

REFORESTATION WITH RUBBER ON DEGRADED LANDS OF COLOMBIA

Document Prepared by:
South Pole Carbon Asset Management Ltd.



Project Title	<i>Reforestation with Rubber on degraded lands of Colombia</i>
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Cover page: CCB Standards

Project name	Reforestation with rubber on degraded lands of Colombia
Project location	The project area includes 10.000 hectares (Ha) located in the municipality of La Primavera, San Teodoro Inspection of Vichada Department in Colombia, between the coordinates 4°50'-5°00' N, 70°30'-70°15' W.
Project Proponent	Compañía de Profesionales de Bolsa S.A (PdB) Contact: Beatriz Cuello beatrizcuello@profesionalesdebolsa.com +57 3123318363 Juan Guillermo Cruz juanguillermocruz@profesionalesdebolsa.com +57 3132436007
Auditor	Environmental Services, Inc
Project start date,	The project activity started in December 20, 2011
GHG accounting period and lifetime	35 years for a GHG accounting period and lifetime
Document relates to	Full validation process
History of CCB Status	undergoing initial validation
The edition of the CCB Standards	The project is being validated to the Second Edition of the Standards, but following the Third edition for the Rules.
Summary of the project's expected climate, community and biodiversity benefits	Implementation of the project is expected to create positive net climate change impacts. The increase in forest cover and sequestration of carbon in living biomass will contribute to the reduction of greenhouse gas emissions by acting as sinks by sequestering approximately 4.3 million tons of CO₂. Among the positive impacts on communities are include the ones related to employment generation as the project aims to create 400 direct jobs and extend them to 1.000 in the nearly future. Among the positive impacts identify for the biodiversity, are those in relation with the Interconnection of natural corridors, increases of the populations of endemic and endangered species (this will be proven after monitoring activities), the creation of shelterbelts in waterways with native species and the retention of moisture and restoration of micro fauna. Positive impacts on ecosystems are increases in the biomass and the creation of a favourable environment for fauna and flora communities. Project is planting <i>H. brasiliensis</i> that is native specie.

Date of completion	19 December 2013

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1 GENERAL

1.1 Summary Description of the Project (G3)

Provide a summary description of the project.

The forestry project “Reforestation with Rubber on degraded lands of Colombia” consists of the planting of *Hevea brasiliensis* on 10.000 hectares. The project promotes sustainable development through reforestation and forest restoration activities in the oriental plains region of Colombia. It also supports the creation of value-added and exports for the rubber and wood products value chains, enhances and conserves biodiversity in the area, provides carbon sequestration for the mitigation of global warming, and encourages the commercialization of timber and non-timber products from the plantations (sale of wood and latex).

Primavera Municipality in Vichada Region is a remote region, far from the urban and productive centres of the country, with very poor transport infrastructure to connect with domestic or international markets. Illicit drug cultivation and rural violence have traditionally existed in the area. Financial revenues from carbon sequestration will help investors to offset the risks of investing in the area and the high costs of accessing distant markets for the future sale of timber and the development of products made of tropical woods. If the government fails to build highways and river transport infrastructure to the region, the transport costs of taking the timber to market may outweigh its value, and the sale of certificates of emission reduction may end up being the primary source of income to the project.

G2.2 Extensive cattle farming (Photograph 1) including regular anthropogenic burning of grasslands has been the dominant model of land-use for over a century. As a result of the remoteness, lack of infrastructure and high transportation costs, this system is the dominated land-use: 90% of the productive land of the Municipality of La Primavera is devoted to extensive livestock grazing¹. This practice requires low labour force and occurs with an average of 10 hectares per animal (see section 3.6).



Photograph 1 Livestock grazing (cattle farming) in the project area

The practice of grassland burning (without project scenario) (Photograph 2) is carried out twice a year by cattle ranchers to obtain new grass re-sprouts which are palatable to the cattle and to the ranchers who seek to minimize their expenses. Gallery forests are also affected by the burning activities; uncontrolled

¹ Land Management Plan (EOT 2000).

flames often impact these forests causing the loss of forest density and reducing the area of forest cover. The regular burnings limit the ability of the native flora to naturally recover and reduce the load capacity of the soils generating soils degradation. The plantation establishment will create net positive impacts not only in the biodiversity (section 6), but in the climate (section 4.7) and social benefits (section 5) to the communities as direct and indirect creation of employment, the technification of manual labor (enabling the community to obtain major remuneration for their work and improving their skills to perform soil-based activities), the development of infrastructure, and the demonstration of how the VCS and carbon markets can support the sustainable development of the region. The project is drawing labour force away from the illegal crops, which have plagued the region (Also see section 2.2).

The project activity started in December 20, 2010. The early-stage revenues derived from the carbon credits are of utmost importance for the project viability and to overcome the obstacles that confront forestry projects in this region of the country (please refer to the barrier analysis).

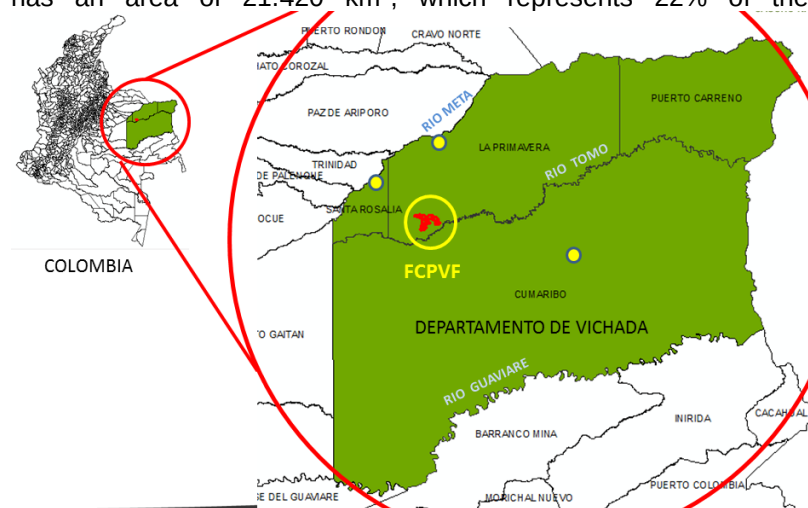


Photograph 2 Anthropogenic grassland-burning activities in the project area

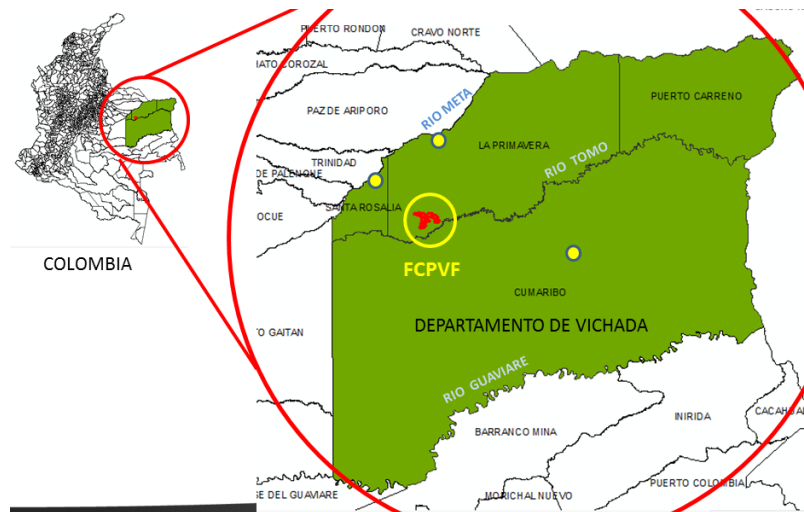
1.2 Project Location (G1 & G3)

Indicate the project location and geographic boundaries (if applicable).

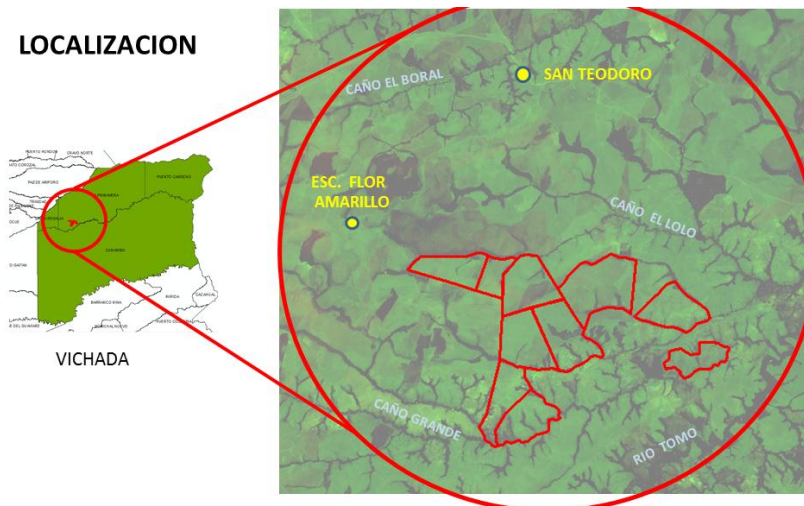
The project area includes 10,000 hectares (Ha) located in the municipality of La Primavera, San Teodoro Inspection of Vichada Department in Colombia, between the coordinates 4°50'-5°00' N, 70°30'-70°15' W. The Municipality of La Primavera is located approximately 400 km from Puerto Carreño, the capital of the department, and limits to the North with the Departments of Casanare and Arauca and the border of Venezuela. To the South, it limits with the Municipality of Cumaribo, to the East with the Municipality of Puerto Carreño and to the West with the Municipality of Santa Rosalia. The Municipality of La Primavera has an area of 21,420 km², which represents 22% of the total land area of Vichada (see







LOCALIZACION



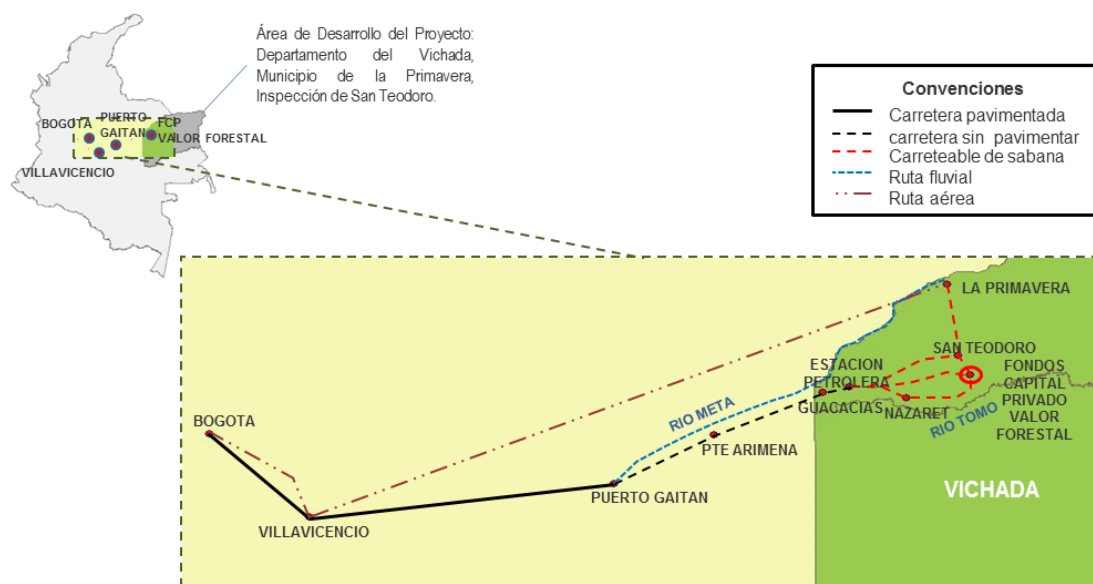


Figure 1 Project area: Municipality of La Primavera, Department of Vichada, Colombia and Location of the compartments of the project area within Vichada Department

The project area is divided into 10 compartments (Table 1, Figure 2): Farms La Herencia, La Ermita, San José, La Pamela, Matalarga, La Daniela, Monos-Región Caribe, Santamaría Granfuturo, Cimarrón-La Fortaleza. Eight are already purchased. Cimarrón-La Fortaleza and Granfuturo are in process to be purchased.

Table 1 Compartments that made part of the project area. Until now eight compartments have been purchased with a total catastral area of 10.185 ha.

Project area	Compartment number	Catastral area (ha)	Map area (ha)	Centroid coordinates	
				X (m)	Y (m)
La Herencia	1	1003	998	1.423.000	1.036.000
La Ermita	2	1009	1005	1.412.535	1.029.000
San José	3	955	952	1.411.000	1.030.000
La Pamela	4	1.314,90	1206	1.412.000	1.034.000
Matalarga	5	868	864	1.407.000	1.039.000
La Daniela	6	1.337,90	1310	1.415.000	1.035.000
Monos/Región Caribe	7	642	640	1.424.584	1.032.806
Santamaría	8	1.312,90	1191	1.413.000	1.038.000
Cimarron 4/La Fortaleza	9	1.290	1713	1.418.000	1.038.000
Granfuturo	10	452	450	1.41.0000	1.039.000
Total		10.184,70	10.330,74		

1.3 Biophysical characteristics of the project area (G1 & G3)

1. Climate

The climate is warm, with temperatures oscillating between 27 and 30°C. The median altitude of the Municipality is 117 meters above sea level, which corresponds to a warm weather (Governance of Vichada 2008). The average rainfall for the period between 1975 and 2005 (September) was 3.450 mm (Figure 4). The rain pattern is usually unimodal², with the wet season from April to October

2. Hydrology

Various water sources are born and flow within the territory of the Municipality La Primavera. These lands are seasonally irrigated by the rivers, streams, brooks and other smaller waterways that traverse them. The Meta River is prominent due to its very large size and because it forms the northern boundary between the Department of Vichada and the depts. of Arauca and Casanare. The Municipality belongs to the Great Watershed of the Orinoco River. The area includes the sub-watersheds of the Tomo and Bitá Rivers that drain into the Orinoco River, covering an area of 43.5% and 52.5% respectively of the territory of La Primavera. Other significant sub-watersheds of the Meta River in the locality of La Primavera are: Caño La Balsa, Caño Aguas Claras, Laguna de La Primavera, Caño Aguaverde and Caño La Culebra³.

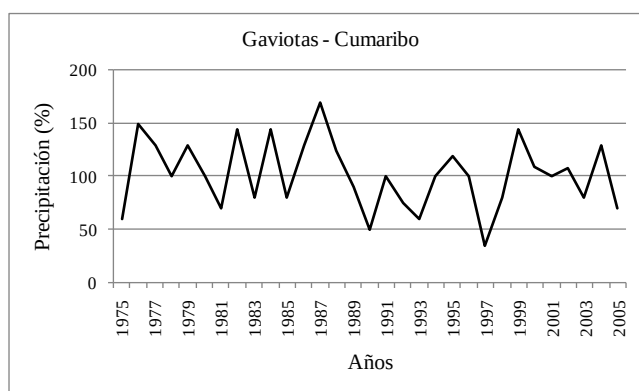


Figure 2 Annual average precipitation percentage in the Gaviotas station – Cumaribo (Source: Organización La Primavera S.A. 2006).

The richness of the surface and ground waters in the Orinoco region is widespread. However, there is a lack of information to quantify the regional water supply, distribution and the quality of the resource, as no adequate network of hydro-climatic monitoring exists. Based on the scarce data available on historic flow rates in some waterways, we can infer by comparing differences between extreme flow rates, the growing loss of regulation capability of the hydrographic basins⁴.

² CORPORINOQUIA 2008. Technical Document La Primavera Municipal Environmental Agenda. Department of Vichada.

³ CORPORINOQUIA 2008. Technical Document La Primavera Municipal Environmental Agenda. Department of Vichada.

⁴ Ibid

3. Soils

The soils of the High Orinoco plains display an ochre colored horizon at the surface with very low content of organic matter. As one moves to low areas or estuaries, where the plant formation associated with gallery forests provides biomass, the water content significantly increases and the soil displays histic or humbric horizons. The *mull* humus presents an average composition of fulvic acids to humic acids of over 1,2⁵ and its humin content is under 50%. It provides little biomass (2.2 to 3.8 t ha⁻¹ yr⁻¹) in herbaceous grasslands, but may increment to 28 or more t ha⁻¹ yr⁻¹ when taking into account rainfall patterns, the length of the dry season and the available nutrients (Lamotte cited by Malagon 2004⁶).

The rainy season causes the loss of the few soluble or interchangeable elements in the soil generating high acidity. Soil pH is generally under 5.0 and in dry seasons favors the polymerization of humic substances, including the hardening of the horizons and cementation (petroferric materials) from the dehydration of iron compounds. In flat or dissected plains not affected by hydromorphism, this alteration is highly developed, reflected by the mineralogical composition of the sands and silts. Kaolinite, iron and aluminum oxyhydroxides are predominant in the clayey fractions, integrated at 2:1:1 with interlaminar aluminum, pyrophyllite and gibbsite⁷.

This pertains mainly to ferralization processes (formation of oxisols) through processes of high conversion and depletion of elements such as Ca, Mg, K, Na and Si among others. The formation of Ultisols is present in a much smaller proportion. Additionally there are some formations of Spodosols, and Inceptisols transitional to Oxisols. Indicators of these processes, other than the mineralogical, are those associated with the low capacity of cation exchange (CIC), measures less than 4 meq⁸/1000 g of the effective capacity

The soils are of very low fertility, both current and potential. A soil analysis carried out by the El Deseo farm of the Organización La Primavera S.A. sub-project is featured in Table 2.

Table 2 IGAC Soil Analysis

Description	Characteristics	Percentage (%)
Granulometry	Sand	45.60
	Silt	36.30
	Clay	18.10
Texture	Blunt	
pH		5.00
Interchangeable acidity	A.I	0.79 meq/100g
Saturation % of Interchangeable acidity	S.A.I	
Organic matter	Organic Carbon	0.32
Change complex	Cation exchange capacity (CEC)	2.1 meq/100 g

⁵ Fulvic acids to Humic acids relation. Fulvic acids are a mixture of aliphatic and aromatic organic and water soluble acids. Humic substances are a source of energy for soil microorganisms and animals. Humates are mineral salts of humic or fulvic acids. Pettitt, Robert. Organica matter, humus, humate, humic acid, fulvic acid and humin. Texas A&M University

⁶ MALAGÓN, D. 2004. Tipología de suelos en las regiones naturales de Colombia

⁷ INSTITUTO GEOGRÁFICO AGUSTÍN CODAZZI (IGAC). 1995. Suelos de Colombia: origen, evolución, clasificación, distribución y uso. República de Colombia, Ministerio de Hacienda y Crédito Público. Santa fe de Bogotá, D.C.

⁸ Milliequivalent, defined as 1/1000 of an equivalent of a chemical element

Description	Characteristics	Percentage (%)
	Calcium	0.04 meq/100 g
	Magnesium	0.01 meq/100 g
	Potassium	0.01 meq/100 g
	Sodium	0.04 meq/100 g
	Total bases	0.10 meq/100 g
Percentage of base saturation		4.70%
Phosphorus		None detected

4. Geomorphology

The territory of the Department of Vichada is in the region of the Llanos Orientales (Eastern Plains), where there are four physiographic land types: the Alluvial Plain which accepts the overflow of the poorly drained Orinoco region, the well-drained High Orinoco plains, the Alluvion Strip which is frequently flooded by annual overflows of the large rivers, and the Guiana Shield. The first is formed by low flatlands located to the north in the municipalities of Puerto Carreño and La Primavera, covered by grassland vegetation and wetlands.

The High Orinoco Plains, with varying degrees of dissection, cover the largest extension in the department between the Meta and Vichada Rivers; they are covered by grassland vegetation alternating with gallery forests and rain forest in the interior between the Vichada and Tuparro Rivers. The Alluvion Strip extends parallel to the Meta, Tomo, Bitá, Tuparro and Orinoco rivers, covered by surveyed gallery forests. Finally, the Guiana Shield is located in the more isolated region to the East of the department and is characterized by the presence of rocky outcrops and white sediments. The main land cover consists of a mosaic of forest vegetation, shrubland and degraded grasslands. There are some orographic features such as the del Mono and Mateavení mountains and the hills of Casuarito⁹. The geomorphology of the VCS Forest Project responds to the physiographic unit of High Orinoco Plains¹⁰.

5. Geology

In general, the Orinoco region's soil types and evolution are linked to the origin of the sedimentary mega-basin located between the Guiana Shield and the eastern flank of the Cordillera Oriental (Eastern mountain chain). Quaternary deposits of fluvial origin, Tertiary sedimentary rocks (sandstone, mudstone and limestone) resting on Cretaceous, Paleozoic and Precambrian felsic crystalline rocks sediments are predominant. Located on these materials are foothill landscapes, vast plio-pleistocene highlands with variable dissection, partially dissected alluvial and wind powered plains, cut by long and narrow alluvial valleys, recent and current, connected with major rivers. The faults on which the Meta River flows, establish two distinct subregions, the Orinoco High plains and the Orinoco Floodplain (Mendivelso 2003, cited by Malagon 2004¹¹).

⁹ CORPORINOQUIA 2008. Technical Document La Primavera Municipal Environmental Agenda. Department of Vichada.

¹⁰ (Organización La Primavera S.A. 2006).

¹¹ MALAGÓN, D. 2004. Tipología de suelos en las regiones naturales de Colombia

6. Topography

The Project takes place in the municipality of La Primavera. the topographic landscape for the corresponding areas of La primavera, have similar conditions such as extensive flat plains with slopes of less than 2% in most cases, with plano-convez interfluves (1 ° to 2 °) slightly tilted toward the east and some hilly areas in the south east of the project area. The altitude of the area varies between 127 and 150 m, with incisions that serve as seats for the main rivers and streams of the region.

7. Precipitation

The precipitation regime is determined by the geographical location and the influence of some important factors, such as atmospheric circulation, relief, integration between land and sea and the influence of forest areas.

Colombia's geographic position (ecuatorial area), facilitates the influence of the northeast and southeast Alisio's winds also known as trade winds, characterized by warm and wet air streams located in a fringe denominanted as ZCIT, which moves longitudinally with respect to the apparent motion of the sun, reason for which this confluence occurs twice per year

The precipitation regime is considered as monomodal presenting a period of heavy rains during the months of April to November and one of low rainfall, between the months of December to March. This regime is characterized by a marked decrease of precipitation, with January being the driest month. The lowest rainfall are reported by the stations Hato report Burrunay and Santa Maria, which normally occur in the month of January.

The average annual rainfall is 2628.7 mm. The behavior of the precipitation is relatively uniform throughout the area of influence.

8. Temperature

According to the values registered by Cumaribo station, the temperature regime of the study area is isomegathermic, namely the temperature difference between the coldest and the hottest month is below 5° C , reason why the temperature is relatively stable throughout the year with little significant monthly variations, whose highest values occur between January and March and the lowest in June and July, showing an inverse relationship with rainfall

The mean annual temperature in the study area is 26.2° C, with monthly mean values ranging from 25° C in July and 27.6° C in February, presenting a maximum variation in the year of 2.6° C. Regarding the extreme values, the minimum temperature reached 24.2° C in August and the maximum (29.5° C) in February .

9. Relative Humidity

The relative humidity (percentage of air saturation with water vapor) in the study area, indicate an annual average of 83% according to the data presented by Cumaribo station, with monthly average variations between 73% in February in which accentuates the dry season or less precipitation, and 89% in June and July, the months of greatest rainfall intensity. Likewise, extreme values of moisture occur in June with a maximum of 92% and in February with a minimum of 56% . In general, it is possible to conclude that in the area predominates a wet environment with a small dry season

10. Cloudiness and solar Brightness

The cloudiness in the area occurs almost constant throughout the year with an average annual value of 5 oktas (0 means no clouds or discovered and 8 oktas means fully covered), demonstrating greater cloudiness during the months of May and June with a monthly average of 6 oktas, and reduced cloudiness during the months of January and February with a monthly average of 4 oktas.

Regarding to the extreme values of cloudiness, records showed data corresponding to 8 oktas for February to June, and 2 oktas in the months of January, February, April, September, October and November.

Solar brightness corresponds to the number of hours of incidence of sunlight on the Earth's surface. According to the analyzed stations of Cumaribo and El Tapón, the annual average of sunlight in the area is 1942 hours, with December to January as the months of highest sunshine, this last one with 240.3 hours, while during June presented the lowest monthly average 107.8 hours. Regarding the extreme values of sunshine, there has been presented data of 293.4 and 49.2 hours in the months of January and August, respectively. The largest solar brightness is associated with lower rainfall areas, fact caused by the country's situation in the Intertropical Convergence Zone (ITCZ).

11. Evaporation

This parameter and the relative humidity greatly contribute to the behavior of the annual precipitations and annual temperatures. The average annual evaporation is 1489.8 mm as reported by the Cumaribo station, with monthly mean values between 88.7 mm during June and 162.9 in March. Hence, evaporation outliers indicate a maximum of 207.3 mm in March and 73.2 mm in June. (This means that when the precipitation values are high, the temperature decreases bringing with reduced evaporation.

1.4 Conditions Prior to Project Initiation (G1)

This project has not been previously implemented. Therefore there is no evidence of GHG reductions, removals or destruction within the project boundary. Conditions of the area prior to the project initiation are as follows:

Life Zones

The predominant life zone in the Department of Vichada is humid tropical forest (bh-T for its name in Spanish) according to the Holdridge classification system, followed to a lesser extent, by the area of tropical dry forest (bs-T) life zone. The area of the project activity also includes areas of the tropical wet forest (bmh-T) life zone. This zone extends from sea level to 1.000 m and is characterized by temperatures between 24 and 35°C and annual rainfall between 2.000 and 4.000 mm¹²

Endangered species

The freshwater dolphin (*Inia geoffrensis*), the West Indian manatee (*Trichechus manatus manatus*) and the giant otter (*Pteronura brasiliensis*), are threatened aquatic mammals. In mammals, the pressures on their habitat represent the greatest threat to species like the leopard (*Leopardus pardalis*) and the *Cebus*

¹² (Holdridge1978).

apella. The “llanero” caiman (*Caiman intermedius*) is emblematic of the area and one of the most studied crocodiles in the basin; it is of commercial importance, endemic and in critical need of conservation. The morrocoy and charapa turtles (*Geochelone denticulata* and *Podocnemis expansa*), are also in danger of extinction; locals consume the eggs or meat of these species, they are hunted very young to be exported as aquarium pets (Figure 3)¹³. Table 3 presents the list of species reported as endangered in the region.

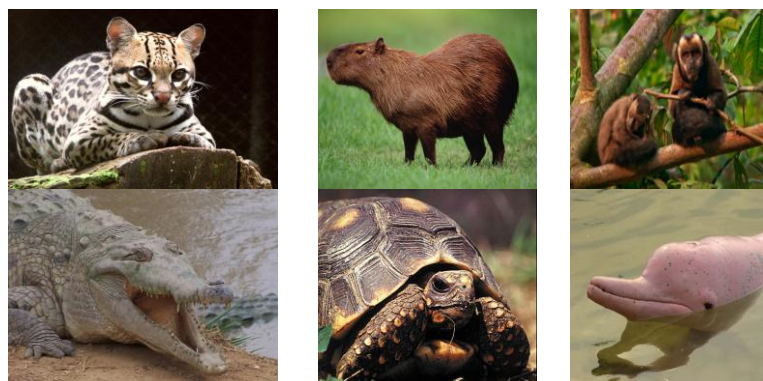


Figure 3 Some endangered species of the Orinoco region¹⁴:

According to the UICN red list of threatened species, version 2012.2, the following species (Table 3) are catalogued as DD (Data deficient), LC (Least concern)¹⁵, NT (Near threatened), VU (Vulnerable), EN (Endangered), or CR (Critically endangered) (Catalogue of life)¹⁶ depending of their current status of threat.

Mammals

In the Orinoco basin converge fauna elements of the Andean, Amazonian and Guyanese shield, and others coming from large areas that function as ecotones (transition zones between Orinoco-Amazon, Orinoco and Andes). Neotropical savannas lack of specialized and endemic mammalian fauna as they represent a mix of amazon and other wildlife surrounding biomes¹⁷. Preliminary data for the Orinoco region (without excluding the whole basin) presented by the National Biodiversity Report¹⁸ identified the presence of 101 species, 72 genera, 26 families and 9 orders of mammals

Mammals play an important role in tropical ecosystems, being crucial for the maintenance and regeneration of forests, through processes such as seed dispersal activities, pollination and frugivory. They also are integral components of the religion, culture and economy of the region, and they are used as food, pets and decorations by different ethnic groups¹⁹.

¹³ Governance of Vichada 2008, CORPORINOQUIA, 2004).

¹⁴ 1. *Leopardus pardalis* (Venezuelaverde.net) 2. *Cebus paella* (Photo by Salvador Solé Soriano (22/10/2011) . *Hydrochaeris hydrochaeris* (photo by Frans Lanting/National Geographic Stock). 4. *Crocodylus intermedius* (photo by Asociación Chelonia. UNED) 5. *Geochelone carbonaria* (photo by Andy C. Highfield.) 6. *Inia geoffrensis* (photo by Ivan Sgualdini/Fotolia)

¹⁵ When a taxon has been evaluated against the criteria and does not qualify for Critically Endangered, endangered or vulnerable or any other category

¹⁶ The species catalogued as LF, are those who have not been yet reported by the UICN but appear on the Catalogue of life (indexing the world's known species)

¹⁷ Ojasti 1991 Defler and Rodriguez 1998

¹⁸ Chaves and Arango 1998

¹⁹ (Morales et al. 2004)

Reptiles

The reptile species of the study area are in strong recoil due to the loss of their habitat. This alarming decline is due to pollution and degradation of ecosystems in which they dwell, which in addition represents a great loss of biodiversity (biological richness), and also an important economic loss, since many of these species are beneficial for humans in their fight against diseases and pests such as flies, mosquitoes etc. In the case of snakes, these reptiles have been hard whipped by the humans, as they are considered a threat and traditionally evil, even when these species work stabilizing the natural balance of the environment by eliminating pests (rodents, among others).

Currently 524 species of reptiles in Colombia have been recorded and it is possible that through further exploration and more detailed systematic studies this amount could increase²⁰. 119 species have been reported for this group in the Orinoco region²¹

Amphibians

Amphibians represent an interest group, not only because of their biological and ecological peculiarities but also for their marked vulnerability to the transformation and degradation of the ecosystems they live in, as they tolerate very little pollution and fragmentation of their habitats²². Changes in forest structure can produce direct and indirect effects on the local and regional communities, including loss of habitat and food resources, microclimatic changes and reduction of available microhabitats.

Birds

Birds are the most abundant class of vertebrates in the world. Their ability to fly allow them to distributed along different ecosystems, reason for being considered "species of litmus paper to measure the quality of the environment"²³. Nationally, the taxonomic group of birds are represented by 1871 species representing 20% of the world's birds²⁴ therefore they are considered as the most diverse and rich biological group in Colombia, and hence the ecological importance of strategic ecosystems as bioindicators, because there are some groups of birds which can only be set within certain adverse conditions as the moorlands ecosystems, wetlands and Andean forests²⁵

These birds can indicate the status of ecosystems, since they form part of the development of vegetation as they act as seed dispersers giving strengthening for the growth dynamics of vegetation in any type of plant cover (grass, shrubs and forests)²⁶.

Table 3 Endangered fauna species in the Orinoco region.

Scientific name	Common name	Category
Fish		
<i>Osteoglossum ferreirai</i>	Arauna Azul, Arawana	LC
<i>Colossoma macropomum</i>	Cachama Negra, Cherna, Gamitana	LF

²⁰ (Profepa 2002 in Romero 2008)

²¹ (Corporinoquia *et al.*, 2006).

²² (Rueda *et al.* Acosta 2004 and 2000)

²³ (Roger, __ in: University of Antioquia 2006)

²⁴ (Salaman *et al.*, 2001),

²⁵ (CAR, 2005).

²⁶ (Peña, 2003).

Brachyplatystoma juruense	Apuy, Manta Negra, Camisa Rayada	VU
Brachyplatystoma filamentosum	Valentón, Plumita, Lechero, Pirahiba	EN
Brachyplatystoma flavicans	Dorado, Plateado	EN
Brachyplatystoma vaillantii	Blancopobre, Pirabutón, Capaz	EN
Paulicea luetkeni	Saliboro, Bagre Sapo, Peje Negro	EN
Pseudoplatystoma tigrinum	Pintadillo Tigre, Bagre, Capararí	EN
Primates		
Aotus brumbacki		VU
Aotus vociferans		LC
Ateles belzebuth		EN
Callicebus torquatus		LC
Cebus apella		LC
Saimiri sciureus		LC
Cacajao melanocephalus		LC
Lagothrix lagothricha	Choyo	VU
Mammals		
Alouatta seniculus	Araguato	LC
Cebus apella	Maicero	LC
Cerdocyon thous	Zorra	LC
Eira Barbara	Ulamá	LC
Inia geoffrensis	Delfín Rosado	DD
Leopardus pardalis	Leopardo	LC
Leopardus wiedii	Tigrillo peludo	NT
Lontra longicaudis	Nutria neotropical	DD
Myrmecophaga tridactyla	Oso hormiguero, oso palmero	VU
Odocoileus virinianus	Venado sabanero	LF
Panthera onca	Tigre	NT
Pecari Tajacu	Zaino	LC
Priodontes maximus	Armadillo gigante	VU
Pteronura brasiliensis	Perro de agua	EN
Puma concolor	Puma	LC
Saimiri sciureus	Mico	LC
Tapirus terrestres	Danta común	VU
Tayassu pecari	Cajuche	NT
Reptiles		
Ameiva ameiva	Lobato cardenillo	LF
Amphisbaena alba	Tatacoa	LC
Boa constrictor	Boa	LF
Bothrops asper	Mapaná	LF
Caiman crocodilus crocodilus	Cachirre	LF

Chelonoidis carbonaria	Morrococoy	LF
Chelonoidis denticulata	Tortuga morrococoy	VU
Chironius carinatus	Voladora	LF
Cnemidophorus lemniscatus	Lobo	LF
Crocodylus intermedius	Caimán del Orinoco, llanero	CR
Crotalus durissus	Cascabel	LC
Eunectes murinus	Guio	LF
Gonatodes albogularis	Toteca	LF
Iguana iguana	Iguana	LF
Leptodeira annulata	Falsa Mapaná	LF
Mabuya mabouya		LF
Mastigodryas pleei	Guardacaminos	LF
Paleosuchus palpebrosus	Babilla	LC
Podocnemis expansa	Galápaga	LR
Podocnemis unifilis V	Galápaga	VU
Tupinambis teguixin	Lobo pollero	LC
Birds		
Amazona amazónica	Lora	LC
Amazona ochrocephala	Lora Cabeciamarilla	LC
Ammodramus humeralis	Correcaminos Sabanero	LC
Anas cyanoptera	Pava negra	LC
Anthracothorax nigricollis	Colibrí	LC
Ara macao	Guacamaya Macao	LC
Ara militaris	Guacamaya verde	VU
Ara severus	Guacamaya Cariseca	LC
Aratinga pertinax	Perico Carisucio	LC
Ardea alba	Garza Blanca	LF
Arremonops conirostris	Pinzón conirrostro	LC
Arundinicola leucocephala	Monjita pantanera	LC
Athene cunicularia	Murruco , Guarracuco	LC
Basileuterus cinereicollis	Arañero pechigris	NT
Botaurus pinnatus	Avetoro	LC
Brachygalba goeringi		LC
Burhinus bistriatus	Guerere – Gurre	LC
Buteo albicaudatus	Gavilan	LC
Buteo magnirostris	Gavilán azul	LC
Buteogallus meridionalis	Aguila mona	LC
Butorides striata	Chicuaco	LC
Cacicus cela	Arrendajo	LC
Cacicus uropygialis	Arrendajo escarlata	LC

Caprimulgus cayennensis	Guardacaminos	LC
Caracara cheriway	Carraco	LC
Cathartes aura	Guala	LC
Cathartes burrovianus	Laura	LC
Chlorostilbon poortmanni	Esmeralda rabricorta	LC
Circus buffoni	Aguilucho Negro	LC
Coereba flaveola	Mielero Común	LC
Colaptes punctigula	Carpintero	LC
Colinus cristatus	Perdiz	LC
Columbina squamata	Torcaza	LF
Columbina talpacoti	Tierrera	LC
Coragyps atratus	Samuro	LC
Crax daubentoni	Pavón moquiamarillo	NT
Crotophaga ani	Jirijuelo	LC
Cyanocorax violaceus	Pollo de monte	LC
Dacnis cayana	Dacnis azul	LC
Dendrocygna viduata	Careto	LC
Dryocopus lineatus	Carpintero real	LC
Egretta caerulea	Garza Azul	LC
Elaenia flavogaster	Elaenia copetona	LC
Falco deiroleucus	Halcón Colorado	NT
Falco femoralis	Halcon	LC
Falco sparverius	Halcon, Cernícalo	LC
Forpus conspicillatus	Periquito	LC
Gymnomystax mexicanus	Toche	LC
Harpia harpyja	Águila moñuda	NT
Herpetotheres cachinnans	Guacabó	LC
Hypnelus ruficollis		LC
Jabiru mycteria	Gaban	LC
Manacus manacus	Pica piedra	LC
Megaceryle torquata	Matraquero, Martin pescador	LC
Milvago chimachima	Chiriguare	LC
Mimus gilvus	Parablata	LC
Mitu tomentosum	Paujil	NT
Momotus subrufescens	Barranquero	LF
Morphnus guianensis	Águila arpía	NT
Myiozetetes cayanensis	Siriri	LC
Neochen jubata	Pato carretero	NT
Nycticorax nycticorax	Chicuaco	LC
Nyctidromus albicollis	Bujio	LC

Orthopsittaca manilata	Catarnica	LC
Oryzoborus angolensis	Arrocero	LC
Patagioenas cayennensis	Torcaza	LC
Pauxi pauxi	Paujil Copete de Piedra	EN
Penelope jacquacu	Pava	LC
Piaya cayana	Pisca, pascuita	LC
Pilherodius pileatus	Garza	LC
Pipra erythrocephala		LC
Pitangus lictor	Caballicero	LC
Pitangus sulphuratus	Cristofue	LC
Polystictus pectoralis	Tachurí barbado	NT
Progne chalybea	Golondrina	LC
Pyrocephalus rubinus	Pechirrojo	LC
Quiscalus lugubris	Mirla	LC
Ramphastos tucanus	Piapoco, Tucán	LC
Ramphocelus carbo	Come queso	LC
Sarcoramphus papa	Raisamuro	LC
Sicalis flaveola	Canario	LC
Sporophila minuta	Espiguero	LC
Sturnella magna	Chirlobirlo	LC
Sturnella militaris	Soldadito	LC
Syrigma sibilatrix	Campanilla, Chunguita	LC
Tachycineta albiventer	Golondrina	LC
Tangara cayana	Tangara triguera	LC
Theristicus caudatus	Tautaco	LC
Thraupis episcopus	Azulejo	LC
Thraupis palmarum	Azulejo	LC
Tigrisoma lineatum	Vaco Colorado	LC
Todirostrum cinereum	Espatulilla	LC
Trogon viridis	Trogon	LC
Tyrannus melancholicus	Caballicero	LC
Tyrannus savana (Ma)	Tijereta	LC
Tyrannus tyrannus	Siriri	LC
Vanellus chilensis	Alcaraván	LC
Veniliornis passerinus	Carpintero	LC
Xiphorhynchus obsoletus	Trepa troncos	LC
Zenaida auriculata	Paloma	LC
Amphibians		
Rhinella granulosus	Sapito verrugoso	LC
Rhinella marina	Sapo	LC

Hypsiboas boans	Rana	LC
Hypsiboas crepitans	Rana	LC
Hypsiboas punctatus	Rana	LC
Pseudis paradoxa	Rana	LC
Trachycephalus venulosus	Rana	LC
Leptodactylus fuscus	Saltona	LC

Source: Mojica et al. (2002)²⁷, Renjifo et al. (2002)²⁸, Corporinoquía (2004)²⁹, Romero et al (2009)³⁰., Rodríguez et al (2006).

Environmentally fragile areas

The ecosystems in the Orinoco region, significantly contribute to the country's natural wealth since they meet basic ecological functions for the hydrological cycle of the basin. Strategic and environmentally fragile areas such as Moriches, gallery forests and wetlands were recognized, georeferenced, delineated and described, to identify key areas in the farm Heritage.

The study area consists of elements characteristic of savannas, forests and floodplains. Below is the description of the main strategic environmental areas:

Lotic systems

The study area has a great abundance of water, where water recharge is high, due to heavy rainfall and the existence of forests, morichales, floodplain and other systems, which create different types of landscapes formed in the micro-rivers The Cimarron and La Fortaleza, which feed the Caño Lolo watershed.

In the savannas, the drainage pattern is parallel and the flows decrease in the summer time, but still, these pipes and morichales maintain a good flow, bringing its waters to Caño Lolo which finally discharges its waters into the Rio Tomo.

Estuaries, lagoons, morichales and floodplains

The morichales are basic constituents of flood zones, as they are a type of permanent lentic wetland type, with vegetation cover composed primarily by individuals of the moriche palm. They can be found in pipes and in swampy areas and in transition zones between the savannas and gallery forests. They are characterized by their large capacity to hold water during dry seasons and because of their high contents

²⁷ Mojica, J. I., C. Castellanos, J. S. Usma y R. Álvarez (eds.). 2002. Libro rojo de peces dulceacuícolas de Colombia. Serie Libros Rojos de Especies Amenazadas de Colombia. Instituto de Ciencias Naturales - Universidad Nacional de Colombia y Ministerio del Medio Ambiente. Bogotá, Colombia.

²⁸ RENGIFO, L. M., A. M. FRANCO-MAYA, J. D. AMAYA-ESPINEL, G. H. KATTAN Y B. LÓPEZ-LANÚS (eds.). 2002. Libro rojo de aves de Colombia. Serie Libros Rojos de Especies Amenazadas de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt y Ministerio del Medio Ambiente. Bogotá, Colombia.

²⁹ Corporación Autónoma Regional de la Orinoquía (CORPORINOQUIA). 2004. Plan de Acción 2004-2006. Yopal, Colombia.

³⁰ Romero M.H., Maldonado-Ocampo J.A., Bogotá- Gregory J.D., Usma J.S., Umaña-Villaveces A.M., Murillo J.I., Restrepo-Calle S., Álvarez M., Palacios-Lozano M.T., Valbuena M.S., Mejía S.L. Aldana-Domínguez J. y Payán E. 2009. Informe sobre el estado de la biodiversidad en Colombia 2007- 2008: piedemonte orinoquense, sabanas y bosques asociados al norte del río Guaviare. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Bogotá D.C., Colombia. 151 p.

of organic matter. They also provide shelter and food for mammals, birds, reptiles, amphibians and some fish (Corporinoquia, 2010).

Fauna habitats

The Orinoco region is considered as a bridge for exchange between species of the Orinoco and the Amazon. Its geography, geological history, humidity and its ecological and anthropogenic activities, determine the presence of a high biodiversity. This is reflected in the number of ecosystems and is consider as a shelter for migratory species.

Gallery forests of the different water drains in the area make up a significant ecosystem diversity of fauna and flora due to their constant supply of resources, the ecological dynamics, climate and hidrological regulation, and erosion control, among others. In addition, they make part of the wooded areas still present in the study area, generating supply of food resources and potential sites of displacement, shelter and / or nesting of different animal species as howler, agoutis, deer, birds and associated silvicultural to the margins of rivers and streams.

Additionally, the Moriche palm-based forest (Morichales) of the study area, belong to these biological corridors offering refuge and feeding areas for birds, mammals, amphibians and reptiles



Gallery Forest associated to La Fortaleza River



Gallery forest asociated to the Cimarrón river

Photograph 3 Gallery forest associated to two different compartments that make part of the project area

A virtual research was conducted at the Institute Alexander von Humboldt Biological Resources site³¹ to verify the existence of reports of important areas for bird conservation in the tropical Andes. However there are no reports of ecologically important areas for the region of the Orinoco (Vichada)

³¹ (http://aicas.humboldt.org.co/ficha_aica.php?cod=CO196)

Sensitive Ecosystems and natural protected areas.

Sensitive ecosystems have been identified as those water bodies listed as morichales, due to its importance in the regulation of the water system in the area and also because they act as receptors areas for wildlife and as ecological buffer zones.

Plant formations

The plant formations are the result of the sum of climatic, edaphic and biotic factors, that determinate the existence of typical vegetation, which may be differentiated at the physiognomic or floristic level.

According to the Holdridge system adapted to the climatic conditions of Colombia by IDEAM (2000), the Life Zone for the project area is recognized as Tropical Humid Forest (bh-T), see Table 4.

Table 4 Life Zones of the Project influence area

Life zones	Height	Precipitation	Temperature °C
Tropical Humid Forest	0 – 1000	2.000 a 4.000	≥ 24

The tropical rain forest has a high biodiversity. It contains groups of plants delimited by specific physiognomic characters. In most cases, there are not dominant tree species. Rather, the individuals of each species are widely dispersed through the forest and a large number of species of trees can grow together. The vegetation can be divided into many layers, depending on their height, canopy, emergent trees, etc.

The trunks of many rainforest trees have buttress very noticeable, also known as Bambas, bulges or buttresses. Although its function has not been determined satisfactorily, seems to help sustain the trees growing on shallow soils. Another striking feature of the tropical rainforests is the relatively large size of the leaves of many trees, compared with small leaves in colder climates. The abundance of large lianas contributes to the characteristic appearance of rainforests.

The most representative species for this formation are: *Trema micrantha*, *Protium hectaphyllum*, *Bursera simaruba*, *Spondias mombin*, *Jacaranda caucana*, *Erythrina fusca*, *Tabebuia pentaphylla*, *Cecropia telealba*, etc.

The constant moisture and heat promote the rapid recycling of nutrients: fungi, microorganisms and insects, rapidly decompose dead materials and re-integrate them into the nutrients chain that plants use.

There are also fungi, known as mycorrhizae, living associated with the roots of many trees increasing its absorptive surface; these mycorrhizae have been helpful to allow large tracts of forest to grow now on nutrient-poor soils.

Vegetation Cover Units

The natural vegetation cover of the Project area is described as follows:

Natural Pasture (NP)

Natural pastures cover the major land of the study area corresponding to 80% approximately. they are characterized by the presence of large tracts of land predominantly covered with natural grasses and herbs, sometimes with trees and scattered bushes. Among the predominant grass species, there is the *Andropogon* sp, *Heteropogon contortus*, *Leptocoriphium* sp. *Trachypogon* sp, and others

Galery Forest (GF)

This unit is of great ecological value because is considered as protective forest due to its location on the banks of water sources such as Cimarron and La Fortaleza rivers. Additionally they prevent soil erosion. These forests are generally grown as stripes with tunnel appearances that drain the area. The morichales of the study area are generally consider as gallery forests, as these are the first recipients of the runoff water from the savannah, product of rainfall and then they bind to the woods.

In the area of direct influence of the project these forests have an area equivalent to about 12%. Currently on the site there is no pressure on forests bordering the project, as harvesting is strictly forbidden in protected areas.

Projected Forest Plantations (PFP)

It is the cultivation of tree species produced by direct human intervention with commercial and industrial purposes. This plantation is capable of producing timber, non-timber forest products and sub-products of natural rubber. It is projected to have 8.377 ha planted in 2014, after accomplishing the establishment phase. The rest of area will be planted in 2015

Table 5 Projected area to be cover by forest plantations by 2014 within the project boundary

Project area	Compartment number	Catastral area	Map area	2012	2013	2014
La Herencia	1	1003	998	506	630	
La Ermita	2	1009	1005	400	505	
San José	3	955	952	206	500	
La Pamela	4	1.315	1206	0	500	800
Matalarga	5	868	864	180	650	
La Daniela	6	1.338	1310	50	500	
Monos/Región Caribe	7	642	640	0	100	
Santamaría	8	1.313	1191	0	500	850
Cimarron 4/La Fortaleza	9	1.290	1713	0	200	1000
Granfuturo	10	452	450	0	300	
Total		10.185	10.331	1.342	4.385	2.650

Crops (C)

At the site are projected 0.4 ha of food crops.

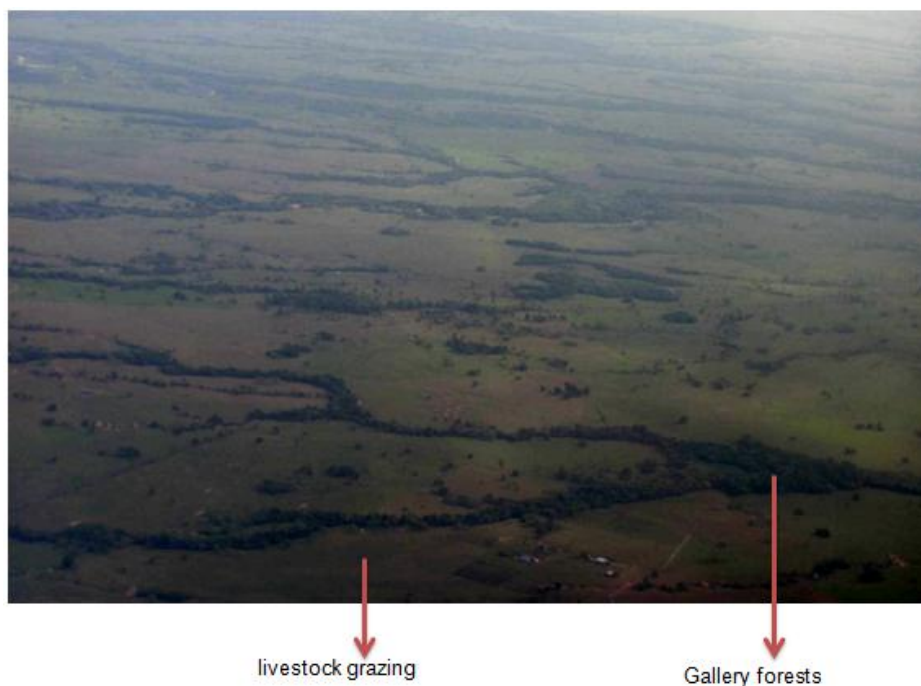
Current Land-use

Extensive cattle farming based on regular anthropogenic burning of grasslands has been the dominant model of land-use for over a century. As a result of the remoteness, lack of infrastructure and high transportation costs, this system has dominated land-use (Photo 4).

Land-use in the Municipality of La Primavera is different in urban and rural areas. In the town, it is primarily used for housing and commerce. In rural areas, it is used for livestock farming and small dairy industries. Approximately 90% of rural lands in the Municipality are used for livestock grazing, on which its economy depends. This practice occurs with an average of 10 hectares per animal. Approximately 2% is used for basic food crops. Generally, these crops are found in small parcels called “conucos” on the banks of streams where native forest must be felled to accommodate them. Another 2% is used for the improvement of pastures with high productivity grasses in large-livestock farms, with species such as *Brachiaria humidicola* and *Llanero* grass. Finally, 6% is used for logging activities in areas like Santa Cecilia, Marandúa and Urillano³²

Natural fires occur on the plains with some regularity. In addition, it is common practice for cattle ranchers to burn the pastures to promote grass sprout renewal and increase its acceptance in cattle grazing. In summer months, the native grasses get very hard and dry and are not easily digested by the cattle. Therefore, the traditional practice is to burn the pastures twice a year to obtain grass re-sprouts to promote feeding by the cattle. These cyclical fires cause soil degradation since the soil loses minerals and porosity; this produces larger flood prone areas during winter months and decreases the capacity of native flora to naturally recuperate. Furthermore, flames generated during burning practices can occasionally affect gallery forests and decrease their density and land cover. Soils are degraded by over-grazing, anthropogenic burning, and the constant washing of the soils by the heavy rains.

³² Land Management Plan, EOT 2000



Photograph 4 Land cover in the project area. Notice how the most part of the land cover in the municipality of La primavera is grazing. Small lines of gallery forest are surrounding the water bodies. This grazing are used for cattle farming and subsistence agriculture

The land cover classification for year 1988 is presented in figure 4. The project area is located mostly in areas classified as non-forest. This land classification keeps as the same in 2011 with few changes.

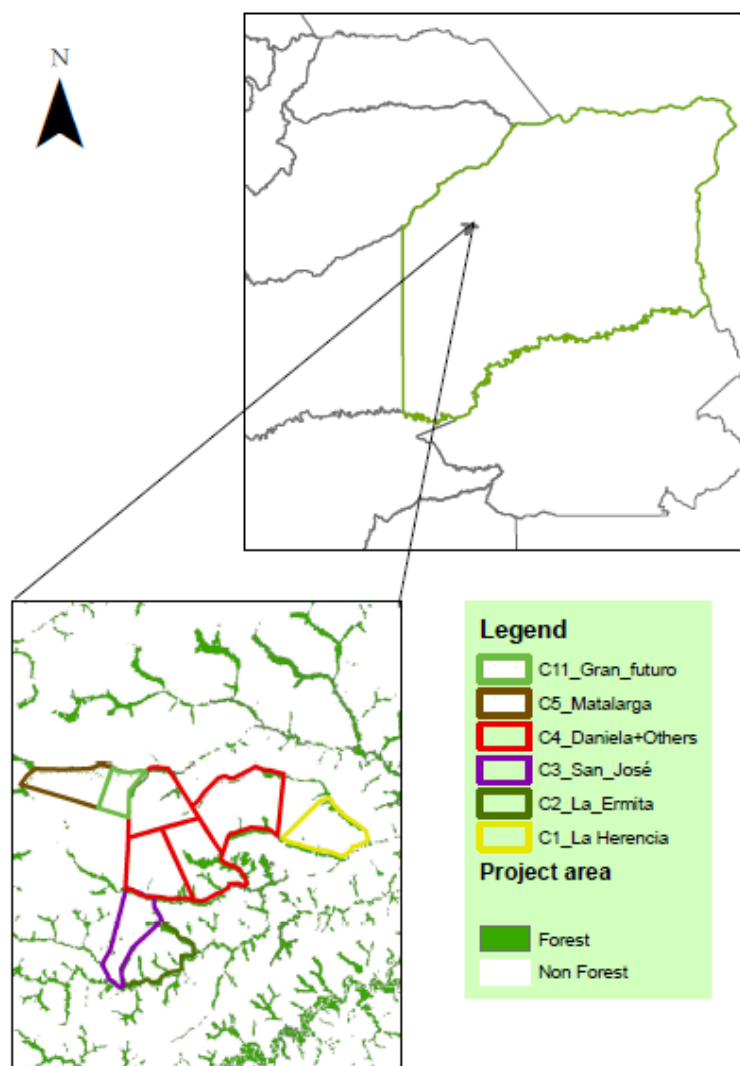


Figure 4 Land cover in the project area in 1988

Area of Direct Influence

The area directly affected by the project, consists of those veredas³³ where silvicultural activity will take place, i.e. where rubber cultivation is going to be established and where all activities related to the project are going to take place. In total, one vereda will be directly affected.

The municipalities of Santa Rosalia and La Primavera were recognized as the areas of indirect influence in relation to job opportunities generated by the project and the economic benefits to be derived from taxes paid by the project developers to the municipalities.

The land management from people in the department of Vichada has depended on the arrival of settlers to the municipality usually from departments like Arauca, Casanare and Meta, with the aim of developing

³³ Veredas are small villages within one municipality. This term is commonly used and accepted in the Colombian geographic units classification

livestock activities. The lack of institutional policies regarding the control of population dynamics addresses inappropriate uses of natural resources. Additionally due to the problems related to property rights of land there have been identified instances of capital accumulation and inequitable land distribution.

The dynamics of land occupancy in the highest parts of the territory are characterized by the development of small settlements in areas near to water sources, followed by the development of large-scale livestock, mixed with subsistence farming. On the other hand low and flat areas are characterized by poorly drained soils and water deficit preventing the development of agriculture, livestock and forestry. Hence, within these areas the most common activities are related to the extraction of materials for road construction and maintenance.

Population Density

The population density in most of the villages within the municipality is low and dispersed due to the topography, the heavy rainfalls and the diversity of plant communities in (rain forest, flooded savannas morichales and others) making it difficult to establish centers towns and development of adequate road infrastructure. This prevents the implementation of more intensive production activities and the diversification of the productive sector. Additionally, issues related to public order, generate constant displacement of communities to urban centers close to the area

The armed political conflict in the country since the middle of last century has been a causal factor of various migratory phenomena that address in most cases the structuration of population dynamics. The pressure and forced displacement as strategies of subversive groups in the area has been determinant in terms of the population dynamics and reiterated housing abandonment

In the table 6 are mentioned the population densities per vereda as a function of the number of families. The data were obtained in the SISBEN offices of the municipalities

Table 6 Population densities in the areas of direct and indirect influence of the project

DESCRIPTION OF THE POPULATION	VEREDAS	AREA (Ha)	No Population	Population density Hab/Km ²
Information taken from the EOT, veredal sheets and SISBEN	La Ladera	42712	172	0.403
	Flor Amarillo	112790	362	0.321
	Nazaret	62840	167	0.266
	San Teodoro	361070	541	0.150

The veredas with higher densities are generally those, which are found near to either urban areas or main communication routes in the region. Therefore they have good conditions to provide access to social and public services including transport and harvested product marketing. This situation can be found in villages like Flor Amarillo and San Teodoro in the municipalities of Santa Rosalia and La Primavera

On the other hand, there are veredas with very low population densities and with almost total lack of social infrastructure and public services, this situation can be found for example in the veredas of La Ladera and Nazareth.

Resguardos³⁴ and Indigenous Peoples of La Primavera

In relation to the indigenous population, according to DANE in 2011 the percentage of indigenous population in the entire municipality was 27%, including the resguardo Campo Alegre - Ripialito, La Llanura y La Pascua. Of this population, 15.20% self-identify as indigenous and 10.50% as afro. Indigenous communities in the municipality La Primavera are concentrated around the Indigenous Council of Campo Alegre - Ripialito, La Llanura, Gavilan, el Tomo and La Pascua, for a total of 1451 Indigenous living on resguards.

Table 7 Resguardos and indigenous peoples of La Primavera inspection. Town (pueblo), Extension (extension), Men (Hombres), Females (Mujeres).

Resguardo (1)	Pueblo	Extensión en Ha (2)	Hombres	Mujeres	Total
Campo Alegré-Ripialito	Sikuani	6,946.78	390	374	764
La Llanura-El Tomo	Sikuani	72,991.27	291	244	535
Gavilán-La Pascua	Sikuani	19,024.82	88	64	152
	Totales	98,962.87	769	682	1451

Census conducted by the Cabildo Governor of the "Resguardo" and captains of the Community. Municipal Government Plan 2012-2015.

The behavior of the indigenous population clearly shows an accelerated growth from 2005 to 2011.

1.4 Ownership and Other Programs

Proof of Title

The lands are private property of Private Equity Found. There are copies of the Real State Registration (RSR) documents that will be available for the company hired for validation process. Table 8 shows the number of the RSR documents.

Table 8 RSR Numbers. PdB is in process to get the rest of RSR documents

Project area	Compartment number	Area	RSR Number
La Herencia	1	1.003	5400003815
La Ermita	2	1.009	5401885

³⁴ According to the law 160/1994, the resguardos are a legal and sociopolitical institutions, formed by one or more indigenous communities, that with a collective title enjoy the guarantees of the private property. They have an autonomous organization covered by Indigenous laws and they also have their own regulatory system.

San José	3	955	5401886
La Daniela	4	1.337,9	540 3812
Matalarga	5	868	5401887
La Pamela	6	1.314,9	540 3814
Santamaría	7	1.312,9	540 3813
Granfuturo	11	452	540 7402
Cimarrón 4	12	1.290	
Total		9.542,7	

1.5 Project Proponent (G4)

Table 9 Project proponents with the description of the company and the contact person

Entity	Description	Function	Contact
Compañía de Profesionales de Bolsa S.A (PdB)	Offers investment options that meet people's needs, providing ongoing professional advice and support in an atmosphere of efficiency and safety in their operations through market knowledge. The company has more than 22 years of experience in the Colombian financial market, more than 10 years of experience in collective portfolio management and nearly a trillion dollars of assets under management.	Project proponent	Beatriz Cuello beatrizcuello@profesionalesdebolsa.com .

1.6 Other Entities Involved in the Project (G4)

Table 10 Contact information and roles/responsibilities of the other entities involved in the project

Entity Involved	Contact Information	Roles/Responsibilities
South Pole Carbon Asset Management Ltd. (South Pole)	Technoparkstrasse 1 8005 Zurich Switzerland Phone: +41 43 501 35 50	South Pole elaborates and oversees the development of appropriate project design and monitoring techniques in line with the guidelines of the VCS and CCBS. South Pole is a globally active carbon project developer and

	Fax: +41 43 501 35 99 www.southpolecarbon.com	consultant with a long and successful track record working on forestry-based carbon projects. In 2011 and 2012, South Pole was elected the Best Project Developer of the Voluntary Carbon Markets.³⁵
Agromottas EU	35 years experience providing plant material and 25 years of innovation and developing projects has allowed them to position themselves as leaders in the agribusiness sector in Colombia.	Business development and plantation operations, including monitoring and technical assistance from them.
Agroforestal Internacional S.A.S	They are consultants with experience in agroforestry production projects related to cocoa, coffee, rubber, forestry and forest management plans, who have worked in several parts of Colombia as the Pacific Coast, Urabá, the Sierra Nevada de Santa Marta, Northern Santander, Caquetá and Putumayo. It has experience in countries such as Bolivia and Thailand where they have developed agroforestry projects with strong economic and social impacts	Perform project support in two specific lines: Technical Assistance (Technical Coordinator) and project social Coordination

The project proponent is committed to act responsibly to guarantee quality of the silvicultural activities performed in the field, and also that the environment, industrial safety and occupational health, are proper to the development of all the processes, products and projects. The skills required by the staff in order to work in the project are as follows:

Specialized staff

³⁵<http://envirofinance.wordpress.com/2011/02/11/whatever-happened-to-jp-morgan/>

These staffs are professionals that perform specific technical and administrative tasks and that usually have experience in this type of projects. This group is hired by the company Compañía de Profesionales de Bolsa S.A and many of them belong to the permanent plant staff. The group consists of forestry, agricultural, civil and environmental engineers, nurses, biologists, accountants, business managers, and surveyors, among others.

Qualified staff

Corresponds to the staff who have acquired training and experience in forestry projects through its ongoing work on these projects, and that have specialized in a specific task. The positions held by these personnel are: wholesalers, tractor drivers, mechanics, cooks, and others.

No-qualified staff

Workers engaged to unskilled activities do not require special skills or training to perform their duties. The company will prioritize the habitants of the community of San Teodoro Inspection and other communities in the area where the project is developed.

1.7 Project Start Date (G3)

The purchase of the project area has been developing in a step-by-step process. Land purchase started in 2011, in La Primavera- with about 9.542,7 ha purchased (catastral area). Is expected to purchase 100% of project reaching a total project size of 10.000 ha in 2015. PdB buys land together with investors; partnership contracts are available.

In 2010 company presentations show the interest to register the project in the carbon markets. In addition to this, on September 09 of 2011, an early consideration letter was sent to the DNA in Colombia. This letter reflects the decision to commit financial resources to the development of a carbon project to create an incentive for the establishment of natural rubber plantation and was documented and signed by the board of Private equity Found. The effective start date of the project is December 20, 2011, as this was the date where the implementation of the first project activity started. Specifically, this is when the preparation of the soil for the establishment of the first rubber plantations occurred. The full establishment of all 10'000 ha of Rubber is expected for 2015. The plantations rotation cycle for rubber tree is 36 years. The project will have a duration of 35 years.

1.8 Project Crediting Period (G3)

The project crediting period is 35 years. The start date of the crediting period is December 20th 2011, the end date is December 20th, 2046. There's no difference between the project start date and the project crediting period start date.

Establishing plantations

The plantations will be established according to a planting schedule presented in Table 11. By the end of 2013, 3.805 ha will be planted. Finally the remaining 4.900 will be planted between 2014 and 2015.

Table 11 Planting projection for the project area

Compartment number	Total Ha per	Productive areas	2012	2013	2014
La Herencia	998,47	650	506	630	
La Ermita	1005,2	505	400	505	
San José	951,5	500	206	500	
La Pamela	1.206,22	900	0	500	800
Matalarga	864,46	650	180	650	
La Daniela	1310,41	700	50	500	
Monos/Región Caribe	640	450	0	100	
Santamaría	1.191,07	850	0	500	850
Cimarron 4/ La Fortaleza	1713,39	1200	0	200	1000
Granfuturo	450,02	300	0	300	
Total	10.330,7	6.705,0	1.342	4.385	2.650

The following activities will be carried out to establish the rubber plantations.

2 DESIGN

2.1 Sectoral Scope and Project Type

This is an AFOLU A/R project that aims to reforest degraded lands, which are expected to remain degraded or to continue to degrade in the absence of the project. The project is not a grouped project.

2.2 Description of the Project Activity (G3)

The objective of the forestry project is to establish 10.000 hectares of *Hevea brasiliensis* in pastures of the municipality of La Primavera (department of Vichada) that are currently used for cattle farming. This initiative seeks to complement the generation of rubber and timber with the participation in the market for carbon credits (Verified Carbon Standard-VCS) as a complete economic alternative that propels competitiveness and development in the region.

Direct planting of *H. brasiliensis* in the project area began in December 14 of 2011 and will continue through 2015. The effective planted area until the current date corresponds to 5.505 hectares which is given by planting density of natural rubber plantations. This area excludes other vegetated areas within

project boundary such as creeks, borders vegetation, and small spots of vegetation.

For the sake of sustainable development, the project will work not only to generate economic benefits, but it will also focus on the integration of social and environmental components. This is because these components will determine the continuation of the activities and their sustainability over the long term. The notable environmental benefits that are expected from the project include reduced pressure on native forest, regulation of water flow, conservation of existing fauna and flora, and soil protection and rehabilitation.

G 3.7 Project proponent and entities involved in project design and implementation are not involved in or complicit in any form of discrimination (Including discrimination based on gender, race, religion, sexual orientation or other habits) or sexual harassment with respect to the project. Social benefits include immediate new income for small landowners in rural areas (many of which are located within conflict zones), as well as the creation of permanent jobs in large plantations and the reduction of labor dedicated to illegal crops. According to the size of the project, it is expected to produce around 2.500 permanent jobs in the harvest stage and 180 in the planting stage.

The project aims to create a sustainable mechanism for project finance, introducing carbon finance as a new and key financial tool to reach the required rate of return for investors in rubber plantations and a comprehensive tool kit of methods and knowledge related to carbon project development, monitoring, and management for new rubber tree plantations. In addition to this a milestone of cobenefits certification in the country, as the plantations established by the project will be certified under the Climate, Community and Biodiversity Standard (CCBS).

CCBS certification for the rubber tree plantations established by the project activity ensures that the project will comply with stringent standards for social and environmental responsibility, in addition to generating higher-quality emission reduction credits. Also, not only will the project create new employment opportunities for stakeholders, it will strive to protect worker safety and rights while maintaining a good relationship with neighbouring communities. It is evident that the sector faces a greater challenge: addressing the paradox between its interest in promoting the development of large agroindustrial plantations and promoting equitable processes of sustainable development.

Project activities

- *Reforestation:*
The project owner has developed a sustainable forest management plan. These include information about the technical aspects of the reforestation projects as well as all procedures that will be carried out to prepare the land, germinate and cultivate the seedlings, transplant the trees, perform regular maintenance, harvest and replant after harvest.
- *Monitoring:*
A coherent monitoring plan will be established and applied across all project area. This monitoring plan includes monitoring for carbon stock changes as well as community and biodiversity parameters. The carbon stock monitoring allows for accurate measurement of carbon capture in the reforestation project, project emissions and leakage. The community monitoring will be carried out through surveys of project employees in order to gauge the direct benefits of the

project. For biodiversity monitoring, inventories will be carried out of both flora and fauna found in the project area. These monitoring activities will be realized in each verification year.

- **Capacitation and Education:**

Project employees have carried out education activities. These have been achieved through lectures, meetings with local military and specific training for plantation workers. These seminars span topics as diverse as the ecological benefits of reforestation, ecosystem conservation, fire prevention techniques, economic opportunities related to reforestation beyond timber and eco-tourism.

Specie selected for the proposed VCS AR project

Hevea brasiliensis is a rapid-growing species that can reach 40m in height and 35cm in diameter. Its trunk is cylindrical with a narrow base and a gray-green bark and irregular branches. Its leaves are compound, trifoliate, and alternate. They have a dark green upper face, a light green lower face, and marked venation (Figure 5). The form and composition of the leaves varies between individuals.

Commonly known as the rubber tree, *Hevea brasiliensis* is a native tree species of Brazil, Bolivia, Peru, Colombia, Guyana, and Suriname. The rubber tree is found in tropical America from Mexico to Sao Paulo, in Africa from Mozambique to Madagascar, in southern India, Sri Lanka, and throughout Southeast Asia, the Philippines, Indonesia, and New Guinea. Commercial rubber plantations are found between 24 degrees north latitude in China to 25 degrees south latitude in the state of Sao Paulo, Brazil. The majority of the plantations are located between the equator and 16 degrees north or south latitude³⁶.



Photograph 5 Installed nurseries for the project area. Photos obtained by the project owner

Hevea brasiliensis is cultivated from sea level to 1.200 m in a range of temperatures between 20°C and 30°C, with 25°C being its optimal temperature. If temperatures are below 20°C or above 35°C, growth and production is noticeably affected. Precipitation should range from 1.800 mm to 2.500 mm and be well distributed throughout the year and without dry seasons or pronounced or prolonged heavy precipitation. Otherwise, tree growth and latex production can be delayed. Relative humidity should fluctuate between 70% and 90%. An average humidity of 50% can alter production by affecting levels of refoliation.

³⁶ Jurado & Pérez 2007

Trees should annually receive between 1.500 and 2.500 hours of sunshine. Less than an average of 1.200 hours per year can notably affect the content of dry rubber in the latex. Rubber trees should not be planted in areas with high winds given that stems break easily and adult plantations can suffer great losses. The slope of the ground should not be greater than 25%. It is ideal to have flat or slightly undulating soil that has a depth of 1–1.5 m, a sandy loam and clay loam texture, good capacity for retaining humidity, good drainage, and acidity (with a pH between 4.1 and 6.0)³⁷

2.3 Technology to be employed by the proposed VCS AR project

Seeds

Origin of the plant material

The plant material of rubber clones will initially come from nurseries or clonal gardens duly certified by the ICA. The Provider shall comply with ICA's 1478 resolution from 2006, related to the guidelines of production, distribution and marketing of vegetative propagation material of natural rubber.

The initial plant material shall be "stumps" (ground nursery grafted and uprooted trees whose stem and root have been trimmed to lengths from 25 to 30 cm) to be planted in plastic bags, forming a nursery from which a clonal garden will be established for *varetas porta yemas* production, intended for grafting patterns produced in nursery's bag from sexual seeds.



³⁷ Jurado & Pérez 2007.



Photograph 6 Seeds bank for the project. Plants located within the nurseries areas are grouped in order to improve plant development.

Nurseries

The nursery area is where the seedlings produced in the germinator are placed in order to produce rootstock (onto which the scions will be grafted). This area should be commodious enough to facilitate the work of the person who will do the grafting. The selection of the plot is closely related to the type of substrate that will be used in filling the bags. It is preferable to use a soil that contains at least 25% clay. Additionally, there should be easy access to a plentiful, constant supply of water. To prepare the soil for the nursery, it is passed with a chisel and harrow and a soil amendment (two tons of lime/ha and one ton of rock phosphate) is added according to soil analyses.

Once the site is selected and prepared, ditches are dug that are 30 cm wide, 25 cm deep, and 1m apart from each other and the path. The length of the ditches depends on the kind of management to be implemented and the conditions of the terrain (Figure 6).

The nursery uses polyethylene bags that are 40-45cm high, with a diameter of 16cm, and a thickness of 8/100mm. The bag system facilitates planting in the different lots of the plantation. The substrate should be kept with a very good level of humidity. It should also be loose in order to avoid problems with poorly formed roots. However, the substrate should be firm enough that the root ball does not fall apart when planted.

The nursery should be kept completely clean so that the plants develop well. In general, it should be cleaned every 7 to 10 days during the first two months, and subsequently it should be cleaned once a month. Manual weeding is necessary until the shoots become brown colored. In order to maintain the substrate humid, sprinkler irrigation should be used that provides 120mm of water each month during the dry season.

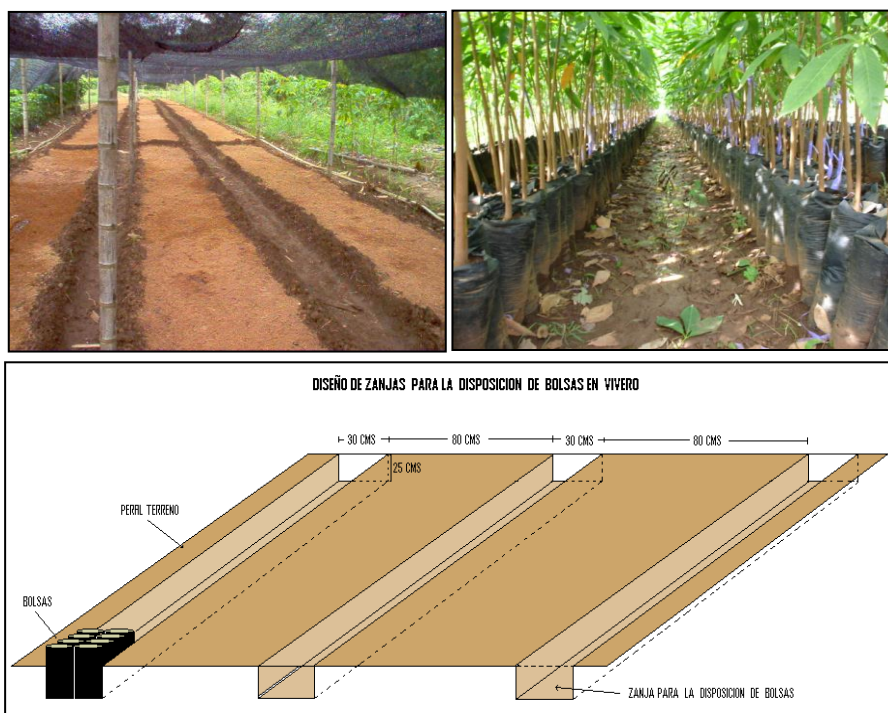


Figure 5 Design and nurseries management

Grafting

The common method for grafting *H. brasiliensis* is in a tongue shape graft, with a dormant bud or “window”. This is done by making two lateral incisions 1cm apart the shoot of the rootstock, and then another incision above the previous two that links them together. These incisions should be made 10-13cm above the ground on each shoot³⁸, and should be successively on approximately 50 rootstocks in order to allow the latex to drip before introducing the scion. A grafting knife, rag, tape for fastening, and a wooden box are used in this process. The rootstock should be 6-8 months old and 1.5cm in diameter at the base. The bark of the rootstock should be in a process of change color from green to brown.

Grafting should be carried out during dry periods, given that buds generally rot in the rainy season if the graft is not well fastened³⁹. Twenty days after grafting, the graft is uncovered to confirm that it has attached. The graft is considered definitely successful if the bud and the tissues that surround it are alive ten days after being unwrapped (Figure 7).

³⁸ RINCON, Ovidio. Agronomía y tecnología del caucho. 1985.

³⁹ NIETO, Manuel. Investigación Bibliográfica Sobre Caucho Natural (*Hevea sp.*). 1996.



Photograph 7 . Ruber plant, located in a nursery of the project

Establishing plantations

The plantations will be established according to a planting schedule presented in Table 8. Until 2013, 5.900 ha will be planted. Finally the remaining 3.800 will be planted between 2014 and 2015

The following activities will be carried out to establish the rubber plantations. This information was provided for the project owner

Planting design

Sowing density will be 555 trees per hectare set in lines spaced at 6 meters planting and trees will have a 3 meter distance of each other (6m x 3m). The distribution will be staggered type.

Planting lines will be oriented from north to south, ensuring that the maximum length of sawing continuous line (planning scratch and latex collection) is 300 meters. Planting lines will form blocks with dimensions of 800 meters from east to west and 300 meters from north to south. Normally, these dimensions make blocks of 24 hectares but according to the conditions of the surface, they may be adjusted.

The blocks will be separated by streets 10 meters wide from north to south or from east to west, which besides allowing traffic into the plantation, will define each block. In addition, there will be a main road 19 meters width, whose function will be allowing the transport flow of personnel, load, supplies, machinery or other required materials, and also acting as a central firewall barrier (Figure 8).

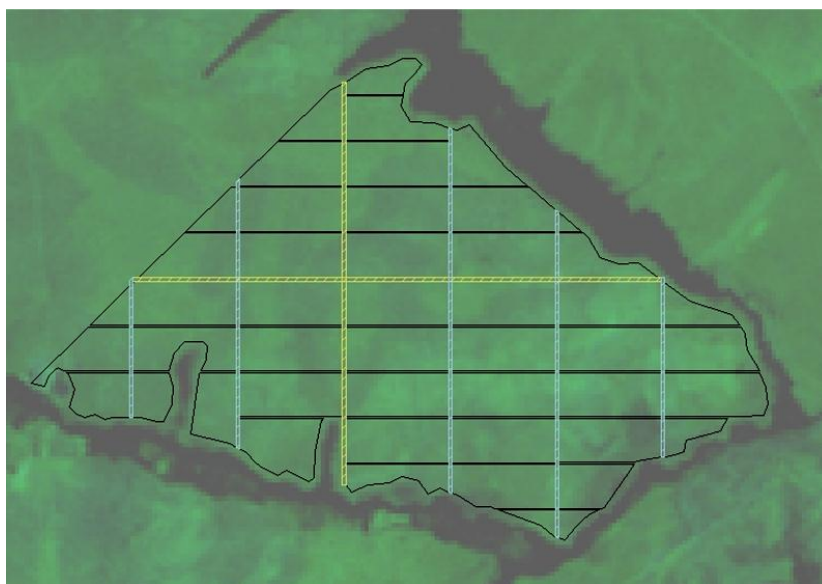


Figure 6 Planting design

Planting Outline

Distribution of clones

Monoclonal blocks will be formed (only one clone per sowing block), trying to form a checkerboard-type distribution. If possible, sideways and frontal adjacency in blocks of the same clone will be avoided (Figure 9).



Figure 7 Checkerboard-type distribution of clones in sowing blocks

To define the clones per block, aspects of incidence are considered, such as wind, slope, phreatich level, bioclimatic aspects that may impact positively or negatively on the development of the plantation and on the phytosanitary conditions. All this is made according to the characteristics of each clone.

Clones and its distribution in planting will be:

- FX3864: with 40% of the total plantation area
- RRIM600: with 40% of the total plantation area
- IAN873: with 18% of the total plantation area
- Other clones: Will occupy a surface of 2% and its main purpose will be helping in evaluation and research about their levels of adaptability to the region, production, development, etc.

Preparation work is carried out in a mechanized way by using tractors whose engine power range is between 65 HP and 106 HP. The tractors have been equipped with tools for agricultural use, specially adapted to the tasks described below:

Plotting planting: According to the set designs, field signaling and stakeout start in each part of plantation (pathways, planting blocks, infrastructure, etc.), adjusting to thematic mapping produced for this purpose. The field layout is supervised or controlled through the verification of predefined points by using GPS.

For field signaling, wooden stakes are used. They have an average length from 3 to 4 meters and a reflective element placed at the top for an easy viewing from a distance.

Rocería:

It consists of the removal of isolated trees and/or shrubs occasionally found in the planting area. This process is performed by controlling grasses and forbs in a manual or mechanized way, as well as using agrochemicals or combining the previous options.

Application for amendment:

The purpose of the amendment is to correct, improve and / or condition the soil's chemical characteristics with essential elements so that chemical and biochemical natural processes have place, improving aspects such as acidity (PH), percentage of base saturation, relationships between existing elements and the cation exchange capacity. Besides, it enables the plant root system to fulfill its nutritional functions.

From the physical-chemical analysis previously performed to the ground in specialized laboratories, corrective or chemical amendments are defined for being applied as needed in each case.

The amendment reflects a formulation made by experts and it is developed in specialized industrial plants for this purpose. The main components of the amendment include oxides and hydroxides of calcium, magnesium, sulfur, agricultural gypsum, phosphorus, silicon and other elements carefully mixed.

Depending on the planning of planting, the type of amendment, edafo-climatic factors or other logistics aspects, the amendment may be applied for prior periods ranging from 12 to two months before planting.

The application of the amendment to the floor is performed by using a mechanized tractor and *encaladoras* properly calibrated for dosage and accurate distribution of it. Initially, the amendment is applied only on the crop rows, forming bands or lanes with a width of 2 m and a length equal to the block (300 m as a standard length). A few months later, when the root system of the plants will require it, the soil of the streets formed between planting strips whose width is 4 m. will be amended.

Incorporating amendments and chiseling: As a part of the preparation processes, a three point chisel plow with an average depth of work on the ground of 45 cm will be used. This work is done on planting strips previously amended and aims to improve soil physical aspects, causing a "blow" inside to promote soil aeration processes, rupture of possible hardened layers, improvement of drainage conditions and incorporation of the applied amendment, etc.

Likewise, chiseling helps the subsequent "trenches" preparation process in the crop rows to be established in each of the rubber trees.

Planting

As part of the process of sawing, the following activities are implemented:

Trenching: By using a tractor and a plowing machine equipped for this purpose, in a mechanized way, a trench 30 cm wide x 50 cm deep and a length equal to the block (300 m to standard blocks) will be made. This trench is drawn on the seed line following the main "footprint" marked by the chisel plow.

Subsequently, rubber trees will be planted in this trench, with a 3 m distance from each other. The trench planting replaces the planting holes or pits.

With the methodology used in trench planting, seeding yields improves substantially over other manual and machining methods, additionally contributing to the amendment and substratum mixing (inclusion), stimulating aeration processes, getting loose soils and improving some drain aspects, especially in times of excessive rainfall.

Distribution of plant material

Once built the trenches and following the design and layout of the plantation, with the use of tractor, trailers and qualified personnel, nursery trees are transported and placed in each planting sites, from where they will be taken by the staff to be planted in the trench with accuracy.

Planting

Manually, trees are planted in the ditch, in strict compliance with technical parameters about location of the tree:

Planting distance: 3 meters from each other

Planting depth: the insertion point of the grafting resurgence on the tree's stem will remain at a planting depth of approximately one (1) inch below ground level.

Orientation of the grafting regrowth: the tree will be planted pointing the regrowth to north, which will create an effect of opposition to the prevailing direction of the winds in the region (they are shifted from the northeast to the southwest).

Formation of "bread of ground": when tree planting is going to have place, it must be carefully removed from the plastic bag, avoiding root damage and / or collapse of the "block" of land but if necessary, a light

pruning root can be made. The tree is located in the trench planting and a "bread of ground" of about one (1) meter on each side of the tree planted in the sense of the trench is formed.

Compaction of soil: air "bags" will be removed from the soil of the "bread of ground" by manual compaction around the newly planted tree.

Implementation of corrective planting site: in addition to the amendment mechanically applied to planting lines, it will be used 100 grams of amendment per tree, which will be dispersed and incorporated into the area of the "bread of ground" for planting each tree.

Signage: each planting line will be marked with stakes or something else than can identify them and their main data.

Trench covering: By using a tractor and a shovel or agricultural blade, the trench space between the "bread of ground" of adjacent planted trees is covered with ground. For this work is used the same ground that was previously removed by the plow machine before planting.

Plantation management

Pruning

Forming during the growth of the tree: is the removal of lateral branches. In this process, longitudinal growth of the tree in a single main stem or shank is attempted, making the necessary formation pruning to ensure there are not treetop ramifications on the shaft within 3 feet length measured from ground level. With this, there will be as a result a well-shaped cylindrical shaft, allowing scratching or bleeding activity during the production stage of the crop and making possible the use of commercial wood at the end of the turn. Pruning cuts are made with tools such as pruning scissors or similar, ensuring aseptic conditions and cicatrization after cuts.

Treetop formation: In order to increase the leaf area available for photosynthesis and physiological processes of the plant, the treetop formation will be induced from three meters height in each planting tree and the growth of 3-5 main branches inserted to the stem in a "staggered" alternate way, thereby preventing the formation of whorls, which represent risk of breakage due to high winds.

The treetop induction will be held by stimulating regrowth of buds through the not leaftalked of the foliar top floor that has reached a height of 3 meters. In addition, treetop-forming pruning can be made, trying to obtain a symmetrical distribution of the treetop on the main axis of the tree.

Phytosanitary pruning: branches with high presence or signs of disease that can be a source of infection for the tree or planting will be removed, as well as branches with mechanical physical damage which may represent greater risk of damage to the tree or to people passing by the crop.

Cleaning

It will be removed in a manual, machined or chemical way herbaceous or shrubby whose presence on the site is not required. The cleaning will have place in the streets and corridors of planting, avoiding prevent damage to rubber trees.

Among the hand tools are used machetes, small shovels, hoes and others; for machined cleaning, tractor; chemical control of "weeds" will be performed using motorized knapsack pumps with herbix-type engine (ultra low volume applications).

Coverage Management

In the streets formed by lines of planting, within plantation blocks, it will be established vegetative coverages formed by climber and invasive herbaceous legumes of the species *Mucuna deringianna*, *Mucuna bracteata* y *Pueraria ensiformis*. Such coverage will be established prior to the planting in the field or may also be established immediately after rubber planting. The coverage managing will correspond to nutritional agronomic and phytosanitary criteria, making permanent controls to prevent the rubber trees from the invasion of these climbing species, which can affect their development.

The growth of coverage legume species will be stimulated to form vegetable "mattresses" in the rubber planting, in order to obtain, for instance, the benefits below:

- They help to improve soil physical aspects since its roots work as a natural "drill".
- Contribute to setting and input of nitrogen to the soil.
- Participate in the soil phosphorus cycle, facilitating the assimilation of rubber plants.
- They give organic matter to the soil and promote the development of soil's beneficial microfauna and microflora.
- Protect the soil from the erosive effect of water and wind.
- Decrease the incidence of direct sunlight.

Periodically, it will be caused a mechanical change to the coverage foliage, resulting in similar proportions the root death and release of nitrogen in nitrifying nodules and enhancing the incorporation of organic matter to the soil.

Integrated Management of Pest and Diseases

Through a continuous monitoring scheme, there will be a surveillance aimed to prevent, detect or correct damage caused by pests and or diseases originated by pathogens. In any case, it will be procured to maintain levels of incident or damage below 3% on plantation total surface.

The products, dose and frequency of application are indicated in the Integrated Management of Pest and Disease Plan for natural rubber in *Fondo Capital Privado Valor Forestal* (FCPVF).

It will be used products such as fungicides, insecticides and biological control products as complement to cultural and agronomic practices for management of natural rubber plantations. Agronomic management proceedings for rubber plantation fall under the criteria of good agricultural practices.

The application of products or inputs for phytosanitary management and control will be made by foliar spray systems with hand and / or motorized pumps, tractor pumps, soil applications and, in general, the methods recommended by the product manufacturers.

Fertilization plan

It will be held in every block, line and tree planted. For carrying out this activity, the technician will assign the qualified personnel required for such activity under their responsibility. Fertilization can be foliar or edaphic using agro inputs provided by the Forestry Value Fund and following technical recommendations related to formulation, dosage and product management in general. It will be taken into account the incoming aspects:

- *Foliar Fertilization:* may be performed using manual back sprayers, motor back sprayers, sprayers operated by tractor and / or ultra low volume sprayers. For such activity it will be applied safety measures in handling of products recommended by manufacturers and also equipment provided by the Forestry Value Fund will be operated according to the instructions of each team. The ranges of application and other technical aspects will correspond to the provisions of the planting fertilization plan.
- *Soil's fertilization:* Consists in the application of granular, liquid or diluted nutrients directly to the ground, using procedures recommended by the manufacturers of the products. The timing, dose and other technical aspects related to soil's fertilization shall comply with the provisions of the planting fertilization plan.

Fire protection

A fire brigade will be formed by people linked to the different roles of the private capital fund of forestry value in plantation areas. The main objective of this brigade is to develop preventive or control activities of forest fire control in case they occur in plantations areas or close to them, as well as in machinery or equipment of FCPVF.

The main brigade will have 15 people from different work sections (tractor, nursery, field technicians, administrators and personnel of work in the field), who will be trained by organizations specialized in the field of forest fires and basic care in first aids, such as civil defense, volunteers firefighters and Red Cross from La Primavera municipality. People will also have the right equipment for fire control if they occur (protective suits, machinery, tools and fire equipment) and in addition, the other personnel that work in the plantation areas of FCPVF will receive basic instructions on procedures in case of fire, according to the plan for prevention and control of fires.

Among functions for prevention and / or control of the fire in charge of the fire fighter brigade of FCPVF, these are the most important:

- Identification of areas and potential risks
- Verification and monitoring to implementation of preventive measures such as built or natural firebreaks state, roads for access or evacuation in different planting areas or other facilities, status and location of firefighting equipment, communication channels, disclosure, periodic test of the equipment operation.
- Maintenance of water recharge areas for firefighting equipment (track, "intakes" and others)
- Training or periodic updating of the brigade staff on specific issues related to fire.
- Review and / or update of the fire plan.
- Fire control procedures (operation of machinery and equipment)
- Work in communications with the team and with care agencies specialized in evacuation, search, rescue and first aid.
- Support for the assessment of damage caused by a possible fire.
- Verification of eliminating risks of fire once the emergency has been controlled.

Latex use

The use of latex in planting will start upon fulfilment of the following minimum criteria:

- Stem's circumference or perimeter is at least 50 cm, measured at a height of 1 meter from the base of the trunk or graft insertion point (if visible).
- At least 50% of trees per hectare must meet the minimum perimeter.
- Crust thickness is at least 6 mm.

The opening of pike or scratching will start at the beginning of the rainy season and it will be avoided the use during the dry season or "summer". In general the use of latex will be developed under the following guidelines:

- System pike in a half spiral shape.
- V-shaped cutting
- Frequency in the 3d or 4d cut
- 6 or 7 working days a week
- Descending cutting direction
- 9-10 months of work per year

Stimulation methods may be used to increase the production of latex. However, this practice will be subject to verification of phytosanitary conditions in the plantation and particular characteristics of each clone.

Considering biological threat as the condition of natural, technological or human actions or activities that have destructive potential of causing undesirable consequences or serious damage on people, infrastructure or the environment. The identified threats are explained as follows:

Exogenous threats:

Damages generated for third parties

Damage generated by third parties are represented by the actions executed by people from outside the company, such as theft of items, acts of vandalism, encroachment of the company, burning of garbage, among others. These actions can occur at any stage of the project. The following threats have been identified for the Project:

Threat of terrorism and common crime or Sabotage.

Threats caused by natural phenomena

Landslides

In the study area denudational processes don't occur because the landform corresponds to a residual altillanura⁴⁰ with a drop of 0.11% and 0.15%. The ecosystems that may have some sort of chance of removal, are the Morichales. However, the project will not affect any of these ecosystems, since there is no kind of intervention planned in them.

Floodings

The top of the residual altillanura presents a high density of "falls" (subunit of wetland that tends to the ponding due to the contribution of rain), which get saturated during the rainy season causing waterlogging on roads. However there is not risk for buildings or people since there is low population density in the area and the existent is mainly localized at the highlands of the savannah.

Forest Fires/Wildfires

Fire prevention is extremely important, as it may affect the productive capacity of the rubber plantations, causing coagulation of latex in laticifers vessels of the cortex. One of the strategies to reduce the risk of forest fires, is hiring insurance that protect plantations of damage caused by fire, windstorms, lightning and other atmospheric phenomena.

Firewall barriers and weed control should be carried out at the beginning of the dry season. Workers training and coordination with neighbors is important for the prevention and control of fires.

In the area, fires occur in the open savannas where vegetation cover are natural pastures and low scrub, generated by the habitants of the region to monitor the development of natural regeneration areas that might invade interest areas of livestock and small scale agriculture. These fires are controlled, but

⁴⁰ The concept of altillanura refers to an altitudinal position versus other plains less high that are the Llanos Orientales. The separation of the two units occurs along the Meta River

sometimes cover extensive areas including morichales or gallery forests and as mentioned above this could represent a risk for the plantation. For this reason there should be implemented management and control measures to control potential events.

Endogenous threats:

Operational Accidents

In this group are associated threats related to operational accidents generated by technical failures or damage in the operating systems required for project activities susceptible to generate emergencies affecting staff, the community, the environment and / or the image of the company. Among these accidents there have been identified those related to operation of equipment or components and deficiencies in industry.

Vehicles and agricultural machinery-related accidents

There will be required continuous moving of vehicles for tillage, transport of personnel, materials and equipment, being able to present traffic accidents with loss of life and / or damage of infrastructure. These accidents can occur at high speeds due to overconfidence of drivers, poor mechanical condition of the vehicles, signaling deficiency, climate effects and poor condition of the roads.

Accidents at work

This item refers to accidents that affect the physical integrity of the field staff, including mutilations, fractures, injuries, shock, burns, electric shock, poisoning, etc. They may occur due to lack of training, coaching, lack of safety equipment, incompetence, neglect, etc. Threat and vulnerability variables are directly associated, as there are events whose threat might be low but at the same time vulnerable (eg the death of an operator), and also some of them are very likely to occur but with marginal or low vulnerability (cuts, scrapes, bruises mild, etc.).

Fire and / or explosion

The occurrence of explosions due to fuel storage can result in fire or explosion causing injury or loss of life, infrastructure damage and pollution of the area. The source of this event is given by the improper disposal and use of equipment, inadequate management of power plants or electrical conductive wires

Biological Accidents

Refers to insect, animal and snakes bites, among others.

Risk Assessment

As a result of the risk assessment for the activities of the project area, there were assessed threats attributed to external factors specifically related to damage caused by third parties due to terrorist actions.

In this case safety of all project participants is of paramount importance to FCPVF and was a key concern in designing the project. Private equity employs local residents to watch over the plantations and notify

local authorities immediately if any unauthorized persons are discovered on the plantation. Private equity has reached out to local military and local government police forces in all zones where project activities are being developed. These security forces have made it a priority to provide security on all plantations and have highlighted the importance of creating a secure environment for projects that create employment. Military units have advised Private equity to notify them whenever they visit plantations and keep them updated as to what activities are being carried out where so that they may provide security.

Regarding to operational accidents, this risk cannot be avoided by the company, however a Contingency Plan will be formulate and disseminate to the staff, with adequate preparation and training for proper reaction to reduce the potential impacts on the different elements. The threat identified as “vehicle accidents”, is considered as HIGH risk, specifically in the work fronts due to maneuvers of agricultural machinery in the road between the urban centers of La Primavera and Santa Rosalia located outside the project area.

Endogenous threats identified and defined as work accidents, landmines, biological accidents and fires and explosions, are considered as medium risk , however periodic training will be offer to the staff to adopt all the precautionary measures identified in the contingency plan in order to minimize these risks

Training on health and safety will be enhanced to increase awareness and to create an attitude in employees that make their health and safety their main concern. Posters and news media are also used to convey information about safety and health. Also among the safety requirements workers need to use protection equipment explained as follows:

Protective clothing

Given the nature of forestry work, is not always possible to adopt technical measures to prevent accidents. For this reason, protective clothing is still an important part of working with agrochemicals. The items required will depend on the harmful effects of agrochemicals and how these are used.

In practice, the information contained in the label supplied with the agrochemical usually specifies the level of protection required. Data about the quality of the various articles, such as the minimum thickness of the gloves or the material which they are made of, for example neoprene, nitrile or butyl, and the list of the elements for respiratory protection and necessary actions for their maintenance can be found on the labels or must be provided by the company to the workers.

Head protection

The head can be protected with a hooded mask. The advantage of such combined garment is that it ensures the protection of the neck and prevents agrochemicals spilled on the hood and soiled work clothes worn underneath. The head protection should cover all parts above the shoulders, with the exception of the face. The material used must be resistant to penetration of agrochemicals.

Eye and face protection

It is mandatory to wear a mask that covers the entire forehead and face up under the jaw to protect against accidental spills of hazardous liquids during opening or pouring the liquid. It is also important to wear goggles when handling smoky powders or granule

Respiratory protection

Respiratory protection masks can cover half the face, nose and mouth or the entire face, ie, nose, mouth and eyes. Its function is to prevent inhaling hazardous agrochemicals. A filtering mask removes the hazardous substances by absorption, adsorption or simple filtration. Filtration is effected by using a simple metal screen.

When highly hazardous agrochemicals, the air is filtered through a filter containing tube or other chemicals that absorb or adsorb the agrochemicals. In several countries good respirators masks are manufactured and they can be adapted to the national standards. However, the user must ensure that the respirator fits the nose and mouth and that has received sufficient information and instruction on its use and maintenance. The tubes must be renewed periodically and masks should be replaced regularly to ensure protection.

Protective gloves

They are required when handling concentrated agrochemicals, particularly pesticides. Gloves should be at least 0.4 mm thick, while retaining flexibility for simple manual tasks such as opening containers or changing nozzles. The type of glove for a particular activity depends on the agrochemical and the extent of the contact time. For example, there are gloves that cover the wrist to the conventional application of toxic pesticides, or gloves that reach to the elbow for handling pellets and gloves that extend up to the shoulder for dipping plants in pesticides.

Garments are personal and are used when handling agrochemicals. In this case include such items as shirts, pants, skirts, socks and shoes or boots.

Main requirements for the garments

- Be comfortable to allow free movement of the body;
- Being carried by the same person every day and not exchanged between individuals
- Be in good condition, sewn or mended when necessary, be clean and free of deposits of agrochemicals.
- Keep separate from protective clothing in order to avoid cross-contamination.

Exogenous threats attributed to flooding's, natural phenomena identified as landslides and forest fires are considered to have a risk of MEDIUM level to LOW, taking into account the physical characteristics of the area.

2.4 Measures to Maintain High Conservation Values (G3)

The only HCV identified in G1 is HCV1: Areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia). This is due to the fact that the project zone contains a wide variety of vulnerable, endangered and critically threatened species. One of the primary objectives of the project is to avoid deforestation of natural ecosystems that support the natural biodiversity of the region. In the baseline, the project area is grassland that support a much smaller variety of both flora and fauna. Forest plantation seeks to create better conditions than baseline that can help to support these species. The project is in line with the precautionary principle because the project activity does not imply a risk of reduction of biodiversity values. On the contrary, the conversion of pasture to forestland will increase the support for threatened species.

The measures to be adopted in order to diminish the impacts on biodiversity include the implementation of gradually tree clearing activities to facilitate the migration of animals, the creation of shelterbelts in waterways with native species and avoid burnings in the area.

The rubber reforestation project is conceived as a permanent sustainable forestry plantation with a 20 year rotational cycle and a crediting period is 40 years. However at the end of that crediting period is considering the possibility to continue with the plantation as a sustainable forestry project. with the continuance of the sustainable forestry plantation, the climate, community and biodiversity benefits will be maintained after the end of the project lifetime.

2.5 Project Financing (G3 & G4)

According to the Law 2175 of 2007, now Act 2555 of 2010 of the Ministry of Finance, various agents including stock brokerage firms are empowered to administer "Private Equity", a type of collective portfolio whose assets under management should be (2 / 3, at least) than traditional assets registered in the National Registry of Securities and Intermediaries.

Thanks to the experience that Profesionales de Bolsa (PF) has with private equity funds in Colombia, today this company has administered more than COP\$500.000.000.000 (USD\$280.000.000) in assets, reason that has improved the investment in the market of natural rubber and that's how borns the forest private equity fund. After analyse the current state of the rubber market at the national and international level, PF decide to invest in the rubber project in Colombia. However for the magnitude of the project the money that becomes from carbon revenues is considered a key element to guarantee the project implementation in the mid and long term.

2.6 Employment Opportunities and Worker Safety (G4)

One of the primary community objectives of the Project is to train local workers in skills sustainable forestry techniques and rubber plantation management and latex production. Those skills can help them maintain long term employment and contribute to sustainable development. All workers receive orientation before beginning their work. This training depends on their tasks, which vary from site

preparation, greenhouse work, transplanting, maintenance and harvesting. In any training the workers are instructed on workplace safety and correct use of machinery if necessary.

The capacity building activities carried out in La Primavera are targeted a wide range of groups and have a special focus on marginalized groups including women, the unemployed and those affected by the political conflict. These capacity building exercises span a wide range of topics in order to educate the community about the vast array of opportunities and resources that the project brings with it.

The goal is to provide the communities with the skills and knowledge to take advantage of these resources and develop viable economic alternatives to cattle ranching. the capacity building activities are targeted are those rural poor who have few economic opportunities and very little knowledge about sustainability and its economic alternatives. This is also the demographic that is most prone to cut down existing forest to practice small-scale subsistence agriculture on land that is not good agricultural land. For this reason they are the most important target population for these educational programs. Through these programs the Project Owner seeks to improve these families' economic capacity and at the same time prevent further deforestation.

On-the-job training

The training that workers on the plantations receive on the job is comprehensive. It includes all necessary information related to skills and strategies for rubber reforestation. This includes site preparation, greenhouse construction, germination, transplanting, maintenance, harvest and replanting. Workers are further instructed about the importance of sustainable management practice, the value of various ecosystem resources and the variety of flora and fauna that surrounding forest contains.

FCPVF⁴¹ actively employs women in their reforestation activities both in the field and in the office. In particular has found that female workers perform better than men as workers in the plant nurseries. FCPVF thus trains women in on-the-job training with the same skills as male workers.

The management plans in place is open for constant review and modification based on site-specific experience and the input of local workers, research institutions and other stakeholders. The management plans were developed based on local circumstances and are tailored to the needs of the site. All decisions about management plans are transparent and input from workers is always welcome. The technical manager, Juan Mancipe, welcomes the feedback and reports from his staff in the field so that management decisions can be adapted to the idiosyncracies of project plantation. Furthermore, Juan Mancipe visits each compartment frequently in order to be in touch with the proceedings in each individual area and to speak with employees at each site.

Both training and lessons learned on the job are designed to be passed on and accumulated. All project documentation both from the office and from the field is kept in archives in the central office of FCPVF in Bogotá. The primary manner to transmitting practical information is through the plantation manager and his technical staff who visit each plantation compartment frequently and disseminates lessons from other plantations. This team is responsible for organizing project archives and be sure that all information is stored.

⁴¹ Fondo Capital Privado Valor Forestal

The main actors of the project will be the ones located within the direct and indirect area of influence of the project. They will be involved in the various techniques of establishment and maintenance of nursery and plantations, and any adult person who is interested in the project will have the opportunity to demonstrate work skills.

2.7 Stakeholders (G3)

According to the Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects PART 1 – core guidance for project proponents (September 2011)⁴². CCB Criterion G1.5 indicates that it is necessary to differentiate local stakeholders according to their wealth or well-being (for example, by using a participatory wealth or well-being ranking method), ethnicity, gender, age, tenure, land use and/or livelihood interests (e.g., charcoal makers, pastoralists, non-timber forest product (NTFP) gatherers⁴³). In the case of the project, there is only one family close to the project area; no one is living inside of it. However the community surrounding the project was identified as the main group that will receive impact for the project implementation.

Stakeholder group representatives was selected according to the SBIA process in a Stakeholder Committee that could guarantee a balance between leadership. Considering this On the February 27th (2012) an invitation letter was generated containing the summary of the project and it was posted on the wall of the unique telephone exchange in the community. This place is characterized for being the most visited space in the project area. Additionally, different members of the community were invited face to face to guarantee their presence in the consultation activity (**section G 1.6 of CCBA third edition**).

- Representatives of the Community Action Board JAC
- Director of the College's Mission
- Mission College Students
- Police Inspector San Teodoro
- Community members of San Teodoro: in this group are the merchants.
- Members of communities in the municipality of La Primavera and Santa Rosalia.

On march 8th before the meeting scheduled for march 9th the invitation was repeated face to face to several members of the community in The inspection of San Teodoro with the aim of guarantee the success in the assistance.

Under this scenario, to present the project to the community identified , a summary document was generated which showed the name and characteristics of the project and the main impacts on social, economic and environmental that this is generating in the project area. Additionally simple billboards were developed with the key elements that should be taken into consideration at the meeting.

During the consultation, once the presentation developed by the engineer in charge of the project was finished (Juan Mancipe), questions about past initiatives related to working in partnership with rubber smallholders and the contribution of the project to improve the quality of life of the community were the

⁴² https://s3.amazonaws.com/CCBA/SBIA_Manual/SBIA_Part_1.pdf

⁴³ https://s3.amazonaws.com/CCBA/SBIA_Manual/SBIA_Part_1.pdf

main concerns of the attendees. Both questions were answered to the satisfaction of those present and in general terms it was explained that project will promote different kind of activities around the houses building, roads and employment that will benefit the whole community.

As a conclusion of the process, the community feels acceptance for the project and they recognize the benefits that it has for the improvement of their quality of life. Annex 1, presents the stakeholder report in local language (Spanish).

All stakeholders in attendance at the local stakeholder consultation were advised that the PDD would be available for public comment and at that time their input was sought out. And when the PDD is posted for public comment FCPVF will follow up with them in order to encourage their further participation.

Project Owner and technical supervisor Juan Mancipe will deal personally with all conflicts and grievances that arise during project planning and implementation. Complaints may be made either orally or in writing and all complaints will be treated with the utmost importance. FCPVF also resolve all conflicts through official channels of local government, the Police Inspector, Environmental authority or local courts.

CM 3.1, 3.2, 3.3 In addition to this, no other stakeholder groups were identified, then there are not any kind of potential positive or negative impacts that the project activities are likely to cause on their well-being.

2.8 Commercially Sensitive Information

No sensitive information has been generated and/or excluded from the public version of the project

2.9 Compliance with Laws, Statutes, Property Rights and Other Regulatory Frameworks (G4 & G5)

Submit a list of all relevant laws and regulations covering worker's rights in the host country. Describe how the project will 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

According to the laws of contract, each person has its individual employment contract where as contractor has the duty of paying its own social security against the risks of sickness and accident, in addition to financial compensation for the work performed by the worker.

Every worker has the right to receive job training and it must be provided by the employer in order to raise the standard of living and productivity, according to the programs formulated by mutual agreement between the employee and the employer.

The project complies with international rules and standards on workers' rights. Situations and occupations that pose a substantial risk to worker safety have been assessed and have been communicated to the staff involved as well as the safety measures that should be taken. For each activity carried out on the plantations, FCPVF provides training and all necessary safety equipment with particular attention to the following areas:

- Sanitary considerations
- Protective gears as specified for the different activities
- Training of workers and staff on safety precautions.

The company is committed to meet local and regional legal requirements. Fair wages shall be paid in accordance with Colombian law and on time. Capacitation activities are administered to all employees as well as to other community groups on different issues pertaining to plantation protocols regarding as fire protection, no grazing in the project area, protection of biodiversity against fire, soil and water conservation practices etc.

Submit a list of all relevant national and local laws³⁰ and regulations in the host country and all applicable international treaties and agreements. Provide assurance that the project will comply with these and, where relevant, demonstrate how compliance is achieved.

A national forest policy was espoused by national planning document *CONPES 2834, 1996* to be developed within the Environmental Policy framework. Given that the policy is strictly conservationist, the forestry industry has expressed the need to refresh it and to give more attention and guidelines to commercial forestry as a means to rural sustainable development and to combat poverty. Moreover, the state lacks a policy to govern of commercial forestry, with total clarity in the rules for the private investor is equally felt (Acosta 2004⁴⁴). A more productive approach was adopted in 2000 under the National Forestry Development Plan. To implement this plan, there were some limited resources available to improve the competitiveness of the productive forest through research and development, but no funds were allocated for reforestation activities.

Colombian forestry legislation provides incentives to commercial reforestation through the Forestry

⁴⁴ Acosta, 2004. Estudio de tendencias y perspectivas del Sector Forestal en América Latina Documento de Trabajo.

Incentive Certificate (CIF) under Law 139 of 1994. However, the impact of this incentive has not been significant and effective in its aim to promote reforestation, due to high transaction costs and fact that the effectiveness of the incentive depends mainly on the availability of budgetary resources⁴⁵. When national fiscal resources become scarce, the CIF is often not funded due to other priorities.

Document that the project has, or expects to secure, approval from the appropriate authorities

Domestic law does not require any special licenses or permits to plant a forest. There is an Internal Environmental Impact Assessment developed by PO with the aim to identify the Project impacts and management strategies.

2.10 Evidence of Right of Use (G5)

Demonstrate that the project proponents have clear, uncontested title to the carbon rights, or provide legal documentation demonstrating that the project is undertaken on behalf of the carbon owners with their full consent.

FCPVF is the only owner of the carbon rights.

2.11 Emissions Trading Programs and Other Binding Limits (CL1)

The emission reductions or removals will not be used for compliance with another emissions trading program.

2.12 Participation under Other GHG Programs (CL1)

The project has not been registered under any other GHG program and is not seeking a second registration in the future

2.13 Other Forms of Environmental Credit (CL1)

The project has no intends to generate other forms of GHG related credits for emissions reductions or removals under the VCS program

2.14 Projects Rejected by Other GHG Programs (CL1)

The project has not been rejected by other GHG programs as it is not participating in any other GHG program

⁴⁵ (Aldana 2004).

2.15 Respect for Rights and No Involuntary Relocation (G5)

The stakeholders involved with the project as well as the communities and any other parties affected by the project activities were informed prior to the planting starting date and the results of such consultation are expressed on section 2.7. It is important to mention that the influence area of the project has a very low population density hence no voluntary or involuntary relocation will be needed.

2.16 Illegal Activities and Project Benefits (G5)

Within project area have not been identified illegal activities. However, historically, this region has been an area dominated and used as a corridor for various subversive groups, principally the Revolutionary Armed Forces of Colombia and the National Liberation Army, which in the midst of war strategy have had recurring clashes with the national army with the aim of obtaining the political and military dominance of the region. Currently the institutional policy of the national government at the head of the military forces, has recovered the territory that now is free of illicit crops and armed groups acting outside the law.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Methodology applied: AR-ACM0003. Afforestation and reforestation of lands except wetlands. Version 01.0.0⁴⁶

3.2 Applicability of Methodology

This methodology is applicable under the following conditions:

- a) The land subject to the project activity does not fall into the wetland category.

The project complies with this condition. The land cover in the project area is degraded pasture. Without intervention, it is expected that this cover would remain or that it would be partially reforested at a rate of reforestation that has been commonly observed in the periods prior to the VCS proposal mainly because the socio-economic conditions that created them are still and will continue to be present. A multi-temporal assessment of land use changes, using satellite images, was developed, in order to prove the state of land cover until 2011. These grasslands have been degraded by the ranching activity that traditionally has taken place in the entire Orinoco region⁴⁷.

In the specific case of the department of Vichada the soils are of sedimentary origin and have undergone various weathering processes. Aided by the tropical climate, these weathering processes have

⁴⁶ <https://cdm.unfccc.int/methodologies/DB/WB63WYT7LKF8N6V0A3YXXI8GCP2J3>

⁴⁷ Plan de Ordenamiento Territorial municipio La Primavera

intensively washed away minerals and nutrients, resulting in poor soils. In terms of their physical characteristics, the soils have good internal drainage due to their clay loam and sandy loam texture and their loose and porous granular structure. They have a low organic material content, and likewise contain low concentrations of magnesium, phosphorous, and potassium⁴⁸.

Considering these physical characteristics, as well as the great extension of savannas that contrast with the forest remnants (principally gallery forest), and the extensive ranching throughout the region, it is improbable that the soils will recover and that forest cover will naturally reestablish itself in these areas. The grazing and fire that has affected the land for many years impedes the natural regeneration of the forest.

- b) Encroachment of natural tree vegetation that leads to the establishment of forests according to the host country definition of forest for VCS purposes is not expected to occur.

The project complies with this condition. In project area forests occur in some areas close to the plantation. Gallery forests are evergreen forests that form corridors along rivers or wetlands and project into landscapes that are otherwise only sparsely covered with trees, such as savannas, grasslands or deserts. Gallery forests are able to exist where the surrounding landscape does not support forests. The project takes place in a savannah area where the natural conditions cause almost no forest cover. The practice of using fire is related to the renewal of pastures for cattle ranching. In many cases, fires occur naturally and are part of the natural process of plant succession⁴⁹. Burning prevents the accumulation of biomass in the soil and frees nutrients.

It is not expected that the growth of natural tree vegetation will lead to the development of a forest as per the definition adopted by the country in which the project is implemented.⁵⁰ Native savannahs of the Colombian high plains are very ancient. Thus, it is probable that the biomass of the native vegetation varies around an average, maintaining a certain dynamic equilibrium. Additionally Between 2000 and 2009 more than 5000 fire events were registered in Vichada's department (Figure 8)

⁴⁸ De la Espriella, R., Flórez, R., Galvis, J., González, C.F., Mariño, J. y Pinto, H. 1990. Geología Regional del Norte de la Comisaría del Vichada. Geología Colombiana, 17: 93-106.

⁴⁹ (Pérez *et al.* 2009).

⁵⁰ Rippstein, G., E. Amézquita, G. Escobar and C. Grollier. 2001. Condiciones naturales de la sabana. *En*: G. Rippstein, G. Escobar y F. Motta (Eds.). Agroecología y biodiversidad de las sabanas en los Llanos Orientales de Colombia. pp: 198-222. Centro Internacional de Agricultura Tropical.



Figure 8 Fire events between 2000 and 2009 in Colombia

Therefore, according to the baseline scenario there is no expectation that natural vegetation will become established and subsequently set in motion successional and regeneration processes that lead to the development of a forest.

c) Soil disturbance attributable to the afforestation and reforestation (A/R) VCS project activity does not cover more than 10 per cent of area in each of the following types of land, when these lands are included within the project boundary:

- (i) Land containing organic soils.
- (ii) Land which, in the baseline, is subjected to land-use and management practices and receives inputs listed in appendices 1 and 2 to this methodology.

The proposed project activity does not take place on organic soils. In the absence of the project activity, the baseline is expected to remain unmanaged grasslands. Such grasslands under tropical conditions have less soil carbon compared to plantations. Therefore, not accounting for soil organic carbon is a conservative approach for the project case as it is expected to increase less in the absence of the project activity relative to the baseline.

In addition to this, in the project area the weathering processes have intensively washed away minerals and nutrients, resulting in poor soils. They have a low organic material content, and likewise contain low concentrations of magnesium, phosphorous, and potassium⁵¹

⁵¹ (CONIF *et al.* 1998).

3.3 Methodology Deviations

There is no methodology deviation.

3.4 Project Boundary (G1)

According to the Methodology the “project boundary” geographically delineates the afforestation or reforestation project activity under the control of the project participants (PPs). The VCS project activity may contain more than one discrete area of land. Please refer to section 1.2 Table 1 for further details on coordinates of compartments selected as part of the project area.

Project areas are only eligible if the area had not been a forest for 10 years prior to the project start or since the 1st of January 1990. This criterion must be proven by ground-truthing, satellite images, aerial photographs, official maps or land-use records.

LandSat satellite images were used that cover the area of interest (Figure 9). The LandSat satellite images used are:

LandSat (Path 5) (Row 57) of 1988 (etp005r57_4t19880113)
 LandSat (Path 5) (Row 56) of 2011 (LF0557_050211).

The Landsat Thematic Mapper (TM) is a sensor carried on board Landsat 4-5 and has acquired images of the Earth nearly continuously from July 1982 to the present, with a 16-day repeat cycle. Landsat TM image data consist of seven spectral bands (band designations) with a spatial resolution of 30 meters for bands 1 to 5 and band 7. Spatial resolution for band 6 (thermal infrared) is 120 meters, but band 6 data are oversampled to 30 meter pixel size. The 1988 land eligibility segment was conducted using imagery from the Landsat TM sensor.

The Enhanced Thematic Mapper Plus (ETM+) instrument is a fixed “whisk-broom”, eight-band, multispectral scanning radiometer capable of providing high-resolution imaging information of the Earth's surface. The Landsat ETM+ has been providing imagery since April 1999 but suffered a sensory failure in May 2003, which resulted in data gaps or the loss of approximately 25% of the data within each scene. Each ETM+ scene has an Instantaneous spatial resolution of 30 meters in bands 1-5 and 7 while band 6 has a spatial resolution of 60 meters and the panchromatic band 8 has a spatial resolution of 15 meters. Landsat 7 collects data in accordance with the World Wide Reference System, which has catalogued the world's land mass into 57,784 scenes, each 183 km wide by 170 km long. The 2011 land eligibility segment was conducted using imagery from the Landsat ETM+ sensor.

Methodology

The land eligibility assessment is comprised of two segments: —1988 and 2011—. The LandSat images used were: LandSat (Path 5) (Row 57) of 1988 and Landsat (Path 5) (Row 57) of 2011 Eligibility analysis was performed for all compartments purchased. These compartments represent a total area of 9.690,74 hectares in the map.

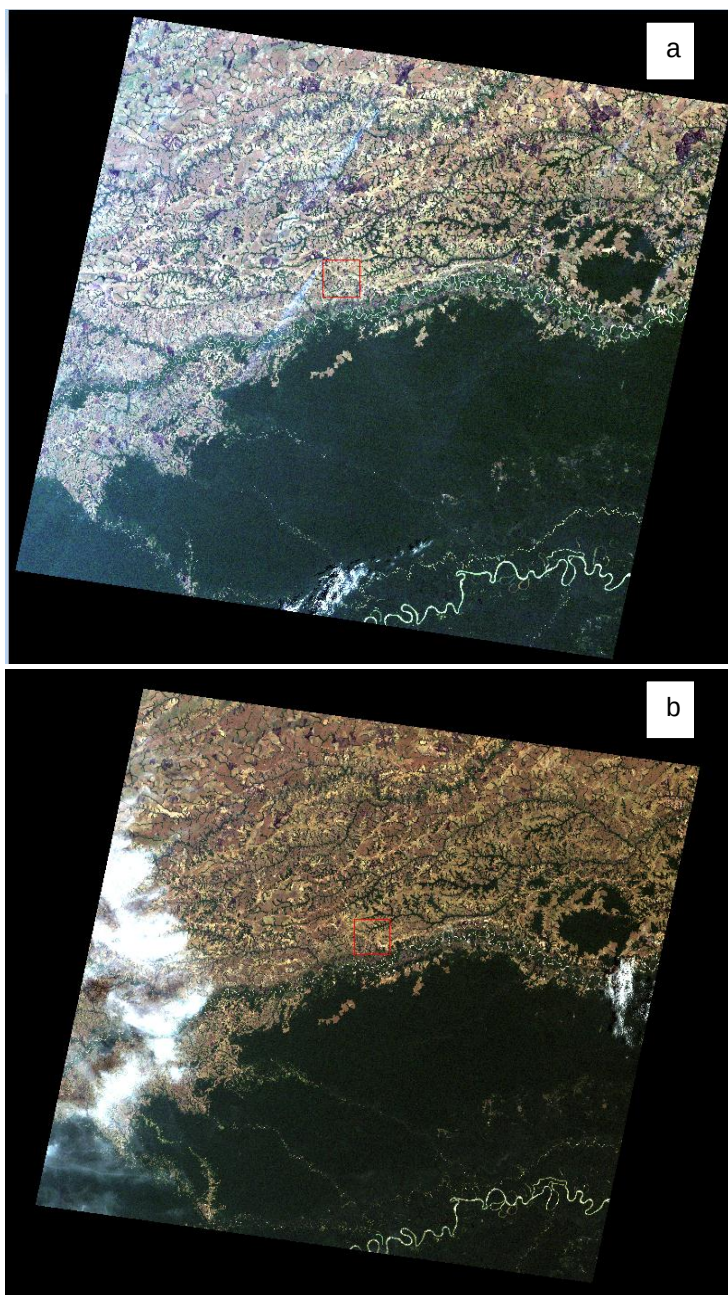


Figure 9 LandSat Satellite Images used in the eligibility evaluation (image bands composition 3,2,1) in year (a) 1988 and (b) 2011. Total area evaluated: 8,010 ha.

Project starts: Assessment of Area-year 2011

The LandSat Image available for 2011(LF0557_050211) displays the characteristics of Land Use Coverage of the region.

The images were classified using the ENVI Spectral Processing Exploitation and Analysis Resource (SPEAR) Tools, automate many common image processing tasks into workflows. The workflow of extracting features is the combined process of segmenting an image into regions of pixels, computing attributes for each region to create objects, and then classifying the objects (with rule-based or supervised classification) based on those attributes, to extract features .

The workflow consists of two primary steps: Find objects and extract features. The find objects task consists of segmentation and object generation, then the image classification. The image classification component consists of supervised or rule-based classification prior to exporting results to shapefiles and/or raster images .

Supervised classification can be used to cluster pixels in a dataset into classes corresponding to user defined training classes. In this classification were selected training areas for use as the basis for classification. Various comparison methods are then used to determine if a specific pixel qualifies as a class member. In our project case Maximum Likelihood method was used to select training areas also known as regions of interest (ROIs): Forest, non forest and no data.

In our case, we used the SPEAR TERCAT Workflow tool that produces a terrain classification by automatically grouping pixels with similar spectral properties into classes These classes were user-defined. The TERCAT tool provides all of the standard ENVI classification algorithms, plus an additional algorithm called Winner Takes All. This is a voting method that classifies pixels based on the majority compiled from all of the other classification methods that were conducted. Finally the best classification algorithm was selected according to the confusion matrix analysis.

The land uses identified in the vegetation map for each year, are: Gallery Forests (as Forest), Savannas (as non Forest)) (Figure 10 and Figure 11). After considering the UNFCCC and the OCMCC definitions of forest, it was determined that the areas which presented Gallery Forest, coverage in 2011, in each of the compartment tested, would not be considered as potentially eligible areas and classified as forest, while the Land Uses of savannas classified as non forest are considered to be eligible. Table 12 lists Land Uses and the percentage for each one of the Land Use Coverages, found in each compartments. The raster images from 1988 and 2011 were converted to vector form to facilitate comparison. From the land cover assessment, a land cover map and a forest non forest cover map were generated from the project area for both (Figure 12 and Figure 13)

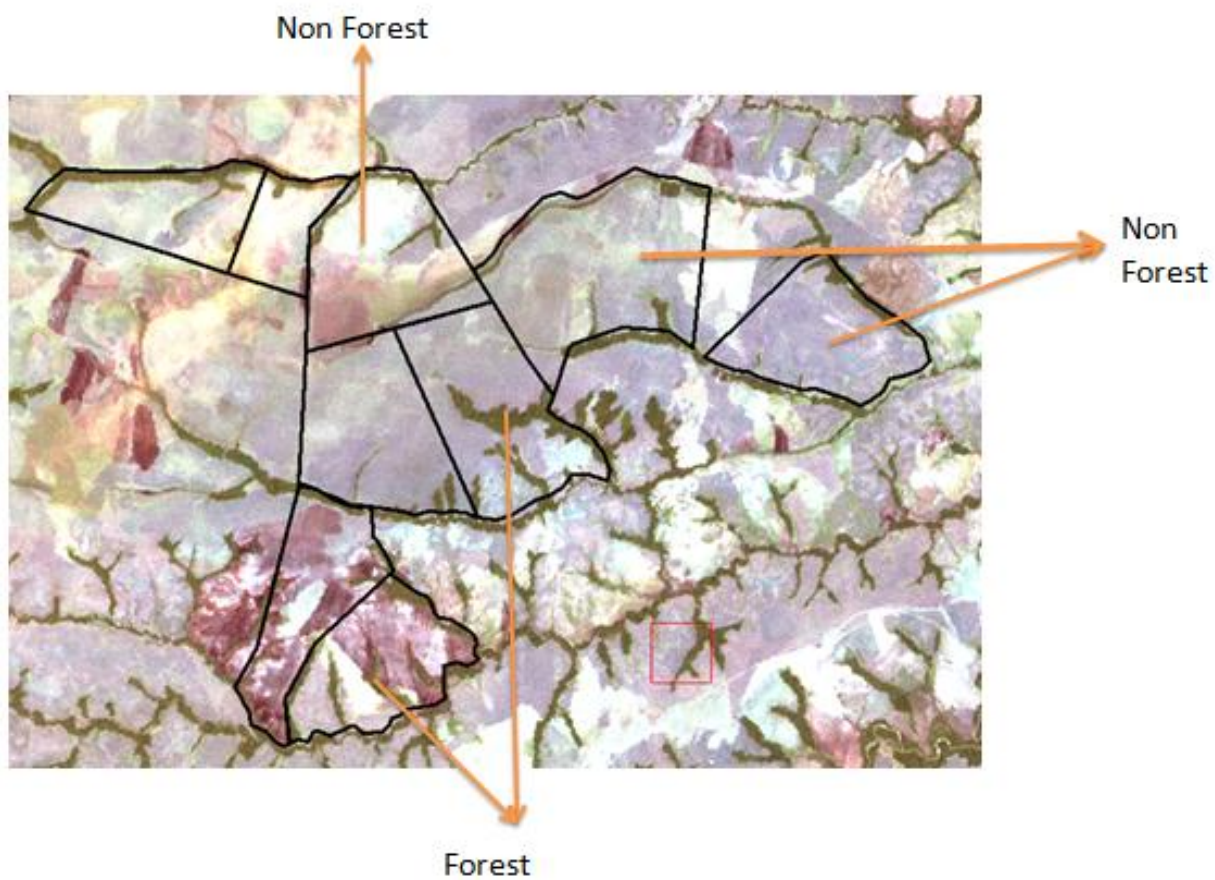


Figure 10 Land cover in the project area. Year 1988

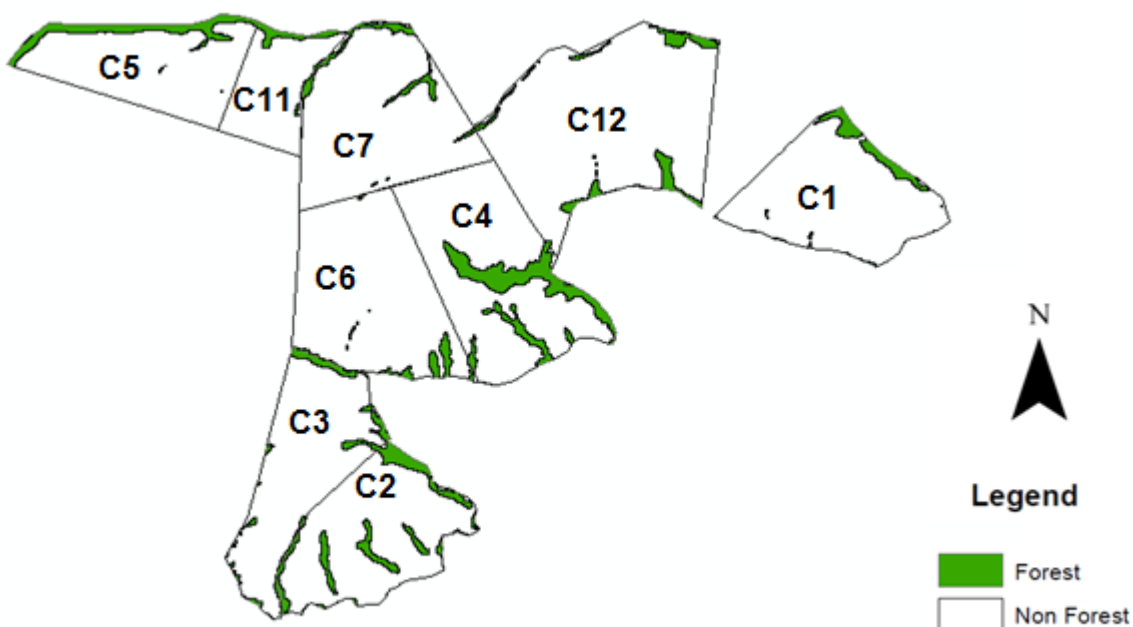


Figure 11 Forest non forest classification for the project area in year 1988. La Herencia (C1), La Ermita (C2), San José (C3), La Daniela (C4), Matalarga (C5), La Pamela (C6), Santamaría (C7), Granfuturo (C11), Cimarrón4(C12)

Table 12. Eligible areas of non forest in the project area for year 1988. In this year 8.896,4 ha was eligible with a forest cover of 794,34 ha

Project area	Compartment number	Area	Non Forest (ha)	Forest (ha)
La Herencia	1	998,47	936,,3	62,04
La Ermita	2	1.005,2	874,44	130,76
San José	3	951,5	883,55	67,95
La Daniela	4	1.310,41	1.109,74	200,68
Matalarga	5	864,46	751,16	113,30
La Pamela	6	1.206,22	1.158,80	47,42
Santamaría	7	1.191,07	1.137,18	53,89
Granfuturo	11	450,02	416,50	33,52
Cimarrón 4	12	1.713,39	1.628,61	84,78
Total		9.690,74	8.896,4	794,34

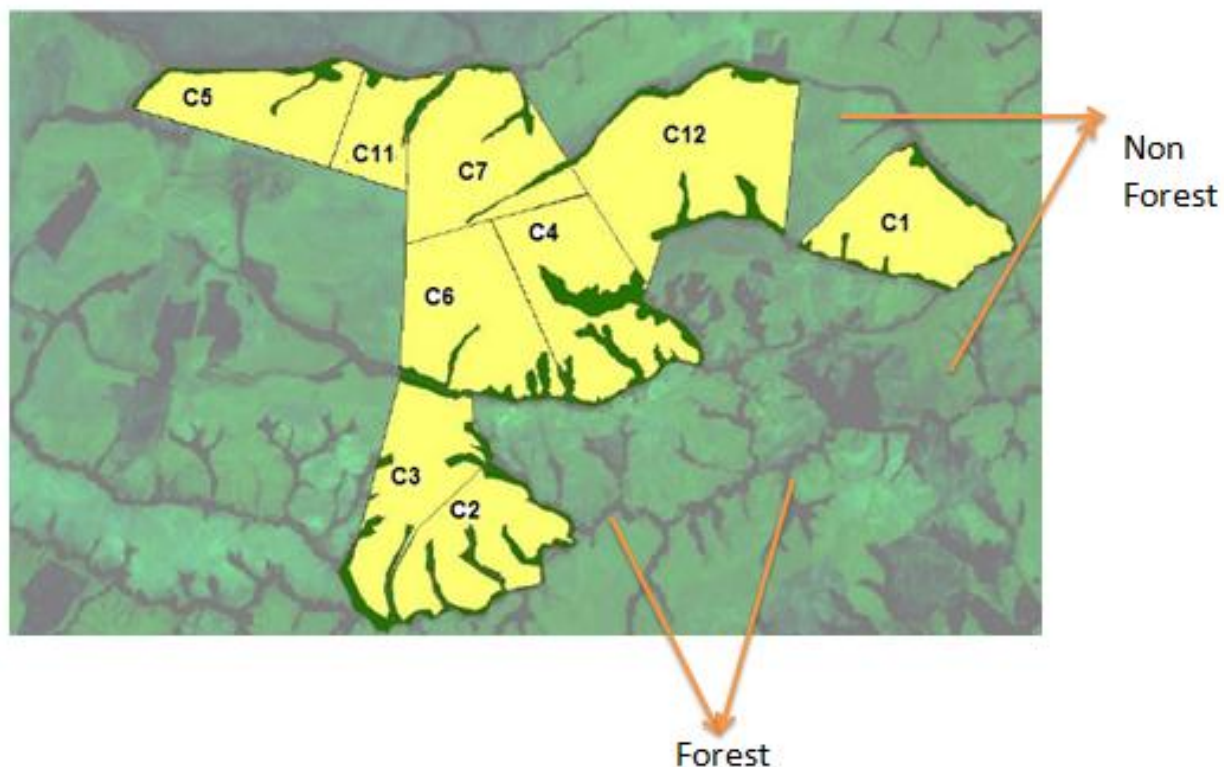


Figure 12 Land cover in the project area. Year 1988

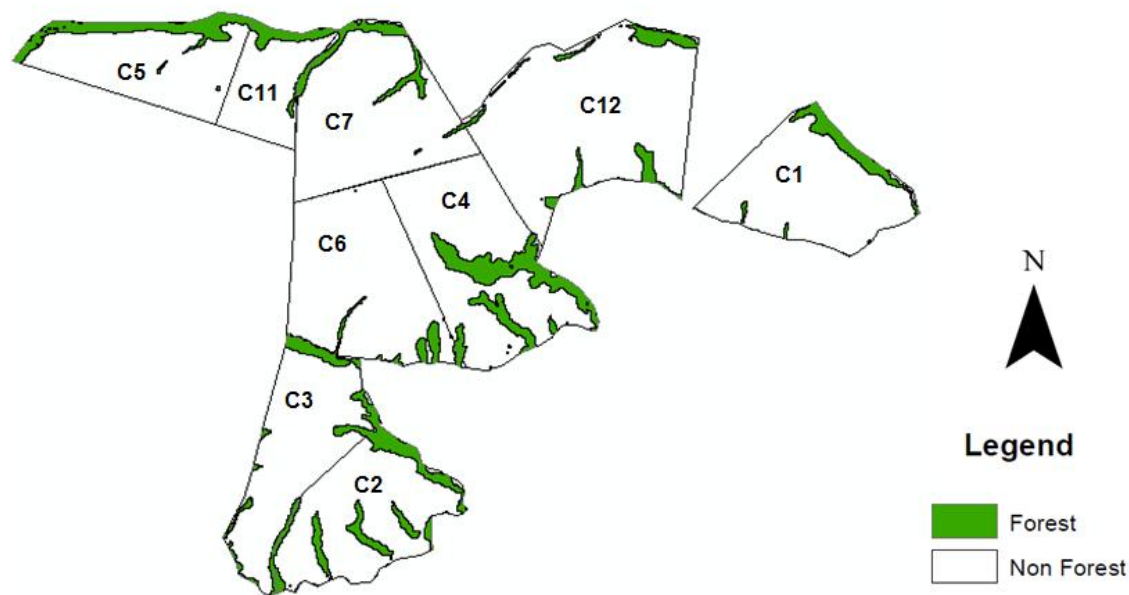


Figure 13 Forest non forest classification for the project area in year 2011. La Herencia (C1), La Ermita (C2), San José (C3), La Daniela (C4), Matalarga (C5), La Pamela (C6), Santamaría (C7), Granfuturo (C11), Cimarrón4(C12)

Table 13 shows the eligible area for year 2011 on the lands already purchased. A total of 8.589,9 ha are suitable to develop the reforestation process. The remaining 1.410,1 ha are in the process of being defined and purchased. An additional eligibility analysis should be developed on these areas.

Table 13 Eligible areas of non forest in the project area for year 2011. A total of 8.589,9 ha are eligible for the project reforestation process

Project area	Compartment number	Area	Non Forest (ha)	Forest (ha)
La Herencia	1	998,47	906,09	92,38
La Ermita	2	1.005,2	827,67	177,53
San José	3	951,5	840,78	110,72
La Daniela	4	1.310,41	1064,67	245,74
Matalarga	5	864,46	705,89	158,57
La Pamela	6	1.206,22	1.149,08	57,14
Santamaría	7	1.191,07	1.100,20	90,87
Granfuturo	11	450,02	389,38	60,64
Cimarrón 4	12	1.713,39	1.606,14	107,25
Total		9.690,74	8.589,9	1.100,84

An increase of 306,5 ha of forest was identified in the project area between the time period analyzed. These results reflect the regeneration process occurred in areas that were deforested for livestock grazing activities until year 1988. After that probably because of political conflict these areas could return to their original forest land cover.

All data are available upon request.

3.5 Baseline Scenario (G2)

The land within the project boundary is defined as grassland. As a result of the multi-temporal land use change analysis, developed using satellite images, the land proposed for the forestry activity (eligible area) was found in more than 90% as natural savannas 23 years prior to the project start date (see section 3.4)

3.6 Additionality (G2)

STEP 0. Preliminary screening based on the starting date of the A/R project activity

The land within the project boundary is degraded grassland. As a result of the multi-temporal land use change analysis developed by using satellite images, the land proposed for the forestry activity (eligible area) was found, in more than 90% of the area, as natural savannas 23 years prior to the project start date (please see section 1.13).

The project activity started in December 20, 2010 (first soil preparation). Income from carbon sequestration is mentioned in the company presentations to the investors and potential investors since October 2010, before the first contracts were signed with investors. Initially the project considered to be participating in the CDM instead of the VCS process; therefore a letter of intentions was sent to the Colombian DNA on September 9 of 2011. The documents are available to the auditor upon request.

Step 1: Identification of alternative scenarios

Step 1a: Define alternative scenarios to the proposed VCS project activity.

The identified alternative land uses in absence of the VCS forestry proposal are:

Cattle farming

According to Rubio⁵², the Orinoco has 7.2% of the country's agricultural land, of which only 2.2% is being used; most of the land with agricultural potential of this region is used for cattle farming. Extensive cattle farming is the most widespread form of land use in the entire Orinoco region, and the department of Vichada has more than 135'000 heads of cattle, with an average of 10 ha per head of cattle.

The beef cattle's farming has been a historical adaptation to the communities' culture and to the conditions of regional ecosystems. Cattle's farming is done by 90% on land with that kind of vocation, while cultivated areas occupy 32% of the land with agricultural potential. In 2008, 9.75 million hectares held a stock of 5.727.131 cattle heads, in the region equivalent to 21,3% of the national total (26.877.824 head).

Additionally there is the presence of strong national programs to promote cattle farming in the region⁵³. Through its national office and its Orinoco branch, the Colombian Federation of Cattle Ranchers (Fedegan) promotes a modern and entrepreneurial vision of efficient land use.

Based on calculations deduced from DANE about the production value and its value-added component, it is estimated that cattle farming involved with just under 3.6% of national Gross Domestic Product (GDP), a significant percentage for an individual activity and especially for a rural activity in the country. Within the agricultural sector and its relative importance is 27% of agricultural GDP and 64% of livestock related GDP⁵⁴.

Palm Oil

Colombia is the fifth largest producer of oil palm in the world, having a planted area of ~360.500 ha and annual production of ~802.000 tons of crude palm oil (CPO) in 2010⁵⁵. The Colombian government has recently identified palm oil as a key economic sector and a priority for national agricultural development and the country's biofuel program⁵⁶. The Colombian palm-oil farmers association⁵⁷ plans to maintain

⁵² Quoted by Informe Contraloría General de la República 2002

⁵³ Departamento Nacional de Planeación-Colombia. 2005. HACIA UNA COLOMBIAEQUITATIVA E INCLUYENTE. Informe de Colombia Objetivos de Desarrollo del Milenio. http://www.pnud.org.co/img_upload/9056f18133669868e1cc381983d50faa/introduccion.pdf

⁵⁴ http://portal.fedegan.org.co/Documentos/pega_2019.pdf

⁵⁵ Fedepalma. (2010). Statistical yearbook 2010. Federacion Nacional de Cultivadores de Palma (Fedepalma), Bogota. Cited by Garcia-Ulloa, J., Sloan, S., Pacheco, P., Ghazoul, J. & Koh, L. P. Lowering environmental costs of oil-palm expansion in Colombia. Conservation Letters (2012). doi:10.1111/j.1755-263X.2012.00254.x

⁵⁶ MADR. (2008). Agriculture prospects: first semester 2008 (Perspectivas agropecuarias: primer semestre de 2008). Ministerio

Colombia's position as the largest palm-oil producer in South America by increasing annual CPO production sixfold to ~3.5 Mt by 2020⁵⁸

According to the environmental assessment of the palm oil for biodiesel production in Colombia, developed by the Faculty of Economics of the University of Antioquia in 2009, the project area was within areas classified as suitable for the establishment of oil palm cultivation⁵⁹. The project area is located in the eastern part of Colombia. This area has about 452'305 hectares suitable for palm, divided into three departments: Guaviare (3%), Meta (70%) and Vichada (27%)⁶⁰. Palm oil is the fastest expanding crop in Colombia⁶¹. The palm oil sector considers the Orinoco to be a region with great potential for expanding palm oil cultivation. Therefore Orinoco provides already approximately 30% of national biodiesel production⁶².

In addition, the national government has offered a policy of subsidies aimed at increasing palm oil production and exports and serving the national and international biodiesel market⁶³.

Forest plantations of non-native species (without being registered as a carbon project)

For over 30 years, there have been trials of forest plantations in the high plains, but until now only very few, mainly non-native, species have been promoted in the country such as *Eucalyptus pellita*, *E. tereticornis*, *Pinus caribea*, *Pinus oocarpa*, and *Anacardium occidentale*⁶⁴.

In terms of monoculture plantations, the Colombian government is expecting that more than one million hectares will be planted in 2014⁶⁵. In the case of forest plantations, according to the Ministry of Commerce, Industry and Tourism of Colombia there are 17 millions of hectares suitable for forestry plantations establishment distributed in different regions of the country. Vichada has 467.834 ha suitable without biophysical limitations and 2.128.105 ha with minor ones for eucalyptus and pine species⁶⁶. The

de Agricultura y Desarrollo Rural, República de Colombia. Cited by Garcia-Ulloa, J., Sloan, S., Pacheco, P., Ghazoul, J. & Koh, L. P. Lowering environmental costs of oil-palm expansion in Colombia. Conservation Letters (2012). doi:10.1111/j.1755-263X.2012.00254.x

⁵⁷ Fedepalma. (2010). Statistical yearbook 2010. Federacion Nacional de Cultivadores de Palma (Fedepalma), Bogota. Cited by Garcia-Ulloa, J., Sloan, S., Pacheco, P., Ghazoul, J. & Koh, L. P. Lowering environmental costs of oil-palm expansion in Colombia. Conservation Letters (2012). doi:10.1111/j.1755-263X.2012.00254.x

⁵⁸ see <http://www.fedepalma.org/vision.htm>, accessed 16 March 2012.

⁵⁹ Mauricio Alviar Ramírez. Decano Facultad de Ciencias Económicas. Universidad de Antioquia. 2009. III SEMINARIO REGIONAL CONALPE ECONOMIA AMBIENTAL: BIOCOMBUSTIBLES Y DESARROLLO SOSTENIBLE. Análisis ambiental de la producción de palma de aceite para biodiesel en Colombia

⁶⁰ III Seminario Regional CONALPE.2009. Economía ambiental: Biocombustibles y desarrollo sostenible. http://www.google.com.co/search?hl=es&site=&source=hp&q=III+Seminario+Regional+CONALPE.2009.+Economia+ambiental%3A+Biocombustibles+y+desarrollo+sostenible&og=III+Seminario+Regional+CONALPE.2009.+Economia+ambiental%3A+Biocombustibles+y+desarrollo+sostenible&aq=f&aql=&gs_l=hp.3...563796.563796.0.564401.1.1.0.0.0.294.294.2-1.1.0...0.0.SQhgsHfU31c

⁶¹ Federación Nacional de Cultivadores de Aceite de Palma. 2008. Informe de gestión 2007. Bogotá. Cited by Pérez *et al.* 2009.

⁶² Ibid.

⁶³ Pérez, G., Castro, L., Durán, A., Rodríguez, M., Rudas, G., Uribe, E. and E. Wills. 2009. La mejor Orinoquia que podemos construir. Corporinoquia, Universidad de los Andes, Foro Nacional Ambiental and Friedrich Ebert Stiftung.

⁶⁴ Pérez, G., Castro, L., Durán, A., Rodríguez, M., Rudas, G., Uribe, E. and E. Wills. 2009. La mejor Orinoquia que podemos construir. Corporinoquia, Universidad de los Andes, Foro Nacional Ambiental and Friedrich Ebert Stiftung. The National Corporation for Forestry Research and Development of Colombia (CONIF), the Colombian Corporation for Agricultural Research (CORPOICA), the International Center for Tropical Agriculture (CIAT), and the Gaviotas Research Center have carried out research on the silviculture of this species.

⁶⁵ Plantaciones Forestales en Colombia. Una mirada crítica. 2011. <http://www.nasaacin.org/attachments/article/2807/monocultivos.pdf>

⁶⁶ http://www.inviertaencolombia.com.co/Adjuntos/089_Sector%20Forestal.pdf

goal is to establish 280'000 hectares until 2014 in strategic corridors and with an investment of 1.3 billion COP of which 900'000 will come from public resources.

There are more than 3.5 million hectares with potential for palm oil monocultures (that is planted in areas with potential for agricultural crops) plus potential areas for other monocultures such as as sugar cane, summing up to about 7.2 million hectares between both⁶⁷. This would implicate the use of 51% of the area with agricultural potential in the country. Therefore, rubber plantations, not being common practice, will have to compete for the remaining area with cattle farming and non-native forest plantation, activities that are more supported by the government.

Sub-step 1b: Consistency with mandatory applicable laws and regulations

According to the information in sub-step 1a all of these alternative land use scenarios are legal and enforced by mandatory applicable laws and regulations taking into account the enforcement in Colombia and Orinoco's region development plans.

In summary the following alternative land uses scenarios in the project area that are in compliance with national vision of development in Colombia⁶⁸ are:

- Cattle farming
- Oil palm cultivation
- Reforestation of non native species (without carbon revenues).

Step 2: Barrier analysis

Sub-step 2a: Identify barriers that would prevent the implementation of alternative scenarios

Investment barrier

17 million of hectares are identified in Colombia with potential to establish commercial forest plantation, however only 253'066 hectares (1.5%) have been planted⁶⁹. The Ministry of Agriculture (2005) concluded that the majority of wood and wood products are derived from the exploitation of natural forests, given that commercial reforestation is neither economically attractive nor consolidated as a profitable activity.

⁶⁷ Departamento Administrativo de Planeación. 2010. Currently it is estimated that 14 million hectares of Colombian soils have an agricultural potential and in 2008 only 2 million hectares of these soils were used in permanent crops different to palm and sugar.

⁶⁸ Forest Plantations in Colombia. A critical look. 2011. The National Development Plan sets a goal to increase the commercial forest plantations, increasing the currently 364,000 hectares to 596 000 hectares. This sector is linked to two of the five locomotives promoted by the Santos government: the innovation engine, considered as one of the boosting green markets, and agricultural locomotive.
<http://www.nasaacin.org/attachments/article/2807/monocultivos.pdf>

According to the Livestock Development Programme 2005-2019, the government's objective is to achieve by 2019 a herd of 48 million cattle heads in 38 million hectares suitable for livestock in the country, that is, a capacity of 1.27 head/ha.

The Ministry of Agriculture estimates for 2010 a planted area of 443.000 ha, 664.000 ha for 2015 and 996.000 for 2020. This represents a growth in area planted of 125% in a 10 years period. Meanwhile, if expectations of palm oil production are reached, rising from 1.2 million tons in 2010 to 3.3 million tons in 2020, the domestic production of palm oil would increase 183%.

⁶⁹ Ministerio de Comercio, Industria y Turismo. 2009. Invierta en Colombia.
http://www.inviertaencolombia.com.co/Adjuntos/089_Sector%20Forestal.pdf

According to official data, Colombian economy grew 4.3% in 2010⁷⁰. All productive sectors showed positive behavior with exception of agriculture sector, where forestry is included. In 2009 this sector represented a -1.1% and 0% in 2010 of the GDP⁷¹. This indicates that commercial forestry is a unattractive scarce activity relative to others in the sector.

In 2011 agriculture grew 2.2% compared to last year. This growth is explained by the increase in 3.8% of agricultural products, 4.2% by living animals and silviculture, 1.3% by logging and fishing. According to DANE⁷², agricultural sector in the first quarter of 2011 grew 20%, 11% in second and 14% in the third one, compared to the same quarter in 2010^{73,74}. The main land use activity at national level is livestock farming (44.3%)⁷⁵, followed by permanent crops (29.7%). In terms of agricultural production value, natural and planted forests only have the 6.5% of national territory compared with agricultural activity that has the 36.1%⁷⁶.

The very low level of economic activity in the commercial forestry sector is attributed to several factors, among them: low rates of return, the high number of intermediaries, the long production cycle, the long periods between cash flow disbursements, the high concentration of costs in the first years of production, the long wait for economic returns and difficulties in obtaining bank credits for this type of activity^{77,78}.

There are no commercial bank lines of credit for long-term investments such as reforestation projects.⁷⁹ Banks perceive the investment risk for this type of project as very high due to market limitations, the lack of cash flow, and the long wait for a return on the investment.⁸⁰ There are multilateral banking credit sources, but processing is quite complex.

⁷⁰ El Departamento Administrativo Nacional de Estadística (DANE) realizó una corrección inusual del dato de crecimiento del PIB para 2009 al elevarlo del 0,8% al 1,5%.

⁷¹ Acciones y Valores: 2011. Análisis Crecimiento Económico colombiano Producto interno bruto – Cuarto Trimestre y total anual 2010. <http://www.accivalores.com/boletines/pdf/Informe%20PIB%202010.pdf>

⁷² National Department of Statistics (DANE by its Spanish Name). 2011

⁷³ Coyuntura ganadera. Balance 2011.

http://portal.fedegan.org.co/pls/portal/docs/PAGE/PORTAL/ESTADISTICAS1/CIFRAS%20DE%20REFERENCIA/BALANCE_2011%20FINAL.PDF

⁷⁴ Análisis competitivo del mercado automotriz y de la madera en Colombia frente al mundo. 2008.

<http://es.scribd.com/doc/69204350/14/Tabla-3-PIB-AGROPECUARIO-EN-COLOMBIA-%E2%80%93-2006>

⁷⁵ Documento de Discusión Nacional acerca de los Asuntos Claves en el Análisis del Sector Agricultura (Mitigación). Figura 1.

http://www.pnud.org.co/img_upload/61626461626434343535373737353535/CAMBIOCLIMATICO/3.%20Memorias%20Di%C3%A1logo%20Nacional%20Interministerial%20sobre%20cambio%20clim%C3%A1tico%20en%20el%20sector%20agropecuario/2DocdiscusionAgriculturayMitigacionColombia.pdf

⁷⁶ Documento de Discusión Nacional acerca de los Asuntos Claves en el Análisis del Sector Agricultura (Mitigación). Figura 1.

http://www.pnud.org.co/img_upload/61626461626434343535373737353535/CAMBIOCLIMATICO/3.%20Memorias%20Di%C3%A1logo%20Nacional%20Interministerial%20sobre%20cambio%20clim%C3%A1tico%20en%20el%20sector%20agropecuario/2DocdiscusionAgriculturayMitigacionColombia.pdf

⁷⁷ see also Aldana, C. (2004): Sector forestal Colombiano; fuente de vida, trabajo y bienestar. Serie de documentación no. 50. Corporación nacional de Investigación y Fomento Forestal (CONIF), Bogotá, p. 42

⁷⁸ These arguments are presented in the “Análisis del Mercado Crediticio para el Sector Forestal Colombiano” developed by Juan Manuel Soto, (CONIF 2002), cited by Contreras, 2004: (<http://www.fao.org/docrep/007/j4192s/j4192s00.htm#TopOfPage>), who concludes that in Colombia we have no lines of credit that can be called forestry credit lines, with the exception of two very limited lines from the Banco Agrario (a state Bank) which specifically limit activities to “plantation and maintenance” and “harvest of trees” but are not focused to reforestation activities.

⁷⁹ Aldana, C. (2004): Sector forestal Colombiano; fuente de vida, trabajo y bienestar. Serie de documentación no. 50. Corporación nacional de Investigación y Fomento Forestal (CONIF), Bogotá. p. 26f, p. 49f

⁸⁰ “Estudio de tendencias y perspectivas del sector forestal en América Latina Documento de Trabajo. Informe Nacional Colombia”. 2008. Available at: <http://www.fao.org/docrep/007/j4192s/j4192s00.htm#TopOfPage>

In comparison, ample lines of credit and financing sources exist for coffee growing and cattle farming (Banco Agrario) because of lower perceived risks, proven experience, and a steady cash flow. Cattle farming require a minimal investment (basically the purchase of cattle). This investment comes from the income earned with the sale of adult cattle. Additionally, this activity requires a very limited labor force, which is supplied by regional inhabitants who have worked for many years in the ranching sector. Given that this is an extensive activity, the region's ecological conditions permit the supply of grass required for production. Lastly, this activity requires little infrastructure given that the management system consists of herding cattle (to handling centers) across pastures that feed them until they reach a marketable weight⁸¹. There are also tax exemptions oriented to promote the agricultural sector⁸².

Barriers as that the lack of knowledge that financial intermediaries have about forest sector, their perception about forest business as a risk in terms of investment and the legal vacuum created through the rejection of Forestry law in 2008⁸³ have stimulated the banks unwillingness to create flexible credit lines for forestry projects.

About 90% of commercial reforestations are supported by incentives and tax benefits given by the government. These incentives are not enough to stimulate the reforestation adequately⁸⁴. For example, the government created a risk capital in the Fund for Agricultural Financing- Finagro (with more than 30.000 millions COP) to invest directly in the commercial forestry sector, however only 514 millions COP⁸⁵ were used for forestry projects (0.99%)⁸⁶.

The Certificado de Incentivo Forestal (CIF) has been created to support A/R activities. According to the Sectorial Forest Monitoring made in 2011 by Banco Agrario of Colombia, in 2008 the total resources received by forestry sector through government amounted to 51.281 Millions COP⁸⁷. The biggest resources were used through the CIF (35.000 million COP). It corresponds to 67.57% of resources available. Nevertheless this money is not constant and high transactions costs of obtaining the incentive make it difficult to use. The policies and procedures related to effectively obtaining this incentive are confusing and constantly changing. The delivery of CIF is highly uncertain because it becomes unavailable when the national government accounts go into deficit or when the government changes during the election period (avoidance of corruption).⁸⁸

Further, the level of the incentive is relatively low in terms of the positive externalities generated by reforestation and the high opportunity cost associated with other uses of the land. Second, government deficits often abort the supply of the incentive, even when projects have been approved to receive it.⁸⁹ Some projects have waited for more than three years for approval⁹⁰. There is no appropriate information to identify the effectiveness of incentives and it is not possible to determine the real impacts over investors. If you receive the CIF you lost the right to get more incentives or tax exemptions that law gives for forestry sector⁹¹.

⁸¹ de la Hoz, J.V. 2009. Geografía Económica de la Orinoquia. Documento de trabajo sobre economía regional. <http://www.banrep.gov.co/documentos/publicaciones/regional/documentos/DTSER-113.pdf>

⁸² article 31 of the law 812 of 2003 and article 18 of the law 788 of 2002

⁸³ Ibid

⁸⁴ Villar, C.M. 2010. Financiación forestal, estímulos y exenciones. http://www.revista-mm.com/ediciones/rev67/forestal_financiacion.pdf

⁸⁵ About 293.714 USD

⁸⁶ Ibid

⁸⁷ About 29.303.428 M USD

⁸⁸ http://www.minagricultura.gov.co/02componentes/06com_03d_cif.aspx

⁸⁹ See footnote 42 and http://www.minagricultura.gov.co/02componentes/06com_03d_cif.aspx;

⁹⁰ Villar, C.M. 2010. Financiación forestal, estímulos y exenciones. http://www.revista-mm.com/ediciones/rev67/forestal_financiacion.pdf

⁹¹ Villar, C.M. 2010. Financiación forestal, estímulos y exenciones. http://www.revista-mm.com/ediciones/rev67/forestal_financiacion.pdf

The subsidies program Agroingreso Seguro (AIS), was proposed in President Alvaro Uribe's government and had the goal of reducing the inequalities in rural areas. However, most of the money becoming for this program and that intended to encourage the agricultural crops and long term monocultures (as rubber plantations) didn't have results⁹².

In general, most of the government monetary resources mentioned before are mainly oriented to the setting of forestry species that the Ministry of Agriculture and Rural Development (MADR for its name in Spanish) promote as more suitable for Colombian regions. In the case of Vichada state the MADR only promotes to plant *Eucaliptus pellita* and *Pino caribea* var *Hondurensis*.

VERs might generate the possibility to **alleviate the investment barrier as the decisive barrier** for this A/R VCS project activity by generating access to international capital due to early stage payments for VERs.

Infrastructure barrier (routes of transportation)

In general, the departments of the Orinoco region have remained isolated from the Andean region due to a lack of access by land routes. Infrastructure is thus one of the factors that have disadvantaged the development of the country's forestry potential. On one hand, there is a tremendous lack of highways and railways in areas with forest resources, and on the other hand the nearby rivers are not, or not sufficiently navigable or they do not connect towards centers of consumption. Transportation costs represent 10%-34% of the value of forest products in the market⁹³.

A large percentage of forestry products in the Colombian market is transported by roads, which is a negative factor given its high costs. According to the calculations of CORMAGDALENA, the cost of transportation by waterway is nine times lower than roads. The poor transportation infrastructure constitutes a costly constraint to the project activity because it hinders and prevents displacement of personnel, increases the costs of all silvicultural practices and timber harvesting, and increases the travel time of all access routes. According to the development plan 2008-2011 of the Primavera municipality, the absence of roads in good conditions weakens the commercial connections between the urban and rural area. This situation is common in the whole region⁹⁴ (Table 14). It gets worst in winter because of the rainfalls and has negative consequences over all social and economic sectors⁹⁵.

Table 14 Number of roads in the Department of Vichada

Networks	Km	Traffic (%)	
		Dry Season	Rainy Season
Secondary	1670	95	25
Tertiary	835	85	15

⁹² <http://www.noticiascaracol.com/nacion/video-225269-estallo-el-escandalo-de-agro-ingreso-seguro>

⁹³ Refocosta, 2007. Comercialización de Madera en Colombia y sus oportunidades.

⁹⁴ <http://www.econegociosforestales.com/enf/files/Comercializacion de Madera en Colombia.pdf>

⁹⁵ http://laprimavera-vichada.gov.co/apc-aa-files/33656130643232386131393538623639/plan_de_desarrollo_municipal_Aprobado_2008_2011_La_Primavera.pdf

Source: Development Plan 2008 – 2011⁹⁶

The PO has to invest in infrastructure to reach the plantations area and transport any equipment, materials, technology and tools needed for the work. These adverse conditions represent an important barrier that must be overcome by the technical team to guarantee the competitiveness in the national and international markets.

As an example of investment in infrastructure, one of the objectives of the project includes to focus efforts to sign an agreement between the Piloto's University and PF, in order to diagnosis and formulate a project based on the urban and rural development. Within the proposed activities to achieve this goal are include the design of the urban, technic and infrastructure components and the formulation and monitoring of the productive project

Social barriers

Lack of skilled labor

As we mentioned before historically only a few tree species, mostly non-native, have been promoted in the country⁹⁷. Some numbers show the most planted specie has been *Pinus patula* with an area of 53.197 hectares, equivalent to (36.5 %) of the country's total, followed by *Eucalyptus grandis*, the second most abundant species with 15.265 hectares or (10.4 %), *Pinus caribea* with 10.365 hectares (7.11%), and *Cupressus lusitanica*, with 9.982 hectares (6.25 %). Other important species that were planted included: *Gmelina arborea* with 5.083 hectares, *Tabebuia rosea* with 3.988 hectares, and *Tectona grandis* with 3.501 hectares.⁹⁸ In 2001 this surface was 161.161 hectares (0.14% of country surface)⁹⁹. In the case of rubber plantations, in 2008 was projected to have 3.773 hectares planted in the country¹⁰⁰, but until now according to official information presented by Finagro, there are only 10.000 hectares planted around the country.

Rubber cultivation requires large amounts of resources and personal. However, in an area where historically rubber plantation has not been promoted, it is quite difficult to have a significant amount of trained personnel, infrastructure and tilling equipment. All of these elements must be present over the long production periods.

The few communities that inhabit the area do not have experience in reforestation. Their economic activity is based primarily subsistence farming and subsistence fishing. There is no local supply of labor with experience in forestry, so training is more costly and skilled labor must be paid a higher wage to

⁹⁶ Departamento de Vichada, 2008. Plan de desarrollo de Vichada 2008_2011.

⁹⁷ Pérez, G., Castro, L., Durán, A., Rodríguez, M., Rudas, G., Uribe, E. and E. Wills. 2009. La mejor Orinoquia que podemos construir. Corporinoquia, Universidad de los Andes, Foro Nacional Ambiental and Friedrich Ebert Stiftung. The National Corporation for Forestry Research and Development of Colombia (CONIF), the Colombian Corporation for Agricultural Research (CORPOICA), the International Center for Tropical Agriculture (CIAT), and the Gaviotas Research Center have carried out research on the silviculture of this species.

⁹⁸ REFORESTATION A NATURAL PROCESS, Luis Gonzalo Moscoso Higueta, 2005

⁹⁹ EVALUACIÓN DE LOS RECURSOS FORESTALES MUNDIALES. 2010. INFORME NACIONAL COLOMBIA. <http://www.fao.org/docrep/013/al479S/al479S.pdf>

¹⁰⁰ Comportamiento del caucho natural en Colombia y en el mundo 2002-2008. http://www.google.com.co/url?sa=t&rct=j&q=&esrc=s&source=web&cd=7&sqi=2&ved=0CFgQFjAG&url=http%3A%2F%2Fportal.araujoibarra.com%2Festudios-de-mercados-por-paises%2Fcolombia%2Festudio%2520Caucho.pdf&ei=RRPyT4jLLqSp6QGA4uCVBg&usq=AFQjCNF470y-t7DkFEE9HpdccGRvKtEO_g

move them from other regions of the country to this remote region. The population density in the department of Vichada is very low (1.8 inhabitants per km²) and therefore insufficient to supply the labor requirements of the project activity. While a traditional cattle farming requires one person for the management of 100 ha, forestry activities require one person to manage 10 ha.¹⁰¹

The project owner has to recognize all these obstacles and has to overcome these technical barriers. Part of the capacity work could be financed by the income of the carbon credits.

Civil unrest and instability barrier

Due to the lack of government presence, the state of Vichada has remained a stage with presence of illegal, armed groups such as Farc and paramilitaries with the interest of having control of legal and illegal commerce and drug trafficking,^{102 103 104}.

This project will promote a reactivation of economic dynamic in the area. There are few activities available in the area that can provide labour and tax sources. A major reason for this is that cattle farming has been widely abandoned by landowners due to actions carried out by illegally armed groups. Most landowners decided to reduce economic activity on their lands, opting for unmanaged and subsistence cattle farming to keep their property to a basic administrative and technical management stage. The reason is the avoidance of forcible displacements.¹⁰⁵

In such a volatile environment it can be assumed, that any reforestation investment project that seeks to increase sustainable economic activity (as proposed Private Equity) without embeddedness in an international context, would be even more difficult to implement. Registering the project under an international standard will give the project more social acceptance among the impacted communities and local authorities. Social acceptance will be attained via the project's environmental benefits, new job creation and tax generation. The project will lend support to the Colombian government's policy of economic reactivation of armed conflict areas.

Sub-step 2b: Eliminate alternative scenarios which are prevented by the identified barriers

Reforestation with or without native species, without carbon revenues, and oil palm cultivation all face at least one of the identified barriers. Extensive cattle farming is the only land use alternative that does not face any of the identified barriers. Therefore, extensive cattle farming is the baseline scenario (Table 15).

The A/R project with Rubber with Carbon revenues will alleviate the identified barriers.

Table 15 Summary of barriers faced for alternative use scenarios

Project alternative	Barrier faced
Cattle farming	No barriers faced
Palm oil	Infrastructure barrier

¹⁰¹ (Organización La Primavera S.A. 2006).

¹⁰² Diagnóstico departamental vichada

¹⁰³ <http://www.derechoshumanos.gov.co/PNA/documents/2010/vichada/vichada.pdf>,

¹⁰⁴ <http://terranova.uniandes.edu.co/centrodoc/docs/registro/Los%20limites%20de%20la%20guerra.pdf>.

¹⁰⁴ CODES, Informe especial de riesgo electoral 2011 <http://www.eltiempo.com/elecciones-2011/gobernaciones-2011/home/ARCHIVO/ARCHIVO-10072745-0.pdf>

¹⁰⁵ <http://www.colombiassh.org/site/spip.php?article517>

Forest plantations of non native species (without being registered as a carbon project)	Investment barrier, Infrastructure barrier (routes of transportation), Social barriers
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Step 4: Common practice analysis

Commercial reforestation is not commonly practiced in Colombia. Reforestation began in the 1940's at a very low scale and has never played a major role in the land use sector. Even though government plans and programs have promoted reforestation, this activity only manages to provide 12.4% of wood supply for the forest industry (84.1% still comes from natural forests and 3.5% from imports)¹⁰⁶. Forest plantations for industrial purposes (over 500 ha) are usually located in the areas where the industrial activities of pulp, particleboard and immunization occur. These are in the departments of Cauca, Valle, Quindío, Risaralda, Caldas, Tolima, Antioquia, Cundinamarca, Boyacá, Bolivar and Magdalena¹⁰⁷.

In the Department of Vichada, the common practice in terms of land use has been extensive cattle ranching based on regular anthropogenic burning of grasslands for over a century. Total forest plantations reported by the Government of Vichada by 2008¹⁰⁸ only amounted to 3.450 ha. Reforestation in the Orinoquia region remains incipient. In 2008, only 780 ha of forest plantations (including palm plantations) were recorded in Meta, and 13.300 ha were registered in the department of Casanare. These areas respectively represent 0.23% and 3.93% of the area of all forest plantations in Colombia.¹⁰⁹

The proposed project activity aims change land use to reforestation, and plant about 10.000 ha in the remote region of the Orinoco, where the dominant economic and cultural activity has been and continues to be extensive cattle ranching. Financial revenues from carbon sequestration will help investors to offset the risks of investing in the area and the high costs of accessing distant markets for the future sale of rubber and timber. The sale of certificates of emission reduction may be part of the main sources of additional income to the project.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS (CLIMATE)

4.1 Project Scale and Estimated GHG Emission Reductions or Removals

Emission reductions or removals for the project's crediting period.

Project	X
Mega-project	

¹⁰⁶ Plan de Acción para la reforestación Comercial. 2011. Ministerio de Agricultura y Desarrollo Rural. Available in <http://fedemaderas.org.co/wp-content/uploads/2012/04/Plan-de-Accion-Reforestacion-Comercial.pdf>

¹⁰⁷ (Ministry of Agriculture 2005, p. 16).

¹⁰⁸ Departamento de Vichada, 2008. Plan de desarrollo de Vichada 2008_2011. Pg 39

¹⁰⁹ (Pérez *et al.* 2009).

Table 16 Estimated GHG emissions reductions or removals per year, through out the development of the project

Years	Estimated GHG emission reductions or removals (tCO ₂ e)
1	5,203
2	42,221
3	138,219
4	263,736
5	377,363
6	447,213
7	471,082
8	460,061
9	426,952
10	382,292
11	333,551
12	285,498
13	240,862
14	200,976
15	166,274
16	136,656
17	111,734
18	90,986
19	73,852
20	59,793
21	48,312
22	38,973
23	31,399
24	25,271
25	20,323
26	16,333
27	13,119
28	10,533
29	8,454
30	6,784
31	5,442
32	4,365
33	3,501
34	2,808
35	(662,714)
Total estimated ERs	4.287,428 tCO ₂ e
Total number of crediting years	35 yr
Average annual ERs	122,498 tCO ₂ e

4.2 Leakage Management (CL2)

There is not leakage management in the project area.

4.3 Baseline Emissions (G2)

The carbon pools included in or excluded from the project boundary are shown in Table 17.

Table 17 Selection and justification of carbon pools

Carbon pool	Whether selected	Justification/Explanation
Above-ground biomass	Yes	This is the major carbon pool subjected to project activity
Below-ground biomass	Yes	Carbon stock in this pool is expected to increase due to the implementation of the project activity
Dead wood Litter and Soil organic carbon	yes	Carbon stock in these pools may increase due to implementation of the project activity

Changes in carbón stock of above-ground and below-ground biomass of non-tree vegetation may be conservatively assumed to be zero in the baseline scenario, also it is expected that the baseline dead wood and litter carbon pools will not show a permanent net increase. It is therefore conservative to assume that the sum of the changes in the carbon stocks of dead wood and litter carbon pools is zero in the baseline scenario. Moreover, since carbon stock in SOC is unlikely to increase in the baseline, the change in carbon stock in SOC may be conservatively assumed to be zero.

As it is demonstrated, baseline is the continuation of extensive grazing (previous activity). The entire area within the project boundaries were and would have been covered by pastures. Thus, it is not applicable to account for tree and shrubs baseline biomass.

Historically cattle grazing have been the main land use in the Project área and selected as the baseline scenario. According to this and in agreement with IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry (2003) that the net GHG removals by sinks in the baseline equals zero.

4.4 Project Emissions (CL1)

The emission sources and associated GHGs selected for accounting are shown in Table 18

Table 18 justification of the project emissions

Sources	Gas	Whether Selected	Justification/Explanation
Burning of woody biomass	CO ₂	No	CO ₂ emissions due to burning of biomass are accounted as a change in carbon stock
	CH ₄	Yes	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology
	N ₂ O	Yes	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology

However considering the methodology applied to the project, GHG emissions resulting from removal of herbaceous vegetation, combustion of fossil fuel, fertilizer application, use of wood, decomposition of litter and fine roots of N-fixing trees, construction of access roads within the project boundary, and transportation attributable to the project activity shall be considered insignificant and therefore accounted as zero.

4.5 Leakage (CL2)

According to the equation 4 of the methodology AR-ACM0003, version 01, the leakage that could occur as a result of the project would be the displacement of cattle ranching from the plots where the plantations would be developed.

The application of the tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity” led to the conclusion that this source can be neglected. The application of the “Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant”, which is one of the applicability conditions of the tool. In this case project will not cause any displacement of the activity occurring before project implementation.

The stocking density ranges between 0.09 head of cattle per hectare in the high plains (extremely extensive) to 1.56 head of cattle per hectare in areas with improved pasture, shows that well-managed lands in the region can support greater stocking densities that are above the average (which is estimated to be 0.39 head of cattle)¹¹⁰. At the time of the project’s implementation, landowners sold a large part of their cattle, and intensified grazing in areas beyond the borders of the project that were already covered with grass. This is completely viable given the great extensions of grasslands in the region.

4.6 Summary of GHG Emission Reductions and Removals (CL1 & CL2)

The net anthropogenic GHG removals by sinks shall be calculated as follows:

¹¹⁰ Romero, M; Galindo, G; Otero, J. and Armentaras, D. 2004. Ecosistemas de la cuenca del Orinoco Colombiano. Instituto de Investigaciones de Recursos Biológicos Alexander von Humboldt. Instituto Agustin Codazzi. 187 pp.

$$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t \quad \text{Equation (1)}$$

Where:

$\Delta C_{AR-CDM,t}$	=	Net anthropogenic GHG removals by sinks, in year t ; t CO ₂ -e
$\Delta C_{ACTUAL,t}$	=	Actual net GHG removals by sinks, in year t ; t CO ₂ -e
$\Delta C_{BSL,t}$	=	Baseline net GHG removals by sinks, in year t ; t CO ₂ -e
LK_t	=	GHG emissions due to leakage, in year t ; t CO ₂ -e

Baseline net GHG removals and total GHG emissions due to leakage are zero, thus ex-ante estimation of C AR equals ΔC_{ACTUAL} . The period over which the long-term average GHG benefit is calculated is 35 years.

The actual net GHG removals by sinks shall be calculated as follows:

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t}$$

Where:

$\Delta C_{ACTUAL,t}$	=	Actual net GHG removals by sinks, in year t ; t CO ₂ -e
$\Delta C_{P,t}$	=	Change in the carbon stocks in project, occurring in the selected carbon pools, in year t ; t CO ₂ -e
$GHG_{E,t}$	=	Increase in non-CO ₂ GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year t , as estimated in the tool “Estimation of non-CO ₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity”; t CO ₂ -e

Change in the carbon stocks in project, occurring in the selected carbon pools in year t shall be calculated as follows:

$$\Delta C_{P,t} = \Delta C_{TREE_PROJ,t} + \Delta C_{SHRUB_PROJ,t} + \Delta C_{DW_PROJ,t} + \Delta C_{LL_PROJ,t} + \Delta SOC_{AL,t}$$

Where:

$\Delta C_{P,t}$	=	Change in the carbon stocks in project, occurring in the selected carbon pools, in year t ; t CO ₂ -e
$\Delta C_{TREE_PROJ,t}$	=	Change in carbon stock in tree biomass in project in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; t CO ₂ -e
$\Delta C_{SHRUB_PROJ,t}$	=	Change in carbon stock in shrub biomass in project in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; t CO ₂ -e
$\Delta C_{DW_PROJ,t}$	=	Change in carbon stock in dead wood in project in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO ₂ -e

$\Delta C_{LI_PROJ,t}$	=	Change in carbon stock in litter in project in year t , as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; t CO ₂ -e
$\Delta SOC_{AL,t}$	=	Change in carbon stock in SOC in project, in year t , in areas of land meeting the applicability conditions of the tool "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities", as estimated in the same tool; t CO ₂ -e

Change in carbon stock in tree biomass in project in year t

To estimate the Change in carbon stock in tree biomass in project in year t the AR-TOOL14 Methodological tool: Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities Version 03.0.0 was employed. According to this the option b) Estimation of tree biomass using the allometric equation technique using (equation 2) of the tool.

In this case a carbon accumulation equation was developed using the information available in the current scientific literature and giving priority to information on Colombia. Due to the limited information on dendrometric variables with respect to age, the analysis used adjusted Bertalanffy-type equations and the available information. The species, the equations of carbon accumulation, the parameters and sources consulted are listed in Table 10, Figure 16.

The available information was performed, using only data reported for Colombia in: Milan-Caquetá, Scimitar-Santander Puerto López-Meta, Caquetá Florencia-, Doncello-Caquetá, Putumayo-Mocoa and Opon-Santander, under the following procedure:

Collecting of dendrometric information

From the collection of information, values were found for volume (m^3), biomass (BT / tree), carbon (CT / tree) and carbon dioxide (tCO₂ / ha) reported by ITTO et al. (2004), Snow et al. (2005), Gonzalez (2006), Jury & Pérez (2007), for plantations of *H. brasiliensis* in different parts of Colombia.

Unification of the information found

Subsequently the unification process was carried out using the expansion factors, as follows
The values of trade volume (VC), or IMA values ($m^3 \text{ ha}^{-1} \text{ yr}^{-1}$), were multiplied by the basic wood density (ρ), obtaining the value of stem biomass (BF):

$$BF = VC \cdot \rho; \quad (i)$$

The BF is multiplied by a factor of biomass expansion (FEBA), which establishes the relationship between total biomass and stem biomass.

$$BA = BF \cdot FEBA; \quad (ii)$$

with BA values, root biomass content (BR) is obtained, after multiply this variable by the fraction of roots (Fr).

$$Br = BA \cdot Fr. \quad (iii)$$

Subsequently, the total biomass (BT), is the sum of both components.

$$BT = BA \cdot BR. \quad (iv)$$

with the values of BT, total C content is calculated (CT), after multiply this variable by the carbon fraction (CF) of plant material.

$$CT = BT \cdot CF. \quad (v)$$

The values used for the unification of the information are presented below

Table 19 Parameters - expansion factors to determine the content of biomass and carbon of *H. brasiliensis*

Parameter	Description	Value	Source	Place
ρ	basic density of the wood	0.49	Jurado y Pérez 2007	Putumayo, Colombia
FEBA	biomass expansión factor	1.44	Jurado y Pérez 2007	Putumayo, Colombia
Fr	root fraction (root-shoot ratio))	0.26	IPCC 2003.	Tabla 3A.1.8
CF	Carbon content in the vegetable material	0.42	Jurado y Pérez 2007	Putumayo, Colombia

Adjustment of the asymptotic growth model

the model of von Bertalanffy was parameterized as explicit in Equation 1 (von Bertalanffy 1976, Zaide 1993, Lei & Zhang 2004). $C = A[1 - \exp(-bt)]^{1/(1-m)}$ (1)

Where, C is carbon ($t \text{ ha}^{-1}$), t is time (years) and A, b and m are parameters of the equation. The term exp denotes the exponential operator and A is the asymptote or the maximum that the body can achieve with the advancement of time, which controls the maximum rate of growth of the species.

Using Equation (1) allow to adjust the model for *Hevea brasiliensis* under OLS procedure (Steel & Torrie 1960).

Table 20 shows the carbon accumulation model (*Car*) for *Hevea brasiliensis*, estimates made with adjusted Bertalanffy-type equations and the available data reported in the literature. The letters A, b y c are regression parameters. Furthermore, the coefficient of determination (R²) and and the Square Mean Error (MSE) are listed. The parameter A is the asymptote or maximum quantity of carbon that the specie can assimilate.

Table 20 Equation parameters of carbon accumulation in function of time for *H. brasiliensis*. The letters A and b are the parameters of Equation 1, c = 1/1-m, where m = 2/3

Specie	Model			Value (R ² %)	Source
	A	B	c		
<i>Hevea brasiliensis</i>	118.59	0.22	3.00	R ² : 0.94 CME: 119.75	ITTO et al. (2004), Nieves et al. (2005), González (2006), Jurado & Pérez (2007)

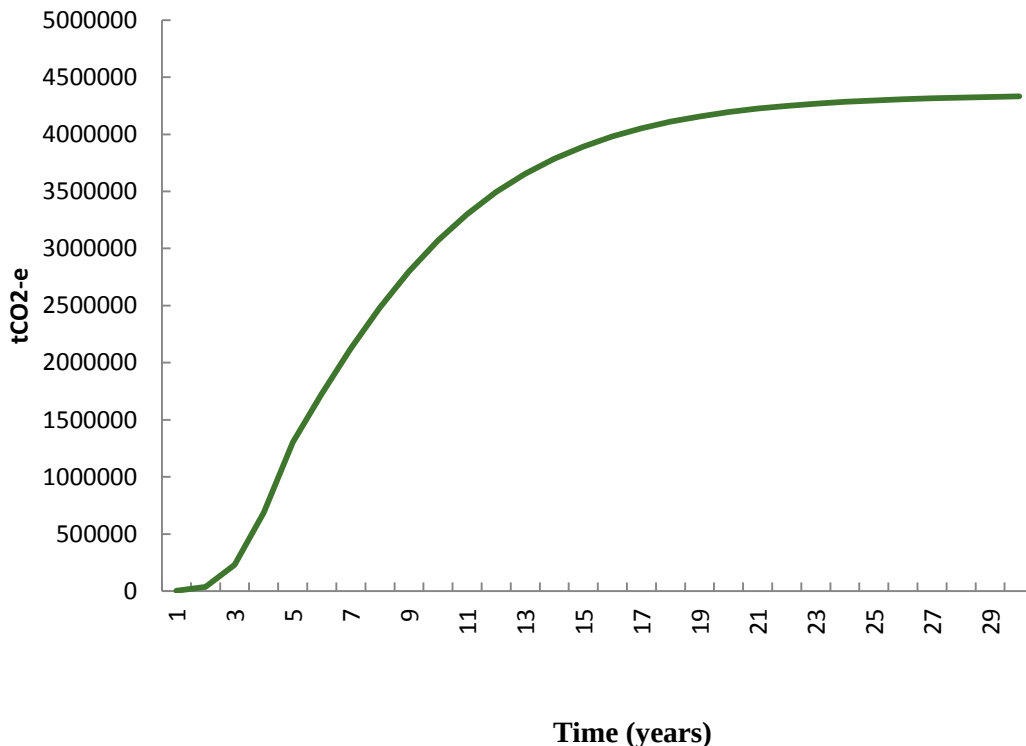


Figure 14 carbon accumulation in function of time for *H. brasiliensis*

Soil organic Carbon

Estimations of soil organic carbon (SOC) stocks were done in accordance to the “Tool for the estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activity”. As suggested by the tool, it is assumed that the implementation of the project activity increases the SOC content of the lands from the pre-project level to the level that is equal to the steady-state SOC content under native vegetation. The increase in SOC content in the project scenario takes place at a constant rate over a period of 20 years from the year of planting. The project meets the applicability conditions of this tool in the area managed with rubber plantations:

The areas of land to which the tool is applied do not fall into wetland category, do not contain organic soils and are not subject to any of the land management practices and application of inputs listed in Tables 1 and 2 of the tool.

Since the land use prior to project start was grassland, only Table 2 applies. For the Tropical, moist climate region corresponding to the project activity, none of the three combinations included in Table 21 are applicable; litter remains on site and is not removed and soil disturbance is in accordance with appropriate conservation practices, limited to site preparation and not repeated more than 20 years.

Table 21 Parameters used for the the estimation of the soil organic carbon (SOC)

Parameter	Symbol	Value	Source estimation (SOC tool, V01.1.0)
Reference SOC (tC/ha)	SOCREF,i	47	Table 3 LAC soils,

			Tropical, moist
Land use factor	fLU ,i	1	Table 6 All permanent grassland
Management factor	f MG,i	0.97 (Tropical)	Table 6 Moderately degraded grassland Overgrazed or moderately degraded grassland, with somewhat reduced productivity (relative to the native or nominally managed grassland) and receiving no management inputs
Input factor	fIN,i	1	grassland without input of fertilizers

$$dSOC_{t,i} = \frac{SOC_{REF,i} - (SOC_{INITIAL,i} - SOC_{LOSS,i})}{20 \text{ years}} \quad \text{for } t_{PREP,i} < t \leq t_{PREP,i} + 20$$

where:

$dSOC_{t,i}$ The rate of change in SOC stock in stratum i of the areas of land, in year t ;
 $t \text{ C ha}^{-1} \text{ yr}^{-1}$

$t_{PREP,i}$ The year in which first soil disturbance takes place in stratum i of the areas of land

$SOC_{LOSS,i}$ Loss of SOC caused by soil disturbance attributable the A/R CDM project activity, in stratum i of the areas of land; $t \text{ C ha}^{-1}$

$SOC_{REF,i}$ Reference SOC stock corresponding to the reference condition in native lands (i.e. non-degraded, unimproved lands under native vegetation – normally forest) by climate region and soil type applicable to stratum i of the areas of land;
 $t \text{ C ha}^{-1}$

$SOC_{INITIAL,i}$ SOC stock at the beginning of the A/R CDM project activity in stratum i of the areas of land; $t \text{ C ha}^{-1}$

i 1, 2, 3, ... strata of areas of land; dimensionless

t 1, 2, 3, ... years elapsed since the start of the A/R CDM project activity

Where

$$SOC_{INITIAL,i} = SOC_{REF,i} * f_{LU,i} * f_{MG,i} * f_{IN,i} \quad (1)$$

where:

$SOC_{INITIAL,i}$ SOC stock at the beginning of the A/R CDM project activity in stratum i of the areas of land; t C ha⁻¹

$SOC_{REF,i}$ Reference SOC stock corresponding to the reference condition in native lands (i.e. non-degraded, unimproved lands under native vegetation – normally forest) by climate region and soil type applicable to stratum i of the areas of land; t C ha⁻¹

$f_{LU,i}$ Relative stock change factor for baseline land-use in stratum i of the areas of land; dimensionless

$f_{MG,i}$ Relative stock change factor for baseline management regime in stratum i of the areas of land; dimensionless

$f_{IN,i}$ Relative stock change factor for baseline input regime (e.g. crop residue returns, manure) in stratum i of the areas of land; dimensionless

i 1, 2, 3, ... strata of areas of land; dimensionless

In the case of the soil disturbance attributable to project activity and for which the total area disturbed, over and above the area in the is less than 10% of the area of the stratum. Then the carbón loss is assumed as zero.

The application of these equations results in an estimated increase of 0.071 t C/ha/year in soil organic carbon

Litter and Dead Wood

Estimations were done in accordance with the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”. Values of the conservative default-factors expressing carbon stock in litter and dead wood as a percentage of carbon stock in tree biomass was selected according to the guidance provided in the methodological tool: 6% in the case of dead wood and 1% for litter. (Table 22)

Table 22 Conservative default factor expressing carbon stock in dead wood and litter

Parameter	Description	Value (%)	Comments
DFDW	Conservative default factor expressing carbon stock in dead wood as a DW percentage of carbon stock in tree biomass	6	Biome: tropical Elevation: <2000m Precipitation >1600 mmyr-1
DFLI	Default factor for the	1	Biome: tropical

	relationship between carbon stock in litter and carbon stock in living trees		Elevation: <2000m Precipitation >1600 mmyr-1
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Carbons stock in dead wood and litter in stratum i at a given point of time in year t; (tCO₂e) were estimated according to equation 9 and 15 of the methodological tool respectively.

The period over which the long-term average GHG benefit is calculated is 35 years. The total GHG benefit, calculated as the sum of stock changes along the 35-year period, is 4,287,428 t CO₂e (Table 23).

Table 23 Estimated net GHG emission reductions or removals (tCO₂e)

Years	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
1	0	5,203	0	5,203
2	0	42,221	0	42,221
3	0	138,219	0	138,219
4	0	263,736	0	263,736
5	0	377,363	0	377,363
6	0	447,213	0	447,213
7	0	471,082	0	471,082
8	0	460,061	0	460,061
9	0	426,952	0	426,952
10	0	382,292	0	382,292
11	0	333,551	0	333,551
12	0	285,498	0	285,498
13	0	240,862	0	240,862
14	0	200,976	0	200,976
15	0	166,274	0	166,274
16	0	136,656	0	136,656
17	0	111,734	0	111,734

18	0	90,986	0	90,986
19	0	73,852	0	73,852
20	0	59,793	0	59,793
21	0	48,312	0	48,312
22	0	38,973	0	38,973
23	0	31,399	0	31,399
24	0	25,271	0	25,271
25	0	20,323	0	20,323
26	0	16,333	0	16,333
27	0	13,119	0	13,119
28	0	10,533	0	10,533
29	0	8,454	0	8,454
30	0	6,784	0	6,784
31	0	5,442	0	5,442
32	0	4,365	0	4,365
33	0	3,501	0	3,501
34	0	2,808	0	2,808
35	0	(662,714)	0	(662,714)
Total				4,287,428

4.7 Climate Change Adaptation Benefits (GL1)

Implementation of the project is expected to create positive net climate change impacts. The increase in forest cover and sequestration of carbon in living biomass will contribute to the reduction of green house gas emissions by acting as sinks by sequestering approximately 4.3 million tons of CO₂.

5 COMMUNITY

5.1 Net Positive Community Impacts (CM1)

Among the positive impacts on communities are include the ones related to employment generation as the project aims to create 400 direct jobs and extend them to 1.000 in the nearly future. Job stability is also accounted as impact taking into account that it is mandatory for the employees to ensure that they have medical and social insurance in order to sign the contract and thereby to make sure that the activities performed by the workers are acting according to the law.

The contracts are generally short term depending on the activity that the employee is applying for. However long term contracts are also considered. The activities that require a formal engagement for the project are:

- Establishment of the plantations
- Plant production
- Maintenance of the plantations
- Weed Control
- Fertilization
- Sawing
- Dilution, Acidification and Lamination
- Drying and pressing

While engaging people to the project through the activities mentioned and others that could arise, the project is also encouraging people to stay and work in and for the area, it means that the project aims to avoid displacement while promoting entrepreneurship and social-building capacities.

5.2 Negative Offsite Stakeholder impacts (CM2)

According to Impacts analysis expressed on section 2.1 (The expected community and biodiversity impacts) there are not negative offsite stakeholder impacts produced by the project activities. The project will not affect negatively the wellbeing of stakeholders or other parties involved.

5.3 Exceptional Community Benefits (GL2)

Besides the positive benefits expressed in sections 2.1 and 6.2, no exceptional benefits on communities have been identified.

6 BIODIVERSITY

6.1 Net Positive Biodiversity Impacts (B1)

Without the project scenario The pasturelands for cattle simply cannot support the diversity of a forest plantation, cows pollute water sources and compact soil which decreases fertility. With the project among the positive impacts identify for the biodiversity, are those in relation with the Interconnection of natural corridors, increases of the populations of endemic and endangered species (this will be proven after monitoring activities), the creation of shelterbelts in waterways with native species and the retention of moisture and restoration of micro fauna. Positive impacts on ecosystems are increases in the biomass and the creation of a favourable environment for fauna and flora communities. Project is planting *H. brasiliensis* that is native specie. Considering this, no High Conservation Values related to biodiversity will be negatively affected.

B 1.5 In addition to this the project activity has not considered the implementation of GMOs in the project area

6.2 Negative Offsite Biodiversity Impacts (B2)

The environmental assessment carried out for the study area shown as possible negative impacts, those related with the pest control systems as they can cause poisoning of the vegetable and animal species. Such impacts can be reduced and controlled by using preventive technics like the right dosage of the pesticides and a constant monitoring of the species. Another negative impact is the weed control because if the cases of not using adequate technics, phenomena like loss of species can occur.

6.3 Exceptional Biodiversity Benefits (GL3)

No exceptional biodiversity benefits were identified for the ongoing project.

7 MONITORING

7.1 Description of the Monitoring Plan (CL3, CM3 & B3)

This Monitoring Plan provides guidance on monitoring and standard operational procedures for the A/R project activity. The proposed project activity aims to generate net anthropogenic GHG removals by establishing native forest plantations under sustainable management. The plantations are established on degraded grasslands that were subject of burning activities and extensive cattle ranching.

This Monitoring Plan fulfils the requirement that the project activity should have credible and accurate monitoring procedures in place to enable the evaluation of project performance and verification of the net anthropogenic GHG emission removals. It sets out monitoring procedures that follow the provisions outlined in the PD and the approved monitoring methodology AR-AM0003

It is considered the establishment of permanent sample plots for monitoring. Plots will allow monitoring changes in carbon content of aboveground and belowground biomass, in different periods. Monitoring will assess biomass evolution in rodals/stands or layers enclosed by the project and those that have been subjected to various silvicultural activities (i.e. soil preparation, fertilization, thinning, harvesting, enrichment). All parcels shall be properly numbered, geo-referenced, and located within a coverage/layer map present in the Project scope

General instructions on data collection

Collecting reliable field measurements is an important part of quality assurance (QA). Standard procedures should be followed to collect reliable data to ensure credibility in the estimation of the baseline, project emissions, leakage, and GHG removals.

During the monitoring process, the senior personnel overseeing the project activity shall verify the data collected by the field personnel. The project entity shall implement procedures that will ensure independent verification. Should there be differences in the electronic and paper based formats, these will be clarified in the terms defined and procedures followed. Particular attention shall be paid to monitoring and measurement errors. This issue will be addressed through mandatory data checks and training of field personnel.

Data storage

The project entity shall make necessary arrangements for data entry on the registry forms. The forms shall be both in paper and electronic formats to ensure that the information is stored in multiple ways. Further the entity shall ensure the transfer of data to the spreadsheet database as outlined in the monitoring methodology at required intervals. The data shall be archived using acceptable standards and stored in compliance with the instructions of the project information management system. The electronic data shall be stored securely at multiple locations using backup procedures. All GHG related information is collected and aggregated.

Information (data) management system

The project information management links the operations of the field data collection and spreadsheet database. Further it outlines responsibilities of staff involved in collecting field data and organization of the spreadsheet database. The supervisory staff overseeing the field data and spreadsheet database must check and certify the data. If any changes occurred in the data collected and processed during the month, the supervisory staff has to provide necessary clarification.

Monitoring periods and frequency

The project monitoring is expected to cover the crediting period of years, starting from 2010 (December 20th 2010 to December 20th, 2059. The project participants will use the VCS buffer approach to address any loss of permanence. The monitoring process will cover periods of five years. However it depends on the verification intervals which are expected to be also every five years. Data needed for the monitoring of emission sources will be collected and analyzed annually.

Monitoring and operational procedures

The project participants use Standard Operation Procedures (SOPs). All measured and experimental data shall be documented and archived. Operational procedures under this monitoring plan are defined as those that enable measuring and estimating net carbon stock changes associated with the plantations under the project activity, as well as general monitoring of forestry operations. The project participants shall keep records of all activities, like changes in the actual planted areas, site preparation and forest management. Further the use of fossil fuels and fertilizer shall be recorded and archived.

Measurement and estimation of carbon content changes.

Aboveground and underground biomass of trees established in the project. Therefore, only monitor individual growth of each tree in the plots. This value shall be estimated from the increase in the determined stem in each monitoring. The changes of carbon content in other components of the biomass (branches and leaves) and underground (roots) of trees of each plot will be estimated by the Method of Biomass Expansion Factors (Biomass Expansion Factor Method-BEF). This procedure is accepted by the IPCC111.

Plot size

Permanent sample plots (PSPs) will be used for sampling over time to measure and monitor changes of the relevant carbon stocks. Permanent plots will be installed prior to the first verification but may not be installed at time 0. GPS readings will be taken at the centre of the plot and the radius of the plot will be

¹¹¹The Intergovernmental Panel on Climate Change (IPCC) 2003. IPCC Good Practice Guidance for LULUCF.

set. The sample plots are used to take measurements such as tree height, DBH¹¹² and species type. For all trees the DBH measurement will be taken at a height of 1.3 m. This is good practice in inventory and assures that the same point is measured continuously. The field forms for every PSP shall be recorded and kept in the PSP file.

With the above information, the sample size (number of sample plots to be established and measured) can be estimated as follows:

$$n = \left(\frac{t_{\alpha}}{E} \right)^2 * \left(\sum_{i=1}^I W_i * s_i * \sqrt{C_i} \right) * \left(\sum_{i=1}^I W_i * \frac{s_i}{\sqrt{C_i}} \right)$$

where:

N	Sample size (number of sample plots required for monitoring)
t _α	t value for a significance level of α (0.05) or confidence level of 95%
N _i	Number of sample units for stratum i, calculated by dividing the area of stratum i by the area of each plot
N	Total number of sample units of all stratum levels, N = ΣN _i
s _i	Standard deviation of stratum i
E	Allowable error (±10% of the mean)
C _i	Cost to select a plot of the stratum i
I	Stratum i (total number of strata I)
W _i	N _i /N

The number of plots will be allocated among the strata as per the equation below:

$$n_i = n * \frac{W_i * \frac{s_i}{\sqrt{C_i}}}{\sum_{i=1}^I W_i * \frac{s_i}{\sqrt{C_i}}}$$

where:

n _i	Number of sample units (permanent sample plots) per stratum, that are allocated proportion to W _i * s _i /√C _i
C _i	Cost to select a plot of the stratum i
N	Sample size (number of sample plots required for monitoring)
s _i	Standard deviation of stratum i
I	Stratum i (total number of strata I)
W _i	N _i /N

When no information on costs is available or the costs may be assumed as constant for all strata, then:

$$n = \frac{\left[\sum_{i=1}^I N_i * s_i \right]^2}{\left(N * \frac{E}{t_{\alpha}} \right)^2 + \sum_{i=1}^I N_i * (s_i)^2}$$

where:

¹¹² Diameter at Breast Height

N	Sample size (number of sample plots required for monitoring)
t_α	t value for a significance level of α (0.05) or confidence level of 95%
N_i	Number of sample units for stratum i, calculated by dividing the area of stratum i by the area of each plot
N	Total number of sample units of all stratum levels, $N = \sum N_i$
s_i	Standard deviation of stratum i
E	Allowable error ($\pm 10\%$ of the mean)
I	Stratum i (total number of strata I)

The number of plots will be allocated among the strata as per the equation below:

$$n_i = \frac{\sum_{i=1}^I N_i * s_i}{\left(N * \frac{E}{t_\alpha} \right)^2 + \sum_{i=1}^I N_i * (s_i)^2} * N_i * s_i$$

where:

n_i	Number of sample units (permanent sample plots) per stratum, that are allocated proportion to $Wh * s_i / \sqrt{C_i}$
N_i	Number of sample units for stratum i, calculated by dividing the area of stratum i by the area of each plot
s_i	Standard deviation of stratum i
N	Total number of sample units of all stratum levels, $N = \sum N_i$
E	Allowable error ($\pm 10\%$ of the mean)
t_α	t value for a significance level of α (0.05) or confidence level of 95%
I	Stratum i (total number of strata I)

The project participants anticipate using circular shaped PSP of 249 m² (radius of 8.9 m), since these are easy to establish and re-measure within the terrain of the project boundary. Sample plots of the same size within the recommended range will be adopted..

Standard operating procedure SOP:

SOP Establishment of Plots" will be used to establish all plots. The plots will be systematically located with a random start in each stratum and/or sub-stratum to avoid subjective choice of plot locations (plot centers, plot reference points, movement of plot centers to more "convenient" positions). The plot locations will be identified with the help of a GPS device in the field. For each plot the geographic position (GPS coordinate), administrative location and compartment series number will be recorded and archived. The PSPs will be established before the first monitoring takes place and measured for each monitoring event. In the case of special circumstances (e.g., forest fires, uneven growth) additional PSPs may be laid out.

Standard operational procedures for monitoring emissions resulting from the project are the following:

Step 1: The type and amount of fossil fuels used in project activities, such as site preparation, planting, thinning and harvesting (but excluding transportation) will be monitored and recorded. Sources are, for example, log books, sales records, etc.

Step 2: The project activities that use fossil fuels will be identified and the parameters of activities such as number of hours of machines operation, fuel consumption per hour of the machines, type of vehicles used, amount of timber thinned or harvested etc. will be monitored and recorded. Sources are, for example, log books, sales records, etc.

Step 3: The emission factors (EF) of the fuels used in the project should be chosen. If national/regional EFs are not readily available, IPCC default EFs will be used.

Data Collection

Each pool will be measured following the methodology procedures and IPCC Good Practice Guidance for LULUCF (2003), Carbon stocks in above and below ground biomass of trees are estimated by applying the BEF method, Stem volume, will be calculated applying a manual of procedures developed for local conditions, based on DBH and height measurement in each plot, Stem volume of trees is converted to above-ground and below-ground tree biomass using basic wood density (D), biomass expansion factor (BEF) and root-to-shoot ratio (R), Default carbon fraction (CF) value will be used in order to estimate the carbon stock.

Deadwood, litter and carbon stock will be calculated according to the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”, The conservative default approach might be selected.

Prior to the start of the inventory, all equipment used during the fieldwork shall be checked and calibrated. The project will manage the sampling uncertainties evaluating and trying to reduce the type of errors.

Quality Assurance and Quality Control (QA/QC)

The implementing organization will be responsible for the centralized documentation of all project planning and implementation. QA/QC procedures will be implemented and the use of these procedures monitored to ensure that net anthropogenic GHG removals by sinks are measured and monitored precisely, credibly, verifiably, and transparently. Profesionales de Bolsa will coordinate QA/QC activities and is responsible for implementing and documenting these QA/QC procedures. Profesionales de Bolsa ensures that the QA/QC plan is developed and implemented. For this purpose Profesionales de Bolsa will designate a QA/QC coordinator.

The project will follow the IPCC GPG of using two types of procedures in order to ensure that the inventory estimates and their contributing data are of high quality.^{113 114 115} Quality assurance (QA) and Quality control (QC). Since a QA/QC plan is fundamental to create credibility, one will be developed that outlines QA/QC activities with a scheduled time frame from preparation to final reporting. The plan will describe specific QC procedures in addition to special QA review procedures. The QA/QC plan is an internal document to organize, plan, and implement QA/QC activities and will be represented here only in reduced form. Abstract of QA/QC plan features:^{116 117}

- a) Standard Operating Procedures (SOP) that will be established for all procedures such as: GIS analysis; field measurements; data entry; data documentation, and data storage.
- b) Training courses will be held for all relevant personnel on all data collection and analysis procedures.

¹¹³ IPCC GPG for LULUCF; Chapter 5.5 Quality assurance and quality control

¹¹⁴ IPCC GPG and Uncertainty management in National GHG Inventories; Ch. 8 QA and QC

¹¹⁵ IPCC GPG for LULUCF; Chapter 3.2 Forest land

¹¹⁶ IPCC GPG for LULUCF; Chapter 5.5 Quality assurance and quality control

¹¹⁷ IPCC GPG and Uncertainty management in National GHG Inventories; Ch. 8 QA and QC

- c) Steps will be taken to control for errors in the sampling and data analysis to develop a credible plan for measuring and monitoring carbon stock change in the project context. The same procedures shall be used during the project life to ensure continuity.

Field data collection

- d) The personnel involved in the measurement of carbon pools will be fully trained in field data collection and analysis. SOPs will be developed for each step of the field measurements and followed so that measurements are comparable over time. If different interpretations of the SOPs exist among the field teams, they will be jointly revised to ensure clearer guidance. This procedure will be repeated during the field data collection.
- e) To verify that plots have been installed and the measurements taken correctly:
A minimum of 10% of randomly selected plots will be re-measured by a supervisor with a team not involved in the initial measurement sampling.
- f) The re-measurement data will be compared with the original measurement data. Any errors found will be corrected and recorded. The level of errors recorded will be calculated and reported using this equation:

$$g) \text{ Measurement } t \quad Error(\%) = \frac{(Estimate1 - Estimate2)}{Estimate2} * 100$$

- h) The proper entry of data into the data analyses spreadsheets is required to produce reliable carbon estimates. All data sheets will include a "Data recorded by" field. Communication between all personnel involved in measuring and analyzing data will be used to resolve any apparent anomalies before final analysis of the monitoring data can be completed. If there are any problems with the monitoring plot data that cannot be resolved, the plot will not be used in the analysis. Expert judgment and comparison with independent data will be used to ensure data results are in line with expectations. Additionally, field data will be reviewed by a senior member of the monitoring team further ensuring that the data and analysis are realistic.
- i) Due to the long length of the project and the speed at which technology changes data archiving will be an essential component. Data will be archived in several forms and copies of all data will be provided to each project participant.
- j) Original copies of the field measurement (data sheets and electronic files) and laboratory data will be stored in a secure location.
- k) Copies will be stored in a dedicated and safe place (preferably offsite) of all data analysis and models, the final estimate of the amount of carbon sequestered, any GIS products, and the measuring and monitoring reports.
- l) Electronic copies of all data and reports will be updated periodically and converted to any new format required by future software or hardware. A project participant involved in the field measurements will be assigned to implement this updating.

Description of the operational and management structure(s) that the project operator will implement in order to monitor the proposed A/R VCS project activity

Profesionales de Bolsa implements the proposed A/R project activity utilizing the locally available and experienced staff. The A/R VCS project is implemented under the authorization and supervision of the technical manager of Profesionales de Bolsa. (Juan Mancipe). The technical manager organizes technical training and consultation, and is responsible for the organization and coordination of measuring and monitoring the actual GHG removals by sinks. Any activity related to monitoring and measuring data will be reported to and archived under Profesionales de Bolsa. in both electronic and paper formats.

Under the proposed A/R project activity the project entity will provide technical instruction on reforestation and forest management, conduct the specific supervision of the implementation of the proposed A/R project activity, collect specific activity data at routine basis, be responsible for measuring and monitoring of the actual GHG removals by sinks, establish an expert team when necessary (e.g., to address any technical issues), conduct checks, and verify the accuracy of measured and monitored data.

Uncertainty assessment

The project follows the methods from IPCC GPG for LULUCF, GPG 2003, and the modalities and procedures for A/R project activities to estimate baseline net GHG removal by sinks, leakage, actual net GHG removal by sinks, and net anthropogenic removal by sinks. In the context of this methodology, the major sources of uncertainties related to changes in carbon stock in the living biomass pool include: natural factors such as fire and pest outbreaks; stand variables such as variation in the yield tables, allometric equation, biomass expansion factor (BEF), wood density, carbon fraction; and the errors contributed by the measurement. Estimates of uncertainty will be developed for all land-use categories involved in the inventory part of the monitoring.

Other elements of monitoring plan

The baseline will be the continuation of economic activities that take place today; which are due to historical use of the soil, and is unlikely they will have a change. Additionally, it is considered that the changes in the removal of carbon in the baseline scenario are equal to zero.

However, if in the course of the project is decided to renew the Accreditation Period of this, it must necessary an upgrade of the baseline to determine whether the baseline approach used is still valid or if the conditions have changed due to changes in regulations and sector policies, technical factors, environmental or market.

CM3. Community Impact Monitoring

The community monitoring plan seeks to measure the direct impacts of the project through surveys of employees. The variables to be monitored have been selected based on an evaluation of potential positive and negative direct impacts of the project activity and based on the categories of the Sustainable Livelihoods Approach including social capital, financial capital, natural capital and human capital. These variables include income, employment, local participation, professional know-how, job security and environmental factors.

Community monitoring will be carried out in each verification year and will include a representative sample of employees in both Antioquia and Arauca. The surveys will be offered in both written and oral form in order to gain the feedback and insights from the many employees who do not read and write.

Project commits to 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.

B3. Biodiversity Impact Monitoring.

B3.1. The monitoring plan will track biodiversity variables through forest inventories and monitoring of increased plantation cover, species abundance, population size and diversity. Inventories will be made in each verification year of both flora and fauna species. Inventories of flora will be realized in permanent

samples plots which will be established as part of the carbon stock monitoring. These inventories will be completed by qualified personnel.

A system to register all wildlife sightings in the project areas in order to monitor the species of fauna found will be implemented. The registries for wildlife sightings will be maintained in the project site. Employees will be trained to write down when they see an animal, describe it and, if possible, photograph it. Cameras will be provided on the job site. We consider this to be the optimal approach for monitoring of fauna since monitoring cannot be done in a limited sample plot on a particular day. This process is continuous and seeks to take advantage of the presence of workers in order to keep a constant watch for different species of fauna. These registries will be compiled by central office and reported every verification period.

B3.2. There are no offsite negative impacts identified

B 3.3 The project commits to developing a full monitoring plan within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.

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7.2 Data and Parameters Available at Validation (CL3)

Data Unit / Parameter:	BEF1, j
Data unit:	Dimensionless
Description:	Biomass expansion factor for conversion of annual net increment (including bark) in stem biomass to total above-ground tree biomass increment for species j
Source of data:	The source of data shall be any of the following: (a) Existing local and species-specific or group of species-specific; (b) National and species-specific or group of species-specific (e.g., from national GHG inventory); (c) Species-specific or group of species-specific from neighbouring countries with similar conditions; (d) Globally species-specific or group of species-specific (e.g., IPCC literature: Table 3A.1.107 of the GPG-LULUCF (IPCC 2003), and Table 4.58 of the AFOLU Guidelines (IPCC 2006).)
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	/ Data is used for project emission calculation
Any comment:	BEFs in IPCC literature and national inventory data are usually applicable to closed canopy forest. If applied to individual trees growing in open field it is recommended that the selected BEF be increased by a further 30%

Data Unit / Parameter:	Ai
Data unit:	ha
Description:	Area of stratum i
Source of data:	Monitoring of strata and stand boundaries is done using a Geographical Information System (GIS) which allows for integrating data from different sources (including GPS coordinates and Remote Sensing data)
Value applied:	10.000
Justification of choice of data or description of measurement methods and procedures applied:	/ Data is used for project emission calculation
Any comment:	

Data Unit / Parameter:	CF j
Data unit:	t C t ⁻¹ d.m.
Description:	Carbon fraction of dry matter for species of type j
Source of data:	The source of data shall be any of the following: (a) National and species-specific or group of species-specific (e.g., from national GHG inventory); (b) Species-specific or group of species-specific from neighbouring countries with similar conditions; (c) Globally species-specific or group of species-specific (e.g., IPCC GPG-LULUCF 2003);
Value applied:	The default IPCC value 0.5 t C t ⁻¹ d.m.
Justification of choice of data or description of measurement methods and procedures applied:	/ Data is used for project emission calculation
Any comment:	Carbon fraction of dry matter for dominant species DS when j=DS

Data Unit / Parameter:	D j
Data unit:	t d.m. m ⁻¹
Description:	Basic wood density for species j
Source of data:	The source of data shall be any of the following: (a) National and species-specific or group of species-specific (e.g., from national GHG inventory); (b) Species-specific or group of species-specific from neighboring countries with similar conditions; (c) Globally species-specific or group of species-specific (e.g., IPCC GPG-LULUCF 2003)
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	Data is used for project emission calculation
Any comment:	Basic wood density for dominant species DS when j=DS

Data Unit / Parameter:	f j (DBH, H)
Data unit:	t d.m.
Description:	Allometric equation for species j linking diameter at breast height (DBH) and possibly tree height (H) to above-ground biomass of a living tree
Source of data:	Whenever available, use allometric equations that are species-specific or group of species-specific, provided the equations have been derived using a wide range of diameters and heights, based on datasets that comprise at least 20 trees. Otherwise, default equations from IPCC literature, national inventory reports or published peer-reviewed studies may be used—such as those provided in Tables 4.A.1 to 4.A.3 of the GPG-LULUCF (IPCC 2003)

Value applied:	na
Justification of choice of data or description of measurement methods and procedures applied:	Data is used for project emission calculation
Any comment:	

Data Unit / Parameter:	CO ₂ e
Data unit:	The factor of 3.667 (44/12) is applied to convert the tree carbon sequestered to tree CO ₂ -e sequestered
Description:	The factor of 3.667 (44/12) is applied to convert the tree carbon sequestered to tree CO ₂ e sequestered
Source of data:	IPCC default value
Value applied:	3.667 (44/12)
Justification of choice of data or description of measurement methods and procedures applied:	Data is used for project emission calculation
Any comment:	Any comment: If default allometric equations are available for conditions that are similar to the project (same vegetation genus; same climate zone; similar forest type), then the equation may be used and considered conservative. Otherwise, it is necessary either to use conservatively assessed values, or to verify the applicability of the equation if mean predicted values are to be used. Allometric equations can be verified by: • Selecting at least 5 trees covering the range of DBH existing in the project area, and felling and weighing the above-ground biomass to determine the total (wet) weight of the stem and branch components; • Extracting and immediately weighing 9 sub-samples from each of the wet stem and branch components,10 followed by oven drying at 70°C to determine dry biomass; • Determining the total dry weight of each tree from the wet weights and the averaged ratios of wet and dry weights of the stem and branch components. If the biomass of the harvested trees is within about ±10% of the mean values predicted by the selected default allometric equation, and is not biased—or if biased is wrong on the conservative side (i.e., use of the equation results in an underestimate rather than overestimate of project net anthropogenic removals by sinks)—then mean values from the default equation may be used

Data Unit / Parameter:	R _j
Data unit:	kg d.m.yr ⁻¹ (kg d.m.yr ⁻¹) ⁻¹
Description:	Root-shoot ratio appropriate for biomass stock, for species j

Source of data:	The source of data shall be any of the following: (a) National and species-specific or group of species-specific (e.g., from national GHG inventory); (b) Species-specific or group of species-specific from neighbouring countries with similar conditions; (c) Species-specific or group of species-specific from global studies
Value applied:	See comments below
Justification of choice of data or description of measurement methods and procedures applied:	Data is used for project emission calculation
Any comment:	Conservative choice of default values: 1. If in the sources of data mentioned above, default data are available for conditions that are similar to the project (same vegetation genus, same climate zone, similar forest type), then mean values of default data may be used and are considered conservative; 2. Global values may be selected from Table 3A.1.8 of the GPG-LULUCF (IPCC 2003), or equivalently from Table 4.4 of the AFOLU Guidelines (IPCC 2006), by choosing a climatic zone and species that most closely matches the project circumstances; 3. Alternatively, given that many datasets of root-shoot ratios are relatively small because of the difficulty of determining this parameter, conservative selection of a value from the global study by Cairns et al. (1997) is likely to provide a reliable default value. For the purpose of estimating baseline removals by sinks, a conservative value is about one standard deviation (circa 0.04) above the mean (0.26); i.e., a value of 0.3 kg d.m. kg ⁻¹ d.m. For the purpose of estimating the project removals by sinks, use a value about one standard deviation below the mean; i.e., 0.22 kg d.m. kg ⁻¹ d.m.

Data Unit / Parameter:	fN,i
Data unit:	Dimensionless
Description:	Relative stock change factor for baseline input regime (e.g. crop residue returns, manure) in stratum i of the areas of land
Source of data:	Tables 6 of "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM Project" activities
Value applied:	1
Justification of choice of data or description of measurement methods and procedures applied:	NA
Any comment:	NA

Data Unit / Parameter:	fMG,i
Data unit:	Dimensionless
Description:	Relative stock change factor for baseline management regime in stratum i of the areas of land; dimensionless
Source of data:	Table 6 of "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM Project" activities.
Value applied:	0.97
Justification of choice of data or description of measurement methods and procedures applied:	NA
Any comment:	NA

Data Unit / Parameter:	SOCREF
Data unit:	t C ha ⁻¹
Description:	Reference SOC stock corresponding to the reference condition in native lands (i.e. non-degraded, unimproved lands under native vegetation, normally forest) by climate region and soil type applicable to stratum i of the areas of land
Source of data:	Table 3 of "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM Project" activities.
Value applied:	47
Justification of choice of data or description of measurement methods and procedures applied:	NA
Any comment:	NA

Data Unit / Parameter:	fLU,i
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Data unit:	Dimensionless
Description:	Relative stock change factor for baseline land use in stratum i of the areas of land
Source of data:	Tables 6 of "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM Project" activities
Value applied:	1
Justification of choice of data or description of measurement methods and procedures applied:	NA
Any comment:	NA

Data and Parameters Monitored (CL3, CM3 & B3)

Data Unit / Parameter:	DBH
Data unit:	cm
Description:	Diameter at breast height of tree
Source of data:	Field measurements in sample plots
Description of measurement methods and procedures to be applied:	Usually the diameter at breast height of the tree, but it could be any other diameter or dimensional measurement (e.g. basal diameter, root-collar diameter, basal area, etc.) applicable for the model or data source used. Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In the absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, are applied.
Frequency of monitoring/recording:	Before every verification event
Value applied:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	Quality control/quality assurance (QA/QC) procedures prescribed under national forest inventory are applied. In the absence of these, QA/QC procedures from published handbooks, or from the IPCC GPG LULUCF 2003, are applied
Calculation method:	<i>If applicable</i>
Any comment:	

Data Unit / Parameter:	H
Data unit:	m
Description:	Height of trees
Source of data:	Field measurements in sample plots
Description of measurement methods and procedures to be applied:	Standard operating procedures (SOPs) prescribed under national forest inventory are

	applied. In the absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, are applied
Frequency of monitoring/recording:	Before every verification event
Value applied:	<i>Provide estimated value for the purpose of calculating ex-ante GHG emission reductions or removals</i>
Monitoring equipment:	<i>Identify equipment used to monitor the data/parameter including type, accuracy class, serial number of equipment</i>
QA/QC procedures to be applied:	Quality control/quality assurance (QA/QC) procedures prescribed under national forest inventory are applied. In the absence of these, QA/QC procedures from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied
Calculation method:	NA
Any comment:	

Data Unit / Parameter:	N
Data unit:	Dimensionless
Description:	Total number of wood pieces intersecting the transect
Source of data:	Field measurements
Description of measurement methods and procedures to be applied:	<i>Identify how the data/parameter is measured</i>
Frequency of monitoring/recording:	<i>Identify measurement and recording frequency</i>
Value applied:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	NA
Any comment:	

Data Unit / Parameter:	T
Data unit:	Year
Description:	Time period elapsed between two successive estimations of carbon stock in trees and shrubs
Source of data:	Recorded time
Description of measurement methods and procedures to be applied:	NA
Frequency of monitoring/recording:	NA
Value applied:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	NA
Calculation method:	NA
Any comment:	If the two successive estimations of carbon stock in trees are carried out at different points of time

	in year t2 and t1, (e.g. in the month of April in year t1 and in the month of September in year t2), then a fractional value is assigned to T
--	---

Data Unit / Parameter:	Ap,i
Data unit:	ha
Description:	Area of sample plot
Source of data:	Field measurement
Description of measurement methods and procedures to be applied:	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In the absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, are applied
Frequency of monitoring/recording:	<i>Identify measurement and recording frequency</i>
Value applied:	NA
Monitoring equipment:	NA
QA/QC procedures to be applied:	Quality control/quality assurance (QA/QC) procedures prescribed under national forest inventory are applied. In the absence of these, QA/QC procedures from published handbooks, or from the IPCC GPG LULUCF 2003, are applied
Calculation method:	NA
Any comment:	

ANEXX I

INFORME: CONSULTA LOCAL



Figure 15 First slide of the stakeholder presentation

Confidencial
29 Marzo 2012

Este informe ha sido desarrollado por
Victor David Giraldo T.
Forestry Project Manager
South Pole Carbon Asset Management Ltd

Texto de invitación

FONDO DE CAPITAL PRIVADO. VALOR FORESTAL. CAUCHO NATURAL REFORESTACIÓN DE ÁREAS DEGRADADAS CON CAUCHO

Profesionales de Bolsa se enorgullece de ser parte del desarrollo agroindustrial de nuestro país. Nuestro Fondo de Capital Privado Valor Forestal es una inversión innovadora diseñada para desarrollar y explotar directa o indirectamente plantaciones de caucho en Colombia.

El fondo está proyectado para tener 10.000 hectáreas productivas de caucho natural en el departamento del **Vichada-Municipio La Primavera-Inspección de San Teodoro**.

Localización del proyecto

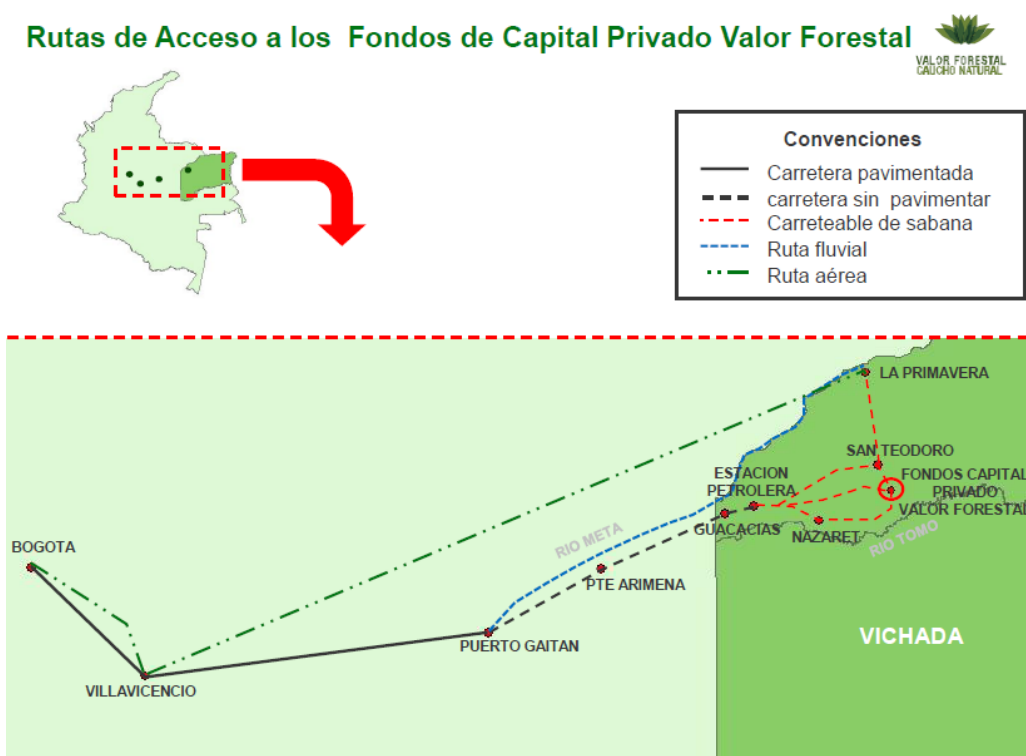


Figure 16 access routes to the private equity funds

El proyecto busca impactar positivamente las comunidades a través de:

- Impulsar alternativas sostenibles de trabajo en el campo
- Mantener a la población en sus lugares de origen, evitando el desplazamiento de los campesinos a la ciudad
- Mejorar las condiciones de la población a través de una estabilidad laboral que los beneficie con protección social y servicio de salud.
- Creación inicial de 400 empleos directos, pero al finalizar el proyecto son más de 1.000 familias vinculadas directamente.

- Desarrollos de infraestructura a fin de crear un crecimiento en la región y así mismo mayor bienestar social.

Adicionalmente este proyecto tiene por objetivo contribuir en la disminución de la contaminación mundial a través de la capacidad que tienen los árboles de absorber **CO2 (LO QUE COMUNMENTE USTED OBSERVA COMO HUMO)** producto de las quemas y otras actividades.)

El área del proyecto históricamente ha sido dedicada a **ganadería extensiva** con agricultura de subsistencia. El proyecto busca generar un cambio en el uso del suelo al **establecer cobertura forestal** que genera impactos positivos en términos de reducir la contaminación y el efecto negativo del Humo por transporte, quemas en el mundo.

Por tal motivo se considera la generación **de bonos de carbono** para la adquisición de **recursos adicionales** que permitan el **éxito** de las actividades propuestas por el proyecto a **nivel técnico** y de impacto **socioambiental** en la población.

Actores invitados al proceso de consulta

En general las personas invitadas hacen parte de diferentes sectores de la comunidad: Entre ellos se encuentran los trabajadores del proyecto como directos beneficiarios del mismo.

Vecinos directos del proyecto: Fincas de la vereda Flor Amarillo, El Triunfo y San Teodoro. El proceso de consulta con los vecinos directos del proyecto se realizó cara a cara y visitando cada una de las fincas.

Los representantes de la Junta de Acción comunal JAC: Este es un organismo que gestiona y administra el desarrollo del centro poblado de San Teodoro.

Director del Colegio La Misión: Esta es la única entidad educativa en la región. Funciona como internado y alberga alrededor de 250 jóvenes y el equipo de docentes.

Estudiantes del Colegio La Misión: Estos constituirán el capital humano que tendrá una oportunidad de formación en áreas técnicas y administrativas que requerirá el proyecto.

Inspectora de Policía de San Teodoro: Autoridad Municipal de carácter permanente.

Miembros de la comunidad de San Teodoro: en este grupo se encuentran los comerciantes que se han visto directamente beneficiados a través de la reactivación del consumo de víveres por parte de los trabajadores del proyecto.

Miembros de comunidades del municipio de La Primavera y Santa Rosalía: Estos centros poblados a pesar de no estar directamente limitando con el proyecto son fuente de la mano de obra que requiere el proyecto.

Table 24 prior guest list

Nombre	Ocupación	Relación con el proyecto	Dirección, teléfono
Luis Armenio Tellez	Presidente JAC	Representante de la comunidad	Finca Lusitania- Inspección de San Teodoro_ Mpio La Primavera
Fabián Muñoz	Vocal JAC	Representante de la comunidad	Inspección de San Teodoro- Mpio La Primavera
Luis Bageón Reuto	Vicepresidente JAC	Representante de la	Inspección de San

		comunidad	Teodoro- Mpio La Primavera
Mélida Castro	Tesorera JAC	Representante de la comunidad	Finca La Busca Vereda el Triunfo-Mpio La Primavera
Carlos Enrique Martínez	Fiscal JAC	Representante de la comunidad	Inspección de San Teodoro- Mpio La Primavera
Luis Martínez	Secretario JAC	Representante de la comunidad	Inspección de San Teodoro- Mpio La Primavera
Horacio Aros	Director del Colegio La Misión (Teodoro Weiner)	Representante del sector educativo	Inspección de San Teodoro-Mpio La primavera
Federico Ardila	Personero Colegio La Misión	Estudiante	Inspección de San Teodoro-Mpio La primavera
María Humo	Inspectora de Policía de la inspección de San Teodoro	Representante de la autoridad civil	Inspección de San Teodoro-Mpio La primavera
Bonifacio Dominguez	Comerciante	Representante sector comercial –inspección de San teodoro	Inspección de San Teodoro-Mpio La primavera
Wilson Gutiérrez	Comerciante	Representante sector comercial –inspección de San teodoro	Inspección de San Teodoro-Mpio La primavera
Mercedez Sánchez	Comerciante	Representante sector comercial –inspección de San teodoro	Inspección de San Teodoro-Mpio La primavera
Habitantes de la inspección de San Teodoro			
Trabajadores del proyecto pertenecientes al municipio de la primavera y Santa Rosalía			

Adicionalmente de manera independiente dadas las distancias en la región, se desarrollaron reuniones con miembros de la autoridad ambiental competente (CORPORINOQUIA) y miembros de la Administración municipal del municipio de La Primavera.

Table 25 members of the environmental authorities who participated in the meeting

Nombre	Ocupación	Relación con el proyecto	Dirección, teléfono
Fernando Quiroga	Secretario de Gobierno del municipio La Primavera	Vínculo institucional con el sector público	
Marcela	Profesional de apoyo	Representa la autoridad ambiental	

Resultados de la Consulta

Para la exposición del proyecto a la comunidad se generó un documento resumen en lenguaje simple donde se presentaba el nombre del proyecto y los principales impactos a nivel social, económico y ambiental que este ha generado en la misma. Adicionalmente se elaboraron carteleros simples con los elementos clave que se debían tener en cuenta en la reunión.

La inspección de San Teodoro no cuenta con medios masivos de comunicación que se pudieran utilizar para invitar a la comunidad a hacer presencia en la consulta local. Por tal motivo y con aproximadamente 2 semanas de antelación (27 de febrero de 2012) se generó una carta que contenía el resumen del proyecto y esta fue publicada en la pared de la única central telefónica de la comunidad y la cual se caracteriza por ser el espacio más visitado por los miembros de la misma.

Adicionalmente se invitó cara a cara a diferentes personas miembros de los principales actores identificados y que representaran los intereses de todos los sectores en la comunidad. El día 08 de marzo previo a la reunión programada para el 09 de marzo se reiteró la invitación cara a cara en la inspección de San Teodoro con el objetivo de garantizar el éxito en la asistencia.

Durante la consulta, una vez terminada la exposición desarrollada por el ingeniero encargado del proyecto (Juan Mancipe) se generaron las siguientes inquietudes por parte de la comunidad:

1. *hubo una iniciativa para los medianos productores de caucho pero no tuvo éxito. Qué pasó?*

R:/ ICR incentivó la capitalización rural. Cuando una empresa dentro de su esquema apoyaba o se asociaba con pequeños productores, esta podía acceder a un 40% de capitalización rural. Esto significaba que el gobierno les rebajaba de 100% a 60%. Sin embargo, para los pequeños productores hubo una limitante y esa fue el dinero. El banco solo les prestaba dinero si ellos contaban con un capital inicial por lo que no podían acceder a este recurso.

El modelo inicial que se planteaba era sembrar caucho donde los pequeños productores tenían la mitad y la empresa la otra mitad. La problemática se generó porque los pequeños productores no tienen dinero para acceder a ningún préstamo. La empresa intentó prestar el dinero también para los pequeños productores y responder por ellos.

En este sentido, el banco solicitaba una organización de productores para poder prestarles el dinero. La empresa apoyó este proceso de creación de la asociación para que el banco pudiera considerar prestar el dinero. Debido a problemas de corrupción por el manejo de los recursos para los agricultores (agroingreso seguro en Colombia), se redujo el porcentaje de colaboración por parte del estado para los pequeños productores del 40 al 20%. Esto impidió que los pequeños caucheros pudieran acceder al dinero necesario para plantar.

2. *Cuál es el aporte que tiene la empresa frente al mejoramiento de la calidad de vida de los diferentes estratos socioeconómicos?. Existen muchas falencias en infraestructura, educación y servicio de salud. La comunidad busca que la empresa pueda aportar en el mejoramiento de esta situación.*

R:/ En cuanto al mejoramiento de la calidad de vida de los habitantes, la empresa propone gestionar recursos económicos y a través de los dineros que se generen por los bonos de carbono, apoyar en el mejoramiento de la calidad de vida de los habitantes de la inspección y vecinos del proyecto.

Fue clara la necesidad para los líderes de la comunidad la iniciativa de apoyarse de estos procesos de gestión y recursos adicionales que la empresa pueda traer para estimular sus proyectos productivos y de mejoramiento en infraestructura, salud y educación.

Adicionalmente a este proceso de retroalimentación verbal, los asistentes a la consulta local tuvieron la oportunidad de expresar de manera escrita y anónima (dado la timidez que en muchos casos se evidencia en las comunidades campesinas para expresar sus inconformidades o inquietudes) su opinión con relación al efecto positivo y/o negativo que ellos pudieran percibir sobre el proyecto.

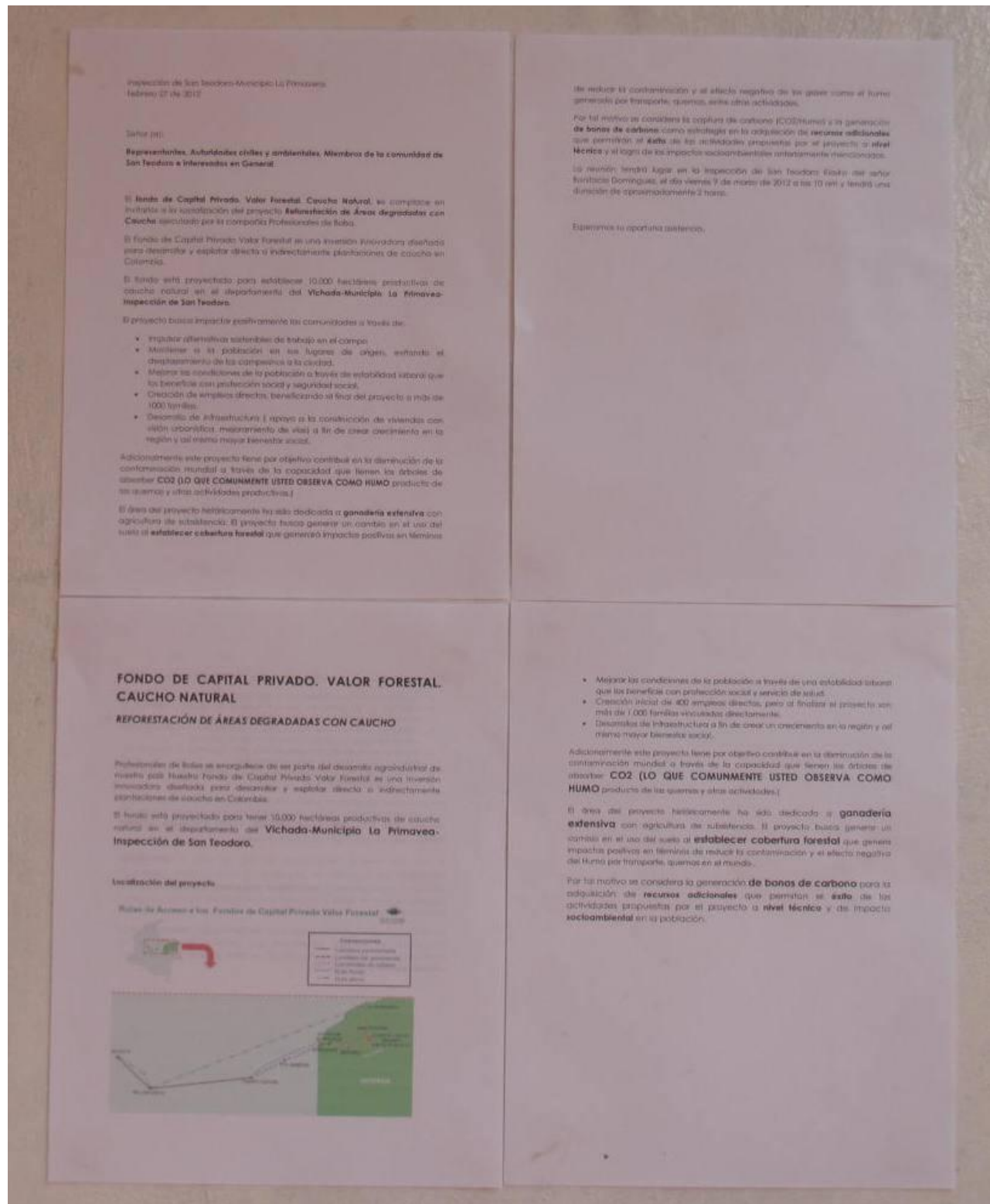
Finalmente, de este proceso se generó una acta de cierre y retroalimentación que fue escuchada, aprobada y firmada por todos los asistentes.

Registro Fotográfico del proceso de consulta





Photograph 8: Stakeholder consultation performed by the PO and the PD



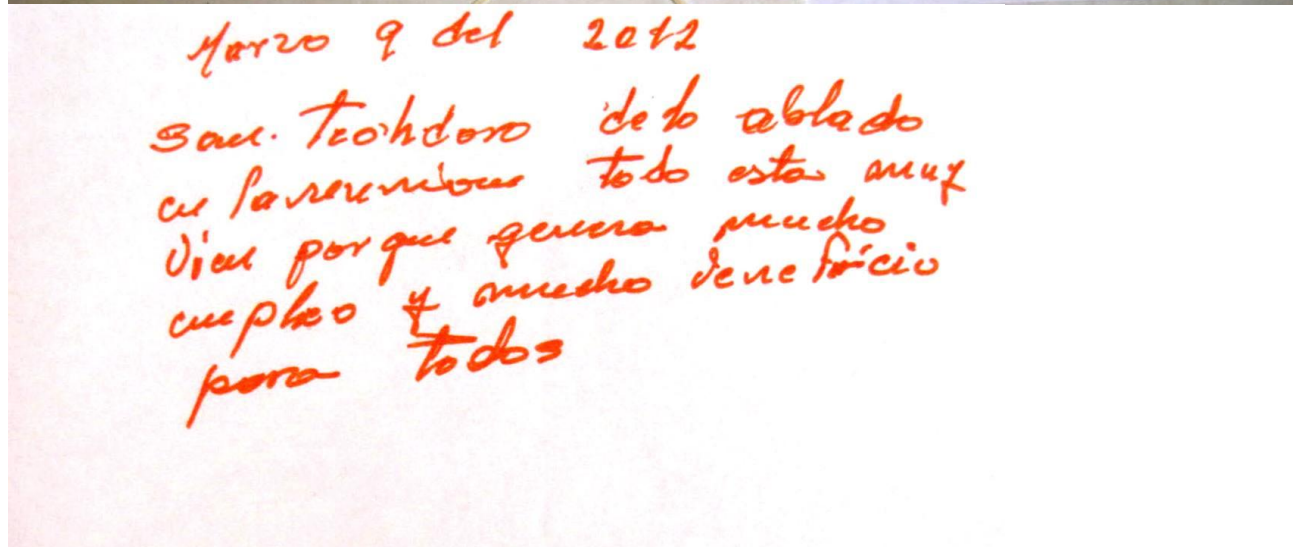
Photograph 9 Stakeholder consultation content and introduction



Photograph 10: Women and children participating in the stakeholder consultation



Photo 11: Stakeholders adding their comments and questions about the consultation



Proyecto.

Es que de verían de sembrar yuca
Platano Comino Los utiles en el
-Pueblo. Ser todo unidos.

SANTO DOMINGO - MARZO 09 DE 2012

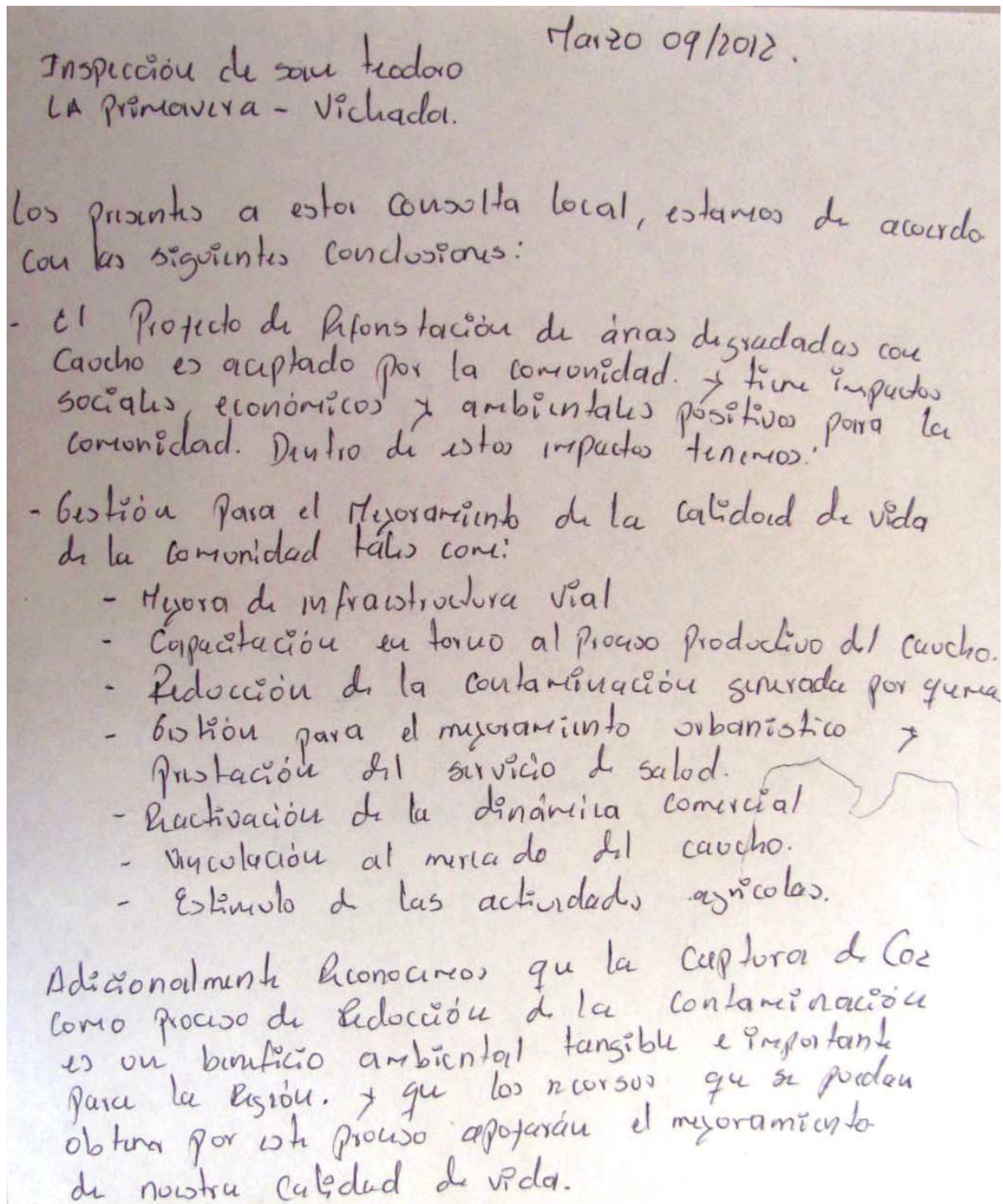
POR ENCIMA DE LAS DIFÍCUL-
TADES DE LA REGIÓN, Y EL AL-
TARGO TÍPICO DE LOS QUE NO
HACEN ~~ni~~ NI HAN VISTO HACER
EMPRESA; DAMOS GRACIAS A DIOS,
POR LAS GRANDES OPORTUNIDADES Y EJEM-
PLOS DE EMPRESA QUE INEVITABLEMENTE NOS
ARRASTRARÁN EN EL FUTURO, DEBIDO A
LA LLEGADA DE USTÉDES.

ESTOY DE ACUERDO DEL PROYECTO
QUE ESTAN HACIENDO ME PARECE
MUY BIEN ESTAMOS MUY DE
ACUERDO ES LO MEJOR QUE ALLEGO
GRACIAS



PARA MI ES MUY
BUENO POR TODO LOS
PROYECTOS + POR
ESTAR TRABAJANDO

Acta: consulta local marzo 09 de 2012.



Photograph 12 Notes and comments of the stakeholders and participants

Para Constancia firmar:		
Nombre.	Colocación.	Dirección, teléfono.
Jhon Fredy Mandujano	estudiante	La pasera 5208565.
LUIS MARTINEZ	HABITANTE	SANTO DORO.
Luis Tellez	SAN TEOD.	
Johán Muñoz	Finquero	santodoro
Mercedes Sánchez	santodoro	santodoro
María Mayr Fellz	planta de casa	santodoro
Maribel Sánchez	ama de casa	santodoro
JHANA AVILA	COMERCIANTE	SANTODORO
RAUL ALVAREZ	Finquero	santodoro
Milady Basto Diaz	Hogar	santodoro
CARLOS E. MARTINEZ	SANTODORO.	comerciante.
Rogelio Cardona	SANTODORO	santodoro
José Andrés Lora	Santodoro.	San Teodoro
CARLOS ALEXIS VARGAS PEREZ	CHAPARRI	SANTODORO
JOSE MANUEL ACUARO	MATA LARGA	SANTODORO
Sandro A. Grass	Hatunlarga	Santodoro.
CHRISTIAN REYES	estudiante	La pasera
David Diaz G.	estudiante	La pasera 5208565
Pedro Ortega	Inspector	Flor Amarillo -
	Inspector	0385221901
	SAN TEODORO	8122429398 -
		INSPECCION
		91332751.26 -
		Inst. T. Weyner
Andrés Gabriel Hino		
lic. exp. Adelaida Celma		
	Inspección Ed. Teodoro Weyner	

Lista de Asistencia

Fecha: marzo 09/2012

Lugar: Inspección de San Teodoro.

Objetivo de la reunión:

Nombre y apellidos	Institución/ocupación	Dirección (Datos de contacto)
LUIS MARTINEZ	SECRETARIO JUNTA	SANTEODORO.
Luis Tellez	presidente JAC	san teodoro
Fabian Muñoz	boccal JAC	San Teodoro
Mercedes Sanchez	Comunidad	san teodoro
Maria Ines Jallas B	COMUNIDAD	San Teodoro
MARCELLO SANCHEZ	comunidad	san teodoro
JOHANA AVILA	COMERCIANTE	SANTEODORO.
Raul Martinez	FIQUERO	
Maria Isabel Hinoj	INSPECTORA	SANTEODORO.
Rodrigo Gardena	70245653	San Teodoro
Jorge Duran	Superficial Justicia	San Teodoro
JUAN MANTILLA	EMBOLSADOR	SANTA ROSALIA de primavera.
Sandro A. Gasso	VIVANISTA	MISION la posada
CHRISTIAN A. ROSSI	THEODORO WEJMAN	MISION la posada
David Diaz G.	Theodoro wejman	MISION la posada
Jose Bonifacio Domínguez	ganadero.	san teodoro
Atelaida Colina	Ins. Teodoro W. Jacante	Inspección Teodoro Wejman
Pedro Ortega	Inspector	Flor Amarillo.
CARLOS ALVARO VARGAS PEREZ	EMPLGADO	CHIAPARAN
JOSÉ ANSEL VASQUEZ	EMPLGADO	SANTISODORO

Photograph 13: Participants list

Lista de Asistencia
Fecha: Marzo 09 de 2012
Lugar: Inspección de San Teodoro

Objetivo de la reunión: Consulta Local. Socialización del proyecto reforestación de áreas degradadas con caucho.

Table 26 Participants list of the stakeholders consultation

Nombre y apellidos	Institución/ocupación	Dirección (Datos de contacto)
Luis Martínez	Secretario JAC	Inspección de San Teodoro
Luis Tellez	Presidente JAC	Inspección de San Teodoro
Fabian Muñoz	Vocal JAC	Inspección de San Teodoro
Mercedez Sánchez	Miembro de la comunidad/Inspección de San Teodoro	Inspección de San Teodoro
Marelby Sánchez	Miembro de la comunidad/Inspección de San Teodoro	Inspección de San Teodoro
Johana Ávila	Comerciante	Inspección de San Teodoro
Maria Isabel Humo	Inspectora/Inspección de San Teodoro	Inspección de San Teodoro
Rogelio Cardona	Miembro de la comunidad/Inspección de San Teodoro	Inspección de San Teodoro
Juan Mantilla	Trabajador del Proyecto	Municipio de Santa Rosalía/Instalaciones del proyecto
Sandro A. Grass	Trabajador del Proyecto	Municipio de La Primavera/Instalaciones del proyecto
Kristian A. Reyes	Estudiante, Institución Teodoro W.	Misión La Pascua
David Díaz D	Estudiante, Institución Teodoro W.	Misión La Pascua
Jose Bonifacio Dominguez	Ganadero	Inspección de San Teodoro
Adelaida Colina	Docente: Institución Teodoro W.	Misión La Pascual
Pedro Ortega	Inspector	Inspección de Flor Amarillo
Carlos Alexis Vargas Pérez	Empleado proyecto Chaparral	Finca Chaparral
Jose Ariel Vásquez	Miembro de la comunidad/Inspección de San Teodoro	Inspección de San Teodoro