Plan Vivo Project Design Document (PDD)

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SICIREC BOLIVIA ltda

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Contents

Title of project

CARBON SEQUESTRATION THROUGH REFORESTATION AND IMPROVED LAND USE IN THE BOLIVIAN TROPICS BY SMALLHOLDERS

ArBolivia Project

Executive Summary

The ArBolivia project started in 2007 as a portfolio of small scale reforestation activity within the Clean Development Mechanism of the UNFCCC. The first SSC-AR was registered with the UNFCCC in June 2009--- However due to a change of policy by the Bolivian government the project is now focusing on voluntary markets based on the “Plan Vivo” standard.

The initiative seeks practical solutions to increasing worldwide deforestation, climate change, and poverty in developing countries. It is the first of its kind to implement reforestation through an association between local smallholders and outside ethical investors.

To reduce the level of initial investment required, which is one of the main barriers for reforestation activities, income is obtained through the sale of Verified Emission Rights, as well as through tree planting subsidies. Through this line of finance, ArBolivia becomes profitable and viable for both the smallholders and the investors.

The ArBolivia project is being implemented in settler areas in the Cochabamba Tropics, the Province of Ichilo in the department of Santa Cruz, Northern La Paz, and Western Beni. The settlers’ areas have been a destination for migrants coming from the “High Valley” and Altiplano regions of Bolivia since the 1930s. This migration has intensified during the last decades due to increased poverty, and deterioration of the mining and agricultural economic bases that have traditionally supported the people of the Bolivian highlands.

Small holders own 95% of the land in the portfolio regions. The sizes of the properties vary, but they are on average 20 hectares per family and are usually 100 by 2,000 m in the Cochabamba Tropics, and 25 to 50 ha in the other regions. Only a few farmers have land less than 20 ha.

The settlers are organised into syndicates of 20 to 60 farmer families. Approximately 5 syndicates form a “central”, which in turn belongs to a federation.

The recent migrants have tried to apply traditional land-use practices from their native regions, which are not suitable for the new tropical setting where soils, climate and pests are totally different. Unsustainable land-use practices and associated over-harvesting of native forests has led to widespread deforestation, causing substantial emissions of greenhouse gases. Moreover, it has led to a growing shortage of timber from commercial native species, causing an increase in operating costs in the timber processing industry due to longer supply lines for trunks from remaining primary forests. This has spurred interest by small farmers in the conservation and sustainable management of the primary and secondary forests and in planting trees on their farmland.

In the baseline scenario, loss of biomass and degradation is expected to continue, eventually reducing food production per capita. Favourable conditions, i.e. rapid growth of native species,

readily available land, low labour costs, increasing demand for forestry products, relatively good road access, and experiences gained in establishing and managing native species for reforestation and enrichment planting, provide a good basis for initiating forestry activities in the project areas, with the dual aim of generating carbon credits and producing marketable timber.

The purpose of the ArBolivia is to reforest a portion of land owned by small farmers. In addition to this the project aims to improve land use by, introducing agroforestry and silvipastorial systems, forest protection and nature conservation activities.

The proposed project **adds to sustainable development** by introducing an integrated farming system aimed at efficient land use practices on the entire farm, considering both the current and future needs of the farmer family. Sustainable crop and timber production will generate income in the short, mid, and long term.

If fully developed, the project will directly benefit at least 2000 families (participants of ArBolivia). The reforested surface will be 6,000 hectares, 5,000 has of this will be pure forest plantations, and 1,000 hectares will be established as agroforestry and or silvipastoral systems.

The proposed sites for these reforestation activities are several thousands of hectares of deforested land, scattered over a large number of farmers' properties. The scattered nature of the deforested land and the large number of farmers involved means that there is a need to scale up the project over time.

ArBolivia´s intention is to widen the scope of the project within the following years with conservation activities and other deforestation avoidance strategies. In this way carbon sequestration by tree planting will be complemented by CO2 emissions reduction from avoided deforestation.

ArBolivia will establish agreements with different entities and companies which are willing to address their social and environmental responsibilities, enhancing the possibilities for reforestation (and thus creating a new source of income for the rural people) and, as a result, stimulating additional investment by the private and public sectors. To obtain the necessary funds for implementing the project and guaranteeing its financial sustainability during the whole project cycle, the project proponent, "Asociación Accidental Cetefor-Sicirec", will generate the necessary funds through ethical investors[1] as well through the sales of carbon credits and other environmental services. Net revenues from timber sales are directed to the farmer families (50%) and Asociación Accidental CETEFOR-Sicirec (50%). Net revenues from environmental services will be directed to the farmers once the establishment and maintenance of the plantations is carried out to the required standard. This is regarded as a key element of the program as it develops, since other reforestation efforts in the country in the past have failed due to lack of mid and long-term involvement and management.

The Asociación Accidental CETEFOR-SICIREC will provide planting material, technical assistance, administrative and managerial support. The lifetime of the project will be about 40 years.

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[1] *At the moment investors in the ArBolivia project are: The Cochabamba Project Ltd(Industrial Provident Society in the UK), SICIREC Group BV (Netherlands), and several smaller investors who channelled their investments through the SICIREC Group*

Section A. Aims and objectives

ArBolivia is an alternative business initiative to promote reforestation and fair trade. The initiative seeks practical solutions to increasing worldwide deforestation, climate change, and poverty in developing countries.The current focus is on reforestation but during the second half of 2011 it will be widened to include conservation and restoration of existing forests and to address forest degradation[2].

ArBolivia will reforest 6,000 hectares in the sub-tropical lowlands of the Amazon Basin in Bolivia through small-scale forestry plantations with local farm families, using almost entirely native tree species.[3].

Since reforestation activities cannot be seen in isolation from other livelihood activities, project participation begins in all cases with the elaboration of an Integrated Land Use Plan.

Mission:
ArBolivia together with local rural smallholders promotes rural and productive development through reforestation activities, forestry plantation management and the provision of environmental services that generate economic resources and equal benefits for all stakeholders.

Vision:
ArBolivia establishes forestry production and environmental services in the project areas, through its reforestation activities with a view to carbon sequestration, commercial timber production, integrated farm planning, and the conservation of ecosystems and biodiversity, in association with local smallholders in Bolivia and outside investors.

Specific Objectives:

- Integrated farm planning aimed at improved and sustainable land use with a total participation of 2000 smallholders
- On-farm establishment of 5000 has of small scale commercial forestry plantations
- On-farm establishment of 1,000 hectares of agroforestry or silvopastoral plantations
- Production of a continuous flow of export quality hardwood timber and improved market access
- Sequestration of about 87,000 tn of CO_2e a year on average over the 21 year crediting period
- Livelihood improvement through incomes generated from the sale of plantation timber under fair trade conditions
- Strengthening current structures of cooperation between local farmers
- Assured commercialization of timber under fair-trade conditions
- Access to microcredit, with trees as collateral.

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[2] *Technical specification are under development on this moment and it is expected that these documents will be finished by April 2011.*

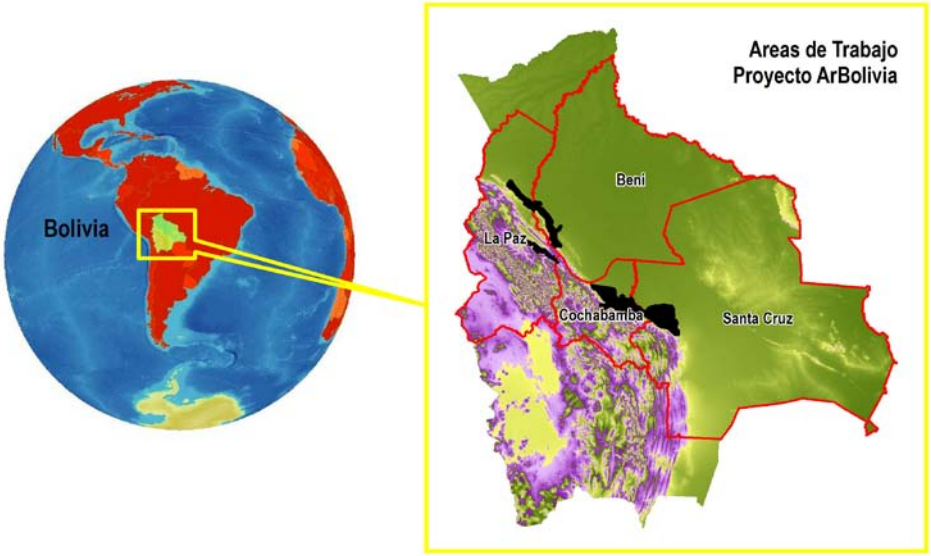
[3] *Only one naturalised specie is used: Tectona Grandis, only on sites where it has been proven that no negative impact will occur (see annex 3b site selection protocol)*

Section B. Site information, activities and carbon benefit

1. Project location, land type and boundaries

The ArBolivia initiative started in 2007 as a portfolio of small-scale CDM-AR activities in the settler areas of the Cochabamba Tropics, the Province of Ichilo in the department of Santa Cruz, Northern La Paz, and Western Beni. See map figure B.1

Figure B.1: Project areas



Within these four departments the projects implements its activities in 13 municipalities. (see table B.1) The project established until November 2010, 1709 hectares, with 907 farmer families.

Table B.1: Municipalities in which project activities take place (per department)

Dep. Beni	Dep. La Paz	Dep. Cochabamba	Dep. Santa Cruz
Reyes	Ixiamas	Chimoré	Buena Vista
Rurrenabaque	San Buenaventura	Entre Rios	San Carlos
San Borja		Puerto Villarroel	San Juan
		Shinahota	Yapacani

Over the past year the Bolivian government has changed its policy on climate change and is now very critical of the flexible mechanisms within the Kyoto protocol and especially CDM-projects. In order to reflect national climate policies the initial idea of creating a portfolio of small-scale CDM activities has now adapted to become a reforestation program. If fully developed, the project will directly benefit at least 2000 families (participants of ArBolivia). The reforested surface will be 6,000 hectares, 5,000 has of this will be pure forest plantations, and 1,000 hectares will be established as agroforestry and or silvipastoral systems. It is expected that the project will reach full development in 2014.

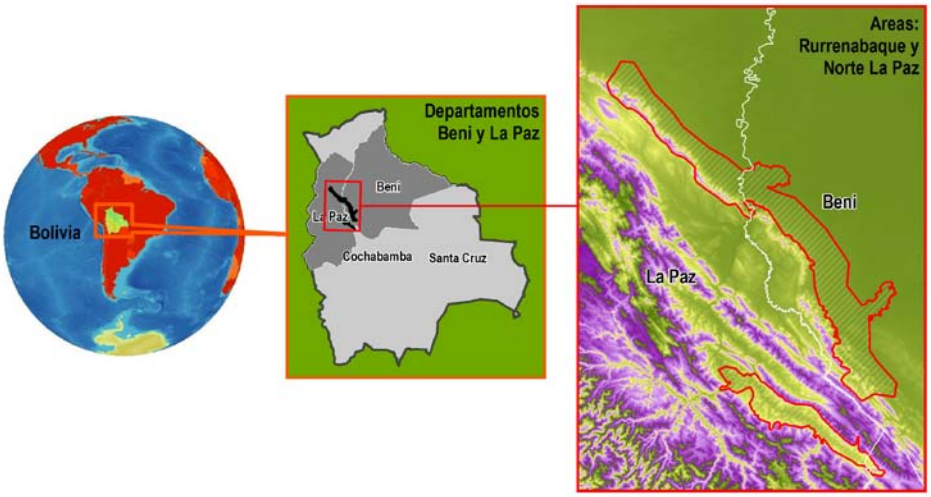
The project areas are all located at the foot of the Andes mountain range within the Amazon River basin. All project areas have in common that they have similar ecological characteristics and all project areas are settler areas. The settler areas have been a destination for migrants coming from the High Valley and Altiplano regions of Bolivia since the 1930s. This migration has intensified during recent decades due to increasing poverty, the “coca boom” and the deterioration of the mining and agricultural economic bases that have traditionally supported the people of the Bolivian highlands. Smallholders own 95% of the land in the portfolio regions. The sizes of the properties vary, but they are on average 20 hectares per family and are usually 100 by 2,000 m in the Cochabamba Tropics, and 25 to 50 ha in the other regions. Only few farmers have land less than 20 ha. The settlers are organised into syndicates of 20 to 60 farmer families. Approximately 5 syndicates form a “central”, which in turn belongs to a federation.

Tree planting activities in the first phase took place exclusively on lands deforested prior to 1990 (UNFCCC eligibility criteria), but in the roll-out phase this will be on land deforested 10 years prior to the start of the reforestation activity.

For organisational purposes the project areas are divided into three main zones:

Rurrenabaque
The Rurrenabaque area comprises the province of José Balivian inthe department of Beni and the province of Abel Ituralde. , in the department of La Paz and is, located near the national parks of Madidi (La Paz) and Pilon Lajas (Beni). It contains the municipalities of Rurrenabaque (Beni), San Borja (Beni), San Buenaventura (La Paz) and Ixiamas (La Paz). See map figure B.2.

Figure B.2: Location of the “Rurrenabaque” area

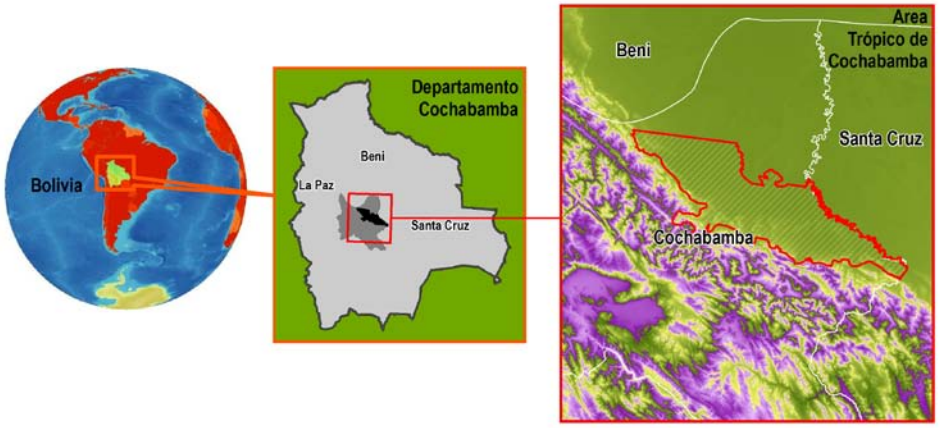


Ichilo Province.
This is situated in the department of Santa Cruz, bordering the Amboro National Park to the south. It contains the municipalities of Yapacani, San Juan, San Carlos, Buena Vista. See map figure B.3.

Figure B.3: Location of the "ichilo" area

Cochabamba Tropics
The Cochabamba Tropics region lies in the department of Cochabamba, bordering the Carrasco National Park to the south. It contains the provinces Chapare and includes the municipalities of Villa Tunari,Tiraque, Shinahuota, Carrasco Chimoré, Puerto Villarroel and Entre Rios. See map figure B.4

Figure B.4: Location of the "Cochabamba Tropics" area



Examples of specific areas identified to be planted or already planted are shown on ArBolivia´s website: www.arbolivia.org/index.php?mc=24

The geographical coordinates of the boundaries of each of the sites where project intervention will take place (project sites) will be and have been determined by GPS (Positional accuracy 10 m). All parcels have a unique identification code, generated automatically by the database system of the project.

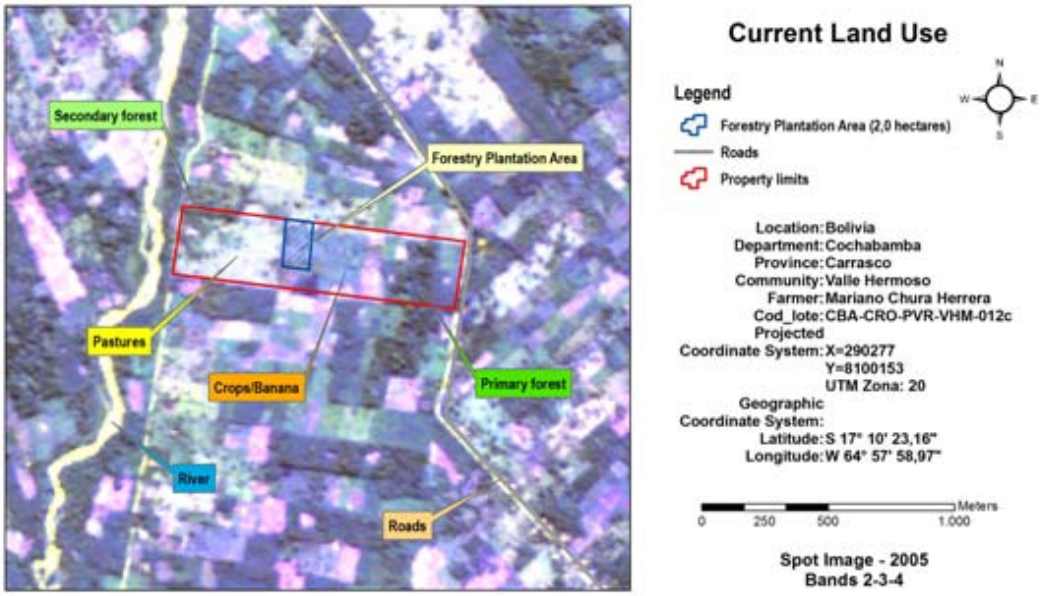
Examples of coordinates in UTM-WGS84 of the different parcels where small-scale A/R CDM project activity will take place are shown in table B.2 below. The complete set of data is available on request.

Table B.2 Example of coordinates for planting areas

Planting areas in the Small-	Unique ID of planting areas	Easting	Northing
1	SCZ-ICH-SCS-14S-12-S2-P1	409069	8103033
		408964	8103066
		408986	8103153
		409088	8103126
		409069	8103033
2	SCZ-ICH-SCS-14S-27-S1-P1	410635	8104127
		410420	8104195
		410425	8104215
		410640	8104150
3	SCZ-ICH-SCS-14S-27-S1-P2	410469	8104405
		410473	8104421
		410769	8104336
		410765	8104321

An example of one farm with a parcel selected for the reforestation activity is shown in the figure B.5.

B.5. Example of farmers parcel and the selected area for the plantation



2. Description of the project area

2.1 General description

2.1.1 Biophysical characterization

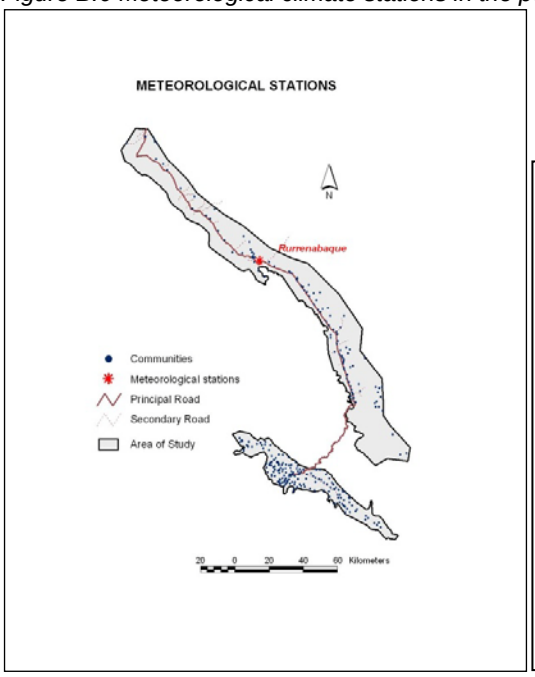
From a biophysical perspective the portfolio area is quite uniform; the terrain is relatively flat, the precipitation and temperature patterns do not fluctuate significantly and the soil texture and depth remain relatively homogeneous throughout. The Andes mountains are located immediately south of the portfolio area. The rivers flow in a north-easterly direction.

The portfolio area ranges in elevation from 250 to 450 meters above sea level. More than 75% of the area has a slope angle of less than 5%.

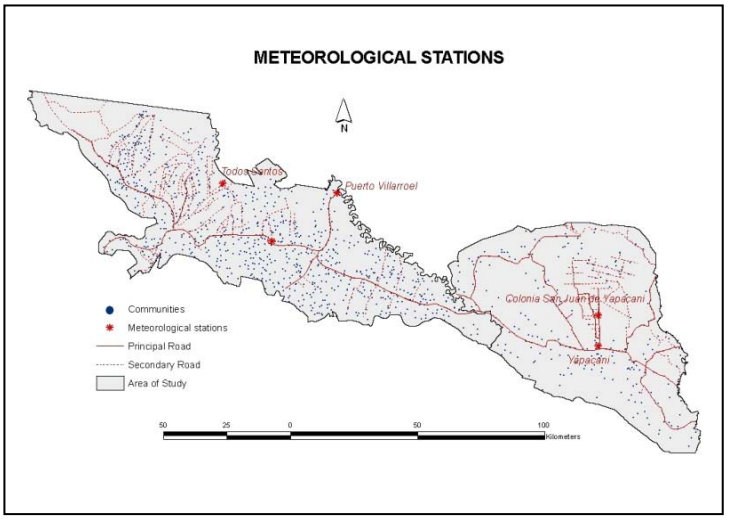
2.1.2 Climatic conditions

As shown in figure B.6.there are five climate stations within the portfolio region. Monthly rainfall and temperature is shown in figure B.7 Average annual rainfall is highest in the La Jota station with an average of 4449 mm, with most precipitation falling between the months of November and March, going further to the north and east average annual rainfall decreases to 1725 mm. The average annual temperature is 24.7 ^{o}C. Temperatures are between 6 ^{o}C and 39 ^{o}C. Temperature declines during the dry season.

Figure B.6 Meteorological climate stations in the portfolio area.

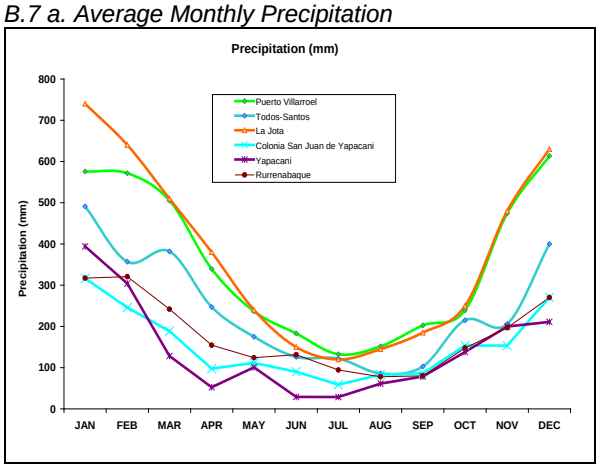


Rurrenabaque area

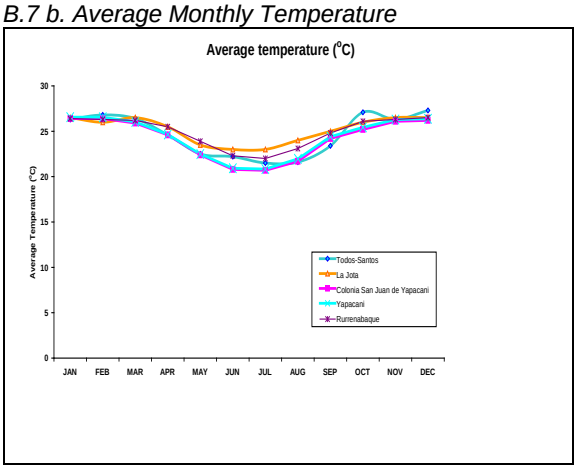


Cochabamba and Ichilo area

B.7 a. Average Monthly Precipitation



B.7 b. Average Monthly Temperature

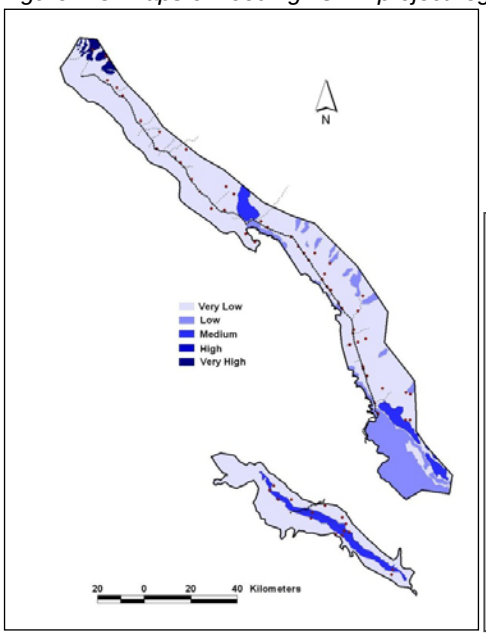


Source: FAO, 2003

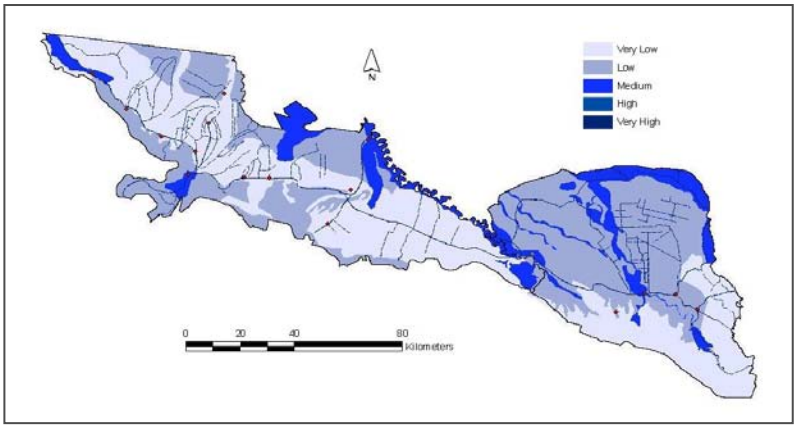
2.1.3 Flood occurrence

In the northern and eastern (see map figure B.8) part of the portfolio area flooding may occur with a frequency of 1 to 2 times a year, for a period of less than 5 days. In the site selection procedures this is taken into account and tree species will be selected considering their resistance to flooding.

Figure B.8: Maps of flooding risk in project regions.



Rurrenabaque area



Cochabamba and Ichilo area

2.1.4 Other site conditions

Drought occurrence: July, August and September are the driest months in which generally no tree planting will take place. Once established, drought does not affect the development and growth of the trees.

There is no frost occurrence in the area.

Occurrence of other extreme events: Strong winds have been reported in the area with a frequency of 1 to 2 times a year. Plantation design, including wind breaks, will avoid major damage to plantations and infrastructure.

2.1.5 Soil and terrain conditions

The maps, figure B.9a and B.9b delineates soil types using the Fertility Capability Classification (FCC) System. The FCC groups soils according to edaphic criteria that directly influence interactions between nutrient availability and plant growth. Map units, see table B.2 represents the dominant soil type in this unit, which should be the soil type in at least 70% of the area. For the individual tree-planting areas, the scale of this map is not detailed enough, therefore for each individual planting area a soil classification is made, also based on the FCC system, based on these data obtained during site selection a species-site matching assessment is done.

Figure B.9a Soil map Rurrenabaque area

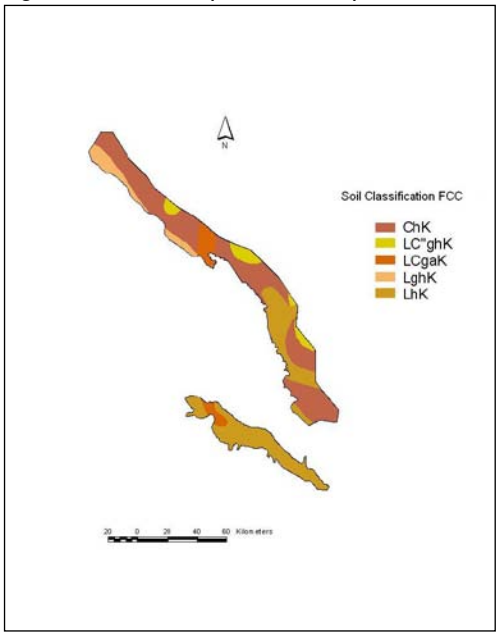
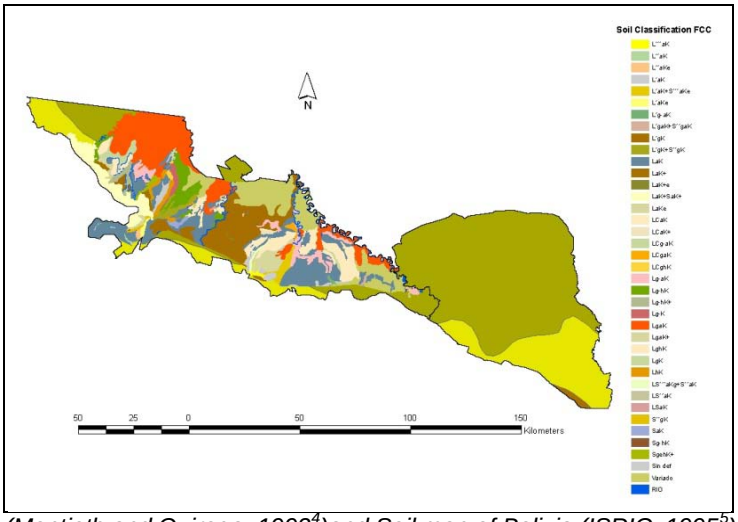


Figure b.9b: Soil map of the Cochabamba and Ichilo area



Source: Based on Map of Soil Texture Classes (Montieth and Quiroga, 1993[4])and Soil map of Bolivia (ISRIC, 1995[5]) and own field evaluations

[4] *Monteith,S. and A.Quiroga (1993). Mapeo de Suelos del Chapare con Sistema FCC. Cochabamba, Development-Alternatives-inc.*
[5] *ISRIC, 1995, Homogenized Soil Data File Global Environmental, Internacional Soil Referente Centre (ISRIC), Wageningen.*

Table B.2: Soil legend

Soil	Characteristics
L'''aK	Loamy soils, presence of >gravel, soils are presenting Aluminium saturation of the effective CEC, low potassium reserves.
L''aK	Loamy soils, presence of >35% gravel, soils are presenting Aluminium saturation of the effective CEC, low potassium reserves and low cation Exchange capacity (CEC)
L''aKe	Loamy soils, presence of >35% gravel, presenting Aluminium saturation >60% of the effective CEC, low potassium reserves and low Cation Exchange capacity (CEC)
L'aK	Loamy soils, presence of gravel, soils are presenting Aluminium saturation >60% of the effective CEC, low potassium reserves.
L'aK+ S'''aKe	Loamy soils over a sandy layer, presence of gravel in upper layer and high presence of gravel in sandy layer, soils are presenting Aluminium saturation >60% of the effective CEC, low potassium reserves, <10% weatherable minerals. Low Cation Exchange Capacity in the under layer.
L'aKe	Loamy soils, low presence of gravel, soils are presenting Aluminium saturation >60% of the effective CEC, low potassium reserves and low cation Exchange capacity (CEC)
L'g-aK	Loamy soils, low presence of gravel and presence of some mottles <2chroma within 50 cm of the soil service, soils are presenting Aluminium saturation >60% of the effective CEC, low potassium reserves
L'gaK+ S''gaK	Loamy soils over a sandy layer, low presence of gravel and presence of mottles <2chroma within 50 cm of the soil service, soils are presenting Aluminium saturation >60% of the effective CEC, low potassium reserves. <10% weatherable minerals. Sandy layer, has a high presence of gravel or coarse particles, and soil or mottles <2crhoma, Aluminium saturation>60%, low potassium reserves
L'gK	Loamy soils, low presence of gravel, with soil or mottles <2chroma within 50 cm of the soil service, low potassium reserves
L'gK+ S''gK	Loamy soils over a sandy layer. Upper layer with presence of gravel or coarse particles, with soil or mottles <2chroma within 50 cm of the soil service, low potassium reserves. Sandy layer has a high presence of gravel or coarse particles, and soil or mottles <2crhoma, low potassium reserves
LaK	Loamy soils, presenting Aluminium saturation >60% of the effective CEC, low potassium reserves
LaK+	Loamy soils, presenting Aluminium saturation >60% of the effective CEC, low potassium reserves and <10% weatherable minerals.
LaK+e	Loamy soils, presenting Aluminium saturation >60% of the effective CEC, low potassium reserves and <10% weatherable minerals and low cation Exchange capacity (CEC)
LaK+ SaK+	Loamy soils over a sandy layer, soils are presenting Aluminium saturation >60% of the effective CEC, low potassium reserves. <10% weatherable minerals.
LaKe	Loamy soils, presenting Aluminium saturation >60% of the effective CEC, low potassium reserves and low cation Exchange capacity (CEC)
Chk	Clayay soils, presenting Aluminium saturation 10-60% of the effective CEC, low potassium reserves
LCaK	Loamy to clayey soils, presenting Aluminium saturation >60% of the effective CEC, low potassium reserves
LCaK+	Loamy to clayey soils, presenting Aluminium saturation >60% of the effective CEC, low potassium reserves and <10% weatherable minerals.
LCg-aK	Loamy to clayey soils, presence of some mottles <2chroma within 50 cm, presenting Aluminium saturation >60% of the effective CEC, low potassium reserves
LCgaK	Loamy to clayey soils, presence of mottles <2chroma within 50 cm, presenting Aluminium saturation >60% of the effective CEC, low potassium reserves
LCghK	Loamy to clayey soils, presence of mottles <2chroma within 50 cm, presenting Aluminium saturation10-60% of the effective CEC, low potassium reserves
LC''ghK	Loamy to clayey soils, with high presence of gravel or coarse particles, presence of mottles <2chroma within 50 cm, presenting Aluminium saturation10-60% of the effective CEC, low potassium reserves
Lg-aK	Loamy soils, presence of some mottles <2chroma within 50 cm, presenting Aluminium saturation >60% of the effective CEC, low potassium reserves
Lg-hK	Loamy soils, presence of some mottles <2chroma within 50 cm, presenting Aluminium saturation 10-60% of the effective CEC, low potassium reserves
Lg-hK+	Loamy soils, presence of some mottles <2chroma within 50 cm, presenting Aluminium saturation 10-60% of the effective CEC, low potassium reserves and <10% weatherable minerals.
Lg-K	Loamy soils, presence of some mottles <2chroma within 50 cm, presenting, low potassium reserves
LgaK	Loamy soils, presence of mottles <2chroma within 50 cm, presenting Aluminium saturation >60% of the effective CEC, low potassium reserves
LgaK+	Loamy soils, presence of mottles <2chroma within 50 cm, presenting Aluminium saturation >60% of the effective CEC, low potassium reserves and <10% weatherable minerals.
LghK	Loamy soils, presence of mottles <2chroma within 50 cm, presenting Aluminium saturation 10-60% of the effective CEC, low potassium reserves
LgK	Loamy soils, presence of mottles <2chroma within 50 cm, low potassium reserves

Soil	Characteristics
LhK	Loamy soils, presenting Aluminium saturation 10-60% of the effective CEC, low potassium reserves
LS"'aKg+ S"aK	Loamy soils with high content of sand over a Sandy layer, with high presence of gravel, soils are presenting Aluminium saturation >60% of the effective CEC, low potassium reserves and low cation Exchange capacity (CEC), soil or mottles <2chroma are dominant within 50 cm of the soil surface , soils saturated with water during part of the year.
LS"aK	Loamy soils with high content of sand, with high presence of gravel, soils are presenting Aluminium saturation >60% of the effective CEC, low potassium reserves and low Cation Exchange capacity (CEC),
LSaK	Loamy soils with high content of sand, soils are presenting Aluminium saturation >60% of the effective CEC, low potassium reserves
S"gK	Sandy soil with high presence of gravel, with soil or mottles <2chroma within 50 cm of the soil service, low potassium reserves
SaK	Sandy soils, soils are presenting Aluminium saturation >60% of the effective CEC, low potassium reserves
Sg-hK	Sandy soils, with low presence of soil or mottles <2chroma within 50 cm of the soil surface, soils are presenting Aluminium saturation 10-60% of the effective CEC, low potassium reserves
SgehK+	Sandy soils, with presence of soil or mottles <2chroma within 50 cm of the soil surface, low Cation Exchange Capacity (CEC) soils are presenting Aluminium saturation 10-60% of the effective CEC, low potassium reserves and <10% weatherable minerals

In all areas clayey and loamy soils prevail. Some areas to the north have a greater clay component, while the areas surrounding the central river bed are sandier. The FCC map indicates soil textures but also it indicates the deficiencies present in the soil. Within the area there are a number of factors influencing growth, the main limiting factors are:

- Aluminum toxicity: Within the entire area aluminium toxicity poses a limiting factor for plant growth.
- Gleying: Gleying and poor soil drainage is also a limiting factor in the north-eastern part of the area.
- Low cation exchange: The central area has a low cation exchange capacity.
- Stoniness/ Rockiness: In some areas located along the southern border and along the rivers.

2.1.6 Land cover / land use

Farm land in the program area comprises a heterogeneous mix of different land cover and land use types.

The most common types of agricultural land use in the portfolio area are:

- Cattle grazing for beef and milk production
- Annual cropping (rice, maize, cassava)
- Perennial cropping (banana, palm heart, papaya, pineapple, citrus)

Each of these classes exhibit unique biomass accumulation curves through the course of their rotations, as agriculture crops shift within the land use system. In table B.3 and figure B10a and b the land cover types are show.

Table B.3: Land cover types in the program area.

Actual Land cover type	Surface (Ha)	Surface (%)
Primary forest	961,160	53.9
Secondary vegetation/fallow	295,019	16.6
Crops	328,223	18.4
Pasture land	134,806	7.6
Water	62,535	3.5
Total	1,781,742	100.0

Fig. B.10a Veg. cover in the Rurrenabaque area

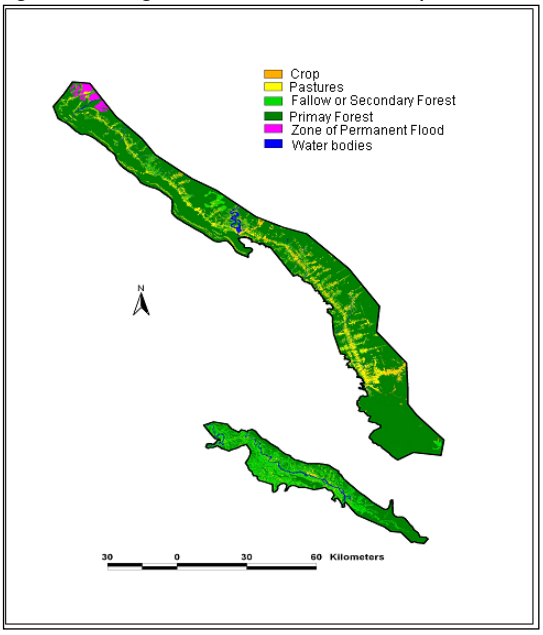
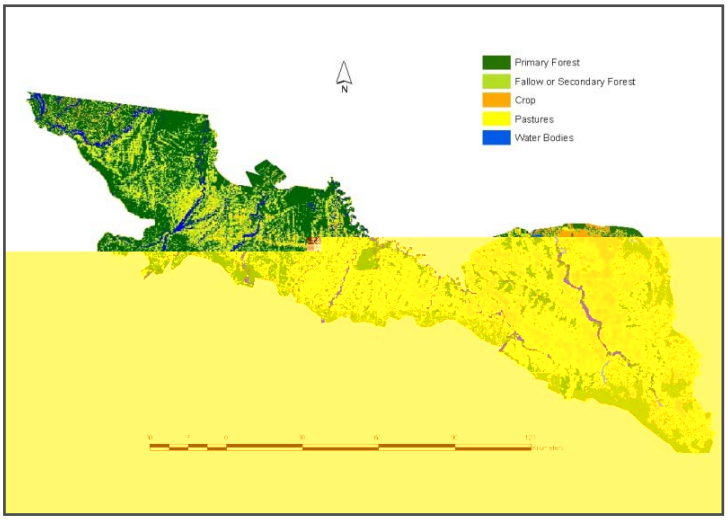


Fig. B.10b Veg. cover in the Cochabamba and Ichilo area



2.1.7 Ecosystem

According to the biogeographical zonation of Bolivia, the Cochabamba Tropics and Ichilo province belong to: Biogeographic province of Acre and Madre de Dios (South West Amazone), Sector biogeographic Amazon Andean foothill. District A.5. biogeographic district Amazon Chapare and A.3. bio geographic district Amazon Alto Beni, Characterised by the following species: *Aspidosperma rigidum, Astorcaryum murumur, Attalea phalerata, Brosimum acutfolium, B. lactescens, Cariniana estrellensis, Cedrela odorata, Celtis schippi, Cetrolobium ochtryxylum, Clarisia biflora, C.racemosa, Coussapoa ovalifoloa. C. villosa, Erythrina poeppigiana, Guarea macrophylla, Iriartea detoidea, Leonia glycicarpa, Porcelia steinbachii, P. ponderosa, Poulsenia armata, Pourouma cecropiifolia, Protium opacum, Pseudolmedia laevis, P. macrophylla, Ruizodendron ovale, Sloanea guianensis, Socratea exorhiza, Spaattosperma leucanthum, Swietenia macrophylla, Tabebuia serratifolia, Tapura acreana, Terminalia amazonica, T. oblonga, Trichilia pleeana, Thrihis caucana* (Navarra, 2002[6]).

2.1.8 Rare endangered species

The project sites are poor in the variety of flora and fauna, however on most farms, near to the planting areas, residual primary forests with a high variety of fauna and flora do still exist. The project area as a whole contains a wide variety of fauna, including avifauna and aquafauna.

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[6] *Navarro, 2002, Geografía Ecológica de Bolivia. Vegetación y Ambientes Acuáticos. Centro de Ecología Simón I. Patiño-Departamento de Difusión. Cochabamba. 719*

Inhabitants of the region have reported a decline in the number of animals and fish, due to hunting, fishing and the destruction of their natural habitat.

The following mammal species have been reported in the project areas by people from the communities: jochi pintado (*Agouti paca*), jochi colorado o calucha (*Dasyprocta* sp.), chichilos (*Saimiri sciureus*), taitetú (*Tayassu tajacu*), parabas (*Ara spp*), loro cenizo (*Amazona farinosa*), venado o huaso (*Mazama americana*), tropero (*Tayassu pecari*), anta (*Tapirus terrestris*) y oso hormiguero (*Tamandua tetradactyla*). All of these species except the jochi pintado and the jochi Colorado are protected under CITES. People from the communities have reported a decline in all mammal species due to the conversion of forest to crop- and pasture land in the portfolio area. In other words natural habitats for these species have already been and continue to be lost. Another reason they give for the decline of these species is pressure from hunting.

Since predominantly native species are used for commercial reforestation activity, it is expected that the habitat for these species will improve. In addition professional land use planning will be conducted for the whole property of each farmer, improving the land use of lands that have already been deforested thereby reducing the need for the conversion of further forest to agricultural land. It is expected that improved land use planning and timber production on farmland will reduce the pressure on the natural forests within and outside the national parks. Environmental impact monitoring will ensure proper measures can be taken so no negative impact will occur.

2.2 Description of areas on which planting activities will take place (AGR, SILV, FP)

2.2.1 Current Land Use

Land in the project area comprises a heterogeneous mix of different land cover and land use types. Trees will mainly be planted on degraded grassland and on cropland which are part of a slash and burn system. Land use type “annual crops/fallow land”; is mainly rice land, which after the rice harvest will be used for a few months more for maize and after that will become fallow land for several years. Since these lands have been part of such a system for a long time, they are becoming very poor and no crop production can be expected for almost 10 years. To give an example of the land use on the project sites a summary of land-use types on which trees already are planted is shown in the table B.4.

Table: B.4: Land use types eligible for tree planting

Land Use Types	Northern La Paz and Beni	Cochabamba Tropics	Ichilo province	Surface (ha)	Area (%)
Annual crops/fallow land	394	16	728	1,138	67%
Grassland	25	-	305	330	19%
Grassland with existing trees	19	-	2	21	1%
Perennial crops	43	64	114	221	13%
Total general	**481**	**80**	**1,149**	**1,710**	**100%**

Future plantations will be planted on the same land types. All these land types have to complete with the requirements for land eligibility as stated in section B 6.1.3.

3. Description of the Plan Vivo technical specifications (methodologies)

Carbon estimates for Agroforestry activities, Silvipastoral and forest plantations are based on the approved CDM small-scale methodology AR-AMS0001 vs5.

A summary of the project activities is given in table B.5 a detailed description can be found in the technical specification (annex 3).

All activities are embedded in a proper land use planning system. If land use can be improved, agriculture can be more efficient and the deforestation caused by the traditional slash and burn methods can be reduced. In addition those areas, which the farmer is willing to protect can be defined as special units, registered and subsequently hence protected.

Improved land use planning resulting in a lower rate of deforestation rate and higher levels of sustainability for the implemented project activities. The methodologies for conservation and avoidance of deforestation and forest degradation are under development.

Table B.5

Title	Type of activity	Objectives	Brief description	Target areas / groups
FP	Forestry Plantations for sustainable wood production	Income improvement Environmental benefits	Only native tree species will be planted, except for the naturalised *Tectona grandis*, which will be planted only on a small scale. The native tree species proposed are: *Aspidosperma macrocarpon, Cederela fissilis, Guarea rugby, Schlizobium amazonicum, Stryphnodendron purpureum, Centrolobium tomentosum, Terminalia amazonica, Buchanavia sp, Swartzia jorori, Virola sebifera, Virola peruviano,* and *Swietenia macrophylla.*	Farmers participating in the project
AGR	Agroforestry	Food security and income on the short term	Systems with perennial crops and or fruit trees will be established, e.g. systems with coffee *(Coffea Arabica*), Achiote (*Bixa orellana*), Cacao (*Theobroma cacao*), Copoasu (*Theobroma grandiflorum*), mixed with native trees planted for shade and wood production such as Chilijchii (*Erithrina sp*). Pacay *(Inga sp.*), Trompillo de altura (*Guarea rusby*), Serebo (*Schlizolobium amazonicum*), Tejeyeque (*Centrolobium tomentosum*), Verdolago (*Terminalia amazonica*), and Mara (*Swietenia macrophylla*). To increase agricultural production, nitrogen fixing soil cover crops like *Mucuna puriens* will be sown.	Farmers participating in the project
SILV	Silvipastoral systems	Improvement of productivity of grazing land for cattle production, Improved income, Deforestation avoidance	Pacay *(Inga sp.),* Tajibo (*Tabebuia sp.*), Paquio (*Hyminea courbaril*), Chilijchi (*Erithrina sp.*)	Farmers participating in the project

4. Duration of project activities and crediting period

Since 1995, the FAO, EU, the Flemish Government (Belgium) and the regional government have funded the reforestation of 2000 ha as part of the regional sustainable development programme. This program intended to promote and implement economically viable and labour-intensive land-use and forest resource management practices in the Cochabamba Tropics region of Bolivia, in the form of plantation forestry, agroforestry, silvipastoral systems and sustainable management of residual primary forests. The program served as a pilot for the proposed activity and generated knowledge on how trees can fit into an integrated farming system as part of plantation forestry, agroforestry and silvipastoral systems.

Based on these experiences, the ArBolivia initiative started in 2007 as a portfolio of small-scale CDM-AR activities, the first SSC-AR activity was registered in the UNFCCC 2009, under registration number 2510, for two other SSC-AR activities a draft-validation report exists. Due to a shift in the Bolivian government's policy in respect of compulsory markets, and CDM it has become very unlikely that the CO_2e which has been fixed to date can be sold as CERs, therefore the proposed portfolio of SSC-AR projects has been adapted as a reforestation program, which will be gradually rolled-out over 6.000 ha and will benefit at least 2000 families. In table B.6 the surfaces which have been established already are shown.

Table B.6: Surfaces already established

Year	Forest plantations (ha)	Agroforestry systems (ha)	Silvipasotral systems (ha)	**Total surface (ha)**
2007	16	0	0	**16**
2008	538	12	3	**553**
2009	675	102	3	**780**
2010	342	19	0	**361**
Surface established	1,571	133	6	**1,710**

The number of farmer families participating to date is 907. In all of these cases for the whole farmers' property an **I**ntegrated **L**and-use **P**lan (ILP)[7] is elaborated or is under elaboration, this includes planning of the **P**rotection **U**nits (PU), which in a later stage of the project might be brought under Plan Vivo Certification as well. The planning for the reforestation activities for the next years is shown in table B.7.

Table B.7: Planning of the roll out phase

Year	Forest plantations (ha)	Agroforestry systems (ha)	Silvipasotral systems (ha)	**Total surface (ha)**
2011	500	150	21	**671**
2012	1,000	190	40	**1,230**
2013	1,000	190	40	**1,230**
2014	929	190	40	**1,159**
Surface projected	3,429	720	141	**4,290**

[7] *The Integrated Land Use Plans, can be defined as well as a "Plan Vivo", it is a description of previous and actual land use, mayor land use and future land use. Once presented to the Authority for Forests and Territories (ABT) it is becoming a legal document. For an example see annex 3a*

The total number of participating families is estimated to be about 2.000 families; all of them will have their Integrated Land Use plan.
The proposed crediting period is 21 years. The project lifetime is 40 years (the longest rotation period).

5. Carbon benefits of project activities

Since the 1980s, deforestation and subsequent cultivation have led to land degradation in the project area. Currently, the lands to be reforested within the project boundary are marginal agricultural lands and pasture lands. On these lands carbon stocks will continue to decrease.
The estimation of baseline net GHG removals by sinks has been performed according to AR-AMS0001version 5.0 in which changes in living biomass of cropland and grassland does not exceed 10%.

For the ex-ante calculation of the project biomass, the project area is stratified according to the project planting plan, which is divided into plantation type and tree-specie groups as follows:

1. *Agroforestry System*
2. *Silvipastoral system*
3. *Tree-plantations*
    a. *Fast growing tree species*
    b. *Medium growing tree species*
    c. *Slow growing tree species*

In the monitoring phase a further stratification is designed.

The project is managed in order to avoid leakage. This means that forestry production will not replace agricultural production.
Therefore the project is not only dedicated to planting trees but also to:

1. Improving grazing systems introducing silvopastoral systems and improved pastures
2. Introducing agro forestry systems, which are more sustainable over time than rice, yield higher incomes per hectare and per working day and generate subsistence products for the farmer and his family
3. Introducing Land Use Planning at an individual farmer level across the entire property thus improving agricultural production in the short and long term.

As a result of the implementation of these measures leakage is not considered to be significant.

A summary of the carbon benefits per hectare is given in the table B.9, detailed calculations can be found in the technical specification annex 3.

Table B.9 Summary of baseline and project carbon uptake or emissions reductions per hectare over crediting period

Title of technical specification	**1. Baseline carbon uptake/ emissions (t CO_2e / ha)**	**2. Carbon uptake/ emissions reductions with project (t CO_2e / ha)**	**3. Expected losses from leakage (t CO_2e / ha)**	**4. Deduction of risk buffer (t CO_2e / ha)**	**Net carbon benefit (t CO_2e /ha) = 2 – (1+3+4)**
FP	0	442	0	30%	309
AGR	0	225	0	30%	157
SILV	0	176	0	30%	123

6. Process and requirements for registering *plan vivos*

6.1 Requirements for participating farmers

The principal stakeholders are the farmers and their communities.
Considering the importance of syndicalism in Bolivia in general and within the project area in particular, acceptance by the community and coordination with tcommunity groupson different levels is of vital importance.

Therefore the following procedures were and are followed:

i. Introducing the project idea to the federations and syndicate representatives, as well as local, departmental and national authorities.
ii. Introducing the project idea to the communities in conjunction with the federations
iii. Identifying interested land holders within the communities
iv. Visiting every individual interested landholder to establish
    a. Requirements on land ownership
    b. Acceptance of contract
    c. Selection of eligible land within the farm
    d. Biophysical evaluation of eligible area
    e. Evaluation of actual and potential land use
    f. Collection of ideas on the design of the reforestation activities
v. Documenting data in forms and on data base.

The basic activity is the implementation of the wood-plantations. The basic requirement is the acceptance of the project approach by each farmer and his or her willingness to plant at least 1 hectare on eligible land.

6.1.1 Requirements on land ownership

Participating farmers need to present their ID-card and confirm their land ownership, either by title or, in cases wherecase no title exists, by an alternative recognized statement proving their ownership of the land. In paragraph D.2 land ownership is discussed in more detail.

6.1.2 Acceptance of contract

Farmers also need to agree to with the terms and conditions as established in the contract, which will be signed between farmers and the project. The contract format is shown in annex 4a.

6.1.3 Land Eligibility

Tree planting activities in the first phase took place exclusively on lands deforested prior to the 31st of December 1989, but in the roll-out phase this will be extended to parcels deforested 10 years before the start of the reforestation activity.
According the forest definition as established by the executive board of the UNFCCC and the Designated National Authority (DNA) of Bolivia forest is defined as:

- A minimum area of 0.5 hectare
- A minimum tree crown cover of 30 %
- Trees that potentially reach a height of >4 m.

6.1.4 Species-site matching

The selection of tree species for specific sites is based on site evaluations and depends on proven suitability for the specific site conditions and function of the trees species in the (agro) forestry systems.

Step 1: Selection of potential sites for reforestation activities
Site selection and potential for reforestation is determined together with the small holder, taking into consideration the current and future needs of the farmer family and the biophysical characteristics of the area. This consultation leads to the establishment of an integrated farm plan. Objectives of this integrated farm plan is to improve agricultural production, avoid competition between tree planting and agricultural uses and thus avoid leakage due to tree planting, an example of such an integrated Farm Plan can be found in annex 3a.

Step 2: Matching site and species
For these sites the selection of tree species is based on site evaluations and the best match between site and the desired specie of the farmers is made from the 13 available species.

The plantation design is based on site characteristics, species requirements and the production criteria of the farmer and the project staff. If both farmer and project staff agree on the plantation design and the conditions in the contract, the contract will be signed, underlining commitments to the project activities to be implemented on his land.

Full specifications of ArBolvia's specific procedures on tree species selection and site selection can be found in the technical specifications annex 3b.

6.2 Carbon Rights and Allocation of Carbon Revenues

The obligations of each party are established in the contract, which stipulates that the farmers will transfer their rights regarding the sale of carbon-credits to the AACS. AACS will then sell these rights and payments from the sale of carbon-credits will be transferred to the farmers as part of the total investment capital of the project. More specifically carbon revenues will be used to make staged payments to the farmers for plantations well established and maintained. The Payments are made periodically and after the plantations have been evaluated against the quality standard established by the project.

In order to guarantee the fair distribution of the project's benefits, the partner farmers, through their forestry committees, have access to the financial balances and technical reports of the project. The amounts are defined in the contract and adjusted in meetings with the forestry committees. The amount is based on the labour costs for establishment or the maintenance of the plantation and is not necessarily the same as the carbon revenues. If these payments cannot be covered by the revenues for carbon credits, the project manager (SICIREC Bolivia ltda) is obliged to cover the deficit. In the event that carbon revenues are higher than the partial payments then the surplus funds will be used for investments which directly benefit the farmers, such as barbed wire, agroforestry plants etc.

6.3 Economic incentive system

As stated in 6.1.2 a contract is signed between the AACS and the farmers. In this document farmer and AACS agree on the conditions for the establishment and maintenance of the plantations. This includes the economic incentive system which works as follows:

The implementation as well as the maintenance activities necessary to ensure optimal tree development within plantations will be carried out by the farmers. The activities, e.g. weeding or pruning, are planned together with the project staff during the farm visits.

Activities, planned between farmer and project staff, are noted on an activity planning sheet. During the visit a personalized on-farm capacity building assessment will be realized by the technician to the farmer in order to assure accomplishment according to certain minimal technical standards.

Having completed the planned activities according to the completed time schedule, , the technician will carry out a further visit in order to carry out an on-farm evaluation of the plantation. Depending on the fulfilment of certain technical criteria, which guarantee the optimal tree development, payments will be paid in cash to the farmer.

7. Measures to address risks and ensure permanence

Risk management is based on the establishment of a common responsibility and the shared interests between the farmers and the AACS. The aim of the AACS is not only to motivate famers in a participatory process to plant trees, but the AACS and the farmers have to become partners and both parties unite to form the ArBolivia project. In this way the social risks will be minimized. In table B.10 a description is made of the main risks

Table B.10

Permanence Risks	**Level of risk (low/medium/high)**	**Management Measures**
Drought	Low	No planting in July, August and September
Floods	Medium	Adequate site selection, site-specie match according to strict protocols
Wind fall	Low	Adequate site selection according strict protocols and introduction of wind breaks if necessary
Encroachment of cattle	High	Fencing, the project provides barbed wire
Forest fires	Medium	Project and forest committees implement measures to reduce this risk.
Changes in ownership, not interested in trees, or farmers losing interest over the long term	Medium	Involvement of community authorities, legal aspects, involvement of forestry committees can minimize these situations. The partial payments and the possibility of obtaining loans, using the plantations as a guarantee will minimize the loss of interest as well and will motivate to manage the plantations well.
Wood will be used and cut before maturity, sold elsewhere	Medium	Forestry committees control illegal logging, consciousness program, legal announcements which makes it impossible to sell the wood, project will provide higher prices than on a regularly market, Payments for environmental services generate income and are therefore an incentive to leave the trees growing.
Lack of cash flow within the project, during project life time	Low	Lack of cash flow might affect the quality and growth of trees, but since tree-growing is a shared activity between farmer and project it is expected that this will not result in the complete failure of the plantations. On the other hand the financing strategy is based on avoiding cash-flow shortage.
Lack of sufficient knowledge on natural resource management	Low	The AACS will monitor the level of knowledge and strengthen capacities among famers and the contracted (community based) companies

Although growth projections are rather conservative the percentage of carbon credits sold upfront is 70%, after verification a maximum of 90% of the existing carbon will be sold, leaving 10% as a risk buffer by the project as insurance against unexpected losses or under-achievement later on in the project.

Section C: Project governance and financial structure

1. Project organisational structure

1.1 Stakeholders

In order to achieve reforestation at a small-scale level with rural smallholders through a joint venture enterprise, ArBolivia depends on the cohesive interaction of several actors with different expectations.

The flow chart, figure C.1., explains who the main actors within ArBolivia are, and how they are linked to one another:

Figure C.1: Project organisational Structure

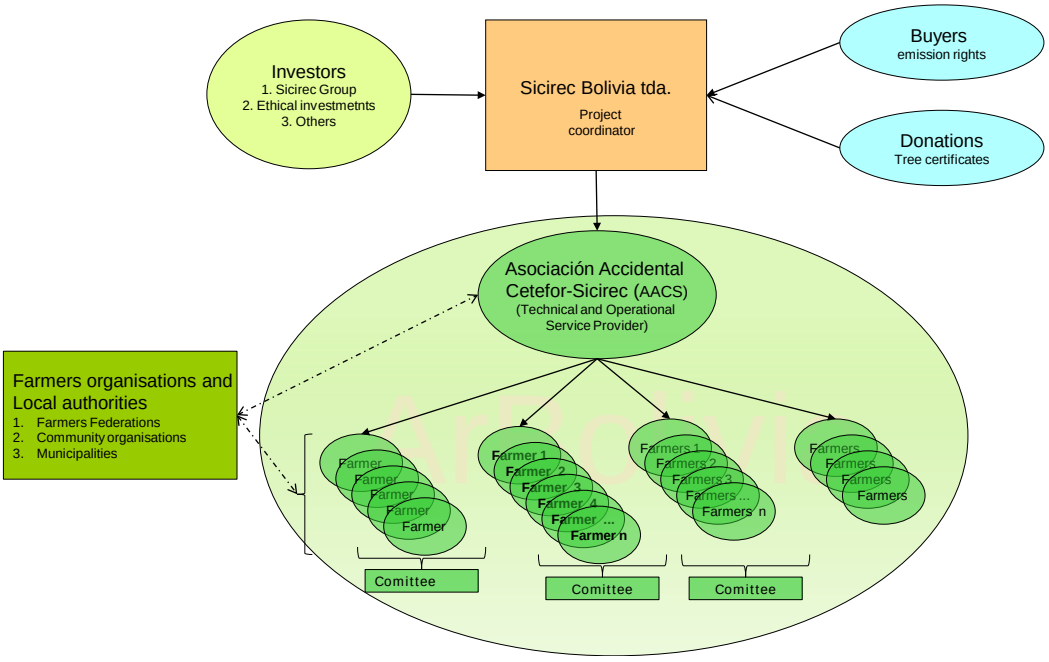


Table C1: Project participants			
Key Function	**Organisation/ group(s) involved**	**Type of group/ organisation and legal status**	**Brief description of activities**
Project Administration	SICIREC Bolivia Ltda	Bolivian Company	1. Financial planning 2. Reporting to investors and other financers 3. Development of Standard Operational Procedures and implementation of these procedures 4. Monitoring and Quality Control 5. Carbon calculation
Project Technical Operations	Asociación Accidental CETEFOR SICIREC	Typical bolivian legal structure which can be compared with a joint-venture	The AACS is responsible for the project implementation , which includes: 1. Farmers participation 2. Land Use planning, Site selection and plantation design 3. Plant production and distribution 4. Establishment 5. Maintenance The AACS can do project implementation directly or may sub-contract this to other entities.
	Micro companies	Small community based companies	Project target is to generate local capacity to transfer field implementation of the project to local groups
Community Engagement/ Participation	Farmers	Small land holders	So called partners, the AACS signs contracts with the farmers with the purpose to reforest a portion of their land.
	Forestry committee	Committee of participating farmers, farmer organizations and AACS staff	entity involved in the control, vigilance, information, coordination and the evaluation of the fulfilment of the agreed activities between the farmers and the project
	Community enterprise	A group of participating farmers establishing their one forestry company	Field implementation of the project and once enough capacity has been transferred from the AACS to these community based enterprises as well in technical assistance

2. Relationship to national organisations

The ArBolivia project started in 2007 as a portfolio of SSC-AR activities.
The Bolivian DNA was very closely involved in the development of the project, being the first of its kind in Bolivia and indeed in Latin America.

The first SSC-AR activity in the portfolio received its Letter of Approval in May 2008, it was titled: *sequestration through reforestation in the Bolivian Tropics by smallholders of the "Federación de comunidades Agropecuarias de Rurrenabaque (FECAR)".* It was registered in the UNFCCC in June 2009 (no 2510, methodology AR-AMS0001).
For practical reasons the following SSC-AR activities were not presented at once, since up-scaling within the AR-AMS0001 methodology is not possible. Therefore the AACS waited to present new PDDs until the exact coordinates of the plantations had been verified in the field. However in the meantime national policies regarding market mechanisms within the Kyoto protocol changed and the signing of Letters of Approval for CDM-projects has been postponed indefinitely. Opposition from the Bolivian governments is related to the compulsory market under Kyoto rather than on voluntary markets, so that the project has to change its marketing strategy in favour of environmental services.

The national authorities indicated that they are willing to look for solutions, since the general concept (except the part on related to CDM) of the ArBolvia project is fully in line with national policies.

Regular meetings are held with the vice-ministry for environment, biodiversity, forest resources and Climate.

In the National Development Plan (2007) in chapter 4.4.4 II it can be evidenced that reforestation is one of the main concerns of the Bolivian government and should be supported. The plan also states that investments to recover National Resources, which improve the economy and economic empowerment of communities in poor rural areas, should be stimulated (PND chapter 4.5.2i).

In April this year the President of the Plurinational State of Bolivia, signed a Decree Supreme to establish a National Programme of Afforestation and Reforestation (DS 0443) supporting all initiatives working on reforestation activities.

Environmental Impact Licences are obtained at department level. The 4 departments in which ArBolivia is active have all provided environmental Licences.

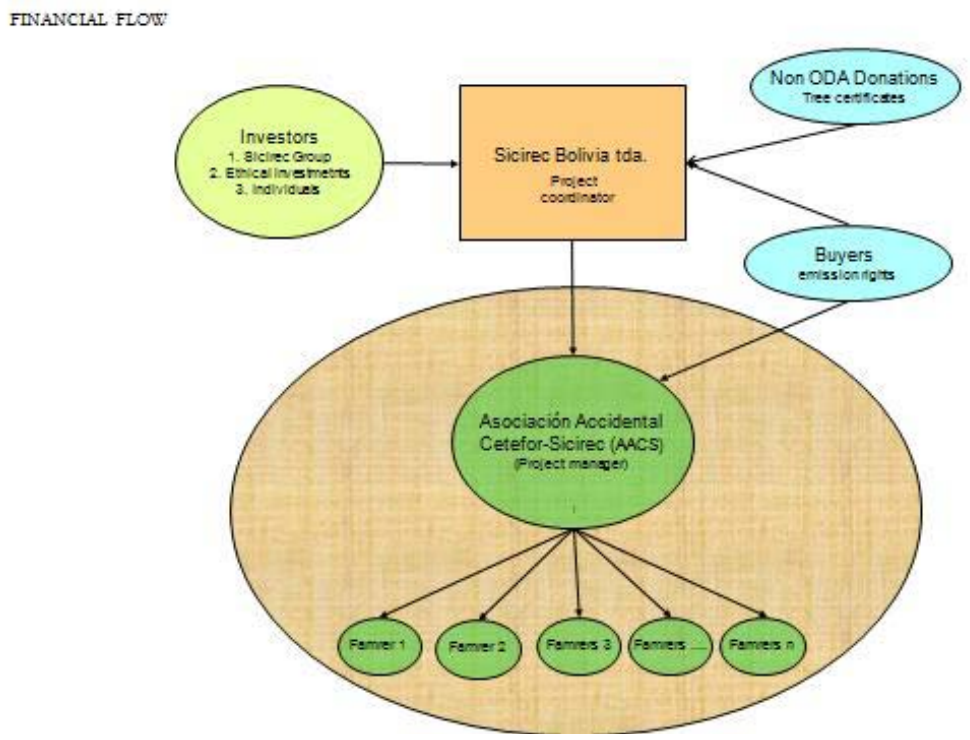
3. Project financial structure (sharing of benefits)

Project financing is structured as follow:

Financial input:

- Ethical investors
- Donations, this might be tree planting subsidies of individuals without expecting returns, or donations from companies willing to finance a project as part of their strategies for social corporate responsibility.
- Sale of carbon credits
- Farmers in-kind investment

C.2. Financial flow through the project



With the exception of the farmers input in kind, all funds are channelled through SICIREC Bolivia ltda. to the Asocicación Accidental Cetefor Sicirec.

Sicirec Bolivia is responsible for the sale of Carbon Credits, and other fundraising activities as well as reporting activities, preparation of technical documents such as PDDs and the technical and financial reports required by its investors and clients.

Carbon revenues are used to cover the cost related to the sale of credits:

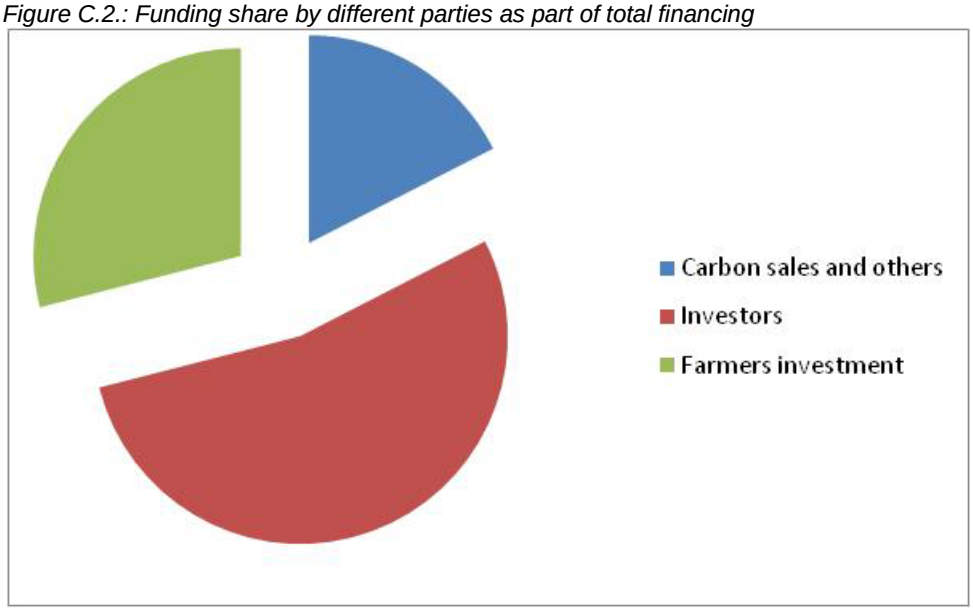
- PDD preparation
- Commercialization costs
- Sales agreements and other transaction costs
- Carbon monitoring activities
- Reporting on carbon sequestration and other relevant aspects of the project for the client
- Validation
- Verification

All other revenues benefit the farmers directly

- Periodical payments (at least 803 USD/ha)
- Agroforestry planting material (>100 USD/ha)
- Barbed wire (>100 USD/ha)
- Other materials (>200 USD/ha)

It is important to note that ArBolivia covers the full costs of managing the plantations whether this is financed by investors or by the sale of carbon credits. If revenues from carbon are lower than expected the funds needed have to be covered by the investors, If the revenues from the carbon credits are higher than anticipated the surplus will be used to improve the conditions for the farmers.

Figure C.2.: Funding share by different parties as part of total financing



The responsibilities and tasks for both the smallholders and the AACS in order to execute reforestation activities are arranged under a contractual agreement that affirms the business association.

The smallholders make an in-kind investment of the land and labour required for site preparation, tree planting and plantation maintenance, while the AACS is responsible for the elaboration of land use plans, capacity building, site selection, production and transport of seedlings as well as technical support to the participating smallholders.

Afterwards, Sicirec Bolivia ltda will handle the harvesting, processing and commercialization of the timber, as well as its possible certification (CCBA, FSC) in order to enhance market prices. As established under the contractual agreements smallholders will receive 50% of the net revenues obtained from timber sales.

Through the forestry committees, which each represents a group of farmers, project staff are obliged to inform the farmers every year about the revenues obtained for the project, from carbon sales, donations and the investments made in order to provide full transparency over the project's financial flows.

Section D: Community and livelihood information

1. Target communities/groups

The selected project areas have been progressively settled over the last two decades by settlers originating from the Bolivian Andean region.

In the quest to improve their living standards these settler families have followed agricultural practices, based mainly on the slashing and burning of primary forest for annual crops and extensive pastures for cattle, factors which have contributed to deforestation and the degradation of the fragile soils of the ecosystem.

For this project reforestation areas will be selected on the properties of about 2000 families. These are the most important partners of the project, those who designate an area of their property to realize the plantation. These properties have an average size of 20 to 35 ha. The project is characterized by its focus on this group of people and its social objectives to reduce poverty. The producers commit themselves on a voluntary basis to participating in the project and to fulfilling the conditions of the forestry plantation contract, where the rights and obligations between parties are set out in a clear and transparent way. The farmers are organised in a hierarchic way within Communities, Centrals and Federations, such as the **FSCIPAY**[8] (La Federación Sindical de Comunidades Interculturales Productores Agropecuarios de Yapacaní). These Federations have played an important role in the development of the project and the implementation of the project will be coordinated closely with the help of these institutions.

Data obtained in the area and data of the National Institute for Statistics (INE/ UDAPE) poverty index show that the communities which will be participating in the project are very poor.

2. Ownership of carbon benefits (land-tenure)

Ownership of land can be demonstrated in the following ways:

- Land is privately owned; the majority of the landowners do have legal titles issued by the Land Reform Institute (INRA) since 1996, and in or before 1996 by the National Colonization Institute (Instituto Nacional de Colonización).
- Not all land holders have legal documents proving ownership of their land. In most cases however they have provisional titles that are still in the process of approval with the INRA.
- If the land owner is not the original settler but bought the land in the period after the community was settled in most cases a notarized certificate exists on the purchase of the land.

[8] *The FCISPAY is the federation made up of all the organisations within its jurisdiction and represents its affiliated members with national, international and private authorities. It looks after the economic, political, social, cultural and environmental interests of all organization that belong to it.*

- If no notarized certificate exists then either land ownership can be proven by the community. Each community possesses a so-called “Foundation Statement” including a map. Under the law on Land Reform 1715 and its modification law 3545 land distribution within these communities is an internal matter and land ownership within the community is certified by the community itself.

According to forestry law (Ley 1700 and DS2453) the landholder is owner of the trees planted. This means that the landowner is owner of the services provided by the trees as well, including the carbon pools. Since the environmental services, such as carbon credits belong to the farmers, contracts are signed between the AACS and the farmers in which farmers transfer their emission rights to the AACS. In the same contract it is established that revenues from the emissions rights are returned to the participating farmers, copies of contracts are stored in the project offices. The standard format is shown in annex 4a.

One of the conditions for participation in the project is that no land tenure disputes exist. Therefore ArBolivia´s involvement in the communities is always coordinated by the community authorities (syndicates) and their parent organisations (Federations and Central). In most cases it is these syndicates that provide the certification for individual farmers to demonstrate their land ownership and the boundaries of the farm parcels.

In the case of indigenous communities, land is owned by the community but subdivided by internal regulations. If an indigenous farmer wants to establish a plantation by him or herself the community authorities have to provide authorization by submitting a certificate identifying, where the trees can be planted

3. Socio-economic context, anticipated impacts and livelihood benefits

3.1. Farmers, communities and their matrix organizations

The proposed activity will be executed in settler areas and in indigenous territories in the Cochabamba Tropics, in the Province of Ichilo in the department of Santa Cruz, and in Northern La Paz, and Western Beni, with the aim of reforesting 6000 ha on farm land. The settler areas have been a destination for migrants coming from High Valley and Altiplano regions of Bolivia since the 1930s. This migration has intensified during recent decades due to increased poverty, the “coca boom” and deterioration of the mining and agricultural industries that have traditionally supported the people of the Bolivian highlands. Smallholders own 95% of the land in the portfolio regions. The size of the properties varies, but they are on average 20 hectares per family and are usually 100 by 2,000 m in the Cochabamba Tropics, and 25 to 50 ha in the other regions. Only a small proportion of farmers have land less than 20 ha. The indigenous territories consist in communal land.

The settlers are organised into syndicates of 20 to 60 farmer families. Approximately 5 syndicates form a “Central”, which in turn belongs to a “Federation” (Federación).

Social participation is key for the project; therefore the project collaborates as much as possible with farmer’s organisations and local governments.

Agreements have been signed with:

- Federación de Comunidades Agropecuarias de Rurrenabaque (FECAR - Department of Beni)-2007
- Federación Sindical de productores Agropecuarios de Ituralde (FESPAY - Department of La Paz)-2008
- Municipality of San Carlos (Department of Santa Cruz)-2008
- Municipality of San Juan (Department of Santa Cruz)-2008
- Federación especial de colonizadores de Chimoré (FECH-Department of Cochabamba) -2009
- Federación especial de colonizadores de Carrasco Tropical (FECCT-Department of Cochabamba)-2009
- Federación Sindical de comunidades Interculturales productores agropecuarios Yapacani - Ichilo (FSCIPAY-Department of Santa Cruz) – 2009
- Central Buena Vista
- An agreement with the Municipality of Buena Vista (Santa Cruz) is under revision of the municipality.

These agreements cover almost all areas in which the project is being implemented, an example of an agreement with a municipality and with a federation can be found in annex 4b and 4c.

3.2 Socio-Economic Context

Interviews with stakeholders and land use surveys combined with social surveys, show that similar lands in the vicinity are not being converted on a significant scale either to; commercial plantations, agroforestry or silvipastoral systems.
A livelihood analysis was carried out based on 111 field surveys and semi-structured interviews with farmers from October 2005 to May 2006[9]a summary of the study can be found in annex 10a. It was concluded that there is a set of factors influencing land use and farming systems in the area. It is very likely that the process of extension of the agricultural frontier will continue. Farmers' own intentions are towards the extension of the agricultural frontier and not towards reforestation, despite the fact that they recognize the environmental problems caused by deforestation and the benefits which could be obtained from forestry.

3.3 Socio economic baseline and expected impacts

The farming alternatives in the area are analyzed in order to show the socio-economic impact of the project. The most developed activities are, rice cultivation, cattle farming and on a smaller scale banana and citrus fruits.
In the following paragraphs a summary of the study is outlined. The incomes for these activities (rice and cattle) have been calculated and compared with the anticipated income from timber resulting from the project. The study will be repeated every five years to evaluate the social and economic impacts of the project.

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[9] *Berger, D. 2006. Summary of the livelihood study, realized in colonization areas of the Cochabamba tropics and the areas of influence of the Park Madidi, North of La Paz, and Pilon Lajas, Beni Bolivia. Wagenigen University and DED. Rurrenabaque, Bolivia.*

3.3.1 Incomes generated by cultivating rice

Slash and burn system

According to studies carried out in the settler areas within the project zones rice cultivation rapidly degrades the soil. For this reason the soils are left fallow for several years (4-7). As a consequence farmers need to look for new soils for rice production , which is achieved by slashing and burning and in this way the agricultural frontier advances. This production method is very inefficient and destructive.

For the income calculation for rice production, consideration must be given to the fact that this is a very labour intensive type of production. For the production of 1 hectare 61 working days are required with a resultant gross income of 390 USD. After deducting the costs, of 156 USD (seeds, transport, herbicides, etc.) a net income of 234 USD is reached. This results in an income per working day of only 4 USD.

Mechanized rice cultivation

Some rice-cultivation is more intensive. It is mechanised, and fertilisers are also used. Although the harvests are higher and rice can be produced almost every year the financial input is also high. After having produced rice over 15 to 20 years (depending on soil conditions), the financial return becomes less than the financial input and the land is then left as wasteland. However since these lands are degraded no natural forest recovery can be expected.

3.3.2 Incomes generated by cattle

Another important land use type in the area is cattle breeding. Cattle often act as a “savings account” for the families.

In the project areas cattle’s farming is also a relative labour intensive type of production. The ratio of animals to land is two cows per hectare. The annual workload is 43 working days and a gross income of 208 USD is obtained. After annual costs of 34 USD (vaccines, medicines and vitamins, etc.) and capital expenditure of 23 USD for posts, wire, shackles (amortised over 15 years of use), a net income of 151 USD is reached. This results in an income per working day of only 4 USD.

3.4 Comparing the incomes from the different cropping systems

With the amounts elaborated in the preceding paragraphs, a comparison of the income of the different alternative products has been produced.

In the figure D.1 and D.2 a comparison of the incomes from different products is made; tree plantations with fast growing species (FP Fast), plantations with intermediate growing speed (FP Med), slow growing species (FP Slow), rice and cattle. Figure D.2 shows the cumulative total net revenues divided for the duration of the rotations for each crop in years. However a correction has to be made for NPV it is clearly noted that wood production has a big advantage compared with the traditional crop production.

Figure D.1.: Comparison of revenues/ha from different products (timber, rice and cattle)

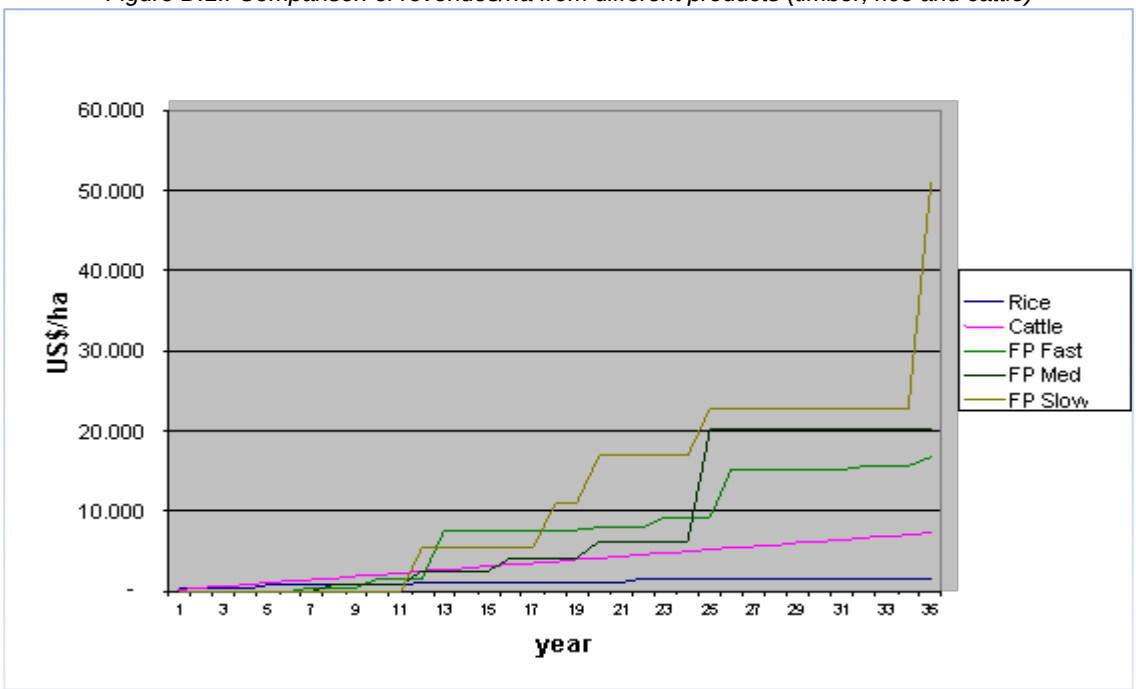
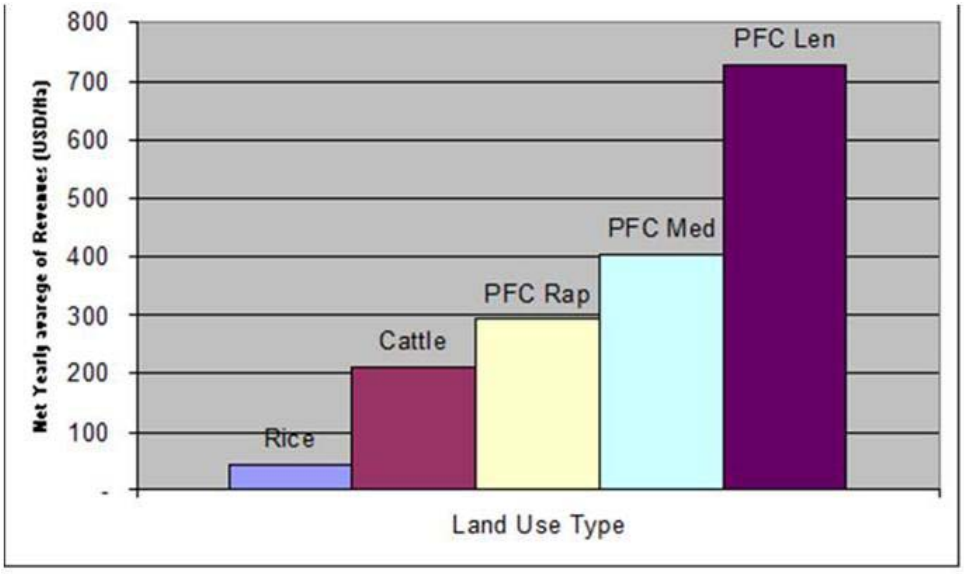


Figure D.2: Comparison of farmer's net revenues per ha (average per year) of the different products[10][11]



The comparison made in figure D.2 demonstrates a clear advantage of timber in the framework of this project most notably over the long term. The income of rice per hectare is low. Even though the incomes of the farmer may reach 234 USD per hectare, consideration must be given to the fact that in practice, the terrain is left fallow after every rice harvest and therefore will not generate any income whatsoever for several years

[10] *Note: The incomes of the forest plantations include the payments to the farmers by Carbon revenues and deposits and 50% of the value of the timber.*

[11] *PFC Rap = FP Fast, PFC Med,= FP Med, PFC Len = FP slow*

It is possible that the relative prices of meat and rice may rise over time. Nevertheless the difference in profitability per hectare in forest plantations and the principle crops is so much higher that even with an increase in the prices of rice and/or meat the incomes from plantations will remain significantly higher.

Figure D.3 Comparison of income per working day of the different products (in USD)

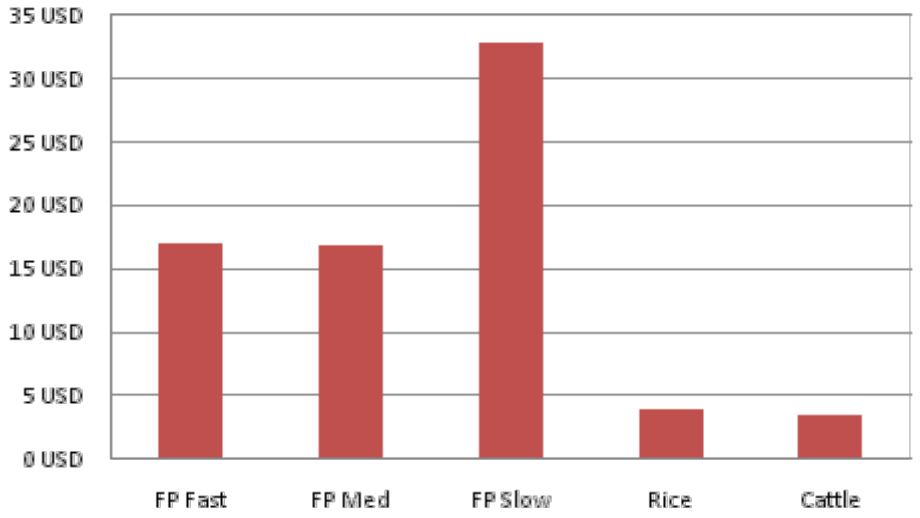


Figure D.3 shows that the incomes per working day in wood production are a lot higher than in the alternative products, which is another positive aspect of the project.

3.5 Income security

From a financial perspective forestry plantations offer a good alternative to the common agricultural crops in the area. However in the first few years there is not a lot of revenue, which is in practice necessary for maintaining the family. In contrast subsistence farming does at least provide food security, which a forest plantation does not provide. For this reason the project is designed in such a way that prevents forest plantations from leading to a reduction in income from other crops. The project has also been designed to avoid leakage. This means that forestry production will not displace agricultural production.

Therefore the project is not only dedicated to planting trees but also to:

1. Improving grazing systems introducing silvopastoral systems and improved pastures
2. Introducing agro forestry systems, systems which are more sustainable over time than rice, generate higher incomes per hectare per working day and also produce subsistence products for the farmer and his family
3. Introducing Land Use Planning at individual farmer level, improving the efficiency of production planning across the entire property and increasing agricultural production over both the short and long term.

3.6 Optimal Plantation Development according to Livelihood Needs

In order to guarantee the quality of the plantations on the one hand and to avoid harming local livelihood security the economic incentive system as explained in C.6.3 is crucial. For most farmers it is not possible to establish and maintain the plantation without these payments. If no payments are made, they cannot cover their day to day livelihood needs while working in the plantations. This means they cannot do the necessary work in the plantation and optimal development of these plantations cannot be guaranteed.

However it may still be the case that the farmer is prevented from carrying out his/her planned forestry plantation activities due to sickness or unavoidable involvement in different forms of livelihood income activities. For this reason ArBolivia has created an alternative in the form of small communal based enterprises, which specialize in carrying out planting and maintenance activities, and will carry out the planned activities in return for the payments that would otherwise have been due to the farmer. For the accomplishment of the planned activities, timing is an essential factor to assure optimal tree growth during the initial stages as the small plants are easily stressed or killed by weed competition.

All the technical criteria as well as the planning and timing of these activities are explicit in the standard operational procedures for “Implementation and Maintenance processes”, and are obligatory for all personnel operating under ArBolivia, to assure the quality of the plantations. In annex 3b the standard operational procedures are shown. The standard Operational Procedures document is a living document which will be adjusted after periodical evaluations by the project team.

3.7 Benefit sharing of Timber Harvests

The actual net benefit of the timber harvest to the small farmers in Bolivian settlement areas depends heavily on market access. As shown in the prefeasibility studies, most farmers lack access to transparent markets, as well as the ability or capital even to harvest the trees from their land for timber processing. The lack of access to the timber market results in very low timber prices, and can result in the exploitation of farmers.

In order to address these problems and assure a real net livelihood income improvement for the participating small holders, ArBolivia has set up an arrangement between farmers and the project, that guarantees a profits sharing mechanism based on the following fair trade principles.

- Small holders have 50% of total net benefits derived from sale, while investments for establishment and maintenance of the forestry parcels are distributed at the same rate (taking into account local wages). Incomes derived from carbon sales will directly and solely benefit the farmers.
- Local investment costs made by smallholders are monitored on a yearly basis during forestry committee meetings where realized investments (annual balance of ArBolivia) are discussed and evaluated by Project staff and smallholders.
- Every 5 years, a more detailed livelihood study is undertaken by the project to obtain more detailed information of socio-economic nature to evaluate the impact of timber plantation on small-scale by local smallholders.

Under the ArBolivia-scheme foreign investors organized under Sicirec-Bolivia will carry out the certification, harvesting, transformation as well as transporting and other trade activities, ensuring that the timber will be sold in the best market possible. The net benefits will be divided equally among outside investors and smallholders, assuring a considerable income for the smallholders.

4. Community-led design and livelihood benefits

The project was developed in conjunction with the participating farmer organisations. Several studies have been carried out on the feasibility of the project within the ENCOFOR-project[12]. Two pilot projects, financed by the Flemish NGO Groenhart were conducted from 2005 to 2006 by the CETEFOR-foundation, with the objective of validating the efficacy of the proposed activities by obtaining valuable feedback from the farmers. Based on feasibility studies, farmer meetings and these pilot projects the final project was designed.

Permanent quality control is realized within the project management plan, based on the feedback given by the forestry committees and farmer organizations. The details for quality control and permanent feedback mechanisms are described under the ArBolivia management plan and its Standard Operational Procedures document, see annex 3b (Standard Operational Procedures).

Involvement of farmers

Participation is voluntary and in order to motivate farmers to change their current land use practices different approaches will be applied:

1. Participative approach
   - Farmers and their organisations have participated in the design of the project; they will also participate in the implementation of the project trough the forestry committees.
   - During the implementation and consolidation phase of the project, farmers and their communities and organisations play an active role only through entrepreneurial involvement, while decision-, strategy-, and policymaking are the jurisdiction of forestry committees and project staff. (See regulations and minutes of meeting in annex 9)
   - Communal and/or local organizational laws and regulations, as well as verdicts, are mandatory for the project implementation according to their degree of authority. Therefore agreements with local authorities and farmers organizations are established to agree upon the details under which the project will be implemented under their jurisdiction. See as well D.3.1.
   - The project will have a high presence in the area, and work closely with the farmers initiating a process of local empowerment through the formed forestry committees.

[12] *ENCOFOR Project ("ENvironment and COmmunity based framework for designing afFORestation, reforestation and revegetation projects in the CDM: methodology development and case studies"). For the evaluation of the environmental impact the "social tool" and the "institutional tool" developed for this project have been used.* www.joanneum.at/encofor

- The specific Integrated Land Use design, the specific site selection for plantations and the plantation design is done on a participative way, see as well sections B6 and G3.

2. Promotion and education
   - Implementation of an extension program to create awareness of the advantages of the proposed land use practices among farmers.
   - Training of farmers to create the necessary knowledge and skills concerning the new land use practices.
   - Training of community based forestry companies for the fulfilment of certain necessary tasks, such as plant production, maintenance of the plantations, within the established quality norms and criteria of ArBolivia.
3. Economic incentives
   - The new land use (forestry plantations and agroforestry systems) promoted has a higher financial rate of return.
   - The proposed activity will provide staged payments to farmers during establishment and management of the forest plantations and share the benefits when timber or other products can be harvested.
   - The small community based companies providing services such as maintenance can reduce forestry management cost considerably for both the project and the local smallholders, while generating new income facilities for those farm families more dedicated to forestry activities.
4. Legal arrangement
   - Contracts will be signed with each land owner, underlining commitments to project activities to be implemented on his land. In these contracts farmers will transfer their carbon rights to the AACS. The contracts stipulate that payments for Carbon rights to the farmers will be transferred to the farmers as part of the total investment in this project. The obligations and rights of the AACS on the one hand and the farmers on the other throughout the life of the project are also set out in the contract, e.g: provision of planting material and other materials, provision of technical assistance, maintenance of the plantations, payments for Carbon Rights and anticipated payments for timber production, commercialisation of wood and distribution of revenues between farmers and the AACS.
   - Each contract shall be registered with the Authority for Forests and Territories, so as to improve control over illegal harvesting.
5. Permanent monitoring, evaluation and control system.
   - Compliance with the contract during the various stages of the implementation of the project will be monitored and evaluated by the Asociación Accidental CETEFOR-SICIREC through site visits.
   - Evaluation of the plantation for growth and development will be realized periodically for each plantation.
   - Permanent Sample Plots will be established to monitor tree-growth and development
   - Established and managed areas will be measured with GPS
   - Socio-economic impact monitoring is realized according to the following procedures based on the ENCOFOR[13] methodology (see Table 6.1)
   - All data is documented and systematized within the ArBolivia database see annex 5.
   - Main results are reported to the farmers, through the forestry committees.

[13] *ENCOFOR Social Impact Assessment Module: http//www.joanneum.at/encofor*

Projects benefits, and the distribution of these benefits, will be monitored and administered by the project in a transparent way. In order to guarantee the fair distribution of benefits, the partner farmers have access to the financial accounts of the project and, through the forestry committees, they are involved in decision making with respect to the development of the chain of custody and the sale of the products of the forestry plantation.

5. Capacity building and training

Since the implementation of the project depends largely on the farmers' input, capacity building and the transfer of technology is extremely important. Training for farmers is focused on technical issues such as planting techniques, management techniques, protection measures against pests, diseases, floods, fires and other risks which might appear during project life.

Given the multiple tasks that many smallholders carry out on their different livelihood income activities, special interest is given by the project to the communal development of small scale forestry service enterprises. These enterprises will provide services to smallholders by carrying out management tasks for forestry plantations, as well as providing crucial inputs, such as plant material. The objective of local capacity building through small-scale enterprise for forestry services is intended to provide favourable conditions for forestry development, local empowerment and to contribute towards a process of decreasing dependency on project staff.

Capacity building is also focused on farm planning, improving access to markets, and the development of a chain of custody of forest products and for those farmers who will be directly involved in project management (as a member of the forestry committees) as well as in financial, administrative and legal issues.

Capacity building will be developed in different ways:

1. Courses for groups of farmers; these courses will be divided into a theoretical component and practical exercises in the field.
2. Famer to farmer, with the participation of one of the project staff members; Farmers will visit other Farmers so they can discuss their experiences, evaluate and improve technologies and know-how.
3. Famers will be frequently visited on their land by extension workers, receiving regular assessments on the implementation and management of their plantations.
4. Capacity building and creation of community based forestry services enterprises.

In all three cases knowledge transfer is not a one way flow from staff member to farmer. There will be open discussions, in which farmers comments will be used to improve techniques.
A detailed plan on capacity building and technology transfer is made each year.

6. Monitoring livelihood and socio-economic impacts

Monitoring of livelihood and socio-economic impacts will be done by an external consultant according to the schedule in table D1. The results of the impact study will be reported to the management of the project so, if necessary, appropriate measures can be taken. Following the ENCOFOR-tools for analysing the socio-economic and communal impact of the project, a list of potential criteria has been evaluated in order to elaborate a valid monitoring system:

Table D.1: Analysis of potential negative socio economic impacts

Potential negative impact	***Indicator***	***Potential Impact Estimated***
Will the project cause displacement of local people?	Number of families/households displaced	No, unlikely since we are introducing an implementation of an average of 1,5 to 3 hectares of forestry plantations per farm, indicating a total of 10 to 15 % of the total farm surface at the maximum. Thus displacement due to project implementation is very unlikely, taking into account that most farmers occupy only a small percentage of their total property of land.
Will the project cause an immigration for which the region is not prepared?	Number of families/households expected to immigrate in the project area	No, the social attraction of plantation forestry for small holders is reduced due to the long time schedule for economic returns.
Due to the project implementation will there be a reduction in the availability of main food sources?	Reduction of specific food products in kg. per year/season	No, since the implementation of plantation forestry will be implemented on 10 year old deforested land used for agricultural cropping or grassland. Due to degradation, most of these areas are destined to fallow periods by the smallholders of at least 10 to 12 years, by which time initial incomes can be derived from the timber plantations. Therefore plantation activities are unlikely to result in derived income losses, food security reduction nor potential leakage.
Will the offer of/access to timber or non timber products be reduced?	m^3 of wood	No, this is a positive impact that will increase, as reforestation and timber plantations will be implemented on cleared forest lands. Thus therefore only contribute to increased access to timber and non-timber products
Will the project cause a reduced or unequal access to capacity building?	Number of persons / groups affected	No, all capacity building must be provided equally among the farmers on an individual as well as group level. The control of technical assistance will be controlled continuously and monitored through the "planning sheet".
Will the project cause a reduced or unequal access to new technology and know-how?	Number of persons / groups affected	Yes, those families who do not have any surface eligible under the applied carbon standards for implementation of forestry plantations are excluded from the project. This means they cannot participate in the project and will not have access to the technology for establishing and maintaining forestry plantations as well as agro-forestry systems.
Will the project cause the loss of land or reduced use rights for some groups or individuals?	Number of persons / groups affected	No, small holders voluntarily apply to be a participant in project activities.

Potential negative impact	***Indicator***	***Potential Impact Estimated***
Will the project reduce the access to or ownership of the carbon pools?	Number of persons / groups affected	No, under contractual agreement the right are transferred to the project. However benefits will be used for the owner of the carbon pool.
Will the project concentrate the ownership of the VERs in a reduced number of persons (<10%) or social groups?	Number of persons / groups affected	Yes, under institutional ownership (rights transferred to AACS), but they have the legal obligation to return all benefits directly to the participants as owners of the carbon
Will the project damage or reduce access to cultural or religious sites?	Number and extension of the cultural and religious sites	No
Will some social groups have less access to information or to participation mechanisms? Answer:	Number of persons / groups affected	No, as information will be open and transmitted through forestry committees and meetings will be organised where all participants will be invited. All participants, settlers and indigenous people participate under the same principles.
Will some social groups have a reduced access to decision-making	Number of persons / groups affected	No, all participants have the right to participate among the forestry committees, and include their preferences within the activity planning for the forestry maintenance.
Will some social groups consider the lack of benefits as a negative impact?	all participant smallholders	Yes because of the long term of the project, however this will be reduced by periodic payments which are made to meet implementation and maintenance investments made by farmers. Pre-feasibility study (based on Encofor tools) confirmed the profitability of timber plantations in the long term compared to current land use practices.
Is any inequality or conflict in the region going to arise/increase due to the project implementation?	Number of persons / groups affected	No, as for the invasion of cattle and fires, which can have a considerable impact on the quality of plantations, these conflicts will be monitored by the project through the forestry committees where its results will be conveyed to project staff. Conflicts of this nature, however, will be dealt with at the level of local and communal authorities as this falls under their jurisdiction.
Will the project activities affect on the family well being, (children and women)?	females and children of participant households affected	Subject to monitoring, where the household will be asked to specify those involved in project activities. If this includes the wife and children, they will be asked if this augments to their usual labour time invested in on farm activities or interferes with their other activities of interest. If negative, mitigation measures will be carried out.
Is any inequality or conflict in the region going to arise/increase due to the project implementation?	inequalities/ conflicts in area	No, however, in order to avoid misunderstandings of the actions proposed by the project, the project will concern itself with the continuance and construction of alliances with local authorities and institutions to promote and establish the project on local, regional and national level
Will plantation damages, due to natural and anthropogenic consequences, cause conflicts within the project or communities?	plantations damage reports and solution reports registered	revision of solution reports realized by forestry committees according to plantations with damage reported

Table D.2: Analysis of project´s positive socio-economic impact

Potential positive impact	***Indicator***	***Potential positive impacts Estimated***
Due to the project implementation will there be an improvement in food sources?	Surface (ha) of agroforestry crops and its production level	Yes, the implementation of Agro-Forestry Systems (AFS) SAF.
Will the offer of/access to timber or non timber products be improved?	m3 of wood	Yes, the implementation of timber plantations will improve timber and non-timber product access, as well as seeds and other products will be produced.
Will the project cause an improved access to capacity building?	Number of participant households	Yes, the project will provide capacity building to all participant families through technical assistance and capacity building. This is monitored constantly through the registration of field visits realized and lists of participants who assisted to workshops.
Will the project provide a new offer or improve already existent access to technology and know-how?	Number of participant households/ surface planted	Yes, the existence of forestry plantations as well agro-forestry is minimal on participant farm level before project implementation, as shown by the elaborated Integral Farm Plans and prefeasibility studies
Will the project cause an improvement in land tenure or use rights for some groups or individuals?	Number of participant households	Yes, since the elaboration of the Land Use Plan-document for each smallholder shows how they are really using the land, their land title can be verified in. in the National Institute for Land Reform
Will the project improve/ensure the access to or ownership of the carbon pools to local people?	participant households	Yes, by contract.
Will the project ensure an equal ownership of the carbon credits?	participant households	Yes, by contract.
Will new social groups have access to information or to participation mechanisms?	participant households	Yes, by participation among forestry committees and meetings, information will be provided, as well as difficulties and suggestions are observed and transmitted to project staff.
Will new social groups have access to decision-making?	participant households	Yes, via the forestry committees and on a personal level during the maintenance and implementation of plantation activities small holders together with project staff will elaborate necessary activities according to a mutually agreed plan.
Will the project promote new alliances between different social groups?	agreements between local smallholders and European equity investors	Yes, through a fair trade business agreement as well as agreements with local authorities and farmer federations and the project:
Will the project strengthen or improve the social group internal organization?	Number of new, improved or strengthen organization forms	Yes, through the formation of forestry committees, participating smallholders will be able to accept joint responsibility and share in the decision making process. The project will build on existing organisations when establishing forestry committees.
Will the project improve environmental concern and knowledge	local communities in project area	Yes, the project provides and promotes educational material among communities (technical guides, radio or television spots) which tackle the issues of deforestation and climate change.
Will the project improve protection of fragile ecosystems on farm	Integrated Land Use Plans and surface of	Yes, with an improved land use planning, agroforestry and plantations with native species and with the on-farm implementation of ecologic corridors. All

Potential positive impact	Indicator	Potential positive impacts Estimated
	ecological corridors	participating farmers have a contractual agreement to set aside an area equivalent to at least 20% of the area dedicated to commercial forestry for conservation or restoration.

A selection is made of those criteria which might cause a potential impact, see table D.3; these are selected for the periodical impact analysis. This analysis will be done by an external expert.

Table D.3. Methods of measurement of expected socio-economic impacts

Potential Impact Area	Baseline/ source	How (method of measurement)	When
The implementation of the project activities does not reduce on-farm consumption and income production	Documents: Integrated Land Use Plan-document	Inventory of Land Use and farm production every 5 years, as for the Integrated Land Use Plans	every 5 years
The net benefits of for carbon and timber sales provide on-farm economic surplus	Integrated Land Use Plan-document	On-farm assessment of current land-use, local market analysis and livelihood analysis[14].This has been based on methodology proposed by ENCOFOR see as well section D	every 5 years
The project improves the introduction of new food/cash crop production (sustainable production alternatives)	Land Use Plan-document elaborated, with baseline 0 for AFS production.	Land Use as registered in the Integrated Land Use Plan at outset is compared with Land Use at the time of evaluation. Special focus will be made on Agro Forestry Systems (AFS),	every 5 years
The project activities will not adversely affect the household's well being, (children and women)	Integrated Land Use Plan	Verification of the persons who are involved in the on-farm activities. The introduction of project activities does not increase labour input of children and females	every 5 years
The project activities will increase the on-farm production of timber and non timber products	Actual surface of FP and AFP, SP and production, which is almost 0	Surface of FP, AFP and SP is measured and Permanent Sample Plots are installed for measuring biomass increment.	every 5 years
The project activities will have an increased access to timber and non-timber products markets	Production and market analyses in the baseline, for timber and agroforestry products this is near to 0	Sales t=0 compared with sales on t every 5 years	every 5 years
The presence of external threats of fire and cow/animal invasion do not affect on-farm development of project activities	Database of ArBolivia	registration and verification of plantations	continuous

[14] *Note: Differentiation will be made according to the different "modes of production" or "farming styles" identified among the Integrated Land Use Plans and livelihood analysis.*

Section E: Ecosystem impacts and monitoring

1. Ecosystem impacts

1.1 Environmental Impact Assessment

Environmental impact assessment was done according Bolivian law and regulations. A “ficha ambiental” was prepared according to Bolivian law 1333. This “environmental assessment” is the technical document that marks the start of the environmental evaluation process. This document, prepared by an independent registered consultant, comprises of a sworn declaration, includes information about the project, identifies the key impacts and gives a possible solution to any negative impacts. According to the environmental index card the EIA category, see table E.1, is determined.

Table E.1. Categories of environmental impact according to Bolivian legislation (art. 25, law 1333)

Category	Environmental Impact Analysis (EIA)
1	Need of an integrated EIA analysis
2	Need of a specific EIA analysis
3	No need of a specific EIA analysis, but a conceptual revision is recommended
4	No need of an EIA

According to Bolivian national regulations (Environmental law 1333) the project activity is identified as a “class three” project. Because of this classification the EIA of the project is executed on a general basis. This means that in the Environmental Assessment the potential risks are identified on a qualitative basis and the proposed monitoring method and the mitigation measures are detailed in the Application and Monitoring Plan (PASA). The environmental assessment was done for all areas where project activities might take place. Below a summary of the environmental assessment and the mitigation measures is presented.

1.1.1 Negative environmental impacts

The identified negative environmental impacts are the following:
Minor negative impacts on biodiversity, soil conditions and water permeability of soils might occur during site preparation just before planting when the ground will be cleaned. Site preparation might affect the flora of the low vegetation. Because of clearing the vegetation due to site preparation and digging the planting holes the terrestrial flora and fauna will be slightly affected. Site preparation might e.g. affect some birds’ nests. Nevertheless these are temporary impacts, and when the forest emerges, the species will recover themselves and even more species will settle in the plantation.

Another potential risk might be on leakage, but mitigation measures are taken to avoid this. The focus of the project activity is on areas with poor soils, which are currently under cultivation in a system with long fallow periods, or on low productive and generally degraded pasture lands. To avoid leakage, in part of the project area improved agricultural, silvicultural and agroforestry systems will be introduced. The introduction of integrated farm planning will improve agricultural production in general and thus avoid leakage. It will also slow down the actual deforestation rate.

1.1.2 Additional Environmental impacts analysis.

It is worthwhile to emphasize that the project has paid a lot of attention to subjects that are not required under the official norms and regulations in Bolivia, but that are considered relevant and possible impacts. Although not required by existing regulations a more detailed analysis has been carried out using the ENCOFOR[15] environmental impact tool. An additional study has also been done to address the project's impact on biodiversity.

One of these subjects refers to the leakage that could occur when converting agricultural land into forests, leakage that could be translated into negative environmental impacts. Nevertheless it has to be emphasized that with the elaboration of the Land Use Plans and the implementation of agroforestry systems, not only is leakage avoided, it will even reduce the need for converting primary forest into agricultural land. This means that positive environmental benefits can be expected.

ArBolvia uses specific procedures for tree species and site selection, see annex 3b, technical specifications. The selection of tree species for specific sites is based on site evaluations and depends on proven suitability for the specific site conditions and function of the trees species in the (agro) forestry systems. Only native species are used, with the exception of teak which is used on a relative small scale and only if it can be adapted to site conditions, avoiding any negative impact on the site. The strict site selection procedures will avoid negative impacts on site conditions.

1.1.2.1 Positive environmental impacts

The most important environmental benefits of the forests and how this project generates these benefits are summarized below:

The identified positive environmental impacts for this project are the following:

- Soil protection and soil improvement
- Hydrographical watershed protection and regulation
- Conservation of biodiversity
- Avoided degradation and desertification
- Carbon sinks

Other impacts may exist that have not been analyzed in the actual project. Recreational use and landscape values are aspects, which could in the future provide in opportunities for alternative use of the forest areas for eco tourism.

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[15] *http://www.joanneum.at/encofor/tools/doc_sp/Manual%20de%20apoyo%20para%20la%20herramienta%20de%20evaluacion%20de%20impactos%20ambientales.pdf*

1.2 Comparison with the environmental situation without the project (Baseline)

The agricultural system in the project area has experienced a constant degradation from the 80s onwards. Actually the lands that are to be reforested by this project are marginal agricultural lands and pastures.

If the project is not executed the lands located in the project area would still be used in the same way. These lands which at the moment are fallow would be used progressively as pastures. The unproductive grounds would be abandoned in a progressive way by the farmers. Also soils could be eroded, by floods, or changes in the river beds. This scenario would be the most probable if nothing is undertaken to change this tendency. So the existing carbon stocks would decrease more. In addition, without the project implementation there would be no change in the method of production. Reforestation would not occur naturally, because the small farmers do not have any incentives to change their agricultural habits.

As illustrated in D.3.2 and section F, the small producers, do not have the possibilities to change, not the means nor the funding to make this kind of investment. Therefore the most probable scenario without the application of the project would be the existence of eroded and unproductive lands. The value of the soil would continue to reduce due to a continual decline in productivity, aspects that are most visible in the cases of rice production and cattle farming.

Various studies[16] show that the process of an expanding agricultural frontier would continue without real planning. The smallholders plan to extend the agricultural frontier instead of reforestation, despite recognizing both the environmental problems derived from the deforestation and the economic benefits which can be obtained in a reforestation process. Nevertheless according to this same study, the agricultural pressure is high, the pressure for lands and urgent economic necessities make it impossible for them to reforest because the return is seen on the intermediate and long term. The financial and social barriers are too strong to permit a vision change.

[16] .e.g

- *Zomer R., Van Straaten O., Stilma A., 2006, Pre-Feasibility Report Chapare Case Study. ENCOFOR, IWMI, Cetefor.. Colombo.*
- *Sejas R. espinosa J. 2007, Producción de pastos en las ecoregiones "bosques amazónicos pre andinos e sub-andinos, revisión de bibliografía. Fundación Cetefor. Cochabamba*
- *Stilma A.A., Sejas R. 2006. Pre-feasibility study for a CDM-AR project in the Cochabamba Tropics, Cochabamba, Bolivia*
- *Stilma A.A., Berger D. Knoblauch B.M. 2006. Estudio de Prefactibilidad, Captura de carbono y apoyo a la conservación a través del manejo sostenible de recursos forestales en la zona de amortiguamiento del PNANMI Madidi y de la RBTCO Pilón Lajas. Cetefor/DED/PRISA. Rurrenabaque.*
- *Encofor Social-tool/Zona Rurrenabaque,*

2. Monitoring of ecosystem impacts

Environmental impact and ecosystem analysis will be carried out by an external consultant, legally registered by the Bolivian environmental authorities. Data gathering for this will be done by students of the agricultural faculty and forestry school of sciences.

2.1 Valuing of the environmental impacts

At this point an approximate value of the positive impacts of the project on the environment in general is given, based on biological indicators

2.1.1 Soil protection and improvement

In the execution of the project, by reforesting the marginal lands a soil improvement will be generated. This will be measured by the following indicators.

- Indicator on soil compaction: show a decline with forestation
- Soil structure and disturbance: The reforested areas show a decline in soil disturbance
- Soil erosion: The reforested areas clearly show a decline in erosion

2.1.2 Protection and regulation of the hydrographic watersheds

The process of reforestation contributes to:

- Regulation of the hydrological cycle, by maintaining the supply of water in the dry season and control against inundations
- Conservation of water quality, reduction in the sediment and nutrient load, chemical load and salinity
- Control against soil erosion and sedimentation
- Maintaining the aquatic habitats, by the reduction of water temperature because of the shade of the trees over the rivers and streams, besides the remnants of forest which provide a habitat for aquatic species.

Respective indicators:

- Surface runoff: declines with reforestation, the forest works like a sponge
- Water infiltration in the soil improves, this can be noticed through improved soil structure
- The water balance improves significantly, better water infiltration into the soil, decrease of surface runoff

2.1.3 Vegetation

The indicators for vegetation change are:

- Total biomass:
- Area leaf index:
- Development of cover:

2.1.4 Biodiversity

- It is expected that the reforested areas, which at the moment are degraded lands will improve in terms of biodiversity, a higher diversity of species is expected as well as a higher number of individuals per specie. The Simpson's biodiversity index will be used to monitor this
- Use of bio chemicals, fertilizer and degradation: decline with reforestation

Table E.2 shows a summary of the methods of monitoring for the potential environmental impacts of the project.

Table E.2. Methods of monitoring environmental impacts of proposed activities

Impacts	Baseline	Methods and thresholds
Biodiversity impacts	Without project biodiversity will be declining	The Simpson biodiversity index will be used to monitor this Leaf area index will be used, as well the % vegetation cover Threshold = No negative impact
Water availability impacts	Due to a declining vegetation cover in the situation without project the permeability of the soils will decline, which means higher peak flows and in the rainy season and drought in the dry season	During the project the amount of vegetation and canopy cover will increase substantially. This will have a positive effect on the amount of surface run-off which will be slowed down by the vegetation (including a higher interception rate). The increase in Organic Matter will also slow down the surface run off since there is more potential for infiltration. Threshold=no negative impact
Soil conservation impacts	Soil erosion and compaction will be higher without project.	This will be classified on a scale -3 (high negative impact) to 3 (high positive impact)

Monitoring will be done in permanent sample plots every five years.

SECTION F. Additionality of project and project activities

The demonstration of additionality follows the simplified methodology (AR-AMS0001/version 05 – Appendix B). The project activity would not have occurred without the CDM component due to the following barrier:

Barriers due to local traditions:

Without the project it is not very likely that reforestation activities will take place on a significant scale:

- There is no significant tradition in Bolivia of investing in plantation forestry even if the investment itself is profitable.
- There is no tradition within companies for long term investments, especially when repayment periods are relatively long.
- There is a high risk of shortage of cash flow during different stages of the project since, since the Bolivian government and also the wood companies, as potential investors, not only have a lack of funds for the investment phase but do not have sufficient cash flow capacity. There is often simply no tradition of anticipating future expenses. This makes it unlikely that the needed investments during the whole period will be covered and thus that the management of the plantation is successful.

Examples show that even in those cases where the establishment phase was financed by ODA projects, the management of plantations failed in later years due to financing and capacity deficits and plantations were lost. The proposed project will cover the financing need during the entire project period, guaranteeing the appropriate implementation and long-term management of the plantations.

Livelihood and (pre)feasibility studies down in the project areas[17][18], show other land uses types respond better to the direct socio-economic needs of the farmer families than tree planting activities, since the livelihood analysis showed a list of important requirements which should be met at least partly by alternative land uses:

For farmer families the following characteristics and requirements for land use are considered important:

1. Income within a relatively short period
2. Possibility of having direct access to capital in case of emergencies.
3. Investments should generate an increase in the value of their land.
4. Markets for products should be visible; farmers are more willing to invest if clear markets exist for their products.
5. Access to markets should be relatively easy; preferably access should be possible on an individual basis, without the need for intervention from a multitude of intermediary stakeholders (middlemen, community or producer organisations, etc.).
6. Handling of products should be relatively easy.
7. Constant and secure markets are preferred over insecurity in markets.

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[17] *Berger, D. 2006. Summary of the livelihood study, realized in colonization areas of the Cochabamba tropics and the areas of influence of the Park Madidi, North of La Paz, and Pilon Lajas, Beni Bolivia. Wagenigen University and DED. Rurrenabaque, Bolivia.*

[18] *Stilma A.A., Sejas R. 2006. Pre-feasibility study for a CDM-AR project in the Cochabamba Tropics, Cochabamba, Bolivia*

8. Labour demand, and peaks in labour demand should be linked directly to labour supply.
9. Relatively simple land use methods are preferred to more complex land use methods.
10. Level of investment.
11. Cost-benefits.

Without project intervention, using specific strategies to solve the social and economic needs mentioned above it is not very likely that land holders will implement plantations by themselves or continue to manage them over the years, due to the following:

- Agroforestry activities cannot compete in terms of points 5,6,7,8,9,10 compared with traditional land use systems.
- Silvipastoral systems cannot compete in terms of points 8,9,10 compared with traditional land use systems.
- Commercial forestry plantations cannot compete in terms of points 1,2,5,8,9,10 compared with traditional land use systems.

Investment Barriers

In addition to the points above, investment barriers may also be mentioned. Based on the same additionality tool (AR-AMS0001/version 05 – Appendix B), it can be stated that:

Without the project it is not very likely that reforestation activities will take place on a significant scale:

- Loan finance is not available for this type of project activity;
- No access to international capital markets due to real or perceived risks associated with domestic or foreign direct investment in the country where the project activity is to be implemented;
- Lack of access to credit.

No examples exist of loan finance to small farmers in Bolivia, and farmers lack access to any type of credit.
Since the planted area is distributed over a high number of farmers, this means that operational costs are relatively high. Investors would only be willing to invest if additional funding can be obtained from environmental services.

SECTION G: Monitoring, technical support and payment plan

1. Monitoring of performance indicators

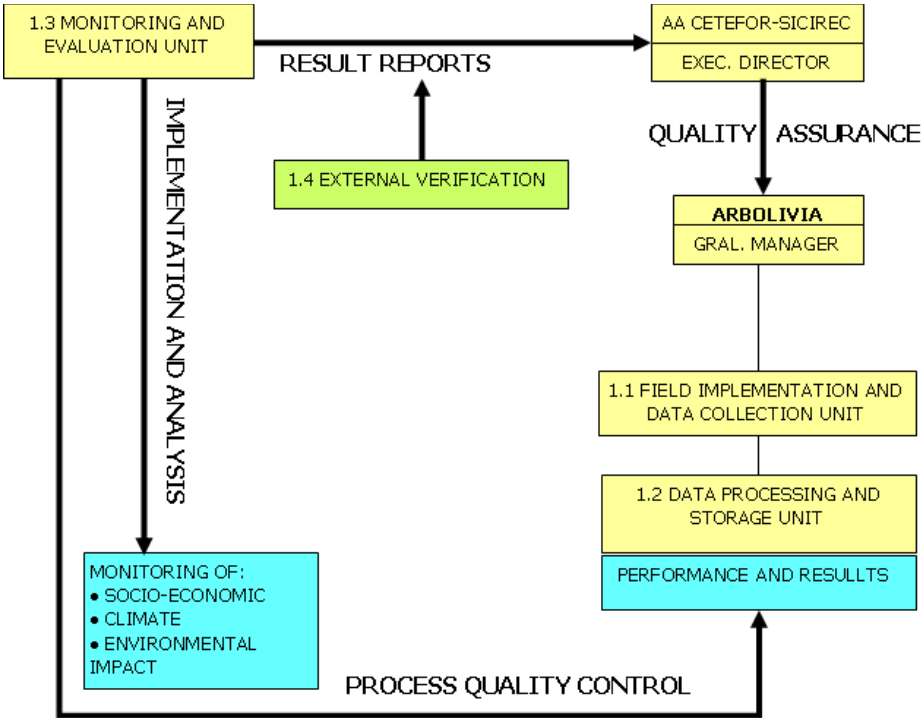
The monitoring process is an ongoing process that is standardized by operational procedures, technical criteria, and indicators that permit verifiable and certifiable evaluations of the progress, extent and quality of the plantations and measurements of changes in carbon stocks annex 3 and annex 5.

In addition the monitoring process enhanced by Arbolivia facilitates effective quality assurance (QA) as well as quality control (QC) procedures as discrepancies in the state of the plantations are identified relatively quickly, thus enabling the development and implementation of corrective measures by project management.

Monitoring consists of four components which are interrelated, as shown in figure G.1: The four components are:

1. Data collecting
2. Data processing and storing
3. Internal monitoring and evaluation
4. External verification (certification)

Figure G.1: Monitoring of performance



1.1 Data collecting

ArBolvia's technical staff are responsible for the data gathering and data processing.

Data gathering is the responsibility of the field staff. The training of field staff in data collection procedures is an ongoing, interactive process facilitated by management. The objective is to ensure that the method used by every technician is the same. and that new technicians can learn from the experienced technicians. Both the monitoring procedures and the interpretation of the monitoring form are standardized throughout the entire organization.

A standard field form is used for data collection, which provides a range of important information and key measurements. The combined information and measurements are used to ascertain and verify the state and quality of the plantations. The standard operating procedures and field forms are shown in annex 3.b.

1.2 Data processing and data storing

Data storage is responsibility of the Data Processing Unit.

The information will be stored by the projects´ Data Processing Unit and is made available to authorised personnel.

Information is stored both in paper files and on a data base which permits comprehensive analysis of the data per plantation sector. The database, see annex 6, serves as a monitoring tool by providing information about the current state of the plantations, as well as an effective tool for the planning and direction of field activities required for the maintenance of the plantations.

Due to the relatively long-term nature of forestry activities, data archiving (maintenance and storage) is an important component of a project. Copies of all data analyses and models, the final estimate of the amount of carbon sequestered, GIS data and copies of all measuring and monitoring reports will all be stored and this task is the responsibility of the Data Processing Unit.

Given the time frame of the project, and the pace of production of updated versions of software and new hardware for storing data, electronic copies of data and reports will be periodically updated or converted to a format that can be accessed by any future software applications.

This information can be shared with other projects or institutions to optimize the benefits accruing from the exchange of experience, the close contact with stakeholders and the possibilities for establishing strategic alliances, etc.

1.3 Quality Control and Quality Assurance

The quality and accuracy of data is verified s by ArBolivia´s internal Monitoring and Evaluation Unit. As shown in figure G1. In order to maintain objectivity the Monitoring

and Evaluation Unit is independent and separate from other project staff within the project structure.

The internal Monitoring and Evaluation Unit of ArBolivia evaluates the data obtained by the field technicians to identify errors in field techniques, verify measurement processes and identify problems. The evaluation is used to quantify the coherence of:

- The data entered in the field forms (annex 3b) by the field technician
- The data entered in the field forms from tree measurement and evaluations of the permanent sample plots
- The data entered into the database by the data processing unit
- The measurements and data carried out by the field technician according to the established standard procedures

Once coherence of the forms and data in the data base has been checked; 10% of the field forms is completely re-evaluated and the corresponding fields are re-measured, by special staff within the Monitoring and Evaluation Unit who are particularly experienced in forest measurements. After this second round of measurement, a comparison is made with the original data and screened for discrepancies.

Field data collected at this stage are compared with the original data and quantified according the formula below:

$$\text{Measurement error (\%)} = \frac{\text{(Number of errors among checked sample)}}{\text{Total number checked}} \times 100$$

Any errors found are corrected and recorded, and can be expressed as a percentage of all the items of information that have been rechecked in order to provide an estimate of the degree of inaccuracy.

If the calculated measurement error is greater than 10 per cent, all the analyses are returned to the technician responsible and their line manager for revision. The objective of such a quality assurance is to identify the shortcomings of the field personal at an early stage and to insist on the appropriate use of standard procedures for field measurements and data collection. This also reduces the risk of sending inaccurate data to a client.

The Monitoring and Evaluation Unit reports its results to the executive director of ArBolivia, responsible for quality assurance, who will decide on any corrective action deemed appropriate in respect of field staff.

In this way the quality and accuracy of the data shared with investors and clients (carbon or environmental services, donators) can be assured since performance statistics will be reported if the data used has met the established quality standards.

1.4 External verification

The whole process will be verified by an external certifier, as established in agreements with the investors and clients of carbon credits or donors.

2 Payment plan

The farmers will receive payments for the establishment and maintenance of the trees, which are considered incomes from the start of the project. Although these are not high payments, they are sufficient to encourage the farmer to continue with the project. Moreover these amounts are necessary for the initial investment, given the fact that a lot of farmers do not have money to invest.

Payments to farmers are made after evaluations of the plantations which confirm that the established quality standards are meat. The evaluation forms and quality standards are shown in annex 3b.

Table G1: Payments to the farmer

Payment	Milestone	Period after planting	Amount (USD/ha)	Cumulative (USD)
Establishment	Plantation established according SOP	2 weeks	83.00	83.00
Maintenance 1	Maintenance done according SOP	3-4 months	50.00	133.00
Maintenance 2	Maintenance done according SOP	8 months	50.00	183.00
Maintenance 3	Maintenance done according SOP	12 months	50.00	233.00
Maintenance 4	Maintenance done according SOP	17 months	50.00	283.00
Maintenance 5	Maintenance done according SOP	<24 months	50.00	333.00
Maintenance 6	Maintenance done according SOP	Year 3	50.00	383.00
Maintenance 7	Maintenance done according SOP	Year 4	50.00	433.00
Maintenance 8	Maintenance done according SOP	Year 5	50.00	483.00
Maintenance 9	Maintenance done according SOP	Year 6	20.00	503.00
Maintenance 10	Maintenance done according SOP	Year 7	20.00	523.00
Maintenance 11	Maintenance done according SOP	Year 8	20.00	543.00
Maintenance 12	Maintenance done according SOP	Year 9	20.00	563.00
Maintenance 13	Maintenance done according SOP	Year 10	20.00	583.00
Maintenance 14	Maintenance done according SOP	Year 11	20.00	603.00
Maintenance 15	Maintenance done according SOP	Year 12	20.00	623.00
Maintenance 16	Maintenance done according SOP	Year 13	20.00	643.00
Maintenance 17	Maintenance done according SOP	Year 14	20.00	663.00
Maintenance 18	Maintenance done according SOP	Year 15	20.00	683.00
Maintenance 19	Maintenance done according SOP	Year 16	20.00	703.00
Maintenance 20	Maintenance done according SOP	Year 17	20.00	723.00
Maintenance 21	Maintenance done according SOP	Year 18	20.00	743.00
Maintenance 22	Maintenance done according SOP	Year 19	20.00	763.00
Maintenance 23	Maintenance done according SOP	Year 20	20.00	783.00
Maintenance 24	Maintenance done according SOP	Year 21	20.00	803.00

These payments are financed through the sale of carbon credits. Carbon sales are also used to finance protection measures, such as barbed wire planting, material for the agroforestry plantations and forest plantations and the elaboration of land-use plans. Since total revenues from carbon sales will not cover the whole amount of the payments and materials delivered to the farmer the balance will be covered by the ethical investors.

3 Technical support and review:

Species-site matching
CETEFOR established procedures for trees species and site selection, annex 3.b.
Tree species selection for specific sites is based on site evaluations and depends on proven suitability for the specific site conditions and function of the trees species in the (agro) forestry systems. The functions include, amongst others, timber production, shading and nitrogen fixation. Native species will be used, such as: *Guarea rusby, Schlizobium amazonicum, Buchanavia sp., Centrolobium tomentosum, Terminalia amazonica, Cedrela fissilis*, *Stryphnodendron purpureum,* and *Swietenia macrophylla.*

Step 1: Selection of potential sites for reforestation activities
Site selection and the potential for reforestation is defined together with the small holder, taking account of the current and future needs of the farmer family and the biophysical characteristics of the area. This phase results in an integrated farm plan. Based on this plan and the eligibility criteria as mentioned in section B.6, the potential area for the CDM activities is defined.

Step 2: Matching site and species
For these sites tree species selection is based on site evaluations, using the species-site selection procedures of CETEFOR.

Integrated Farming System
The traditional agricultural practices of slash and burn will lose importance by introducing permanent agroforestry systems.
As part of the regional sustainable development programme (not the proposed activity), any primary forest still existing within the farmer's property will be managed sustainably for timber and other forest products, while fallow land and secondary forests will be enriched with the aim of making these areas economically productive. Land used for annual crops will have a reduced fallow period, because of the use of nitrogen fixing crop species (*Inga sp., Mucuna pruriens* and other leguminous species). Land fertility is recovered much faster by leguminous species than by species of natural fallow lands. With this set of interventions (including the proposed activity) a more intensive integrated land use will be introduced with a resultant higher quantity of biomass.

Plantation design and forest management system
Based on site characteristics, species requirements and production criteria of the farmer and the AACS, the plantation will be designed according protocols used by the project.

All plantations will be managed according to a management plan, adjusted periodically based on evaluations of the plantations by project staff. Specific silvicultural and forest management tasks will be defined together with the farmer. The forest plantations will be harvested in the future, but a forest management system will be adopted to minimise CO_2 emissions (by minimising clear-cutting) and thereby maximizing carbon sequestration. The application of a poly-cyclic harvesting system will guarantee a relatively high average carbon storing capacity in the plantations.

Nursery techniques
Seed collection is carried out by the project's Plant Production Unit. Plant production is certified by the National Institute for Innovation of Agriculture and Forestry (INIAF), which

is the regulatory agency for seed and plant propagation (*formerly the Programa Nacional de Semillas PNS*). Seed sources are registered sources, and selected on specific characteristics for quality. Since the Asocación Accidental CETEFOR SICIREC has control over the seed sources, nurseries and the distribution of plants to the plantation site, monitoring of the chain from seed tree to planting in the field is guaranteed.

Nursery: For plant production genetic material is used according to the standards and regulations of the National Institute for Innovation and Forestry (INIAF) and is certified by the same governmental agency (formerly conducted by the Regional Seed Office-Cochabamba). Plant production is done in nurseries according to the standards and regulations of the same entities for all species, except *Schizolobium amazonicum*, a species sown directly in the field.

Site preparation
Sites will be prepared to enhance the early growth and development of the planted seedlings. The area around the planting spots will be weed free before planting. Planting holes of 20 cm deep and 20 cm wide on cropland and 35 cm deep and 30 cm wide on pasture land will be dug. CO2 emissions will not be significant due to the low soil disturbance caused by this form of site preparation.

Planting
Tree plantations for wood production
Planting distances will be such as to maximize stand development for timber production: the norm is 3.0 m x 3.0 m (1,111 plants per hectare) or 3 x 4 m (833 plants per hectare) according to tree species and specific site conditions. Accurate alignment of planting lines and spacing within the lines is important for subsequent tending operations. Since there is no pronounced dry season, planting can be done throughout the year. Plants will be delivered to the farmer once site preparation is done, while planting should be done within 2-3 weeks after delivering the plants.
After this period plantation quality and survival rate will be checked to determine whether any replanting is necessary. Where survival is less than 90%, replanting will be carried out.

Tending and weed control
Weed control, especially in the first few years is crucial for growth, survival rates and quality of the plantation. Weed control will be manual and no herbicides will be used to avoid damage to the plantations and the environment.

Thinning and pruning
Thinning and pruning of the plantations will be important to ensure that they maximise the proportion of large stems with clear timber. The purpose of thinning is: i) to focus the growth of the stand on the most vigorous stems and ii) to reach the targeted final product diameter as soon as possible. The object of pruning is to produce high quality timber. Thinning and pruning regimes depend on species and the growth rates achieved in the project area. The impact of thinning and other silvicultural measures on carbon sequestration is accounted for in the quantification of the actual net GHG removal by sinks. The impact of pruning is accounted for by application of a reduced biomass expansion factor (1.4 for all tree species).

Harvesting

Although these forest and agro-forestry plantations will be harvested in the future, a forest management system will be introduced to minimize CO_2 emissions and maximize CO_2 sequestration. The application of a poly-cyclic harvesting system in forest plantations will guarantee a relatively high average carbon storing capacity.

Wind

If there is risk that a specific plantation may be subject to extreme winds (no natural wind barriers exist) this will be considered in species selection and the establishment of wind breaks within the project.

Fire control

Fire risks exist since farmers are used to burn old pastures to promote the renewal of pasture and this might cause fire in the plantations if no mitigation measures are taken. To reduce the risk of fire the following measures are taken:

1. Capacity building in the whole community on the control of renewal (burning) of pasture lands
2. Fire breaks, between pasture land and the newly established plantations (10-20m)
3. Removal of dry weeds and other vegetation in the most delicate parts of the plantations.

Animal control:

Risks exist since most farmers manage husbandry (cows, pigs and chickens) for their livelihood income. In order to protect forestry plantations from cattle or pig invasions that can generate enormous damage especially during the initial stage, protective fencing will be placed around the planting site. The famer is obliged to fence the area identified while the project supports the farm household with a maximum of 1000 mts of barbwire per hectare.

Pest control

Due to proper site selection and good silvicultural management procedures, risk for pest and diseases is minimized, since pest and diseases usually occur in stressed crops. However, the project area will be routinely assessed for any pest and disease problems that may arise. If pests or diseases appear, these will be controlled by using organic products and in the worst case scenarios chemical control methods may be used as a last resort but only after careful consideration of the environmental impacts.

SECTION H. Compliance with the law

The requirements of the national DNA shall be fulfilled; The project has to be adjusted to accommodate any forthcoming regulations introduced by the vice-minister of environment, biodiversity, and climate. As a result it cannot sell carbon credits on the compulsory market.

The laws on land tenure and land use rights shall be respected

Labour laws and regulations are respected.

The forest law will be respected.

Environmental regulations will be respected. The project has obtained environmental licenses for all 4 departments.

SECTION I. Certification or evaluation to other standards

It started in 2007 as a portfolio of small scale reforestation activity within the Clean Development Mechanism of the UNFCCC.

The DOE Jaco-CDM conducted the field validation for the whole portfolio area in 2007 and the first SSC-AR was registered in the UNFCCC in June 2009. The draft-validation reports for two other PDD have been completed but the LoA from the Bolivian government is missing with the result that registration has not been concluded. Due to changes in Bolivia's national policies the projects can no longer be registered as a CDM-AR project, which means that no CERs can now be sold.

ArBolivia is therefore now focusing on the voluntary and non-compulsory markets based on the Plan Vivo Standard. The project maintains a strict registry of generated biomass and credits to be sold. The project's data-base ensures that no double-selling occurs. All information can be verified by external entities guaranteeing transparency.

JACO-CDM also conducted the field validation against the CCB-standard criteria. The draft validation report against this standard is available on request. The final CCB report is expected soon.

Annex 1: List of responsible staff and contact information

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Asociación Accidental Cetefor Sicirec (board)
Anko Arthur Stilma (president and Executive director a.i.)
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Annex 2: Information regarding public and other sources of co-funding

No public funding is used at this time. However, additional activities such as capacity building for the participating farmer families may in future be supported with public funds.

The reforestation activities will be financed by the "Asociación Accidental Cetefor-Sicirec", which is an Association between the not for profit organisation CETEFOR and the company Sicirec Bolivia Ltda. The farmers in the project will provide in-kind contributions. Cetefor-Sicirec will use funds from the Dutch based investment company SICIREC Group BV and the sale of Carbon credits. Sicirec Group BV obtains funds from timber and carbon markets. There is no funding that will result in a diversion of official development assistance and financial obligations of any Party under the UNFCCC. Project development has been supported by the ENCOFOR project funded by EuropeAid (www.joanneum.at/encofor and the Flemish Government, Belgium. The latter subsidy is not ODA and is not part of the ODA budget of the Federal Government of Belgium.

Annex 3: Technical specifications

Technical specifications document with annexes

A. Integrated Land Use Plan (with maps)
B. Standard Operational Procedures, Field Forms
C. Carbon Calculations

Annex 4: Producer/group agreement template

A. Example of agreement with farmer federations
B. Example of contract between AACS and farmer

Annex 5: Monitoring plan

Annex 6: Database template

Annex 7. Example forest management plans

Plantation design document: see annex 3b

Annex 8. Permits and legal documentation

A. EIA, Environmental Licenses
B. LoA first project

Annex 9. Evidence of community participation e.g. meeting minutes

A. Example of regulations of the Forestry committees
B. Minutes of a meeting with forestry committees

Annex 10. Related Documents

Annual Reports

Verification Reports

Validation report JACO
Draft validation report
Draft validation report
Draft validation report CCB
SGS-report

Annex 11. List of Acronyms

Abbreviations

AR-AMS0001 - Simplified baseline and monitoring methodologies for small-scale afforrestation and reforestation project activities under the Clean Development Mechanism http://cdm.unfccc.int/methodologies/documentation/meth_booklet.pdf

AACS - Asociación Accidental Cetefor-Sicirec

CCBA - The Climate, Community and Biodiversity Alliance (CCBA) is a partnership of international NGOs and research institutes seeking to promote integrated solutions to land management around the world. With this goal in mind, the CCBA has developed voluntary standards to help design and identify land management activities that simultaneously minimize climate change, support sustainable development and conserve biodiversity. www.ccba.org

CETEFOR means Fundación Centro Técnico Forestal

CDM- Clean Development Mechanism means the mechanism defined under Article 12 of the Kyoto Protocol;

CDM-EB - The *CDM Executive Board* - supervises the Kyoto Protocol's clean development mechanism under the authority and guidance of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (COP/MOP). The CDM EB is fully accountable to the COP/MOP. The CDM EB will be the ultimate point of contact for CDM Project Participants for the registration of projects and the issuance of CERs.

CDM EB Event means a decision or omission made by the CDM Executive Board after the date of this Agreement that prevents a Party from performing an obligation under this Agreement;

CERs – Certified Emission Reduction means a unit pursuant to the Clean Development Mechanism and all other relevant Kyoto Protocol Rules which is equal to one metric tonne of carbon dioxide equivalent

CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora www.cites.org

CO2e – Carbon dioxide equivalent (CDE) and Equivalent carbon dioxide (or CO_2e) are two related but distinct measures for describing how much global warming a given type and amount of greenhouse gas may cause, using the functionally equivalent amount or concentration of carbon dioxide (CO_2) as the reference.

DOE – Designated Operational Entity - is an independent auditor accredited by the CDM Executive Board (CDM EB) to validate project proposals or verify whether implemented projects have achieved planned greenhouse gas emission reductions.

EIA - Environmental Impact Assessment

EU – European Union.

EuropeAID - EuropeAid Development and Co-operation is a the Directorate–General responsible for designing EU development policies and delivering aid through programmes and projects across the world.

FAO – The Food and Agriculture Organisation of the United Nations
www.fao.org

FCC / FCCS- Fertility Capability Classification System for soils.

FSC - Forest Stewardship Council

GHG – Green House Gases

GIS - A geographic information system or geospatial information system is any system that captures, stores, analyzes, manages, and presents data that are linked to location(s). In the simplest terms, GIS is the merging of cartography, statistical analysis, and database technology.

INRA- Instituto Nacional de Reforma Agraria – the national institute of agrarian reform

I**NC** - Instituto nacional de colonización – national institute of colonisation

ODA – Overseas Development Aid

PDD – Project Design Document –The PDD pulls together all information on the project including governance structure and processes.

UNFCCC – United Framework Convention on Climate Change – the treaty signed by the majority of countries at the Rio Earth Summit in 1992 to begin to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable. The UNFCCC is the official body established by the United Nations to provide accreditation for Clean Development Mechanism Projects
www.unfccc.org

VER -Verified Emissions Reductions Verified emission reduction – a carbon credit created by a project which has been verified outside of the Kyoto Protocol. One VER corresponds to one ton of CO2e emission reductions.

Key parties

ArBolivia – the name of the reforestation project managed

Asociación Accidental Cetefor-Sicirec (AACS) - the name of the joint venture between Cetefor and Sicirec Bolivia Limitida, this is the entity managing the ArBolivia project

Fundación Cetefor – Centro Tecnico Forestal – centre for forest technology foundation. A foundation which provides practical support and capacity building for forestry enterprise in the Cochabamba region

Jaco CDM – The Designated Operational Entity which validated the AACS - CDM proposal

Sicirec Bolivia Limitida – the Bolivian registered company, which controls the management of the project on the ground

Sicirec Group BV – the group of companies which provides the financing, consultancy and other support services to the project

Glossary

agroforestry - Land-use systems that combine agriculture and forestry practices to create a more holistic, integrated, profitable and sustainable system of food and fibre production

Altiplano - The high plateau in southern Peru and northwestern Bolivia located around Lake Titicaca.

Aquafauna – animals that live in water

Avifauna – Birds

Biogeography - the science which deals with geographic patterns of species distribution and the processes that result in such patterns.

Biophysical - The application of physical principles and methods to the study of the structures of living organisms and the mechanics of life processes.

Carbon sequestration -The natural removal of carbon from the atmosphere by the soil and plants; Any of several processes for the removal of excess carbon dioxide from the atmosphere in an effort to mitigate global warming

Cation - An ion carrying a positive charge of electricity,usually found dissolved in water, such as calcium. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Clean Development Mechanism – CDM the name given to projects in developing countries

which are shown to lead to a reduction in emissions of carbon dioxide and other harmful gases and can earn certified emission reduction credits. These saleable credits can be used by industrialized countries to meet a part of their emission reduction targets under the Kyoto Protocol.

Central – an organisational unit within the project's participating communities.

Certified Emmissions Reductions (CERs) – A unit issued under the CDM that is equal to one metric ton of carbon dioxide equivalent, calculated using global warming potentials defined by the Kyoto Protocol.

Department – one of the 9 autonomous regions of Bolivia

Edaphic -In ecology, edaphic refers to plant communities that are distinguished by soil conditions rather than by the climate.

Fauna – animals

Gleying - reduction of ferric iron to ferrous iron, which takes place in soils that are waterlogged, changing the colour of the soil from reddish brown to blue-grey.

Leakage - The unintended change (normally thought of as being negative although positive leakage can occur) of carbon stocks outside the boundaries of a project resulting directly from the project activity. The change may be an increase in emissions or a decrease in sequestration, resulting in a lower carbon benefit being created by the project

Microcredit - is the extension of very small loans (**microloans**) to those in poverty designed to spur entrepreneurship. These individuals lack collateral, steady employment and a verifiable credit history and therefore cannot meet even the most minimal qualifications to gain access to traditional credit.

Perennial – is a plant (crop) that lives for more than two years.

silvopastoral - Land-use systems that combine cattle breeding, pasturing and forestry practices to create a more holistic, integrated, profitable and sustainable system of food and wood production