CCBA Project Implementation Report
for

Restoration of degraded areas and reforestation in Cáceres and Cravo Norte, Colombia

For verification under

The Climate, Community and Biodiversity Standard

Third Edition

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Version: 3
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CONTENTS

CCBA Project Implementation Plan for Restoration of degraded areas and reforestation in Cáceres and Cravo Norte, Colombia

Introduction

South Pole Carbon Asset Management Ltd. submitted a Project Description (PD) for the project "Restoration of degraded areas and reforestation in Cáceres and Cravo Norte, Colombia", for validation under the Climate, Community Biodiversity Standard (CCB). Because the PD was written after the project had been in the operational for about 8 years, the following Project Implementation Plan (PIR) will look very similar to the PD. This report covers the period first of February 2002 to 31 December 2010.

Project overview

The project envisions the reforestation of grasslands and degraded ex-mining lands in Colombia. The grasslands show low soil carbon content because of soil degradation and/or climate-edaphic conditions. The forestry project activity proposes to reforest ~ 1,230 ha in the area of Cáceres/Antioquia and ~ 9,640 ha in CravoNorte/Arauca.

Since 2002, Asorpar Ltd. has been reforesting land with various tree species planted in different stand models that allow for natural regeneration of flown-in seeds on the reforestation sites. Asorpar Ltd. puts emphasis on promoting mixed stands. This differentiates their approach from other commercial plantation forestry entities active in Colombia. The management of mixed stands is far more challenging than that of monocultures. This circumstance is reinforced by the fact that little is known about several tree species planted in the project, particularly with regard to their growth performance and silvicultural management. Hence, the proposed project activity offers a unique opportunity to obtain valuable knowledge about silvicultural management practices for mixed plantation forestry and suitability of native tree species for commercial plantation forestry.

The project activity is carried out in two areas: Cáceres and Cravo Norte. The previous land use in Cáceres was extensive livestock farming due to the availability of open grass vegetation caused by historic deforestation in the area. Gold mining is considered to be a feasible commercial activity in the region. The previous land use in Cravo Norte was extensive livestock farming. That activity was favoured by open grass vegetation due to climate-edaphic conditions. Similar lands, in the vicinity of Cáceres and Cravo Norte, have similar land cover and are not expected to be used for private, large-scale native species plantations as alternative land use.

The project activity is implemented by the private company Asorpar Ltd (Asesorías en Ornato Paisajismo y Reforestación, Ltda.). The legal representative is Juan Guillermo Molina, the technical manager is Luis Gonzalo Moscoso.

I. Basic Data:

1) The title of the CCB Standards project activity:

Restoration of degraded areas and reforestation in Cáceres and Cravo Norte, Colombia

2) The version number of the document:

Version III

3) The date of the document:

20 June, 2011

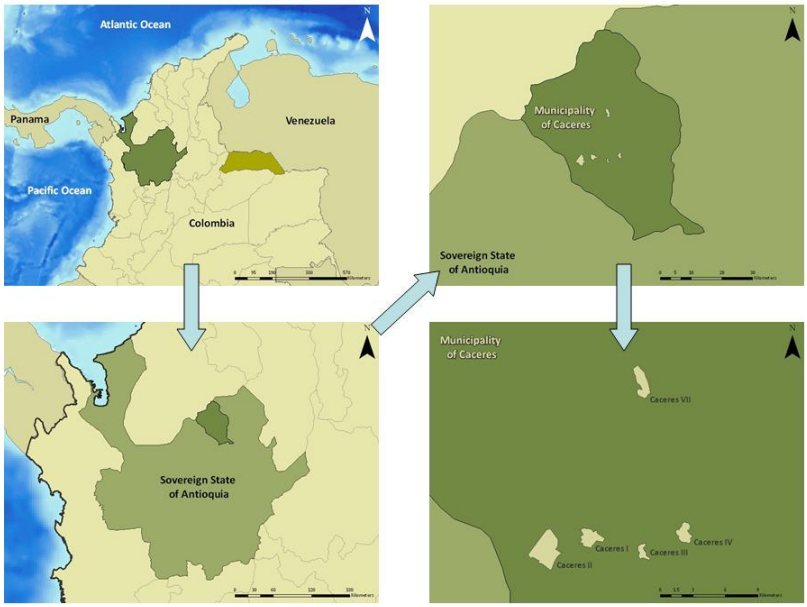
II. General Section:

G1 Original Conditions at Project Site (Required)

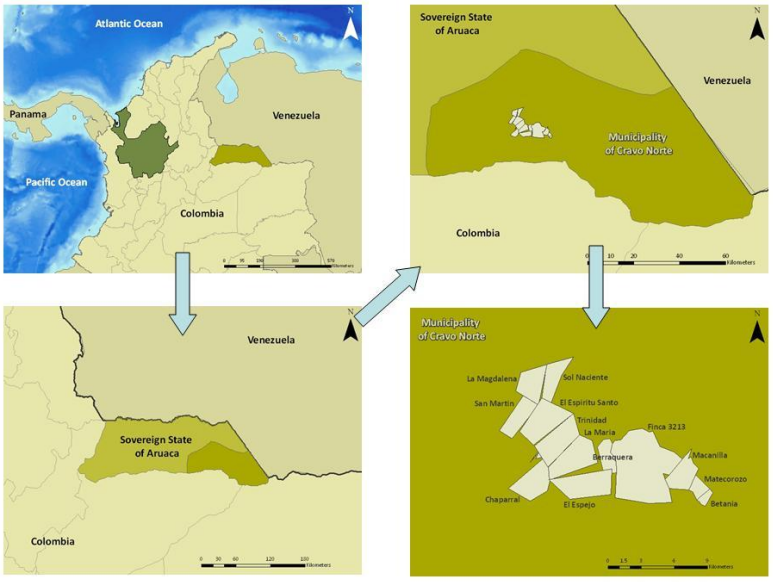
G.1.1 Describe the location of the project and basic physical parameters (e.g., soil, geology, climate)

Location: The project is located in two different Departments of Colombia. The first site is located in Cáceres Municipality in the Department of Antioquia. The second site is located in Cravo Norte Municipality in the Department of Arauca. Throughout this document the first project site will be referred to as "Cacares (Antioquia)" and the second as "Cravo Norte (Arauca)."

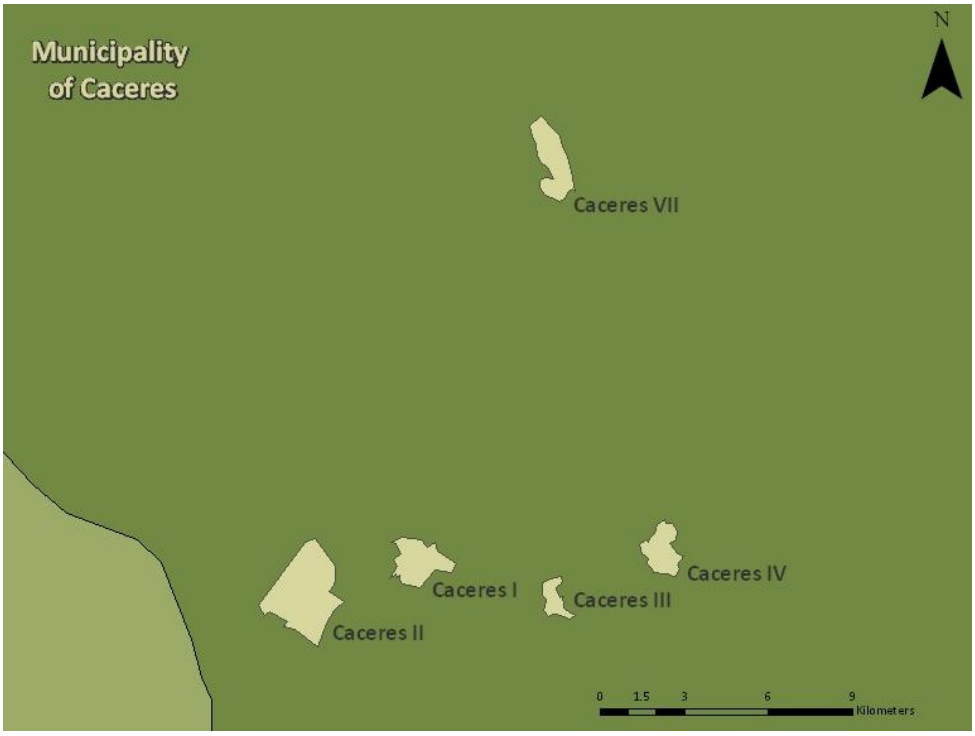
Maps 1-4 below illustrate the location of each farm on political and geographical maps respectively.



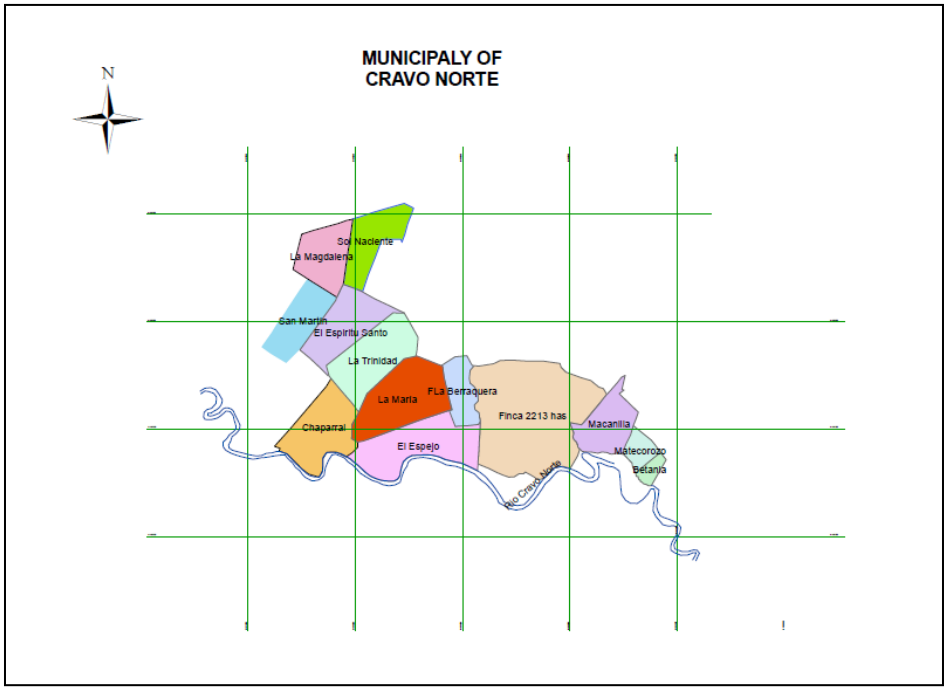
Map 1: Situational map of project area Cáceres (Antioquia)



Map 2: Situational map of project area Cravo Norte (Arauca)



Map 3: Cáceres (Antioquia) project parcel location



Map 4: Cravo Norte (Arauca) project parcel location

Hydrology:

- Caceres (Antioquia): several sub-basins of the Cauca River are located within the territory including the sub-basins of the rivers Man, Corrales, Tamaná and streams Nicapá, Agua Linda and La Magdalena, among others. These waterways provide water to the municipality and the counties Jardín and Puerto Belgium.[1]
- Cravo Norte (Arauca): in this area the hydrographic network is extensive. The whole river system empties in the west-east direction to the Orinoco river through the rivers Cravo Norte, Casanare, Meta, Vichada, Guaviare and Tomo, which collect water from other tributaries of importance in the department of Arauca, such as Tocoragua, Tame, Cravo Norte, Ele, Lipa, San Miguel and all Negro-Cimaruco. The El Medio and Cumare pipes, tributaries of the Casanare River, are important means of transport in the region.[2]

Climate:

- Caceres (Antioquia): this region experiences a summer season from November to March, and winter from March to November. During the wet season rainfall reaches up to 82.3% of the annual total.[3] The predominant climate in the region is warm. The average temperature is 28 º C with varying fluctuations in the range of 4 º C. The most dramatic temperature variations occur in the early hours of the day, with temperatures as low as 20 º C, and at noon, with temperatures as high as 32 º C.
- Cravo Norte (Arauca): this area falls into the category of dry or seasonal grasslands. The climatic conditions alternate annually between a wet season with high availability of water in the soil (6-9 months) and another, more or less prolonged, season characterized by a deficiency or decrease in water soil substrate. The rainfall record describes a unimodal curve.[4] The highest rainfall occurs between April and November. December and March have low rainfall because the northeast trade winds prevent the formation of clouds in the region. When it rains the intensity is high, thus, water erosion is a common degradation process in the region. The average annual precipitation is 1,532 mm.[5] The average annual temperature is 26.1 ° C, the maximum value (36.4 º C) occurs during March and minimum (18.6 º C) during January.

[1] Gonzalez F. Á. and A. Cortes. “Suelos del departamento de Caceres (Antioquia). Tomo I: Departamento de Caceres (Antioquia) y su aptitud de uso. Instituto Geográfico” “Agustín Codazzi” (IGAC). Bogotá DC (1979).

[2] National Corporation for Forestry Research and Development (CONIF), Ministry of Environment, International MDER (ITTO). "A Guide to commercial forest plantations Orinoco. Documentation Series No. 38. "Santafé de Bogotá (1998); Regional Autonomous Corporation of the Orinoco (CORPORINOQUIA). "Plan of Action 2004-2006." Yopal, Cravo Norte (Arauca) (2004). (http://corporinoquia.gov.co)Corporación Nacional De Investigación y Fomento Forestal (CONIF), Ministerio Del Medio Ambiente, Organización Internacional De Mderas Tropicales (OIMT). “Guía para plantaciones forestales comerciales Orinoquía. Serie de documentación No. 38.” Santafé de Bogotá (1998); Corporación Autónoma Regional de la Orinoquía (CORPORINOQUÍA). “Plan de Acción 2004-2006.” Yopal, Cravo Norte (Arauca) (2004). (http://corporinoquia.gov.co)

[3] Agudelo et. al. “Estudios en Rastrojeras incentivadas del Municipio de Cáceres.” Universidad Nacional de Colombia, Departamento de Ciencias Forestales. Corporación Autónoma Regional del Centro de Caceres (Antioquia) (CORCACERES (ANTIOQUIA)). (2000); Gonzalez F. Á. and A. Cortes. “Suelos del departamento de Caceres (Antioquia). Tomo I: Departamento de Caceres (Antioquia) y su aptitud de uso. Instituto Geográfico” “Agustín Codazzi” (IGAC). Bogotá DC (1979).

[4] Rippstein, G., G. Escobar, F. Motta.(Eds.) “Agroecología y Biodiversidad de las sabanas de los llanos orientales de Colombia.” Centro Internacional de Agricultura Tropical (CIAT), (2001).

[5] Corporación Autónoma Regional de la Orinoquía (CORPORINOQUÍA). “Plan de Acción 2004-2006.” Yopal, Cravo Norte (Arauca) (2004). (http://corporinoquia.gov.co)

Soil and Topography:

- Caceres (Antioquia): the terrain is made up of terraces, some of which are dissected as well as relief with sloping areas that are flat on top. In general the soils are from two textural families: fine with clay loam or clay skeletal, which exceed 50% of particles with diameters larger than 2 mm. Layers of pebbles exist up until one meter of depth, Structural development is regular with dark colors on the surface and brown and yellowish-red in the subsoil, which may have spots in the lower horizons. The area in Cáceres (Oxic Dystropept) consists of soils located in the oldest terraces, which are located in the high and intermediate levels. These are moderately deep and are limited by chemical factors or by the presence of gravel in the profile and are generally well drained. Fertility varies from low to very low, the reaction ranges from very strong to strongly acidic. The cation exchange capacity is between medium and low; total bases range from low to very low; the base saturation is medium to low; the organic carbon decreases regularly from high to very low; phosphorus is low. Aluminum reaches toxic levels for plants near the surface.[6]
- Cravo Norte (Arauca): the area consists of fluvial terraces and floodplains, which extend from the foothills of the eastern cordillera of the Andes to beyond the border with the Republic of Venezuela. Soils vary from very superficial to moderately deep, limited by stoniness. Textures are loamy sand, with quartz as the dominant material, mainly in the coarse fraction. They have moderate contents of organic matter; moderate to low cation exchange capacity; and are low in calcium, magnesium, potassium and phosphorous. The active aluminum content is high and fertility ranges from low to very low. Aluminum is the main component of the soil's exchangeable acidity, being one of the main factors contributing to poor plant growth. The pH values below 5.5 reduces crop growth by the presence of toxic amounts of aluminum.[7]

G.1.2 Describe the types and condition of vegetation at the project site:

The predominant vegetation at the project sites both in Caceres (Antioquia) and Cravo Norte (Arauca) is grassland. In Caceres (Antioquia) primary forest was felled decades ago to create grassland, which has been used over the past few decades for extensive cattle grazing or for gold mining. In Cravo Norte (Arauca) the grassland is part of natural savannahs. At both project sites there are some isolated trees and shrubs, however these have not been removed in order to carry out the project activity. Any existing stands of forest or natural regeneration have been excluded from the project area and have not be affected.

[6] Agudelo et. al. "Estudios en Rastrojeras incentivadas del Municipio de Cáceres." Universidad Nacional de Colombia, Departamento de Ciencias Forestales. Corporación Autónoma Regional del Centro de Caceres (Antioquia) (CORCACERES (ANTIOQUIA)). (2000); Gonzalez F. Á. and A. Cortes. "Suelos del departamento de Caceres (Antioquia). Tomo I: Departamento de Caceres (Antioquia) y su aptitud de uso. Instituto Geográfico" "Agustín Codazzi" (IGAC). Bogotá DC (1979).

[7] Corporación Nacional De Investigación y Fomento Forestal (CONIF), Ministerio Del Medio Ambiente, Organización Internacional De Mderas Tropicales (OIMT). "Guía para plantaciones forestales comerciales Orinoquía. Serie de documentación No. 38." Santafé de Bogotá (1998)

The principle species of grass found in project sites in Caceres (Antioquia) are *Hyparrenia Ruffa*, *Briachiara*, *Andropogum guayanus*, *Panicum maximum*, *Digitaria decumbens*, *Dichanthium aristatum*, *Brachiaria mutica* and *Echynochloa polystachya*.[8]

The principle species of grass found in project sites in Cravo Norte (Arauca) are *Hyparrhenia rufa*, *Melinis minutiflora*, *Paspalum plicatulum* and *Briachiara decumbens*, a particularly aggressive non-native grass introduced for cattle grazing purposes because it is highly adaptable and has a higher yield.[9]

In the case of Cravo Norte (Arauca), gallery forests occur in some areas close to the plantation. Gallery forests are evergreen forests that form as 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 allow for almost no forest cover. Furthermore, the lands have been subjected to annual fires originating from anthropogenic activities, or natural causes.

G.1.3 Boundaries of the project area and the project zone

Table 1: Boundary coordinates for location of project area

Name	Latitude	Longitude
Caceres I	7º36'20.36"N	75º17'54.96"W
	7º36'13.72"N	75º18'08.04"W
	7º36'12.85N	75º18'02.00"W
	7º36'00.54"N	75º17'55.64"W
	7º35'53.61"N	75º18'04.60"W
	7º35'46.73"N	75º18'00.17"W
	7º35'32.75"N	75º18'09.40"W
	7º35'37.62"N	75º18'01.76"W
	7º35'33.51"N	75º18'01.16"W
	7º35'35.87"N	75º17'57.34"W
	7º35'30.44"N	75º17'57.62"W
	7º35'26.19"N	75º17'54.37"W
	7º35'21.25"N	75º17'34.05"W
	7º35'41.71"N	75º17'16.89"W
	7º35'38.97"N	75º16'58.64"W
	7º35'50.14"N	75º16'52.35"W
	7º36'04.47"N	75º17'14.46"W
	7º36'14.74"N	75º17'17.13"W
	7º36'08.84"N	75º17'25.36"W
	7º36'16.60"N	75º17'32.59"W
Caceres II	7°36'18.28"N	75°19'35.41"W
	7°36'14.43"N	75°19'46.25"W
	7°35'01.896"N	75°20'40.214"W

[8] Moscoso, L. G. Reforestación, un proceso natural. Eurotex. Editorial Colina, (2005).
[9] Corporación Autónoma Regional de la Orinoquía (CORPORINOQUÍA). "Plan de Acción 2004-2006." Yopal, Cravo Norte (Arauca) (2004). (http://corporinoquia.gov.co)

	7°34’49.738"N	75°20’32.554"W
	7°34’53.901"N	75°20’27.309"W
	7°34’42.615"N	75°20’06.736"W
	7°34’36.869"N	75°20’10.876"W
	7°34’33.976"N	75°19`58.641"W
	7°34’13.36"N	75°19’31.984"W
	7°34’41.05"N	75°19’21.763"W
	7°34’55.521"N	75°19’13.175"W
	7°35’05.373"N	75°19’01.021"W
	7°35’17.568"N	75°19’19.159"W
	7°35’25.143"N	75°19’12.725"W
	7°35’31.045"N	75°19’12.078"W
	7°35’46.822"N	75°19’11.777"W
Caceres III	7º35'35.23"N	75º14’52.21"W
	7º35'32.02"N	75º15'04.14"W
	7º35'27.04"N	75º15'13.38"W
	7º35'12.74"N	75º15'13.14"W
	7º35'08.88"N	75º15'09.25"W
	7º35'06.30"N	75º15'09.24"W
	7º34'55.77"N	75º15'11.90"W
	7º34'48.14"N	75º15'06.41"W
	7º34'51.83"N	75º15'02.04"W
	7º34'51.54"N	75º14'57.76"W
	7º34'48.59"N	75º14'48.70"W
	7º34'45.43"N	75º14'42.03"W
	7º34'50.01"N	75º14'35.77"W
	7º34'52.98"N	75º14'39.86"W
	7º34'52.87"N	75º14'42.05"W
	7º34'58.12"N	75º14'48.92"W
	7º35'03.87"N	75º14'48.84"W
	7º35'08.44"N	75º14'50.25"W
	7º35'11.42"N	75º14'48.86"W
	7º35'11.81"N	75º14'50.35"W
	7º35'09.72"N	75º14'53.53"W
	7º35'19.83"N	75º14'57.34"W
	7º35'23.01"N	75º14'55.66"W
	7º35'24.61"N	75º14'52.68"W
	7º35'28.89"N	75º14'49.70"W
Caceres IV	7°36'17,023"N	75°12'39,638"W
	7°36'27,611"N	75°12'37,73"W
	7°36'35,49"N	75°12'43,979"W
	7°36'36,061"N	75°12'50,631"W
	7°36'39,751"N	75°12'52,577"W
	7°36'33,85"N	75°13'0,811"W
	7°36'24,517"N	75°13'4,743"W
	7°36'19,633"N	75°13'9,192"W
	7°36'13,831"N	75°13'11,702"W
	7°36'16,847"N	75°13'14,74"W
	7°36'11,031"N	75°13'22,469"W
	7°36'1,348"N	75°13'18,908"W
	7°35'58,199"N	75°13'15,112"W
	7°35'54,596"N	75°13'11,904"W

	7°35'54,597"N	75°13'11,735"W
	7°35'49,638"N	75°13'13,069"W
	7°35'44,361"N	75°13'7,163"W
	7°35'39,493"N	75°13'5,887"W
	7°35'39,588"N	75°13'1,763"W
	7°35'37,75"N	75°12'57,97"W
	7°35'37,266"N	75°12'50,224"W
	7°35'34,387"N	75°12'44,156"W
	7°35'34,903"N	75°12'39,444"W
	7°35'39,611"N	75°12'37,857"W
	7°35'43,399"N	75°12'34,668"W
	7°35'47,504"N	75°12'38,466"W
	7°35'58,61"N	75°12'31,509"W
	7°36'1,449"N	75°12'37,914"W
	7°36'5,628"N	75°12'41,797"W
	7°36'12,08"N	75°12'47,622"W
Caceres VII	7°42'48.34"N	75°14'24.73"W
	7°43'0.667"N	75°14'26.009"W
	7°43'15,143"N	75°14'29,21"W
	7°43'51,665"N	75°14'39,625"W
	7°43'57,171"N	75°14'40,316"W
	7°43'56,827"N	75°14'42,209"W
	7°43'58,261"N	75°14'49,495"W
	7°44'12,711"N	75°14'59,479"W
	7°44'11,42"N	75°15'12,798"W
	7°43'57,377"N	75°15'13,504"W
	7°43'49,701"N	75°15'13,623"W
	7°43'37,91"N	75°15'12,18"W
	7°43'27,922"N	75°15'9,668"W
	7°43'17,894"N	75°14'53,024"W
	7°43'25,17"N	75°14'32,535"W
	7°43'2,32"N	75°14'56,018"W
	7°42'36,962"N	75°14'45,204"W
	7°42'33,701"N	75°14'36,998"W
	7°43'45,166"N	75°14'35,601"W
	7°42'46,227"N	75°14'32,561"W
Finca El Espejo	6°22'0.17"N	70°18'48.619"W
	6°21'21.842"N	70°21'22.869"W
	6°21'46.481"N	70°18'7.383"W
	6°21'42.274N	70°18'44.719"W
	6°20'50.425N	70°21'28.996"W
	6°20'25.71N	70°20'22.212"W
	6°20'40.171N	70°18'23.107"W
	6°20'30.331N	70°18'10.176"W
Finca Sol Naciente	6°24'57.44"N	70°20'59.91"W
	6°26'30,311"N	70°20'48.70"W
	6°26'32.804"N	70°20'25.018"W
	6°27'22,039"N	70°20'15.66"W
	6°26'58.35"N	70°21'21.109"W
	6°26'6.055"N	70°21'31.08"W
	6°25'14.9"N	70°21'38.559"W
Finca El Espiritu Santo	6°24'57.44"N	70°20'59.91"W

	6°25'14.9"N	70°21'38.559"W
	6°24'54.33"N	70°21'44.16"W
	6°24'10.956"N	70°21'58.503"W
	6°23'32.315"N	70°22'39.636"W
	6°22'53.675"N	70°21'53.517"W
	6°24'32.769"N	70°20'9.437"W
	6°23'55.624"N	70°20'37.062"W
Finca La Magdalena	6°26'58.35"N	70°21'21.109"W
	6°26'6.055"N	70°21'31.08"W
	6°25'14.9"N	70°21'38.559"W
	6°26'29.064"N	70°22'34.65"W
	6°25'32.35"N	70°22'50.23"W
	6°24'54.33"N	70°21'44.16"W
Finca La Maria	6°23'35,297"N	70°19'55,863"W
	6°23'19,347"N	70°19'18,211"W
	6°22'12,933"N	70°19'2,261"W
	6°21'22,626"N	70°21'24,764"W
	6°22'1,062"N	70°21'27,64"W
Finca La Trinidad	6°23'55.624"N	70°20'37.062"W
	6°23'21.035"N	70°19'19.002"W
	6°22'59.066"N	70°19'3.109"W
	6°22'0.17"N	70°18'48.619"W
	6°21'21.842"N	70°21'22.869"W
	6°22'3.91"N	70°21'16.793"W
	6°22'45.511"N	70°21'52.784"W
Finca San Martin	6°24'54.33"N	70°21'44.16"W
	6°25'19.512"N	70°22'29.664"W
	6°23'36.055"N	70°23'38.84"W
	6°23'12.37"N	70°23'0.203"W
	6°24'10.956"N	70°21'58.503"W
Finca Macanilla	6°20'56.102''N	70°15' 30.212"W
	6°21'19.162''N	70°15' 44.546"W
	6°21'40.352''N	70°15' 49.532"W
	6°21'39.728''N	70°15' 29.58"W
	6°22'26.471''N	70°14' 53.441"W
	6°22'52.959''N	70°14' 27.38"W
	6°22'31.267''N	70°14' 28.76"W
	6°22'25.79''N	70°14' 36.445"W
	6°21'56.911''N	70°14' 7.47"W
	6°20'53.547''N	70°14' 34.514"W
Finca Matecorozo	6°20'53.547''N	70°14' 34.514"W
	6°20'57.191''N	70°13' 33.58"W
	6°20'24.319''N	70°14' 13.027"W
	6°20'46.864''N	70°14' 21.906"W
	6°21'37.147''N	70°14' 15.192"W
Finca Betania	6°20'57.191''N	70°13' 33.58"W
	6°20'24.319''N	70°14' 13.027"W
	6°20'45.034''N	70°13' 24.74"W
	6°20'6.033''N	70°13' 47.922"W
	6°20'11.579''N	70°13' 59.569"W
	6°20'18.457''N	70°14' 3.673"W
Finca 3213 Has	6°23'19.662"N	70°18'11.59"W

	6°23'9.671"N	70°18'18.163"W
	6°21'46.481"N	70°18'7.383"W
	6°20'30.331''N	70°18' 10.176"W
	6°20'12.476''N	70°16' 26.303"W
	6°20'16.215''N	70°15' 22.11"W
	6°20'56.102''N	70°15' 30.212"W
	6°21'19.162''N	70°15' 44.546"W
	6°21'40.352''N	70°15' 49.532"W
	6°21'39.728''N	70°15' 29.58"W
	6°22'26.471''N	70°14' 53.441"W
	6°22'45.168''N	70°15' 17.747"W
	6°22'58.87''N	70°15' 57.011"W
	6°23'46.868''N	70°16' 17.578"W
	6°23'43.75''N	70°16' 30.042"W
	6°23'53.724''N	70°16' 49.986"W
	6°23'47.491''N	70°17' 29.249"W
Finca Chaparral	6°21'21.842"N	70°21'22.869"W
	6°22'3.91"N	70°21'16.793"W
	6°22'45.511"N	70°21'52.784"W
	6°20'50.618"N	70°21'29.074"W
	6°20'19.229"N	70°22'19.079"W
	6°20'55.512"N	70°23'24.744"W
Finca Berraquera	6°22'59.066"N	70°19'3.109"W
	6°22'0.17"N	70°18'48.619"W
	6°23'21.765"N	70°18'46.822"W
	6°23'19.662"N	70°18'11.59"W
	6°23'9.671"N	70°18'18.163"W
	6°21'46.481"N	70°18'7.383"W
	6°21'42.274"N	70°18'44.719"W

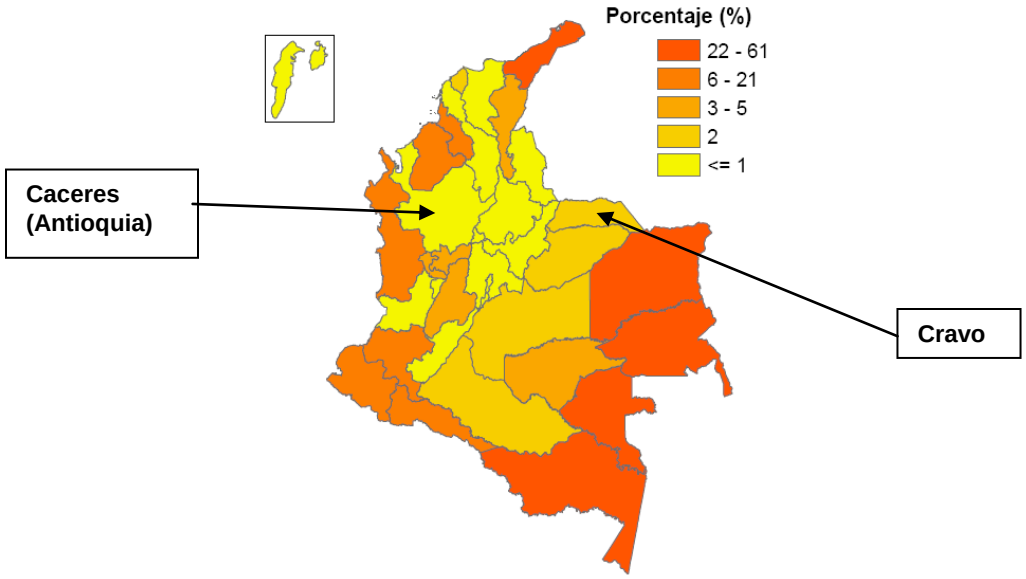
G.1.4 Current carbon stocks at the project site(s), using methodologies from the Intergovernmental Panel on Climate Change's Good Practice Guidance (IPCC GPG) or other internationally approved methodologies (e.g. from the CDM Executive Board):

The existing carbon stocks have been calculated in accordance with the approved methodology AR-AM0005 for CDM project activity. The land use under the baseline scenario is grassland. Added has been the case of Cáceres (Antioquia) with areas of alluvial gold mining. Since the grassland will be maintained in its state, the methodology assumes the carbon pools to be in steady state. Hence, the sum of the carbon stock changes of the living biomass in the grassland, for any year t, is considered to be zero. However, in some parts within the project boundary, scattered shrubs and isolated trees are encountered. But since all isolated trees and shrubs have not been and will not be removed within the project boundaries, no GHG emissions from the removal of the woody baseline vegetation occurred. The same holds for the grass vegetation due to the site preparation practice. Further, in accordance with the guidance contained in paragraph 35 of EB 42 meeting report, GHG emissions from the removal (loss) of herbaceous

vegetation as a component of non-tree biomass are neglected. For this reasoning the *ex ante* baseline net GHG removals by sinks are set to zero.

G.1.5 Description of communities located in and around the project area, including basic socioeconomic information (using appropriate methodologies such as the livelihoods framework).

Caceres (Antioquia): The project activities are located in the municipality of Cáceres in the Department of Antioquia. The population of the Department of Antiqouia is 5,682,276 according to the 2005 census and the population of the municipality of Cáceres is 28, 145.[10] According to the 2005 Census, 23% of the population of Caceres (Antioquia) suffers from unsatisfied basic needs. However, the figure for Cáceres is almost triple the level of the Department overall at 67%.[11] The indicators used to determine the level of basic needs unsatisfied are inadequate homes, critically overcrowded homes, home without basic services and homes with young children who do not attend school.[12] The educational level of most residents is very low. In general children and women attain a higher degree of education than the heads of the families. The average number of children per household is three. Fifty percent of the population is under 14 years, which shows a significant population of children, demanding basic services like education, recreation and health.[13] The department of Antioquia does not have a significant indigenous population. According to the 2005 Census, Antioquia has less than 1% indigenous inhabitants (See Map 5 below).



Map 6: Participación de Indígenas Respecto a la Población Total Departamental[14]

[10] Censo General 2005, www.dane.gov.co/daneweb_V09/
[11] Spreadsheet Necesidades Básicas Insatisfechas. Censo General 2005. www.dane.gov.co/daneweb_V09/
[12] Boletín, Censo General 2005: Necesidades Básicas Insatisfechas. www.dane.gov.co/daneweb_V09/
[13] Agudelo et. al. "Estudios en Rastrojeras incentivadas del Municipio de Cáceres." Universidad Nacional de Colombia, Departamento de Ciencias Forestales. Corporación Autónoma Regional del Centro de Caceres (Antioquia) (CORCACERES (ANTIOQUIA)), (2000).
[14] Censo General de Colombia 2005, www.dane.gov.co/daneweb_V09/

The main economic activities of Cáceres (Antioquia) are raising livestock, small scale mining and subsistence agriculture for family consumption. However the livestock business is controlled by a small portion of the population and 73% of family units engage in subsistence farming of maize, cassava, banana and rice. Significant portions of the land have been severely affected by alluvial gold mining. The forest is also used as a resource for fuel, building materials and, when there is a surplus, to sell timber.[15]

The rural areas of Caceres (Antioquia) have been subject to significant security issues from guerrilla and paramilitary activities. About 20 years ago the country and especially the project regions started to suffer under the formation of the "Guerrilla" and the "Paramilitary" that started to collect protection rents. Until now this problem is prevalent and has some serious negative effects on social life, economic activities and politics. While security has improved markedly in recent years, these security issues remain a significant presence in the region.[16]

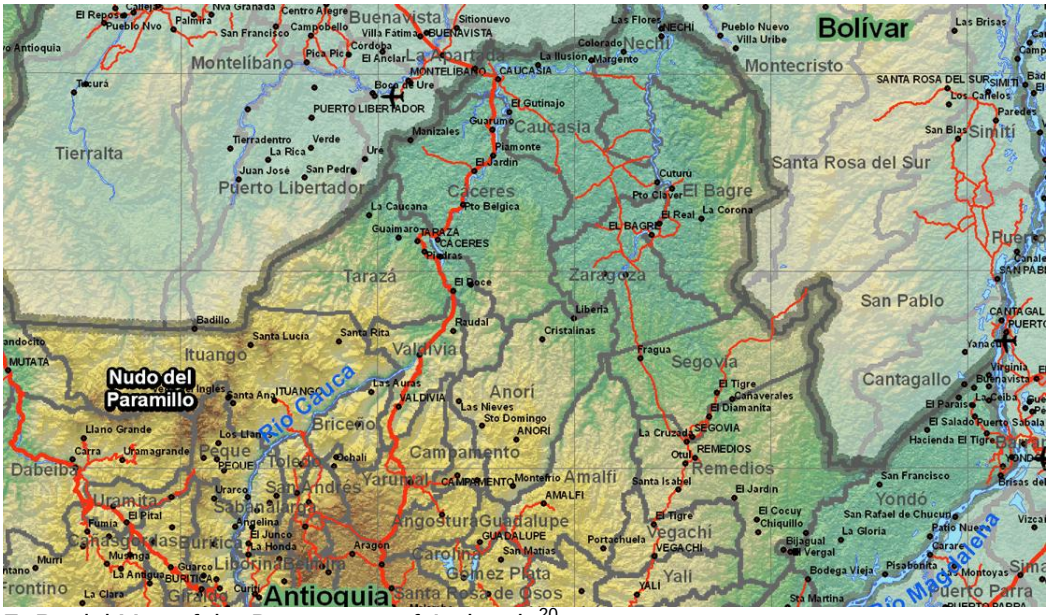
The municipality of Cáceres borders four other municipalities. The basic demographic information of each is summarized in Table 2: below. These areas have similar profiles to Caceres. Cáceres is connected to Caucasia and Taraza by the interstate 25. Caceres is not connected to Zaragoza and Anorí any direct highway.[17]

Table 2: Demographics of towns near Cáceres in Antioquia[18,19]

Municipality	Population	Basic Needs Unmet
Taraza	30,633	62.55%
Caucasia	85,667	52.41%
Zaragoza	25,173	64.30%
Anorí	9,638	48.14%

These municipalities can be located in relation to Caceres in the Map 6 below.

[15] Agudelo et. al. "Estudios en Rastrojeras incentivadas del Municipio de Cáceres." Universidad Nacional de Colombia, Departamento de Ciencias Forestales. Corporación Autónoma Regional del Centro de Caceres (Antioquia) (CORCACERES (ANTIOQUIA)), (2000).
[16] Interview with Project Owner, 13 April, 2010.
[17] http://www.colombiassh.org/site/IMG/png/Antioquia_A3.png
[18] Spreadsheet Necesidades Básicas Insatisfechas. Censo General 2005. www.dane.gov.co/daneweb_V09/
[19] Censo General 2005, www.dane.gov.co/daneweb_V09/



Map 7: Partial Map of the Department of Antioquia[20]

Cravo Norte (Arauca): The project activities take place in the municipality of Cravo Norte, Department of Arauca. Cravo Norte's population according to the Census of 2005 was 232,118 and the population of Cravo Norte was 2,970.[21] In the Department of Arauca 36% of inhabitants suffer from unsatisfied basic needs and in the municipality of Cravo Norte the figure is 54%.[22] The indigenous population in Arauca is very small. According to the 2005 Census, approximately 2% of the population of Arauca belongs to indigenous communities.

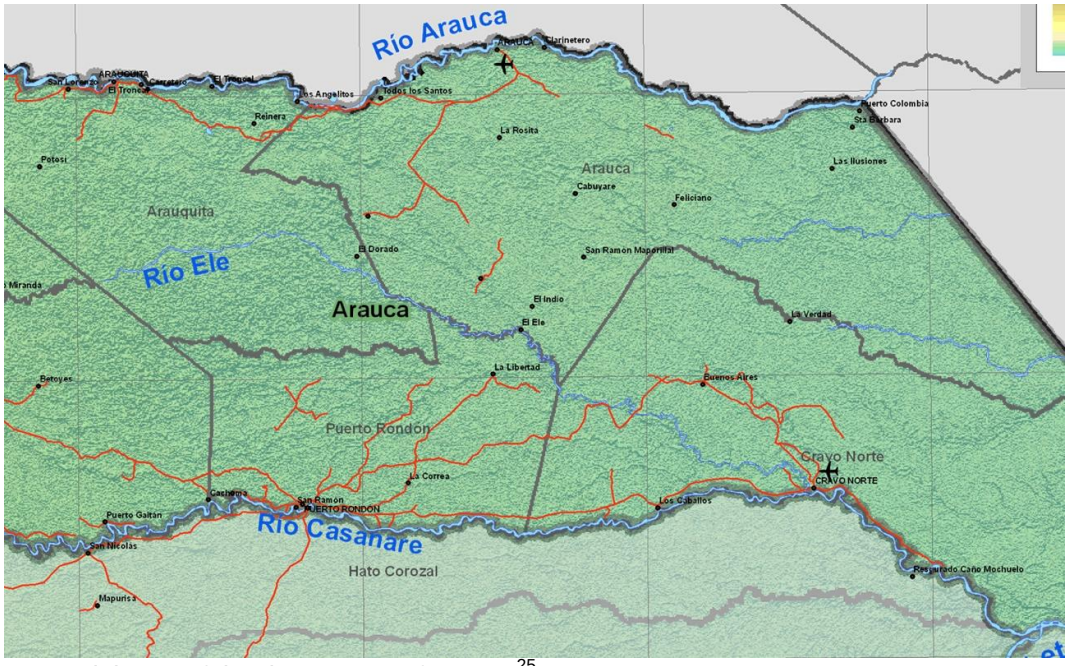
In Cravo Norte (Arauca) cattle ranching dominates the economy. While there is limited subsistence farming of maize, cassava, banana, rice and other fruits, there is no significant agriculture in the area. Arauca is one of the poorest departments in the country. For the low-income segment of the population there are few opportunities for employment to increase their income. While there have been attempts by the government to implement agricultural projects with rice and soy beans they have been largely unsuccessful due to lack of technology and know-how. Despite being one of the countries' least advanced departments in terms of education, industry and technology, the basic infrastructure in the town including schools, roads and medical clinics is above average because the department is home to part of the domestic oil industry and oil companies have been obligated to implement social infrastructure projects.[23]

Arauca is also situated at the border with Venezuela, which makes it a particularly sensitive zone in relation to guerrilla and paramilitary activity. This border area is a zone with large amounts of outlaw activity as extra-legal groups go back and forth between Colombia and Venezuela. The region of Cravo Norte (Arauca) has also suffered from the

[20] http://www.colombiassh.org/site/IMG/png/Antioquia_A3.png
[21] Censo General 2005, www.dane.gov.co/daneweb_V09/
[22] Spreadsheet Necesidades Básicas Insatisfechas. Censo General 2005. www.dane.gov.co/daneweb_V09/
[23] Corporación Autónoma Regional de la Orinoquía (CORPORINOQUÍA). "Plan de Acción 2004-2006." Yopal, Cravo Norte (Arauca) (2004). (http://corporinoquia.gov.co)

phenomenon beginning about 20 years ago when the country started to suffer under the formation of the “Guerilla” and the “Paramilitar” that started to collect protection rents.

Cravo Norte is an extremely isolated municipality with poor infrastructure connecting it to other parts of the Department of Arauca. It borders on two other municipalities: Arauca and Puerto Rondón. The Municipality of Arauca has a population of 68,222 and 33.72% have basic needs that go unmet. Puerto Rondón has a population of 2,656 of whom 36.10% do not have their basic needs met.[24] These municipalities and their location in relation to Cravo Norte can be seen in Map 7 below.



Map 8: Partial map of the department of Arauca[25]

G.1.6 A description of current land use and land tenure at the project site.

Land Use:

Figure 1. Photo of Project Region, Cravo Norte, Arauca. October 2009

[24] Censo General 2005, www.dane.gov.co/daneweb_V09/, Spreadsheet Necesidades Básicas Insatisfechas. Censo General 2005. www.dane.gov.co/daneweb_V09/
[25] http://www.colombiassh.org/site/spip.php?article3

The baseline scenario, in the absence of the project activity, would be extensive livestock farming. This land use is common practice around and within the project territories.

Some areas in Cáceres (Antioquia) have also been exploited for alluvial gold mining. Because of the high price of gold, lands with gold mining potential are highly valued. The majority of the population practices subsistence agriculture but this accounts for a small percentage of the total land area. In addition it is noted that the project sites are located in one of the main areas of Coca cultivation and one of the projects goals is to provide a successful case of reforestation that would illustrate an alternative to coca farming. All lands in the project areas are privately owned.

Land Tenure: Partnership contracts between Asorpar and investors were signed. The investor's stake in the initial investment totals up to 70%. Land is purchased and forest plantations are established from the investor's financial participation. While the group of investors represents the major share-holder, Asorpar is assuming 30% of the costs and is in charge of reforesting the purchased land. Once the project will receive the financial support from the CIF or carbon credits revenues, Asorpar will reimburse some of the initial costs to the group of investors. The ownership structure of the land and reforested trees will change with the reimbursement and both parts will hold an equitable share of 50%.

While most land tenure in the project zone is private property, Colombia law does accord land tenure rights to squatters who occupy unproductive land for a period of 10 years. The situation where rural lands are abandoned and unproductive was very common when paramilitary groups controlled most of the rural areas. As these areas return to government control and the public safety situation improves, some areas have contested land title due to the two different sources of rights to land tenure in Colombia.[26]
Please refer to section G.5.4. for details on how Asorpar did handle squatter issues in the project area.

[26] Interview with Juan Guillermo Molina, 13 April 2010.

G.1.7	Description of current biodiversity in the project area and threats to that biodiversity, using appropriate methodologies (e.g., key species habitat analysis, connectivity analysis), substantiated with reference (evidence) where possible.

Flora

- Caceres (Antioquia): The project area is located on primarily grassland areas. The primary forest was felled decades ago to open areas to pasturelands for extensive cattle grazing. The principle species of grass found in project sites in Caceres (Antioquia) are *Hyparrenia Ruffa*, *Briachiara*, *Andropogum guayanus*, *Panicum maximum*, *Digitaria decumbens*, *Dichanthium aristatum*, *Brachiaria mutica* and *Echynochloa polystachya*.[27] There are small amounts of secondary forest that are not be disturbed by the project activities. Among the common trees species in the project zone are *Clusia spp*., *Tapirira sp*., *Luehea seemanni*, *Cecropia spp*., *Jacaranda sp*., *Vismia sp*., *Hymenaea courbaril*, *Cespedesia macrophylla*, *Spondias mombin*, *Canavillesia planatifolia*, *Cedrela odorata*, *Hura crepitans*, *Lecythis sp*., *Anacardium excelsum*, *Jenipa American*, *Bursera simaruba*, *Ochroma lagopus*, *Brosimun utile*, *Cariniana pyriformis* and *Cordia alliodora*. Other representative species of the area are: *Bellucia pentamera*, *Croton billbergianus*, *Apeiba tibourbou*, *Ochoterenaea colombiana*, *Vismia billbergiana*, *Trichospermum galeottii*, *Trema micrantha*, *Goethalsia meiantha*, *Ochroma pyramidale*, *Miconia sp*., *Schefflera morototoni*, *Isertia haenkeana* and *Goupia glabra*. Many of these species and a variety of others are endangered (See section G.1.8).
- Cravo Norte (Arauca): in this region there are three main types of vegetation: secondary forests, gallery forests and natural savannahs. Secondary forests are located mainly in the hills and the species of greatest importance are: *Miconia scorpiaides*, *Ficus sp.*, *Ochroma lagopus* and *Jacaranda copaia*. The gallery forests are strips that are located along rivers and streams in small valleys that dissect in ancient terraces, in the form of narrow strips with little continuity.[28] Predominant species found in gallery forests are: *Ocotea sp*., *Trattinickia aspera*, *Clusia columnaris*, *Astrocaryum vulgare*, *Socratea exorrhiza*, *Licania hypoleuca*, *Dialyanthera parviflia*, *Swartzia sp*., *Protium sp*., *Vosoohysia sp*., *Miconia scorpiaides*, *Mauritia minor*, *Caraipa llanorum*, *Thalia geniculata*, *Trichantera gigantea*, *Brosinum sp.*, *Cecropia sp*., *Aniba sp.* among others. The natural savannas are found in low savanna areas on well drained pastoral terraces. Among the most common species of these areas are *Trachipogon vestitus*, *Andropogon bicornis* and *Rynchospora nervosa*. In many places the vegetation has been replaced by improved pasture for the establishment of livestock production systems, among them the *Hyparrhenia rufa* and *Brachiaria decumbens*.[29]

[27] Moscoso, L. G. Reforestación, un proceso natural. Eurotex. Editorial Colina, (2005).
[28] Veneklaas, E. J., A. Fajardo, S. Obregon, and J. LOZANO. "Gallery forest types and their environmental correlates in a Colombian savanna landscape." Ecography 28: 236-/252 (2005).
[29] Corporación Nacional de Investigación y Fomento Forestal (CONIF), Ministerio del Medio Ambiente, Organización Internacional de Mderas Tropicales (OIMT). Guía para plantaciones forestales comerciales Orinoquía. Serie de documentación No. 38. Santafé de Bogotá (1998)

Wildlife:

- Caceres (Antioquia): The area has a strong mammal presence including *Cerdocyon thous*, *Myrmecophaga tridactyla*, *Saguinus oedipus*, *Cebus albifrons*, *Seirus sp*., *Dasyprocta punctata*, *Didelphis albiventris*, among others.[30] The municipality of Caceres has reported at least one new amphibian species: *Colosethus cacerensis*, of the Dendrobatidae family.[31] Cuartas and Muñoz report the following species of mammals for the project area: *Caluromys derbianus, Chironectes minimus, Didelphis marsupialis, Marmosa robinsoni, Micoureus regina, Bradypus variegatus, Dasypus novemcinctus, Cyclopes didactylus, Tamandua mexicana, Centronycteris centralis, Saccopteryx bilineata, Saccopteryx canescens, Saccopteryx leptura, Noctilio albiventris, Noctilio leporinus, Mormoops megalophylla, Pteronotus davyi, Pteronotus gymnonotus, Pteronotus parnellii, Pteronotus personatus, Chrotopterus auritus, Glyphonycteris sylvestris, Lophostoma brasiliense, Glossophaga commissarisi, Carollia perspicillata, Atribeus cinereus, Centurio senex, Mesophylla macconnelli, Platyrrhinus helleri, Sturnira lilium, Uroderma bilobatum, Uroderma magnirostrum, Natalus stramineus, Thyroptera discifera, Lasiurus ega, Myotis albescens, Myotis nigricans, Eumops glaucinus, Molossus molossus, Nyctinomops aurispinosus, Nyctinomops macrotis, Saguinus leucopus, Alouatta seniculus, Aotus lemurinus, Ateles fusciceps, Conepatus semistriatus, Eira barbara, Potos flavus, Procyon cancrivorus, Sciurus granatensis, Heteromys anomalus, Oecomys bicolor, Oryzomys talamancae, Sigmodon hispidus, Zigodontomys brevicauda, Hydrochaeris hydrochaeris, Cuniculus paca, Echimys gymnurus, Proechimis magdalenae*.[32] Many of these species and a lot of others are endangered (See section G.1.8).
- Cravo Norte (Arauca): There are birds, mammals, fish and reptiles. According to the national biodiversity report the Orinoco region contains 101 species of mammals, 72 genera, 26 families and 9 orders. The group in the area that is most studied is the chiroptera. There have also been studies on diet, behavior in captivity, territorial habits and population aspects of the Chigüiro (*Hydrochaeris hydrochaeris*). They report, in addition, 16 species of primates. The most important aquatic mammals in the region are the river dolphins (*Inia geoffrensis*), the West Indian manatee (*Trichechus manatus*) and the giant otter (*Pteronura brasiliensis*). As for the fish population, 608 species spread over 44 families and 11 orders are reported for the region of the Orinoco River basin. The most representative families are *Characidae, Prochilodontidae* y *Pimelodidae,* and the most representative species are *Piaractus brachypomus*, *Colossoma macropomum*, *Brycon sibienthaleae*, *Pseudoplatystoma fasciatum* and *Prochilodus mariae*, for which detailed biological studies exist. Although the area does not have detailed studies of the ecology and biology of reptiles, significant populations of *Podocnemis expanda*, *Podocnemis unifilis*, and four species of

[30] Agudelo et. al. "Estudios en Rastrojeras incentivadas del Municipio de Cáceres." Universidad Nacional de Colombia, Departamento de Ciencias Forestales. Corporación Autónoma Regional del Centro de Caceres (Antioquia) (CORCACERES (ANTIOQUIA)), (2000).

[31] Rivero, J. and S. Marco. "Nuevos Colosethus (Amphibia: Dendrobatidae) del departamento de Caceres (Antioquia), Colombia, con la descripción del renacuajo de Colosethus fraterdanielli." Rev. Ecol. Lat. Am. 2(1-3): 45-58. (2005)

[32] Cuartas, C. and J. Muñoz. "Lista de mamíferos (Mammalia: Theria) del departamento de Caceres (Antioquia), Colombia." Biota Colombiana 4(1): 65-78. (2003).

Crocodylia: *Crocodylus intermedius*, *Paleosuchus trigonatus*, *P. palpebrosus* and *Caiman sclerops* have been reported. One of the most studied crocodiles in the basin is the *Crocodylus intermedius*. This is for various reasons, including the fact that it constitutes a flagship species, commercially important, endemic and in a critical state for conservation; other species available on biological information management and ex-situ animal breeding purpose is *Caiman Crocodylus*.[33] See section G.1.8 for endangered species.

Birds:

- Caceres (Antioquia): The records of birds in the area recorded 69 species belonging to 24 families. The family with the greatest number of species reported is Trochilidae with 12%. Orochilidae family, the *Threnetes* leucurus is worth highlighting because it was not previously reported for the area. The families Pipridae y Formiicaridae follow with, 10% each of the species. Of all species, 45% are insectivorous, and 28% frugivorous. The most abundant species are *Pipra erythrocephala*, *Manacus vitellinus*, *Glyphorynchus spirurus*, *Psarocolius decumanus*, *Ictinia plumbea*, *Phaethornis superciliosus*, *Phaethornis longuemareus*, *Mirmeciza exsul*, *Ortalis garrula*.[34]
- Cravo Norte (Arauca): In general, the bird life of the department of Cravo Norte (Arauca) has been little studied in terms of its ecological and biogeographical aspects. Due to flat topography and river channels in this region drainage is ineffective, which results in a large swampy area that is an ideal habitat for many species of birds in the area. The inventory made by Rojas and Piragua recorded 253 species belonging to 57 families and 18 orders. The Tyrannidae family was the most widely represented with 34 species. Other important families were Fringillidae with 16 species, Accipitridae with 15, Ardeidae and Icteridae with 12 each. There were also two species new to Colombia, the migratory *Satrapa icterophrys* and resident *Phelpsia inornata*. According to the habitat types, 42% of the species live in a forest habit, 24% in a savanna and shrub habitat, 23.8% in aquatic habitats and 10% adapt to a variety of environments. Of the 18 foraging guilds found, the one that presented the highest number of species of insect was the forest with 35%, followed in importance by omnivores and predators with 8.7% and 7.5% respectively.[35]

Threats: The main threats that the flora and fauna face in the areas of Caceres (Antioquia) and Cravo Norte (Arauca) are from mining, deforestation for the purpose of extensive cattle grazing and burning of land in Cravo Norte (Arauca). Large scale deforestation presents a significant threat to the habitats of the various animals that live in these areas and destroys the majority of the plant biodiviersty to replace it with pasture lands. The project activity restores these natural habitats and prevent further threats within the project area.

[33] Corporación Autónoma Regional de la Orinoquía (CORPORINOQUÍA). "Plan de Acción 2004-2006." Yopal, Cravo Norte (Arauca) (2004). (http://corporinoquia.gov.co)

[34] Agudelo et. al. "Estudios en Rastrojeras incentivadas del Municipio de Cáceres." Universidad Nacional de Colombia, Departamento de Ciencias Forestales. Corporación Autónoma Regional del Centro de Caceres (Antioquia) (CORCACERES (ANTIOQUIA)), (2000).

[35] Rojas, R., and W. Piragua. "Afinidades biogeográficas y aspectos ecológicos de la avifauna de Caño Limón, Cravo Norte (Arauca), Colombia." Crónica Forestal y del Medio Ambiente, 15: 163-184. (2000).

G.1.8 Evaluation of wheather the project zone includes any of the following High Conservation Values (HCVs) and a description of their attributes:

1. Globally, nationally or regionally significant concentrations of biodiversity values;

a. Protected areas: the project zone does not include any protected areas.

b. Threatened species: the HCV Resource Network defines areas that contain significant populations of endangered species as HCVs. However, the presence of threatened species is not sufficient to designate an area a HCV area. In addition, the concentration of the threatened species must be globally, nationally or regionally significant.[36] The following tables summarize the species in the two project zones Department of Antioquia/Nothern Andean and Department of Arauca/Orinoco) based on the IUCN Red Lists available from the Humboldt Institute in Bogotá. Only those species that fall into the Critical (CR), Endangered (EN) or Vulnerable (VU) categories are included in this analysis. Both project zones show the presence of many threatened species both flora and fauna. No specific local information is available about the concentration of these populations however.

Table 3: Threatened Species of Flora in Department of Arauca[37,38]

Family	Scientific Name	UICN Risk Category
Bombacaceae	*Pachira quinata*	EN
Magnoliaceae	*Magnolia caricifragans*	EN
Brassicaceae (=Cruciferae)	*Draba arauquensis*	CR
Brassicaceae (=Cruciferae)	*Draba hammenii*	VU

[36] The High Conservation Value Resource Network. http://www.hcvnetwork.org/site-info/The%20high-conservation-values-folder/hcv1

[37] "Listas rojas preliminares de plantas fanerógamas y briófitos de Colombia." Humbolt Institute. http://araneus.humboldt.org.co/conservacion/Listas.htm

[38] In all tables of threatened species, the standard IUCN risk categories are used: EX=Extinct, CR=Critically Endangered, EN =Endangered, VU=Vulnerable, NT=Near Threatened, LC/LR=Low Risk, DD=Deficient Data.

Table 4: Threatened Species of Fauna in the Orinoco[39]

Family	Scientific Name	UICN Risk Category
Birds		
Tinamidae	*Crypturellus columbianus*	EN
Cracidae	*Pauxi pauxi*	VU
Freshwater Fish		
Osteoglossidae	*Osteoglossum ferreirai*	EN
Pimelodidae	*Brachyplatystoma juruense*	VU
Pimelodidae	*Brachyplatystoma filamentosum*	EN
Pimelodidae	*Brachyplatystoma flavicans*	EN
Pimelodidae	*Brachyplatystoma vaillantii*	EN
Pimelodidae	*Goslinea platynema*	EN
Pimelodidae	*Paulicea luetkeni*	EN
Pimelodidae	*Pseudoplatystoma tigrinum*	EN
Pimelodidae	*Pseudoplatystoma fasciatum*	EN
Pimelodidae	*Sorubim lima*	VU
Pimelodidae	*Sorubimichthys planiceps*	VU
Mammals		
Dasypodidae	*Priodontes maximus*	CR
Myrmecophagidae	*Myrmecophaga tridactyla*	VU
Cebidae	*otus brumbacki*	VU/DD
Cebidae	*Aotus hershkovitzi*	VU/DD
Cebidae	*Ateles belzebuth*	VU
Cebidae	*Cacajao melanocephalus*	VU
Canidae	*Speothos venaticus*	VU
Mustelidae	*Pteronura brasiliensis*	CR
Felidae	*Felis pardalis*	VU

[39] RODRIGUEZ, José Vicente, 1998. Listas preliminares de mamíferos colombianos con algún riesgo a la extinción. Informe final presentado al Instituto de Investigación de Recursos Biológicos Alexander von Humboldt; 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; Castaño-Mora, O. V. (editora). 2002. Libro rojo de reptiles 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; RUEDA, José Vicente, 1998. Listas preliminares de anfibios colombianos con algún riesgo a la extinción. Informe final presentado al Instituto de Investigación de Recursos Biológicos Alexander von Humboldt; 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. http://araneus.humboldt.org.co/conservacion/Listas.htm

Felidae	*Felis wiedii*	VU
Felidae	*Felis concolor*	VU
Felidae	*Panthera onca*	VU
Delphinidae	*Sotalia fluvitilis*	VU
Platanistidae	*Inia geoffrensis*	VU
Trichechidae	*Trichechus manatus*	CR
Tapiridae	*Tapirus terrestris*	VU
Tayassuidae	*Tayassu pecari*	VU
Cervidae	*Odocoileus virginianus*	VU
Reptiles		
Crocodylidae	*Crocodylus intermedius*	CR
Testudinidae	*Geochelone carbonaria*	CR
Testudinidae	*Geochelone denticulata*	EN
Pelomedusidae	*Podocnemis expansa*	CR
Pelomedusidae	*Podocnemis unifilis*	CR

Table 5: Threatened Flora Species of Department of Antioquia[40]

Family	Scientific Name	IUCN Risk Category
Acanthaceae	*Aphelandra antioquiensis*	VU/EN
Acanthaceae	*Aphelandra blandii*	VU/EN
Acanthaceae	*Aphelandra flava*	VU/EN
Acanthaceae	*Aphelandra lasiophylla*	EN/CR
Acanthaceae	*Aphelandra xanthantha*	VU/EN
Acanthaceae	*Ruellia cuatrecasasii*	VU/EN
Amaryllidaceae	*Caliphruria subedentata*	VU
Annonaceae	*Raimondia quinduensis*	VU/EN
Annonaceae	*Rollinia rufinervis*	VU/EN
Apiaceae	*Arracacia xanthorrhiza*	VU
Apocynaceae	*Aspidosperma cruentum*	VU/EN
Apocynaceae	*Aspidosperma curranii*	VU/EN
Apocynaceae	*Quiotania colombiana*	NT/VU
Aquifoliaceae	*Ilex danielis*	EN/CR
Aquifoliaceae	*Ilex goudotii*	VU
Araceae	*Anthurium cabrerense*	VU/EN
Araceae	*Anthurium crystallinum*	VU/EN
Araceae	*Anthurium truncicolum*	NT/VU
Araceae	*Chlorospatha gentryi*	NT/VU

[40] "Listas rojas preliminares de plantas fanerógamas y briófitos de Colombia." Humbolt Institute. http://araneus.humboldt.org.co/conservacion/Listas.htm

Araceae	*Spathiphyllum kalbreyeri*	VU/EN
Araceae	*Spathiphyllum kochii*	VU/EN
Araceae	*Spathiphyllum patinii*	VU/EN
Araceae	*Spathiphyllum perezii*	VU/EN
Araceae	*Spathiphyllum quindiuense*	VU/EN
Araceae	*Spathiphyllum schomburgkii*	EN
Araceae	*Spathiphyllum silvicola*	VU
Araliceae	*Oreopanax trianae*	VU
Asteraceae	*Baccharis fraterna*	VU
Asteraceae	*Diplostephium antioquense*	VU
Asteraceae	*Gynoxys frontinoensis*	NT/VU
Begoniaceae	*Begonia cryptocarpa*	NT/VU
Bignonaceae	*Amphitecna isthmica*	VU
Bignonaceae	*Parmentiera stenocarpa*	VU
Bignonaceae	*Tabebuia striata*	NT/VU
Bombacaceae	*Catostemma digitata*	VU/EN
Bombacaceae	*Cavanillesia platanifolia*	NT/VU
Bombacaceae	*Huberodendron patinoi*	VU/EN
Bombacaceae	*Pachira dugandeana*	EN
Bombacaceae	*Phragmotheca rubriflora*	VU/EN
Bombacaceae	*Quararibea sanblasensis*	VU/EN
Bombacaceae	*Quararibea tulekunae*	VU
Bromeliaceae	*Aechmea longicuspis*	VU
Bromeliaceae	*Greigia danielii*	EN
Bromeliaceae	*Guzmania betancurii*	VU
Bromeliaceae	*Pepinia alborubra*	EN
Bromeliaceae	*Pepinia pectinata*	EN
Bromeliaceae	*Pitcairnia arida*	VU
Bromeliaceae	*Pitcairnia basincurva*	VU
Bromeliaceae	*Pitcairnia fluvialis*	VU
Bromeliaceae	*Pitcairnia ventidirecta*	VU
Bromeliaceae	*Puya antioquensis*	VU
Bromeliaceae	*Puya ochroleuca*	CR
Bromeliaceae	*Puya roldannii*	CR
Bromeliaceae	*Racinaea seemannii*	VU
Bromeliaceae	*Tillandsia carrierei*	VU
Bromeliaceae	*Tillandsia schimperiana*	VU
Bromeliaceae	*Vriesea hodgei*	VU
Brunelliaceae	*Brunellia amayensis*	VU/EN
Brunelliaceae	*Brunellia antioquensis*	VU
Brunelliaceae	*Brunellia boqueronensis*	CR
Brunelliaceae	*Brunellia occidentalis*	VU
Brunelliaceae	*Brunellia penderiscana*	VU/EN

Brunelliaceae	*Brunellia subsessilis*	VU
Brunelliaceae	*Brunellia trianae*	VU/EN
Caryocaraceae	*Caryocar amygdaliferum*	EN
Cecropiaceae	*Pourouma melinonii ssp. glabrata*	NT/VU
Chloranthaceae	*Hedyosmum steinii*	VU
Chrysobalanaceae	*Couepia platycalyx*	EN
Chrysobalanaceae	*Hirtella leonotis*	EN
Chrysobalanaceae	*Hirtella magnifolia*	VU
Chrysobalanaceae	*Hirtella tubiflora*	VU
Chrysobalanaceae	*Licania arborea*	EN
Chrysobalanaceae	*Licania cabrerae*	CR
Chrysobalanaceae	*Licania durifolia*	EN
Chrysobalanaceae	*Licania pittieri*	EN
Chrysobalanaceae	*Licania salicifolia*	CR
Chrysobalanaceae	*Licania silvae*	VU
Chrysobalanaceae	*Parinari pachyphylla EN*	EN
Dichapetalaceae	*Stephanopodium aptotum*	EN
Dichapetalaceae	*Tapura colombiana*	VU
Lecythidaceae	*Cariniana pyriformis*	CR
Lecythidaceae	*Couroupita nicaraguarensis VU*	VU
Lecythidaceae	*Gustavia dubia*	VU
Lecythidaceae	*Gustavia gentryi*	VU
Lecythidaceae	*Gustavia gracillima*	VU
Lecythidaceae	*Gustavia grandibracteata*	VU
Lecythidaceae	*Gustavia petiolata*	VU
Lecythidaceae	*Gustavia romeroi*	EN
Lecythidaceae	*Lecythis tuyrana*	VU
Magnoliaceae	*Magnolia espinalii*	EN
Magnoliaceae	*Magnolia guatapensis*	EN
Magnoliaceae	*Magnolia henaoi*	EN
Magnoliaceae	*Magnolia hernandezii*	EN
Magnoliaceae	*Magnolia katiorum*	CR
Magnoliaceae	*Magnolia lenticellata*	EN
Magnoliaceae	*Magnolia polyhypsophylla*	CR
Magnoliaceae	*Magnolia silvioi*	VU
Magnoliaceae	*Magnolia urraoensis*	VU
Magnoliaceae	*Magnolia yarumalensis*	EN
Palmae	*Aiphanes leiostachys*	CR
Palmae	*Aiphanes parvifolia*	EN
Palmae	*Astrocaryum malybo*	EN
Palmae	*Astrocaryum triandrum*	EN
Palmae	*Attalea amygdalina*	EN
Palmae	*Attalea cohune*	EN

Palmae	*Attalea nucifera*	VU
Palmae	*Bactris gasipaes var. chichagui*	VU
Palmae	*Ceroxylon alpinum ssp. alpinum*	EN
Palmae	*Ceroxylon quindiuense*	EN
Palmae	*Chamaedorea pygmaea*	VU
Palmae	*Chamaedorea ricardoi*	EN
Palmae	*Cryosophila kalbreyeri*	VU
Palmae	*Elaeis oleifera*	EN
Palmae	*Geonoma chlamydostachys*	VU
Palmae	*Prestoea simplicifolia*	EN
Palmae	*Reinhardtia koschnyana*	CR
Palmae	*Reinhardtia simplex*	CR
Palmae	*Syagrus sancona*	VU
Palmae	*Wettinia hirsuta*	VU
Zamiaceae	*Zamia disodon*	CR
Zamiaceae	*Zamia manicata*	EN
Zamiaceae	*Zamia montana*	CR
Zamiaceae	*Zamia sp. 1*	CR
Zamiaceae	*Zamia wallisii*	CR

Table 6: Threatened Fauna Species of the Northern Andean Region[41]

Family	Scientific Name	IUCN Risk Category
Amphibians		
Dendrobatidae	*Dendrobates lehmanni*	CR
Dendrobatidae	*Epipedobates andinus*	VU
Dendrobatidae	*Minyobates bombetes*	VU
Dendrobatidae	*Minyobates opisthomelas*	VU
Dendrobatidae	*Minyobates virolinensis*	VU
Dendrobatidae	*Phyllobates bicolor*	VU
Birds		
Podicipedidae	*Podiceps occipitalis*	EN
Anatidae	*Sarkidiornis melanotos*	EN
Anatidae	*Anas georgica*	EN
Anatidae	*Anas cyanoptera*	EN
Anatidae	*Netta erythrophthalma*	CR
Anatidae	*Oxyura jamaicensis*	EN
Cathartidae	*Vultur gryphus*	EN
Accipitridae	*Harpyhaliaetus solitarius*	EN

[41] See footnote 30.

Cracidae	*Pauxi pauxi*	VU
Cracidae	*Crax daubentoni*	VU
Phasianidae	*Odontophorus atrifrons*	VU
Phasianidae	*Odontophorus melanonotus*	VU
Phasianidae	*Odontophorus strophium*	CR
Rallidae	*Rallus semiplumbeus*	EN
Rallidae	*Gallinula melanops*	CR
Columbidae	*Leptotila conoveri*	EN
Psittacidae	*Pyrrhura calliptera*	VU
Psittacidae	*Leptosittaca branickii*	VU
Psittacidae	*Ognorhynchus icterotis*	CR
Psittacidae	*Ara militaris*	VU
Psittacidae	*Bolborhynchus ferrugineifrons*	VU
Psittacidae	*Touit stictoptera*	CR
Psittacidae	*Pionopsitta pyrilia*	VU
Psittacidae	*Hapalopsittaca amazonina*	VU
Psittacidae	*Hapalopsittaca fuertesi*	CR
Strigidae	*Glaucidium nubicola*	VU
Apodidae	*Cypseloides lemosi*	CR
Trochilidae	*Amazilia castaneiventris*	CR
Trochilidae	*Coeligena prunellei*	VU
Trochilidae	*Eriocnemis mirabilis*	CR
Trochilidae	*Acestrura bombus*	VU
Ramphastidae	*Capito hypoleucus*	EN
Ramphastidae	*Andigena hypoglauca*	VU
Furnariidae	*Schizoeca perijana*	EN
Thamnophilidae	*Clytoctantes alixii*	EN
Thamnophilidae	*Dysithamnus occidentalis*	VU
Formicariidae	*Grallaria alleni*	EN
Formicariidae	*Grallaria gigantea*	EN
Formicariidae	*Grallaria kaestneri*	EN
Formicariidae	*Grallaria milleri*	EN
Formicariidae	*Grallaria rufocinerea*	VU
Formicariidae	*Grallaricula lineifrons*	VU
Tyrannidae	*Pseudocolopteryx acutipennis*	VU
Tyrannidae	*Muscisaxicola maculirostris*	EN
Cotingidae	*Doliornis remseni*	EN
Cotingidae	*Lipaugus weberi*	CR
Alaudidae	*Eremophila alpestris*	EN
Troglodytidae	*Cistothorus apolinari*	EN
Troglodytidae	*Thryothorus nicefori*	CR
Thraupidae	*Chlorospingus flavovirens*	VU
Thraupidae	*Bangsia melanochlamys*	VU

Thraupidae	*Bangsia melanochlamys*	EN
Thraupidae	*Buthraupis wetmorei*	VU
Thraupidae	*Chlorochrysa nitidissima*	VU
Thraupidae	*Dacnis hartlaubi*	VU
Emberizidae	*Diglossa gloriosissima*	EN
Emberizidae	*Atlapetes fuscoolivaceus*	VU
Emberizidae	*Atlapetes flaviceps*	EN
Emberizidae	*Ammodramus savannarum*	CR
Cardinalidae	*Saltator cinctus*	VU
Icteridae	*Hypopyrrhus pyrohypogaster*	EN
Icteridae	*Macroagelaius subalaris*	CR
Fringillidae	*Carduelis cucullata*	EN
Mammals		
Marmosidae	*Gracilinanus perijae*	VU
Callitrichidae	*Saguinus leucopus*	VU
Cebidae	*Alouatta seniculus*	LR/VU
Cebidae	*Aotus lemurinus*	VU
Ursidae	*Tremarctos ornatus*	EN
Felidae	*Felis pardalis*	VU
Felidae	*Leopardus tigrina*	VU
Felidae	*Felis wiedii*	VU
Felidae	*Felis concolor*	VU
Felidae	*Panthera onca*	VU
Tapiridae	*Tapirus pinchaque*	CR
Cervidae	*Mazama rufina*	VU
Cervidae	*Odocoileus virginianus*	VU
Cervidae	*Pudu mephistophiles*	EN
Erethizontidae	*Sphiggurus vestitus*	CR
Dinomyidae	*Dinomys branickii*	VU
Reptiles		
Emydidae	*Rhinoclemmys diademata*	VU

c. Endemic species: Colombia is host to a variety of endemic species. Limited information is available on a regional basis. However, based on the wide variety of threatened flora and fauna (above), the project zone has been identified as an HCV for endangered species.

d. Areas that support a significant concentration of species during any time in their lifecycle (migrations, feeding grounds, breeding grounds etc.): the project zone does not include areas that support a significant concentration of species during a phase in their lifecycle.

2. Globally, regionally or nationally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of

distribution and abundance;

The project zone does not contain large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution or abundance. The HCV Resource Network defines these areas as forests that are relatively unaffected by recent anthropogenic activities and are necessarily extensive forest areas or areas with a forest mosaic. The project zone has suffered intense pressure from anthropogenic activities, is largely deforested and does not meet this definition.[42]

3. Threatened or rare ecosystems;

The HCV Resource Network defines rare ecosystems as those for which the climatic or geologic conditions are naturally rare or those that have become rare due to anthropogenic pressure such as land conversion.[43] This conservation value also includes rare associations of species even if the individual species are widespread. The predominant ecosystem in both of the project zones is principally grassland and is not threatened or endangered. The Department of Arauca is part of the Orinoco or the "llanos orientales" (eastern plains). In the case of Antioquia, it is not even the natural ecosystem since primary forests were felled decades ago to open pastureland. The project scenario ecosystem, while trying to emulate native forests to the extent possible by using native species, is a plantation and not a threatened or endangered ecosystem.

4. Areas that provide critical ecosystem services;

According to the HCV Resource Network, critical ecosystems services are differentiated from the ecosystem services that all forestland provide by the criterion that "if the consequence of a breakdown of these services would have a serious catastrophic or cumulative impact."[44] The types of ecosystems services are divided into water catchments, erosion control and barriers to destructive fire. The project zone in Antioquia is essentially mountainous terrain that at one time was primary forest but has now been mostly deforested in order to open pasture land. This area does not provide critical ecosystem services for water catchments; problems with erosion are common due to extensive deforestation but the consequences have not been catastrophic; these areas of pastureland do not create barriers to destructive fires. The project zone in the Department of Arauca also does not contain areas that provide critical ecosystem services. The zone is predominantly plains and grassland. It does not provide critical water catchment resources although seasonal flooding is normal and non-destructive. Erosion is not an issue in the area as it is a relatively level zone. The ecosystems in the project zone also do not serve as barriers to destructive fires.

For these reasons, the project zone does not provide critical ecosystem services.

5. Areas that are fundamental for meeting the basic needs of local communities (e.g., for

[42] The High Conservation Value Resource Network. http://www.hcvnetwork.org/site-info/The%20high-conservation-values-folder/hcv2

[43] The High Conservation Value Resource Network. http://www.hcvnetwork.org/site-info/The%20high-conservation-values-folder/hcv3

[44] The High Conservation Value Resource Network. http://www.hcvnetwork.org/site-info/The%20high-conservation-values-folder/hcv4

essential food, fuel, fodder, medicines or building materials without readily available alternatives);

This HCV is designed to protect the food, income and products that communities living in and around the project zone derive from natural resources. This does not include extractive practices, even if they are traditional, that are unsustainable or degrading to the ecosystem. Furthermore, only the existence of traditional practices that are both fundamental and have no easily available alternative make an area a HCV.[45] In the project zone of the Asorpar Project, the baseline scenario of pastureland is not an area that is fundamental for meeting communities' basic needs. While cattle ranching provides some employment to local communities, it generates less employment than the reforestation project.[46] The grasslands of the region, while providing employment through cattle ranching do not provide any services that are fundamental to the surrounding communities for meeting their needs of income, food, fuel or medicines. Thus, the project zone is not a HCV for meeting the needs of local communities.

6. Areas that are critical for the traditional cultural identity of communities (e.g., areas of cultural, ecological, economic or religious significance identified in collaboration with the communities).

The project zone is not a HCV area that is critical for traditional cultural identity. The project is not located on tribal lands, ancient burial grounds or lands of religious significance. During the local stakeholder consultations the local attendees raised no issues about any cultural significance of the project area. All land is privately owned.

G2 Baseline Projections (Required)

G.2.1 Description of the most likely land-use scenario in the absence of the Project activity. Identify whether the scenario assumes that existing laws or regulations would have required that project activities be undertaken anyway:

In compliance with the baseline methodology, the following steps were followed for the determination of the baseline scenario.

Step 1: *Demonstration of the most likely land use at the time the project starts*

The project activity is carried out in two areas: Cáceres (Antioquia) and Cravo Norte (Arauca).

Cáceres (Antioquia): the previous land use was extensive livestock farming. That activity was favored by open grass vegetation. Gold mining is considered to be a feasible alternative in the region. Project proponents can prove through documentation that they

[45] The High Conservation Value Resource Network. http://www.hcvnetwork.org/site-info/The%20high-conservation-values-folder/hcv5

[46] Taylor, Davis F. "Employment-based analysis: an alternative methodology for project evaluation in developing regions, with an application to agriculture in Yucatán." Ecological Economics, 36:2 (2001) Pg. 249-262.

received offers for the mining rights. However, it has to be noted that the offer is dated back to the year 2009. It is likely that the offered price could have been different in the year 2002. The alternative of gold mining, in general, refers to the opportunity to sell or rent land for the activity.

Cravo Norte (Arauca): The previous land use was extensive livestock farming. That activity was favored by open grass vegetation due to climate-edaphic conditions. Similar lands, in the vicinity of Cáceres (Antioquia) and Cravo Norte (Arauca), have similar land cover and are not expected to be used for private, large-scale native species plantations as alternative land use.

Extensive livestock farming is carried out at the expense of forestry lands. This is because 35.1% of current land use is used for this activity while only 16.8% of the country's land area has livestock farming potential. In addition, while there is 12.7% of land with agriculture potential, only 4.6 % of it is used for this purpose. Likewise, there are 78.3 million hectares with forestry potential, but forests at the beginning of the last decade only reached 58.8 million hectares (see Table 7:).

Table 7: Comparison between the current land use and the potential land use in Colombia[47]

Activity	Current land use (%)	Potential land use (%)
Agriculture	4.66	12.70
Livestock farming	35.11	16.80
Forest	49.00	68.50

Step 2: *Assessment of national and sector policies and legislation*

(a) Policies related to the creation of wood sources

(b) Legislation related to the requirements of A/R activities and land use

The identified alternatives in Step 1, commercial or conservation-oriented reforestation activities, extensive cattle farming activities and gold mining, are entirely in compliance with applicable legal and regulatory requirements, both currently and in the foreseeable future. No specific requirements, such as an environmental license or permit given by local or national authorities, are foreseen in the Colombian environmental regulations catalogue. All other regulation requirements for the commercial forestry activity, like accepted land use, taxes, labor regulation, land property, and all other legal aspects, are in full compliance.

In order to consolidate the national forestry policy, and as start-up strategy, the government approved the National Plan for Forestry Development (PNDF) in December 2000, so that the Ministry of Environment, the National Department of Planning, the Ministry of Agricultural and Rural Development, the Ministry of Economic Development and the Ministry of Foreign Trade can define a management scheme. This is done in a coordinated manner with regional autonomous corporations and other entities that are

[47] National Department of Planning of Colombia. 1993. Informe de Colombia Sector Forestal. Proyecto FAOGCP/
COL/019/NET. Segunda reunión regional de Directores de proyectos forestales. Quito, Ecuador.

part of the national "environmental system." The ultimate purpose is to provide an impetus for the forestry sector.

The PNDF offers a strategic vision of national forestry management for the next 25 years, going beyond government tenures because it constitutes a state policy. The plan focuses on the participation of actors involved in forestry resources and ecosystems. In the plan, start-up strategies and programs are detailed. They are adapted to different needs of regions, conservation and recovery of ecosystems, and management and use of forestry ecosystems. An important aspect is the adoption of a chain of custody of commercial reforestation processes, industrial development and commercialization of forestry products. Likewise, the plan considers institutional and financial aspects required for its implementation.

The law 1021 from 2006 (General Forestry Law[48]) adopts measures to encourage the development of plantation forestry. Forestry activities shall be able to compete on equal terms with other productive sectors, even in the international market. With regard to industrial production, the State shall promote the development and modernization of the forestry sector so as to increase the competitiveness of the industry. Guarantees for investment are set forth, and the awarding of preferential loans for the sector is encouraged.

Currently, like the international community, the State is aware of environmental damage due to tree-felling processes. Increased awareness has led to the creation of new incentives to stimulate reforestation with productive purposes such as production-protection. The CIF was created by means of law 139 from 1994 and regulated by decree 1824 from 1994. The CIF is a direct contribution in cash made by the government so as to cover part of the establishment and maintenance expenses to be paid by those carrying out new commercial forestry plantations activities with one or more tree species developed in areas with forestry features for commercial or production purposes. Although incentives like the CIF exist, the timber market in Colombia remains small. No significant market for native species exists (see Step 3).

Step 3: *Assessment of demand and supply of wood resources for industrial and commercial purposes.*

The timber market in Colombia, dominated by pine trees, is quite small. Pinus is the most favored tree species for plantation forestry. At the moment there is no significant market for native tree species in Colombia. Due to the lack of adequate infrastructure, and particularly in the region of Cravo Norte (Arauca), the transport of timber is very expensive. Transportation costs for extracted timber are considered to be above the industry's national and international average. Generally the preferred option for timber transportation is via rivers. Frequently, timber is shipped over the border to Venezuela (this is a natural route for transporting goods). However, the project owner considers this option (currently and at project start in Cravo Norte (Arauca)) unfeasible for political

[48] National and/or sectoral land-use policies or regulations, which give comparative advantages to afforestation/reforestation activities and that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001), need not be taken into account in developing a baseline scenario (i.e. the baseline scenario could refer to a hypothetical situation without the national and/or sectoral policies or regulations being in place)"

reasons.[49] Therefore, it is difficult for the proposed A/R project activity to compete on both the national and international markets.

Given the growing ecological pressure on natural forest resources due to increased timber demand, many industrialized nations have limited access to tropical wood imports originating from sustainable sources. It can be assumed that the availability of tropical timber has diminished, but demand has not. Availability on the international market has decreased because of rapid degradation of natural forests due to unsustainable management practices, and because industrialized countries have drafted and implemented legislation to hamper tropical timber trade from unsustainably-managed forest resources.

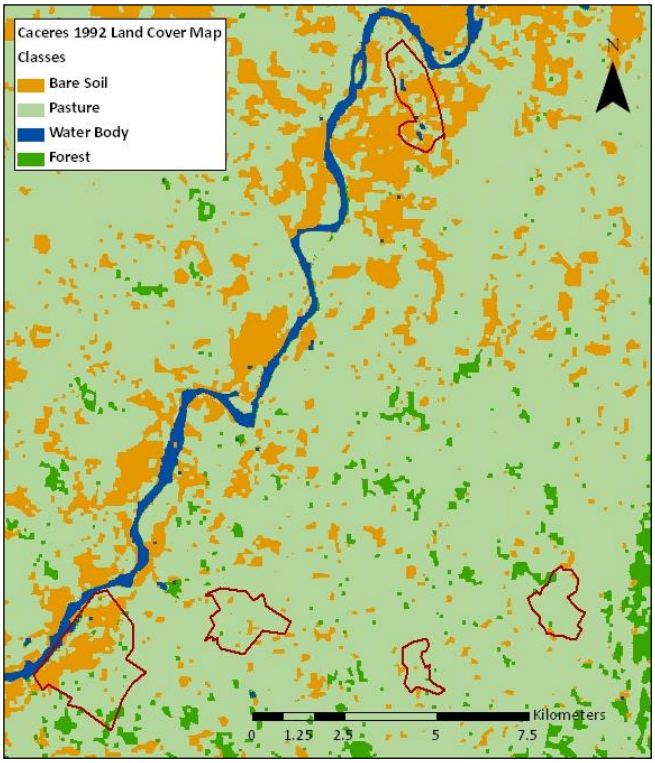
The proposed A/R project activity intends to supply a high demand international market with wood from sustainably-managed forestry plantations planted with native tree species.

Step 4: *Assessment of previous land use and project entity's land use practices within the project boundaries*

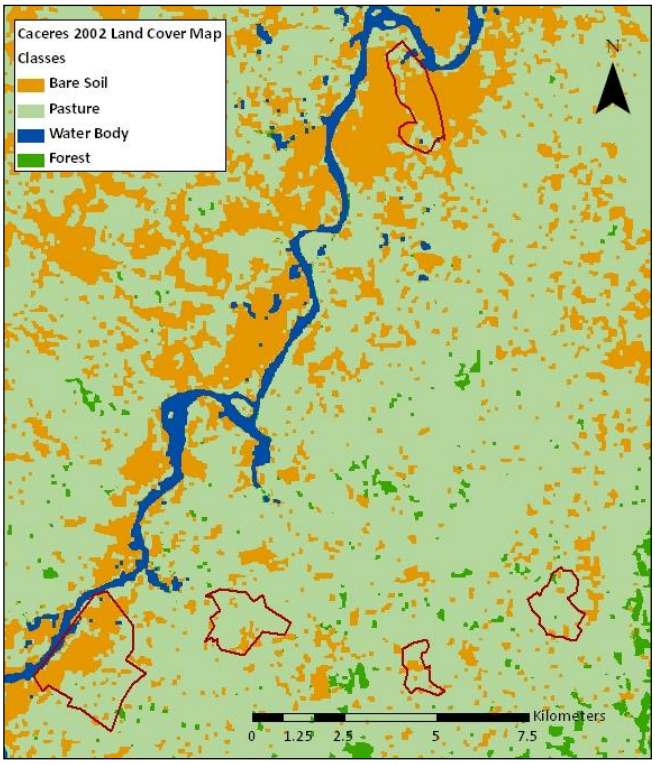
Project activities are carried out in two areas:

- Cravo Norte (Arauca): the previous land use was extensive cattle farming, as can be seen from Maps 1 and 2. These lands were acquired to conduct forestry activities.
- Cáceres (Antioquia): The previous land use was extensive cattle farming with some gold mining activities, as illustrated in Maps 3 and 4.

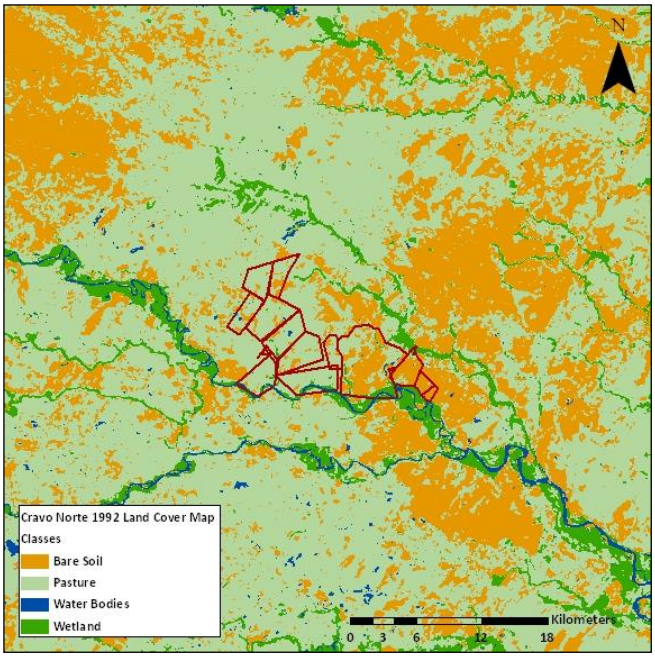
[49] http://www.terra.com.co/noticias/articulo/html/acu23646-relaciones-entre-colombia-y-venezuela-marcadas-por-la-crisis.htm



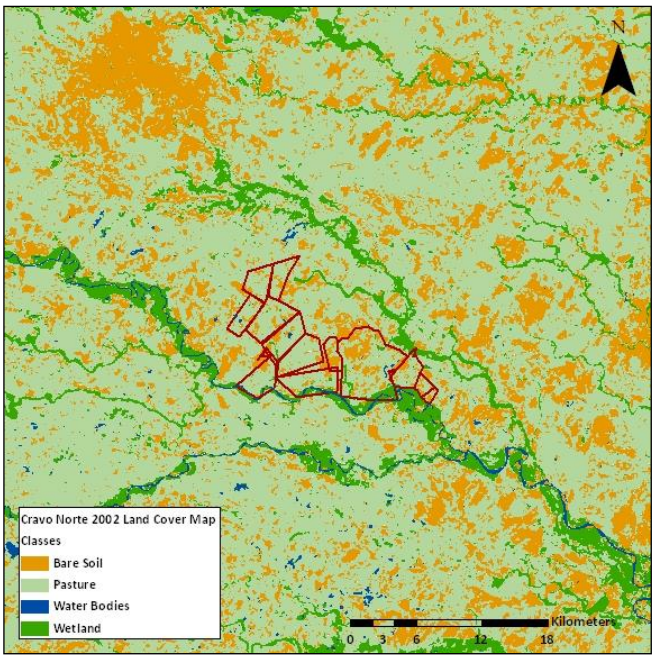
Map 9: 1992 Land cover classification map for Caceres



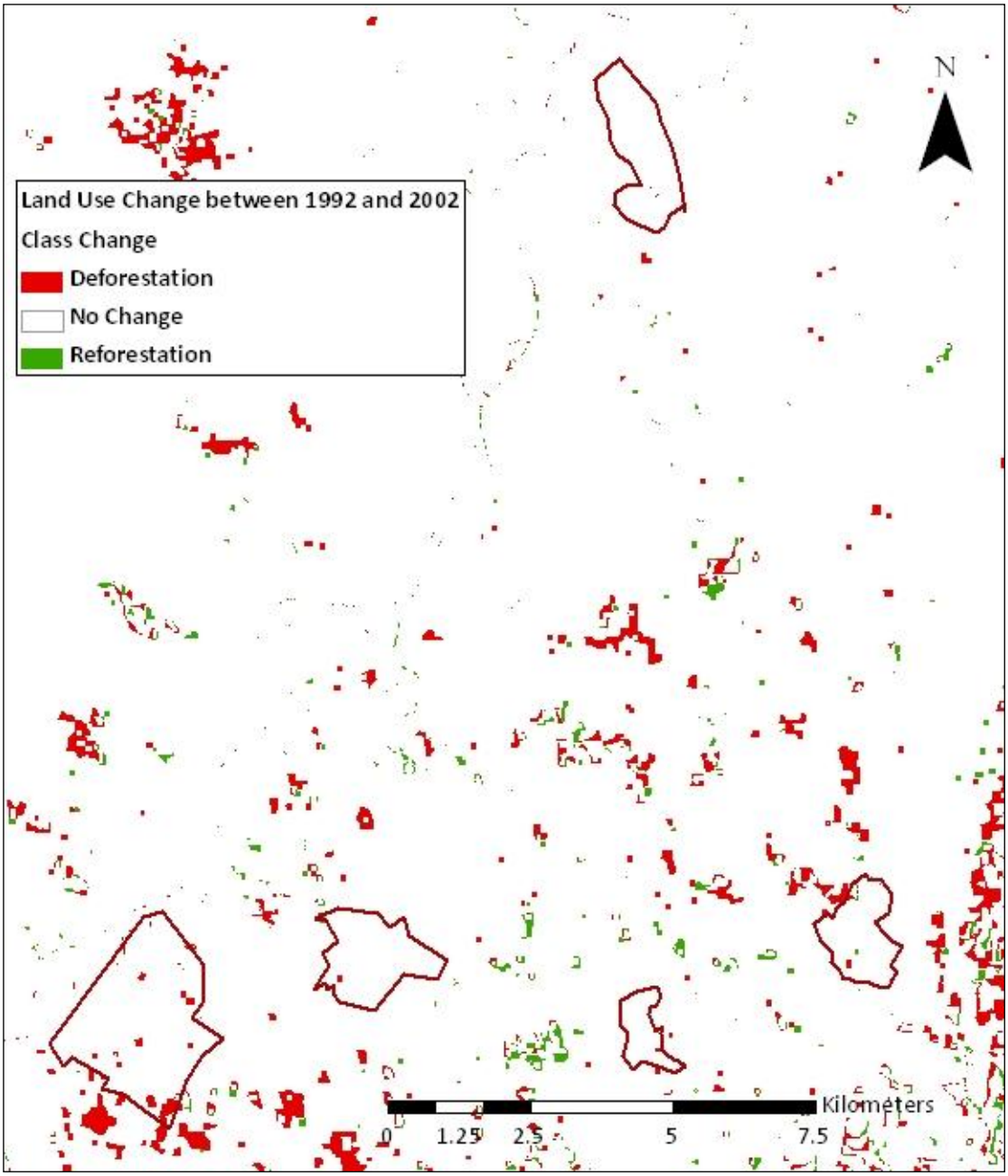
Map 10: 2002 Land cover classification map for Caceres



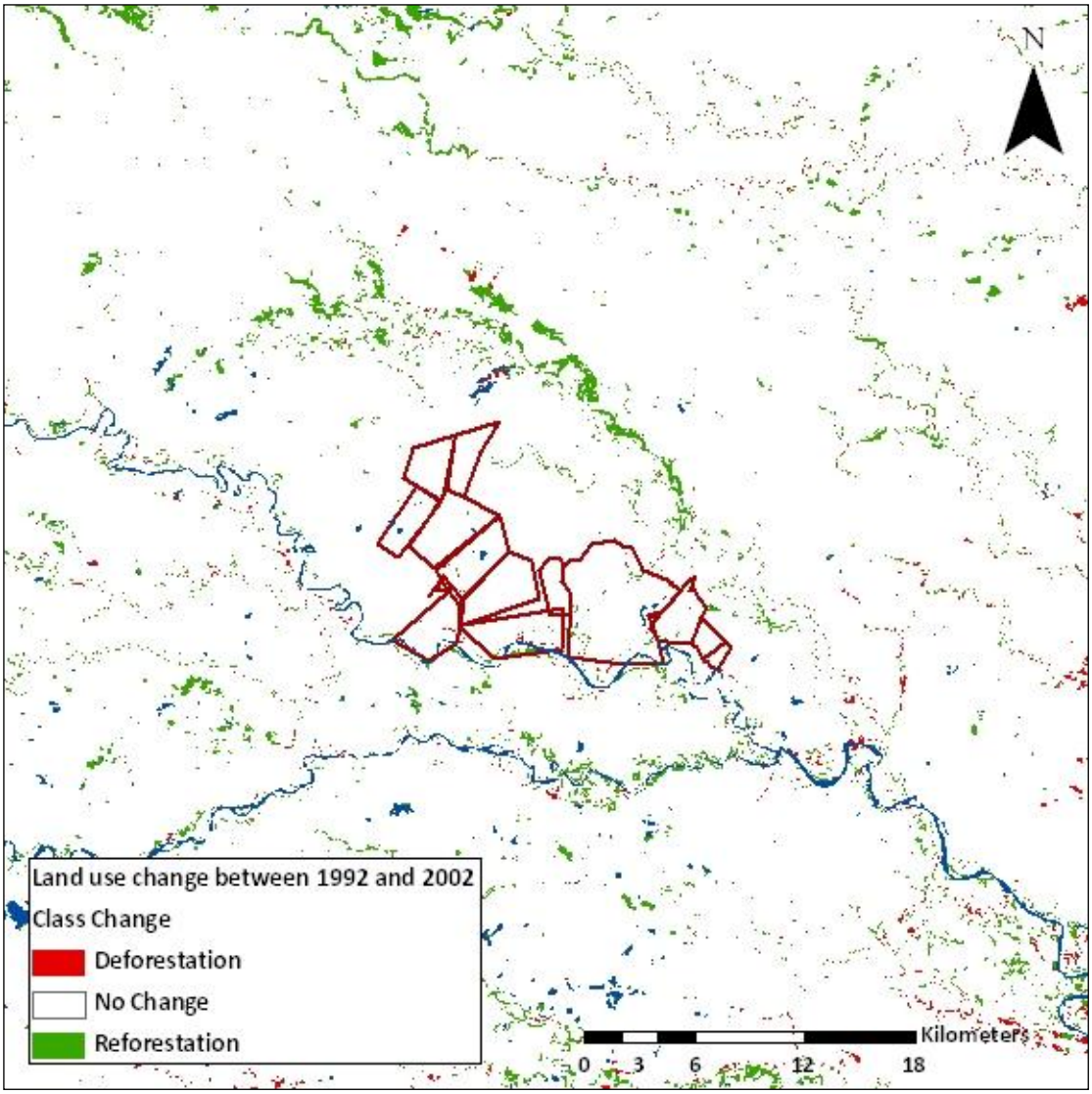
Map 11: 1992 Land cover classification map for Cravo Norte



Map 12: 2002 Land cover classification map for Cravo Norte



Map 13: Land cover change between 1992 and 2002 for Caceres

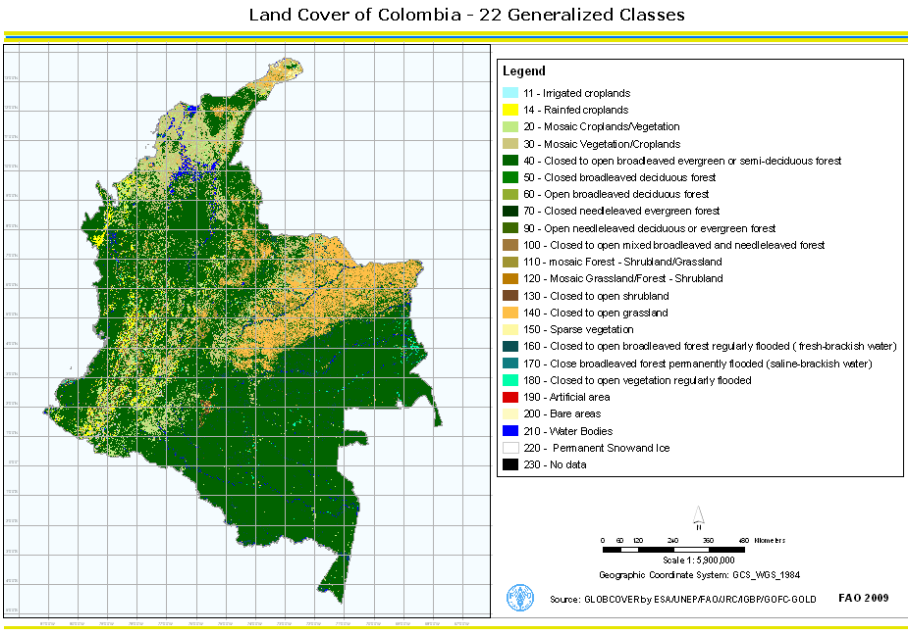


Map 14: Land cover change between 1992 and 2002 for Cravo Norte

Step 5: *Identification of plausible and credible land-use alternatives*

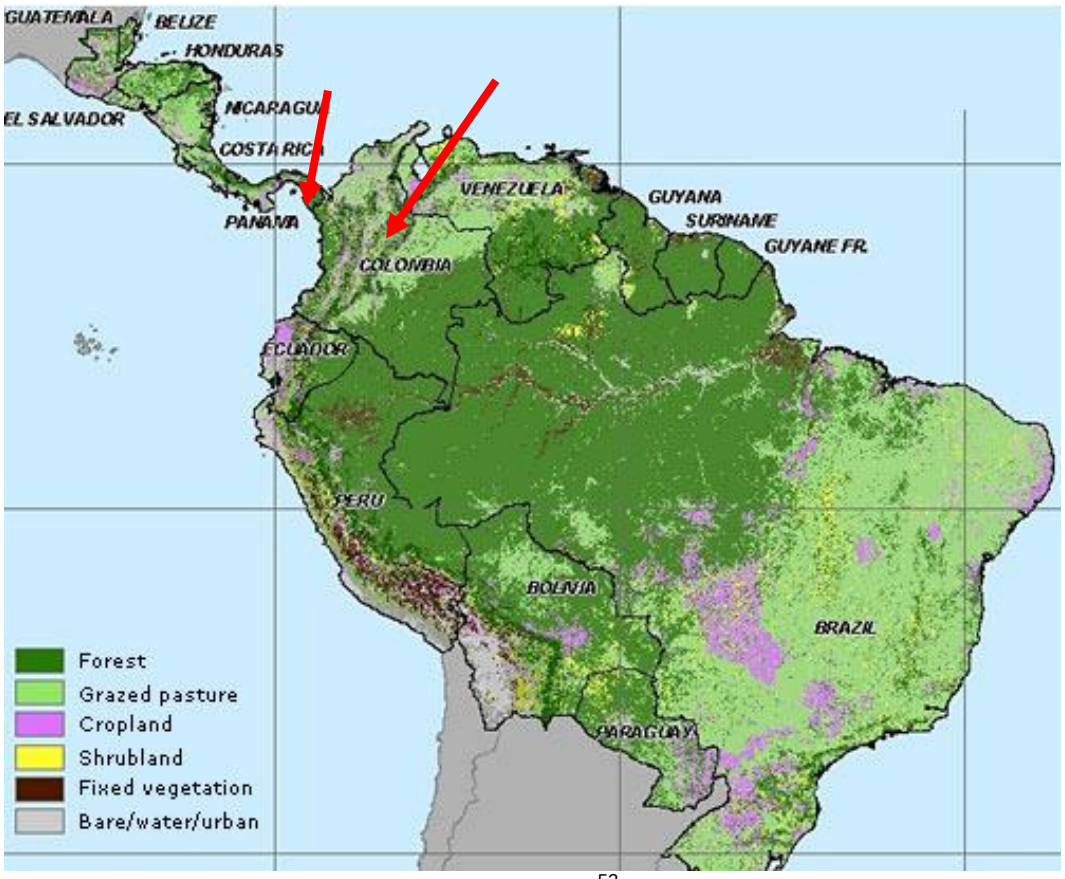
According to data from territory maps and satellite study (please refer to step 4), as well as feedback given by stakeholders and literature[50], the most favorable alternatives of land use with regard to current and potential land use are:

- Livestock farming activities in Cravo Norte (Arauca) and Cáceres (Antioquia)
- Gold mining activities in Cáceres (Antioquia)



Map 15: Land cover of Colombia, 2009[51]

[51] Food and Agriculture Organization of the United Nations. 2009: http://www.fao.org/geonetwork/srv/es/graphover.show?id=37154&fname=lc_Colombia.png&access=public



Map 16: Image US2, land use in tropical Latin America[52]

Step 6: *Identification of the baseline scenario as the most likely land-use in the absence of the project activity*

The baseline scenario, in the absence of the project activity, would be extensive livestock farming, and in some areas in Cáceres (Antioquia) gold mining. This land use is common practice around and within the project territories.

Extensive livestock farming has some negative environmental effects. Deforested areas are first used for agricultural purposes and later transformed to conduct extensive activities such as cattle farming. The decrease of the overall forest area is attributed to the expansion of livestock farming. The area suitable for cattle farming has already been exceeded. Consequently, it has reduced areas with a superior potential for other kinds of activities, such as forestry (see Table 7:Comparison between the current land use and the potential land use in Colombia in Step 1).

[52] Food and Agriculture Organization of the United Nations. 2000. Essential documents, statistics, maps and multimedia resources. www.fao.org/english/newsroom/extras/200506_deforestation/deforestation1.htm

G.2.2 Document that project benefits would not have occurred in the absence of the project, explaining how existing laws or regulations would likely affect land use and justifying that the benefits being claimed by the project are truly 'additional' and would be unlikely to occur without the project.

The procedure to demonstrate additionality follows EB 35 Report Annex 17 with the A/R Methodological Tool "Tool for the Demonstration and Assessment of Additionality in A/R CDM Project Activities" (Version 02). The following five basic steps as outlined in the additionality tool are followed to demonstrate that the proposed A/R CDM project activity is additional and not the baseline scenario:

- Step 0: Preliminary screening based on the starting date of the A/R project activity;
- Step 1: Identification of alternative land use scenarios to the A/R project activity;
- Step 2: Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land use scenarios; or
- Step 3: Barriers analysis; and
- Step 4: Common practice analysis.

Step 0: Preliminary screening based on the starting date of the A/R project activity

This step determines the land eligibility prior to the starting of the A/R CDM project activity. The land within the project boundary is defined as grassland (see also G.2.1). As a result of the multi-temporal land use change analysis, developed using satellite images, the land proposed for the forestry activity was found in 97% in Caceres (Antioquia) and 93% in Cravo Norte (Arauca) to be eligible 1992.

The project activity started in 2002. Income from carbon sequestration is mentioned in the contracts of participation. First contracts were signed in January 2002 by the investors. In May 2007, the company "Carbono & Bosque" delivered an analysis of carbon sequestration potential and an eligibility study of the area. The project PIN was sent to the Colombian DNA on June 1, 2007. A Letter of No-Objection was obtained on June 5, 2007.

Step 1: Identification of alternative land use scenarios to the proposed A/R project activity

Sub-step 1a: *Identify credible alternative land use scenarios to the proposed project activity*
See chapter G.2.1

Sub-step 1b: *Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations*
See G.2.1

Sub-step 1c: *Selection of the baseline scenario*
See G.2.1

Step 2: Investment analysis
N/A

Step 3: Barrier analysis

Sub-step 3a: *Identify barriers that would prevent the implementation of type of the proposed project activity*

Investment barrier
In 2002, the forestry plantations in Colombia occupied 231,912 hectares, equivalent to about 3% of the country's total forest cover. 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.

Silviculture and extraction of wood represents 0.14% of the national Gross Domestic Product (GDP). Only 1.2% of the GDP from agriculture, forestry, hunting and fishing include lumber and forestry products. This indicates that commercial forestry is a scarce activity relative to others in the sector (see Table 8:). 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 credit for this type of activity (Ministry of Agriculture 2005).[53, 54,55]

[53] "Caracteristicas y estructura del sector Forestal-Madera-Muebles en Colombia. Una Mirada Global de su Estructura y Dinamica 1991-2005". Ministerio de Agricultura y Desarrollo Rural. 2005. page 32, section 7, para 2:
http://books.google.com.mx/books?id=RDaAgeny6GAC&printsec=frontcover&dq=Caracteristicas+y+estructura+del+sector+Forestal-Madera-Muebles+en+Colombia&source=bl&ots=TZqrmy1huw&sig=zZoj7vxT7d1WCcd-cfy9GkjFafE&hl=es&ei=MnQOTMa9K4LOM8vR0dEM&sa=X&oi=book_result&ct=result&resnum=3&ved=0CB0Q6AEwAg#v=onepage&q&f=false

[54] 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

[55] For the year that the Asorpar project began, 2002, credit lines for forestry investment were nonexistent. The high market risks and the long periods to wait for returns did not make for an attractive investment. The regulatory instability in the forest sector also limited attractiveness. (Rivera y Moreno, 2002; Espinal et al, 2005). These arguments are also 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.

Table 8: Participation of Agricultural Activities in the Gross Domestic Product (GDP) in Colombia, 2004.[56]

Activity	2004
Coffee, without roasting	13.3%
Other agricultural products	45.8%
Live animals and animal products	36.7%
Lumber and forestry products	1.2%
Fish and other fish products	3.0%
GDP from agriculture, forestry, hunting and fishing	100%

There are no commercial bank lines of credit for long-term investments such as reforestation projects.[57] 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.[58] There are multilateral banking credit sources, but processing is quite complex. Furthermore, they are intended mainly for institutions such as the Regional Autonomous Corporations (the entities in charge of managing environmental resources and policies in the various regions of Colombia) instead of private landowners.[59]

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 was subject to an important increase in government assisted financing through FINAGRO between 1998 and 2002, increasing from $153,500 million pesos to $221,300 million pesos. In contrast, the forestry sector received the smallest allocation in FINAGRO: $350 million pesos in 1998 and only $64 million pesos in 2002.[60]

Furthermore, because of internal social conflict, Colombia is perceived as a country with high risks for international investment, making access to international capital for long-term investments such as reforestation projects virtually impossible.[61, 62]

Although there is an incentive in Colombia allocated to reforestation activities, specifically the Forest Incentive Certificate (CIF: Certificado de Incentivo Forestal), 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

[56] Source: DANE: http://www.agrocadenas.gov.co/forestal/Documentos/caracterizacion_forestal.pdf, page 31 Table 15.
[57] 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
[58] "Estudio de tendencias y perspectivas del sector forestal en América Latina Documento de Trabajo. Informe Nacional Colombia". Available at: http://www.fao.org/docrep/007/j4192s/j4192s00.htm#TopOfPage
[59] Instituto de Investigación de Recursos Biológicos "Alexander von Humboldt". Estudio del Mercado Colombiano de Semillas Forestales. 2003
[60] IDEA 2003
[61] 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. 50
[62] http://www2.standardandpoors.com

the election period (avoidance of corruption). [63] Blanco's review of the programs to support environmental services (2005) reported three important problems with the CIF incentive program. First, 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.[64] Third, high transactions costs of obtaining the incentive make it difficult to use. Some projects have waited for more than three years for approval.

An additional important investment barrier of Colombia is the interest rate of banks. In 2002, the interest rate was above 31%.

VERs 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 advance (up front) payments for VERs. It is likely that such additional revenue streams will provide a guarantee to some banks to facilitate the granting of commercial loans.

Technological barriers

Technological barriers involve an array of shortcomings in the successful establishment of tree plantations using native species. In general, there is a shortage of required input and management factors. Most of the reforestation programs have been carried out with exotic tree species, especially Pinus, Eucalyptus and to a lesser extent Tectona and Gmelina species.[65] There are three reasons for this: 1) the lack of scientific and technical knowledge of native species, 2) the perception that native species imply a longer investment time frame (not always true), and 3) the environmental challenges associated with native species. In 2009, in the Department of Antioquia, the majority of the reforestations have been carried out with Pinus, followed by Tectona, Acacia and Eucalyptus.[66] A 2007 publication of the Government Antioquia lists the largest reforestation companies of the country. The plantations of these largest reforestation companies consist mainly of Pinus but Eucalyptus, Tectona, Cypress, Gmelina and Ceiba are also planted.[67] This information is congruent with data provided in 2009 by the Ministry of Agriculture and Rural Development et al.[68]

As of September 1999, the total reforested surface in Colombia for industrial purposes was 145,759 hectares, according to consolidated data by SITEP (not including areas of less than 10 hectares). The predominant tree species in commercial reforestation programs belonged to the following botanical families: *Pinaceae* (55.1%), *Myrtaceae* (18.6 %), *Cupresaceae* (7.00 %), and *Verbenaceae* (7.1 %). The most planted species was *Pinus patula* with an area of 53,197 hectares, equivalent to (36.5 %) of the country's total. These forests were located primarily in Caceres (Antioquia), Caldas, Cauca and Quindio provinces. These above-mentioned species were followed by *Eucalyptus*

[63] http://www.minagricultura.gov.co/02componentes/06com_03d_cif.aspx
[64] See footnote 42 and http://www.minagricultura.gov.co/02componentes/06com_03d_cif.aspx;
[65] Lucía Atehortúa Gárces Ph. D in REFORESTATION A NATURAL PROCESS, Luis Gonzalo Moscoso Higuita, 2005
[66] Informacion obtained by the "Cadena forestal de Caceres (Antioquia)", 2009
[67] "Reforestacion", una publicacion de la Gobernación de Caceres (Antioquia), Medellin, October 2007
[68] Forestry Sector, Invest in Colombia. Ministry of Agriculture and Rural Development, National Federation for the Lumber Industry; National Forestry Investigation Center; Colombian Corporation of Agricultural Investigation. Bogotá, July 2009, page 15

grandis, the second most abundant species with 15,265 hectares or (10.4 %), *Pinus caribea* with 10,365 hectares or (7.11%), and *Cuppresus lusitanica*, with 9, 982 hectares or (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.[69]

In the project area there is a lack of knowledge regarding native tree plantations, a lack of skills for producing high quality seedlings, a lack of adequate tree planting, and a lack of measures to prevent planted trees from being subject to fire, pest and diseases. This impairs, among other things, the ability to guarantee sources of quality seeds. This can be proven due to the fact that native tree plantations are not common practice in Colombia. 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.

Barriers due to prevailing practice

As discussed earlier (see the section on "Technological barriers") most reforestations have been carried out with exotic (not native) tree species. This large-scale plantation project, with the plantation of around 25 native species[70], is among the first of its kind in Colombia. [71, 72] Native species are mixed in the same area - not common practice in Colombia. Common practice is a plantation of Pinus, Eucalyptus, Tectona, Cypress, Gmelina and Ceiba. The VCS carbon credit project will help to increase the general acceptance and the knowledge of native species (see "Technological barriers").

Civil unrest and instability barrier

In the past, the economic dynamics of both project areas have been impacted by armed conflicts between the Autodefensas Unidas de Colombia (AUC, United Self-Defence Forces of Colombia), the Colombian regular armed forces, the F.A.R.C.-E.P. (Fuerzas Armadas Revolucionarias de Colombia - Ejército del Pueblo), and other Guerrilla groups such as the Ejercicio Nacional de Liberación (ELN, National Liberation Army). At the time the project started, the AUC had a very strong presence in the Cáceres (Antioquia) plantation area, and the FARC had a very strong presence in the Cravo Norte (Arauca) plantation area.[73] Since the proposed locations are in an internal conflict region, both labor options and economic dynamics have been very depressed, and the social life of the local inhabitants has been deeply and negatively impacted.

The project generates tax income for both local and national authorities. The economic situation today is the same as at the beginning of the project. That is, there are no economic activities available in the area that can provide labour and tax sources. A major

[69] REFORESTATION A NATURAL PROCESS, Luis Gonzalo Moscoso Higuita, 2005

[70] Considerable more native tree species can be found within the plantations, since the micro-climate condition created by the reforestation project allow natural regeneration from the already planted trees, the Gallery forest in Cravo Norte or form the selective trees that have been in the project area before the project start.

[71] "Reforestacion", una publicacion de la Gobernación de Caceres (Antioquia), Medellin, October 2007

[72] Forestry Sector, Invest in Colombia. Ministry of Agriculture and Rural Development, National Federation for the Lumber Industry; National Forestry Investigation Center; Colombian Corporation of Agricultural Investigation. Bogotá, July 2009, page 15

[73] See e.g. http://worldmeets.us/images/FARC_map.gif or http://globalguerrillas.typepad.com/globalguerrillas/2005/09/journal_a_map_t.html or http://farm3.static.flickr.com/2015/2144612941_e9c041129c.jpg?v=0

reason for this is that both commercial agriculture and cattle farming have been widely abandoned by landowners due to blackmailing and kidnapping threats and actions by illegally armed groups. Most landowners decided to reduce economic activity on their lands, opting for unmanaged cattle farming to keep their property within a basic administrative and technical management stage. The reason is the avoidance of forcible displacements.[74]

In such a volatile environment it can be assumed, that any reforestation investment project that seeks to increase sustainable economic activity 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. It will also lead to more safety with respect to armed conflict and forcible displacements. 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.

The project was conceived from its beginning as a carbon capture reforestation project. Asorpar Ltd. assumed the inherent internal socio-economic conflict risks of the regions,[75] given the possibility of having the project registered under an international standard.

Barriers relating to markets, transport and storage; unregulated and informal markets for timber, non-timber products and services prevent the transmission of effective information to project participants

One of the barriers in the region of Cravo Norte (Arauca) is the lack of infrastructure. The region is isolated and remote. The transportation costs for extracted timber are above industry averages. Generally, the preferred option of timber transportation is via rivers. Common procedure is shipping over the border to Venezuela (this is a natural route for transporting goods). However, the project owner considers this option as currently unfeasible for political reasons.[76] The supply of fertilizers, seeds, etc. is considered to be very expensive and difficult due to the lack of roads in the project region. There is no infrastructure of paved roads, rails or waterways (e.g., rivers). Therefore the PO has to invest in infrastructure such as water supply.

Due to a significant lack of infrastructure in the region of Cravo Norte (Arauca) (and in Colombia in general), the transport of the timber is very expensive. Therefore it is difficult to compete on the national and international markets. Furthermore, the timber-market of Colombia is quite small, not sufficiently developed, dominated by pine trees, and prices are low. [77, 78]

[74] http://www.colombiassh.org/site/spip.php?article517
[75] http://www.scribd.com/doc/8579058/Paramilitarismo-de-Estado-en-Colombia; http://lacocalocacompany.blogcindario.com/2008/06/02225-mas-de-4-000-hectareas-de-coca-de-los-paramilitares-fueron-erradicadas-manualmente-en-Caceres (Antioquia)-co.html; http://www.analitica.com/archivo/vam1997.05/semop27.htm;
[76] http://www.terra.com.co/noticias/articulo/html/acu23646-relaciones-entre-colombia-y-venezuela-marcadas-por-la-crisis.htm
[77] La cadena forestal y madera en Colombia, 1991-2005, page 15. Ministerio de Agricultura y Desarrollo Rural Observatorio Agrocadenas Colombia, Bogota, March 2005. http://201.234.78.28:8080/dspace/bitstream/123456789/875/1/20051121663_caracterizacion_forestal.pdf
[78] Interview with the project owner, 2010

Sub-step 3b: *Show that the identified barriers would not prevent the implementation of at least one of the alternative land use scenarios (except the proposed project activity)*

The establishment of native plantations is limited by the barriers mentioned above.

Step 4: Common practice analysis

Due to the large and low cost supply of wood and wood products from the abundant natural forests throughout the country, 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 sector. Even though government plans and programs have promoted reforestation, this activity only registers 9,494 hectares per year, which is only 41% of the planning targets for the year 2000. [79]

In the 2000 report on the Financial Condition of the State (CORPOCALDAS), it was reported that only 1,900 hectares of new forest had been established between 1994 and 2000 (approximately 271 ha per year in the entire department).

This project is an initiative which differs substantially from the common practice, due to the fact that native species are be planted.

G.2.3 Calculate the estimated carbon stock changes associated with the 'without project' reference scenario described above.

It is assumed that both trees and shrubs are in a steady state, since no significant change occurred in the area the last 10 years

G.2.4 Description of how the "without-project" scenario would affect local communities in the project area.

Caceres (Antioquia)
In this region the "without project" scenario includes extensive cattle grazing, mining and subsistence farming. While livestock production and mining are more profitable than reforestation, these activities are controlled by, and benefit, only a small percentage of the population and create little employment for the rest of the community. Subsistence farming, while accounting for a very small percentage of the land in the project area, is an activity carried about by many local workers. Subsistence farming in this area is very difficult and the middlemen who buy their goods tend to pay them unfair prices.[80]

Cravo Norte (Arauca)
This is one of the poorest departments in Colombia. The predominant economic activity is cattle ranching, which provides few jobs for the local communities because land ownership is highly concentrated and extensive ranching requires little manual labor.[81] This means that the majority of the local community that is able to practice subsistence

[79] Supporting documentation for Bill 264 of 2004 shows that from 2000 to 2002 28,482 ha were planted in the entire country with CIF, which produces a reforestation rate of 9,494 ha per year.
[80] Interview with Juan Guillermo Molina, 13 April 2010.
[81] Interview with Juan Guillermo Molina, 13 April 2010.

farming does so as squatters with tenuous legal rights to the land they live on. As stated above, subsistence farming does not provide a good living for these families because they have little to no surplus income to invest in new crops and the middlemen buy the small amount of crops that they can sell for extremely low prices.[82]

G.2.5 Description of how the "without-project" land-use scenario would affect biodiversity in the project area.

In both Cravo Norte (Arauca) and Caceres (Antioquia) in the "without project" scenario the project areas would not benefit from the biodiversity increases that come with forests. In the areas used for cattle ranching, nearly the only flora is the various types of grasses for cattle sustenance. These grasses do not create the necessary habitat for the wide variety of fauna found in Colombia's forests. In the areas devastated by mining the harm to biodiversity is even more extreme because of the use of mechanized excavation, the use of mercury that leaks into the water systems and the spraying process that disrupts the entire ecosystem.[83] In Cravo Norte (Arauca), prior to the project activity, there existed a strong local practice of burning land on a yearly basis. This devastated the biodiversity in the burned areas.

G3 Project Design & Goals (Required)

G.3.1 Provide a description of the scope of the project and a summary of the major climate, community and biodiversity goals.

The overall objectives of the project are to restore forest cover using principally native species on degraded lands and show that commercial plantations with native species can be viable investment options with the aid of carbon revenues. Through these activities the project owner seeks to contribute to sustainable development in Colombia, protect the biodiversity being quickly lost in Colombia's forests[84] and promote poverty alleviation.

Specific objectives of the reforestation activity include:

- Increase forest cover on degraded land using native species and implement sustainable forestry practices. The project activity increases native species forest cover on approximately 11000 hectares of degraded land, restoring habitats for the vast biodiversity boasted by Colombia's forests and significantly improving water and soil resources depleted by cattle grazing and alluvial gold mining.
- Sequester carbon dioxide in a way that can be measured, verified and monitored.
- Promote soil conservation and improvement of water resources, protection from soil erosion as a result of grazing and mining. The reforestation activities restore the balance of nutrients and health of soils that have been highly depleted, over compacted and devastated by mechanized mining activities. These activities further improve water resources by removing pollution sources like cow dung and

[82] Interview with Juan Guillermo Molina, 13 April 2010.
[83] Moscoso Higuita, Luis Gonzalo. Reforestation, a natural process. (2005) Pg. 35
[84] Estado de Conocimiento de la Flora Silvestre en la Jurisdiccipon de CORCACERES (ANTIOQUIA). CORCACERES (ANTIOQUIA): Subdirección de Ecosistemas, Pg. 103 (2009)

mercury and improving the health of the subterranean water resources from tree planting.

- Provide habitat for increased biodiversity. The natural habitats for Colombia's wide variety of flora and fauna found naturally in the forests have been severely compromised by deforestation for ranching and mining. The restorations of native forests regenerate these conditions and provide sanctuary for the biodiversity that suffered as a result of deforestation.
- Educate communities about sustainable economic development using wood and non-wood forest resources. Asorpar has carried out extensive training and seminar courses both for Asorpar employees and other interested local residents. The topics of these seminars vary widely but all are targeted at increasing awareness about sustainability and the importance of forests and attempt to provide local residents with the know-how to take advantage of wood and non-wood forest products in order to improve their socio-economic situation.
- Contribute to community development and poverty alleviation. Asorpar creates employment in an area with few alternative income sources and high levels of instability and economic depression due to guerrilla and paramilitary activities. Not only do the project activities provide employment but they provide an employment in which the workers learn skills that can be applied to achieve better employment opportunities in the future.
- Create a successful example of viability of reforestation projects with native species that can be replicated in Colombia and elsewhere.

G.3.2 Describe each major project activity (if more than one) and its relevance to achieving the project's goals.

- **Reforestation**: for each farm involved in the project activity the project owner has developed a sustainable forest management plan that has been approved by the Ministry of the Environment of Colombia in order to qualify for the forestry incentive program. These include information about the social 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 has been established and applied across all farms. 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 has been carried out through surveys of Asorpar employees in order to gauge the direct benefits of the project. For biodiversity monitoring, inventories have been carried out of both flora and fauna found in the project areas.
- **Capacitation and Education**: in both project areas Asorpar employees have carried out intensive education programs for Asopar employees and their families. 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.

G.3.3 Provide a map identifying the project location, where the major project activities will occur, geo-referenced boundaries of the project site(s).

Please refer to Map 1-4.

G.3.4 Provide a timeframe for the project's duration. Describe the rationale used for determining the Project lifetime. If the accounting period for carbon credits differs from the project lifetime, explain.

This project envisions a permanent sustainable forestry plantation. The crediting period is 30 years as required by the VCS. For further information please refer to the Management Plan.

G.3.5 Identify likely risks to climate, community and biodiversity benefits during the project lifetime. Outline measures that the project plans to undertake to mitigate the risks.

- **Fire**: as outlined in the management plans, four-meter firebreaks are maintained free of vegetation at strategic areas around all plantations. In general these firebreaks are located every 500m both from north to south and east to west. This varies slightly because the project actively makes use of the natural geography to improve abilities to fight fires. These procedures include using roads and rivers as firebreaks and the high points as lookout stations. Furthermore, in Cáceres (Antioquia) specifically the plantation is extremely close to the River Cauca and thus this water is available as a resource in the case of fire. In Cravo Norte (Arauca) the plantations are dotted with estuaries, which also provide an excellent source of water for fire fighting and natural firebreaks.

  Local community members are trained in firefighting techniques so that the entire community can mobilize in the event of a fire. The instruments used for firefighting include fire extinguishers and small motorized water pumps. Asorpar has carried out extensive capacity building surrounding risks of fire and how to prevent and fight it. These seminars have focused on management of waste, maintenance of roads and fire breaks, the use of fire fighting equipment, and the protocol to be followed in the case of a fire.

  These measures proved successful when a dry thunder storm caused a fire on the plantation Macanilla near Cravo Norte in 2009 and the entire local community worked together to successfully put out the fire.

- **Site Preparation**: the site preparation does not involve burning. The majority of site preparation is carried out with machetes only. In areas affected by mining the project activity involved the use of bulldozers to repair the topography. However this had little to no effect on biodiversity since these areas were devastated from the mining. All planting is done manually and existing, isolated trees or bushes have not been removed.

- **Pests and diseases**: The first line of defense for maintaining a healthy level of insects and funghi is in the decision of the species planted and the maintenance of certain bushes left within the plantation to help prevent pests and diseases. In the initial growth phases, natural insecticides are applied specifically to ward off ants and termites, which can be particularly harmful to young trees.

  In general, protocol for protecting plantations from pests and diseases includes the following steps:

  1. Selection of seeds with appropriate genetic base.
  2. Germination in organic matter with sufficient mycorrhizas and nutrients.
  3. Careful maintenance in the nursery.
  4. Continuous monitoring of the plantations.
  5. Use of a heterogeneous group of species.
  6. Establishment of natural barriers, weeding, maintenance of gallery forests and secondary forests.
  7. Careful management to guarantee good growth characteristics

  Chemical products, including insecticides, pesticides, fungicides and disinfectants, are only used in cases of urgent necessity. In the case of such necessity the project uses the product that is least harmful and with careful attention to dosage and timing.

- **Political instability because of guerrilla activity**: safety of all project participants is of paramount importance to Asorpar and was a key concern in designing the project. Asorpar employs local residents to watch over the plantations and notify local authorities immediately if any unauthorized persons are discovered on the plantation. Asorpar 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 and project the country's natural resources. Military units have advised Asorpar 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.

G.3.6 Demonstrate that the project design includes specific measures to ensure the maintenance or enhancement of the high conservation value attributes identified in G1 consistent with the precautionary principle.

The only HCV identified in G1 is HCV1: significant concentrations of biodiversity values. 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 create sustainable forestland that can support the natural biodiversity of the region. In the baseline, the project areas are grasslands that support a much smaller variety of both flora and fauna. By using a mix of native species in the forest plantation, the project seeks to create conditions similar to primary forests that support these

species. In particular, the project involves the planting of Abarco, one of the species listed as Critically Threatened in the Department of Antioquia, and Ceiba Tolua, which is listed as Endangered in the Orinoco. In particular, in the case of Abarco, Asorpar technical manager Luis Gonzalo Moscoso Higuita is one of the few forestry engineers in the country who knows how to collect, treat, and store Abarco seeds in order to help replenish the endangered tree 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 in addition to the planting of two of the threatened tree species as part of the project.

G.3.7 Describe the measures that will be taken to maintain and enhance the climate, community and biodiversity benefits beyond the project lifetime.

The Asorpar reforestation project is conceived as a permanent sustainable forestry plantation and a crediting period is 30 years as required by the VCS. However at the end of that crediting period Asorpar will continue to operate the plantation as a sustainable forestry project. This intention is born out in the contracts signed between Asorpar and the landowners naming sustainable reforestation projects as the soles purpose of the contract. With the continuance of the sustainable forestry plantation, the climate, community and biodiversity benefits will be maintained after the end of the project lifetime.

G.3.8 Document and defend how local stakeholders have been or will be defined.

The local stakeholders have been identified and included in the project design. A local stakeholder consultation was held on October 29 and 30, 2009. In compiling the list of local stakeholders the following groups were included:

- Community members affected by the project
- Community leaders including
- Representatives of local associations
- Representatives of local government
- Local NGOs working on related projects

The stakeholders' consultation process was undertaken in October 2009. The goals were to discover and assess opinions and views about the project, and to obtain locals' comments through a questionnaire and an open discussion after its implementation. It is possible that interested parties can maintain the communication with the project owners by email. Stakeholders have been identified and invited via email two weeks before the consultation took place.

G.3.9 Describe what specific steps have been taken, and communications methods used, to publicize the CCBA public comment period to communities and other stakeholders and to facilitate their submission of comments to CCBA.

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 Asorpar will follow up with them in order to encourage their further participation.

G.3.10 Formalize a clear process for handling unresolved conflicts and grievances that arise during project planning and implementation. The project design must include a process for hearing, responding to and resolving community and other stakeholder grievances within a reasonable time period.

Project Owner and technical supervisor Luis Gonzalo Moscoso Higuita deals 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 are treated with the utmost importance. Asorpar also resolve all conflicts through official channels of local government, the Police Inspector or local courts. While Asorpar has not had any complaints from workers, the company has had to rely on law enforcement on several occasions due to attempts of illegal mining on their property.

G.3.11 Demonstrate that financial mechanisms adopted, including projected revenues from emissions reductions and other sources, are likely to provide an adequate flow of funds for project implementation and to achieve the anticipated climate, community and biodiversity benefits.

Financing will be secured due to the sale of the carbon credits, and payments from the CIF.

The project owner and the technical manager have significant experience in the administration and practical implementation of reforestation plantations. Approximately two thirds of the land that will make up the final project area has already been purchased, and the continuation of the planting is secured in the medium term. However, the mid- and long-term financial viability of the project depends on the carbon revenue stream.

G4 Management Capacity and Best Practices (Required)

G.4.1 Identify a single project proponent which is responsible for the project's design and implementation. If multiple organizations or individuals are involved in the project's development and implementation the governance structure, roles and responsibilities of each of the organizations or individuals involved must also be described.

The project proponent is ASORPAR Ltda. Luis Gonzalo Moscoso Higuita is the technical manager of Asorpar and Juan Guillermo Molina is the legal manager.

G.4.2 Document key technical skills that will be required to implement the project successfully, including community engagement, biodiversity assessment and carbon measurement and monitoring skills. Document the management team's expertise and prior experience implementing land management projects at the scale of this project.

Reforestation is the core business of ASORPAR. Asorpar Ltd employs 4 engineers and two technicians who support the project. Also a group of over 20 indigenous people has been working with ASORPAR for 10 years; they are working as crew leaders for local

employees. The technical manager, partner and director, Luis Gonzalo Moscoso Higuita, has worked in the forestry, environmental and landscaping areas for many years. He has the reputation of having designed and implemented outstanding projects, due to the knowledge he has gained in environmental and forestry management. He wrote the book "Reforestation, a natural process" in relation to the project in Cáceres. In this book he explains his idea of a forest management development that tries to balance human activities and nature. The book elaborates on the use of timber and non timber products, the technological adaptation, education and research that lead to the minimization and good use of residues, the recovery of degraded soils and the integrated water management. The book won the EXPOFINCA national price (best book on agricultural, farming sector, forestry modality 2005).

Technical skills necessary for implementation of the project activities include safe site preparation, building of greenhouses, germinating seeds, transplanting seedlings, maintenance including pruning, thinning and harvest, and monitoring. Mr. Moscoso is an expert in all these activities and has trained various members of his staff in the methodologies he has developed, as laid out in his book "Reforestation, A Natural Process." His capable team of forestry engineers assists in implementation and supervision of all activities to ensure uniform, high quality results.

Asorpar founder, Luis Gonzalo Moscoso Higuita has been working in the forestry sector for over 22 years. Through his projects Mr. Moscoso has developed an in depth knowledge of all steps of the reforestation process including: knowledge of the region and its people, cartography, air photographs and life zone identification, the knowledge of herbs, shrub and tree species found in stubble fields and forest relicts; surface waters and land use, the agriculture crop handling, cattle raising, fauna and fish raising. In particular, his knowledge of native species and techniques for gathering seeds is so extensive that in this project he has used native species so rare that they are not even included in the government's official list including Fresno, Guacamayo, Melina and Choibá.

Furthermore, Asorpar employees a team of highly qualified forestry engineers who manage the work related to GPS mapping as well as implementation of management plans and monitoring. These engineers have been intensively trained by Mr. Moscoso to understand the subtleties of the regions in which they are working and the native species used in the project activity.

The staff on the ground in the plantations receives training before carrying out their duties. The foremen for the site preparation, greenhouses, transplanting and maintenance activities are trained and supervised by Mr. Moscoso.

G.4.3 Include a plan to provide orientation and training for the project's employees and relevant people from the communities with an objective of building locally useful skills and knowledge to increase local participation in project implementation. These capacity building efforts should target a wide range of people in the communities, including minority and underrepresented groups. Identify how training will be passed on to new workers when there is staff turnover, so that local capacity will not be lost.

One of the primary community objectives of the Asorpar project is to train local workers in skills sustainable forestry techniques and to show a success story so that 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, correct use of machinery if necessary and principles of sustainable forestry.

Furthermore, Asorpar carries out other capacity building activities for its employees and their families. The capacity building activities carried out in Cáceres (Antioquia) and Cravo Norte (Arauca) are targeted a wide range of groups and have a special focus on marginalized groups including women and those affected by guerrilla activity. 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 a forest 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.

Both Cáceres (Antioquia) and Cravo Norte (Arauca) are principally poor municipalities. There is no strong elite presence and the community members at whom 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 Asorpar seeks to improve these families' economic capacity and at the same time prevent further deforestation.

Seminars and Lectures

The educational workshops and talks organized by Asorpar for its employees in the communities of Cáceres (Antioquia) and Cravo Norte (Arauca) span a wide range of topics. These include: sustainable forest management, the importance of forests for climate change, reforestation with native species, seed collecting techniques, the importance of forests for biodiversity and water quality, how to further local economic development by taking advantage of non-wood forest resources in a sustainable manner, fire and disease prevention, and health and sanitation. These lectures usually take the form of instructional lunches for employees and their families.

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 sustainable reforestation. This includes site preparation, green house construction, germination, transplanting, maintenance, harvest and replanting. Workers and further instructed about the importance of sustainable management practice, the value of various ecosystem resources and the variety of flora and fauna that a forest contains.

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

In addition, Asorpar organizes some seminars specifically for a female audience. These topics include using local fish and herbs in home cooking, eco-tourism, sanitation in the home and use of cleaner burning stoves to prevent indoor pollution.

The management plans in place for each plantation are open for constant review and modification based on site-specific experience and the input of local workers and other stakeholders. The management plans were developed based on local circumstances and are tailored to the needs of each site. All decisions about management plans are transparent and input from workers is always welcome. The technical manager, Luis Gonzalo Moscoso Higuita, welcomes the feedback and reports from his staff in the field so that management decisions can be adapted to the idiosyncrasies of each plantation. Furthermore, Luis Gonzalo Moscoso Higuita visits each farm 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 are kept in archives in the central office of Asorpar in Medellin. The primary manner to transmitting practical information is through Mr. Moscoso who visits each plantation frequently and disseminates lessons from other plantations. He also trains all staff and management and thus creates a centralization of information that is distributed to all staff. In particular his team of forestry engineers in the central office is responsible for organizing Asorpar archives and are aware of where all information is stored.

In some cases staff from one project is also brought in to supervise or train staff on another plantation. For example, the manager of the greenhouse in Caceres, a local man whom Mr. Moscoso trained himself, went with Asorpar to Cravo Norte (Arauca) to train the personnel for the greenhouses in that location and supervise the administration of germination.

G.4.4 Show that people from the communities will be given an equal opportunity to fill all employment positions (including management) if the job requirements are met. Project proponents must explain how employees will be selected for positions and where relevant, must indicate how local community members, including women and other potentially underrepresented groups, will be given a fair chance to fill positions for which they can be trained.

In both Cáceres (Antioquia) and Cravo Norte (Arauca) all employees have been local stakeholders with the exception of the technical manager, Luis Gonzalo Moscoso Higuita and in one case the supervisor of the nursery in Cravo Norte (Arauca). In that case a local stakeholder from Cáceres who had already been trained went with the project to Cravo Norte (Arauca) to supervise and train other local stakeholders in the techniques necessary for the nursery. Asorpar is an equal opportunity employer and trains male and female employees in the same way.

G.4.5 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.

Permanent employees of Asorpar are contracted directly and all taxes and social security payments are made directly by Asorpar and employees are advised of their rights directly. For temporary employees in the field Asorpar hires contractors who are paid based on performance and are responsible for covering the taxes and social security obligations of their employees and to advise them of their rights. Asorpar's contracts with all contractors specifically provide that the contract shall be deemed invalid if contractors do not comply with their legal responsibilities.

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, Asorpar provides training and all necessary safety equipment.

Asorpar makes it a priority to make sure that work conditions are clean and safe 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 are paid in accordance with Colombian law and on time. Capacitation programs and seminars 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.

G.4.6 Comprehensively assess situations and occupations that pose a substantial risk to worker safety. A plan must be in place to inform workers of risks and to explain how to minimize such risks.

Aspects of work on the plantation that entail risks include site preparation, planting, thinning, disease control, harvesting as well as road construction work and natural hazards such as snakes and other venomous/dangerous animals, on site accidents and chemical poisoning. Use of chemicals is generally not anticipated. In case the need for the use of chemicals arises, these are properly transported, stored and used following chemical use guidelines. Workers are provided with personal protective equipment including gloves, masks, helmets and boots while performing field operations to minimize such risks when necessary. Asorpar does not require the use of this equipment when the work is not mechanized and the workers are using tools with which they are extremely familiar like machetes.

Workers are properly trained before undertaking any field operations with which they are not familiar. The level of mechanization of site preparation and plantation maintenance is minimal which significantly lowers the risk of on the job accidents.

G.4.7 Document the financial health of the implementing organization(s).

Asorpar is a financially stable private company with four partners. To date Asorpar has had no change in partners, mergers, acquisitions or other major corporate events. Asorpar counts with participation from private investors but so far has not taken on any debt to implement the project.

G5 Legal Status and Property Rights (Required)

G.5.1. Submit a list of all relevant national and local laws[30] 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.

The host country is the Republic of Colombia, which has ratified the Kyoto Protocol through Law 629 of December 27th, 2000.

In order to consolidate the national forestry policy and as starting-up strategy, the government approved in December 2000 the National Plan for Forestry Development (PNDF, for its initials in Spanish). The ultimate purpose is to provide an impetus of implementing action in the forestry sector.

The law 1021 from 2006 (General Forestry Law) adopts measures to encourage the development of plantation forestry. Forestry activities shall be able to compete on equal terms with other productive sectors, even within the international market.

The Forestry Incentive Certificate (CIF, for its initials in Spanish) was created by means of Law 139 from 1994 and regulated by Decree 1824 from 1994. The CIF is a direct contribution in cash made by the government so as to cover part of the establishment and

maintenance expenses to be paid by those carrying out new commercial forestry plantations activities with one or more tree species developed in areas with forestry features, with commercial or production purposes.[85] The entire project applies for the CIF, and is therefore in line with all legal requirements needed in Colombia.

G.5.2. Document that the project has, or expects to secure, approval from the appropriate authorities.

The project sent the Project Idea Note (PIN) to the Colombian DNA in June 2007 for approval because originally Asorpar planned to develop this as a CDM project. As a response to the PIN the DNA sent a letter of no objection. Domestic law does not require any special licenses or permits to plant a forest.

G.5.3. Demonstrate with documented consultations and agreements that the project will not encroach uninvited on private property, community property or government property and has obtained the free, prior, and informed consent of those whose rights will be affected by the project.

The reforestation project is being carried out exclusively on private land. It has not and will not encroach on either government or community property. Contracts have been signed with all landowners that cede 50% of the ownership of the land to Asorpar in exchange for implementation of the project. In the few cases where there were squatters who had been on unused land for more than 10 years and thus had a limited legal right to the land, those individuals were paid fair price for the land.

G.5.4 Demonstrate that the project does not require the involuntary relocation of people or of the activities important for the livelihoods and culture of the communities.

In the project sites in the area of Caceres (Antioquia) there were many families of squatters. Asorpar Ltd. and its investors not only bought the land from the legal title holder, but also paid fair prices to the squatters for the land that they inhabited even though they did not own it. All squatters who sold the land they inhabited did so willingly and those who chose not to sell the land they inhabited were allowed to stay on their land and that part of the farm was excluded from the project boundary, to allow for subsistence production of food crops. In addition to cash payments for the land the squatters inhabited, Asorpar has employed many of the squatters giving them a stable form of income.

G.5.5 Identify any illegal activities that could affect the project's climate, community or biodiversity impacts (e.g., logging) taking place in the project zone and describe how the project will help to reduce these activities so that project benefits are not derived from illegal activities.

There are currently no illegal activities taking place on the project area that would jeopardize the climate, community or biodiversity impacts of the project. However, prior to the project start, illegal alluvial gold mining took place on several of the farms located in Caceres (Antioquia). Asorpar has restored those areas and reforested them and stopped

[85] Republic of Colombia, Ministry of Agriculture and Rural Development, resolution number 2009

all illegal mining within the project boundary. To ensure that no one encroaches on the reforested land, Asorpar employs local workers to patrol the areas and report any incidents.

G.5.6 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.

The project activity started in 2002. Income from carbon sequestration is mentioned in the contracts of participation. First contracts were signed in January 2002 by the investors.

III. Climate Section

CL1 Net Positive Climate Impacts (Required)

CL.1.1 Estimate the net change in carbon stocks due to the project activities. The net change is equal to carbon stock changes with the project minus carbon stock changes without the project (G2). Alternatively, any methodology approved by the CDM Executive Board may be used. Define and defend assumptions about how project activities will alter carbon stocks over the duration of the project or the project accounting period.

The net change in carbon stocks was estimated using the CDM methodology AR-AM0005: Afforestation and Reforestation project activities implemented for industrial and/or commercial uses - Version 03.
TTable 6: summarizes the estimation of the ex-ante emission reductions over the life of the project. Based on these calculations the project will sequester approximately 2.3 million tCO_2e over its 30 year lifetime.

The general equation used for determination of net anthropogenic GHG removals by sinks is as follows:

$$C_{AR,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t$$

where:

$C_{AR,t}$	Net anthropogenic GHG removals by sinks; tonnes CO_2-e yr^{-1} in year *t*
$\Delta C_{ACTUAL,t}$	Actual net GHG removals by sinks; tonnes CO_2-e yr^{-1} in year *t*
$\Delta C_{BSL,t}$	Baseline net GHG removals by sinks; tonnes CO_2-e yr^{-1} in year *t*
LK_t	Leakage; tonnes CO_2-e yr^{-1} in year *t*
T	Ranges from 1 to end of crediting period; years

Table 9: Estimation of net anthropogenic GHG removals by sinks (tonnes of CO_2e)

		C_{AR}	ΔC_{ACTUAL}	ΔC_{BSL}	LK
Year of project	Year	Estimation of net anthropogenic GHG removals by sinks (tCO_2e)	Estimation of actual net GHG removals by sinks (tCO_2e)	Estimation of baseline net GHG removals by sinks (tCO_2e)	Estimation of leakage (tCO_2e)
1	2002	1,772	1,772	0	0
2	2003	10,034	10,034	0	0
3	2004	24,616	24,616	0	0
4	2005	43,783	43,783	0	0
5	2006	66,166	66,166	0	0
6	2007	90,558	90,558	0	0
7	2008	117,461	117,461	0	0
8	2009	147,336	147,336	0	0
9	2010	179,544	179,544	0	0

10	2011	213,876	213,876	0	0
11	2012	254,440	254,440	0	0
12	2013	308,427	308,427	0	0
13	2014	382,448	382,448	0	0
14	2015	480,973	480,973	0	0
15	2016	605,881	605,881	0	0
16	2017	755,988	755,988	0	0
17	2018	927,598	927,598	0	0
18	2019	1,115,469	1,115,469	0	0
19	2020	1,311,403	1,311,403	0	0
20	2021	1,507,617	1,507,617	0	0
21	2022	1,500,001	1,500,001	0	0
22	2023	1,688,295	1,688,295	0	0
23	2024	1,848,600	1,848,600	0	0
24	2025	1,979,780	1,979,780	0	0
25	2026	2,145,617	2,145,617	0	0
26	2027	2,224,284	2,224,284	0	0
27	2028	2,272,014	2,272,014	0	0
28	2029	2,375,733	2,375,733	0	0
29	2030	2,505,423	2,505,423	0	0
30	2031	2,389,921	2,389,921	0	0

CL.1.2 Factor in the non-CO_2 gases CH_4 and N_2O to the net change calculations (estimated in CL.1.1.) if they are likely to account for more than 15% (in terms of CO2 equivalents) of the project's overall GHG impact.

Non-CO_2 gases do not account for more than 15% of the project's overall GHG emissions.

CL.1.3 Estimate any other GHG emissions resulting from project activities. Emissions sources include, but are not limited to, emissions from biomass burning during site preparation, emissions from fossil fuel combustion, direct emissions from the use of synthetic fertilizers, and emissions from the decomposition of N-fixing species.

GHG emissions as a result of project activities is calculated according to the approved methodology. The project takes into account the increase in emissions of GHG gases resulting from use of fossil fuel, biomass loss and the use of fertilizer. Fossil fuel combustion, for instance, occurs during thinning and harvesting activities, but the methodology excludes transportation fuel.

$$GHG_{E,t} = E_{FuelBurn,t} + E_{BiomassLoss,t} + E_{Non-CO_2,BiomassBurn,t}$$

where:

$GHG_{E,t}$ Annual GHG emissions as result of the implementation of the A/R project activity within the project boundary; tonnes CO_2-e yr^{-1} in year *t*

$E_{FuelBurn,t}$ CO_2 emissions from combustion of fossil fuels within the project boundary; tonnes CO_2-e yr^{-1} in year *t*

$E_{BiomassLoss,t}$ GHG emissions from the loss of biomass in site preparation and

	conversion to A/R within the project boundary; tonnes CO_2-e yr^{-1} in year *t*
$E_{Non-CO2,BiomassBurn,t}$	Non-CO2 emission as a result of biomass burning within the project boundary; tonnes CO_2-e yr^{-1} in year *t*
T	Ranges from 1 to end of crediting period; years

The project participants assume that a small amount of GHG emissions will result from site preparation and plantation management activities. However, the proposed A/R project activity does not engage in any burning practices during site preparation. Further, conversion of herbaceous vegetation can be neglected, and the loss of GHG sequestered in woody biomass will not occur since trees and shrubs have not been removed.

However, for the project participants, it is a difficult task to estimate ex ante GHG emissions with a high degree of accuracy. To maintain a conservative approach for the estimation, the proposed A/R project activity applies a default 10% project GHG emission value. Once the real data are available, the calculation is updated.

Table 10: Sum of the increases in GHG emissions by sources within the project boundary as a result of the implementation of an A/R project activity

Year of project	Year	$GHG_{E,t}$	$GHG_{E,t}$: %[86]
1	2002	197	10 %
2	2003	1,115	10 %
3	2004	2,735	10 %
4	2005	4,865	10 %
5	2006	7,352	10 %
6	2007	10,062	10 %
7	2008	13,051	10 %
8	2009	16,371	10 %
9	2010	19,949	10 %
10	2011	23,764	10 %
11	2012	28,271	10 %
12	2013	34,270	10 %
13	2014	42,494	10 %
14	2015	53,441	10 %
15	2016	67,320	10 %
16	2017	83,999	10 %
17	2018	103,066	10 %
18	2019	123,941	10 %
19	2020	145,711	10 %
20	2021	167,513	10 %
21	2022	166,667	10 %
22	2023	187,588	10 %
23	2024	205,400	10 %
24	2025	219,976	10 %
25	2026	238,402	10 %

[86] Project emissions are estimated to be a percentage of the estimated accumulated tCO2e sequestered through the A/R project activity.

26	2027	247,143	10 %
27	2028	252,446	10 %
28	2029	263,970	10 %
29	2030	278,380	10 %
30	2031	265,547	10 %

CL.1.4 Demonstrate that the net climate impact of the project (including changes in carbon stocks, andnon-CO_2 gases where appropriate) will give a positive result in terms of overall GHG benefits delivered.

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 2.7 million tons of CO_2.

CL.1.5 Specify how double counting of GHG emissions reductions or removals will be avoided, particularly for offsets sold on the voluntary market and generated in a country with an emissions cap.

All offsets generated from this project are foreseen to be sold on the voluntary market. Each offset is recorded on the VCS registry system to prevent double-counting. Colombia does not have an emissions cap and therefore double-counting for that reason is not an issue.

CL.2 Offsite Climate Impacts ("Leakage") (Required)

CL.2.1 Estimate potential leakage (increases in emissions or decreases in sequestration) due to project activities.

No offsite climate impacts or leakage are anticipated for this project. The methodology AR-AM0005 Version 03 anticipates two sources of leakage: displaced grazing and fuel wood collection. However, the displacement of grazing activities to other grasslands (without overgrazing) does not result in leakage. It is considered that in general grazing activities in this area are executed in an extensive manner. Hence leakage from displacement of grazing activities can be set to zero.

Since there is currently no fuel wood collection the in Project Area, there is also no leakage form displaced fuel wood collection.

CL.2.2 Document how leakage resulting from project activities will be mitigated and estimate the extent to which such impacts will be reduced. Estimate the extent to which the negative offsite impacts will be reduced adequately.

No leakage is anticipated.

CL.2.3 Subtract any likely project-related unmitigated negative offsite climate impacts from the climate benefits being claimed by the project. The total net effect, equal to the net increase in onsite carbon stocks (calculated in the third indicator in CL1) minus negative offsite climate impacts, must be positive

No leakage is anticipated.

CL.2.4 Non-CO_2 gases must be included if they are likely to account for more than a 5% increase on decrease (in terms of CO_2-equivalent) of the net change calculations (above) of the project's overall off-site GHG emissions reductions or removals over each monitoring period.

No leakage is anticipated.

CL.3 Climate Impact Monitoring (Required)

CL.3.1a Describe the initial plan for how they will select carbon pools and non-CO_2 GHGs to be monitored.

Monitoring entails the utilization of all information related to project development to estimate VERs at the end of an accreditation period. Monitoring activities include gathering information directly from the field and from indirect sources. Further, monitoring involves making the required calculations and estimations to assess if the project is being developed according to the PD and management plans, with the final aim to determinate GHG removals and leakage.

Continuous monitoring of the project sites (e.g., monitoring site preparation and planting) is done. Continuous monitoring of forest management also takes place (e.g., monitoring re-planting, pruning, thinning, harvesting, and areas affected by disturbances).

Monitoring of survival rate is done during the early stage of the forest establishment, covering the 1-3 year period after the planting activity. After year 3 it is impossible to replant because of competitive reasons. Monitoring of firebreaks in Cravo Norte is done during the establishment and maintenance phases. Cáceres doesn't have artificial firebreaks because there are many roads and streams that function as natural firebreaks. The use of fossil fuels and fertilizer, if applied, is monitored continuously each year.

The monitoring of the project and strata boundaries is done before verification takes place. Part of this monitoring process is further the installation of permanent sample plots to monitor trees growth according to the forest management plan. The recollected data within the sample plots serves another main monitoring purpose: the determination and verification of GHG removals.

Monitoring of leakage is neglected, as no significant grazing and fuel-wood collection takes place according to the assumed baseline scenario.

Monitoring is conducted by a professional team consisting of a forestry engineer as coordinator, technical assistants and the General Manager (GM). The coordinator reports directly to the GM.

All monitoring activities are implemented using developed Standard Operational Procedures (SOPs). Personnel is trained to ensure data quality.

The selection of carbon pools to be monitored is explained in below in Table 11:

Table 11: Selection and justification of carbon pools

Carbon Pools	Selected (answer with yes or no)	Justification / Explanation
Above-ground	Yes	Mayor carbon pool subjected to the project activity
Below-ground	Yes	Mayor carbon pool subjected to the project activity
Dead wood	No	Conservative approach under applicability condition
Litter	No	Conservative approach under applicability condition
Soil organic carbon	No	Conservative approach under applicability condition

CL.3.1b State if the corresponding measurements and the sampling strategy (including monitoring frequency) are set in the monitoring plan.

Measurements and sampling strategies for carbon stock monitoring are set in the monitoring plan and are based on the methodology AR-AM0005, version 3.

CL.3.1c Show that all potential pools are included (aboveground biomass, litter, dead wood, belowground biomass and soil carbon). Pools to monitor must include any pools expected to decrease as a result of project activities.

All carbon pools required by the CDM methodology ARM0005 Version 03 are included as illustrated in CL3.1a.

CL.3.1d Describe if relevant non-CO_2 gases are monitored if they account for more than 15% of the project's net climate impact expressed in terms of CO_2 equivalents.

Non-CO_2 gases are not anticipated to account for more than 15% of the project's net climate impact.

CL.3.2 Commit to developing a full monitoring plan within six months of the project start date or 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.

A full monitoring plan has been developed and is being implemented.

IV. Community Section

CM1 Net Positive Community Impacts (Required)

CM.1.1a Describe the appropriate methodologies used (e.g. the livelihoods framework) to estimate the net benefits to communities resulting from planned project activities.

The analysis of the net benefits to the communities resulting from the project activity was organized around the Sustainable Livelihoods Approach (SLA). The SLA includes a framework for understanding the complexities of poverty and guiding principles for action. This framework is designed to center around people and the influences that affect how they can support themselves and their families. The basic units of analysis are *livelihood assets*, which are divided into five categories: human capital, social capital, physical capital, natural capital and financial capital. One of the key factors that affect access to livelihood assets is the *vulnerability context*. This idea incorporates into the analysis economic, political, technological trends as well as shocks and seasonality.

The guiding principles of the SLA are:

- ***Be people-centred.*** SLA begins by analyzing people's livelihoods and how they change over time. The people themselves actively participate throughout the project cycle.
- ***Be holistic.*** SLA acknowledges that people adopt many strategies to secure their livelihoods, and that many actors are involved; for example the private sector, ministries, community-based organizations and international organizations.
- ***Be dynamic.*** SLA seeks to understand the dynamic nature of livelihoods and what influences them.
- ***Build on strengths.*** SLA builds on people's perceived strengths and opportunities rather than focusing on their problems and needs. It supports existing livelihood strategies.
- ***Promote micro-macro links.*** SLA examines the influence of policies and institutions on livelihood options and highlights the need for policies to be informed by insights from the local level and by the priorities of the poor.
- ***Encourage broad partnerships.*** SLA counts on broad partnerships drawing on both the public and private sectors.
- ***Aim for sustainability.*** Sustainability is important if poverty reduction is to be lasting[87].

CM.1.1b Include a credible estimate of net benefits changes in community wellbeing given project activities. This estimate must be based on clearly defined and defendable assumptions about how project activities will alter social and economic wellbeing over the duration of the project.

[87] International Fund for Agricultural Development. "The sustainable livelihoods approach" http://www.ifad.org/sla/index.htm. Site accessed 3 May, 2010.

The evaluation of the net benefits to the community of the project have been based on a comparison with the baseline scenario and structured based on the Sustainable Livelihoods Approach. The information upon which this analysis is based has been gathered by the project owner at the site and through local stakeholder consultations.

Table 12: summarizes the improvements in each category of livelihood asset that the project has provided to the local communities.

Table 12: Net Community Benefits

Livelihood Asset		With Project Scenario	Net Effect	Relevant Project Area
Human Capital	Health	Asorpar has organized many talks for employees and their family members including education relating to sanitation, antiseptics and clean cooking stoves to prevent indoor pollution.	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)
	Nutrition	These talks have also included training about how to include local flora and fauna in cooking to encourage healthier, variable, cheaper and more sustainable cooking habits.	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)
	Education	Asorpar works actively with educational institutions throughout Colombia to further promote understanding of reforestation. These efforts have included bringing various groups of students and professors from the University of Caceres (Antioquia) and National University and foreign country representatives to the project site to learn about reforestation with native species. This process is paramount for the success of further programs using native species because the current university programs in forest engineering essentially only instruct about pine and eucalyptus.	Positive	Caceres (Antioquia)
	Knowledge and skills	Asorpar has trained all of its workers in the techniques of reforestation and maintenance of forest plantations. This training includes all steps from site preparation to building temporary greenhouses to transplanting to pruning, thinning and harvest. This training benefits local workers since Asorpar hires almost exclusively from within the local communities. In addition to the on-the-job training of employees, Asorpar has lead a series of seminars and lectures in both Caceres (Antioquia) and Cravo Norte (Arauca) educating the community in general about the benefits of reforestation, the importance of biodiversity, the importance of preserving ecosystems and	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)

		sustainable ways taking advantage of forest resources. Of particular importance in Cravo Norte (Arauca) was the education about the negative effects of burning, which is a traditional practice in the area. Since Asorpar's training about the importance of maintaining ecosystems and not burning there has not been a single fire caused by humans. One fire was started by a dry storm and the entire town mobilized to fight it.		
Social Capital	Networks and Connections	Asorpar launched a pilot program with Servicio Nacional de Aprendizaje (SENA) to manufacture and market wood floors from the native species on the plantation. This program could provide further indirect employment through Asorpar and expand the local market for wood.	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)
	Relations of trust and mutual support	Asorpar has forged strong links with key members of the community and local governments. Through these connections they have lobbied extensively for programs to improved living conditions and improve access to forest incentives. Of particular importance have been the strongly positive relationships between Asorpar and the Bishop of Caucasia and with the Mayor of Cravo Norte. Both local officials have viewed Asorpar's plantations as an important source of employment and have actively worked with Asorpar. Furthermore, on a case-by-case basis Asorpar has provided support to families displaced by guerrilla activities by providing them with homes and work on the plantations.	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)
	Leadership	In training its employees, Asorpar has allowed many of them to rise to leadership positions that otherwise would not have been available to them. These types of positions include supervisor of site preparation, supervisor of greenhouse construction and operations etc.	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)
Physical Capital	Infrastructure	Asorpar has carried out various projects improving roadways throughout the regions where the projects are located as well as building improvements. The reforestation project has also significantly improved the quality of water supply. In particular in Caceres (Antioquia) where the water supply had been heavily contaminated by mining activities.[88]	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)

[88] Higuita, Luis Gonzalo. Reforestation, a natural process. (2005) Pg. 35

	Tools and Technology	Asorpar has provided the region and its communities with the tools to take advantage of their natural resources in a sustainable manner. This training has included everything form promoting local wood markets, to illustrating the importance of native flora and fauna to training in ecotourism. One of the most important skills Asorpar has been able to return to the area is that of collecting, drying, storing and selling seeds from rare native trees. These are traditional techniques that have been largely lost but create the possibility for an important income from exporting seeds.	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)
Financial Capital	Investment	Asorpar through its reforestation project has brought significant investment into the region. In addition to funds from investors, Asorpar has gained incentive payments from the Ministry of Agriculture through the Forest Incentive Certificates (CIF) and will bring carbon revenues. Additionally, Asorpar, by conducting a project that is a one of the first of its kind is proving the viability of such plantations, which may attract further investment to the region.	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)
	Employment	Asorpar's reforestation project has contributed significantly to increase employment in these rural areas. In the baseline the land was used for extensive cattle ranching and was owned by a few large landowners. Cattle ranching provides less demand for labor and the majority if the community did not benefit from ranching activities.[89]	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)
Natural Capital	Water resources	Asorpar's reforestation project significantly improves water resources in the project area. In particular, in the area of Caceres where the water supply has been contaminated by mining activities.	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)
	Trees and forest products	Asorpar by reforesting a region devastated by cattle ranching is replenishing the area with trees and forest products. In particular Asorpar has used endangered trees species including Abarco and Ceiba Tolua in its reforestation activities.	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)
	Wildlife	Reforestation contributes to protect and expand the habitats of native wildlife. It also improves the watersheds and water resources improving the natural	Positive	Caceres (Antioquia) and Cravo Norte

[89] Taylor, Davis F. "Employment-based analysis: an alternative methodology for project evaluation in developing regions, with an application to agriculture in Yucatán." Ecological Economics, 36:2 (2001) Pg. 249-262.

		environment for aquatic life.		(Arauca)
	Biodiversity	Forests are among the habitats most rich in biodiversity. The project areas in Cáceres (Antioquia) have all suffered extraordinary loss of forest habitats due to deforestation for the purpose of extensive cattle ranching. In Cravo Norte (Arauca) grasslands occur due to natural conditions. However, the reforestation with native species carried out in this project will contribute significantly to protect biodiversity and increase the forest habitat in both project areas.	Positive	Caceres (Antioquia) and Cravo Norte (Arauca)

CM.1.1c Compare the "with project" scenario with the baseline scenario of social and economic wellbeing in the absence of the project. The difference (i.e., the net community benefit) must be positive.

A summary of the net benefits from the project are presented in the Table 12: above.

CM.1.2 Demonstrate that no High Conservation Values identified in G1 will be negatively affected by the project.

The only HCV identified in G1 is HCV1: significant concentration of biodiversity values. This conclusion is based on the wide variety of threatened species of both flora and fauna found in the project zone. Far from negatively affecting these endangered species, the project activity will actively contribute to improving and expanding natural ecosystems and habitats for this panoply of species. In the project area in Caceres (Antioquia), the reforestation project is restoring pastureland and land devastated by alluvial gold mining. In Cravo Norte (Arauca), a rich secondary forest of native species is replacing grassland. Forests by nature support a much greater diversity of flora and fauna than grasslands, pasturelands or degraded mining land. By utilizing a generous mix of native tree species in the reforestation project, the project owner is enhancing the ecosystem that supports these endangered species. For more detailed information please see Section G.3.6.

CM2 Offsite Community Impacts (Required)

CM.2.1 Identify potential negative offsite community impacts that the project is likely to cause.

Various areas have been identified in which there was risk of potential negative offsite community impacts. These issues have been taken into account and measures implemented to mitigate them. Based on these mitigation measures, the project does not anticipate any negative offsite impacts. For further details see CM.2.2

CM.2.2 Describe how the project plans to mitigate these negative offsite social and economic impacts.

All potential negative offsite social and economic impacts have been identified and mitigated as described in Table 13: below.

Table 13: Offsite Impact Mitigation

Areas of possible negative offsite impacts	**Mitigation measures**
Land use change	-The land purchased for the plantation was used for extensive cattle grazing in the baseline scenario. That cattle grazing can be moved to other lands without offsite impacts -Cattle ranching provides relatively low employment.[90] The project activity employs more local workers and thus increase the economic productivity -The land being used has partially extremely depleted soils and is not fertile for crop cultivation
Displacement	-All land was purchased outright and even the squatters who had inhabited small portions of some farms were paid for the land they inhabited
Migration to project area of people from other areas in search of employment	-Asorpar employs almost entirely locally for its projects. The only on-site employees not hired from the surrounding municipalities are the Technical Manager (Luis Gonzalo Moscoso Higuita) and in the case of Cravo Norte (Arauca), the head of the nursery who is a local of Caceres and whom Asorpar brought to the second project area. In addition to providing preference to local laborers, Asorpar has also made a point of hiring local professionals including forestry engineers and training them in techniques for native species.
Infrastructure	-Asorpar has built and improved roads to make access to the project areas easy and safe and to avoid increasing pressure on existing infrastructure

[90] Taylor, Davis F. "Employment-based analysis: an alternative methodology for project evaluation in developing regions, with an application to agriculture in Yucatán." Ecological Economics, 36:2 (2001) Pg. 249-262.

CM.2.3 Evaluate likely unmitigated negative offsite social and economic impacts against the social and economic benefits of the project within the project boundaries. Justify and demonstrate that the net social and economic effect of the project is positive.

The project does not anticipate any unmitigated negative offsite social and economic impacts. As illustrated above in Table 13:, all potential negative impacts have been addressed with mitigation measures.

CM3 Community Impact Monitoring (Required)

CM.3.1 Define the initial plan for how they will select community variables to be monitored, and the frequency of monitoring. Potential variables include income, health, roads, schools, food security, education and inequality. Include in the monitoring plan, community variables at risk of being negatively impacted by Project activities.

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. The surveys is given only to employees of Asorpar Ltd. because the community benefits the project is designed to promote are based on the training, capacity building and support given to the employees working on the reforestation project. The direct community impacts of the project manifests through the impacts on employees and thus the employees are a sufficient sample to evaluate the positive and negative impacts.

Community monitoring is carried out in each verification year (after the combined validation and first verification in 2010/2011, further verifications will probably occur every 5 years) and includes a sample of employees in both Caceres (Antioquia) and Cravo Norte (Arauca). The surveys have been 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.

CM.3.2 Develop an initial plan for how they will assess the effectiveness of measures used to maintain or enhance High Conservation Values related to community well-being (G1.8.4-6) present in the project zone.

The only HCV identified in the project zone is HCV1: significant concentration of biodiversity values. Included in the community and biodiversity monitoring plan are inventories of flora and fauna found in the project areas. These pay special attention to the threatened species that have a presence in the region as identified in G1.8. Part of the project's aim is to educate local communities about how to sustainably use forest resources and provide those resources. For that reason some of the tree species chosen for use in the reforestation project have particular traditional uses. Abarco for instance is a traditional wood for construction. For this reason, as well as the fact that it is a

threatened species, Abarco is being utilized in the project activity. Other tree species provide shelter and co-benefits of other species of plants and their seeds attract animals.

CM.3.3 Commit to developing a full monitoring plan within six months of the project start date or 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

A full community monitoring plan has been developed.

V. Biodiversity Section

B1. Net Positive Biodiversity Impacts (Required)

B.1.1 Describe the appropriate methodologies used to estimate changes in biodiversity as a result of the project. Base this estimate on clearly defined and defendable assumptions. Compare the "with project" scenario with the baseline "without project" biodiversity scenario completed in G2. The difference (i.e., the net biodiversity benefit) must be positive.

The estimation of net biodiversity benefits has been completed using the baseline study including the CDM eligibility study carried out through satellite imaging. These studies identified two distinct "without project" scenarios: areas affected by cattle ranching and areas affected by gold mining. Through satellite imaging as well as site visits the improvements affected in the "with project" scenario are highlighted. These studies revealed severely depleted biodiversity resources in the "without project" scenario. The pasturelands for cattle simply cannot support the diversity of a forest, cows pollute water sources and compact soil which decreases fertility. Furthermore, in the project areas located in Cravo Norte (Arauca), the local custom was to burn the pasturelands once a year, further destroying biodiversity. In areas affected by mining, the damage is even more drastic. In addition to violent disruptions to natural landscape, clear cutting of vegetation and destruction of animal habitats, alluvial gold mining has severely affected the water sources by releasing mercury into rivers and streams.

The "with project" scenario is constituted by diverse secondary forests of 97.17% native species. Forests house the highest level of biodiversity of any ecosystem on earth. By replace pasture lands and former mining lands with native species forests, the project activity rebuilds habitats, replenishes soil, improves water quality and fosters the growth of a great diversity of flora.

B.1.2 Demonstrate that no High Conservation Values identified in G1.8.1-3 will be negatively affected by the project.

Please see sections G3.6 and CM3.2.

B.1.3 Identify all species to be used by the project and show that no known invasive species will be introduced into any area affected by the project and that the population of any invasive species will not increase as a result of the project.

There are no invasive species being used in the project activity. Table 14: below contains all species that will be used in the project activity.

Table 14: Species used in project activity

Species used in reforestation activities	
Cáceres	*Acacia mangium*
	Cariniana pyriformis
	Cedrela odorata
	Cespedesia macrophylla
	Cordia gerascanthus
	Croton smithianus
	Didimopanax morototoni
	Dipteryx oleifera
	Enterolobium cyclocarpum
	Gmelina arborea
	Hevea sp
	Hymenaea courbaril
	Ochroma pyramidale
	Pochota quinata
	Schyzolobium parahyba
	Swietenia macrophylla
	Tabebuia rosea
	Tapirira guianensis
Cravo Norte	*Acacia mangium*
	Calophyllum mariae
	Cariniana pyriformis
	Cedrela odorata
	Copaifera pubiflora
	Cordia alliodora
	Cupania sp
	Dipteryx oleifera
	Enterolobium cyclocarpum
	Guadua angustifolia
	Hymenaea courbaril
	Nectandra sp
	Ochroma pyramidale
	Pithecellobium sp
	Pochota quinata
	Pseudosamanea guachepele
	Swietenia macrophylla
	Tabebuia rosea
	Terminalia ivorensis

B.1.4 Describe possible adverse effects of non-native species used by the project on the region's environment, including impacts on native species and disease introduction or facilitation. Project proponents must justify any use of non-native species over native species.

The project activity involves the planting of around 25 native tree species as well as small percentages of *Gmelina arborea* and *Acacia mangium*. *Gmelina arborea* and *Acacia mangium* are non-native species but they are not invasive species. The project is one of the only of its kind in Colombia that combines a vast array of native species in plantations. The majority of the plantations in Colombia use Eucalyptus, Pine or Teak and even those that use native species tend to be monocultures.[91]

Acacia Mangium, an exotic tree species in Colombia, is used exclusively in areas in Cáceres that were affected by alluvial gold mining. Acacia is a remarkably hardy species that can adapt to some of the worst soil conditions and acts to replenish the soil nutrients as well as improve the soil structure. This species was used in the sub-stratum affected by mining because very few tree species are capable of thriving under such conditions. *Acacia Mangium* represents only 3.24% of total planting area.

Gmelina arborea has been used primarily for living fences due to its fast growth pace in the first 5 to 6 years after planting.[92] It has also been used selectively to create shade to protect other young trees. Melina represents only 0.09% of the total planting area.

The use of Acacia and Melina will not have any significant negative effects on biodiversity. Acacia is distinguished as one of the species that best regenerates soils in grave states of depletion or erosion. Acacia fixes nitrogen and phosphorus in the soils allowing it to revert to its natural qualities, which can sustain a wider variety of species in the future.[93] Melina is considered an optimal species for agroforestry, living fences, windbreaks and protecting young trees as well as for recuperating ecosystems.[94]

For a complete list of species used please refer to Table 14: in Section B.1.3.

For a full list threatened species in the project region please refer to section G.2.7.

Project activities laid out in the Management Plans contribute to protect these threatened species by regenerating their natural habitats that have been destroyed through deforestation. Project activities have been designed to be minimally invasive during site preparation by carrying out most site preparation manually and without machines.

B.1.5 Guarantee that no genetically modified organisms will be used to generate carbon credits.

No genetically modified organisms have been used in this project activity.

[91] Resumen de Plantaciones 2009 Caceres (Antioquia). Cadena Forestal Cravo Norte (Arauca).
[92] Obregon Sanchez, Maria. "Gmelina arborea: Versatilidad, Renovación y Productividad Sostenible para el Futuro." M&M Revista. www.revista-mm.com.
[93] Obregon Sanchez, Carolina . "La Acacia Mangium: Una Especie Promisoria." M&M Revista. www.revista-mm.com.
[94] Obregon Sanchez, Carolina. "Gmelina arborea: Versatilidad, Renovación y Productividad Sostenible para el Futuro." M&M Revista. www.revista-mm.com.

B2 Offsite Biodiversity Impacts (Required)

B.2.1 Identify potential negative offsite biodiversity impacts that the project is likely to cause.

The project does not anticipate any negative offsite biodiversity impacts.

B.2.2 Describe how the project plans to mitigate these negative offsite biodiversity impacts.

The project does not anticipate any unmitigated offsite biodiversity impacts.

B.2.3 Evaluate likely unmitigated negative offsite biodiversity impacts against the biodiversity benefits of the project within the project boundaries. Justify and demonstrate that the net effect of the project on biodiversity is positive.

The project does not anticipate any unmitigated offsite biodiversity impacts.

B3 Biodiversity Impact Monitoring (Required)

B.3.1 Describe the initial plan for how they will select biodiversity variables to be monitored. Potential variables include species abundance and diversity, landscape connectivity, forest fragmentation, habitat area and diversity, etc. Clarify the frequency of monitoring. Include in the monitoring plan, biodiversity variables at risk of being negatively impacted by project activities.

The monitoring plan tracks biodiversity variables through forest inventories and monitoring of increased forest cover. Inventories are made in each verification year (after the combined validation and first verification in 2010/2011, further verifications will probably occur every 5 years) of both flora and fauna species. Inventories of flora is realized in permanent samples plots which have been established as part of the carbon stock monitoring. These inventories are completed by qualified personnel. The project owner carries out a comprehensive inventory for one permanent sample plots per stratum per farm in Caceres (Antioquia) and one sample plots per 1000 hectares per stratum in Cravo Norte (Arauca).

Asorpar has implemented a system to register all wildlife sightings in the project areas in order to monitor the species of fauna found. The registries for wildlife sightings are maintained at each project site. Employees are trained to write down when they see an animal, describe it and, if possible, photograph it. Cameras are provided on the job site in Cravo Norte (Arauca). 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 are compiled by the Asorpar central office and reported every five years after the first verification.

The increase in forest cover is monitored in order to track the increase in habitat area that supports the wide variety of biodiversity that Colombia's forests boast. The increase in forest cover is monitored in the permanent sample plots.

B.3.2 Develop an initial plan for assessing the effectiveness of measures used to maintain or enhance High Conservation Values related to globally, regionally or nationally significant biodiversity (G1.8.1-3) present in the project zone.

Please see section CM.3.2.

B.3.3 Commit to developing a full monitoring plan within six months of the project start date or 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.

A full biodiversity monitoring plan has been developed.

Figure 2. Photo of Project Area Cáceres (Antioquia) Affected by Alluvial Gold Mining[95]

[95] Moscoso Higuita, Luis Gonzalo. Reforestation, a natural process. (2005) Pg. 35