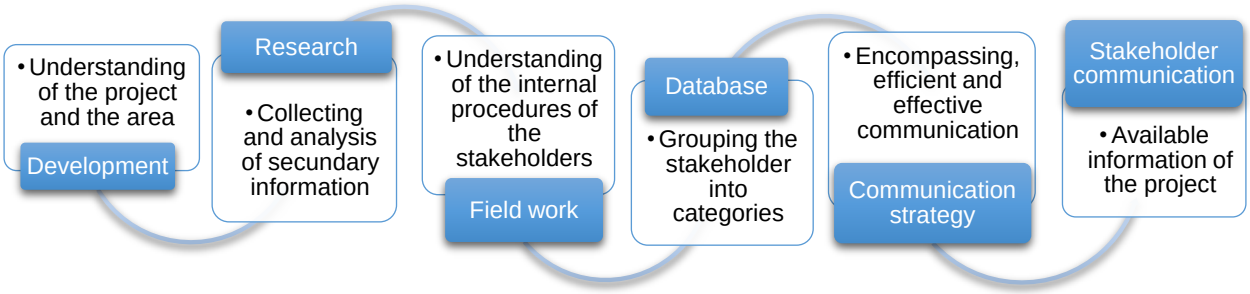


Figure 15. Steps to identify the main stakeholders

With the results of research about the stakeholders actors and the fieldwork, a database was developed classifying the stakeholders into communities, community groups and other stakeholders (see Annex data base Stakeholders). In this database the contact information was included. Nevertheless, the classification by municipality and their relevance within the project was not included.

Once the contact information and the details were organized and classified, the first approach was conducted in order to start the organization of stakeholder consultation. These processes were led by the Project Proponent of the project (CORPOCHIVOR). The strategy of communication was based

on a mass dissemination of information about the project and the schedule of the stakeholder consultation. The main objective was to disseminate in an effective way the information of the project and give the communities the opportunity to take part in the stakeholder consultations.

Finally, the information about the project was put at the disposal of the communities and other stakeholders identified and the stakeholder consultation was conducted. This consultation was developed in three main steps: initial presentation of CORPOCHIVOR, project details and lastly rounds of questions and comments.

Regarding the process of identification, a balance between leadership characteristics (people who inspire respect), confidence (related stakeholders), gender (enforcement of women participation), democratic characteristics (elected representatives), education level or literacy (acceptable level of literacy for effective participation in the study) was sought.

G1.6. List all Communities, Community Groups and Other Stakeholders identified using the process.

The main stakeholders and the analysis of the rights, their interests and the relevancy in the project are described below.

Communities

The communities identified are farmers and/or landowners because they earn their incomes and livelihoods from the Project area. As well, they follow homogenous patterns of social organization and political structure.

Table 10. Analysis of Communities

Communities			
Classification	**Rights**	**Interests**	**Relevancy**
Farmers	• Ensuring the minimal well-being at work. • Express opinions, review, report and propose improvements in their working environment • Be trained on issues related to project activities. • Delivering opinions on the impact of projects on direct or indirect interests of the community	• The way of life and their families are directly dependent on project activities. • Protect the interests of the community about the development of the projects that impact directly or indirectly to environmental, economic or social conditions of the area of influence.	• Direct participation in project activities. • Beneficiaries of the direct and indirect impacts of the project related to climate, biodiversity and communities.

Community Groups

Community groups are subgroups of Communities who earn similar incomes and livelihoods from the Project area. Nevertheless, their interest and values are different from other social groups such as indigenous people or other cultural and economics groups. The classification of these other groups are groups whose way of life is affected by the activities projects.

Table 11. Analysis of Community Groups

Community Groups			
Classification	**Rights**	**Interests**	**Relevancy**
Peasant women	Ensuring the minimal well-being	Strengthening the livelihoods of the stakeholders and their families are directly dependent on project activities	Women's associations for their collective actions favor the emergence of new individual and group identities. In addition to contributing to the active exercise of citizenship
Community Actions Board	They promote local development plans for improving their policies regarding the local reality, regional and national and to enable a planned and harmonious progress according to their needs through projects that improve the quality of life of inhabitants.		

Women's associations allow optimum use of human resources and generate spaces with rebuilding the social fabric of rural communities. Accordingly, equal opportunities must be systematically integrated into the phases of design and implementation of programs and projects of urban and rural development in order to ensure that women and men can participate in and receive benefits equal[34].

Other stakeholders

According to the manual of the CCBA, "other actors" identified in the project covers all groups other than the Communities that may affect or be affected by the project activities and that can live inside or outside the project area. In this case the guilds, associations, cooperatives, businesses, foundations, community leaders, NGOs and others who have an interest in activities and project proposals were identified[35].

Through the actors described in Table 12, the peasant communities (small farmers) can expand their operations, access resources in isolation would not be available, take better advantage of trade and the efficient use of natural resources. They are also key because through these can develop the

[34] European commision, General Direction Agriculture, 2000. Participation of women in rural development. Available in: http://ec.europa.eu/agriculture/publi/women/broch_es.pdf
[35] In the database, is listed in detail each of the actors identified within each category (Guilds, Committees, Associations, NGOs and the private sector).

activities proposed in the project, helping their members to improve the profitability of smallholder agriculture and to make decisions that concern them.

Table 12. Analysis of other stakeholders

Other stakeholders	
Classification	**Relevancy**
Guilds	They are important in strengthening productive chains in the region, and contribute to economic development within and outside the project area. They express common interests with its affiliates and are important players in the direct participation of project activities.
Environmental Association	They are associations seeking to protect the environment from activities that cause degradation and promote community social development in the region.
Farmers Association	They promote agricultural development and the welfare of producers in the region and serves as a channel between different groups and community actors.
Artisans Association	Promote handicraft production using the natural resources of the area as a raw material.
Coffee growers Association	They work to meet the needs of its members and the community. Moreover they boost their crops and venture into promoting sustainable crop production chains.
Disabled people Association	They have a criterion of globality and integrity in their actions towards promoting greater well-being of this vulnerable population.
Association of pastoral farmers	They help improve livestock production through friendly practices with the environment and conservation of natural forests on farms in the area.
Committees	Their function is to ensure the welfare of farmers, coffee growers and their families.
NGOs	They actively contribute to the social, cultural, economic, political and environmental areas, by involving different actors of civil society in projects and programs that advance, promoting changes and transformations at national and regional local level.
Private Companies	Private companies play an important economic and ethical role in relation to preserving the environment and promoting the welfare of the community, care and environmental responsibility, as it is a task that is performed together.

G1.7. Provide a map identifying the location of Communities and the boundaries of the Project Area(s), of the Project Zone, including any High Conservation Value areas (identified in CM1 and B1), and of additional areas that are predicted to be impacted by project activities identified in CL3, CM3 and B3.

The area contains globally, regionally or nationally significant concentrations of biodiversity values as clearly exposed by the status of IUCN red list regarding some of the species present in the project zone (forest and moorlands).

The HCVs identified in the project zone are:

- HCV1: Concentrations of biological diversity including endemic species, and rare, threatened or endangered species.
- HCV 4: Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.
- HCV6: Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous people.

Figure 16. Communities, PA, PZ and HCV

G1.8. Briefly describe each project activity and the expected outputs, outcomes and impacts of the activities identifying the causal relationships that explain how the activities will achieve the project's predicted climate, community and biodiversity benefits.

The activities proposed to avoid deforestation are presented below.

Table 13. Activities to reduce deforestation and relative to the benefits provided by the project

Activity	Objective	Products	How climate, social and biodiversity expected benefits will be achieved?
Education, training and strengthening citizen participation	Strengthening environmental education and training, creating attitudes and behaviors that raise awareness among citizen participation in the conservation and protection of the environment and natural resources.	• Enjoyable and theoretical/practical workshops on issues related to use of fertilizers, herbicides, pesticides, water management, biodiversity conservation, among others • Awareness-raising events on environment and culture • Assistance and support in the development and implementation of projects, with emphasis on recognition of the land tenure	The current economic growth and social development has negatively influenced the rampant use of natural resources. Rural communities that depend directly on logging, either for expansion of their productive activities or for family support (extraction of firewood, medicines and food) have limited access to quality education and environmental education, in particular. That is why their behavior often responds to ignorance of basic concepts. In addition, there is a lack of awareness of the importance of its territory. The REDD + project is seeking to people appropriate their territory, know and defend it against any action or activity that threatens forests, water sources and the other ecosystem services. Education activities will be aimed at empowering children, youth and community about the importance of conservation of biodiversity and. Workshops and training will also be aimed at families of small, medium and large producers, whose activity depends on the direct land use within the territories prioritized criteria.
Conservation, restoration and sustainable management of strategic	Develop activities which foster conservation, restoration, administration and sustainable management of strategic ecosystems and biodiversity existing in the selected	• Reforestation protective-producer. • Restoration of water and forest areas	The planned reforestation activities will establish native species as a priority. They will contribute to the recovery of ecosystems and improving biological corridors, to ensure the survival of endangered, endemic species and migratory species. The support will consist of input distribution and execution of training and monitoring of the species planted,

Activity	Objective	Products	How climate, social and biodiversity expected benefits will be achieved?
ecosystems and biodiversity	municipalities for REDD + project through participatory processes and awareness	• Management of incentives for conservation • Protection of sources and isolation areas in the water and forestry sector • Prioritize and declare regional strategic areas • Adopt management plans of protected areas declared by law • Handling disruptions measures between wildlife - domestic animals	in order to ensure their permanence in each of the properties involved in the project.
Crops improvements	Improve crops and marketing (production chains), through the identification of crops that are within the premises of the participants, in order to characterize their productivity and recognize the inputs, tools and yields. Improving crop seeds involves obtaining high yields, improve soil quality, reduce the amount of inputs used, promote the use of organic fertilizers, diversify	• Advice and environmental support. • Establishing demonstration plots in agroforestry systems. • Analysis of productivity of the implemented system vs conventional systems	The reduction of the expansion of agricultural activities into forest areas is expected while maintaining the size of the production area and improving the level of productivity. This activity seeks to promote a production that minimize waste and increase quality of products, so that in this way can be included in a value chain that monetarily benefits the producer.

Activity	Objective	Products	How climate, social and biodiversity expected benefits will be achieved?
	production, training of farmers, among others. Promote proper land management by implementing agroforestry systems in the ten municipalities that are part of the project area.		
Home vegetable gardens	Promote food security with the implementation and use of complementary food systems	○ Advice and support on nutritional use and food preparation. ○ Implementation of family vegetable gardens with a focus on food sovereignty.	The project seeks to implement agroecological family gardens, with family basic agricultural products consumption, including tubers, vegetables, herbs and fruit, able to meet basic household food needs. Also, it is intended that people reduce their dependence on regional markets for staple foods with the aim of being able to secure a healthy and balanced diet in their homes. At the same time, they can save money while conserving and managing sustainably forests.
Silvopastoral systems	Promote proper management of land dedicated to livestock through the implementation of low impact systems.	• Promote proper management of land dedicated to livestock through the implementation of low impact systems • Establishment of silvopastoral systems	Extensive livestock farming has become the main cause of deforestation within ten municipalities that are part of the REDD + project. This is because this type of farming processes involves expansion into forest areas, which are usually located in the highlands of the Andes mountains, and even to areas of sub *Páramo*. The development of livestock in areas suitable for forestry implies that cattle pastures count with low quality in their protein content. This situation results in decreased supply of pasture and the displacement of livestock to areas not

Activity	Objective	Products	How climate, social and biodiversity expected benefits will be achieved?
			occupied or unproductive in the short term, usually called "stubble" or wooded areas. Improved pastures in association with the establishment of forest species, as part of a silvopastoral system, involves obtaining a greater supply of high quality pasture in a smaller area. Higher productivity per unit area and thus involves having a better fed cattle. The selling price in the market could be significantly larger and capable of generating additional income to the producer. These systems allow the conservation of forest territories and hence carbon content, while the farmer operates in a sustainable manner.
Ecotourism	Create an alternative sustainable development through the strengthening of ecotourism.	• Implementation and / or strengthening of ecological trails in priority municipalities • Structure of service providers for the functionality of trails.	Ecotourism can be an economic alternative for those owners who own forests and natural landscapes that for its beauty should be preserved and it can become tourist attractions. Owners who wish to develop this activity should consider that the permitted activity within their farms will be the conservation and sustainable management of natural resources. Thus the entrance to the public will be allowed to promote the enjoyment of the natural sites. This entry should involve basic restrictions for conservation sites (forestry use, hunting and agricultural development of high-impact activities) As part of the REDD + project, owners who want to run this activity will receive incentives, advice and training related to sustainable tourism. They will also take into account the

Activity	Objective	Products	How climate, social and biodiversity expected benefits will be achieved?
			legal implications and use restrictions associated with the development of ecotourism.
Cookstoves	Reduce degradation of the forests within the jurisdiction through the establishment of cookstoves	Establishment of cookstoves taking into account the selection criteria described by CORPOCHIVOR.	Through the establishment of XXX cookstoves, the number of people with lung diseases. Eye disorders and other cardio-respiratory diseases are expected to be reduced. This represents an improvement in housing as well, by reducing pollution in the kitchen because of the smoke and micro-particles. Finally, it is expected to improve climate impacts through reduced consumption of firewood, and therefore the pressure on the remaining forests will be reduced. This will contribute to reducing CO_2 emissions to the atmosphere.

In addition to the activities described, CORPOCHIVOR has identified the following measures to encourage and facilitate owners participating in the project and protection of forests:

- Advice concerning the procedure to clean up the land tenure: In the department of Boyacá 70% of rural properties have some character of informality or false tradition and that allows those who possess these areas do not have access to state services (financial, public and institutional). Therefore, the project is expected to support owners interested in participating in obtaining legal title to their land. This activity would also have a great effect on the community in terms of entrenchment and governance over its territory and its capital strength on production and development.
- Management before municipal entities to reduce taxes wooded area. These procedures take into account that the owner is not making productive activities in these areas but they are protecting it. This could generate a great positive impact, as farmers are generally encouraged to deforest if low productivity of the land does not allow them to realize profit expectations. However, this measure is subject to approval by the City Council and the municipal administration of each municipality.

G1.9. Define the project start date and lifetime, and GHG accounting period and biodiversity and community benefits assessment period if relevant, and explain and justify any differences between them. Define an implementation schedule, indicating key dates and milestones in the project's development.

The project start date is April 11, 2014 and the end date is April 10, 2044. The project lifetime is 30 years and 0 months.

The GHG accounting period and biodiversity and community benefits assessment period is 30 years and 0 months.

The projected implementation schedule for the first instance and the grouped project is presented in Table 14.

The baseline will be reassessed every 10 years after the project start date and during the crediting period and will be subsequently validated at the same time as the verification.

Table 14. Implementation schedule of the project activities, for the grouped project

Activity	Year /expected year
Start date	2014
Validation/registration	2017
Implementation of project activities	2014 - 2044
Project participants engagement first instance	2015 - 2019
First monitoring period	2014 - 2022

Activity	Year /expected year
First verification	~ 2022
Validation of second instance	~ 2022
Project participants engagement second instance	2019 - 2022
Baseline reassessments	2024, 2034

Risk management and long-term viability

G1.10. Identify likely natural and human-induced risks to the expected climate, community and biodiversity benefits during the project lifetime and outline measures needed and taken to mitigate these risks.

Possible risks that may affect the benefits of the project and the measures taken are:

a. Forestry fires:

To manage this risk CORPOCHIVOR has adopted contingency plan to cope with El Niño[36], which establishes the guidelines and organizational basis to ensure preparedness and risk reduction of adverse effects of El Niño 2015-2016. This plan includes the following steps:

1. **Prevention and Preparedness:**
- Socialization and awareness about El Niño and Contingency Plan, including a promotion about the adoption of the Contingency Plan among the municipalities
- Prohibition of conducting controlled burns
- Check constantly IDEAM information web portal on early warnings
- Provision kit fires in the municipalities of Guayatá, Garagoa and Turmequé (where Cilvil Defense Agencies relief)
- Defining risk scenarios and identify operational capabilities to address them
- Perform actions on technical and community level in order to build capacity around climate variability and climate change adaptation

2. **Attention:** issue press releases about the events presented, supporting municipal councils Risk Management and promote the creation of a network with local communities to facilitate the rapid and timely communication.
3. **Rehabilitation and recovery:** support rehabilitation and recovery through reforestation of areas where forest fires and support for the development of projects leading to the recovery of the population for water supply systems, rainwater collection and others
4. **Monitoring and evaluation:** Keeping updated the system of monitoring and evaluation of actions related to the environmental authority

[36] CORPOCHIVOR 2015. Resolution 657 of October 26, 2015

Concerning the anthropic fires, it is expected that the project activities, especially those related to education and ecotourism, contribute to raising awareness about the importance of protecting the forest resources and the adoption of better farming practices and management waste.

a. Pests and diseases

This risk is related to alternative crops, home vegetable gardens or silvopastoral systems failures productivity and alternative crops. Management teams include Individuals with significant experience in all skills to perform the necessary duties related to the project activities and selected species. Records of the experience can be found in the supporting documents (see NPRT[37] folder). Also, most of the species planted are proven to be adapted to the same or a similar agro-ecological zone in which the project is located (see B2.5 and B2.6 sections). Therefore, taking into account the technical capacity of CORPOCHIVOR and design of production systems according to the knowledge of the area and the species, it is expected that this risk is minimal.

b. Failure of the owners in reference to forest protection

The project will be backed by conservation agreements signed by the owners voluntarily under prior and informed referring to the benefits and commitments to engage in REDD strategy (see documents of social consultation). Likewise, the strategy of permanent communication with the owners and the community (see section G3.8) and the good results of the project will allow continued ownership of the project by the owners.

c. Lack of budget for implementation of activities and / or project monitoring.

The project will adopt a robust funding mechanism to ensure the capture and flow of financial resources for the implementation of the planned activities, contemplating the creation of a Green Fund financing (see section G1.12). This Fund will shield project around the budgetary capacity of the Corporation, management changes and validity of the Institutional Action Plan of the Corporation[38] currently in effect.

G1.11. Describe the measures needed and taken to maintain and enhance the climate, community and biodiversity benefits beyond the project lifetime.

Among the main measures needed and taken to maintain and enhance the climate, community and biodiversity benefits beyond the project lifetime, are:

- The production systems (vegetable home gardens, silvopastoril systems and alternative crops) will be implemented in line with the experience of the technical characteristics of the areas adapted to the experiences and expectations of the owners. These elements through the credit period will promote continuity of these practices in the future.
- It is expected that the training activities will strengthen the capacity of the owners in their participation in the project.

[37] VCS Non-Permanence Risk and supports Project Management Capacity.
[38] The Institutional Action Plan of the Corporation establishes budget allocation for administrative periods, now 4 years.

- The program model project will enable growth throughout the jurisdiction using the Green Financing Fund (see section G1.12), which will support the sustainability of the long-term.
- The activity concerning the advisory for clarifying the land tenure will have a great effect on the community in terms of entrenchment and governance over its territory and its capital on production and development. This also minimizes the risk for future generations, concerning the use and possession of their lands.
- Reducing the tax burden on the forest area (with respect to the protection of the area and not the production thereof) will be a measure to promote the protection of forests, as long as they can demonstrate the results long term. However, by the time this measure is subject to approval by the City Council and the municipal administration in each municipality for each administrative period.

G1.12. Demonstrate that financial mechanisms adopted, including actual and projected revenues from GHG emissions reductions or removals and other sources, provide an adequate actual and projected flow of funds for project implementation and to achieve the project's climate, community and biodiversity benefits.

Financial mechanisms adopted to ensure the capture and flow of financial resources for the implementation of the planned activities within the scheme envisage the creation of a green fund financing that seeks to involve different sectors of society (See **Figure *17***).

Given this structure, an analysis of willingness to pay (WTP) for the ecosystem service supply by freshwater ecosystems stopped and existing forests in priority areas was developed; in this analysis the possible annual income received by the voluntary contributions of users of water resources for the lifetime of the project (See target document 1.4.6 Benefits Transfer) are presented. In addition, a database of potential contributors (both private companies and donors) was developed. These potential donors will be part of the project leverage (See data base of potential donors).

Another tool that will use the green financing fund is the BanCO2 platform. This scheme seeks to both individuals and legal entities to measure and pay for the use of ecosystem services through a web platform of a bank[39].

[39] For more information, please refer to: http://banco2.com/v2/index.php

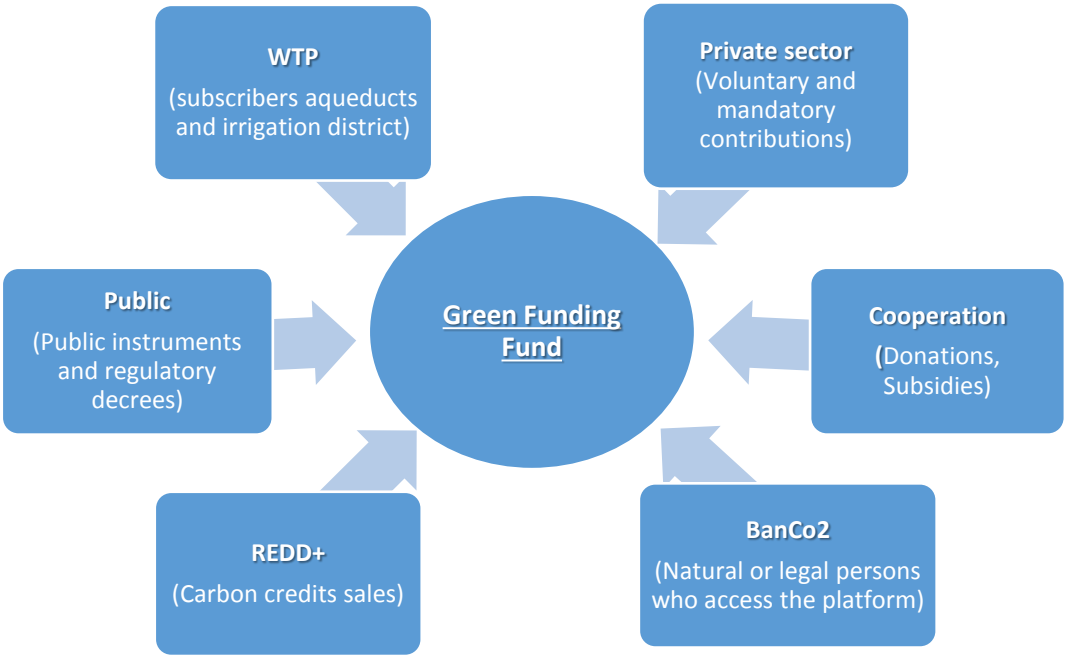


Figure 17. Green Fund funding for the implementation of project activities

Public instruments that the Corporation can use are the pay rates (1% of the municipal collection).

Finally, the expected revenue by selling carbon credits from REDD project registered with the VCS standard is also considered as an important part of the green funding fund.

The funds raised by the Green Financing Fund will serve to ensure the sustainability of project activities long term, as well as monitoring and verification of reducing deforestation.

Program approach

G1.13. Specify the Project Area(s) and Communities that may be included under the programmatic approach, and identify any new Project Area(s) and Communities that have been included in the project since the last validation or verification against the CCB Standards.

Project areas that may be included should be located within the Jurisdiction of CORPOCHIVOR. All owners have to meet the eligibility criteria specified below (G1.14) to be part of the project. New instances have not been yet included in the project to the date.

G1.14. Specify the eligibility criteria and process for project expansion under the programmatic approach and demonstrate that these have been met for any new Project Areas and Communities that have been included in the project since the last validation or verification against the CCB Standards.

The eligibility criteria for project expansion under the program approach, are:

- Letter of intention or conservation agreement signed
  The conservation agreement is signed between the owner and CORPOCHIVOR, where the owner agrees to conserve the forests and the corporation agrees to implement the project activities in each property.

- Representative forest cover
  GIS analysis will be performed to determine the potential forest areas to be deforested in the baseline case.

- Technical land eligibility criteria for forest carbon projects
  Comply with the complete set of eligibility criteria and methodology tools described in Section 2 of the VCS PD.

- Adoption of project activities specified in the PD
  New instances should implement the project activities described in Section G1.8 in their areas.

- Free, prior and informed consent approved
  To include a new instance local consultation should be carried out.

It is expected that the expansion of the project will occur during the monitoring and verification of the previously validated instances. In addition, new instances should comply with VCS criteria:

- Meet the applicability conditions set out in the methodology and tools applied in this project. New instances must comply with 5 criteria (VM0015 methodology described in Section 4.2 of the VCS PD):

  - Unplanned deforestation (agriculture, grazing, fuel-wood, timber, charcoal) as long as fitting with most recent VCS AFOLU Guidelines;
  - Can include one or more activities;
  - Can include multiple forest types, ages, successive stages, agro-forestry, natural, planted;
  - Must have forest classification minimum 10 years before start date;
  - Can include wetland forests unless they grow on peat (at least 65% organic matter, min. thickness 50 cm).

- Have the same baseline scenario determined in the project description which are agriculture and pasture cattle (Section 4.6 of the VCS PD). Determination of baseline scenario is based on the initial project activity instances.
- New instances shall implement the same project activities described in Section 2.2.

- A Non-permanence risk buffer assessment shall be performed for each new instance.

- Demonstration of additionality is based on the initial project activity instances. Face one of the same additionality barriers as the initial project instances (see section G.2). The common practice analysis is necessary to be done by the time of the validation of new instances, in order to demonstrate that the project activity stills not a common practice.

- Not be included in another GHG program.

Inclusion of New Project Activity Instances:

1. Occur within the Corpochvor´s jurisdiction.
2. Comply with the complete set of eligibility criteria for the inclusion of new project activity instances.
3. Be included in the monitoring report with sufficient technical, financial, geographic and other relevant information to demonstrate compliance with the applicable set of eligibility criteria and enable sampling by the validation/verification body.
4. Be validated at the time of verification against the applicable set of eligibility criteria.
5. Have evidence of right of use, in respect of each project activity instance, held by the project proponent from the respective start date of each project activity instance.
6. Be eligible for crediting from the start date of the instance through to the end of the project crediting period.

New instances have not been yet included in the project.

G1.15. Establish scalability limits if applicable, and describe measures needed and taken to address any risks to climate, community and biodiversity benefits if the project expands beyond those limits.

The scalability of the project is limited to the forest cover of the Jurisdiction of CORPOCHIVOR. Primary project proponent is responsible for performing management activities and ensuring the sustainability of forest conservation as well as the monitoring. In addition, the scability could be limited by financial resources. The addition of new instances should have a financial plan and a schedule for activities to ensure the development of the project and achieve the climate, social and biodiversity benefits.

Furthermore, in case new project activities are added, it should have the approval of all project proponents and have the necessary financial resources to promote such activity at least for the initial phase.

Risks associated with the non-continuation of benefits, will be minimized by involving areas with owners committed to the project objectives and that meet the eligibility criteria.

G2. Without-project Land Use Scenario and Additionality

In the baseline scenario, it is expected that forests are converted to non-forest areas by agents of deforestation in the area of reference. Therefore, revenues generated by the REDD+ project will seek to preserve the forest areas that are at risk of being deforested.

The degradation was not included in the project because of the high costs of monitoring and the need for a baseline of forest carbon stocks in different states of conservation.

G2.1. Describe the most likely land-use scenario within the Project Zone in the absence of the project, describing the range of potential land-use scenarios and the associated drivers of land use changes

and justifying why the land-use scenario selected is most likely. It is allowable for different locations within the Project Zone to have different without-project land use scenarios.

For the most likely land-use scenario analysis the latest version of the "Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities - VT0001", Version 3.0 VCS, is used.

Step 1. Identification of alternative land use scenarios to the project activities.

Sub-step 1a: Identification of alternative land use scenarios to the proposed activities of the REDD project.

69% of the jurisdiction of CORPOCHIVOR bases its economy on livestock and agriculture, maintaining traditional ways of establishing crops and grazing for livestock to cut not only the parcel of land that will be used for this purpose, but a much larger area. This indicates that in the absence of the project, the most likely scenario is the loss of forest area because of the expansion of cattle ranching and agriculture. This trend is confirmed taking into account the conclusions of the analysis of agents and drivers of deforestation (see Agents and driver analysis) and changing land covers that occurred between 2000 and 2010.

Deforestation in the reference region is closely related to socioeconomic and cultural phenomena and their location depends on geographical and economic variables; the use given to the soil in these areas is determined by the opportunity cost of land. In the case of the project area for farmers it is more profitable convert forests to carry out agricultural and livestock activities that keep them standing. Therefore, alternative activities in the absence of the project are:

Livestock

According to the analysis of changes in land cover, 8,417 hectares (47% of deforested forests) experienced a transition from forest cover to pasture in the period 2000 - 2010. This pattern of change is common at national and regional level and include people that keep livestock for productive purposes and those seeking to secure land tenure by introducing cattle[40].

Pasture areas in the jurisdiction are characterized by their dedication to extensive livestock farming with a density of less than one head of cattle per hectare[41]. This is an indicator of low productivity in the farms and low technical assistance.

In prioritized municipalities, farmers express the lack of technical assistance for the development of their productive activity[42]. That is why this activity occurs mostly extensively and in a traditional way (Figure 18), which means low-tech and low nutritional quality pasture.

[40] González, J.J., Etter, A.A., Sarmiento, A.H., Orrego, S.A., Ramírez, C., Cabrera, E., Vargas, D., Galindo, G., García, M.C., Ordoñez, M.F. 2011. Trend analysis and spatial patterns of deforestation in Colombia. Institute of Hydrology, Meteorology and Environmental Studies-IDEAM. D.C. Bogotá, Colombia. 64 p.
[41] Given the amount of pastures in the jurisdiction in 2010 and bovine year inventory for the same area.
[42] According to polls of owners in priority areas (2016), the 94.94% of farmers surveyed receive no technical assistance for the development of their productive activity.

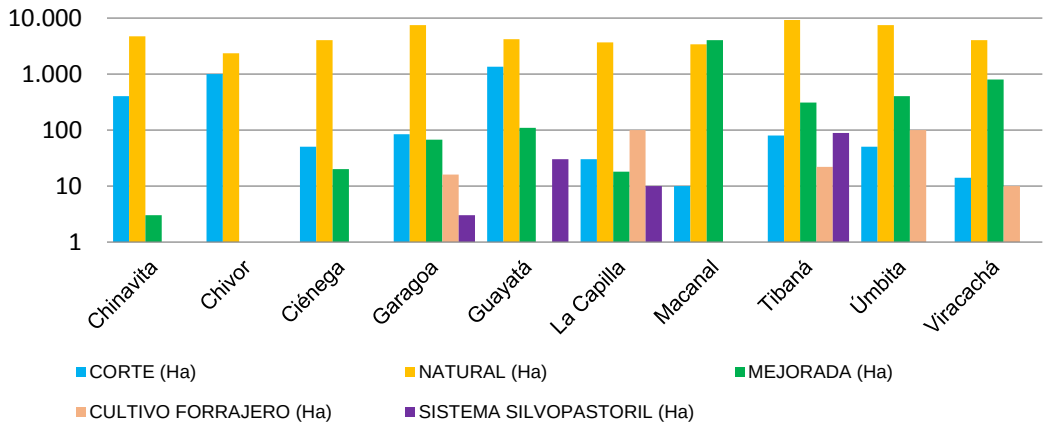


Figure 18. Types of livestock production in prioritized municipalities. Traditional system: orange bars[43].

This form of exploitation is characterized by the large amount of land that cattle need to develop. Farmers call for technical support regarding their production processes in order to identify alternatives that increase the productivity of their business and can get the same or better results than those achieved with extensive livestock[44].

Because of the great importance of livestock in the country and in the department of Boyacá in particular, the sector has great institutional and sectoral support. This strength is reflected in the large number of existing federations: the Colombian Federation of farmers (FEDEGAN), The National Endowment Livestock (FNG), the Stabilization Fund for the Promotion of Export of Meat, Milk and Derivatives (FEP), the Colombian Livestock Foundation (FUNDAGAN) and locally the Federation of Farmers Boyacá (FABEGAN). These institutions and the support of the Ministry of Agriculture promote programs that constantly improve productivity[45], sustainable support systems[46] and associativity of producers. For example, the livestock sector in Boyacá in 2014 created a Dairy Cluster, the formation of various cattle associations and achieving FEDEGAN funded projects in order to consolidate the department as a leader in this activity[47].

- **Agriculture:**

Agriculture is the most important activity in the jurisdiction, characterized by smallholder family farms, not technologically advanced, without specialized tools and dependent on the rainy season. Most of

[43] Consolidated Agricultural (EVAS). Years 2010 and 2014 Boyacá
[44] According to polls of owners in priority areas (2016)
[45] Government of Boyacá, 2015. More resources to strengthen the livestock sector in Boyacá. Available in http://www.Boyacá.gov.co/prensa-publicaciones/noticias/5273-m%C3%A1s-recursos-para-fortalecer-el-sector-ganadero-de-boyac%C3%A1
[46] Fedegan, 2010. Colombian Sustainable Livestock Project. Available in http://www.fedegan.org.co/programas/ganaderia-colombiana-sostenible
[47] Livestock context, 2014. http://www.contextoganadero.com/sistemas-silvopastoriles/asociatividad-pilar-de-la-ganaderia-en-Boyacá-en-2014. Accessed March 8, 2016.

the population engaged in this activity is underemployed and generally work as small independent producers. Generally family labour is employed and sometimes they hire external labour[48].

The most predominant crops in the municipalities of the reference region are temporary crops that occupied the 46% of the total area planted in 2010, followed by permanent crops with 32% and annual crops with 22% (Figure 19).

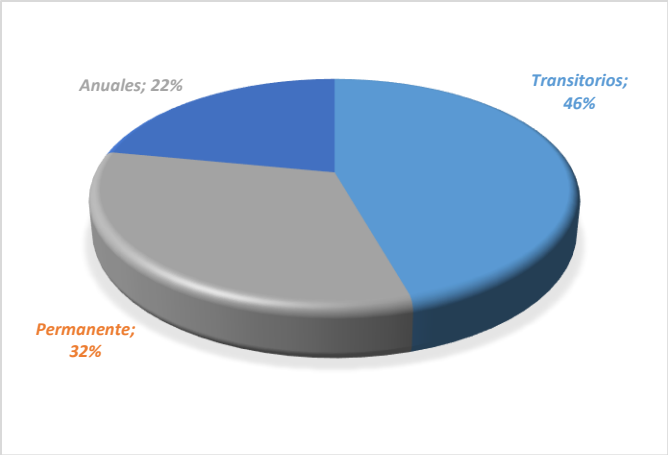


Figure 19. Percentage by vegetative cycle of crops planted

The prevailing practice of this land use is based on the need of populations to meet their food requirements. These are considered as subsistence activities, while for others it means to increase its production capacity by incorporating more land to farming, so it becomes a way to increase family income and complete the family diet. Besides, that the labour supply is based on agricultural activities including the process of land lease which generates significant revenue and is through the elimination of forest cover, the income rises.

Culture plays a crucial role in agriculture, in the absence of other activity, young people follow the same pattern of their ancestors. A householder expands its areas of culture to their offspring possess land to enable till it. Thereby to acquire revenues to sustain its own core. There is then a sum of these activities resulting in new human settlements. This results in an extension of the roads to transport their products and access to services.

Farmers generally are encouraged to deforest if low productivity of the land does not allow them to realize profit expectations[49] because they cannot meet their basic needs. And if farmers wish to increase their income, the trend shows that will increase the area available to develop their economic activity.

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[48] Ministry of environment and sustainable development - environmental compensation fund, Local Environmental Authority of Chivor-CORPOCHIVOR; FORMULATION GENERAL PLAN OF FOREST -PGOF. interadministrative cooperation contract No. 003-10 UDFJDC-CORPOCHIVOR

49 Ministry of environment, housing and development territory-Institute of Hydrology, Meteorology and Environmental Studies-IDEAM. 2011. Analysis of trends and spatial patterns of deforestation in Colombia. Available in: http://www.ideam.gov.co/documents/13257/13817/Proyecciones.pdf/6cad956b-6b92-4320-a090-2000408a5765

The potato crop is the most dominant crops in the department of Boyacá, in different varieties. The potato is the agricultural product of cold weather most important in Colombia, due to: the cultivation, the production value, surface the number of families engaged in this work and because it constitutes one of the main food of the population, with a consumption per capita of about 65 kg per year[50].

In the region, potato production is one of the activities that contaminate the soil the most. This is due to overuse of agrochemicals, which damage the biome soil, pollute water sources and poisons native fauna and air. Also, potato crops are cultivated in high Andean forest land and *páramos,* decreasing the protective forest[51].

Agricultural practices necessary for the installation of this crop started with preparing the soil, which in some regions of Colombia includes slash-and-burn agricultural practices. The first plow breaks the structure of the topsoil, which is damaged and mixed with natural vegetation; to get the land does not lose fertility, after the crop is left fallow for a rotating basis and sometimes goes to grazing for a few months[52]. It is, after deforestation and planting of crops with high impact, livestock become a main activity too. Thus, the loss of environmental soil quality is encouraged by the phenomena of contamination (overuse of agrochemicals and compaction by trampling by livestock.

The relationship between the planted area of this crop and the permanence of forest cover in the project area is reflected in the reduction of deforestation between 2013 and 2014. During this period the cultivation of this product also decreased by 9% in the municipalities of Chinavita, Ciénega, Garagoa, Tibaná and Viracachá (see Agents and driver analysis).

- **Mining**

As mentioned previously, mining is the second productive sector of the department after agricultural activities. In the case of jurisdiction, the mining activity takes place with the exploitation of clays, coal, emeralds, phosphates, sand quarries, gravel, copper ore, iron ore and gypsum.

According to the mining census conducted by the Ministry of Mines and Energy (between 2010-2011), there is 14,357 mining production units (PSUs) in Colombia, 18% of them were located in Boyacá. This department is the department with more UPM in the country[53]. In addition, the growth in this sector is constant and is backed by the Ministry of Mines and Energy of Boyacá, whose vision for the year 2019 is to become the first energy mining power in the country[54].

In the first instance, coal mining occurs mainly in the municipalities of Úmbita and Tibaná and several neighboring villages. Other holdings present is emerald mining in the municipalities of Chivor and Guayatá. In the case of Chivor, its economy is based largely on mining emeralds (since 1537[55]). In the other municipalities in the region aggregates extraction activities are carried out as top dressing for road maintenance and building materials.

[50] Colombian *Páramos*, 2001. Ecological Paper Collection West Bank, Chapter 7de Colombia, 2001.
[51] URPA, Municipal Agricultural evaluations, 2010, Secretary of Agricultural Development, Government of Boyacá. Available in:http://www.Boyacá.gov.co/SecFomento/2-uncategorised/26-informacion-evaluaciones-agropecuarias
[52] Colombian *páramos*, ecological book collection Banco de Occidente, 2001, Chapter 7.
[53] Mining Census. 2012 Ministry of Mines and Energy. Mining Planning Unit
[54] SIMCO, 2015. http://www.simco.gov.co/Home/MineriaenBoyac%C3%A1/tabid/269/language/es-ES/Default.aspx. Accessed June 26, 2016.
[55] Municipality of Chivor, Land Management Scheme

According to official reports, in 2010 the coal mining in the department reached 2,675,000 Ton with an increasing trend, given the volumes reported for previous years. On the other hand, the exploitation of emeralds in the municipalities of Chivor, Macanal and Guayatá generated royalties for the department totaling 299,497,050 million Colombian pesos[56].

Within the priority areas, exploitation of coal, emeralds, sand and construction materials have been identified, as can be seen in the following maps (see below). This land use promotes deforestation directly and indirectly, either by logging and burning logging or road construction for the extraction of materials, facilitating illegal timber transport.

[56] SIMCO, 2015. http://www.simco.gov.co/Home/MineriaenBoyac%C3%A1/tabid/269/language/es-ES/Default.aspx. Accessed June 26, 2016.

Figure 20. Mining activities within the Reference Region

- **Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project**

CORPOCHIVOR, depending on their mission objectives, is the entity responsible for implementing national environmental policy, with the aim of managing and conserving resources in their jurisdiction. Among the environmental activities that the Corporation runs currently within the project area are including the following: restoration and protection of water sources, projects to mitigate and adapt to climate change and natural phenomena such as La Niña and El Niño, social inclusion projects and environmental education, monitoring and conservation of endangered species, forest management programs, actions and activities for the conservation of water resources, among others.

Therefore, taking into account the nature of the project proponent and the environmental characteristics of the prioritized area, it is clear that forest conservation (without being registered as a VCS project) represents a unique opportunity, from the environmental and social standpoint, for the socio-economic development of the region. However, as set forth below, this scenario faces several barriers to their short-term viability.

Outcome of Sub-step 1a: List of credible alternative land use scenarios that could have occurred on the land within the project boundary of the VCS AFOLU project

- Scenario 1: Traditional livestock
- Scenario 2: Agriculture
- Scenario 3. Mining
- Scenario 4. Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project*;*

Sub-step 1b: Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations:

All identified alternative scenarios are lawful and consistent with the applicable laws and regulations at national, regional and local levels. They are even promoted as pillars of sustainable development of national and regional level department[57], as long as it respects the suitability of soil and zoning established by the Corporation.

In the case of the suitability of soils, it is common the use of conflicts in areas where agricultural, livestock and mining activities[58] are carried out. Despite all the administrative tools that the Corporation applies, it is not possible to restrict on private land the implementation of these activities and the consequent impacts on natural forest. Except for mining which requires the granting of a license and environmental control, given by the competent environmental authority.

[57] For example, according to the law 1372 of January 7, 2010, through which the "Free Trade Agreement between the Republic of Colombia and the United States of America" was approved, the need to expand the area dedicated to agricultural production and fattening hectares of pasture has increased.

[58] 78% of the land in the jurisdiction presents conflict in use, which is broken down as follows: mild negative conflict (44%); negative conflict moderate (11%) and severe negative conflict (24%) (PGOF 2010).

On the other hand, according to the values of loss of forest cover in the last decade, even in protected areas such as *páramos*, one can conclude that these legal bodies have not exercised their powers of control and preservation of forest ecosystems[59], therefore considered systematically not enforced in the region.

Outcome of Step 1b: List of plausible alternative land use scenarios to the VCS AFOLU project activity that are in compliance with mandatory legislation and regulations

All scenarios are enforced by the current national regulations

Sub-step 1c. Selection of the baseline scenario

In the absence of the project, the most likely activities are agriculture and livestock; its realization under traditional systems give continuity to management practices that generally are detrimental to natural resources. This in turn affects gradually the loss of soil fertility, increase erosion and decrease topsoil, and as a result, a decrease in productivity is achieved with unprofitable products.

However, these activities continue to perform as traditional methods also involve low capital investment and implementation of known techniques. These characteristics are most important when taking into account that much of the rural population in the prioritized area corresponds to adult age groups, culturally most established to the knowledge acquired from their parents and less willingness to change their traditional systems production.

G2.2. Document that project benefits including climate, community and biodiversity benefits would not have occurred in the absence of the project, explaining how existing laws, regulations and governance arrangements, or lack of laws and regulations and their enforcement, would likely affect land use and justifying that the benefits being claimed by the project are truly 'additional' and would not have occurred without the project. Identify any distinct climate, community and biodiversity benefits intended for use as offsets and specify how additionality is established for each of these benefits.

Although project activities generate community, biodiversity and climate benefits, these also face investment, social, labor skills and land fragmentation barriers. Project development under VCS and CCB standards and the implementation of the green fund financing (see section G1.12) will allow overcome these barriers, due to the provision of technical assistance, knowledge transfer, strengthening governance and financial resources. Details of the barriers that would not allow the project activities on the land within the project boundary performed without being registered as a VCS AFOLU project, are described below.

- **Investment barrier**

The main forest conservation initiatives undertaken by private owners in Colombia, are those implemented through the creation of Nature Reserves of Civil Society (RNSC in Spanish). These initiatives are national schemes registered with the National Parks Unit, established voluntarily by

[59] Widespread in the country, the problems associated with the use of natural forests has been closely related, among other factors, with low institutional presence to ensure compliance with current regulations and inadequate implementation of management plans and management forest (Becerra 2003. Present and future of forests in Colombia. Conceptual basis for the international conference forests debate Santa Marta, Colombia).

owners who wish to retain their lands[60]. Since the benefits generated by these reserves (mostly) are environmental, they are generally implemented by owners who do not economically dependent on the use of their land.

Within the current records of the Colombian Association of Civil Society Reserves (RESNATUR in Spanish), there are five reserves in Boyacá department, however none of these are located in the jurisdiction of CORPOCHIVOR[61].

These conservation activities require the opportunity cost related to reduce or avoid inappropriate use of natural resources, in exchange for keeping and implement conservation and ecotourism activities. That is, that only persons capable of assuming these costs can implement conservation activities. In the context of the project, most owners rely on the direct exploitation of their land and short-term economic returns; therefore it is unlikely to bear the costs involved the abstention or reduction of farm production[62].

Another limiting factor to invest in conservation and sustainable management of natural forests in Colombia has to do with the absence or ineffectiveness of bank credits or incentives created for this purpose. Proof of this is the Certificate of forest conservation incentive (Decree 900 of 1997), which was created in order that the owners of natural forests to access a monetary incentive in exchange for keeping up to 50 hectares of its forests (disturbed or undisturbed) and situated above the altitude of 2,500 meters. However, this mechanism did not work due to lack of clarity in the procedures, lack of guarantees in the resources required to finance projects, and because the amount of the incentive is below the opportunity cost of the land.

Finally, another opportunity to implement conservation actions and sustainable forest management are the activities developed by CORPOCHIVOR that seek the protection of the remaining forests and therefore the conservation of wildlife and flora in the region. However, the financial resources of the Corporation are restricted by the administrative periods and validity of Institutional Action Plan of the Corporation[63]. For this reason, the implementation of a project of 30 years without proper funding strategy (see section G1.12) and additional funding mechanisms such as carbon credits, is outside the administrative and operational scope of this entity.

On the other hand, the amount of resources of the Corporation is limited. To launch the REDD initiative, CORPOCHIVOR accessed the resources from the Environmental Compensation Fund (FCA) of the Ministry of Environment and Sustainable Development[64], in order to counteract the causes of deforestation can lead to increased GHG emissions. This fund is a financial instrument for redistributing resources among the CARs[65] in the country, benefiting those with fewer opportunities for income generation. The operating regulation defines as beneficiaries of the resources of FCA at

[60] Towards the construction of a joint financial strategy of nature reserves networks of civil society and natural-fund biodiversity and protected areas in Colombia. *Patrimonio Natural*, 2007.
[61] Association of Civil Society for the conservation of Colombian reserves. 2016. http://www.resnatur.org.co/las-reservas/reservas-asociadas/. Accessed July 1, 2016.
[62] Towards the construction of a joint financial strategy of nature reserves networks of civil society and natural-fund biodiversity and protected areas in Colombia. *Patrimonio Natural*, 2007.
[63] The Institutional Action Plan of the Corporation establishes budget allocation for administrative periods, now 4 years.
[64] Resolution 1020 of April 19, 2015
[65] Local Environmental Authority (CARs in Spanish)

15 CARs with lowest total current budget, among these CORPOCHIVOR[66]. In the absence of these resources, CORPOCHIVOR did not have the financial capacity to propose and implement the project.

- **Barriers due to social conditions and technical capacity**

The implementation of project activities faces another barrier: the low availability of suitable and qualified people to work in rural areas of the project. A study by the Department of Youth of the Government of Boyacá notes that the population distribution by area indicates that due to the predominance of industrial and social development of the urban area and the steady loss of rural population, the infrastructure of the agricultural[67] sector weakens. According to the same study, the department of Boyacá is characterized at national level as an ejector of population (nearly 30% percent of the total migration of the country). The problem is that the Department is not able to provide employment for people of working age. People leaving the department are mostly between 15 and 24 years old and emigrate from their home villages seeking new learning, knowledge and employment opportunities. This results in the loss of productive and skilled population in the department, who seeks employment in other departments or even in other countries[68].

This situation is also identified in the area of the first instance, where landowners are persons of advanced age (average age: 55 years old and 32% of the population is between 50 and 63 years of age[69]) with low levels of schooling and illiteracy in some cases. This condition negatively predisposes the responsiveness of landowners in reference to the proposed activities.

In addition, the success of the proposed project activities will also depend on exogenous variables such as weather and pests. These variables have changed sharply in recent years, even appearing unpredictable behavior, so it is necessary to implement measures to adapt to these changes and re-learn about new management systems and abnormal production cycles. For this process to take effect it is necessary to combine the technical-scientific knowledge for understanding the exogenous variables, with local knowledge to formulate truly, viable and adaptive measures.

Although these shortcomings are addressed by CORPOCHIVOR in its objective of promoting sustainable environmental practices, many times the number of technical staff of the Corporation, which is concentrated in a single municipality -Garagoa-, is unable to meet the needs of the community because of the large distances between each territory and the problems of road infrastructure in rural areas.

These conditions, coupled with the need to increase their income and the low productivity of the land, lead the farmer to give continuity to the prevailing practices and constitute a barrier to the project activities and for the protection of the forest resource.

These barriers can be even more restrictive than the investment barriers (described above). In the case of agriculture, for example, the farmer carries out this activity in a traditional way, without sophisticated tools, without technical advice. Agriculture is often financed through resources that reach the hands of farmers who are unaware of alternative systems that enable them to improve their

[66] Environmental Compensation Fund. 2016. https://www.minambiente.gov.co/index.php/component/content/article?id=346:plantilla-areas-planeacion-y-seguimiento16
[67] El Tiempo. 2012. http://www.eltiempo.com/archivo/documento/CMS-11976263. Accessed July 1, 2016
[68] El Tiempo (press cutting), 2012. http://www.eltiempo.com/archivo/documento/CMS-11976263. Accessed April 3, 2016.
[69] Surveys owners in the prioritized area in 2016.

productivity agricultural loans. In this regard, often this money is not invested in improving the capacity of the property to optimize processes but to continue with traditional models of production. These models seek to generate a monetary profit, which in addition to high production costs, now have to discount financial obligations, which reduces net income of landowner again.

In conclusion, the human, technical and financial resources are highly correlated when looking to implement sustainable alternative systems; a failure in any part limits the deployment and productivity of alternative systems and consequently limits the protection of the forest resource.

- **Land Fragmentation**

Fragmented land ownership is a common phenomenon in Boyacá. The smallholding is an important feature of this region (see Figure 10), because most owners have small tracts of land. According to Fedesarrollo 2013[70] in the study entitled "Policies for development of Colombian agriculture," it notes that on smallholdings, peasant economic activity depends on the full exploitation of the natural resources of their land. This means that they should work on each tract of land they possess and make it productive.

Given the above, the fragmentation of ownership becomes a constant threat to forest fragments. The presence of these fragments are an obstacle to the entire productive use of the farmland. Therefore the peasant prefers burn and remove them. In other words, when an owner divides his land covered by forests in small plots and then sell them to different users, each user will have a negligible productive area (in agricultural terms). Hence they will decide to remove the amount of forest to take advantage of a larger amount of area, either for the installation of crops or livestock development.

Large tracts of land generally belong to owners who do not live in the region or sublease the land, as observed directly in the field. Therefore the land of small size are the land which are currently being exploited steadily, and it is precisely in these areas where the remaining forests are threatened by deforestation.

Baseline activities are not affected by these barriers

Eventually, the mining activity could face similar barriers facing the project activities, as they have a constant need of qualified staff, available land and economic resources to afford the execution of activities and to purchase tools, machinery and invest on skilled labor. However this activity receives constant support from the government and local authorities, as mining has been recognized as a major economic activity for the national development according to the National Development Plan.

This is reflected in the provided tax incentives to this activity. As a state strategy, they encourage the foreign investment, renew the industry, creating better conditions for competitiveness. Despite the

[70] Perfetti *et al.* 2013. Policies for Agriculture Development in Colombia.

difficulties by low prices, employment are boosted and generally economic and social development are promoted by receiving tax benefits[71,72].

On the other hand, livestock and agriculture expansion does not incur in costs others than the ones that can be easily afforded by the farmer. This activity receives funding from *Finagro* and *Banco Agrario* in forms of loans with very low taxes and flexible payment periods.

In particular, the department of Boyacá, listed as "Land pantry of Colombia" because much of the food consumed in the country comes from these lands, is one of the regions with more investments in form of loans granted by the Banco Agrario and Finagro to finance the agricultural sector (Figure 21). 9.7% of loans disbursed by these entities during the period 2000 to 2015 were for the department of Boyacá, just close to the investments in Antioquia and Cundinamarca.

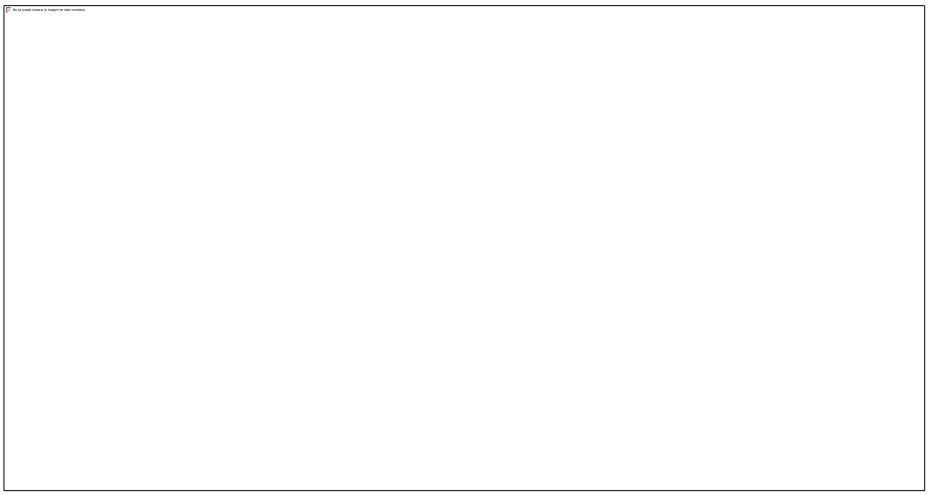

Figure 21. Total allocation of agricultural credit by department, between 2000 and 2015. - Banco Agrario. Source: Agronet 2015[73].

It is important to show these statistics because in Colombia the lack of Agrarian Reform, that could focus on increasing productivity of the Colombian rural areas, together the lack of coordination between policies for environmental conservation and agricultural policies in the historical period of analysis have triggered the purpose of these loans were expanding the agricultural frontier. The main

[71] Resolution 40659, Minister of Mines and Energy, 2015. This resolution defines the incentive scheme mining and energy production, which initiates the approval of the projects that have been presented the mayors of the municipalities with greater production of oil, coal, gas and nickel, to access resources and set them up. For more information: https://www.minminas.gov.co/web/10180/1332?idNoticia=2642448.

[72] Portfolio 2012. Press release: Mining is the sector with more tax benefits. http://www.portafolio.co/negocios/empresas/mineria-sector-beneficios-tributarios-106052

[73] Agronet 2015 Available at: http://207.239.251.112/www/htm3b/excepcionesNuke/cargaNet/netcarga113.aspx?cod=113&submit=Ver%20Reporte&reporte=Cr%E9dito%20agropecuario%20por%20departamento%20-%20Banco%20Agrario&file=20084394053_reportBancoAgrario_totagrodepto_pub.rpt&codigo=113&excepcion=1&fechaI=2000&fechaF=2015.

objective is to realize profit expectations by farmers and thus to cover payments to the financial sector. Furthermore, traditional livestock and agricultural activities do not require skilled labor, as the activities performed are normally known by all farmers as they have been traditionally taught in how to handle cattle and crops in large and small areas with very limited tools and machinery. Even under current conditions (low productivity) in the absence of the project, the owners could continue to perform these tasks.

In conclusion, the only activities that do not face any of the above barriers are livestock activities and traditional agriculture (Table 15). It means that without the project activities the current practices will remain and the social, biodiversity and climate benefits will not occur.

Table 15. Identified barriers and alternative scenarios.

SCENARIOS	BARRIERS		
	Social conditions and labor skills	**Investment**	**Land fragmentation**
Livestock and agriculture expansion			
Mining	X		X
Project activity on the land within the project boundary performed without being registered as a VCS AFOLU project	X	X	X

G3. Stakeholder Engagement

Access to information

G3.1. Describe how full project documentation has been made accessible to Communities and Other Stakeholders, how summary project documentation (including how to access full documentation) has been actively disseminated to Communities in relevant local or regional languages, and how widely publicized information meetings have been held with Communities and Other Stakeholders.

To ensure that the key communities and stakeholders in the planning and implementation of the REDD+ CORPOCHIVOR project had access to project information and documentation, social consultation workshops were held. These events were designed to present and discuss the main objectives and expected impacts of the project and to solicit feedback and suggestions with respect to the perspectives of potential beneficiaries. All of this was done with the aim of improving the project design for the satisfaction of beneficiaries and to ensure its success. These workshops helped identify and establish channels for communication between the parties to ensure that any doubts or concerns that may arise can be promptly addressed and that information can be effectively disseminated among stakeholders when necessary.

The consultation processes were spearheaded by the project developer in conjunction with the project proponent (CORPOCHIVOR). These groups conducted a mass distribution of information to communities and stakeholders, ensuring that said groups became aware of the actions being taken

by the Corporation to decrease deforestation. Among the information provided were the schedule of local consultations and the various means by which further relevant information would be communicated (see Table 16). More than fifty consultation sessions were conducted with interested parties from April 2016 and May 2017. These meetings were held in all the municipalities that conforms the project area (see the Stakeholder Consultation Report).

Table 16. Methods of information dispersal.

Stakeholder(s)	Method of dispersal
"Campesino" (rural, agricultural) communities, surrounding landowners, community leaders, and inhabitants of the area	Radio spots
	Calls with community leaders
	Letters of invitation to community leaders
	Vehicle-mounted loudspeaker
	Word of mouth
Institutions and entities related to forest conservation and/or of a governmental nature, e.g. Community Action Boards (JAC), Water Distribution Boards; Rural Community Boards; cooperatives and trade groups.	Letters of invitation
	Calls
	Official e-mail messages

Project documentation and other relevant information were dispersed to the community through a reciprocal, three-step social consultation process. The steps consisted of: (1) an initial presentation by CORPOCHIVOR, (2) an explanation of the project, and finally, (3) rounds of questions and comments (see Stakeholder Consultation Report).

Step 1: Fell under the responsibility of a member of the CORPOCHIVOR staff. They first presented the institution and explained the role that each involved party would play in the project's development. Next, they presented the project name and the background for this initiative, based on the Plan for Forestry Planning and Governance (Plan de Gobernanza y Ordenación Forestal – PGOF).

Step 2: Fell under the responsibility of the project development team. The team explained the key concepts that are foundational for these types of projects, including *inter alia* the greenhouse (gas) effect, climate change and its consequences, environmental benefits and services provided by forests, and the importance of forest conservation. In this step, stakeholders were also introduced to the idea of forest carbon projects, the specific activities planned for this project, and the project participants (see the Stakeholder Consultation Report).

Step 3: It was in this step that all comments, concerns, worries, and perspectives of attendees were recorded, in order to ensure that this project was both transparent and realistic in scope. In addition, by gathering the perspectives of the community this step served to more accurately identify the interests of landowners and project participants with regard to the proposed project activities.

The documentation and information related to the project were presented in the clearest form possible in order to facilitate the knowledge and understanding of the project and its implications among the general population. This end was achieved by employing straightforward, comprehensible language that was adjusted to the educational background of the target audience; the majority of the population has a primary-school level of education. The information was presented in an audiovisual format (digital projection of presentations). In cases where projection was not possible due to lack of electricity or other inhibiting factors, the main concepts and ideas were demonstrated to the audience using physical materials including posters and display boards.

Finally, attendees were provided the contact information (name, telephone number, and e-mail) for the people in charge of project documentation (i.e. the project developers) as well as a representative of CORPOCHIVOR, cementing a permanent and reliable link for communicating any worries, questions, or comments to those managing the project. At the end of the local consultation session, the attendees were informed that they will be provided the project document as soon as it becomes ready and that they will be notified once the document is published on the CCB website for open public comment.

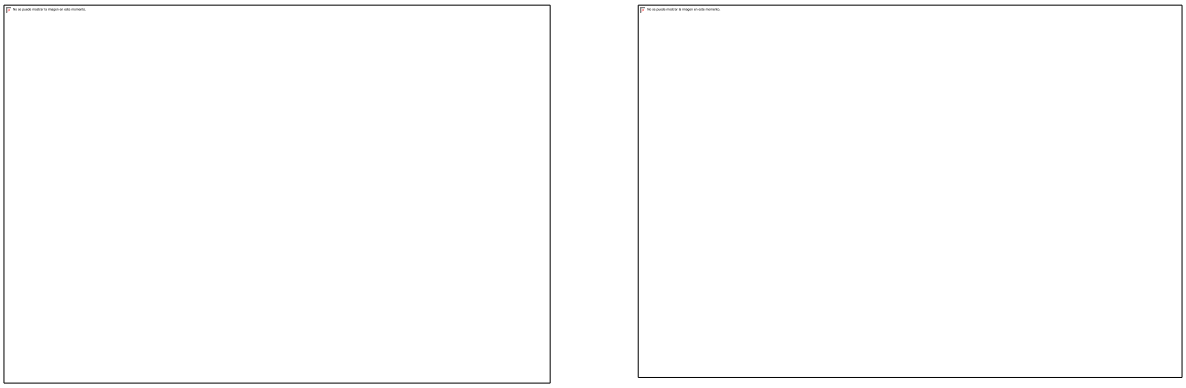

Figure 22. Supporting materials used for the presentation.

G3.2. Explain how relevant and adequate information about potential costs, risks and benefits to Communities has been provided to them in a form they understand and in a timely manner prior to any decision they may be asked to make with respect to participation in the project.

In addition to the secondary means mentioned previously (see Section G3.1), local consultations were employed to assess the possible economic, social, and biodiversity impacts of the project on individual and collective stakeholders. The goal of focusing on these aspects of the project was to timely and transparently report both of the positive and negative implications of the project for the involved beneficiaries and, through the knowledge of these implications, offer information with which the landowners can make prudent decisions regarding their voluntary participation in this REDD+ project.

During the consultations, the general model of project resource management and financing was explained to attendees (including landowners), as follows:

- The project planning is financed by CORPOCHIVOR through the Environmental Compensation Fund of the Ministry of the Environment and Sustainable Development[74].
- Moving forward, CORPOCHIVOR will implement a portion of the project activities with its own resources and will manage others' resources for long-term sustainability.
- The incomes derived from the sale of carbon bonds will be stored in a fund designed to continuously finance project activities, including the monitoring and verification processes.
- Project plans do not anticipate direct payments to the beneficiaries; instead, the economic benefits are to reach beneficiaries through the implementation of project activities.

The consultations highlighted the important role that forests play in environmental issues and as providers of environmental benefits and services in order to raise community awareness of the need for and potential benefits of a REDD+ project (see Figure 23).

In this respect, an important aspect of the project is to help develop alternative production activities by offering technical and advisory support to beneficiaries and assisting with the acquisition of inputs. The aim of this project activity is to help beneficiaries generate or improve income. The development of these activities on the landowners' properties not only creates the possibility for additional economic productivity but also the opportunity to continue enjoying and expanding the benefits and services provided by the forest. This is the backbone of the project's plan to generate positive impacts in local communities while simultaneously conserving forests.

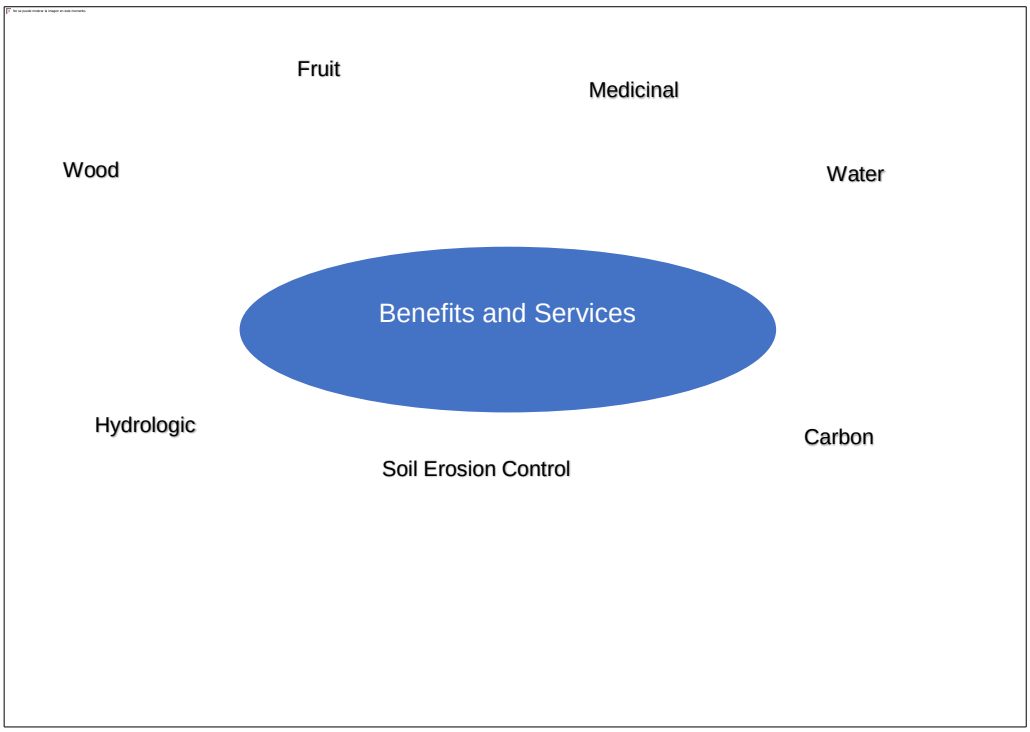

Figure 23. Environmental benefits and services provided by forests.

[74] Fondo de Compensación Ambiental del Ministerio de Ambiente y Desarrollo Sostenible

During the consultation, the community raised the following concerns regarding project implementation (**Table 17**).

Table 17. Possible risks as perceived by the community.

Possible risk (as perceived by the community)	Means of mitigating or avoiding the risk
Decreases in productivity resulting from the minimization of agrochemical use.	If productivity decreases (this outcome is not certain), the difference will be compensated for or mitigated by project activities focused on agroforestry and/or the increased incomes from marketing "green" agricultural products.
Land rights being lost or compromised.	The project will never compromise or affect landowners' rights to own or use their properties.
Non-continuation of project activities in the medium- to long-term (due to negative prior experiences with the project proponent[75]).	The sustainability of this project depends on the management of project resources and the successful, gradual empowerment of the community to assume control over said resources. At the same time, this concern challenges the Project Proponent to improve relations with and regain the confidence of the community. Furthermore, the project has a long-term (30-year) plan with periodic monitoring and verification by external entities. This will encourage responsible management of the project and ensure that necessary adjustments are made to improve and strengthen the project's benefits to the community.

G3.3. Describe the measures taken, and communications methods used, to explain to Communities and Other Stakeholders the process for validation and/or verification against the CCB Standards by an independent Auditor, providing them with timely information about the Auditor's site visit before the site visit occurs and facilitating direct and independent communication between them or their representatives and the Auditor.

During the consultation workshops, the steps and lifecycle of forest carbon projects were explained to members of the community, with an emphasis placed on the steps that must be taken to achieve validation and registration under international standards (see Figure 24. Slide presented during the project consultation, explaining the project cycle under the carbon market standards.).

At the same time, community members were explained that an external auditor (validation and verification body) will visit the project and meet with the parties to evaluate that the project is being effectively developed. This fact that a third party will be assessing this process satisfied and built confidence in the members of the community that the project will be serious, long-term, and sustainable.

[75] In addition to the concerns raised during consultation meetings, previous surveys found that the community were not confident in and did not see as credible payment for environmental services schemes, due to the short-term and non-continues nature of these plans in their experience (see G3.6).

Figure 24. Slide presented during the project consultation, explaining the project cycle under the carbon market standards.

CORPOCHIVOR, as the project proponent, will maintain consistent, direct contact with the owners of the properties on which the project will be developed through the Feedback and Grievance Redress Procedure, as described in section G3.8. This plan ensures that all aspects of the project will be communicated to participants, including validation, registration, and verification.

It is important to note that the project proponent is required to regularly report on the economic, financial, and management state of the project to the regulatory bodies that oversee the Corporation. These and all other relevant materials must be disclosed to the community, which has the permanent right to be informed of the goings-on within CORPOCHIVOR. This information may not be reserved. Furthermore, the reports and recommendations of regulatory bodies will assess the Corporation's management of the project, and these results will be made public.

Consultation

G3.4. Describe how Communities including all the Community Groups and Other Stakeholders have influenced project design and implementation through Effective Consultation, particularly with a view to optimizing Community and Other Stakeholder benefits, respecting local customs, values and institutions and maintaining high conservation values. Project proponents must document consultations and indicate if and how the project design and implementation has been revised based on such input. A plan must be developed and implemented to continue communication and consultation between the project proponents and Communities, including all the Community Groups, and Other Stakeholders about the project and its impacts to facilitate adaptive management throughout the life of the project.

The fundamental role of CORPOCHIVOR, as the regional environmental authority, is to contribute to the protection, conservation, and regeneration of ecosystems under its jurisdiction. However, that responsibility cannot be carried out in isolation. That is to say that rural communities, because they impact ecosystems, must actively participate in the process of formulating and implementing a

successful REDD+ project regardless of whether the impacts they have are beneficial or detrimental. For that reason, the consultation process was established as a means of assessing the comments and concerns of those community members whose interests can be affected by the proposed project (see Stakeholder Consultation Report).

The objective of the consultations is to provide a constructive and participatory space for building links between the project proponent and relevant stakeholders. The channels of communication opened through these consultations allow attendees to convey their doubts and worries and allow the Corporation to prioritize project activities in response to this feedback. Due to the critical role that they play, these spaces must be real and allow the community to create concrete changes to project plans throughout the decision-making process. The project proponent and developers understand that a consultation can only be considered legitimate if the demands and contributions of participants are allowed to be heard and are subsequently incorporated into project plans. They also understand that effective participation means that, in addition to consultation and information collection, the project beneficiaries are provided a guarantee that they will be included in decision making that affects them either directly or indirectly through impacts on the ecosystems with which they interact.

A Registry of Project Comments and Observations was created to document this information for the project's development as well as to optimize the benefits generated for communities and other stakeholders (see Table 18). This was created in addition to the aforementioned "questions and comments" section of the consultation. The registry includes group comments that were recorded whenever a meeting exceeded ten individuals and when the education level ranged from medium to low. Individual comments were typically recorded when the meeting was held in a population center.

Table 18. Main comments received from the communities during the consultation process.

Municipality	What do you like about the project?	What do you not like about the project?	What would you like to change about the project?
Guayatá	Ecosystem conservation.	Lack of adequate announcement. More publicity is needed.	-
	Water conservation, ensuring the food supply		
	Project duration		
	Invites other authorities and groups to participate		
	The involvement of the Water Distribution Board.		
Ciénega	Motivates the community to conserve the natural environment.	The payments for forest carbon should be stable and increase yearly.	That it should present more options for property owners
	The role of cooperation in environmental management.	-	More publicity through all available media.
			Inscriptions should be open at least until the end of 2016.

Municipality	What do you like about the project?	What do you not like about the project?	What would you like to change about the project?
	An opportunity to conserve our flora and fauna.	Ability to participate in the project depends on the characteristics of your property.	-
	That the project is showing us how to protect our forests and *páramos* and at the same time bringing awareness of environmental conservation to our children.	-	More focus should be placed on Andean forests.
	The protection of the environment, increase in the water supply, and inclusion of the community.	-	-
Viracachá	Supports rural inhabitants.	-	To provide training in project formulation.
	That a plan is being created to take complaints and register claims.	They do not buy land.	Conduct a real inventory of forest reserves to decrease the costs of property taxes.
	Attention and rapid response to complaints.	-	-
La Capilla	That the project must contribute positively to the welfare of our community.	-	-
	That it is long-term. It is important that the project is being monitored and that it benefits the environment.	-	Improve the image of the Corporation, which has erroneously been sullied.
	That we are creating a consciousness that the future depends on forest and water resources by educating members of the community about the benefits they provide.	That it will just be one more in a long list of other projects which did little.	Finance more reservoirs and ponds to decrease the extraction of water from streams.
	Greater integration and cooperation between professionals, children, heads of household, the local government, and CORPOCHIVOR.	That people will not come to listen to CORPOCHIVOR representatives, due to their lack of credibility within the community.	Greater exchange of ideas with the people and explanation of conservation benefits, as these resources are the basis for the success of future generations.

Municipality	What do you like about the project?	What do you not like about the project?	What would you like to change about the project?
	Conserves forests, protects páramos, improves the environment, and mitigates damage to ecosystems.	That it is only for properties with forests.	The project should be viable and sponsors and supports the construction of lakes and reservoirs.
Macanal	Protection of water sources.	-	Construct electric fences to protect trees, improve the cattle genetics, and create sanitary septic systems.
	That all activities are followed through.	-	Build support among those in the satellite villages, as distance to the population centers prevents these people from attending the meetings.

The comments from the first consultation workshop were integrated into the design of the project. They also allowed for the planning of another round of consultations, because they clarified the effectiveness of different channels of communication and the viability of meeting dates and times. These meetings were also useful for generating short-term activities that would allow for the inclusion of those who would not otherwise be able to participate in the first stage of the project because they do not manage forests of high conservation priority.

The Feedback and Grievance Redress Procedure described in section G3.8 will be implemented to maintain communication and consultation between project proponents, communities, and stakeholders. This will allow the community to participate in the project by providing a formal avenue for the direct submission of all comments, questions, complaints, and suggestions to the technical team at CORPOCHIVOR.

G3.5. Demonstrate that all consultations and participatory processes have been undertaken directly with Communities and Other Stakeholders or through their legitimate representatives, ensuring adequate levels of information sharing with the members of the groups.

During the REDD+ project design process, the development team considered the particular forms of governance and decision-making in rural communities, groups surrounding the project area, local governments, and municipalities that will participate in the first stage of the project. As a result of this assessment, it was decided that the best approach was to distribute consultation invitations first to the heads of Community Action Boards (JAC) of each village, local governments, representatives, and members of municipal councils. This included representatives from associations previously identified as stakeholders and groups of interest, including guilds, labor groups, and other organizations. The invitation was extended via phone calls and in physical form through letters (see “Letters of Invitation”).

It is essential to highlight that inviting communities through their leaders was effective and translated into considerable attendance and participation in the events. For more details, see Stakeholders consultation folder, in which the handouts, attendance lists, and records can be found, all of which evidence the participatory nature of the project and its community-based activities.

At most of meetings held in population centers, representatives of the municipal council, labor groups, and, in some cases, even the municipal government were in attendance.

For the workshops held in rural areas, the presidents of the JACs not only served as channels for communication with the rest of the landowners in the community but also provided crucial support in coordinating places and times for the meetings to take place.

Refer to the Excel document (Stakeholder identification) for detailed lists of the official representatives invited to participate in the community consultation workshops.

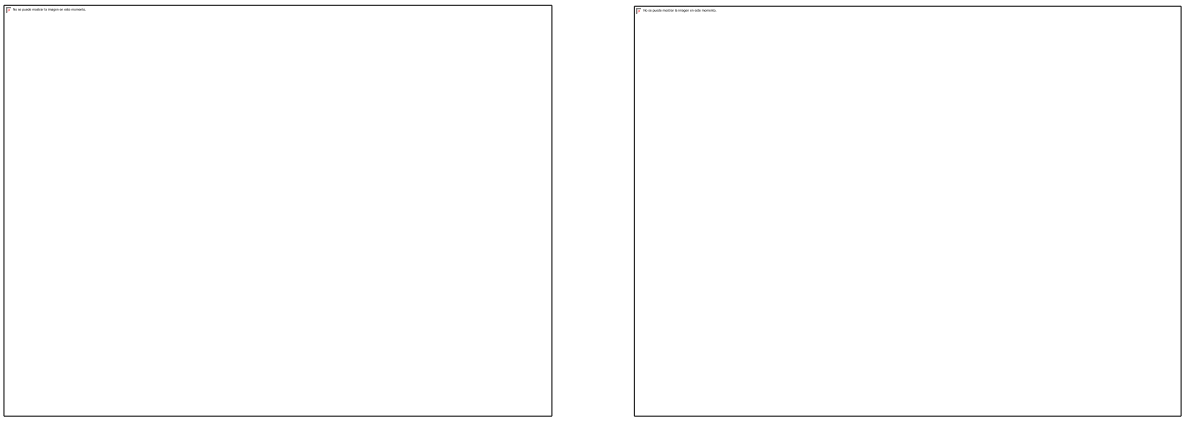

Figure 25. Workshop participants.

Participation in decision-making and implementation

G3.6. Describe the measures needed and taken to enable effective participation, as appropriate, of all Communities, including all the Community Groups, that want and need to be involved in project design, implementation, monitoring and evaluation throughout the project lifetime, and describe how they have been implemented in a culturally appropriate and gender sensitive manner.

Both the REDD+ project PDD and the Monitoring Plans were crafted and refined with the support and participation of involved populations, the results of the consultation process, and an awareness of the importance of forest conservation for the livelihood and sustainable development of the communities. At the same time, means have been established to facilitate community participation during the life cycle of the project, including:

- Local consultations as spaces for community participation in the project. All of the consultations sought to provide an accepting and comfortable atmosphere in which each participant could freely express comments and disagreements.

- A REDD+ Strategy Monitoring Plan that will be implemented during the 30-year duration of the project, which is to be revised by project participants with the support of CORPOCHIVOR. This plan includes indicators and targets that adhere to the principles of participation, negotiation, learning, gender equality, and flexibility that the Corporation considers to be a mark of all of its projects and initiatives within the rural communities under its jurisdiction.
- Plans to disseminate information to communities and stakeholders (e.g. Project Design Document, follow-up reports). The publication of results allows interested institutions and persons to monitor the state of the project and guarantees that the participation and commentary of said stakeholders will be incorporated into the design and implementation of the project.

To ensure that communities were heard and their voices, comments, and suggestions taken into account, the development team compiled information to characterize the target communities and community groups in advance of the consultations. This was determined to be a necessary starting point in garnering full participation, and it also provided equal opportunity for both those directly and indirectly affected by project decisions to participate in the process.

This first characterization allowed the team to identify the first steps of work, better known the reality of involved stakeholders, understand social relations, and assess the possible reactions of affected groups to the actions and activities to be implemented. In the case of rural farming communities, surrounding landowners, community leaders, and inhabitants of the zone, information was gathered from primary sources[76]. For the Community Action Boards (JAC), village water distribution boards, trade groups, and civil society associations, information was collected from secondary sources, including research and databases obtained from the Corporation.

The results of this information gathering identified important socioeconomic variables such as age, level of education, household composition, and income (see Stakeholder Consultation Report) before the consultations took place. They also clarified community perceptions concerning the state of forests and the activities that drive deforestation and threaten the conservation of natural resources. Taken altogether, these results informed the thematic structuring of the consultations, including the formulation of project activities that respond appropriately to the needs of communities.

Other factors considered in this initial exercise were the role of leaders within communities and the confidence in and credibility of “payment for environmental services” schemes in the eyes of the community.

This information shaped the presentation to align with the characteristics of the audience. It helped in selecting the most effective means of communication for publicizing the project and associated events, programming meetings, workshops, and trainings, choosing appropriate places and times for consultations, building relationships with community leaders, creating official channels of communication, circulating information about the workshops, and generating project materials that built confidence in the long-term sustainability of the project.

Finally, the consultations were publicized through diverse media (see Table 16) to guarantee large participation of all stakeholders and reach all identified communities and community groups.

Anti-Discrimination

[76] 107 surveys were carried out in the municipalities (Annex 1).

G3.7. Describe the measures needed and taken to ensure that the project proponent and all other entities involved in project design and implementation are not involved in or complicit in any form of discrimination or sexual harassment with respect to the project.

CORPOCHIVOR exercises its environmental authority and its role as the executor of national environmental policy in the jurisdiction of Chivor. It manages environmental and natural renewable resources for the benefit of the community and to promote sustainable development. The Corporation, as an official authority, must comply with the Code of Good Governance (Código de Buen Gobierno[77]), which among its principles rejects any act of racial, ethnic, political, religious, sexual, or cultural discrimination and any type of sexual harassment, implicit or explicit. The reach of this policy extends to the technical and field personnel of the REDD+ project and every individual and institution involved in the design and implementation of the project and its activities.

The Corporation has highlighted gender inclusion from among its inclusion policy priorities. CORPOCHIVOR seeks to focus on issues of gender and considers as imperative cooperative planning to identify and redress such inequalities at the national, departmental, and local levels. It seeks to foment strategies that fortify the provision of equal rights, benefits, duties, and opportunities. This policy is manifested in the Gender Focus Action Plan (Plan de Acción Enfoque de Género 2013 - 2015[78]), designed to foster the mainstreaming of gender foci in all processes, plans, programs, and projects to be implemented by the Corporation. This act is consistent with international treaties and regulations that have been ratified by the Colombian state.

CORPOCHIVOR additionally strives to institutionalize and integrate progressive gender perspectives into the Regional Environmental Management Plan (Plan de Gestión Ambiental Regional 2007-2019), Institutional Action Plan (Plan de Acción Institucional 2012-2015), and the Annual Operational Investment Plan (Plan Operativo Anual de Inversión), and apply those policies to every project in the Quality Management System of CORPOCHIVOR (Sistema de Gestión de la Calidad de CORPOCHIVOR).

Therefore, the policies and guidelines that govern CORPOCHIVOR guarantee that no type of discrimination will be tolerated at any point during the project development at the hands of the Corporation or any involved parties.

Feedback and grievance redress procedure

G3.8. Demonstrate that a clear grievance redress procedure has been formalized to address disputes with Communities and Other Stakeholders that may arise during project planning, implementation and evaluation with respect but not limited to, Free, Prior and Informed Consent, rights to lands, territories and resources, benefit sharing, and participation. The project shall include a process for receiving, hearing, responding to and attempting to resolve Grievances within a reasonable time

[77] Corporación Autónoma Regional de Chivor (2009), Codigo de buen gobierno. Available at: http://www.CORPOCHIVOR.gov.co/wp-content/uploads/2015/11/C%C3%B3digo-buen-gobierno.pdf
[78] Corporación Autónoma Regional de Chivor (2013), plan de acción enfoque de género 2013 – 2015. Available at: http://www.CORPOCHIVOR.gov.co/wp-content/uploads/2015/11/plan_enfoquegenero2013_2015.pdf

period. The Feedback and Grievance Redress Procedure shall take into account traditional methods that Communities and Other Stakeholders use to resolve conflicts.

The Feedback and Grievance Redress Procedure is integrated into the Management System Corporation is documented Process Citizen Service, which aims to provide an efficient, timely and efficient service to users CORPOCHIVOR way to meet their information needs or procedures, as well as care requests, complaints, claims, suggestions and complaints (PQRSD) submitted by citizens and measure user satisfaction. The mechanisms for the presentation of PQRSD are:

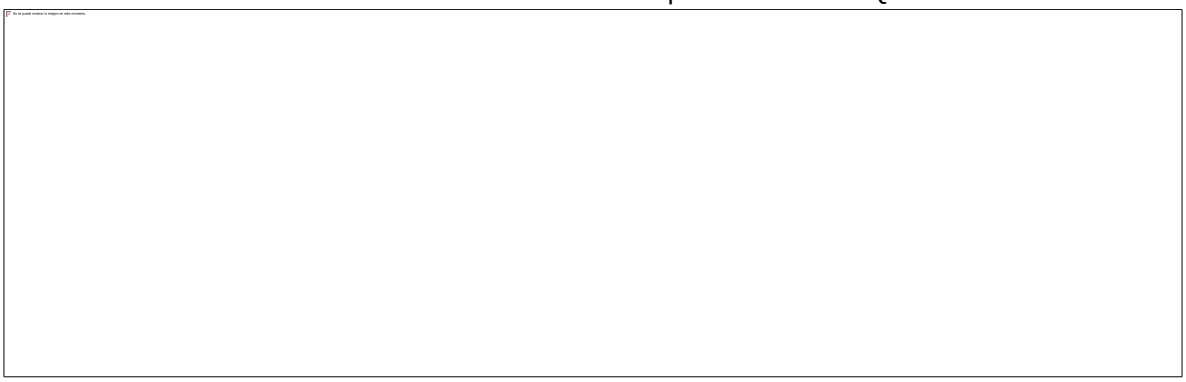

Figure 26. Channels of communication CORPOCHIVOR

The system PQRS online applications allows the presentation of the request and monitoring thereof by the registration of the person concerned.

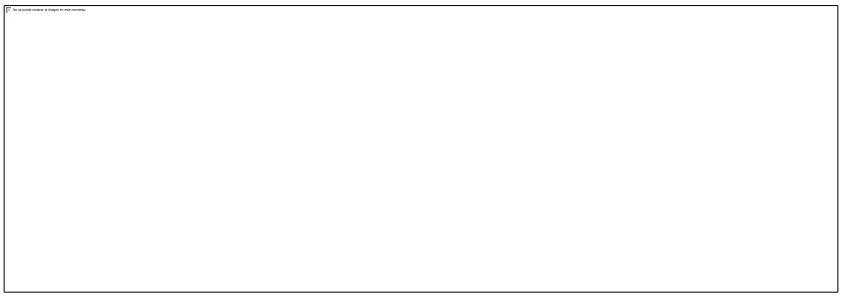

Figure 27. Application System PQRS online. Translation of the image: Register. New application. My applications

CORPOCHIVOR guarantees the confidentiality of personal data filled out by users via the online form and treatment in accordance with the legislation on protection of personal data; it is exclusive use of the entity and transferred to third parties with prior consent of the user, according to Law 1581 of 2012 and Decree 1377 of 2013.

By this means, the person concerned may ask:

- **Request for information:**

  Requirement that makes a natural or legal person, public or private to the Corporation in order to receive information and guidance for the services of the Corporation. Term response: 10 working days after receipt.

- **Documentation request:**

It is the requirement that makes a natural, legal or private person to the Corporation, in order to obtain copies or photocopies of documents held in the state. Term response: 10 working days after receipt.

- **Request for consultations:**

It is the requirement that makes a natural or legal person, public or private person to the Corporation related topics by it and within the limits of its jurisdiction, the answer is a concept that is not mandatory or execution. Term response: 30 working days after receipt.

- **Request of general interest:**

It is based on the need to protect the common good and general interest. Term response: 15 working days after receipt.

- **Request of particular interest:**

It seeks recognition by the State, a right which holds the petitioner. Term response: 15 working days after receipt.

- **Suggestion:**

  It is a proposal or advice formulated by a user or institution to improve services of the entity. Term response: 15 working days after receipt.

- **Complaints:**

  It is the manifestation of dissatisfaction verbal or written, presented to the institution by a natural or legal person, with respect to the conduct or act of an official and / or contractor of the organization in carrying out its duties. Term response: 15 working days after receipt.

- **Claims:**

It is the manifestation of dissatisfaction verbal or written, presented to the institution by a natural or legal person, on the failure or irregularity of some of the features of the services offered by the entity. Term response: 15 receipt working days.

The Corporation applies the mechanisms of citizen participation included in the Colombian law. This has spaces of citizen-face interaction with personalized attention and electronically through online services and call. Implement strategies face and citizen participation by electronic means, such as environmental awnings, environmental classrooms, film forums, environmental playful workshops, virtual forums, among others.

Worker Relations

G3.9. Describe measures needed and taken to provide orientation and training for the project's workers and relevant people from the Communities with an objective of building locally useful skills and knowledge to increase local participation in project implementation. These capacity building efforts should target a wide range of people in the Communities, with special attention to women and vulnerable and/or marginalized people. Identify how training is passed on to new workers when there is staff turnover, so that local capacity will not be lost.

CORPOCHIVOR is charged with contracting the technicians that will implement project activities and provide technical assistance throughout the lifecycle of the project. As such, the Corporation is

obligated to train, equip, and instruct these workers, ensuring that they have the technical knowhow and fundamental understanding of the dynamics of a REDD+ project necessary for the timely performance of their duties. This Corporation's commitment to develop the capacities, abilities, and aptitudes of its contracted staff and public servants is required by Articles 14 and 18 of its Code of Good Governance.

This technician training process will serve as the starting point for the transfer of knowledge to the property owners participating in the REDD+ project. As landowners accompany technicians during the implementation of project activities on their lands, these farmers will begin to acquire the skills and abilities necessary to ensure the complete and successful realization of said activities. Furthermore, this repeated learning-through-doing will become entrenched in the daily practices of these individuals, not only as a technical approach to land management but also as a form of cultural knowledge that can be transmitted between colleagues and passed to future generations.

The children in the region will play an important role with respect to the intentions of the project, as their knowledge of natural resource management in the jurisdiction will determine the future. The "Corpochivatos" program, directed at these youths, states as its mission the formation of community leaders that can promote changes in attitude among the population and encourage the protection of natural resources in micro-catchments, parks, rivers, forests, and natural reserves.

"Corpochivatos" has prompted change through a variety of initiatives, including "Plant and Adopt a Tree', 'Solid waste, responsibility of everyone', 'Disaster Prevention and Assistance' and 'Preservation of environmental, artistic and cultural heritage'[79].

It is important to mention that the project and its activities will be complemented by a rigorous program of education, training, and citizen participation. This component reinforces the abiding transfer of knowledge to communities and community groups. It encourages communities to develop a structured and optimized internal decision making process to replace the current mechanisms and allow for maximum benefits to be reaped from new opportunities as they arise.

G3.10. Demonstrate that people from the Communities are given an equal opportunity to fill all work positions (including management) if the job requirements are met. Explain how workers are selected for positions and where relevant, describe the measures needed and taken to ensure Community members, including women and vulnerable and/or marginalized people, are given a fair chance to fill positions for which they can be trained.

The project proponent commits to the Protection and Development of Human Talent in Article 18 of its Code of Good Governance[80]. This policy espouses the Corporation's pledge to incorporate the constitutional principles of justice, equality, impartiality, and transparency into its relationship with workers during every step of the hiring and labor process. This guarantee applies during every stage, from worker selection, hiring and training to evaluation and promotion, as well as in the performance of duties. As a result, CORPOCHIVOR builds its team based on merit, hiring only the most capable contractors and public servants for the job. Therefore, plans for the development of human talent

[79] The equivalent English translations of these campaigns are, "Plant and Adopt a Tree", "Solid Waste, Everyone's Responisbility", "Prevention of and Attention to Disasters", and "Conservation of our Environmental, Cultural, and Artistic Heritage".
[80] Corporación Autónoma Regional de Chivor (2009), Codigo de buen gobierno. Available at: http://www.CORPOCHIVOR.gov.co/wp-content/uploads/2015/11/C%C3%B3digo-buen-gobierno.pdf

comply with all applicable rules, including the Training Plan, Social Wellbeing Plan, and Incentive Plan.

CORPOCHIVOR will formally and honestly comply with the Statute for Public Hiring, committing to promptly, fully, and diligently observe legal obligations. It will timely, adequately, and fairly deliver information concerning hiring practices and prove that decisions to award contacts were not taken with bias or preference but rather though objective analysis of the qualifications of applicants. Monitoring and auditing of the Corporation's hiring practices conform to the requirements of the Law, which state that any such evaluation be financially and administratively independent.

In conclusion, individuals chosen for hire are selected based on merit and their ability to meet the requirements of the available positions. All hiring is conducted in compliance with the rule of law, without distinction or discrimination and with equal opportunity provided to all who may apply.

G3.11. Submit a list of all relevant laws and regulations covering worker's rights in the host country. Describe measures needed and taken to inform workers about their rights. Provide assurance that the project meets or exceeds all applicable laws and/or regulations covering worker rights and, where relevant, demonstrate how compliance is achieved.

The Political Constitution of Colombia (Constitución Política de 1991) includes a section known as the Colombian Labor Code[81] that regulates the labor laws and relations in the country. It provides a set of principles, actions, and rules governing direct and indirect relations between workers, employers, and the State. It is designed to guarantee and protect fundamental workers' rights and the right to work.

In accordance with the Constitution, the right to work is a fundamental right that is due to all and should be guaranteed by the State. In addition, the Constitution enshrines the right of union association, which protects both workers and employers. These laws agree with those international treaties to which Colombia is a party, such as the Universal Declaration of Human Rights, the International Covenant of Economic, Social and Cultural Rights, the International Covenant on Civil and Political Rights, and the American Convention on Human Rights.

Within the framework of the laws mentioned previously, Colombia has developed a Directorate of Fundamental Labor Rights to support the development of decent work opportunities in the country. That said, the government understands that it is not sufficient to simply create job opportunities in the country, but that it must also guarantee that this employment meets the four pillars established by the International Labour Organization (ILO) (Table 19).

This office articulates and implements actions in different policy spheres in order to protect the labor rights of vulnerable groups, including: young workers, workers with disabilities, indigenous populations, Afro-Colombians, elderly workers, and rural workers. It is also equally responsible for regulating the different forms of employment relationships in the country and creating harmony between labor institutions for the effective protection of workers.

[81] Ministerio de protección social (2011), Código sustantivo del trabajo. Available at: file:///C:/Users/Victor%20G/Downloads/Codigo%20Sustantivo%20del%20Trabajo%20-%20Actualizado%202011.pdf

Table 19. Pillars of "decent work", as established by the ILO.

PILLARS (ILO)
Standards and rights at work: Access to employment with conditions of dignity.
Respect for fundamental rights at work, including the eradication of child labor, especially in its worst forms.
The inclusion of a **Social Protection** system.
Social Dialogue, which promotes and strengthens the actors in tripartism (government, employers, and workers).

Colombia has ratified sixty-one conventions of the ILO guidelines, including the eight "fundamental" conventions (see Table 20), three of the "priority" governance conventions, and fifty technical conventions. Of these sixty-one, fifty-five are in force (see the report concerning the ILO conventions ratified by Colombia).

Table 20. Fundamental Conventions of the ILO, ratified by Colombia.

FUNDAMENTAL CONVENTIONS (ILO)
Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87).
Right to Organise and Collective Bargaining Convention, 1949 (No. 98).
Forced Labour Convention, 1930 (No. 29).
Abolition of Forced Labour Convention, 1957 (No. 105).
Minimum Age Convention, 1973 (No. 138).
Worst Forms of Child Labour Convention, 1999 (No. 182).
Equal Remuneration Convention, 1951 (No. 100).
Discrimination (Employment and Occupation) Convention, 1958 (No. 111).

The project was developed under the regulation of all laws and conventions mentioned here that concern workers' rights. As the project proponent is an local environmental authority of Colombia, all national laws also apply, and the project is constantly verified for compliance.

G3.12. Comprehensively assess situations and occupations that might arise through the implementation of the project and pose a substantial risk to worker safety. Describe measures needed and taken to inform workers of risks and to explain how to minimize such risks. Where worker safety

cannot be guaranteed, project proponents must show how the risks are minimized using best work practices in line with the culture and customary practices of the communities.

As described in Section G3.9, CORPOCHIVOR is the entity charged with contracting the technicians that will implement project activities and continue to provide technical assistance during the lifecycle of the project. As such, CORPOCHIVOR is responsible for training these workers and instructing them in technical matters and issues of work safety.

Possible operational risks for those working as field technicians and participating in project activities include:

- Accidents in the field, including falls due to slopes, ditches, culverts, etc.
- Injuries from falls from horseback.
- Poisoning from handling fertilizers (both organic and chemical).
- Exposure to adverse weather conditions.
- Bites and stings from insects, snakes, and other sources.
- Work sites distant from medical facilities.

Prevention methods taken to avoid these aforementioned risks may include:

- All field personnel (contractors, employees, and officials) should, by law, be covered by the Social Security system.
- Periodic training of personnel concerning the proper and safe use of tools and agricultural inputs.
- First Aid training, in case of accidents, stings, or bites.
- Adequate provision of equipment and supplies to technicians (boots, jacket, raingear).
- Provision of a permanent First Aid kit.
- Logbooks for vehicle maintenance, to ensure their good condition and documentation according to the law.
- Field technicians must carry up-to-date emergency numbers (e.g. nearby police stations, ambulance services, fire departments, and medical centers).

As landowners begin participating in project activities, these safety measures should be expanded to cover them as well and will also be part of the transfer of knowledge and technical training provided by the Corporation to the community.

G4. Management Capacity

G4.1. Describe the project's governance structures, and roles and responsibilities of all the entities involved in project design and implementation. For projects using a programmatic approach, identify any new entities included in the project since the last validation or verification against the CCB Standards.

The current governance structure of the project is composed of the project proponent and landowners:

Project Proponent: CORPOCHIVOR

- Coordinates owners of the land around the project.
- Represents landowners
- Sets conservation agreements with the owners
- Manages resources for implementation
- Hires / implements project activities
- Hires / implements the monitoring Project

Landowners

The land owners are linked to the project by the conservation agreements signed between each of them and the Project proponent. Their participation in the project is completely voluntary, through free, prior and informed consent and through free commitments and the benefits expected.

Project developers

- South Pole Carbon Asset Management SAS
- Research Center Carbono & Bosques

Their responsibilities are elaborate and oversee the development of appropriate project design and monitoring techniques in line with the guidelines of the VCS and CCBS.

New instances have not been yet included in the project.

G4.2. Document key technical skills required to implement the project successfully, including community engagement, biodiversity assessment and carbon measurement and monitoring skills. Document the management team's expertise and prior experience implementing land management and carbon projects at the scale of this project. If relevant experience is lacking, the proponents must either demonstrate how other organizations are partnered with to support the project or have a recruitment strategy to fill the gaps.

The profiles and technical skills required for the successful development of the project are described below:

- **Project Coordinator**: Knowledge of the region and extensive experience in coordinating multidisciplinary teams including field work and community work. Responsible for the overall coordination of the project, including the management of financial resources for the implementation and monitoring of the project.
- **Coordinator of biodiversity and strategic ecosystems.** Experience in biodiversity monitoring, sampling methods of wildlife and ecosystem assessment of quality indicators. Responsible for biodiversity monitoring.
- **Coordinator of education, training and strengthening of citizen participation.** Extensive experience in working with the community and environmental education. Coordinate and plan the activities of this component, making socializations and workshops (or coordinating support staff when required) and monitoring of social variables.
- **Technical Field:** Knowledge of the area and experience in fieldwork and community work. Responsible for field implementation of restoration activities, crop improvement, woodlots, silvopastoral systems and efficient stoves. Responsible for gathering the information from the

owners (including geographical lifting points of interest and polygons) and establish direct and permanent contact with them. Responsible for conducting forest inventories for carbon monitoring (on training).

- **Professional or technical field:** Experience in field work and sampling methods of fauna and flora. Professionals responsible for the sampling of biodiversity.
- **GIS Coordinator.** Responsible for managing all geographic information and database of the owners, as well as generating all required cartographic analysis. Responsible for collecting and organizing all the geographic information collected in the field in the project area and reference region. Coordinating the monitoring of deforestation for verification of the project.

The main responsibility of the community is to support the overall project monitoring. Given that this group of stakeholders has a permanent presence on the ground, with constant contact with the other stakeholders that can affect the forest. This last group is the most impacted by the project, their participation is critical to success. In this regard, it is their responsibility to maximize their participation in social spaces, workshops and training, to understand the operation of the communication channel (Sec G3.8) and use it in an appropriate and timely manner. This will allow them to transmit the observations, suggestions and contributions from their vision, according to social and environmental problems. These problems cannot be evident to the project proponent.

On the other hand, as education, training, capacity and citizen participation move forward, it is expected that the community can actively participate in the monitoring of the project. These activities include:

- Support crews for forest inventories (previous training with field technicians).
- Participate in the register of presence of species of fauna and flora through direct observation methods.
- Participate in inventories of fauna and flora (see sec B4.1) after training with field technicians.
- Participate in social monitoring (see sec CM4.1): gathering information from the other owners through interviews, surveys and other tools used in the monitoring, prior training on variables collected.

Finally, for verification under the VCS and CCB standards and management of the carbon credit (issuance and sale), Copochivor will receive technical advice from the developers of PD or an entity with similar experience. The team of the project developer (South Pole Group and Carbono & Bosques) has a large and very important experience related to carbon markets and AFOLU projects, nationally e internationally[82].

G4.3. Document the financial health of the implementing organization(s). Provide assurance that the Project Proponent and any of the other entities involved in project design and implementation are not involved in or are not complicit in any form of corruption such as bribery, embezzlement, fraud, favoritism, cronyism, nepotism, extortion, and collusion, and describe any measures needed and taken to be able to provide this assurance.

[82] Detailed information of these companies can be found at www.thesouthpolegroup.com and www.carbonoybosques.org.

The first instance of the project has the necessary resources for the development and validation of the PD under VCS and CCB standards. These resources are obtained through the Environmental Compensation Fund (FCA) of the Ministry of Environment, Housing and Territorial Development. The implementation of the first project activities will be carried out with the resources of the Corporation for the Institutional Action Plan 2015-2019 of the Corporation. Subsequently the financial mechanisms approved (see section G1.12) ensure the capture and flow of financial resources for the implementation of the planned activities. All these actions will be covered by the Anticorruption Plan CORPOCHIVOR. Besides, CORPOCHIVOR is supervised by the next organs of public oversight:

External

- General Comptroller of the Republic of Colombia
- General Accounting Department
- Inspector General of the Nation
- Attorney General's Office
- House of representatives
- Ministry of Finance and Public Credit
- Citizen oversight committees

Internal

- Internal Control Office
- Tax inspection
- Corporate Assembly
- Integrated Quality Management System

G5. Legal Status and Property Rights

Respect for rights to lands, territories and resources, and Free, Prior and Informed Consent

G5.1. Describe and map statutory and customary tenure/use/access/management rights to lands, territories and resources in the Project Zone including individual and collective rights and including overlapping or conflicting rights. If applicable, describe measures needed and taken by the project to help to secure statutory rights. Demonstrate that all Property Rights are recognized, respected, and supported.

In CORPOCHIVOR's area of influence, land tenure is characterized by smallholding. This generally means diminutive parcels that are owned by the farmers and families who work them and that only aim to support the consumption needs of those persons. Approximately 56.6% of the properties under the jurisdiction of CORPOCHIVOR are less than one hectare in size, and 99.85% of the properties are considered to be "smallholdings" (Table 21).

Table 21. Land tenure in the region overseen by CORPOCHIVOR.

Size	Number of Properties	Total Area (ha)	Percentage	Property Type
<1 ha	65,762	30,395.71	56.6	Smallholdings 99.85%
1 to 5 ha	88,942	83,292.02	33.5	
5 to 10 ha	6,124	42,551.74	5.27	
10 to 20 ha	3,121	43,200.70	2.68	
20 to 50 ha	1,720	51,769.99	1.48	
50 to 100 ha	421	2,834.88	0.36	
>100 ha	175	32,135.57	0.15	Large Estates
Totals	116,265	311,700.61	100	

Source: Based on [SIAT CORPOCHIVOR 2013]

Of the ten prioritized municipalities within the jurisdiction of CORPOCHIVOR, the majority of the properties can be categorized as either inheritances[83], lands that have not yet been "segregated[84]," or land acquired without regards to documentation or the notary or registration processes. Typically, beneficiaries prove ownership based on family ties or a deed of sale.

In Colombia, land tenure may be demonstrated through a property registration, a unique document that exists for every property in the country[85]. This document or an equivalent[86] will be required for any person who wishes to include his or her property in the Project, in order to ensure that the land tenure over said property is legally held.

Table 22 displays the number of properties without property registration by municipality. Within these properties, the table differentiates between those that are abandoned and those that are inhabited (by passive holders). Approximately 25% (3,740) of the properties under the jurisdiction of CORPOCHIVOR do not have their registration. Of the properties without registration, 1,988 (13%) have been abandoned while the remaining 1,752 (12%) are inhabited.

Table 22. Properties without Registration.

Municipality	Number of Properties	Number of Properties without Registration

[83] Mode of property acquisition due to the death of the owner, i.e. through inheritance, (Código Civil Colombiano. Título II: Del Dominio; Colombian Civil Code. Title II: Of Domain).
[84] Land generally obtained through inheritance, which belonged to various persons and remains undivided.
[85] Law 1579 of 2012, Chapter IV. Available at: http://www.secretariasenado.gov.co/senado/basedoc/ley_1579_2012.html
[86] Another valid document is the "Certificado de Tradición y Libertad" (Certificate of Tradition and Liberty), which describes the use of the property, its previous owners, the mortgage status of a property, whether this land has been seized, and the status of any legal process to which the property is being subjected. The public deed of the property duly registered in the public documents registry office is also a valid form of demonstrating the property and its ownership.

		Abandoned	Inhabited
Chinavita	1,056	274	7
Chivor	395	48	2
Ciénega	4,108	635	4
Garagoa	834	29	7
Guayatá	718	66	164
La Capilla	1,962	259	18
Macanal	134	13	0
Tibaná	751	364	1,387
Úmbita	2,234	88	142
Viracachá	1,827	212	21
Total	**15,019**	**1,988**	**1,752**

Source: based on the property information managed by CORPOCHIVOR.

The property rights for each parcel are recognized and respected. All of the properties involved in the project either have property titles or equivalent documents to certify and assure rights over the land.

That said, one of the complementary and priority project activities is to act in an advisory capacity, assisting each of the landowners interested in project participation in the procurement of legal land tenure documentation.

Within the Reference Region, there are no communities of African or indigenous heritage with collective property titles.

G5.2. Demonstrate with documented consultations and agreements that

a. the project will not encroach uninvited on private property, community property, or government property,
b. the Free, Prior, and Informed Consent has been obtained of those whose property rights are affected by the project through a transparent, agreed process.
c. appropriate restitution or compensation has been allocated to any parties whose lands have been or will be affected by the project.

The Project is being developed on individual parcels of private property, with each of the property owners holding legal title of the land he or she inhabits (See Folder Land owners).

In addition, “socializations” – interactive meetings to introduce, build support for, and solicit feedback on the project – have been conducted both in rural and urban project zones, with the intention of informing the community of the project activities and the benefits that the project offers to the community. To date, twelve (12) “socializations” have been carried out with a total participation of 244 persons (See Stakeholder consultation Folder).

All property owners with parcels included in the project implementation area have freely and voluntarily signed a letter of intention (See Folder Land owners). In this letter, these individuals express their interest in participating in the project and consent to be project beneficiaries, acknowledging the climatic, environmental, and community benefits to be derived from the project.

They have committed to work jointly with CORPOCHIVOR to reach the proposed objectives. Permission was obtained from every landowner through an open and transparent process, and the project will not infringe upon private, community, or public land that has not been designated for participation in this manner (See Stakeholder consultation Folder).

There has been no need to provide compensation for lands affected as a result of project activities, as the activities are being directly implemented on the private land of each consenting owner. As such, the project is not expected adversely affect the local community. Rather, it is expected the project strategies and activities will improve the quality of life of the involved landowners, through training, education, strengthening of citizen participation, improvement of alternative production systems, and the protection and conservation of biodiversity. In addition, the project will provide indirect benefits, such as regulation of river levels and discharge, water quality, and water concessions.

G5.3. Demonstrate that project activities do not lead to involuntary removal or relocation of Property Rights Holders from their lands or territories, and does not force them to relocate activities important to their culture or livelihood. If any relocation of habitation or activities is undertaken within the terms of an agreement, the project proponents must demonstrate that the agreement was made with the Free, Prior, and Informed Consent of those concerned and includes provisions for just and fair compensation.

No involuntary displacement or relocation of landowners is expected for the project; all participants have freely expressed their agreement with the project implementation (See Stakeholder consultation Folder). In addition, project activities will not be implemented in areas controlled by owners who have not signed a letter of intention. It is expected that through project activities, landowners will improve their crop and/or livestock production and that over time the project activities will become fully adopted into the management practices of these individuals.

One method being implemented to achieve this result is constant communication between the project proponent and the landowners participating in the project (see G3.8). This will ensure that these two groups work in partnership to identify the activities to be implemented on each property, adapting activities to respect and fit the needs and technical requirements of each situation.

G5.4. Identify any illegal activities that could affect the project's climate, community or biodiversity impacts (e.g. illegal logging) taking place in the Project Zone and describe measures needed and taken to reduce these activities so that project benefits are not derived from illegal activities.

In Colombia, 1.5 million cubic meters of round wood (or its equivalent in sawn timber) are illegally cut, processed and sold each year[87]. In the reference region for this project, the presence of illegal logging has been identified and confirmed. Wood is primarily extracted from natural forest for use as firewood, cooking fuel, and timber[88]. This issue is primarily caused by inhabitants' unfamiliarity with the permitting process for legal extraction, as well as the difficulty of obtaining legal permission due to

[87] 2011. Pacto Intersectorial por la Madera Legal en Colombia. Ministerio de Ambiente, Vivienda y Desarrollo territorial.
[88] Plan General de Ordenación Forestal-PGOF (2013). Corporación Autónoma Regional de CHIVOR-CORPOCHIVOR. Ministerio de Medio Ambiente y Desarrollo Sostenible-Fondo de compensación Ambiental.

the remoteness of the extraction point, the amount of information required to apply, and the waiting period to receive the permit (approximately two months)[6].

CORPOCHIVOR consistently implements roadblocks and checkpoints to prevent the trafficking of illegally cut wood. At these checkpoints, those transporting wood must demonstrate legal permission to do so. This permission is issued by the Corporation and regulates the quantity and the species of wood that can be transported. In the first half of 2015, 28.31 m^3 of illegally extracted wood was seized by authorities[89].

Mining, mainly for coal, is also occurring illegally in this region, however, the CORPOCHIVOR is impelling investigations to address and stop said activity. During 2014, the Corporation, exercising its rights under Environmental Authority and with support from the National Police, conducted six operations against illegal mining. As a result, fourteen (14) adits were closed[90].

The benefits generated by this project are not derived from any of these activities. To reduce these activities, the project will employ community trainings concerning the illegal trafficking of flora and fauna, environmental law, and strategies to exercise control and increase vigilance in the face of illicit activity. Workshops are to be carried out in the twenty-five (25) municipalities within the jurisdiction of the Corporation, framing these issues in terms of the strategy of education, training, and strengthening of citizen participation. It is in this same manner that the project aims to increase productivity of the land, through implementation of agroforestry and silvopastoral systems, this as a means of generating additional income for the landowners and meeting the project goals of establishing forestry systems, ecological restoration, and supporting alternative production systems.

G5.5. Identify any ongoing or unresolved conflicts or disputes over rights to lands, territories and resources and also any disputes that were resolved during the last twenty years where such records exist, or at least during the last ten years. If applicable, describe measures needed and taken to resolve conflicts or disputes. Demonstrate that no activity is undertaken by the project that could prejudice the outcome of an unresolved dispute relevant to the project over lands, territories and resources in the Project Zone**.**

The most frequent land-rights conflicts in the country are those generated by forced displacement at the hands of various armed groups operating at the fringe of the law.

Although this is true from a national standpoint, each department of Colombia faces a different situation. In the Department of Boyacá in the area under the jurisdiction of CORPOCHIVOR, there are relatively few victims of forced displacement. The number displaced in this region represents less than 1% of the national total[91]. In the Reference Region for this project, the displacement is equally

[89] CORPOCHIVOR. 2015. Management report CORPOCHIVOR 2015- 1st Semester.
[90] http://webanterior.CORPOCHIVOR.gov.co/es/content/CORPOCHIVOR-y-polic-nacional-trabajan-articuladamente-por-la-protecci-n-de-los-recursos
[91] The average number of persons displaced in the municipality of Boyacá between 1985 and 2015 is 941 persons per year, which corresponds to 0.68% of the national total during the same period (Red Nacional de Información de víctimas del conflicto armado – National Network for Information on Victims of the Armed Conflict. Updated 1 May 2016).

low, with an average of 145 persons displaced per year[92]. Figure 28 displays the historic displacement trends and the precipitous decline in displacement that has occurred in recent years.

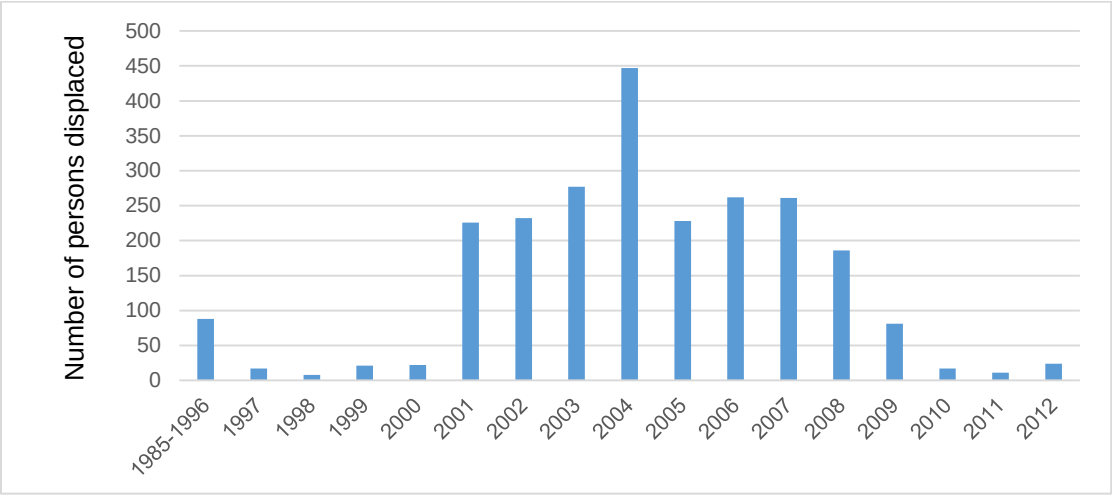

Figure 28. Number of persons displaced in the Reference Area of this project.

The national strategy to mitigate the issues caused by displacement began with Law 1498 of 2011, which details the care, assistance, and reparations to be provided to the victims of the Colombian internal armed conflict. Since 2011, the government has prioritized those departments with the most acute displacement problems. As Boyacá is one of the departments with the lowest number of affected citizens, land restitution processes have yet to be implemented there. However, in June of 2016, the Land Restitution Unit (URT: Unidad de Restitución de Tierras) decided to begin the process of reestablishing land rights for dispossessed and abandoned properties in certain municipalities, some of which fall within the Reference Region of this project[93].

The project activities are carried out on the private properties of landowners that hold legal title or equivalent document to prove their rights over the land (see the Landowners folder). As such, there are no disputes nor conflicts concerning the project zone. In addition, one of the project activities is designed to provide legal assistance to the inhabitants of the project zone, advising them on how to obtain peaceful, legal tenure over their lands so that they can participate in the project and any future initiatives.

Legal Status

[92] Elaboration based on the data presented in "Informe Nacional de Desplazamiento Forzado en Colombia 1985 a 2012" (National Report on Forced Displacement in Colombia, 1985 to 2012). The average national figure from the same period is 233,671 persons per year. Source: Red Nacional de Información de víctimas del conflicto armado. Updated 1 May 2016.

[93] The Reference Region municipalities that have begun the land restitution process inclide: Almeida, Campohermoso, Chivor, Guateque, Guayatá, Macanal, Ramiquirí, San Luis de Gaceno, Santa María, Tibaná, Turmequé, Úmbita and Viracachá. Source: Informe de prensa de la Unidad de Restitución de Tierras (2 Junio 2016). Available at: https://www.restituciondetierras.gov.co/web/guest/historico-de-noticias/-/noticias/687424

G5.6. Submit a list of all national and local laws and regulations in the host country that are relevant to the project activities. Provide assurance that the project is complying with these and, where relevant, demonstrate how compliance is achieved**.**

The project proponent is CORPHOCHIVOR, a state entity responsible for acting as the regional environmental authority. Therefore, all activities implemented by the project will follow the guidelines and regulations described as follows.

Table 23. National laws relevant to the project activities.

National Policies	
Law 164 of 1994 *Ratification of the UNFCCC*	Decision 1/CP16: in agreement with the national circumstances, the parties adopt measures to reduce emissions that result from the deforestation and degradation of forests. This project is in line with the regulation, due to it is a measure to avoid the deforestation and degradation of forests in the region, using the forest definition adopted by the Designed National Authority (DNA).
Resolution 937 of 2011, MADS	Establishes the means for national-scale mapping for the identification and delimiting of *páramo* ecosystems. The project uses this delimitation in order to protect the strategic ecosystems and HCV identified. The project activities are not implemented or promoted on these areas.
Institutional Strategy for the Articulation of Climate Change Policies and Actions in Colombia *Estrategia institucional para la articulación de políticas y acciones en materia de cambio climático en Colombia* *(CONPES Document 3700 of 2011)*	Constructing an interdepartmental coordination scheme that facilitates and foments the formation and implementation of policies, plans, programs, methodologies, incentives, and projects to address climate change, resulting in the consideration of climate as a determining factor for the design of development projects.
Colombia Low-Carbon Development Strategy *Estrategia Colombiana de Desarrollo Bajo en Carbono* *2012*	Planning program for short, medium, and long-term development, aimed at decoupling the increase in greenhouse gas emissions (GHG) from national economic growth. The project complies with this estrategy through the design of activities that simultaneously mitigate GHGs and strengthen the social and economic growth of the Corpochivor´s jurisdiction.

National Policies	
REDD+ strategy as provided for in the National Development Plan Estrategia REDD+ contemplada en el Plan Nacional de Desarrollo *(PND 2010-2014 and 2014-2018)*	The project is a REDD+ project with the ends of reducing GHG emissions, decreasing deforestation and degradation of the forests, and to preserve and augment carbon reserves through sustainable forest management.

Table 24. Local laws relevant to the project activities.

Local laws	
Accord of the Board of Directors No. 16 (27 November 2013)	Adopts the General Forest Management Plan (*Plan General de Ordinación Forestal -PGOF)* for the jurisdiction of CORPOCHIVOR. The PGOF is the Corporation's basic tool for the administration for natural forests and lands suitable for forestry in the Jurisdiction, the creation of forest management plans and silviculture implementation, and the power to make decisions concerning their use and exploitation. All the project design is in line with the PGOF and all the project activities will be implemented according to the zoning maps established in this Plan.

The project proponent is reducing pressure on *páramo* ecosystems and forest resources (including flora, fauna, and water) by supporting production activities and empowering communities to protect and take ownership over their environmental resources.

These activities are to be implemented in agreement with the permitted use and activity definitions for each management category, as stipulated by the forest zoning regulations of the PGOF. At the same time, this plan complies with the definitions of protection and production zones of the CNRN (Law 2811 of 1974) and the MADS delimitation of páramos (Resolution 937 of 2011).

Furthermore, as a forest carbon project formulated under VCS, a quantitative and verifiable system of carbon and forest cover monitoring will be implemented.

G5.7. Document that the project has approval from the appropriate authorities, including the established formal and/or traditional authorities customarily required by the Communities**.**

In Colombia, the local environmental autorities (CARs[94]) are tasked with the implementation of policies, plans, programs, and projects concerning the environment and natural, renewable resources. In doing so, the CARs provide a means for full and timely compliance with all existing legal

[94] As per the name in Spanish

requirements regarding administration, management, and use, in accordance with the regulations, standards, and guidelines issued by the Ministry of Environment and Sustainable Development[95]. As CORPOCHIVOR is the principal project proponent, this project will assuredly comply with all environmental regulations applicable to the zone and therefore will have the approval of environmental authorities.

Regarding communities, the project beneficiaries are private landowners that have title to the land they manage and have voluntarily agreed to participate in the project.

G5.8. Demonstrate that the Project Proponent(s) has the unconditional, undisputed and unencumbered ability to claim that the project will or did generate or cause the project's climate, community and biodiversity benefits**.**

CORPOCHIVOR, as the project proponent, has the unconditional, unrestricted, and indisputable ability to confirm the benefits generated by the project, since it was created under the authority and with the backing of the Ministry of the Environment and Sustainable Development of Colombia (the highest environmental authority in the country). Its mission is to act as an authority in the implementation of environmental policy and seek environmental conservation. CORPOCHIVOR's experience) ensures that climatic, community, and biodiversity objectives will be attained through the development of this project. In addition, the Corporation acts closely with local and regional authorities and with other entities within the National Environmental System, supporting and assuring that the proposed activities will help achieve their expected benefits.

G5.9. Identify the tradable climate, community and biodiversity benefits of the project and specify how double counting is avoided, particularly for offsets sold on the voluntary market and generated in a country participating in a compliance mechanism**.**

The project is not enrolled in any carbon capture project in the regulated market, and therefore, there is no double-counting of such benefits. However, within the reference region, there is an efficient cookstoves project in its initial stages. As such, during the carbon accounting stage, all possible means will be taken to avoid double-counting of emissions reductions (i.e. emissions reductions from avoided degradation will not be included in accounting).

[95] Law 99 of 1993. Article 30.

CLIMATE SECTION

This section is used to demonstrate a project's net positive climate benefits and not for claiming greenhouse gas (GHG) emissions reductions and removals units that may be used as offsets. This section is not required for projects that have met the requirements of a recognized GHG Program.

GL1. Beneficios de la Adaptación al Cambio Climático

GL1.1. Identify likely regional or sub-national climate change and climate variability scenarios and impacts, using available studies, and identify potential changes in the local land use scenario due to these climate change scenarios in the absence of the project.

According to the Third National Communication on Climate Change published in 2015[96], the following changes in temperature will be presented in the department of Boyacá:

Table 25. Climate Change Scenarios 2011 - 2100. Source: IDEAM et al. 2015.

Period	Changing average temperature ° C	Precipitation change (%)
2011- 2040	0.8	5.84
2041 - 2070	1.6	3.69
2071 - 2100	2.4	3.19

According to projections, the temperature for the Department may rise 2.4°C by the end of the century, the most affected will be the provinces of Occidente, Zona Foronteriza, the Distrito de Manejo Especial and Neira; the latter belonging to the jurisdiction of CORPOCHIVOR. Increased precipitation will be between 20% and 40% and is present mainly in the provinces of Central, Oriente and Márquez, while in the Neira Province may be a reduction in rainfall between 10% and 20%.

[96] IDEAM, PNUD, MADS, DNP, CANCILLERÍA. 2015. New Climate Change Scenarios for Colombia for 2011-2100 Scientific Decision Making Tools - National Approach - Departmental: Third National Communication on Climate Change.http://documentacion.ideam.gov.co/openbiblio/bvirtual/022964/documento_nacional_departamental.pdf

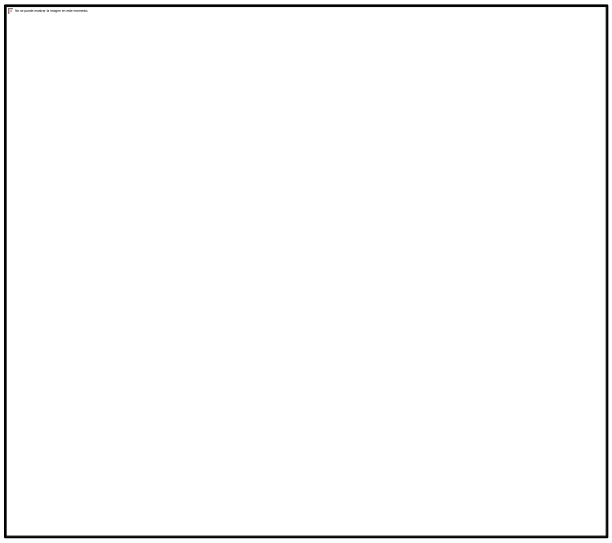

Figure 29. Provinces in the Department of Boyacá. Red Line: jurisdiction of CORPOCHIVOR

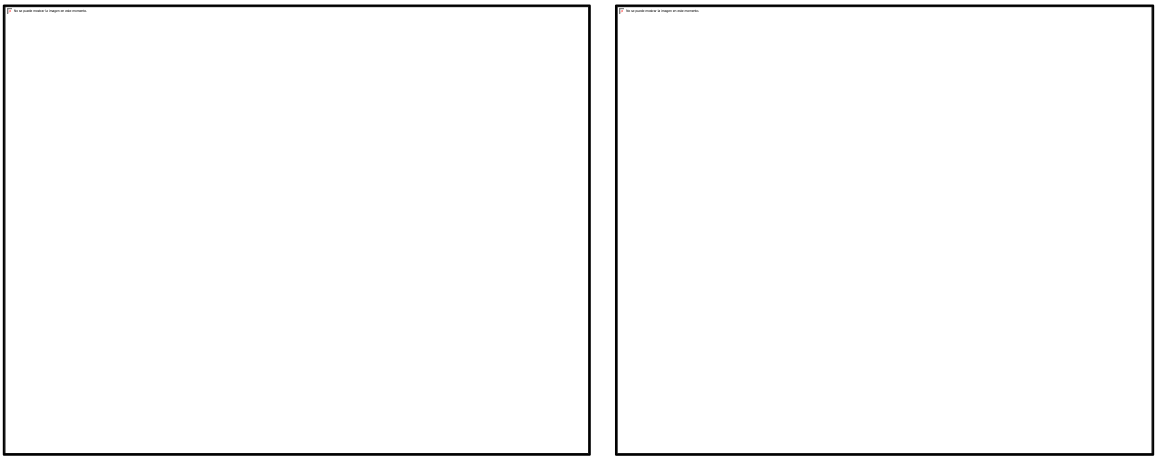

Figure 30. Left: Expected change of temperature (in degrees Celsius) for the 2071-2100 period, compared to the reference period 1976-2005. For temperature yellow and red colors indicate increases. Right: Expected change in precipitation (%) for the 2071-2100 period, compared to the reference period 1976-2005. For precipitation, yellow and red colors indicate decline, while blue and purple colors indicate increasing. Source IDEAM et al. 2015.

Overall the sector can be seen mainly affected is livestock given the progressive increases in temperature. The road sector will be affected especially in Central and Oriente Provinces by increases in precipitation and possible landslides. In general, the *páramos* and nivales covers are subject to thermal stress and associated biodiversity it may be affected by altitudinal movements[97].

[97] IDEAM, PNUD, MADS, DNP, CANCILLERÍA. 2015. New Climate Change Scenarios for Colombia for 2011-2100 Scientific Decision Making Tools - National Approach - Departmental: Third National Communication on Climate Change.http://documentacion.ideam.gov.co/openbiblio/bvirtual/022964/documento_nacional_departamental.pdf

On the other hand, according to the first version of the-LRE Colombia[98], Red List of Terrestrial Ecosystems, of the 81 ecosystems recognized in the country for this analysis, 22% is in critical condition (CR), 21% in state of danger (EN) and 42% are classified with minimal involvement levels (LC). According to figures, wetlands in the Andean region are some of the most threatened ecosystems with dry forests.

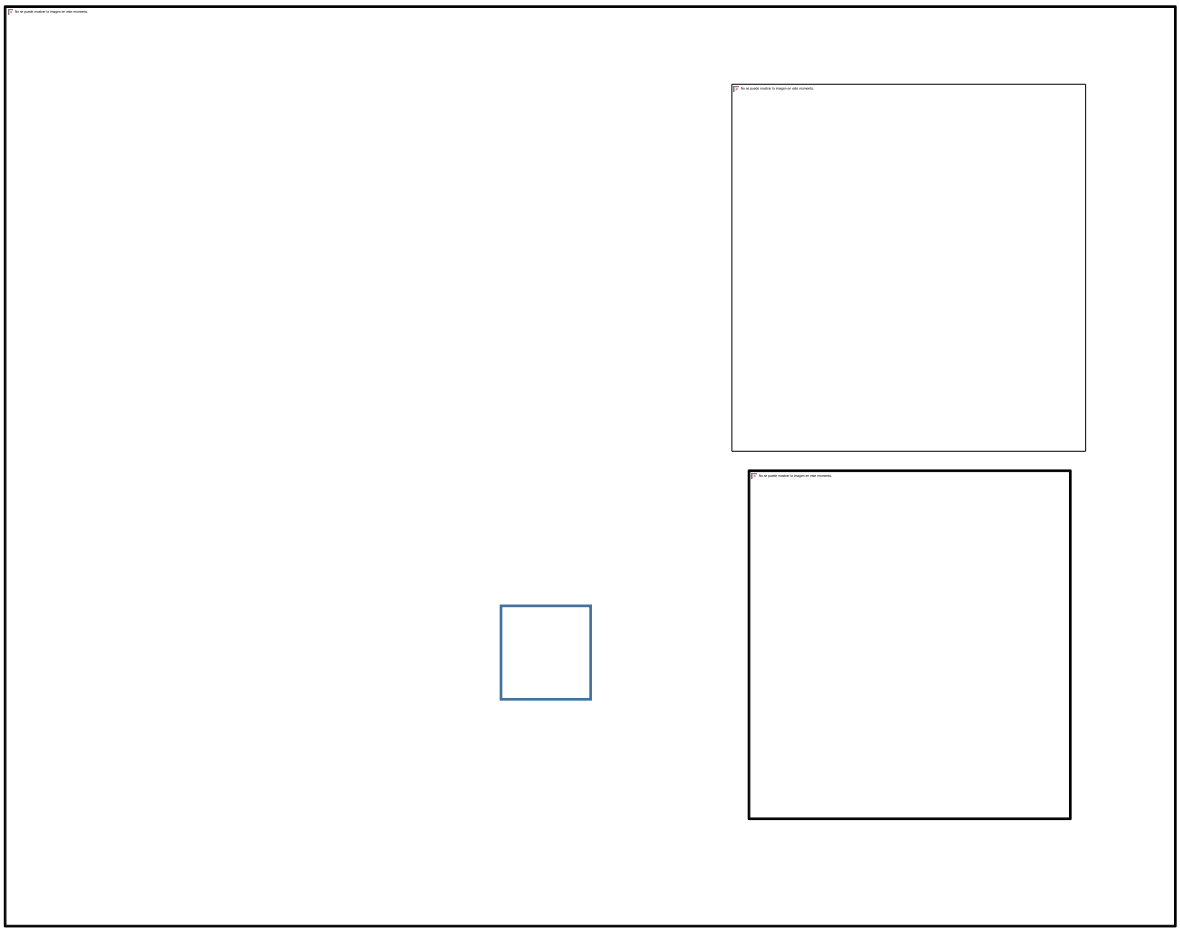

Figure 31. Red List of Ecosystems (FREE) in Colombia. The blue box indicates the southern department of Boyacá, CORPOCHIVOR jurisdiction. Source Etter et al. 2016.

Finally, the result of vulnerability in the jurisdiction shows that the municipalities of Campohermoso, Santa Maria, San Luis de Gaceno, Chivor, Macanal, Nuevo Colón and Pachavita have a very high or high vulnerability therefore are the most likely to be affected negatively by climate change.

[98] Etter A., Andrade A., Amaya P. y Arévalo P.A. (2016). Red List of Terrestrial Ecosystems of Colombia. At: Gómez, M.F., Moreno, L.A., Andrade, G.I. y Rueda, C. (Eds). Biodiversity 2015. Status and Trends of Biodiversity Continental Colombia. Alexander von Humboldt Institute. Bogotá D. C. http://reporte.humboldt.org.co/biodiversidad/2015/cap2/206.html#

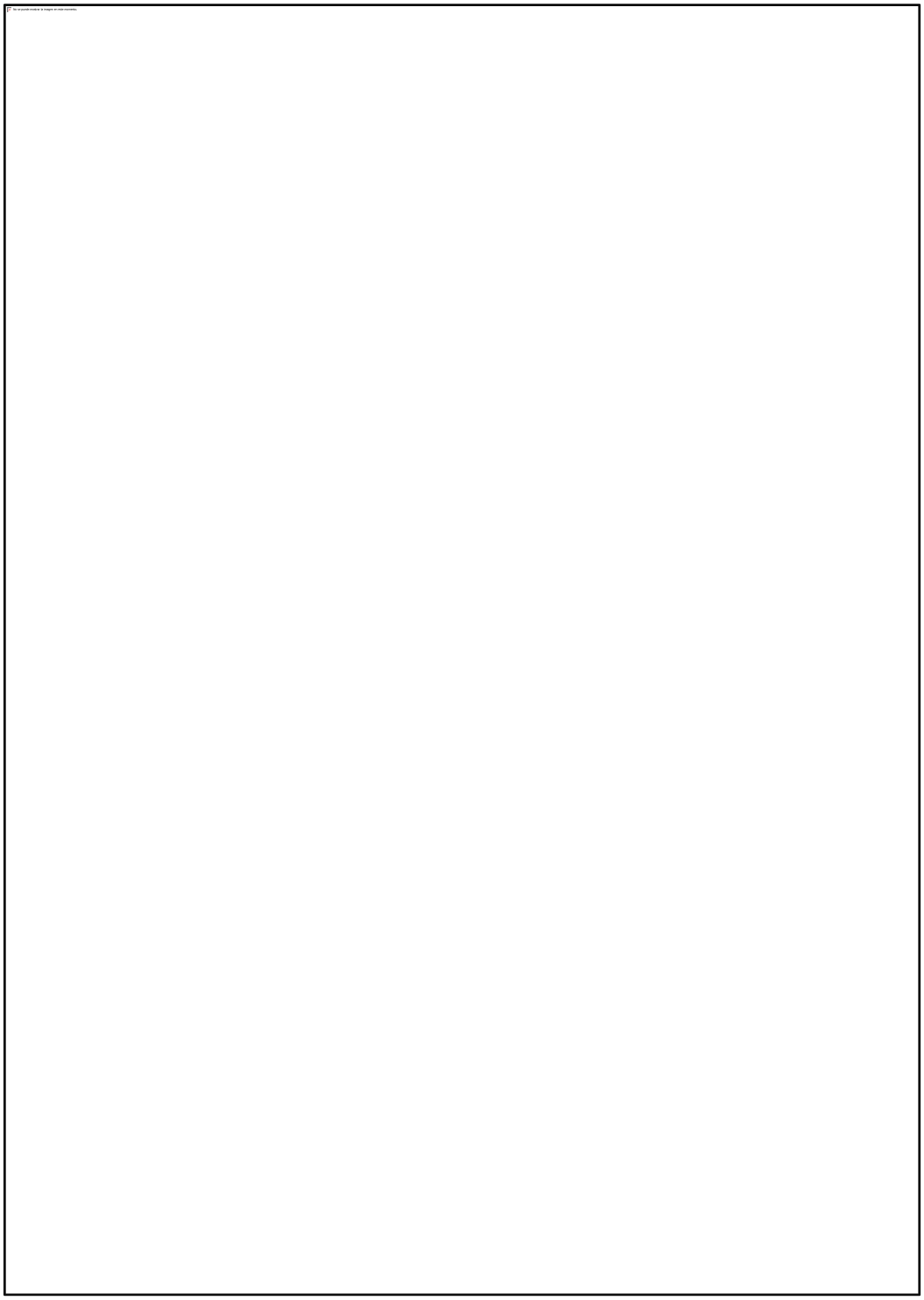

Figure 32. Vulnerability to climate change in jurisdiction. Source: CORPOCHIVOR 2016[99].

[99] CORPOCHIVOR 2016. Atlas para el desarrollo ambiental y social. Available at https://issuu.com/legissa/docs/atlas_CORPOCHIVOR_usb/1?e=2067536/36655589

GL 1.2. Demonstrate that current or anticipated climate changes are having or are likely to have an impact on the well-being of Communities and/or the conservation status of biodiversity in the Project Zone and surrounding regions.

Some of the impacts that will affect the well-being of communities, according to Climate Change Knowledge Portal[100] and the Third National Communication on Climate[101], coul be:

- Increases in La Niña events will lead to higher incidence of droughts, affecting water supplies and crop production.
- Agriculture in Colombia is vulnerable to increases in aridity, soil erosion, and desertification due to increasing climate variability all of which already pose serious problems and could in turn threaten food security.
- Water sources would also be vulnerable to saltwater intrusion and increased temperature will cause glacial retreat, and thus, comprise rural and municipal water supplies. In general, the *páramos* and nivales covers are subject to thermal stress and associated biodiversity it may be affected by altitudinal movements. These facts will decrease access to ecosystem services of importance for communities' livelihoods and overall well-being.
- If there is a true correlation between climate change and increases in the El Niño/Southern Oscillation (ENSO) the associated extreme weather events, including floods, droughts and heat waves would produce severe socioeconomic and environmental impacts including crop failure, forest fires, reduction in of energy security due to interruptions go hydropower generation.
- Agricultural activities could be affected due the progressive increases in temperature; it would be criticall for the community, since 78% of the incomes perceibed by them come from the production of the farms.
- The road sector will be affected especially in Central and Oriente Provinces in Boyacá. by increases in precipitation and possible landslides.

100 http://sdwebx.worldbank.org/climateportal/countryprofile/home.cfm?page=country_profile&CCode=COL&ThisTab=ImpactsVulnerabilities

101 IDEAM, PNUD, MADS, DNP, CANCILLERÍA. 2015. New Climate Change Scenarios for Colombia for 2011-2100 Scientific Decision Making Tools - National Approach - Departmental: Third National Communication on Climate Change.http://documentacion.ideam.gov.co/openbiblio/bvirtual/022964/documento_nacional_departamental.pdf

COMMUNITY SECTION

CM1. Without-Project Community Scenario

CM1.1. Describe the Communities at the start of the project and significant community changes in the past, including well-being information, and any community characteristics. Describe the social, economic and cultural diversity within the Communities and the differences and interactions between the Community Groups.

The communities identified in the project area are communities of farmers and / or landowners. These derive incomes, livelihoods and other forms of welfare from the project area and have homogeneous patterns of social organization, political structure and livelihoods. Within the project area are not settled black communities or indigenous with collective property title.

The main economic activities in the project area have been associated with the dynamics of forest degradation and changes in land use, which have gradually diminished ecological landscape-level functions. Currently these activities affect the provision of ecosystem goods and services. This situation has threatened food security, sustainability of agriculture and sustainable economic development. Additionally, it has contributed, among other factors, rural poverty, which is associated with declining of the per capita arable and available land, without technologies. This results in the expansion of agriculture into marginal lands. This phenomenon becomes a vicious circle[102].

Some of the characteristics of the communities living in the project area related to their welfare, are described in the following table.

Table 26. Features of the communities living in the project area related to their welfare. Source: 2016 Survey owners.

Variables	Description
Incomes origin	Production on the farm: 78.50% Other sources such as lenders or jobs in town: 14.95%
Level of schooling	61% of the population has studied to primary education, 15.89% declares no type of study.
Number of persons in the household	The family unit consists of 1 to 10 members, with an average of 3 people per family. 15% of owners live alone on their farms, because their children or relatives migrate to cities in search of better opportunities.
Agricultural credit	The 61.68% of the population does not have any credit to finance their agricultural activities. The 38.32% possessing such loans obtained mainly from the Banco Agrario, or microfinance institutions as Foundation for Women or Bancamia.
Associations	The 80.37% of the surveyed population does not belong to any association. The participation of the population in guilds, community action and NGOs is very low.

[102] Porras, I., Grieg-Gran, M., Meijerink, G., & Dent, D. L. (2007). Farmers' adoption of soil and water conservation: potential role of payments for watershed services. Green Water Credits Report, 5. Retrieved from http://www.worldsoils.org/isric/webdocs/docs/GWC_Report_5.pdf

Variables	Description
Technical assistance	The farmers mostly (95.33%) did not receive any technical assistance for the development of their farming activities.
Type of Land tenure	The 89.72% of respondents are owners of the land. Other forms of land tenure identified in the area is sharecropper and tenant.
Property title	78% of respondents have title to their land and the remaining 21.50% declared not to be clear in this matter.
GINI Coefficient[103]	GINI coefficient (0.76) shows the degree of inequality in land tenure. This value matches when calculated for all the properties that make up the areas of influence of the project (0.77).
Previous land use	44.8% of the population declared that forest existed in their land, 36% said that always cattle vocation was existed and 18% said that the agricultural vocation was always present. 72.9% of respondents perceive livestock as a major cause of deforestation, followed by monocultures with a percentage of 16.82%.

CM1.2. Evaluate whether the Project Zone includes any of the following High Conservation Values (HCVs) related to community well-being and describe the qualifying attributes for any identified HCVs.

Páramo de Cristales, *Castillejo* or *Guachaneque* has qualified characteristics of High Conservation Values (HCV) for the community because it provides essential ecosystem services.

The *Páramo* is a tropical mountain ecosystem that develop over the forest area and has its limit in perpetual snow[104]. From the functional point of view (vegetation) and biogeographic, J. Cuatrecasas, over forty years ago, established that the vast treeless *páramos* are crowning the stricken regions of ridges above the Andean forest, from 3200-3800 m and can be divided into subfloors: *subpáramo*, *Páramo* itself and *superpáramo*. However, the altitudinal limits in these ecosystems are located in the mountains should not be generalized nationally, due to the diversity of landforms and topography presented in the Andes[105].

In the project area, this ecosystem is part of the Regional District Integrated Management (DRMI) Páramo Cristales, Castillejo or Guachaneque, in the middle of the river basin Garagoa. It covers an area of 11,574 ha in the municipalities of La Capilla, Pachavita, Úmbita and Turmequé[106].

This area has a medium-high degradation derived from the alteration of natural vegetation. In some cases, around the altitude of 2800 m the vegetation has been replaced by pastures for livestock (mainly cattle and goats). In addition, inadequate practice of burning of grasslands and other open areas, has allowed the advancement of native but invasive species (adapted to live in roughest environment). The advance of clear where areas are established or expanded areas devoted to agriculture, is coming in some sectors to

[103] The Gini coefficient measures the inequality among values of a frequency distribution (for example, levels of income). A Gini coefficient of zero expresses perfect equality, where all values are the same (for example, where everyone has the same income). A Gini coefficient of 1 (or 100%) expresses maximal inequality among values (e.g., for a large number of people, where only one person has all the income or consumption, and all others have none, the Gini coefficient will be very nearly one.
[104] http://www.paramo.org/content/%C2%BFqu%C3%A9-son-los-p%C3%A1ramos
[105] Ministry of Environment, Colombia. 2002. Program for Sustainable Ecosystem Management and Restoration of High Mountain Colombiana: *Páramos.*
[106] CORPOCHIVOR 2016. Atlas for environmental and social development. Available at: https://issuu.com/legissa/docs/atlas_CORPOCHIVOR_usb/1?e=2067536/36655589

address the altitude of 3000 meters. In the case of the *Páramo Cristales*, in the past the destruction of most of the high Andean forests, where wildlife could take shelter, find food and nesting was presented. This situation constituted, rather than hunting, the main reason for the local disappearance of a number of species that should exist in the area[107].

From the point of view of conservation and ownership of society of this protected area, an area of sustainable use was linked, so that there is a balance between the ideal concerning the conservation and reality concerning the economic needs of the population. Therefore, zoning adaptive management searches from the current territorial scenarios planned and balanced[108]. In this regard, the following environmental areas were defined:

Preservation area: with 4,706 ha (40.7%). It should be developed protection activities, regulation, order, control and surveillance, aimed at maintaining biodiversity.

Renovated area: with 3,956 ha (34.2%). It should be developed restoration activities, recovery and rehabilitation of ecosystems, management, reforestation, reintroduction or transplantation of wild species, enrichment and habitat management aimed at recovering the attributes of biodiversity.

Area of sustainable use: with 2,910 ha (25%), where it can overtake production activities, mining, construction, adjustment or maintenance of infrastructure as well as agriculture, livestock and forestry, as long as they do not alter the characteristics of biodiversity.

[107] CORPOCHIVOR 2011. Regional District Integrated Management (DRMI) *Páramo de Cristales, Castillejo or Guachaneque.*
[108] CORPOCHIVOR 2011. Regional District Integrated Management (DRMI) *Páramo de Cristales, Castillejo or Guachaneque.*

Figure 33. Delineation and zoning DRMI Páramo de Cristales, Castillejo o Guachaneque. Source: CORPOCHIVOR 2016[109].

[109] CORPOCHIVOR 2016. Atlas for environmental and social development. Available at: https://issuu.com/legissa/docs/atlas_CORPOCHIVOR_usb/1?e=2067536/36655589

Ecosystem services for the community

Table 27. Ecosystem services provided by *páramos* and forests in the project area

MAIN ENVIRONMENTAL SERVICES			
Carbon sequestration		**Water resources supply**	
CO-BENEFITS			
Supporting services[110]	**Provisioning services**	**Regulatory services**	**Cultural services**
• Biodiversity • Nutrients cycling • Soil formation • Improved connectivity forests	• Food supply • Non-timber products	• Air quality • Climate regulation • Water regulation • Soil erosion control • Foods regulation • Water quality • Reduction of sedimentation	• Scenic beauty • Recreation • Science and education • Spiritual or sacred values

According to Laverde 2008[111], the services provided by the *páramo* ecosystem in relation to the community are:

Cultural services

Eco-touristic value: it is considered of great potential in the *páramo* zone. Ecotourism activities in the wilderness, rationally managed, can contribute to the knowledge of the ecosystem and generating income for local people.

Spiritual and religious values: In the literature, *páramos* and some high mountain ecosystems are associated with sacred aspects of human nature and cosmological manifestations[112]. In addition, they recognize that pre-Columbian cultures of various groups in Colombia (Kogi, Muisca, Tolima and Quimbaya) considered sacred and untouchable these ecosystems, intended for performing religious rites. In this regard, the community recognizes that the *páramos* give them peace of mind, and somehow it is a space for reflection and self-knowledge.

[110] Supporting services of this ecosystem are mainly related to biodiversity.
[111] Laverde 2008. Ecosystem services provided by the wilderness of the upper basin of river Teusacá: Perception of peasant actors and their relationship with environmental plans in the *vereda* Verjón Alto, Bogota D.C.
[112] Castaño. C (2002). Colombia Alto Andina and environmental significance of the biome Páramo in the context of the Tropical Andes: an approach to the effects of an additional tightening by global climate change (Global Climatic Tensor) In: Wasteland and Ecosystem High Andean of Colombia on condition HotSpot & Global Climatic Tensor. IDEAM. Bogotá. P. 27-69. Quoted by Laverde 2008.

Esthetic values: high-mountain ecosystems are scenic and attractive values as they have spectacular beauty. The community inhabiting recognize a sense of well-being, to feel at ease by the landscape they see every day.

Provisioning services

Biochemicals, natural medicines and pharmaceuticals products. Among the medicinal plants of the *páramo* ecosystem they are: Real Lítamo (*Draba sp*.) aphrodisiac plant and elixir of life; Arnica (*Senecio formosus*), is used to heal wounds in animals, to massage parties affected by dislocations of bones in humans; Frailejón (*Espeletia sp*.) is used to treat lung diseases such as asthma and bronchitis, ear pain[113].

Service water supply: is the most recognized service. The literature states that the natural functioning of the *páramo* allows basic water supply for economic and social processes in the Andean region[114]. In addition, within the basic services provided by the *páramo* it is the continuous supply of water quantity and quality directly benefits the population and society in general. [115] This service is largely due to there on the *páramos* peat soils thick that allow filtering and storage of rainwater, which will be released slowly, recharging aquifers and making available the resource, promoting human supply[116].

Regulatory services

Service regulating air quality: *páramo* vegetation formations can act as sinks of carbon dioxide through the process of photosynthesis. In general, the community inhabiting the wilderness areas recognize that where they live is less polluted and the air is cleaner compared to urban areas, which gives them a sense of wellbeing.

Climate regulation Service: *páramos* capture carbon dioxide, which accumulates as part of the soil organic matter. Said storage helps to control global warming[117]. In addition, *páramo* as high Andean ecosystem plays an important role in the circulation patterns of air masses at local and continental scale, which relate directly to the local climate[118].

[113] Muñoz. F. (2002). Spread of endemic flora wilderness or endangered the Sierra Nevada del Cocuy. Páramo World Congress Memories Volume II. P. 842-848. Quoted by Laverde 2008.
[114] Rangel O. & Orjuela M. A. (2002). Research priorities in the Desert. Páramo World Congress. Volume I. Pág.267-270 memories. Quoted by Laverde 2008.
[115] Hofstede, R. (2002). The Andean highlands; its diversity, its people, its problems and prospects. A brief regional diagnosis of the state of conservation of the *páramos*. Páramo World Congress. Volume II memories. P. 1062-1089. Quoted by Laverde 2008.
[116] Rey C., Franco L., Castaño C., (eds). (2002). Status Report and Management Colombian Páramo. Páramo World Congress. Volume II memories. P. 1090-1185. Quoted by Laverde 2008.
[117] Hofstede, R. (2002). The Andean highlands; its diversity, its people, its problems and prospects. A brief regional diagnosis of the state of conservation of the páramos. Páramo World Congress. Volume II memories. P. 1062-1089. Quoted by Laverde 2008.
[118] Monasterio. M & Molinillo. M. (2002). The integration of agricultural development and conservation of fragile areas in the *páramos* of the Cordillera de Merida, Venezuela. Páramo World Congress. Memories Vol II p. 734-749. Quoted by Laverde 2008.

Water regulation: is related to peat soils of the *páramos,* which regulate water (holding it and releasing it slowly) control flooding and erosion[119]. River systems, irrigation, drinking water and hydroelectricity of Andean countries depend heavily on this service[120].

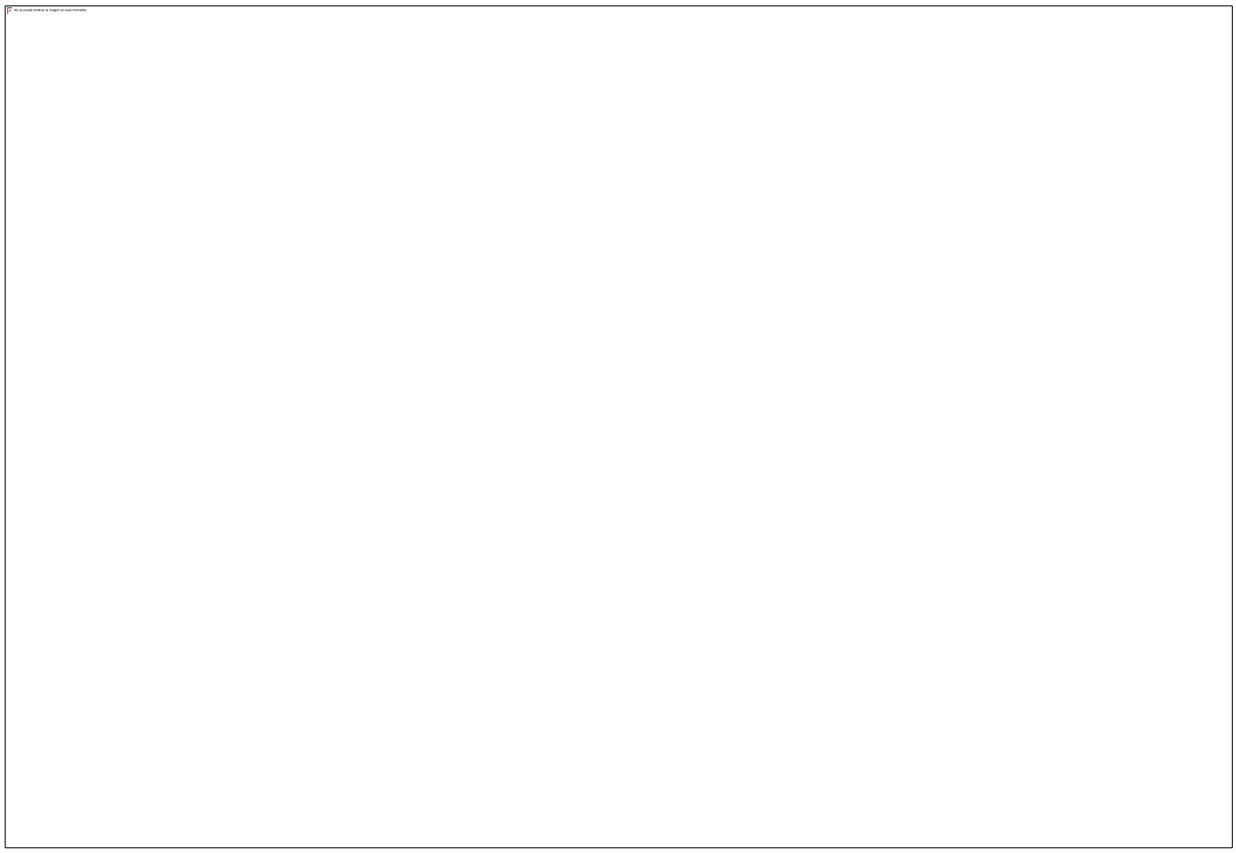

Figure 34. Landscape of: Cristales, Castillejo and Guacheque. Source: CORPOCHIVOR 2016[121].

CM1.3. Describe the expected changes in the well-being conditions and other characteristics of Communities under the without-project land use scenario, including the impact of likely changes on all ecosystem services in the Project Zone identified as important to Communities.

As described in section G2.1, in the without project scenario, the most likely use of soil are the continuity of livestock and agricultural under conventional conditions of low productivity. In this scenario it is likely that welfare and other community characteristics worsen, as the following conditions continue to present:

[119] Rey C., Franco L., Castaño C., (eds). (2002). Status Report and Management Colombian Páramo. Páramo World Congress. Volume II memories. P. 1090-1185. Quoted by Laverde 2008.
[120] Hofstede, R. (2002). The Andean highlands; its diversity, its people, its problems and prospects. A brief regional diagnosis of the state of conservation of the *páramos*. Páramo World Congress. Volume II memories. P. 1062-1089. Quoted by Laverde 2008.
[121] CORPOCHIVOR 2016. Atlas for environmental and social development. Available in https://issuu.com/legissa/docs/atlas_CORPOCHIVOR_usb/1?e=2067536/36655589

- Livestock farming unsustainable practices due to overuse of agrochemicals and tillage practices that generate erosion (soil loss).
- The loss of ecosystems associated with water resources, as riparian areas and headwaters, will remain an important factor. Deforestation in these areas will create many problems such as erosion and loss of flow regulation, affecting the local population.
- The crop productivity will only be improved with the application of higher amounts of chemicals and fertilizers, which undoubtedly will degrade the soil.
- Families that have no home vegetable garden are more prone to having nutritional problems because they must spend more money to get the basic food, as well as wasting more time.
- Current grazing systems are often extensive, which strongly degrades the soil.
- Unplanned tourism deteriorates the ecosystem due to the production of waste and lack of marked trails. This causes soil compaction and disturbance of fragile ecosystems (*páramos*).
- Increased number of people with lung disease, eye disorders and other cardio respiratory diseases associated with pollution inside the kitchen by using traditional wood stoves.
- Progress on the *páramo* degradation due to the replacement of natural vegetation for pastures and crops.

CM2. Net Positive Community Impacts

CM2.1. Use appropriate methodologies to assess the impacts, including predicted and actual, direct and indirect benefits, costs and risks, on each of the identified Community Groups (identified in G1.5) resulting from project activities under the with-project scenario. The assessment of impacts must include changes in well-being due to project activities and an evaluation of the impacts by the affected Community Groups. This assessment must be based on clearly defined and defendable assumptions about changes in well-being of the Community Groups under the with-project scenario, including potential impacts of changes in all ecosystem services identified as important for the Communities (including water and soil resources), over the project lifetime**.**

All project activities are designed to improve the welfare of the community while promoting the conservation of natural forests. This ensures the sustainability of natural resources in the project area. Through activities such as improving production systems, technical training and environmental education, will fulfill the objectives proposed by the project proponent without adversely affecting community groups, community or other actors in the region.

The methodology used to evaluate both positive and negative impacts on the community is based on the Manual for REDD projects on the social impact assessment and biodiversity (SBIA[122]). Through the recommendations contained in this manual is intended:

- To strengthen community knowledge through workshops and local consultations. These activities will be conducted following the approaches and methods of Participatory Rural Appraisal (PRA) in order to make the community take an active role in analyzing their problems and potential and can generate solutions and improvements in conjunction with the project proponent

[122] Richards, M. and Panfil, S.N. 2011. Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects: Part 1 – Core Guidance for Project Proponents. Climate, Community & Biodiversity Alliance, Forest Trends, Fauna & Flora International, and Rainforest Alliance. Washington, DC.

- Improving agricultural and livestock production with the implementation of improved production systems, agroforestry systems and technical support in these activities.
- Reduce the risk of malnutrition in the population through installation and improvements in home vegetable gardens.
- Restore and protect strategic ecosystems.
- Strengthen social capital by strengthening existing institutions, such as corporations, associations and cooperatives.

The analysis of the net benefits of communities resulting from the project activities will be assessed under the approach of "Sustainable Livelihoods Approach - SLA" recommended by the Social and Biodiversity Impact Assessment (SBIA), on the CCBA manual for REDD + projects.

The main objective related to community welfare is to promote the sustainable development of local communities living in the project area, through productive activities adapted to local cultural, geographic, infrastructure and access to markets. One of the key factors that affect access to livelihood assets is the vulnerability context. This idea incorporates into the analysis economic, political, technological trends as well as shocks and seasonality.

The guiding principles of the SLA are:

- **Be people-centred**. SLA begins by analyzing people's livelihoods and how they change over time. The people themselves actively participate throughout the project cycle.
- **Be holistic**. SLA acknowledges that people adopt many strategies to secure their livelihoods, and that many actors are involved; for example the private sector, ministries, community-based organizations and international organizations.
- **Be dynamic**. SLA seeks to understand the dynamic nature of livelihoods and what influences them.
- **Build on strengths**. SLA builds on people's perceived strengths and opportunities rather than focusing on their problems and needs. It supports existing livelihood strategies.
- **Promote micro-macro links**. SLA examines the influence of policies and institutions on livelihood options and highlights the need for policies to be informed by insights from the local level and by the priorities of the poor
- **Encourage broad partnerships**. SLA counts on broad partnerships drawing on both the public and private sectors
- **Aim for sustainability**. Sustainability is important if poverty reduction is to be lasting

The following table shows the expected impacts evaluation, taking into account the activities of the project, its objectives, products and benefits (described above in section G1.8).

Table 28. Assessment of the expected impacts from the Poject on the Community

Livelihood Asset	Activity	Expected impact	Medium /Long term	Direct/ Indirect	Effect (+) / (-)	Stakeholder groups
Human and social capital	Education, training and strengthening of citizen participation	Increased knowledge of the community in reference to the conservation and protection of the environment and natural resources	Medium	Direct	+	Community, community groups and other stakeholders
		Capital increase by strengthening existing institutions, such as corporations, associations and cooperatives.	Medium	Direct	+	Community, community groups and other stakeholders
	Transversal to all activities	Adoption of good agricultural practices	Medium	Indirect	+	Community, community groups and other stakeholders
Natural capital	Conservation, restoration and sustainable management of strategic ecosystems and biodiversity	Increased restored and protected areas of strategic ecosystems	Long term	Direct	+	Community, community groups and other stakeholders
	Cookstoves	Reduction of negative effects caused by the use of traditional stoves	Long term	Indirect	+	Community
	Transversal to all activities	Reduced deforestation	Long Term	Indirect	+	Community, community groups and other stakeholders

Livelihood Asset	Activity	Expected impact	Medium /Long term	Direct/ Indirect	Effect (+) / (-)	Stakeholder groups
		Reduced erosion	Long Term	Indirect	+	Community, community groups and other stakeholders
		Increased degradation and deforestation by non-continuity of project activities	Medium	Indirect	-	Community, community groups and other stakeholders
Financial capital	Crop improvement	Increasing agricultural productivity	Medium	Direct	+	Community and community groups
		Increased supply of goods of organic production and / or clean	Medium	Indirect	+	Community and community groups
		Diversification of productive activities	Long Term	Indirect	+	Community and community groups
		Change in the way traditional production	Medium	Indirect	-	Community and community groups
		Decreased risk of disease due to poisoning by pesticides and chemical fertilizers.	Long Term	Indirect	+	Community and community groups
	Home vegetable gardens	Decreased risk of malnutrition in the population	Long Term	Indirect	+	Community
	Silvopastoral systems	Increasing livestock productivity	Medium	Direct	+	Community

Livelihood Asset	Activity	Expected impact	Medium /Long term	Direct/ Indirect	Effect (+) / (-)	Stakeholder groups
	Transversal to all activities	Insufficient demand for the products generated in project activities	Medium	Indirect	-	Community
		Increased productivity of farms	Medium	Direct	+	Community
Physical and financial capital	Eco-tourism	Increased local economic development	Long Term	Direct	+	Community and community groups

CM2.2. Describe measures needed and taken to mitigate any negative well-being impacts on Community Groups and for maintenance or enhancement of the High Conservation Value attributes (identified in CM1.2) consistent with the precautionary principle**.**

It is expected that the implementation of project activities does not generate negative impacts in any of the owners, local communities and other stakeholders identified. On the contrary, these activities are proposed as the way to achieve improved livelihoods of project beneficiaries and offer attractive alternatives to the unsustainable use of natural resources.

However, through the consultation process with the community, the following risks perceived by the community were identified:

Potential risk associated with the expectation generated by a restoration project that brings benefits initially but that may not come to an end. In this case, perhaps there would be a setback in the process by increasing degradation and deforestation by non-continuity of project activities.

This risk is mitigated through the development of the project under international voluntary standards, under a system of periodic monitoring and signature of the agreements between owners of the project and CORPOCHIVOR. In these agreements, the commitment is made by the corporation to provide all the technical assistance required to implement the proposed project activities. The owner meanwhile, undertakes to meet conservation objectives set by the project. This agreement will be valid for 10 years and may be renewed at the end of this period throughout the project life cycle.

In addition, it was identified that the community could see as a negative impact the change in the traditional way of production, which would redirect to a more sustainable production ecologically through the use of techniques of conservation tillage of soil and change to agrochemicals sustainable. However, support and technical assistance in order to deliver accurate and appropriate information on the benefits will be continued for the project.

Among the main benefits of this new approach is reducing the risk of disease due to poisoning by pesticides and chemical fertilizers, which cause long-term skin diseases, respiratory problems, memory disorders and even neurological diseases[123]. It is expected that the quality of life of farmers improve taking into account the strengthening of the productive chain since the sale of the production of green markets will eventually improve their incomes will be guaranteed.

On the other hand, control plots will be established in these systems to assess their production and demonstrate that productivity does not decrease. In cases where the owner does not accept this new approach, technical assistance will be provided focused on the proper dosage of the inputs used in order to avoid excessive and harmful contaminants application.

With regard to the High Conservation Values, the project is developed in conjunction with a scheme of conservation of water resources, therefore, the activities (G1.8) are developed to conserve these ones. Thus, degradation of highly diverse ecosystems is avoided while protecting those important as the high mountain and *páramos*.

[123] Ecogenetics Center and Environmental Health, University of Washington. (2012). Health risks from pesticides in food. NIEHS grant. #ESO7033. https://depts.washington.edu/ceeh/downloads/FF_Pesticides_SP.pdf

CM2.3. Demonstrate that the net well-being impacts of the project are positive for all identified Community Groups compared with their anticipated well-being conditions under the without project land use scenario (described in CM1)

The net effects expected due to project activities are presented below:

Table 29. Identification of the net impacts of the project on the community, community groups and other stakeholders.

Activity	Stakeholders benefiting	Without Project	With Project	Net impacts
Environmental education	Community, community groups and other stakeholders.	Currently livestock farming practices are not sustainable due to overuse of agrochemicals and tillage practices that generate erosion (soil loss).	The training workshops and competitions will create greater environmental awareness in the community. This will improve agricultural and livestock practices in the area and generate a rational use of natural resources.	The training will not generate any negative impact on the community. The farmer will benefit of the recommendations in the long-term of the implementation. It will improve their income production and reduce soil degradation.
Conservation, restoration and sustainable management of strategic ecosystems	Community, community groups and other stakeholders.	The loss of ecosystems associated with water resources, as riparian areas and headwaters, will remain an important factor. Deforestation in these areas will create many problems such as erosion and loss of flow regulation, affecting the local population.	By protecting all ecosystems that provide ecosystem services in the area, the local community will continue to use benefits such as flow regulation and decrease vulnerability due to natural disasters caused by soil erosion.	By protecting the most important ecosystems, the community will ensure the supply of ecosystem services over time. Additionally, activities that will improve land productivity without expanding the agricultural frontier will be implemented.

Activity	Stakeholders benefiting	Without Project	With Project	Net impacts
Crops improvement	Community and community groups	The crop productivity will only be improved with the application of higher amounts of chemicals and fertilizers, which undoubtedly will degrade the soil.	Implementation of technological packages will improve crop production without damaging the soil. This ensures the sustainability of the soil resource.	The implementation of new production systems could be difficult for the farmer due to the change on the traditional ways of farming. However, the move for achieving best practices will ensure the long-term use of the resources without compromising its current production. At the same time, the new best practices will help to improve the quality of life of farmers. In addition, through training, it will be achieved access to new green markets. Community groups will benefit from the strengthening of the productive chain.
Home vegetable gardens	Community	Families that have no home vegetable garden are more prone to having nutritional problems because they must spend more money to get the basic food, as well as wasting more time.	Implementation and / or improvement of the home vegetable garden provides food security and reduces the costs associated with obtaining food and transportation.	The impacts of this activity are clearly positive as the farmer produce food for their own consumption, generating a benefit to the household economy. In addition, they have no charge for intermediaries or transportation costs, plus they have immediate availability of the food.

Activity	Stakeholders benefiting	Without Project	With Project	Net impacts
Silvopastoral systems	Community	Current grazing systems are often extensive, which strongly degrades the soil.	The implementation of silvopastoral systems improve livestock production as the tree species used in these systems in addition to being a food source for livestock, provides shade and shelter. These two features improve the quality of meat and milk.	The project will provide advice and inputs required for the proper implementation and management of silvopastoril system, thus, productivity and profitability of their land under this mixed system will improve.
Ecotourism	Community and community groups	Unplanned tourism deteriorates the ecosystem due to the production of waste and lack of marked trails. This causes soil compaction and disturbance of fragile ecosystems (*páramos*).	Its implementation creates dynamism and improve the income of organizations with ecotourism focus in the region.	The benefits are clearly positive, as sustainable tourism in the region is encouraged, as well as the ability to organize ecotourism groups is strengthened. In addition, direct revenues from the realization of this activity will increase, improving the quality of life of the local community and surrounding communities (indirect benefit) and potentially the municipality.

CM2.4. Demonstrate that no High Conservation Values (identified in CM1.2) are negatively affected by the project**.**

HCV will not be adversely affected. On the contrary, all project activities are aimed at the conservation of forests and *páramos* areas in the project area:

• As part of the environmental education talks, the principles of zoning of protected areas will be disseminated. It will be explained in which areas can be made productive activities in a controlled manner.
• Restoration activities will enable the expansion of forest areas and the higher areas will become a buffer to protect the *páramos* area. These ecosystems will continue to contribute to the provisioning, regulating, supporting and cultural services providing to the Community.
• The strengthening of ecotourism activities will allow these strategic ecosystems to be a source of income balanced in relation to the economic and environmental interests of the owner.
• It is expected that crop improvement activities, silvopastoral systems and efficient stoves contribute to reducing pressure on fragile ecosystems like *páramos*.

• Reducing deforestation rates results in reducing soil erosion and protecting watersheds in the project area. By improving highlands of a basin, it is benefiting all the downstream community and even from other departments.

These positive impacts on high conservation values result in direct benefits for the Community. As long as the conservation and good management of ecosystems is closely linked to the quality of life of the inhabitants of the project area.

CM3. Other Stakeholder Impacts

CM3.1. Identify any potential positive and negative impacts that the project activities are likely to cause on the well-being of Other Stakeholders**.**

No negative impacts on other identified stakeholders are expected. Conversely, it is expected that the positive impacts of the project impact on areas outside the project area and therefore actors who are not involved directly in the project. Although the protection and restoration processes are performed in a localized way, the benefits derived from these activities cover a larger area because of the natural ecosystem connectivity. Reducing deforestation rates results in reducing soil erosion and protecting watersheds present in the project area, so, by improving highlands of a basin, it is benefiting all the downstream community and even from other departments.

The other stakeholders also benefit from the lectures, workshops and training issued by the corporation on good agricultural practices and environmental education because these are conducted openly. Finally, these actors may be included in the project in subsequent instances if they meet the eligibility criteria set by the standards.

CM3.2. Describe the measures needed and taken to mitigate the negative well-being impacts on Other Stakeholders**.**

No negative impacts have been identified on other stakeholders, and therefore no measures or activities have been developed.

CM3.3. Demonstrate that the project activities do not result in net negative impacts on the well-being of Other Stakeholders**.**

No negative offsite stakeholder impacts are expected to occur since there are no communities impact expected. As described in the section CM2.3, net impacts on the welfare of other stakeholders will be positive.

On the one hand, conservation of natural forests, REDD main objective of the project, provides comprehensive benefits for the whole community. These are: climate regulation through their effects on temperature and relative humidity, regulation impacts of natural extreme events, erosion control and water quality, reduced surface runoff and flood regulation[124,125].

[124] Balvanera, P. (2012). Ecosystem services provided by tropical forests. Ecosystems Magazine, 21 (1-2).
[125] Espinosa, C., Ibarra, J. C., Edna, K., Lozano, M. C. A., Panzavolta, P., Knothe, G., & Nor'aini, S. (2013). National policy for the integrated management of biodiversity and ecosystem services (PNGIBSE) (No. LC-0794). Ministry of Environment.

Other project activities and the implementation of agroforestry systems are also beneficial for all stakeholders involved in the project. In Colombia a successful case where agroforestry contributed to the exchange of experiences that enabled strengthening communication channels within the community was found[126]. These systems also contribute to protection against erosion by wind and rain (less erosive impact of raindrops and surface runoff)[127].

CM4. Community Impact Monitoring

CM4.1. Develop and implement a monitoring plan that identifies community variables to be monitored, Communities, Community Groups and Other Stakeholders to be monitored, the types of measurements, the sampling methods, and the frequency of monitoring and reporting. Monitoring variables must be directly linked to the project's objectives for Communities and Community Groups and to predicted outputs, outcomes and impacts identified in the project's causal model related to the well-being of Communities (described in G1.8). Monitoring must assess differentiated impacts, including and benefits, costs and risks, for each of the Community Groups and must include an evaluation by the affected Community Groups**.**

Communities will be constantly monitored by the project proponent by surveys, and the installation of a box in which they can deposit at any time their opinions, suggestions or complains related to the project. It is necessary to actively involve local people in sustainable development and management of climate change projects, and to participate fairly in the potential positive effects, not only as an important moral responsibility, but also by be essential for successful long-term.

Regular monitoring of the project's impacts on local properties is undertaken. This is separated into direct and indirect effects of the project. Direct effects are measured by evaluating data reported by the monitoring teams of CORPOCHIVOR. Indirect effects are assessed by interviewing people in the project area. A basic questionnaire collects information from all sampled people while two specific questionnaires are tailored toward (a) direct beneficiaries of the project (e.g. project owners) and (b) indirect beneficiaries of the project (e.g. people that have participated in workshops). Monitoring takes place either continuously, or upon verification – at least every five years; the latter in case extra studies like interviews or remote sensing analyses are necessary. The ultimate goal is that all monitoring data is uploaded on an internet platform directly upon data collection.

[126] Molina Suárez, L., Martínez, P., Neomice, M., & Rodríguez Calderón, N. (1998). Project recovery of natural ecosystems in the Caqueta piedemonte: Management Plan and management of Microcuenca quebrada El Arenoso-San Vicente del Caguán, Caquetá
[127] Noscue, E. A. (2014). Adoption of agroforestry systems with coffee cultivation (Coffea arábica).

Table 30. Variables for monitoring the impact in the Community

Activity	Products	Expected impact	Indicators	Frequency	Method	Stakeholder groups
Education, training and strengthening of citizen participation	Ludic and theoretical and practical events on issues related to use of fertilizers, herbicides, pesticides, water management, biodiversity conservation, among others	Increased knowledge of the community in reference to the conservation and protection of the environment and natural resources	Number of events held Number of participants, differentiated by gender and age	Every two years	Compilation of attendance records	Community, community groups and other stakeholders
	Cultural and environmental awareness events					
	Accompaniment and support in the development and implementation of projects, with emphasis on recognition and appropriation of territory	Capital increased by strengthening the existing institutions, such as corporations, associations and cooperatives.	Number of projects supported Number of beneficiary families	Every two years	Collection of project records	Community, community groups and other stakeholders
Conservation, restoration and sustainable management of strategic ecosystems and biodiversity	Protective-producing reforestation	Increased restored and protected areas of strategic ecosystems	Number of hectares reforested	Every two years	Gathering the GIS database	Community
	Restoration of areas of water interest and forestry		Number of hectares at an early stage of ecological restoration processes	Each verification period	Gathering the GIS database Field visit	Community
	Management incentives for conservation		Reduced value of property tax in each municipality	Each verification period	Polls owners	Community

Activity	Products	Expected impact	Indicators	Frequency	Method	Stakeholder groups
	Protection of zones of sources and isolation of areas of water interest and forestry		Number of protected zones	Every two years	Collection of project records Field visits	Community
Cookstoves	Cookstoves installation	Reduction of negative effects caused by the use of traditional stoves	Number of cookstoves installed	Every two years	Collection of project records Field visits	Community
Crop improvements	Consulting and environmental advice	Increasing agricultural productivity	Number of trainings Number of participants in conferences and technical assistance	Every two years	Compilation of attendance records	Community and community groups
	Establishment of demonstration plots in agroforestry systems.	Diversification of productive activities	Number of demonstration plots installed	Every two years	Collection of project records Field visits	Community and community groups
	Analysis of implemented systems vs. conventional systems	Increased supply of goods of organic production and / or clean	Increased productivity	Each verification period	Polls owners	Community and community groups
		Change in the way traditional production	Perception of the owner	Each verification period	Polls owners	Community and community groups

Activity	Products	Expected impact	Indicators	Frequency	Method	Stakeholder groups
		Decreased risk of disease due to poisoning by pesticides and chemical fertilizers.		Each verification period	Polls owners	Community and community groups
Home vegetable garden	Advice and support on nutritional use and food preparation.	Decreased risk of malnutrition in the population	Number of counseling and accompaniments Number of beneficiary families	Every two years	Compilation of attendance records	Community and community groups
	Implementation of family vegetable gardens with a focus on food sovereignty.		Number of vegetable gardens established and improved	Every two years	Collection of project records Field visits	Community and community groups
Silvopastoral systems	Environmental Consulting and support in the implementation of SSP.	Increasing livestock productivity.	Area (hectares) of SSP established	Every two years	Gathering the GIS database Field visits	Community and community groups
	Establishment of silvopastoral systems.					
Ecotourism	Implementation and / or strengthening of ecological paths in priority municipalities	Increased local economic development	Number of implemented paths	Each verification period	Field visits	Community and community groups

Activity	Products	Expected impact	Indicators	Frequency	Method	Stakeholder groups
	Articulation of service providers for the operation of path		Number of alliances or agreements reached	Each verification period	Signed agreements	Community and community groups

The methods described in the table above, include:

- Compilation of attendance records: refers to the database organized with dates, meeting places, topics discussed, number of attendees and supporting documents. In this case, it relates to activities involving training sessions, technical assistance and education.
- Collection of project records: This record is mainly related to activities involving physical facilities: crops, insulation and infrastructure. These records, minimally, must include the beneficiary, installation date and progress.
- Surveys and interviews with owners: through this tool is intended to assess the qualitative aspects of the project including the perception of welfare change perceived by the owners.
- Field visits: direct verification of activities involving physical facilities: crops, insulation and infrastructure. These visits are part of the technical support provided to owners and allow timely identification (on time) possible failure of the proposed activities.
- Compilation of GIS database: Providing GPS points and subsequent storage field coded information in order to quantify the disturbed areas.

CM4.2. Develop and implement a monitoring plan to assess the effectiveness of measures taken to maintain or enhance all identified High Conservation Values related to community well-being**.**

Assessment of maintenance and enhancement of High Conservation Values (HCVs) will be included as part of the project's standard monitoring procedure in biodiversity section (refer to B4.2).

CM4.3. Disseminate the monitoring plan, and any results of monitoring undertaken in accordance with the monitoring plan, ensuring that they are made publicly available on the internet and summaries are communicated to the Communities and Other Stakeholders through appropriate means**.**

All results will be publicly available on internet and summaries are communicated to the Communities and Other Stakeholders through appropriate media. Additionally, all documents and information about the results of the monitoring and verification of this project will be published in the platforms of the VCS and CCB standards as usual.

CORPOCHIVOR has extensive experience with dissemination of the project to communities. The monitoring plan and monitoring result will be disclosed through workshops with the land owners. This ensures direct communication with the community plus it is a feedback tool that generates improvements for the project and the community.

BIODIVERSITY SECTION

B1. Biodiversity Without–project Scenario

B1.1. Describe biodiversity within the Project Zone at the start of the project and threats to that biodiversity, using appropriate methodologies.

The flora and fauna of the reference region comprises a diverse set of ecosystems that includes the last remnants of the Colombian Andean forest and other major natural systems such as wetlands and *páramos*. Similarly, within the project area endemic, rare and migratory species have been reported. Diversity within the project area is high, however, each taxon is represented by a low number of individuals. This is evident in the analysis of average species abundance (MSA) [128] conducted for the jurisdiction where forest ecosystems even reflect a loss of this feature compared to its original condition[129].

In the case of wildlife, this condition is caused by malpractices as indiscriminate hunting and the presence of conflicts between wildlife and domestic animals in the territory. Added to this, habitat destruction and lack of environmental awareness around the role that these species in the ecosystem play is dramatic (Peñuela et al 2016)[130].

Local current conditions show that the region is devoid of a permanent plant cover forming an ecological infrastructure support for economic and natural processes that occur there, especially the regulation of water and soil stability. Although an acceptable productive situation shown in some successful cases, it also presents an environmental situation to the limit of their ability to: maintain an adequate flow of environmental goods and services, regulate meteorological, hydrological and morphodynamic processes, maintaining agricultural production processes and support a population satisfactorily (POMCA).

In relation to the *páramos*, the composition of species and therefore biodiversity has changed, especially in the areas of *subpáramo*. These areas correspond at low altitude forests, great flora and fauna diversity, phytosociology delicate structure, motley organization and low resilience. Its transformation is evident and the remaining areas are very important niches for individuals of large species of wildlife that exist in the basin (POMCA).

There are growing signs of deterioration (states of ecosystems, risks, erosion, species extinction and pollution) indicating that the capacity of the natural base to maintain adequate flow of ecosystem services is diminished. On the one hand, it has been determined that although there are no soils desertified in the reference region, if desertification processes that must be addressed to gradually

[128] The average species abundance (MSA) is defined as the average species abundance relative to the original or pristine abundance. MSA values ranging from 0 to 1, representing a value of 1, the pristine condition.
[129] South Pole Group, 2016. Analysis of Ecosystem Services in the jurisdiction of CORPOCHIVOR using the InVEST program.
[130] Peñuela-Díaz, G., Calonge-Camargo, B., & Aristizábal -G, H. 2016. Birds and mammals in the regional district of inntegrated management of Cuchillas Negra and Guarnaque. Ecopetrol. Local Environmental Authority of Chivor. E-qual environmental services. 365 pp.http://www.CORPOCHIVOR.gov.co/wp-content/uploads/2016/07/LIBRO-AVES-Y-MAMIFEROS-WEB.pdf

decrease the negative affect on the soil[131]. The results of recent studies of desertification in the jurisdiction indicate that 17.33% of the territory has areas susceptible to this phenomenon, mainly in the municipalities of Boyacá, Jenesano, Nuevo Colón, Turmequé, Tibaná and La Capilla[132].

Similarly, analysis of habitat quality evidence that fragmented secondary forest areas and closer to processed ecosystems present great fragility[133].

Another latent floristic diversity of the *páramo* threat is continuous burning. When these events occur, the labile species disappear from the place; the woody habit hardly outweigh the effect of fire and this practice is slowly homogenizing vegetation to persist only aggressive species that support burning. Continuous action causes new growth and especially seedlings fail to fulfill their life cycle. That is, burning and grazing reflect a decrease in coverage of macollosas grasses, which are directly related to a decrease in primary productivity[134].

According to forest inventory conducted in the jurisdiction, it is observed that the greatest diversity alpha (species, genus and family), is located mainly in forests in geoshapes undulating areas, Hillsides Structural, mixed Slopes and Hillsides deposits. Also, the life zones wet tropical forest, very wet tropical forest and very wet pre-mountain forest showed the highest alpha diversity with 57.1%.

Figure 35. Alpha diversity (species, genera and families) for life zones according to Holdridge in the jurisdiction of CORPOCHIVOR [135].

The values of ecological indices show that the diversity of forest cover is high (Simpson index 0.94 on average) and there is a marked dominance of a few species in particular. The lowest values of diversity are presented in the forests of folded areas, both fragmented and dense, where only 14 and 20 species were recorded, respectively.

[131] CORPOCHIVOR – University of Cundinamarca. 29-2010 Convention. Regional action plan to combat desertification and drought.
[132] CORPOCHIVOR 2016. Atlas for Environmental and Social Development.
[133] South Pole Group, 2016. Analysis of Ecosystem Services in the jurisdiction of CORPOCHIVOR using the InVEST program.
[134] Min Medio Ambiente, Andrade et al. 2002. Program for Sustainable Ecosystem Management and Restoration of the High Colombian Mountain.
[135] Valero, F. (2014). Estimates of potential reserves of carbon stock in above ground biomass in natural forests in the south east of the department of Boyacá-Colombia, jurisdiction of the Autonomous Regional Corporation of Chivor -CORPOCHIVOR, and its potential as carbon sinks. Unpublished thesis Magister. University of Bogotá Jorge Tadeo Lozano, Bogotá, DC., Colombia.

Regarding the distribution of individuals assessed by diameter class, a graphic type "j" inverted finding a high frequency of individuals in the first diameter class (68.3%), followed far behind by the second diameter class with 4,370 trees corresponding to 20.3%. This suggests that the population is made up of immature individuals or populations, which shows an early successional stage and a growing population to reach a climax state. This is most likely due to riots and disturbances in forested areas related more to human intervention than natural causes. This might involve selective forest harvesting mature trees.

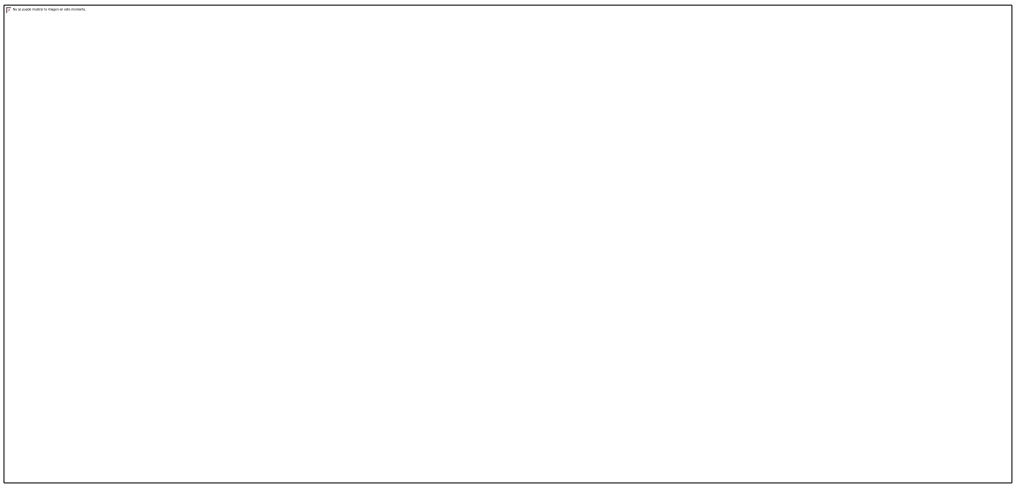

Figure 36. Diameter class by number of trees in the forest sampling registered in the jurisdiction of CORPOCHIVOR [136].

B1.2. Evaluate whether the Project Zone includes any of the following High Conservation Values (HCVs) related to biodiversity and describe the qualifying attributes for any identified HCVs.

The reference region contains the following High Conservation Values (AVC) related to biodiversity:

- Protected Areas (Figure 35)
- Threatened and endemic species
- Large areas at the landscape of regional and national importance

These areas correspond to high Andean forest ecosystems, wilderness and subpáramo. According to the FAO, high mountain ecosystems are globally important areas such as factories of water, biodiversity rich habitats, places for recreation and tourism and areas of important cultural value. The mountains directly provide food for 10% of humanity, they also provide between 30-60% of the water in wetlands and more than 70-95% in semiarid and arid environments[137].

[136] Valero, F. (2014). Estimates of potential reserves of carbon stock in above ground biomass in natural forests in the south east of the department of Boyacá-Colombia, jurisdiction of the Autonomous Regional Corporation of Chivor -CORPOCHIVOR, and its potential as carbon sinks. Unpublished thesis Magister. University of Bogotá Jorge Tadeo Lozano, Bogotá, DC. Colombia.
[137] Min Medio Ambiente, Andrade et al. 2002. Program for Sustainable Ecosystem Management and Restoration of the High Colombian Mountain.

Within the reference region (and growing area grouped project) are identified four major areas classified as páramos (three of them into a regional district of integrated management - DRMI), which are vital for provisioning of all urban and rural centers that are part of the selected municipalities.

In addition to the features mentioned above (section CM1.2), these ecosystems provide support ecosystem services, such as: soil formation, nutrient cycling, primary production and maintenance of habitat (Laverde 2008).

Table 31. Protected areas or strategic importance within the jurisdiction of CORPOCHIVOR (Atlas 2016).

Name	Protection category	Location	Municipalities	Description
Páramo Cristales CG	DRMI (Agreement Number 29 2011)	RR - PA - PZ	Turmequé, Úmibta, La Capilla, Pachavita	**Delimited area**: 11,574 has **Ecosystems**: high Andean forest, páramo and subpáramo **Dominant ecosystem**: Forest Alto Andino **Threats to biodiversity**: habitat transformation, hunting. **Endemic species**: *Rallus semiplumbeus, Cistothorus apolinari* and *Pyrrhura calliptera* **Endangered Species**: Ten species of fauna and flora **Causes of deforestation**: expansion crops (potatoes), and livestock grazing[138]
Páramo Bijagual	*In process Declaratory*	RR - PA - PZ	Viracachá, Ciénaga, Ramiriquí, Tibaná	**Delimited area**: 8.605 has **Ecosystems**: High Andean forest, páramo and subpáramo **Threats to biodiversity:** habitat transformation, hunting. **Endemic species**: *Mustela felipei, Sciurus pucheranii, Microsciurus santanderensis, Vultur gryphus, Phyrrura calliptera, Podiceps andinus, Rallus semiplumbeus, Gallinula melanops and Cistothorus apolinari.* **Endemic and threatened species:** *Mustela felipei* and *Phyrrura calliptera* **Threatened**: 17 species **Extinct species:** *Anas georgica*
Páramo Mamapacha	In process Declaratory	RR - PA - PZ	Ramiriquí, Tibaná, Chinavita and Garagoa	**Delimited area**: 27.517 ha **Ecosystems**: high Andean forest, páramo and subpáramo **Type of soils**: Humic Dystrustepts, Typic Haplustalfs, Typic Haplustands **Threats to biodiversity:** habitat transformation, hunting. **Basins**: Garagoa, Jenesano, Batá river.
Cuchilla Negra-Guaneque	DRMI (Agreement Number 20 2014)	RR - PA - PZ	Chivor, Macanal, Santa María and Campohermoso	**Delimited area**: 19.304,6 has **Ecosystems**: *Páramo*

[138] Information taken from CORPOCHIVOR, 2011. Regional District Integrated Management DRMI Páramo Cristales, Castillejo or Guacheneque.

Name	Protection category	Location	Municipalities	Description
				Species richness was estimated for 1,042 flowering plant species, 68 mosses, 90 *hapeticas* and 106 species of arthropods.
Cuchilla San Cayetano	In process Declaratory	RR - PA - PZ	Guayatá, Somondco, Almeida, Chivor	
Páramo de Rabanal	DRMI (Agreement Number 4 2011)	RR	Ventaquemada	**Delimited area**: 6.640 has **Ecosystems**: *Páramo*

Figure 37. Map of protected areas and images

B1.3. Describe how the without-project land use scenario would affect biodiversity conditions in the Project Zone.

The scenario without project includes: the continuation of the expansion of areas devoted to agriculture and livestock on forest areas*, páramos* and ecosystems are among the transition of both coverages, as is detailed in section additionality G2.

One of the effects of the introduction of domestic livestock to an ecosystem is reducing the amount of plant biomass available for food from other organisms and simplification of the vertical structure of vegetation[139], which provides wildlife of weather shelters and predators and sites for feeding and reproduction[140].

On the other hand, the mobile wildlife, such as birds and large mammals, are best related to landscape architecture, and the effects exerted by livestock depend on how this configuration is changed. In this case the configuration of livestock prevents the establishment of shelters for birds and large mammals as it develops in areas previously owned forest cover second and first order but, at present, have been converted to pasture through execution burning.

When livestock is developed at the expense of natural forests and result in low productivity and low fertility soils, also without the use of adequate grazing management practices, diversity of native species decreases strongly to increasing the load, as a result of the extinction of species intolerant of grazing, as presented in the figure below.

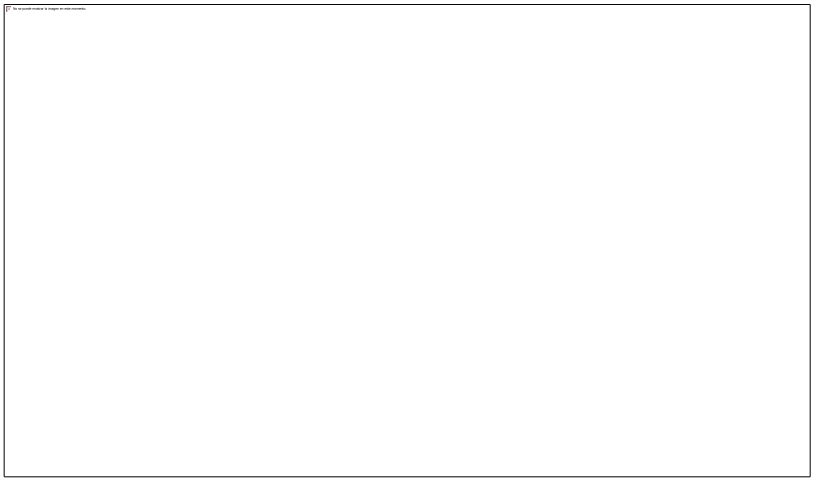

Figure 38. Model of conflict between livestock and Conservation [141]

The development of unsustainable livestock on previously forestry and water attractions include *páramos* areas can generate additional negative impacts on ecosystem services, including water supply for human consumption due to the detriment of water sources and coverages that ensure

[139] Díaz, S; S Lavorel; S Mcintyre; V Falczuk; F Casanovesl. 2007. Plant traits responses to grazing - a global synthesis. Global Change Biol. 13:313-341.
[140] James et al. 1999. Provision of watering points in the Australian arid zone: a review of effects on biota. Quoted by Cingolani et al. 2008, Is ranching compatible with the conservation of biodiversity and soil?. *Ecología Austral* 18:253-271.
[141] Inmanuel Noy Meir. 2005. Livestock Production and Biodiversity Conservation: Conflicts and Solutions.

quality and permanence in space. Regarding regulation services, the most affected are those related to the regulation of surface flows, groundwater recharge, capture and storage of CO^2 and climate regulation.

Large expanses of pasture with low plant diversity and livestock overgrazing cause deterioration and loss in the productive capacity of the soil, which reduces the productive indicators and increases the need for fertilizers. In addition, soil degradation also affects beneficial organisms that inhabit it and play important roles as predators, decomposers and parasitoids. Consequently, these systems are more prone to pests of pastures and livestock due to imbalance in the natural processes of regulation of unwanted organisms, leading to increased use of chemicals for pest control[142].

As for agriculture, this can affect ecosystem functions and the biota in various forms. At the landscape level, agriculture produces a conversion of land cover and the elimination of certain landscape features. At the level of agricultural production unit often results in the loss of land cover and disruption of the structure. Production of domesticated plants and animals directly affect biological diversity by replacing naturally occurring plants and spontaneous[143].

According to UNEP, the impacts of agriculture on ecosystem functions can be grouped into five areas: 1) soil structure; 2) nutrients and microorganisms; 3) water cycle; 4) complexity of the landscape; 5) atmospheric properties. Agriculture affects soil structure and biota primarily through the reduction of organic material incorporated above the soil and roots, by plowing the soil due to tillage and compaction livestock[144]. In particular, in the high mountain areas, intensive soil management carried out in the clean crops have caused, among other adverse effects, lower carbon content and soil nitrogen[145].

In short, given the current conditions of the territory, it requires a type of sustainable productive activities with the environment and viable for producers. In the absence of the project, the continuation of inefficient exploitation of the soil and other natural resources within the ten municipalities selected for the project may affect biodiversity conditions, around the following effects:

Table 32. Affectation of biodiversity in the scenario without the project.

Scenario without project	Environmental impact	Impact on Biodiversity
Expansion of the agricultural frontier and livestock areas	Deforestation, forest fragmentation and reduction of biological corridors	Loss of habitats for birds and mammals, endemic and migratory species threatened. Timber threat of low frequency and high commercial value

[142] Zuluaga A.F., Giraldo C., Chará J. 2011. Environmental services provided silvopastoral systems and biodiversity benefits. Manual 4 Colombian Sustainable Livestock Project. GEF, WORLD BANK, FEDEGAN, CIPAV, FONDO ACCION, TNC. Bogotá, Colombia. 36 p.
[143] Landeros *et al.* 2015. Impact of agriculture on biodiversity.
[144] UNEP, 2006.
[145] Gómez, 2015. Emission of greenhouse gases and carbon and nitrogen content of the soil in a high Andean farmer agroecosistema in Tenerife, Valle del Cauca. Research work presented as partial requirement to qualify for the title: Master of Agricultural Sciences. National University of Colombia, Faculty of Agricultural Sciences, Palmira, Colombia. 122 p.

Scenario without project	Environmental impact	Impact on Biodiversity
	Simplification of the vertical structure of vegetation	Destruction of climatic shelters and predators for wildlife and sites for feeding and reproduction
Lack of technical assistance and education, which leads to continued poor agricultural practices	Degradation and soil compaction and even in areas of grazing stubbles	Extinction of native species intolerant to intensive livestock
		Loss of habitat quality and capacity of natural forest regeneration
	Low productivity and increased use of fertilizers	Threat to soil organisms that play important roles as predators, decomposers and parasitoids. Reduction microfauna
	Pollution of water sources and wildlife due to the use of agrochemicals	Threat to aquatic wildlife and incidence
Using traditional cookstoves	Forest degradation	Loss of habitat quality due to increased extraction of firewood

B2. Net Positive Biodiversity Impacts

B2.1. Use appropriate methodologies to estimate changes in biodiversity, including assessment of predicted and actual, positive and negative, direct and indirect impacts, resulting from project activities under the with-project scenario in the Project Zone and over the project lifetime. This estimate must be based on clearly defined and defendable assumptions.

The clearing of forests for the expansion of the agricultural frontier can generate fragmentation of remaining forests with high conservation values. Therefore, the project activities to increase sustainable productivity of farms, may decrease the phenomena of fragmentation.

As noted Gasca and Torres 2013[146], the strategy for biodiversity conservation within the National Biodiversity Plan in Colombia includes reducing processes involving loss of natural resources by human activities, ecosystem restoration, conservation and recovery populations of threatened or vulnerable wildlife species and finally promoting conservation plans in situ species. However, they note that these conservation actions will never become effective if education and participation of local communities and the support of both governmental actors are implemented.

Therefore, it can be expected that the strategies proposed in the project have a positive effect on changes in biodiversity as they are key elements mentioned in the strategy for biodiversity

[146] Gasca y Torres, 2013. Conservation of biodiversity in Colombia, a reflection for a goal: meet and educate to preserve. Biodiversity notebooks 42 (2013): 31-37. Available in http://cibio.ua.es/Cuadernos/42/42-3.pdf

conservation. Project activities provide education and community participation, restoration of forests and reduction of human activities.

The impact of activities on biodiversity is presented in the following table. Education activity mainly generates indirect benefits and is transverse to the other actions, as all these involve technical support, education and improvements in agricultural practices. Another effect is expected to be positive in all activities is decreased pressure on forests. This can be achieved including activities that generate community sustainable long-term income.

Table 33. Impact on biodiversity through the implementation of project activities.

Activities of the project	Impact on Biodiversity	Type of impact
Crop improvements Silvopastoral systems Cookstoves Ecotourism	Decreased threat to natural habitats for birds and mammals, endemic and migratory species.	Positive, indirect, foreseen
Crop improvements Silvopastoral systems Ecotourism	Pressure decreased on timber low frequency and with high commercial value	Positive, indirect, foreseen
Crop improvements Silvopastoral systems Restauration	Decreased pressure on wildlife, to preserve or protect the vertical structure of vegetation	Positive, indirect, foreseen
	Decreased threat to soil organisms that play important roles of predators, decomposers and parasitoids.	Positive, direct, foreseen
	Decreased threat to aquatic wildlife, protect water sources	Positive, indirect, foreseen
Silvopastoral system Restauration	Decreased pressure on native species intolerant to intensive livestock.	Positive, direct, foreseen
Restauration Cookstoves [147]	Improved habitat quality and capacity of natural forest regeneration.	Positive, direct and real (restauration activities); Positive, indirect and foreseen (cookstoves activities)
Restauration	Increased forest cover and connectivity of biological corridors	Positive, direct, real
Ecotourism	Protection of the fauna and flora, from the awareness of local actors and visitors of ecotourism areas.	Positive, indirect, foreseen

[147] Concha, María Cecilia; Pabón, Giovanni; Cerón Viviana - Ministry of Environment, Housing and Territorial Development, 2015. Guidelines for a national program of cookstoves for cooking with firewood. Bogotá, D.C.: Colombia. 48 p.

Activities of the project	Impact on Biodiversity	Type of impact
	Affectation of natural ecosystems by creating infrastructure for the operation of ecotourism programs	Negative, direct, foreseen
	Affectation of natural ecosystems by increasing access of the population to fragile areas.	Negative, indirect, foreseen

On the other hand, there may be some negative effects related to ecotourism because of human intervention in fragile natural areas and deterioration in the natural environment by visitor traffic, including environmental, visual and noise pollution habitat[148].

B2.2. Demonstrate that the project's net impacts on biodiversity in the Project Zone are positive, compared with the biodiversity conditions under the without-project land use scenario (described in B1).

Table 34. Net impact on biodiversity in the project area.

Scenario without project	Biodiversity Impact without project	Scenario with Project / impact on biodiversity	Net effect
Deforestation, forest fragmentation and reduction of biological corridors	Loss of habitats for birds and mammals threatened endemic and migratory species. Timber threat of low frequency and high commercial value species	Protecting of these habitats. Crop improvement, silvopastoral systems, cookstoves and ecotourism contribute to income generation medium and long term.	Positive, because the pressure on forest resources is decreased and in the medium term the habitat for the survival of endangered, endemic and migratory species is protected.
	Decreased forest cover	Increased forest cover and connectivity of biological corridors	Positive, as the increase in natural forest areas has a positive effect on the quantity, size and quality of habitat for species of fauna and flora, while mitigating the impact of

[148] Orgaz, 2014. Negative impacts in ecotourism. Economic, social and environmental aspects: a review of literature. *Nómadas*. Magazine Critique of Social Sciences and Law | 42 (2014.2). http://dx.doi.org/10.5209/rev_NOMA.2014.v42.n2.48781

Scenario without project	Biodiversity Impact without project	Scenario with Project / impact on biodiversity	Net effect
			climate change on biodiversity
Simplification of the vertical structure of vegetation	Destruction of climatic shelters and predators for wildlife and sites for feeding and reproduction	Protection of niches for wildlife, through ecosystem restoration and implementation of alternative production systems that minimize the removal of native vegetation.	Positive, as these niches are protected and while their ecosystem functions are protecting as well.
	Loss of habitat quality and capacity of natural forest regeneration	Improved quality habitat through forest restoration and implementation of cookstoves	Positive as through the protection and restoration of vegetation in transition, forest functional qualities are improved
Low productivity and increased use of fertilizers	Threat to soil organisms that play important roles as predators, decomposers and parasitoids. Reduction microfauna	Decreased threat to soil organisms through ecosystem restoration and implementation of alternative systems. These systems allow the minimization of use of fertilizers and use of organisms present in the soil.	Positive because these soil organisms are protected and while their roles as decomposers and predators.
Pollution of water sources and associated wildlife due to the use of agrochemicals	Threat of aquatic fauna and incidence	Decreased threat to aquatic wildlife through ecosystem restoration and implementation of alternative systems. These systems allow the minimization of use of agrochemicals and, where possible, be replaced with organic components.	Positive because wildlife is protected, through the reduction of pollution of water sources.
Unsustainable ecotourism activities	Inability to monitor the impact of activities undertaken	Improved eco-tourism activities, but could lead to the detriment of resources.	Negative, because although the conditions are improved with the implementation of these ecotourism activities, building infrastructure and

Scenario without project	Biodiversity Impact without project	Scenario with Project / impact on biodiversity	Net effect
			the presence of visitors impact negatively the ecosystems

B2.3. Describe measures needed and taken to mitigate negative impacts on biodiversity and any measures needed and taken for maintenance or enhancement of the High Conservation Value attributes (identified in B1.2) consistent with the precautionary principle.

Monitoring ecotourism activities promoted under the project will be carried out in order to anticipate or minimize possible negative impacts of these activities (see section B2.1). However, if a timely planning is done and the site is managed properly, the impacts noted above will not be presented[149]. In this regard, it is suggested to follow some of the recommendations of best practice described in detail by Rainforest Alliance 2008[150] and PTP et al. 2014[151]: Given the scope of tourism in the project area, the steps to follow are:

- Adequately sensitize visitors regarding limitations and precautions when transiting the ecotourism area. This involves explaining to tourists on how to behave during tours in places of observation of flora and fauna, emphasizing respect for the species and the importance of keeping silent.
- Establish which areas should be busy in the company of authorized personnel and properly signposted.
- Educating staff and tourists about the importance of not buying wild or products derived from them (turtle shells, skins, bones, precious woods, etc.), particularly if they are endangered or if their trade bodies it is forbidden by law.
- Be informed and inform visitors about the laws that exist for the protection of biodiversity, as they are a mechanism for supporting conservation strategies.
- Have adequate provision for waste and signaling installations.
- Designing Packages / tourist plans for small size groups; thus, less noise occurs, to minimize damage to the field and every tourist can better appreciate what surrounds him.

When the activity requires more infrastructure, the following recommendations should be followed:

[149] Greener Life, 2013. Ecotourism: What are the advantages and disadvantages? http://vidamasverde.com/2013/ecoturismo-cuales-son-sus-ventajas-y-desventajas/
[150] Rainforest Alliance, 2008. Good Practices for Sustainable Tourism. http://www.rainforest-alliance.org/tourism/documents/tourism_practices_guide_spanish.pdf
[151] Productive Transformation Program (PTP), Ministry of Commerce, Industry and Tourism, Organization for Environmental Education and Protection - OpEPA, MinCIT, MADS. 2014. Guide to Good Practice for service providers in nature tourism.https://www.ptp.com.co/documentos/Documento%20Tecnico%20GUIA%20DE%20BUENAS%20PRACTICAS.pdf

- The infrastructure of the establishment must be solid, using local materials, which do not affect sustainability and which are resistant to corrosion. In addition, use materials that contribute to the use of natural light, heat diffusion and thermal insulation, preventing the architecture and design affect or influence the natural landscape enjoyment.
- If you have very large windows, place them silhouettes, figures or lines with self-adhesive material to prevent birds from crashing into the glass.

B2.4. Demonstrate that no High Conservation Values (identified in B1.2) are negatively affected by the project.

All project activities are aimed at the conservation of forest areas, páramos, and protection of areas and species of fauna and flora.

Specifically, given that the ecotourism activity involves a closer interaction with HCV biodiversity, the implementation of these activities should follow the recommendations outlined in the previous section in order to ensure non-involvement of ecosystem wealth in the project area.

B2.5. Identify all species used by the project and show that no known invasive species are introduced into any area affected by the project and that the population of any invasive species does not increase as a result of the project.

None of these species is classified as an invasive species according to the categorization suggested by Baptiste[152]; only the species *Fraxinus chinensis* (Urapán) is recorded in the category of "requires further analysis," which indicates that the species is in a range where you can not determine if it is considered as invasive or not. However, the use of this species will be moderate.

B2.6. Describe possible adverse effects of non-native species used by the project on the region's environment, including impacts on native species and disease introduction or facilitation. Justify any use of non-native species over native species.

The use of these species has good results, adaptation to biophysical conditions and compatibility with native species of Andean forest ecosystem.

B2.7. Guarantee that no GMOs are used to generate GHG emissions reductions or removals.

All species used to restore native forests and native species will not be made use of GMO species.

B2.8. Describe the possible adverse effects of, and justify the use of, fertilizers, chemical pesticides, biological control agents and other inputs used for the project.

Fertilizer application prior soil analysis will be performed on each farm, in order to conservatively determine the nutritional needs of the soil. In addition within the practical use of organic fertilizers will be encouraged.

[152] Baptiste M.P., Castaño N., Cárdenas D., Gutiérrez F. P., Gil D.L. y Lasso C.A. (eds). 2010. Risk analysis and proposed categorization of species introduced to Colombia. Alexander von Humboldt Biological Resources Research Institute. Bogotá, D. C., Colombia. 200 p.

Improper use of chemical fertilizers or abuse them, without taking into account the lack of other nutrients that limit crop productivity, leads to deterioration of natural resources, particularly land. In contrast, organic, due to the characteristics fertilizers in their composition are forming the humus and enrich the soil with this component, modifying some of the properties and characteristics of the soil as its reaction (pH), variable loads, ion exchange capacity, chelation of elements, availability of phosphorus, calcium, magnesium and potassium, and of course the microbial population, making it more appropriate for the proper development and crop yields; therefore organic fertilizers favorably influence the characteristics of fertility and physical soil[153].

B2.9. Describe the process for identifying, classifying and managing all waste products resulting from project activities.

The process for handling waste and waste is determined by the following practices[154]:

- It should be set aside an area for storing waste to final disposal; not bury or incinerate on the premises, as pollute the environment and are harmful to animals and humans.
- In addition, it should be separated the garbage and make proper management of hazardous waste and pesticide containers and pesticides.
- Leftover pesticide applications and the washing water sprayers are deposited on a site fallow properly identified and away from water sources.
- Triple washing of pesticide containers is performed when empty, also drilled without destroying the label and stored in a separate place and restricted to deliver to an appropiate company that promotes this activity in the country.

B3. Offsite Biodiversity Impacts

B3.1. Identify potential negative impacts on biodiversity that the project activities are likely to cause outside the Project Zone.

No negative impacts outside the project area are expected. Conversely, it is expected that the positive impacts of the project will have implications on areas outside the project area. Although the processes of protection and restoration are performed individually, these can have implications on variables more related to species richness, such as the total area of forest fragment, the central area of the fragment and contrast fragment edge. Therefore, it can be assumed that the benefits derived from these activities cover a larger area because of the connectivity that facilitates the movement of organisms and the dispersal of species between fragments, even to areas outside the project area.

It is also expected that the benefits continue to grow directly in other cities and areas of the reference region, due to the inclusion of subsequent instances that meet the eligibility criteria set out in section G1.14.

[153] Santos, 2014. Effect of organic fertilizers and soil characteristics. Organic Culture magazine. http://www.culturaorganica.com/html/viewer.php?ID=44&IDPAG=16
[154] Ciro y Villegas 2009. My good agricultural practices.

B3.2. Describe the measures needed and taken to mitigate these negative impacts on biodiversity outside the Project Zone.

No negative impacts have been identified on outside the Project Zone, and therefore no measures or activities have been developed.

B3.3. Evaluate unmitigated negative impacts on biodiversity outside the Project Zone and compare them with the project's biodiversity benefits within the Project Zone. Justify and demonstrate that the net effect of the project on biodiversity is positive.

Como se demostró en la sección B2.2 el efecto neto sobre la biodiversidad es positivo. Esta conclusión es también válida para la biodiversidad por la zona fuera del área de proyecto.

B4. Biodiversity Impact Monitoring

B4.1. Develop and implement a monitoring plan that identifies biodiversity variables to be monitored, the areas to be monitored, the sampling methods, and the frequency of monitoring and reporting. Monitoring variables must be directly linked to the project's biodiversity objectives and to predicted activities, outcomes and impacts identified in the project's causal model related to biodiversity (described in G1.8).

The activities described below can be adjusted as the project progresses, in order to optimize the sampling procedures and inventories, and involve communities in monitoring the project (as described in section G4.2).

General considerations for biodiversity monitoring

Preliminary sampling / field work:

- Analysis of the latest general information; this includes examining the information available concerning the most current cartographic analysis in order to understand the transformations in the reference region during the time since the last monitoring period.
- Consolidation of the technical team, taking into account what it was described in section G4.2; forming working crews, identifying crew leader, definition of roles and assignment of responsibilities.
- Training of technical staff, monitoring protocol review and, if necessary, make adjustments. In addition, at this stage, it should be informed field technicians on the precautionary measures to be taken in order to minimize risks and ensure maximum safety field (see section G3.12).
- Planning and logistics, including: design field forms, course design and total duration of sampling, identification and effective coordination of transportation, food and lodging, equipment and materials collection.

During sampling/fieldwork:

- The minimum information that must contain each sampling unit is: location, described to the highest level of detail possible (town, village, region, stratum, facility name and owner if applicable, geographical coordinates, altitude), date (dd / mm / yyyy), start and end time (00:00 - 23:59), number / code of the sample, fact sheets and name (s) of (I) responsible (s) of making data. All this information must be homogenized so that it can later be systematized and consulted on a solid database.
- During the sampling period, the leader of the work crew constantly held (at least at the end of each working day) controls quality of recorded information in order to identify errors near the sampling site and correct them promptly. This check will include minor revisions as errors in the basic information or illegible handwriting. In order to avoid misinterpretations of the information recorded or recurrence of errors, corrections and adjustments will be made by the crew leader in company of the responsible of the making data.

After sampling/fieldwork[155]

- Review and organization of the material collected in the field (if applicable).
- Management, storage, processing and analysis of data.
- Making the necessary initial interpretation, according to the verification and validation in field settings.
- Systematization of data for storage and handling of the initial information.
- Development of a descriptive and interpretative report with recommendations for the management of biodiversity in the study area.

1. Monitoring of forest and flora

Monitoring of forest structure

The monitoring of this variable is performed in the wooded areas of the project area. In the case of jurisdiction, it is recommended to follow the methodology used by Valero et al 2014[156], to assess biodiversity and forest structure in the reference region. This analysis includes:

- Analysis of the diametric structure of individuals by forest type, using alpha diversity at the species, genera and families recorded.
- Analysis of the abundance matrix, using the estimators based Abundance Coverage Estimator (ACE) that calculates the expected species, based on species with 10 or fewer individuals in the sample.
- Efficiency of forest sampling through non-parametric estimators and quantification of rare species found.

Monitoring forest connectivity

[155] Villarreal, H., M. Álvarez., S. Córdoba, F. Escobar, G. Fagua, F. Gast, H. Mendoza, M. Ospina, y A. M. Umaña. 2004. Manual methods for the development of biodiversity inventories. Biodiversity inventory program. Institute of Biological Resources Research Alexander von Humboldt. Bogotá, Colombia.
[156] Valero, F. (2014). Estimates of potential reserves of carbon stored in aboveground biomass in natural forests in the south east of the department of Boyacá-Colombia, jurisdiction of the Autonomous Regional Corporation of Chivor -CORPOCHIVOR, and its potential as carbon sinks. Unpublished thesis Magister. University of Bogotá Jorge Tadeo Lozano, Bogotá, DC, Colombia.

The impact of the project on forest fragmentation and connectivity will be done by tracking the change in coverage, especially for the transition from non-forest to forest, in the reference region. In addition, connectivity patterns will be analyzed in order to identify how landscape architecture facilitates the movement of species and other ecological flows[157]. This analysis can be made using the Conefor software designed to quantify the importance of habitat patches in the landscape connectivity, and starting from the first study by South Pole Group for the development of PD[158].

Deforestation monitoring

Deforestation will be monitored through the methodology described in the VCS PD.

2. Monitoring of fauna

Monitoring of birds

Wildlife monitoring is carried out in the area and the project area. In the case of jurisdiction, it is recommended to follow the methodology used by Peñuela et al 2016[159], to assess the wildlife in the region of reference.

For sampling of birds, they are set minimally three monitoring stations in the municipalities of instance 1, with a duration of 4 days each. Methods for the sighting and identification of these species are the following:

- Direct observation or visual capture with the aid of binoculars, through tours of trails. For visual observation are taken into account: the habitat types for each of the sampling points, travel on trails, natural forests, plantations and paddocks (about 2 days) in peak hours bird activity (from 6:00 a.m. to 10:30 a.m. and 3:00 pm to 5:30 pm).
- Using mist nets to catch birds, between 5:30 to 10:30 hours and from 15:00 - 18:00 hours. During this period reviews are conducted every 20 minutes in order to avoid deaths (Villarreal et al. 2004). In these reviews, we proceed to carefully remove the birds caught in the shortest possible time. The photographic record and morphological taking measures to contribute to the determination of the species and classified using specialized bird guide is done.
- To search for species difficult to observe, it will be used the emission of songs recording with sound of the birds of the eastern cordillera. Also a portable digital recorder is used to record the songs of birds, this in order to compare records with the bases hearing songs and create

[157] Taylor, P. D., Fahrig, L., Henein, K., & Merriam, G. (1993). Connectivity is a vital element of landscape structure. Oikos, 571-573.
[158] South Pole Group. 2016. Analysis of Ecosystem Connectivity Jurisdiction CORPOCHIVOR. Contract 237-15: 1.3.1 Register and validate before a certifying body PDD REDD project in order to manage the sale of ecosystem services from forests under the jurisdiction of CORPOCHIVOR; and activity 1.4. Incorporate strategy payment for environmental services in relation to forest resource Development Project Forest Governance strategies for the management and monitoring of forest cover Jurisdiction of CORPOCHIVOR.
[159] Peñuela-Díaz, G., Calonge-Camargo, B., & Aristizábal -G, H. 2016. Birds and mammals in the regional district of integrated management of Cuchillas Negra and Guanaque. Ecopetrol. Local Environmental Authority of Chivor. E-qual environmental services. 365 pp. http://www.CORPOCHIVOR.gov.co/wp-content/uploads/2016/07/LIBRO-AVES-Y-MAMIFEROS-WEB.pdf

a sound bank of the study area; this information must be properly stored, as part of the monitoring records[160].

Monitoring mammals

The presence of medium and large mammals were recorded by direct eye contact and analysis and search for traces such as footprints, feces, feeding and / or burrows, making trips along the project areas. These tours should be conducted between 6:00 am and 10:30 am and 3:00 pm to 5:30 pm.

For flying mammals, mist nets should be used in strategic paths previously identified, between 6:00 pm and 10:30 pm.

For registration of large mammals of special interest, must be installed trap cameras distributed in the three monitoring stations located in each municipality. The minimum period of stay of the cameras is 30 days. Identifying places high probability of presence of endangered species, will be held with the support of the maps of wildlife and testimonies and experience villagers.

Finally, the variables for monitoring the impact of the project on biodiversity is presented in the following table.

Table 35. Biodiversity. Variables to be monitored.

Impact	Variables to be monitored	Areas to be monitored	Unit	Sampling method	Frequency
Decreased pressure on forests	Permanence of forest in threatened areas (according to projections of deforestation)	Project Area	Hectares	Coverage analysis. Remote sensing	Each verification period
	Cover change matrix	Reference region	Percentage	Coverage analysis. Remote sensing	Each verification period
	Presence of species of high commercial value	Project area (plots for monitoring carbon)	Abundance	Inventories of flora in carbon monitoring plots	Each 5 years
	Diameter distribution of	Project area (plots for	Change in the pattern	Diameter measurement	Each 5 years

[160] Peñuela-Díaz, G., Calonge-Camargo, B., & Aristizábal -G, H. 2016. Birds and mammals in the regional district of integrated management of Cuchillas Negra and Guanaque. Ecopetrol. Local Environmental Authority of Chivor. E-qual environmental services. 365 pp. http://www.CORPOCHIVOR.gov.co/wp-content/uploads/2016/07/LIBRO-AVES-Y-MAMIFEROS-WEB.pdf

Impact	Variables to be monitored	Areas to be monitored	Unit	Sampling method	Frequency
	trees in the natural forest	monitoring carbon)	of diameter distribution	in carbon monitoring plots	
Increased biodiversity in flora	Number of native species used in restoration	Project area and leakage management areas	Number of species	Records of project activities	Each verification period
Decreased threat on strategic habitats	Presence of threatened endemic and/or migratory species	Project area	Abundance	Inventories of fauna (mammals and birds)	Each 5 years
Decreased water threat in areas of interest and birthplaces	Number of hectares restored in areas of interest and protecting water birthplaces.	Project area and leakage management areas	Hectares and number of trees	Records of project activities	Each verification period
Increased forest cover	Number of hectares regenerated naturally	Project zone	Hectares	Coverage analysis. Remote sensing	Each 5 years
	Change in annual deforestation rate	Reference region	% Annual deforestation	Coverage analysis. Remote sensing	Each verification period
Increased connectivity of biological corridors	Connectivity patterns	Project area and leakage management areas	Integrated Connectivity Index (ICC)	Coverage analysis. Using CONEFOR software or similar	Each 5 years
Affectation of natural ecosystems by the operation of ecotourism programs	Affectation of natural ecosystems by the operation of ecotourism programs	Project area and leakage management areas	Hectares	Cover analysis. Remote sensing	Each verification period

B4.2. Develop and implement a monitoring plan to assess the effectiveness of measures taken to maintain or enhance all identified High Conservation Values related to globally, regionally or nationally significant Biodiversity (identified in B1.2) present in the Project Zone.

The effectiveness of the measures taken to maintain or enhance High Conservation Values will be monitored through the following variables:

- Increased forest cover within protected areas
- Conservation of the *Páramo* ecosystems and increased forest cover in the high Andean forest area in the reference region
- Presence of endemic species, migratory or endangered

The first two variables are monitored for each verification period, while the third will be monitored in the inventories of fauna.

B4.3. Disseminate the monitoring plan and the results of monitoring, ensuring that they are made publicly available on the internet and summaries are communicated to the Communities and Other Stakeholders through appropriate means.

The results of monitoring undertaken will be made publicly available on the internet and through the web site of CORPOCHIVOR. Additionally, all documents and information about the results of the monitoring and verification of this project will be published in the platforms of the VCS and CCB standards as usual.

GL3. Beneficios Excepcionales para la Biodiversidad

GL3.1. Demonstrate that the Project Zone includes a site of high biodiversity conservation priority by meeting either the vulnerability or irreplaceability criteria.

The project zone is home to the following threatened species (according to the IUCN Red List):

- *Pyrrhura calliptera* (Brown-breasted Parakeet)[161]
- *Vultur gryphus* (Andean condor)[162]
- *Tremartocs ornatus* (Andean bear)[163]
- *Centrolene petrophilum* (Boyaca Giant Glass Frog)[164]

[161] http://www.iucnredlist.org/details/22685867/0
[162] http://www.iucnredlist.org/details/22697641/0
[163] http://www.iucnredlist.org/details/22066/0
[164] http://www.iucnredlist.org/details/54932/0