CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM FOR SMALL-SCALE AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CDM-SSC-AR-PDD)
(Version 02)

CONTENTS

Annexes

SECTION A. General description of the proposed small-scale A/R CDM project activity:

A.1. Title of the proposed small-scale A/R CDM project activity:

Reforestation of croplands and grasslands in low income communities of *Paraguarí* Department, *Paraguay*

Version 04
1 April 2013

A.2. Description of the proposed small-scale A/R CDM project activity:

The purpose of the project activity is the reforestation of lands that are currently croplands and grasslands under poor soil conditions. The total project area is 81.51 ha, which is fragmented in small parcels of land located in low income communities. These communities are situated in *Acahay* and *San Roque González de Santa Cruz* Districts, *Paraguarí* Department, *Paraguay*.

The land owners are low income, small-scale farmers that have limited knowledge on more appropriate soil management practices, and the majority has no financial conditions to implement new and less impacting practices on their own. *Paraguarí* is the 6th poorest Department of *Paraguay* among the 17 existing Departments, and 34.5% of the population lives under the poverty level.[*1]

The Project will be developed by the Japan International Research Center for Agricultural Sciences (JIRCAS)[*2], an agency affiliated with the Japanese Ministry of Agriculture, Forestry and Fisheries, in cooperation with *Instituto Forestal Nacional* (INFONA) [*3], an institute specialized in forest management. JIRCAS transfers know-how on prevention of soil erosion and other issues related to afforestation/reforestation activities to local communities. INFONA provides technical know-how specific to Paraguay.

JIRCAS and INFONA together with the local farmers share the view that the proposed A/R CDM project activity will contribute to poverty alleviation and improvement of environmental conditions (biodiversity conservation and soil erosion control), thus contributing to sustainable development.

In order to define the appropriate tree species to be planted, JIRCAS first conducted a survey of local farmers to identify their preferences in tree species. After a series of consultations among JIRCAS, INFONA and local experts on the survey results and local practices, *Eucalyptus grandis, Eucalyptus camaldulensis*, and *Grevillea robusta* were selected to be planted during 2007 and 2008.

In the proposed small-scale A/R CDM project activity, local farmers will provide the parcels of land and labor, while JIRCAS with the support from INFONA will provide technical and forestry management inputs during the crediting period. In return, JIRCAS and INFONA will have the right to the income from

[*1] Source: "Indicadores Básicos para Focalizar el Gasto Social en Paraguay", Dirección General de Estadística, Encuestas y Censos (DGEEC), http://www.dgeec.gov.py/publicaciones/biblioteca/ibf/IBF019.htm

[*2] From 1 of April, 2008, JIRCAS has succeeded all rights and duties concerning overseas activities from the Japan Green Resources Agency (J-Green) which was dissolved on 31 of March, 2008 according to the law No.8/2008 established by the 169th Diet in Japan.

[*3] From 6 of May, 2008, INFONA succeeds all rights and duties from the *Servicio Forestal Nacional* (SFN) which was dissolved on 6 of May, 2008 according to the law No.3464 established on 6 of May, 2008.

CER resulting from the project activity and the farmers will have the right to the net income from forest products. The income of CERs will be essential for the continuation of this activity and the replication of similar project activities in other communities.

Environmental Benefits

The project will reduce the amount of greenhouse gases (GHG) in the atmosphere by CO_2 capture through the tree growth. The project will also contribute to prevention of soil erosion by planting trees on areas that were under-utilized or mismanaged. In the area where the project is located, there is a strong interest in finding ways to combat soil erosion. The farmers have high hopes that the project will contribute in this regard. The planting of trees will also protect the farms and homes from strong winds.

Social Benefits

Individual farmers who have agreed to participate in the project will have opportunities to gain advanced know-how of reforestation, forestry management and agro-forestry through the project. The project will directly benefit their farmland as well as their living as mentioned above.

JIRCAS, the project developer, intends to use the income gained through the sale of CERs to implement more projects that benefit local farmers. All participating farmers will have equal opportunities to the benefits.

All participating farmers have been directly involved in the project planning process to maximize the benefits they can gain from the project. Their participation was fundamental in determining the tree species for the project activity.

The project activity promotes an educational program on forestry activities for the farmers and primary school students, which is being carried out jointly by JIRCAS and INFONA. In addition, JIRCAS, together with INFONA, has distributed nearly 450 guidebooks on good forestry practice to local schools and libraries.

Economic Benefits

The project will generate profits from the sale of lumber products and CERs that will be essential to providing project participant with the much-needed additional resources to fund various programs to assist small scale farmers in implementing the project. The farmers, in turn, will also benefit from such programs. The project was planned from its outset to make efficient use of local knowledge and resources as much as possible.

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Indicate if the Party involved wishes to be considered as a project participant (Yes/No)
Japan	**Japan International Research Center for Agricultural Sciences**	No
Paraguay (host)	**Instituto Forestal Nacional** (Public entity)	No
(*) At the time of making the CDM-SSC-AR-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

JIRCAS is the coordinator of the project in cooperation with INFONA and participating farmers with whom JIRCAS will establish special agreements in order to guarantee that the project will be implemented as a CDM project activity.

A.4. Description of location and boundary of the small-scale A/R CDM project activity:

A.4.1. Location of the proposed small-scale A/R CDM project activity:

The proposed small-scale A/R CDM project activity is located in *Paraguarí* Department, *Paraguay* (Figure A.1).

A.4.1.1. Host Party(ies):

Paraguay

A.4.1.2. Region/State/Province etc.:

Paraguarí Department

A.4.1.3. City/Town/Community etc:

Lands to be reforested are located in 16 communities within 2 districts *San Roque González de Santa Cruz* and *Acahay*, and other 3 communities within *Acahay*.

Table A.2.: List of communities and location

District	Communities	Longitude (S, degree)	Latitude (N, degree)
SAN ROQUE GONZÁLEZ DE SANTA CRUZ	SAN BLAS	25º 50' 48,9"	57º 13' 25,3"
	CARRERA	24º 49' 37,4"	57º 13' 35,6"
	RINCON SUR	25º 50' 38"	57º 13' 42,5"
	RINCON COSTA	25º 48' 47,9"	57º 15' 09,8"
	MOQUETE	25º 52' 18,9"	57º 15' 29,5"
	AGUAI'Y MI	25º 49' 36,8"	57º 19' 27,4"
	MBOCAYATY	25º 54' 22,8"	57º 13' 48,3"
ACAHAY	YUKYTY	25º 55' 42,5"	57º 07' 44"
	3 DE FEBRERO	25º 56' 44"	57º 07' 43,6"
	ITAKYTY	25º 56' 35,6"	57º 07' 10,6"
	MARIA AUXILIADORA	25º 57' 42,2"	57º 06' 11,6"
	SAN JUAN	25º 58' 01,2"	57º 06' 49,2"
	CABELLO	25º 57' 32,3"	57º 06' 36,6"
	20 DE JULIO	25º 56' 35,7"	57º 06' 18,5"
	LAGUNA PYTA	25º 57' 50,3"	57º 09' 12,4"
	TAPE GUAZŬ	25º 56' 43,9"	57º 08' 30,7"
Other communities	COSTA PEÑA	25º 53' 49,6"	56º 59' 45,7"
	ÑU HAÍ	25º 54' 50,3"	57º 04' 01,5"
	TAPYTANGUA	25º 51' 58,7"	57º 03' 52,5"

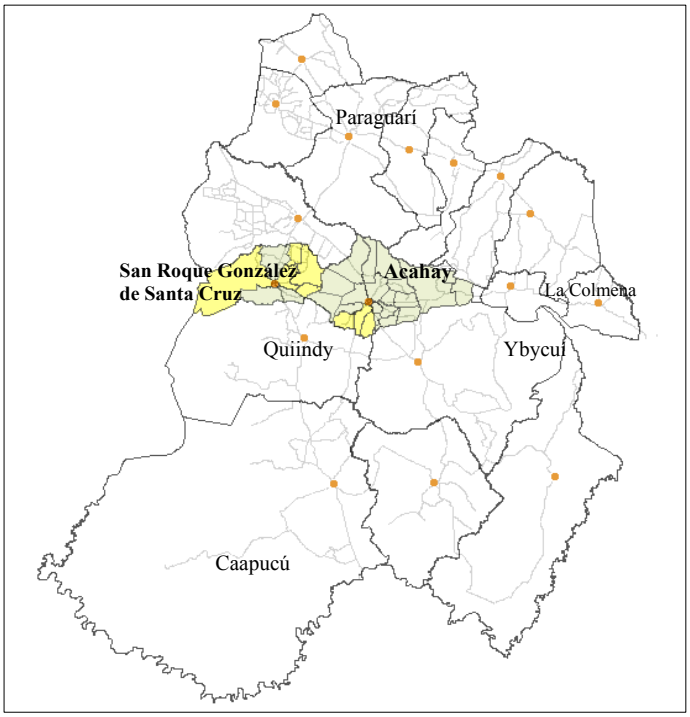
A.4.2. Detail of geographical location and project boundary, including information allowing the unique identification(s) of the proposed small-scale A/R CDM project activity:

The project activity is located in *San Roque González de Santa Cruz* and *Acahay* districts in *Paraguarí* Department.

Figure A. 1. Map of *Paraguay*

Paraguarí Department

Figure A. 2. Map of *Paraguarí* Department



The project boundaries and geographical locations are indicated in figures below and the specific geographical positions (longitude, latitude) at each corner of every 70 parcels of land were determined by using GPS (see Annex 4).

Figure A.3 Parcels of lands to be reforested in *San Roque González de Santa Cruz* District. Community: *Rincón Sur* and *San Blás*

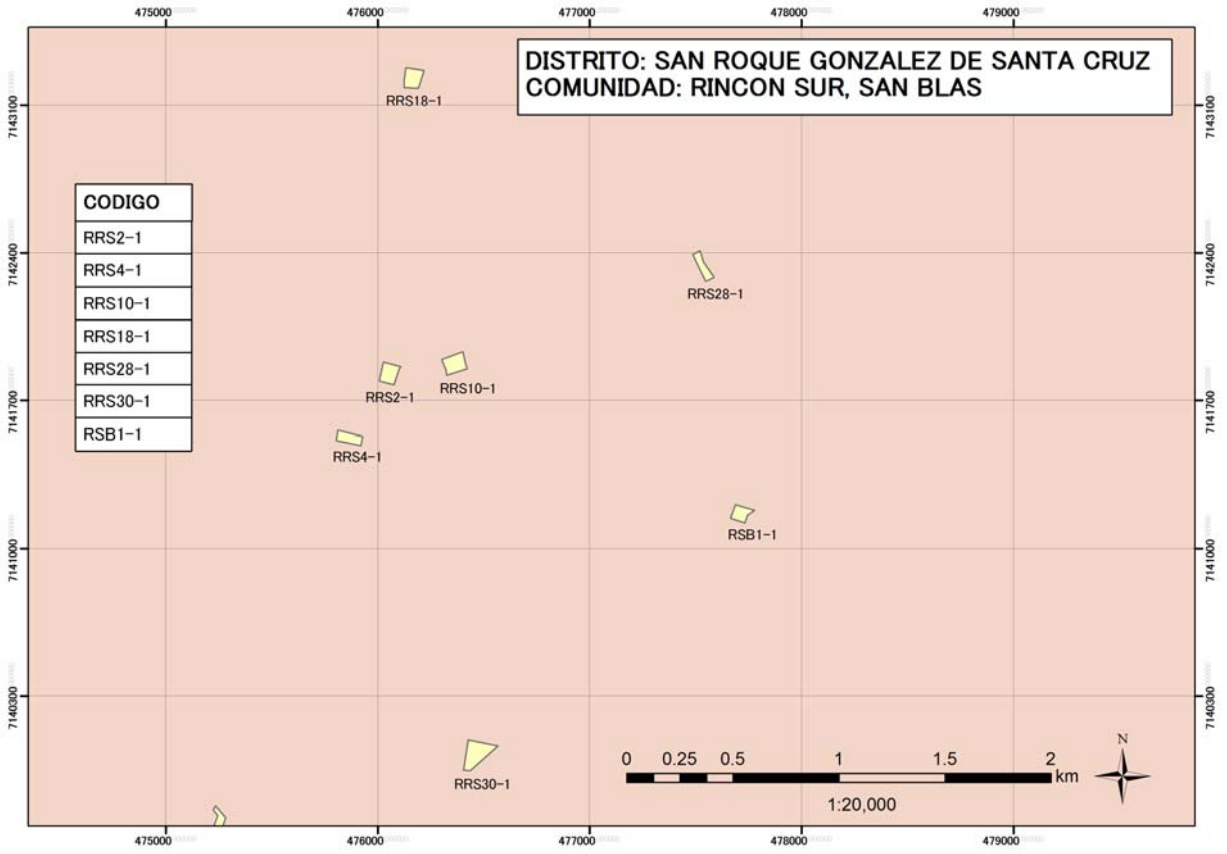


Figure A.4 Parcels of lands to be reforested in *San Roque González de Santa Cruz* District. Community: *Carrera* and *Rincón Costa*

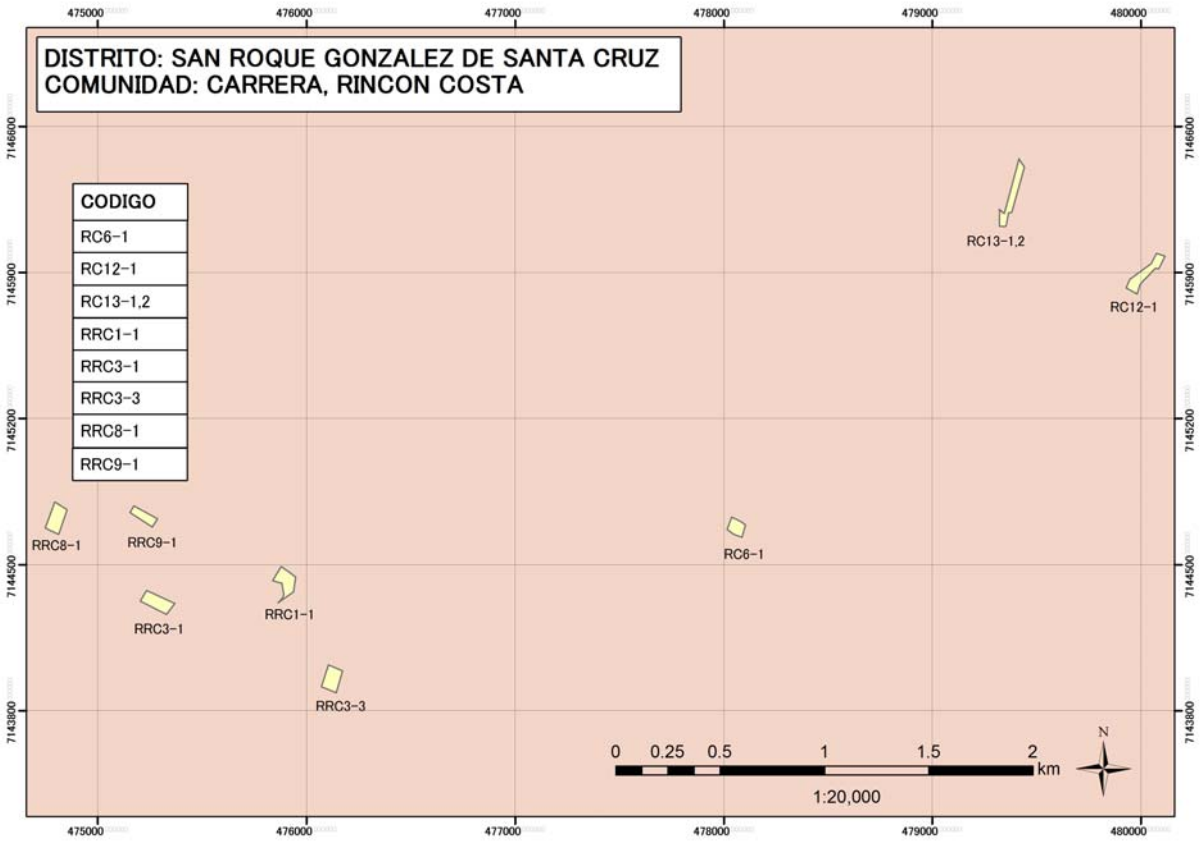


Figure A.5 Parcels of lands to be reforested in *San Roque González de Santa Cruz* District. Community: *Moquete*

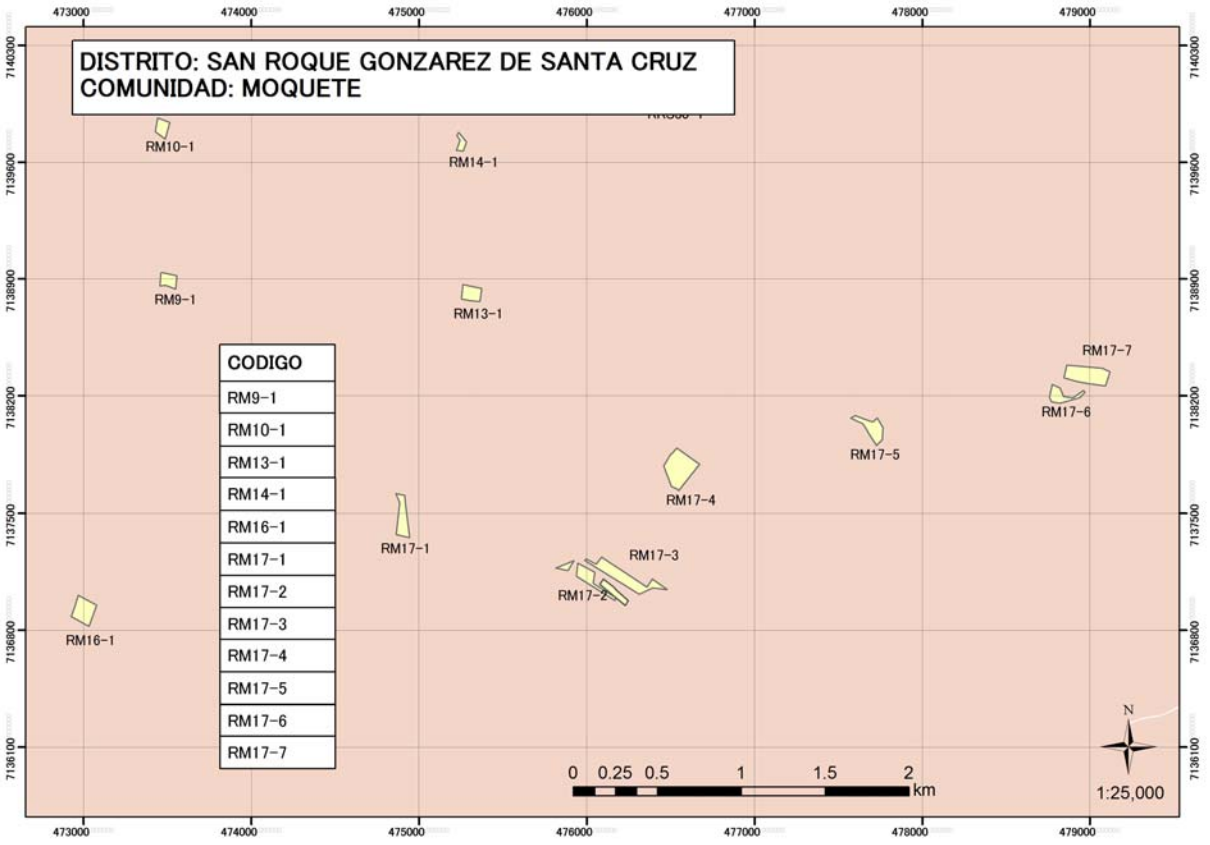


Figure A.6 Parcels of lands to be reforested in *San Roque González de Santa Cruz* District. Community: *Aguai'y Mí*

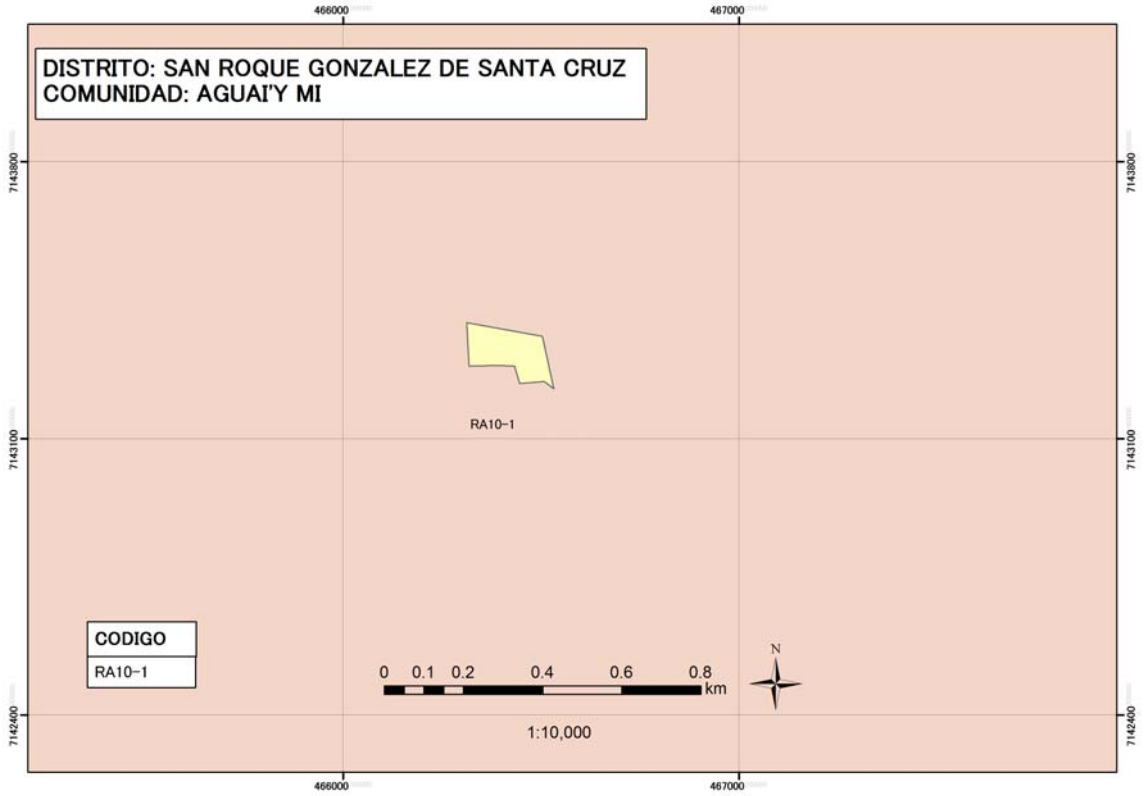


Figure A.7 Parcels of lands to be reforested in *San Roque González de Santa Cruz* District. Community: *Mbocayaty*

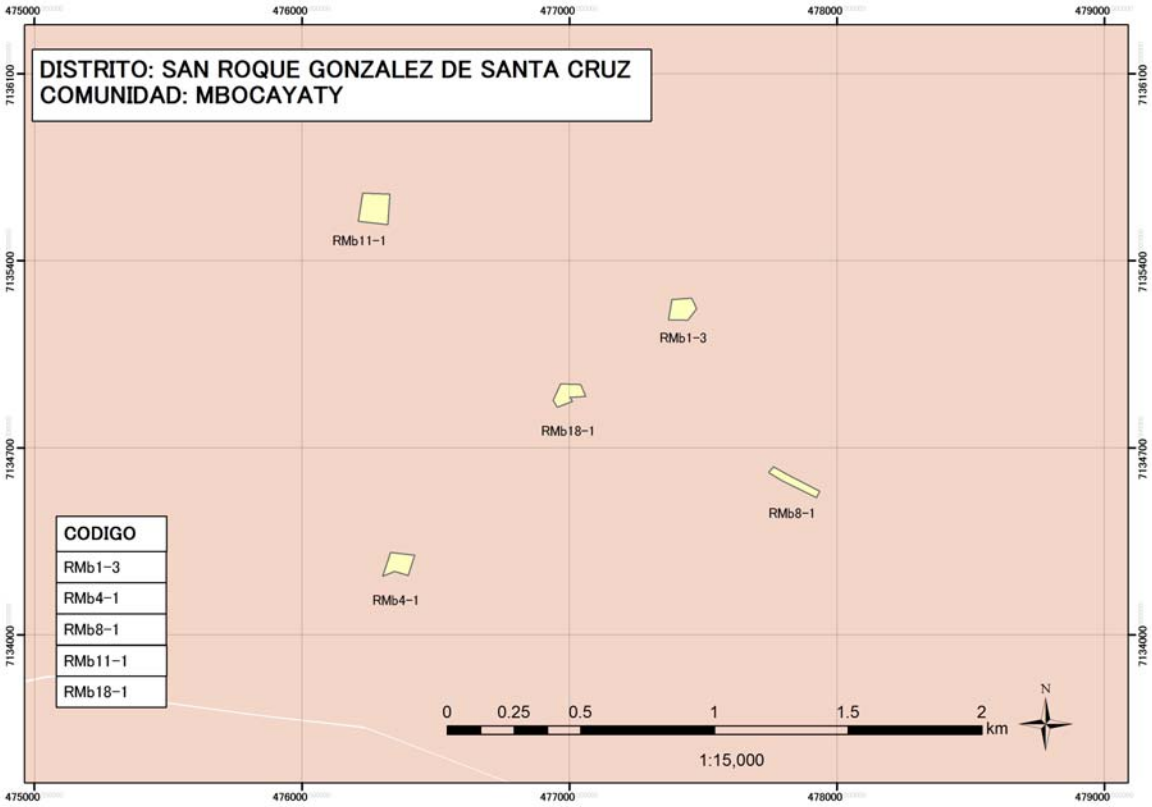


Figure A.8 Parcels of lands to be reforested in *Acahay D*istrict.
Community: *20 de Julio, Maria Auxiliadora,* and *Itakyty*

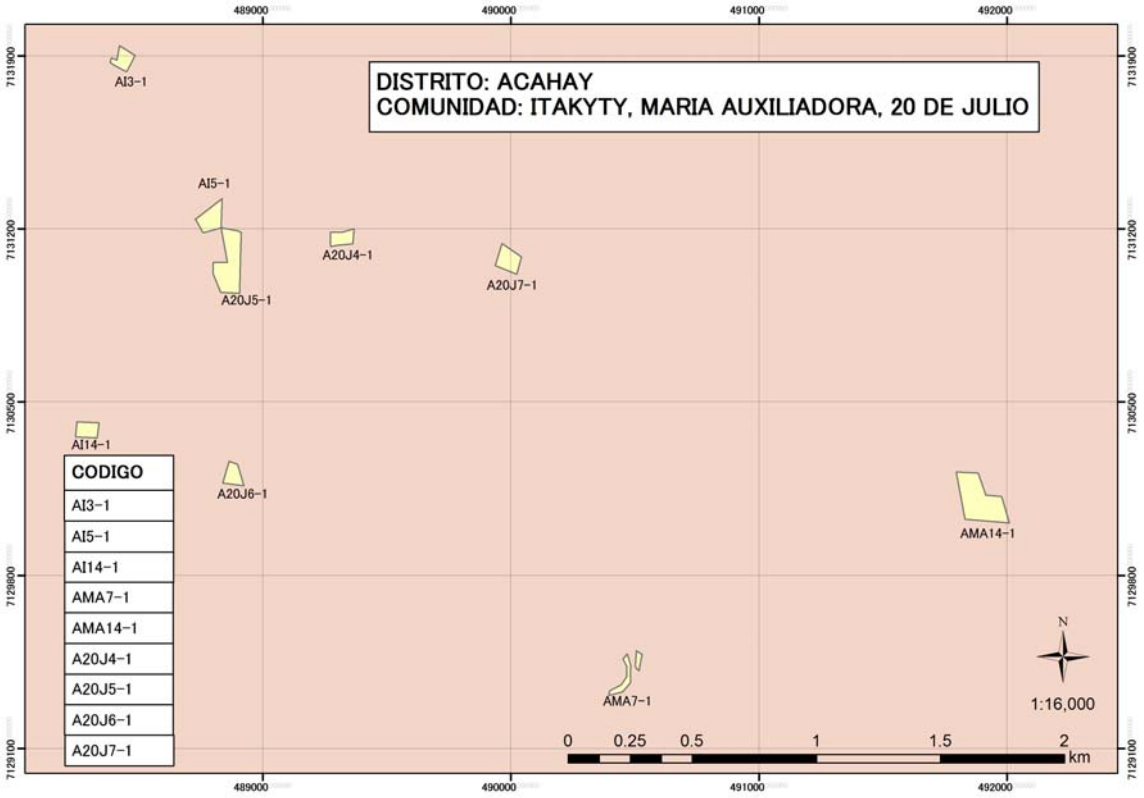


Figure A.9 Parcels of land to be reforested in *Acahay* District.
Community: *Cabello* and *San Juan*

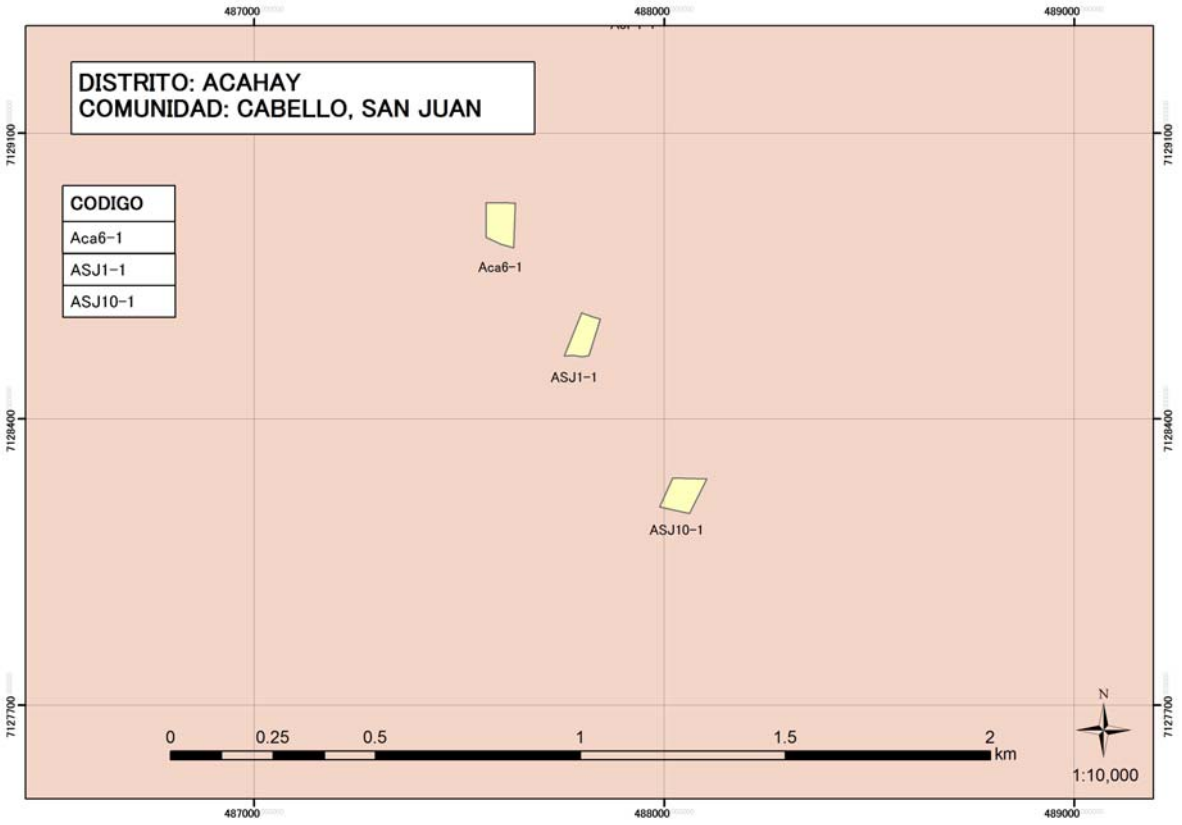


Figure A.10 Parcels of lands to be reforested in *Acahay* District.
Community: *3 de Febrero, Yukyty,* and *Tape Guazú*

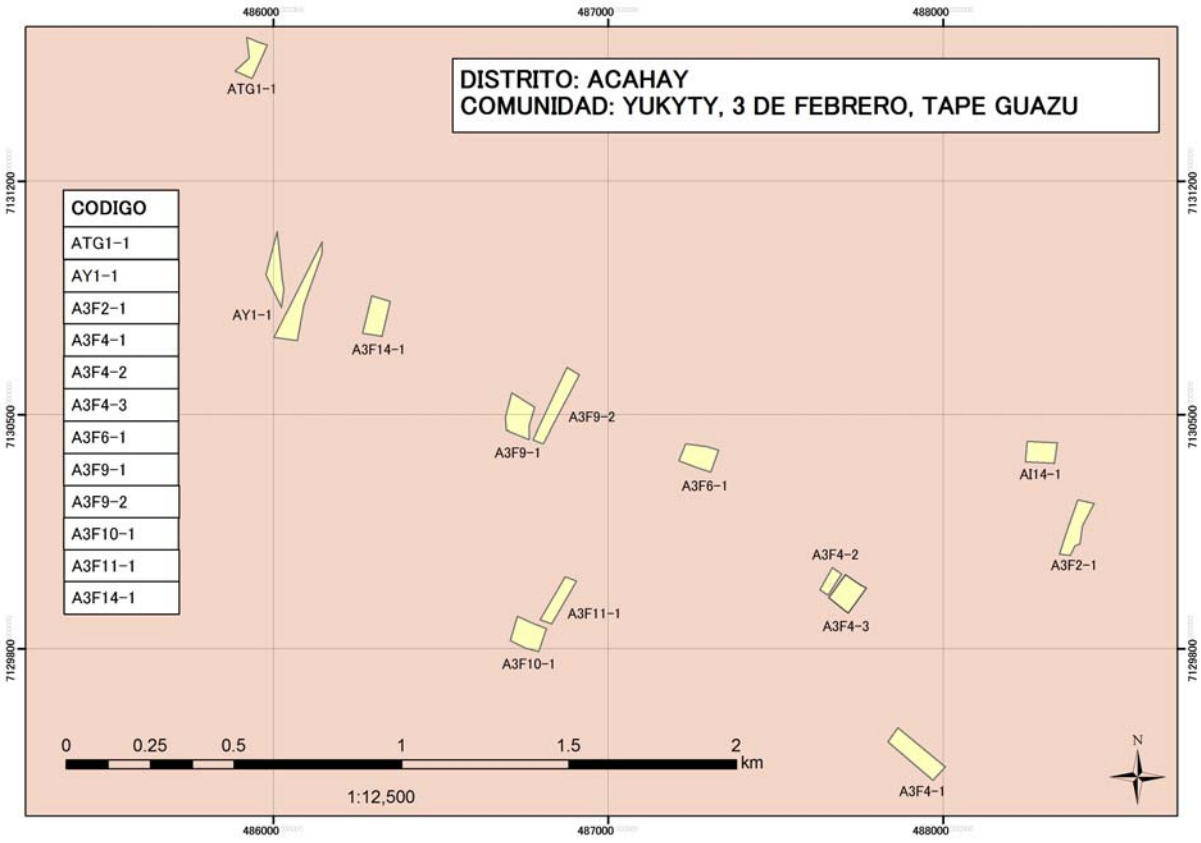


Figure A.11 Parcels of lands to be reforested in *Acahay* District.
Community: *Laguna Pytá*

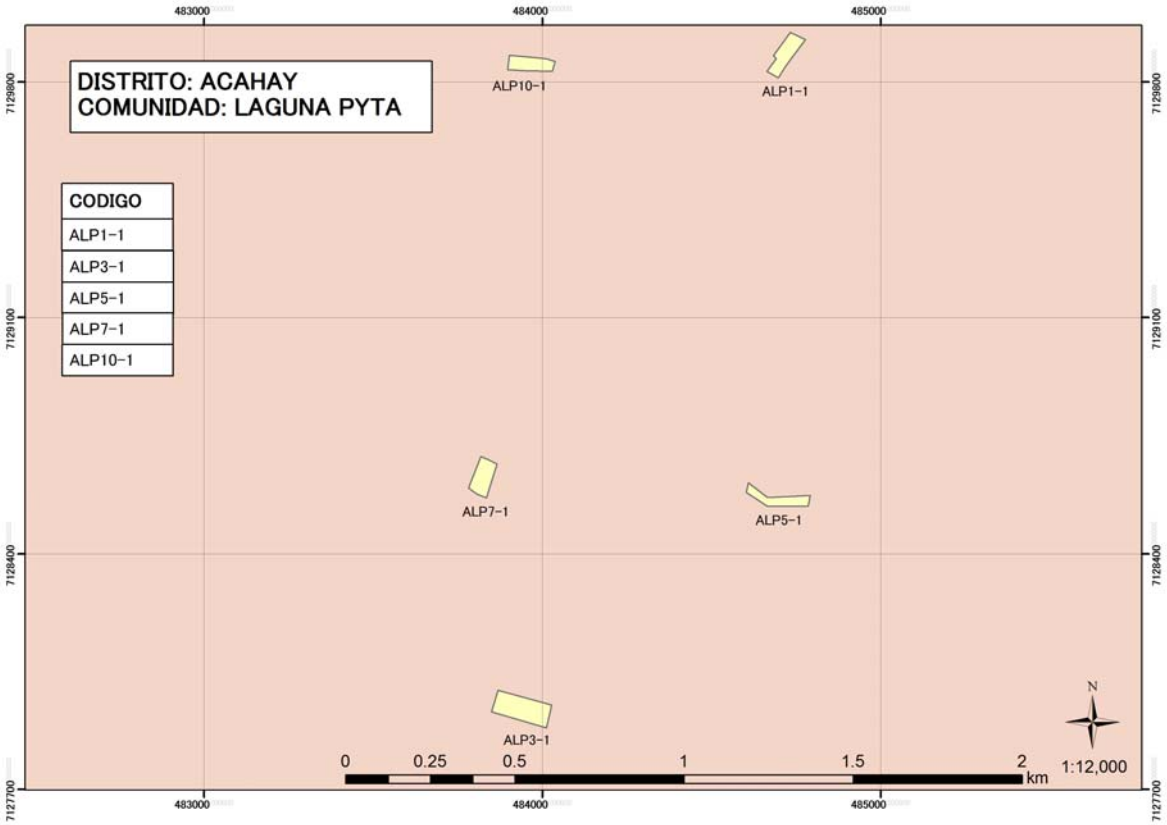
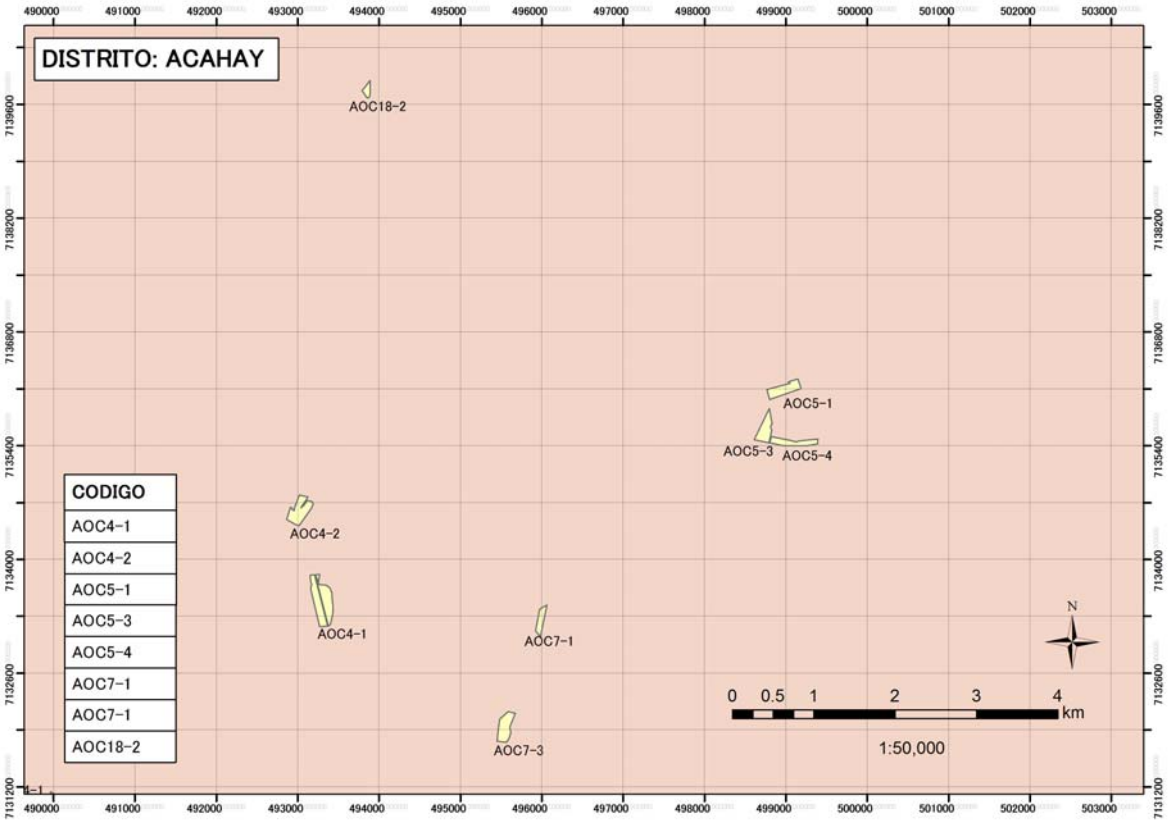


Figure A.12 Parcels of lands to be reforested in Other Communities in *Acahay* District. Community: *Costa Peña, Tapytangua,* and *Ñu Haí*



A.5. Technical description of the small-scale A/R CDM project activity:

A.5.1. Type(s) of small-scale A/R CDM project activity:

Based on the Decision 14/CP.10 "Simplified modalities and procedures for small-scale afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the Kyoto Protocol and measures to facilitate their implementation", the proposed small-scale A/R CDM project activity belongs to the land type of cropland and grassland to be forested.

A.5.2. A concise description of present environmental conditions of the area, which include information on climate, soils, main watershed, ecosystems, and the possible presence of rare or endangered species and their habitats:

Climate

Paraguay is located in a subtropical climate zone. The annual precipitation is 1,300 mm and the annual average temperature is 21~23 degrees Celsius.

There are no adequate public data on precipitation in *Paraguarí* Department, however, the data collected by independent experts taken in the city of *La Colmena* located next to *Acahay*, indicate that the total precipitation in 2004 was 1,828 mm, which is higher than the national average. The historical data from *La Colmena* indicates the largest rainfall in 1992 with 2,522 mm and the smallest in 1944 with 761 mm due to the fact that the region had been affected by El Niño and La Niña. La Niña, which brings climate instabilities, has been seen twice since 1991 according to the records of *La Colmena* (autumn 1998~spring 1998 and summer 1999~spring 2000) but with little effect on the project area and its surroundings.

The project area has experienced El Niño about every 5 years since 1991. The long and large rainfall caused by El Niño has adverse effects on agricultural production and causes soil erosion that is seen in the project area.

Frost, with a damaging effect on agriculture, takes place in autumn and winter being exacerbated in the years of El Niño.

Soil

The soil of the area is 90% susceptible to erosion. Table A.3 shows the results of the soil analysis conducted by *the National University of Asunción.* Soil sample was collected from the experimental demonstration parcel, which was established in a local farm from July 2004. The study shows that organic content of the soil is scarce.

Table A.2: Results of Soil Analysis for the Experimental Demonstration Parcel

Sample #	pH	Organic content %	P (ppm)	Ca^{+2} ($cmol_c$/ kg)	Mg^{+2} ($cmol_c$/ kg)	K^{+} ($cmol_c$/ kg)	Na^{+} ($cmol_c$/ kg)	$Al^{+3}H^{+}$ ($cmol_c$/ kg)	Type of soil	Color of soil (Mun-sell Soil Color Chart)
693	5.99	0.18	0.87	0.67	0.23	0.06	0.08	0.00	Sandy loam	7.5YR 5/3 brown
694	5.85	0.05	0.87	0.77	0.21	0.08	0.08	0.02	Sandy loam	7.5YR 5/3 brown
695	5.63	0.42	0.87	0.67	0.33	0.10	0.08	0.12	Sandy loam	7.5YR 5/3 brown

Complementary data about soil fertility showed in Table A.3 indicates the soil fertility of different districts of *Paraguarí.* As shown by this data, soil fertility tends to be low to medium.

Table A.3: Soil fertility of Paraguarí Department[*4]

District	Fertility Level			
	High	Medium	Low	Average
	---------- % ----------			
Acahay	**1**	**66**	**33**	**medium**
Caapucú	0	34	66	low
Caballero	48	33	19	medium
Carapeguá	2	47	51	low
Escobar	1	29	70	low
La Colmena	2	46	52	low
Mbuyapey	11	46	43	medium
Paraguarí	13	47	40	medium
Pirayú	4	33	63	low
Quiindy	2	42	56	low
Quyquyhó	7	30	63	low
San Roque González de Santa Cruz	**4**	**29**	**67**	**low**
Sapucai	37	48	15	medium
Tebicuarymí	7	33	60	low
Yaguarón	9	54	37	medium
Ybycuí	5	50	45	medium
Ybytimi	5	40	55	low

Note: Average fertility level in the districts where the project will be implemented are classified as medium to low.

[*4] Source: "I seminario: Intercambio de experiencias en Manejo y Conservación de Suelos en el Paraguay", Estudio de Validación del Desarrollo Rural Participativo Basado en la Conservación del Suelo, San Lorenzo, Paraguay, Agosto, 2004. J-Green.

The low organic matter and phosphorus content are the main chemical parameters that contribute to the low soil fertility level in the region.

Main watershed

The project area is a part of the watershed of *Paraguay River*, which has a total course of 2,600 kilometers. The major tributaries entering *Paraguay River* are *Apa, Aquidabán,* and *Tebicuary* rivers, that descend from their sources in the *Paraná Plateau* to the lower lands, where they broaden and become sluggish as they flow westward.

Paraná River is the second major river in the country. From *Salto del Guairá*, where the river enters *Paraguay*, it flows 800 kilometers to its juncture with *Paraguay River* and then continues southward to *La Plata River* estuary at *Buenos Aires*.

Ecosystem

There are five ecoregions in *Paraguay*: *Cerrado*, *Pantanal*, *Chaco* (subdivided in *Dry Chaco and Humid Chaco*), *Upper Parana Atlantic Forest* and the *Misiones Grasslands*.

The *Upper Parana Atlantic Forest*, (originally covers 60% of Eastern *Paraguay*) and *Dry Chaco* (west of the *Paraguay River*) are considered forest ecosystems; the *Humid Chaco* (southern third of the *Paraguayan Chaco*), *Cerrado* (parts of eastern *Paraguay*) and *Misiones Grasslands* (southwestern *Paraguay*,) are considered as grasslands ecosystems and the *Pantanal* (northeastern corner of the *Paraguayan Chaco*), is considered as wetland ecosystem.

The *Upper Parana Atlantic Forest, Cerrado*, and *Pantanal* are considered to be areas of global importance or "hotspots" given their diverse biota and high level of threat of disappearance. The *Chaco* is notable for its high density of mammalian species while the *Misiones Grasslands* are part of an endemic bird area due to its unique avifauna.

Paraguarí Department has originally only 1.4% of its total area covered by *Upper Parana Atlantic Forest*.

The Project is located on the ecoregion of the *Humid Chaco* which is a grassland ecosystem characterized by extensive palm savannas. Table A.4 shows the ecoregion areas of *Paraguay.*

Table A.4: *Paraguay* Ecoregions

Ecoregions	Area of Ecoregion (hectares)	Percent of Paraguay
Dry Chaco	17,484,326	42
Humid Chaco	12,858,489	32
Upper Parana Atlantic Forest	8,591,121	21
Cerrado	819,101	2
Pantanal	198,494	1
Other areas	723,669	2
Total	40,675,200	100

Presence of rare or endangered species and their habitats

JIRCAS conducted two studies: one in 2004 for the department of *Paraguari*[*5] and another in 2008 for the project sites[*6], in which rare or endangered species of flora and fauna were identified.

The endangered fauna species identified in the 2004 study are: *Pteronura brasiliensis*, *Blastocerus dichotomus* and *Caiman latirostris*.

Pteronura brasiliensis can be found in freshwater rivers and streams, which are seasonally flooded. It can also be found in freshwater springs and permanent freshwater lakes.

Blastocerus dichotomus lives only in marsh areas of Pantanal and Chaco Ecosystems, usually with the water level reaching half a meter deep.

Caiman latirostris can be found mostly in freshwater marshes, swamps, and mangroves.

The 2008 study confirmed that the project sites do not contain any places that can match with the descriptions of their natural habitats mentioned above. Therefore, it is not possible for those species to be found within the project boundary. The Government of the *Paraguarí* Department endorsed this point of view. [*7]

The 2004 study listed the endangered flora species such as some cactáceas of genus *Discocactus*, *Frailea* and *Pilosocereus*, *Cedrus* genus trees, *Cordia trichotoma, Tabebuia heptaphylla,* and *Mimosa altoparanaensis*.

The 2008 study concluded that among the endangered flora species of *Paraguarí* Department, the flora species that may be seen within the project boundary are only the ones of *Cordia trichotoma* and *Tabebuia heptaphylla.* The total number of those trees found within the project boundary was estimated by around 70 trees, and those are regarded as common in *Paraguarí* Department. JIRCAS has been making effort to produce and distribute seedlings of native trees in order to contribute to recovery of natural forest since 2007 with the help of INFONA. JIRCAS has already distributed 1,000 seedlings of *Tabebuia haptaphylla* and 500 seedlings of *Cordia trichotoma* to farmers, public entities and those who have intention to plant native trees until 2008. JIRCAS planed to continue this activity until 2010 when the JIRCAS study is scheduled to finish. The project activity will sufficiently compensate the existing trees within reforestation area.

A.5.3. Species and varieties selected:

The selection of tree species was conducted according to the results of interviews with local farmers/communities involved, and taking into consideration of carbon sequestration rates, biodiversity enhancement, soil and climate conditions, and the value of associated forest products. The following three species were selected:

- Eucalyptus (*Eucalyptus grandis*)
- Eucalyptus (*Eucalyptus camaldulensis*)

[*5] Source: "Estudio de Validación del Desarrollo Rural Participativo Basado en la Conservación del Suelo". San Lorenzo, Paraguay, Septiembre, 2004, J-Green.

[*6] Source: "Evaluación de parcelas a ser destinadas para reforestación, proyecto F/R-MDL". Universidad Nacional de Asunción, marzo, 2008.

[*7] Source: "Gob.SMA No 01/08 Manifestación de la Secretaría de Desarrollo Sostenible y Medio Ambiente de la Gobernación de Paraguarí , acerca de Especies de Faunas vulnerables"

- Silver oak (*Grevillea robusta*)

About 4.11 hectares of plantations with *Grevillea robusta* are in association with the current crops, which are cotton, corn, manioc and beans, as well as grazing.

A.5.4. Technology to be employed by the proposed small-scale A/R CDM project activity:

Site and Soil Preparation

The farmers have practiced contour cropping to prevent soil erosion. Neither synthetic fertilizer nor manure as natural organic fertilizer is used in the project areas. Also, tractors will not be used for soil preparation for the A/R CDM project.

Existing non-tree vegetation will be slashed manually along landform contour. Existing trees will not be removed for the site preparation. Thus, there will be no disturbance of the total surface area of the project as a result of soil preparation for planting.

Species and model arrangements

Tree species and spacing are recommended to farmers as indicated in Table A.5. If farmer selects agro-forestry with *Grevillea robusta*, spacing of 5.0 x 4.0m is recommended.

The planting plan is defined according to climatic condition, i.e. planting will start during cool season.

Table A.5: Stratum/spacing and planting plan

Stratum[1]	Tree specie	Spacing (m)	Year of planting	Total Area (ha)[2]
S1+S2	*Eucalyptus grandis*	3.0 x 2.5	2007, 2008	23.18
S3+S4	*Eucalyptus camaldulensis*	3.0 x 2.5	2007, 2008	53.34
S5+S6+S7+S8	*Grevillea robusta*	3.0 x 2.5, 5.0 x 4.0	2007, 2008	4.99
Total				81.51

Note 1) Stratum was established according to PDD-2694 Ver03, namely S1: *E.grandis* planted in 2007, S2: *E.grandis* in 2008, S3: *E.camaldulensis* in 2007, S4: *E.camaldulensis* in 2008, S5: *G.robusta* in 2007, S6: *G.robusta* in 2008, S7: *G.robusta* with agroforestry planted in 2007, *G.robusta* with agroforestry in 2008. Tree species is the sole factor to establish stratum, because the difference of tree growth in spacing and planting year was regarded insignificant after monitoring activity in 2012. The main crops that will be planted together with *Grevillea robusta* for agroforestry are cotton, corn and beans.

Note 2) Area of sub-stratum in each stratum, compiled according to PDD-2694 Ver03, is shown as follows; S1: 13.59 ha, S2: 9.59 ha, S3: 7.71 ha, S4: 45.63 ha, S5: 0.67 ha, S6: 0.21 ha, S7: 1.13 ha, S8: 2.98 ha.

Genetic Sources and Nursery Practices

All seedlings used in the proposed small-scale A/R CDM project activity will be produced in a nursery established in the experimental demonstration parcel near the project area. The nursery was developed by JIRCAS to support the seedling requirement of the Project. Nursery is showed in Figures A.13 and A.14.

Figures A.13 and A.14: Project Nursery


The main seed providers are *Emprendimientos Forestales SRL*, *Instituto Forestal Nacional* (INFONA) and *Instituto Nacional de Tecnología Agropecuária* (INTA) of Argentina.

Seedlings are in plastic bags with natural substrate containing soil, coconut husk and manure in a ratio of 2:1:1, respectively in volume.

Pots of *Eucalyptus grandis* and *Eucalyptus camaldulensis* contain 0.2 kg of substrate and those of *Grevillea robusta* contain 0.3 kg of substrate.

Forest Establishment

The forest establishment will be conducted through direct planting and there will be no use of any kind of machinery. Planting activities will occur in 2007 and 2008. According to the project plan, around 31% of the total project area were planted in 2007 and 69% will be planted in 2008. For both years, the farmers intend to start planting during the cool season between April and November.

Based on the farmers' current practices and on their financial conditions, synthetic compound fertilizer will not be applied during forest establishment and maintenance.

Maintenance Activities

All the maintenance activities including weeding, thinning and harvesting will be conducted manually by each farmer and their families.

Forest Management

The plantations of *Eucalyptus grandis* and *Eucalyptus camaldulensis*, that correspond to S1, S2, S3 and S4 (as in the Table A. 5 and PDD-2694 Ver03), will be thinned manually when they are 4 and 8 years old. The first thinning will remove 40% of the standing volume, and the second thinning will remove 30% of standing volume. Final harvesting will occur when they are 12 years old [*8] (as in the Table A.6).

[*8] Source: "*"Estudio sobre el plan de Reforestación en la Región Oriental de la República del Paraguay",* Japan International Cooperation Agency (JICA), March 2002.

For the strata described above, the spontaneous re-sprouting after harvesting is considered. In order to estimate the growth scenario of regeneration, the suitable rates of sprouting and survival were multiplied to the original growth scenario based on the study results in Brazil. [*9]

The plantations of *Grevillea robusta*, that correspond to S5 and S6 (as in the Table A.5 and PDD-2694 Ver03), will be thinned manually when they are 10 and 15 years old. The first thinning will remove 40% of the standing volume, and the second thinning will remove 30% of standing volume. Final harvesting will occur when they are 20 years old (as in the Table A.6).

The plantations of *Grevillea robusta* for agro-forestry that corresponds to S7 and S8 (as in the Table A. 5 and PDD-2694 Ver03), will not be thinned. Final harvesting will occur when they are 20 years old.

Table A.6: Thinning and Harvesting Schedule

Year	S1+S2				S3+S4				S5+S6+S7+S8							
	S1		S2		S3		S4		S5		S6		S7		S8	
	T*	H**	T	H	T	H	T	H	T	H	T	H	T	H	T	H
2007-08																
2008-09																
2009-10																
2010-11	40				40											
2011-12			40				40									
2012-13																
2013-14																
2014-15	30				30											
2015-16			30				30									
2016-17									40							
2017-18											40					
2018-19		H				H										
2019-20				H				H								
2020-21																
2021-22									30							
2022-23	40				40						30					
2023-24			40				40									
2024-25																
2025-26																
2026-27	30				30					H				H		
2027-28			30				30					H				H

* T: Thinning rate (%)of total existing trees in specific year per stratum.
**H: Harvesting .

A.5.5. Transfer of technology/know-how, if applicable:

The main technologies which will be employed under this project are reforestation through direct planting with environmentally friendly techniques.

[*9] Source : "Capacidade de brotação em subgêneros e espécies de Eucalyptus", Serie Technica IPEF v.11, n30, p23-30, mai.,1997, Rosana Clara Victoria Higa, José Alfredo Sturion

JIRCAS prepared manuals[*10] to introduce these techniques to the small scale farmers. These manuals are based on the study conducted by the Government of Paraguay and Japan International Cooperation Agency in 2002.

The implementation of the project activity will be carried out in a sustainable manner by JIRCAS, which will lead to technical transfer.

A.5.6. Proposed measures to be implemented to minimize potential leakage as applicable:

The participating farmers provide a part of their degraded land for reforestation without damaging their farming activities. The expansion of land beyond their existing land will not occur because of financial scarcity and unavailability of spare land in the project area. Therefore, the project activity will not produce any leakage outside of existing individual farm.

During the period farmers were selecting the areas, JIRCAS guided them to select areas within their farms where there were no activities, unmanaged areas, areas that were not used for a long time and that implementing reforestation would not represent any loss of revenue and/or food. Furthermore, in some cases where there were no areas like that available, JIRCAS suggested agro forestry to minimize leakage.

A.6. A description of legal title to the land, current land tenure and land use and rights to tCERs / lCERs issued:

The land within the project boundary has been in the hands of each farmer/family that uses it for at least a hundred years. Many of them (23 out of 56 participants or 41% in total) are not the legal owners of the land, however they use the lands either for farming or as living. Land ownership in the project area is shown at Table A.7.

Table A.7: Legal title to the land

Status	Number of farmers
With title	25
In process of obtaining title	8
Other (with certificate of occupation)	23
Total	56

The farmers without legal rights to their lands yet will continue to make decisions over their land as they have done for more than a century. This is supported by a national civil law[*11] that mentions the entitlement to the land is handed to settlers if the settlement has been existent for more than 20 years without interruption subject to legal administrative procedures that settlers are asked to take.

As a first step in obtaining land title, *Instituto Nacional de Desarrollo Rural y de la Tierra (INDERT)*, the agency responsible for issuing a certificate of land title, also issues a "certificate" (*certificado*), which acknowledges occupancy of a specified piece of land by a specified natural person. The certificate of land

[*10] "Cartilla 1 Reforestación- Preparación de terreno y transplante" and "Cartilla 2 Plan de Manejo Forestal- Cuidados de los árboles", San Lorenzo- Paraguay, 2007, Proyecto J-Green.
[*11] Source: Ley 1183/85, Código Civil Paraguayo y Código Procesal Civil, Leyes Modificatorias.

occupation can be acquired even before starting the process of obtaining land title, and eventually used as a substitution of a land title in specific cases in Paraguayan legal practice.

To conclude, given the local historical and cultural circumstances, although many farmers are not the "legal" owners of the land, they have and will continue to have tenure to the land. JIRCAS has access to the land and the right to implement the project through forming a contractual relationship with farmers.

JIRCAS has obtained solid evidence of land ownerships status from all farmers participating in the project, and the land ownership status of each farmer is included as part of the monitoring plan as described in section B.8.

The current land use is shown in Tables A.8.

Table A.8: Summary of Current Land Use per Districts

District	Community	Current Land Use (ha)		
		Croplands	Grasslands	Total
San Roque Gonzaléz	San Blás	0.51	0.00	0.51
	Carrera	1.17	0.66	1.83
	Rincón Sur	2.86	0.94	3.80
	Rincón Costa	1.84	2.26	4.10
	Moquete	2.36	12.77	15.13
	Aguai'y mí	0.00	2.17	2.17
	Mbocayaty	2.01	1.31	3.32
Acahay	20 de Julio	3.06	0.56	3.62
	Cabello	0.00	0.33	0.33
	Maria Auxiliadora	0.10	3.03	3.13
	San Juan	0.60	0.25	0.85
	Itakyty	1.28	0.62	1.90
	3 de Febrero	3.19	1.84	5.02
	Laguna Pytá	2.40	0.24	2.64
	Yukyty	0.41	1.24	1.65
	Tape Guazú	0.15	0.00	0.15
Other Communities	Costa Peña, Tapytangua, and Ñu Haí	2.13	29.21	31.34
Total		**24.08**	**57.43**	**81.51**

A.7. Assessment of the eligibility of land:

The *Paraguay* Government defines forests as lands having growing trees with:

- A minimum area of 0.5 hectares;
- A minimum tree crown cover of 25%; and
- A minimum height of 5 meters.

Therefore, the threshold values of the forest definition of *Paraguay* Government comply with the UNFCCC definition.

The land eligibility is demonstrated using the "Procedures to demonstrate the eligibility of lands for afforestation and reforestation CDM project activities".[*12]

(a) Demonstrate that the land at the moment the project starts does not contain forest by providing transparent information that:

(i) Vegetation on the land is below the forest thresholds (tree crown cover or equivalent stocking level, tree height at maturity in situ, minimum land area) adopted for the definition of forest by the host country under decisions 16/CMP.1 and 5/CMP.1 as communicated by the respective DNA;

Currently the vegetation on the land is below forest thresholds of Paraguay. As demonstrated in Figures A.15 to A.18, there are few trees and palms, which are much spread, including the natural young stands. The majority of the existing vegetation is palm, which is less probable to achieve forest definitions due to its crown cover characteristics.

Figure A.15: Croplands

Figure A.16: Grasslands

[*12] Source: EB35 Report, Annex 18, page 01.

Figure A.17: Abandoned Croplands

Figure A.18: Croplands: current practice

(ii) All young natural stands and all plantations on the land are not expected to reach the minimum crown cover and minimum height chosen by the host country to define forest; and

Considering all the young natural stands and plantations, it would not achieve the minimum crown cover and height to define a forest, because of the reasons explained in the previous item *(i)*.

Furthermore, the poor soil conditions and the common practice by the local farmers prevent natural regeneration to occur at the project site. The land does not have the potential to revert to forest without human intervention, especially because of the prevailing soil conditions (Table A.2) and the pressure of the current unsustainable practices with no implementation of soil and water resources conservancy measures. This contributes to a decrease in seed sources and prevents natural regeneration.

The common practice in the region, which is to use the land for agricultural activity and cattle grazing, further hinder the natural forest to grow. During the period between 1984 and 1991, deforestation affected 13,776 ha that represents 1/5 of the remaining forests in *Paraguarí* and it was associated to the agribusiness expansion. In the same period the deforestation rate in *Upper Parana Atlantic Forest* was 4.1% due to lumber market expansion. In 1992, the total area used for agribusiness was 277,753 ha which represent 32% of *Paraguarí* Department area.[*13]

(iii)The land is not temporarily unstocked, as a result of human intervention such as harvesting or natural causes.

The project land is not a forest for more than 50 years, as demonstrated in Figure A.19 to A.23.

(b) Demonstrate that the activity is a reforestation or afforestation project activity:

i. For reforestation project activities, demonstrate that the land was not forest by demonstrating that the conditions outlined under (a) above also applied to the land on 31 December 1989.

Based on the field survey results of 1945 and on the satellite image of 1991, the area has not been a forest for at least 50 years, as shown in Figures A.19 and A.23.[*14]

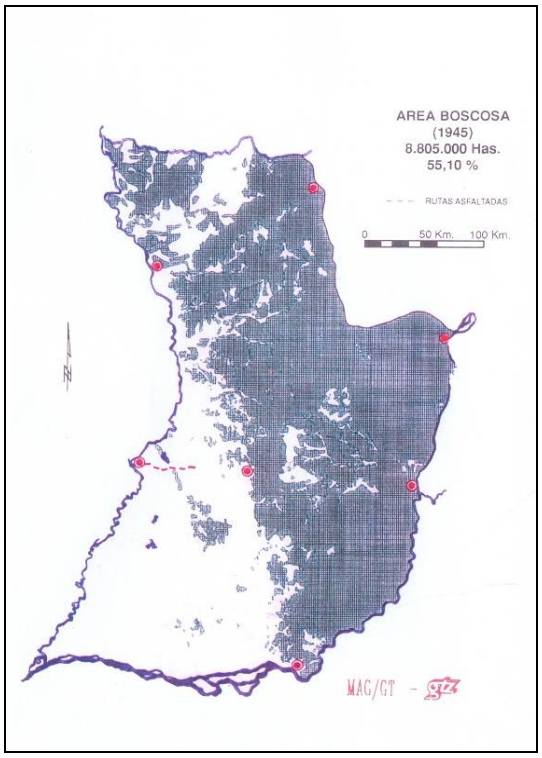
[*13] Source: "Sustainable Forestry in Paraguay. A Review of its Past, Present, and Opportunities." The World Bank – WWF Alliance June 2006.

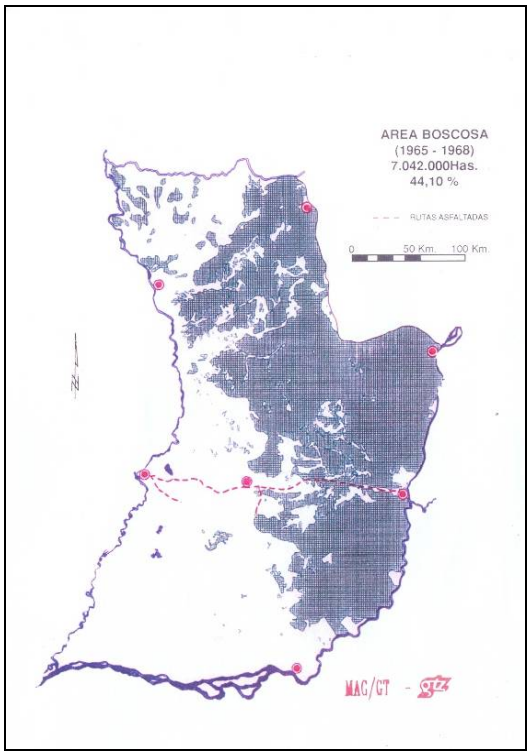
[*14] Source: *El Avance de la Deforestación y el Impacto Económico. Proyecto de Planificación del Uso de la Tierra.*

In 1945, forested area was 52% in *Eastern Paraguay*. However, this was reduced to 21% by 1991.*15

The deforestation of *Paraguarí* Department between 1984 and 1991 was 13,776 ha. In 2005, the forested area of the *Paraguarí* Department that originally represents 1.4% of its total area was reduced to only 0.2%.*16

Figures A.19 and A.20: Eastern Paraguay forest cover in 1945 and from 1965-1968



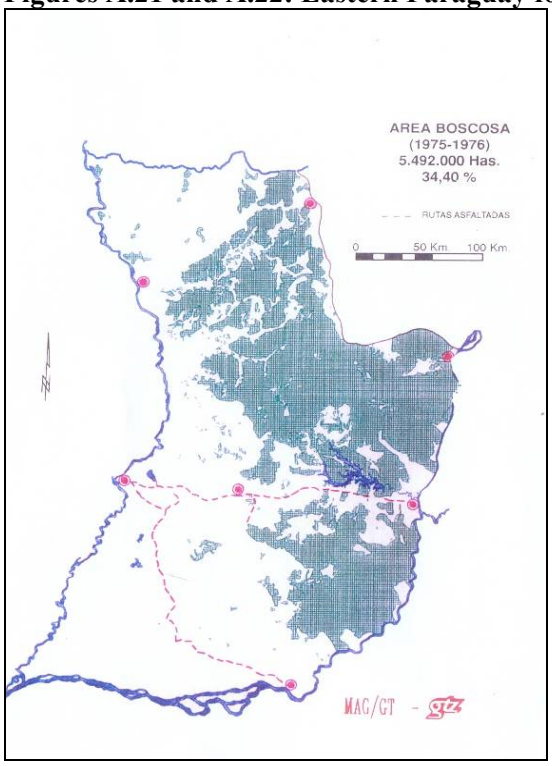


Asunción.1994

*15 Source: "Uso de la Tierra y Deforestación en la Region Oriental del Paraguay Periodo 1984-1991 (Volumen I)", Facultad de Ciencias Agrarias, Universidad Nacional de Asunción, mayo de 1994.

*16 Source: "Atlas Ambiental de la Region Oriental", Universidad Nacional de Asunción , Facultad de Ciencias Agrarias, Carrera de Ingeniería Forestal/FCA/UNA/GTZ. Volumen II, Febrero, 1995.

Figures A.21 and A.22: Eastern Paraguay forest cover from 1975-1976 and from 1984-1985



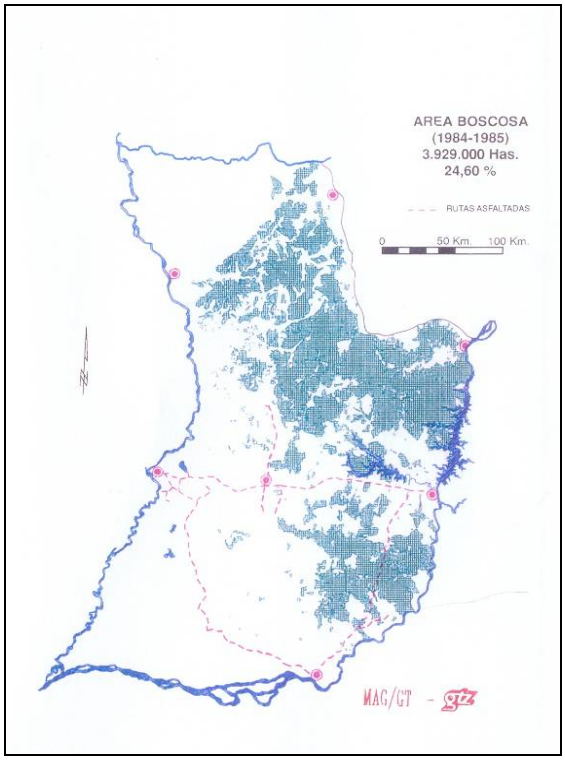
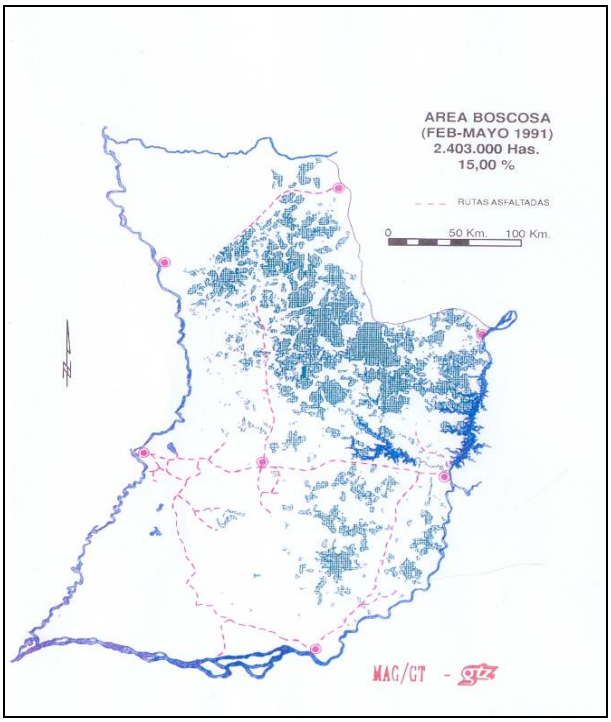


Figure A.23: Eastern Paraguay forest cover in 1991



In some parcels of lands, there are few woody perennials and the growth is too sparse to meet the definition of a forest (5-10 trees per hectare), and are mainly adult trees.

The existing natural tree species are:

- *Tabebuia avellanedae*
- *Cordia glabrata*
- *Cordia longiperda*
- *Peltophorum dubium*
- *Pterogyne nitens*
- *Albizia hassleri*
- *Patagonula americana*
- *Leucaena leucocephala*
- *Cedrela fissilis*
- *Cedrela odorata*

These existing trees will not be removed during site preparation for the project activity implementation, since they are widespread and do not represent any barrier to the implementation of the Project.

A.8. Approach for addressing non-permanence:

The issuance of tCERs for the net anthropogenic GHG removals by sinks achieved by the proposed small-scale A/R CDM project activity was chosen.

A.9. Duration of the proposed small-scale A/R CDM project activity / Crediting period:

A.9.1. Starting date of the proposed small-scale A/R CDM project activity and of the (first) crediting period, including a justification:

The project activity started on 25/07/2007, when the planting started.

A.9.2. Expected operational lifetime of the proposed small-scale A/R CDM project activity:

20 years.

A.9.3. Choice of crediting period and related information:

Fixed crediting period.

A.9.3.1. Duration of the first crediting period (in years and months), if a renewable crediting period is selected:

Not applicable.

A.9.3.2. Duration of the fixed crediting period (in years and months), if selected:

20 years.

A.10. Estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period:

The net anthropogenic GHG removals by sinks as a result of the proposed A/R CDM project activity is anticipated to be 9,860 tonnes of CO_2 equivalent during the first crediting period (between July/2007 and July/2027) as shown in Table A.10:

Table A.10: Ex ante estimated net anthropogenic GHG removals by sinks

Years	Annual estimation of net anthropogenic GHG removals by sinks in tonnes of CO_2 e
Year 1	**-3,221**
Year 2	**2,655**
Year 3	**7,851**
Year 4	**1,892**
Year 5	**-472**
Year 6	**5,091**
Year 7	**4,717**
Year 8	**2,282**
Year 9	**-234**
Year 10	**7,702**
Year 11	**1,188**
Year 12	**-10,041**
Year 13	**-27,690**
Year 14	**2,145**
Year 15	**6,482**
Year 16	**2,016**
Year 17	**-847**
Year 18	**3,937**
Year 19	**3,668**
Year 20	**739**
Total estimated net anthropogenic GHG removals by sinks (tonnes of CO_2 e)	**9,860**
Total number of crediting years	**20**
Annual average over the crediting period of estimated net anthropogenic GHG removals by sinks (tonnes of CO_2e)	**493**

A.11. Public funding of the proposed small-scale A/R CDM project activity:

JIRCAS together with INFONA will make an initial investment into the project by providing seedlings and trainings for small-scale farmers about good practices for project implementation.

Information on sources of public funding for the project activity are provided in Annex 2, proving that the project will not result in the diversion of ODA provided by any Annex I country.

A.12. Confirmation that the small-scale A/R CDM project activity is not a debundled component of a larger project activity:

There is neither registered small-scale A/R CDM project activity nor application to register another small-scale CDM project activity that conform to criteria for determining the occurrence of debundling:

a) With the same project participants;
b) Registered within the previous two years;
c) Whose project boundary is within 1 km of the project boundary of the proposed small-scale A/R CDM activity at the closest point.

Therefore, the project is not a debundled component of a larger project activity.

SECTION B. Application of a baseline and monitoring methodology :

B.1. Title and reference of the approved baseline and monitoring methodology applied to the proposed small-scale A/R CDM project activity:

Simplified baseline and monitoring methodologies for selected small-scale afforestation and reforestation project activities under the clean development mechanism, AR-AMS0001 (Version 04.1).

B. 2. Justification of the applicability of the baseline and monitoring methodology to the proposed small-scale A/R CDM project activity:

The proposed small-scale A/R CDM project activity complies with the applicability conditions under which the chosen baseline methodology is applied in the following ways:

(a) The project is implemented on grasslands and croplands;
The total project area in the baseline scenario is divided exclusively into cropland areas and grassland areas.

(b) Project activities are implemented on lands where the area of the cropland within the project boundary displaced due to the project activity is less than 50 % of the total project area;

Out of the total project area of 81.51 ha, 30% is croplands, which corresponds to 24.08 ha. This means the maximum displacement area of croplands within the project boundary is less than 50 % of the total project area.

The displacement of pre-project activities in croplands may occur in some cases. However, in the parcels of lands classified as sub-stratum S7 and S8 in Table A.5 and PDD-2694 Ver03, displacement will not occur, because their stand models allow the continuation of agricultural practice within the same areas where it is currently implemented. In these strata, project implementation will not represent a significant decrease in the production of current crops, and farmers do not need to search for other areas for the replacement of the current activities.

Considering that the parcels of lands classified as sub-stratum S7 and S8 in Table A.5 and PDD-2694 Ver03 comprise of 4.11 ha, of which 1.21 ha of cropland is displaced, the remaining area of croplands where displacement may occur is 22.87 ha, or 28% of the total project area.

In addition, most of the farmers will not continue the current activity in other areas, mainly due to their financial situation, which further reduces the possibility of the land to be replaced.

On the other hand, JIRCAS has been promoting the extension of introducing green manure[*17] for recuperation of soil fertility in the project area. The sampling survey for the farmers shows that the increase of average agricultural productivity after introducing green manure cultivation was by more than 30%. Therefore, conversion of a part of cropland to forestland is sufficiently compensated by the recuperation of soil fertility.

(c) Project activities are implemented on lands where the number of displaced grazing animals is less than 50 per cent of the average grazing capacity of the project area;

From the total project area, 70% is grasslands, which corresponds to 57.43 ha. The grazing capacity is estimated in the formula provided in Appendix D of the methodology AR-AMS0001 (version 04.1):

$$GC = ANPP \times 1000 \div (DMI \times 365)$$

Where:
GC = grazing capacity (head/ha)
ANPP = above-ground net primary productivity in tonnes of dry biomass (t.d.m/ha/yr)
DMI = daily dry matter intake per grazing animal (kg d.m/head/day).

According to Table 1 of the Appendix D of the methodology AR-AMS0001 (version 04.1), the default value used for ANPP is 8.2 tonnes of dry matter per hectare per year.

The default value of 25.5 kg of dry matter consumption per head per day is used for DMI, according to Table 3 of the Appendix D of the methodology.

Based on these estimations, it is assumed that the grazing capacity of total grassland in project area is 50.5 heads.

According to the field survey, average 2.6 heads of cattle are grazed for 1.5 months annually in the parcels of land where the displacement of grazing animal will be able to occur. The estimated total number of displaced animal is 21.6 heads and less than 50 per cent of the average grazing capacity of the project area or less than 25.3 animals. The estimation was based on the current grazing number of cattle, because participant farmers usually deny the possibility of displacement of cattle in planned reforestation area because of no grazing there.

Generally, the grassland to be reforested is the land where the soil is deteriorated by compaction, erosion, and shortage of fertility, or is low land to be frequently inundated. Therefore, the grazing capacity of grasslands to be reforested is assumed considerably less than the one of currently grazed grassland.

(d) Project activities are implemented on lands where ≤ 10% is disturbed as a result of soil preparation for planting.

[*17] Note: Mucuna, Jack bean and pigeon bean as main green manures for summer season, and lupin for winter season are introduced by farmers. Neither chemical nor organic fertilizer is used for green manure plantation.

The project area has no significant baseline carbon stock in the carbon pools selected, mainly because of current practices, land use and poor soil conditions.

Furthermore, the few existing trees will not be removed for soil preparation before planting.

For the project area currently used as cropland, the land preparation for soil ploughing takes place in the absence of the proposed project activity. No additional ploughing would occur specifically for tree planting.

B.3. Specification of the greenhouse gases (GHG) whose emissions will be part of the proposed small-scale A/R CDM project activity:

Based on AR-AMS0001 (Version 04.1), CO_2 emissions due to changes in the carbon stocks of the selected carbon pools are part of the proposed project activity.

B.4. Carbon pools selected:

Based on "AR-AMS0001/Version 04.1 the simplified baseline and monitoring methodology" applied by this proposed small-scale A/R CDM project activity, the above-ground and below-ground biomass are the only carbon pools to be considered, as shown in Table B.1.

Table B.1: Carbon pools selected

Carbon pools	Selected (answer with yes or no)
Above ground	Yes
Below ground	Yes
Dead wood	No
Litter	No
Soil organic carbon	No

B.5. Description of strata applied for ex ante estimations:

The description of project area stratification is shown in the attached spreadsheet. The reforested area is stratified by tree species.

B.6. Application of baseline methodology to the proposed small-scale A/R CDM project activity:

The baseline was established using the data collected from a series of field surveys, literature reviews, interviews and experts consultations by JIRCAS and National University of Asunción between April 2006 and March 2008.

For baseline study, site visits were conducted in each parcel of land within the total project area. The land use prior to the project implementation was considered as the project baseline, and according to this, baseline stratification was conducted. Detailed information about the baseline scenario in relation to the project scenario in a site specific manner is provided in the attached spreadsheet.

The general description is provided in the Table B.2

Table B.2: Relation between area of croplands and grasslands in baseline scenario and project strata in project scenario

Project Stratification	Baseline Scenario	
	Croplands (ha)	Grasslands (ha)
S1+S2	15.40	7.78
S3+S4	4.66	48.68
S5+S6+S7+S8	4.02	0.97
Total	24.08	57.43

Baseline net GHG removals by sinks which are calculated according to 6.c., 7.c, and 7.d of the AR-AMS0001 (Version 04.1) "Changes in the carbon stocks in the living biomass of woody perennials and the below-ground biomass of grasslands" exceed 10% of *ex-ante* actual net GHG removals by sinks in the project area.

For baseline calculation, the project area was stratified into:

(a) Area of cropland with changes in the carbon stocks in the living biomass pool of woody perennials and in below-ground biomass of grasslands expected to exceed 10% of *ex-ante* actual net GHG removals by sinks multiplied by share of the area in the entire project area;

(b) Area of grassland with changes in the carbon stocks in the living biomass pool of woody perennials and in below-ground biomass of grasslands expected to exceed 10% of *ex-ante* actual net GHG removals by sinks multiplied by share of the area in the entire project area;

For cropland and grassland baseline calculation, carbon stocks in existing trees and palms are considered as follows.

- The values for $B_{A(t)}$ and $B_{B(t)}$ for existing trees were calculated from M_{woody} of palms and other trees.
- The value for $M_{(t=0)}$ was obtained from the result of field survey in the project area conducted by the National University of Asunción in March 2008. [*18]
- The value for $M_{(t=20)}$ was obtained from the assumption that all the existing trees will grow to the largest natural tree, which has the largest stem volume, within the survey result.
- The value of wood density of palm was obtained from Table 3A.1.9 of GPG LULUCF.
- For the value of wood density of other trees except palm, *Peltophorum pterocarpum* was selected from Table 3A.1.9 of GPG LULUCF, because the dominant tree species in the project area except palm is *Peltophorum dubium Taubert* (*Yvyrapyta*) which belongs to genes *Peltophorum*.
- The value of R_{woody} and BEF were obtained from Table 3A.1.8 and 3A.1.10 of GPG LULUCF respectively.

Although cotton plantations are woody perennials under the definition provided by the methodology, it is not regarded as a perennial crop in Paraguay due to its practice of completely destroying stubbles after harvesting every year[*19], in order to eliminate pests like *picudo, lagarta rosada, broca de tallo* and *mocho*.

[*18] Source: "Evaluación de parcelas a ser destinadas para reforestación, proyecto F/R-MDL", Universidad Nacional de Asunción, marzo, 2008

[*19] Source: "Campaña de destrucción de Rastrojos – Propuesta, 2006/07", Ministerio de Agricultura y Ganadería, Programa Nacional del Algodón, Dirección de Extensión Agraria.

For grassland baseline calculation, the below-ground biomass of existing grasses was considered.

- The values for $B_{A(t)\,i}$ and $M_{(t)}$ for grasslands were calculated from $M_{grass,\,(t)}$.
- The value for $M_{grass,\,(t)}$ was obtained from LULUCF Table 3.4.2.
- The values for R_{woody} and R_{grass} were obtained from IPCC Table 3 A.1.8.
- BEF value was obtained from LULUCF Table 3A.1.10.

B.7. Description of how the actual net GHG removals by sinks are increased above those that would have occurred in the absence of the registered small-scale A/R CDM project activity:

Following the Annex B of the AR-AMS0001 (Version 04.1), barriers below were considered to demonstrate project additionality:

(a) Investment barriers, other than economic/financial barriers;
(b) Institutional barriers;
(c) Barrier due to prevailing practice;
(d) Barriers due to local ecological conditions;

There are two possible future scenarios, as outlined below:

1. Implementation of the project activity not undertaken as a CDM project activity;
2. Continuation of current practice i.e. continuation of using the land as cropland or grassland.

The most plausible scenario is the one which faces the fewest barriers.

Investment barriers

Main costs required for reforestation at the proposed project sites, where lands are degraded and agricultural productivities are low, are project preparation and hiring technical experts. No credit mechanisms are in place for farmers to pay for such costs. This is due to the fact that payback period for the investment is long, especially in the area where agricultural productivity is low and that farmers have low income. Even if they have access to such loans, it is unlikely that they would be able to afford the repayments.

The lack of public funding for the reforestation implemented in small areas by low income farmers such as this project is also another constraint. INFONA is an institution able to provide local expertise, however, it does not have funding to finance such a project.[*20] Therefore, INFONA would not be able to undertake this project without the expectation of obtaining carbon credits.

JIRCAS transfers the technology and know-how to implement the project, including different methods for soil erosion prevention, in condition that the project be A/R CDM project. JIRCAS is not in the position to provide financial support to the project under the Law of the Japan International Research Center for Agricultural Sciences.[*21]

[*20] Source: Nota INFONA No.2/9/08
[*21] Source: See http://www.jircas.affrc.go.jp/

Scenario 1 faces the investment barrier, and would not be implemented unless otherwise it is undertaken as CDM project activity.

Scenario 2 does not face investment barriers nor any of the barriers described above, and can be assumed as the baseline scenario.

Institutional barriers

Currently, there are forest management-related laws (*Ley 422/73* and *Ley 536/95*) and regulations in *Paraguay* that require tree plantation. However, these laws and regulations are not actually enforced on small-scale farmers. With regard to support or program for small-scale forestation, there are some projects under implementation in some specific areas in *Paraguay*, although these activities are implemented without direct support from INFONA. The support from INFONA is limited only to providing seedlings to small-scale farmers and the scale of the support is decreasing.[*20] It was only because of JIRCAS's initiative to assist both INFONA and local farmers that realization of the project became possible.

JIRCAS has the institutional barrier as well. It is not within their mandate to operate as a project owner in developing countries. As part of its initiative to promote A/R CDM, JIRCAS can provide a various range of capacity building activities to the participants. It takes a leading role in coordinating the project in close contact with INFONA, because JIRCAS's term for technology transfer to the participants will end in 2010.[*22]

Therefore, there will be no institutional set-up to promote or assist the implementation of the project activity in *Paraguay* in the absence of the CDM project.

There are no institutional barriers for Scenario 2.

Barriers due to prevailing practice

Although there are other reforestation projects under CDM project pipeline, this project activity is the first project in *Paraguay* to be undertaken with the direct involvement of small-scale farmers using their land.

This is also the first project in *Paraguay* where a cooperative effort of the farmers and the coordinating effort of INFONA are needed to implement the project.[*23] The project faces significant risks not only due to the fact that it is the "first of its kind" in the country, but also due to lack of technical skills of the stakeholders involved. In the absence of the project activity undertaken as CDM, the barrier due to prevailing practice would prevent the project from being implemented.

There is no prevailing practice barrier for Scenario 2.

Barriers due to local ecological conditions

As described in section A.5.2., the soil within the project activity area is 90% susceptible to erosion. Furthermore, soil fertility in *Acahay* and *San Roque González de Santa Cruz* districts is medium to low.

[*22] Source: Addenda al convenio interinstitucional "Estudio de validación de medidas contra el calentamiento global basado en AR-CDM" (Estudio) en el Paraguay
[*23] Source: Declaración de Director de SFN, San Lorenzo, 14 de Diciembre del 2007

Therefore the actual net GHG removals by sinks will be increased above those that would have occurred in the absence of the project activity, because Scenario 2 is the most plausible scenario and it is different from the project activity.

B.8. Application of monitoring methodology and monitoring plan to the small-scale A/R CDM project activity:

a. Ex post estimation of the baseline net greenhouse gas removals by sinks

As permitted by decision 6/CMP.1, appendix B, paragraph 6, the baseline will not be monitored. The baseline net GHG removals by sinks will be assumed to be those estimated in section C.1.

b. Ex post estimation of the actual net greenhouse gas removals by sinks

For *ex-post* estimation of project GHG removals by sinks, stratification will be the same as the stratification for the ex ante estimation of the actual net GHG removals by sinks. The calculations shown below will be performed for each stratum.

The project participant will determine any changes in carbon stocks by measuring and monitoring the project area that has been planted. The project boundary will be monitored and carbon sampling will take place within stratified sample plots. The number, size and location of each sampling plot will be calculated according to the section 4.3.3.4. of the IPCC good practice guidance for LULUCF.

The carbon stocks will be estimated using the following equations:

$$P_{(t)} = \sum_{i=1}^{I} (P_{A(t)i} + P_{B(t)i}) * A_i * (44/12)$$

where:

$P_{(t)}$ = carbon stocks within the project boundary at time *t* achieved by the project activity (t C)
$P_{A(t)i}$ = carbon stocks in above-ground biomass at time *t* of stratum *i* achieved by the project activity during the monitoring interval (t C/ha)
$P_{B(t)I}$ = carbon stocks in below-ground biomass at time *t* of stratum *i* achieved by the project activity during the monitoring interval (t C/ha)
A_i = project activity area of stratum *i* (ha)
I = stratum *i* (*I* = total number of strata)

For above-ground biomass:

$P_{A(t)i}=E_{(t)i}*0.5$

where:

$E_{(t)i}$ = estimate of above-ground biomass at time *t* of stratum *i* achieved by the project activity (t dm/ha)
0.5 = carbon fraction of dry matter (t C/t dm)

For below ground biomass:

$P_{B(t)i}=P_{A(t)i}*R_i$

where:

R_i = Root to shoot ratio of stratum *i* (t d.m./t d.m.)

The above and below ground carbon stock ($P_{A(t)i}$ and $P_{B(t)i}$) will be estimated through the following steps:

Step 1: Design a statistically sound sampling procedure

It will be established in accordance with the section 4.3.3.4. of the IPCC good practice guidance for LULUCF.

The project boundaries are physically identified by stakes in corners. They will be checked using GPS for each monitoring period, and the data will be managed by GIS. Any changes in project boundary will be accounted for in all calculations of actual net GHG removals. The farmers will be in charge of the maintenance of these stakes.

If there is a difference of tree growth in the same parcel, good-growth part, which is estimated to have above or equal to baseline carbon stock, will be separated from the parcel for conducting monitoring of net anthropogenic GHG removals by sinks. Then new GPS coordinates will be established along the limit of good growth part, as a new project boundary. In order to examine whether the planted parcel satisfies the definition of forest area in Paraguay (over or equal to 0.5ha), GPS reading of the entire parcel, including poor growth part, will be conducted. The area will be calculated by the formula of Heron. If the planted area is actually less than 0.5ha, or the forest area combined with planted area and natural forest adjacent to the planted area is less than 0.5ha, this parcel will be excluded from the project boundary.

Step 2: Establish permanent plots and document their location in the first monitoring report

The permanent plot will be established at the place more than 10m inner from plantation boundary. The GPS point of the first tree to be surveyed is read and registered as a coordinate representative of the location of permanent plot. The size of permanent plot is decided to include 20 individual trees (4 trees* 5 rows). Each surveyed tree is marked by a tape at which certain specific number is given. The number of tree will be recorded and the trees are distinguished by tape on the trunk.

Step 3: Measure permanent plots

Measure the diameter at breast height (DBH) and tree height of the taped trees in permanent plots,, as appropriate. The survey result of DBH and tree height is entered in the prepared format. The stocking density is decided by measuring the distance between the center of trees located at the corners of the plot. The stem volume and carbon stock of trees in the plot is divided by the area calculated by distance between trees to obtain stocking density.

Step 4: Estimate stem volume

The stem volume is calculated by using volume equation of each tree species established on the basis of field data obtained from sample trees, according to A/R Methodological tool “Demonstrating appropriateness of volume equations for estimation of aboveground tree biomass in A/R CDM project activities” (Version 01.0.1).

Step 5: Estimate above and below ground carbon stock

The above ground biomass in each tree will be calculated by multiplying stem volume to biomass expansion factor, then below ground biomass in each tree will be calculated by multiplying the above ground biomass to root to shoot ratio. The carbon stock of above and below ground biomass in living trees is calculated by multiplying the biomass to wood density, and carbon fraction of dry matter (t C/t d.m.). Net anthropogenic GHG removal by sinks is obtained by deducting baseline carbon stock, project emission, and leakage from above and below ground carbon stock of living trees.

This monitoring plan will be used throughout the project area and the crediting period. However, if national equations and data are available, the project participant may use these up to the first monitoring period.

c. Ex post estimation of project emissions

The methodology states to calculate ex-post project emissions if "the use of fertilizers would result in significant emissions of N_2O (>10 per cent of the actual net greenhouse gas removals by sinks)".

The data are checked by using the AR methodological tool: "Estimation of direct nitrous oxide emission from nitrogen fertilization" to ensure that project emissions represent less than 10 per cent of the actual net greenhouse gas removals by sinks. Since project emissions are considered not significant, it will not be monitored during the crediting period.

d. Ex post estimation of leakage

As described at the AR-AMS0001 (Version 04.1), the possibility of leakage from the displacement of activities will be monitored in the project area with respect to the following indicators:

(a) Area under cropland within the project boundary displaced due to the project activity;
(b) Number of domesticated grazing animals within the project boundary displaced due to the project activity;
(c) For domesticated roaming animals, the time-average number of domesticated grazing animals per hectare within the project boundary displaced due to the project activity.

e. Ex post estimation of the net anthropogenic GHG removals by sinks

The resulting tCERs at the year of verification (*tv)* are calculated as follows.

For the first crediting period

$$tCER_{(tv)} = P_{(t)} - \sum_{t=0}^{tv} \left(GHG_{PROJ,(t)} - \Delta C_{BSL,t} \right) - L_{tv}$$

where:

$P_{(t)}$ = carbon stocks within the project boundary achieved by the project activity at time *t* (t CO_2-e)
$GHG_{PROJ,(t)}$ = project emissions from use of fertilizers (t CO_2-e/ year)
$\Delta C_{BSL,t}$ = baseline net GHG removals by sinks (t CO_2-e/ year)

L_{tv} = total GHG emission due to leakage at the time of verification (t CO_2-e)
tv = year of verification

f. Monitoring frequency

The planting activity started in July 2007. The first monitoring event is planned to occur in 2010. Monitoring will occur every five years from the first monitoring (and verification) onwards.

B.8.1. Data to be monitored: Monitoring of the actual net GHG removals by sinks and leakage.

B.8.1.1. Actual net GHG removals by sinks data:

B.8.1.1.1. Data to be collected or used in order to monitor the verifiable changes in carbon stock in the carbon pools within the project boundary resulting from the proposed small-scale A/R CDM project activity, and how this data will be archived:

Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic / paper)	Comment
Location of the areas where the project has been implemented	*Field survey or cadastral information or aerial photographs or satellite image or GPS*	*latitude and longitude*	*measured*	*5*	*100%*	*Electronic, paper, photos*	*GPS can be used for field survey*
A_i – Size of the areas for each type of strata	*Field survey or cadastral information or aerial photographs or satellite image*	*ha*	*measured*	*5*	*100%*	*Electronic, paper, photos*	*GPS can be used for field survey*
Location of the permanent sample plots	*Project maps and project design*	*latitude and longitude*	*defined*	*5*	*100%*	*Electronic, paper*	*Plot location is registered with GPS and marked on the map*
Diameter of tree at breast height (1.30m)	*Permanent plot*	*cm*	*measured*	*5*	*Each tree in the sample plot*	*Electronic, paper*	*Measure diameter at breast height (DBH) for each tree that falls within the sample plot and applies to size limit*

Height of tree	*Permanent plot*	*m*	*measured*	*5*	*Each tree in the sample plot*	*Electronic, paper*	*Measure height (H) for each tree that falls within the sample plot and applies to size limits*
Basic wood density	*Literature*	*tones of dry matter per m^3 fresh volume*	*estimated*	*once*		*Electronic, paper*	
Total CO_2	*Project activity*	*Mg*	*calculated*	*5*	*all project data*	*Electronic*	*Based on data collected from all plots and carbon pools*
Land ownership	*Survey*	*dimensionless*	*measured*	*5*	*100%*	*Electronic, paper*	*To be monitored through survey*

B.8.1.2. Data for monitoring of leakage (if applicable)

B.8.1.2.1. If applicable, please describe the data and information that will be collected in order to monitor leakage of the proposed small-scale A/R CDM project activity

Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic / paper)	Comment
Area under cropland within the project boundary displaced due to the project activity	*Survey*	*Hectares or other area units*	*Measured or estimated*	*One time after project is established but before the first verification*	*30 %*	*Electronic*	
Number of domesticated grazing animals within the project boundary displaced due to the project activity	*Survey*	*Number of heads*	*Estimated*	*One time after project is established but before the first verification*	*30 %*	*Electronic*	

Time-average number of grazing domesticated roaming animals per hectare within the project boundary displaced due to the project activity	Survey	*Number of heads*	*Estimated*	*One time after project is established but before the first verification*	*30 %*	*Electronic*	

B.8.2. Describe briefly the proposed quality control (QC) and quality assurance (QA) procedures that will be applied to monitor actual GHG removals by sinks:

A quality control and quality assurance (QA/QC) plan will be developed and will become part of project documentation. This plan describes all procedures in the form of Standard Operating Processes (SOPs) and includes instructions related to:

a) Collecting reliable field measurements;
b) Verifying methods used to collect field data;
c) Verifying data entry and analysis techniques;
d) Data maintenance and archiving.

QA/QC for field measurement

Collecting reliable field measurements is an important step in the quality assurance plan. Those responsible for the carbon measurement work will be fully trained in all aspects of the field data collection and data analyses. The SOPs describe in detail all steps of the field measurements and contain provisions for documentation for verification purposes so that future field personnel can check past results and repeat the measurements in a consistent fashion. It will be ensured that:

- Field team members are fully aware of all procedures and the importance of collecting data as accurately as possible;
- Field team install test plots if needed in the field and measure all pertinent components using the SOPs to estimate measurement errors;
- The document will list all names of the field team and the project leader will certify that the team is trained;
- New staff members are adequately trained.

After measurement a comparison will be made with the original data and discrepancies re-verified. Field data collected at this stage will be compared to the original data. Any errors found will be corrected.

QA/QC to verify field data collection

To verify that plots have been installed and the measurements taken correctly, a re-measurement of 10% of the plots by different crew members from the original field crews will be performed at the end of the

fieldwork. The verifying crew will be experienced in forest measurement and highly attentive to detail. After measurement, a comparison will be made with the original data and discrepancies re-verified. Field data collected at this stage will be compared with the original data. Any errors found will be corrected and recorded. Any errors discovered will be expressed as a percentage of all plots that have been rechecked to provide an estimate of the measurement error.

$$\text{Field measurement error (\%)} = \frac{(\text{Data before corrections} - \text{Data after corrections})}{\text{Data after corrections}} \times 100$$

The following quality targets should be achieved for the measurements:

- Missed or extra trees: no error
- Tree species or groups: no error
- DBH: $< \pm 10\%$
- Height: $< \pm 20\%$

QA/QC for data entry and analysis

To produce reliable carbon estimates the proper entry of data into an analysis spreadsheet is required. Steps will be taken to ensure that errors are minimized, such as cross-checking entry of field data and laboratory data. If there are any problems with the monitoring plot data that cannot be solved, the plot should not be used in the analysis.

QA/QC for data maintenance and storage

Due to the long-term length of the project activities, data storage and maintenance is very important. The procedures include data archiving in different forms (electronic and paper). All data will be archived in paper and electronically in a separate remote location. Electronic data will be copied and stored by relevant persons in charge. All staff is trained in monitoring method to improve accuracy of collecting data. Data will be archived in safe place. Procedures also include updating storage onto new data technologies, both hardware and software.

All data archived will be stored for at least 2 years after the end of the project activity.

B.8.3. Please describe briefly the operational and management structure(s) that the project operator will implement in order to monitor actual GHG removals by sinks by the proposed small-scale A/R CDM project activity:

The proposed A/R CDM project activity will be coordinated by JIRCAS in cooperation with INFONA. JIRCAS will be responsible for administrating and coordinating the participants, facilitating and supervising the implementation of the proposed small-scale A/R CDM project activity, organizing technical training and consultation, and implementing the monitoring of the actual GHG removals by sinks and any leakage. INFONA will provide advice to the project as a local expert.

JIRCAS, as the administrative operator, is responsible for obtaining all relevant documents that would guarantee high quality of the project and assure its implementation as a CDM project.

For this reason, JIRCAS is in charge of confirming documented evidences on land ownership by each individual farmer participating in the project through interviewing and document checking.

JIRCAS has been assisting to establish the framework for monitoring the project activity for INFONA and local participants and has been directly involved in preparing project implementation and monitoring plans. In addition, JIRCAS has provided a series of manuals specifically designed for the project activity to ensure that local participants will not have a difficulty in following the plans. The topics include seedling preparation, planting methods and thinning. JIRCAS has also provided on-site technical supports for the project implementation.

B.9. Date of completion of the baseline study and the name of person(s)/entity(ies) determining the baseline and the monitoring methodology:

The date of completion of baseline study is 31/03/2008.

The entities responsible for determining the baseline scenario and obtaining necessary data from the field surveys and studies are:

Mirtha Vera de Ortiz, National University of Asunción.
Patricia Toledo Mérola, Mitsubishi UFJ Securities, Co., Ltd.

The entity responsible for determining the monitoring methodology is:

Eiji Matsubara, Japan International Research Center for Agricultural Sciences (JIRCAS)

The contact details and responsible person for the project are listed in Annex 1.

SECTION C. Estimation of ex ante net anthropogenic GHG removals by sinks:

C. 1. Estimated baseline net GHG removals by sinks:

The changes of the carbon stocks in the living biomass of existing palms and other trees will occur in the absence of the project activity. However, cotton plant which is regarded as woody perennials is not considered in the baseline for the reason described in section B.6.

The changes in carbon stocks in the below-ground biomass of grasslands are assumed to be zero, since it is expected not to exceed 10% of *ex-ante* actual net GHG removals by sinks in the absence of the project activity.

The formula/calculations used to estimate the baseline net GHG removals by sinks are as follows:

Above-ground biomass

$B_{A(t)} = M_{(t)} * 0.5$

Where:

$B_{A(t)}$ = carbon stocks in above-ground biomass at time *t* in the absence of the project activity (t C/ha)
$M_{(t)}$ = above-ground biomass at time *t* that would have occurred in the absence of the project activity (t d.m./ha)
0.5 = carbon fraction of dry matter (t C/t d.m.)

In case of living biomass in existing trees, the average biomass stock is estimated as the above-ground biomass stock in age-dependent above-ground biomass stock:

$M_{(t=0)} = M_{woody\ (t=0)}$

if: $M_{woody\ (t=n-1)} + g * \Delta t < M_{woody\_max}$ then
$M_{(t=n)} = M_{woody\ (t=n-1)} + g * \Delta t$

if: $M_{woody\ (t=n-1)} + g * \Delta t \geq M_{woody\_max}$ then
$M_{(t=n)} = M_{woody\_max}$

Where:
$M_{woody\ (t)}$ = above-ground biomass of woody perennials at time t that would have occurred in the absence of the project activity (t d.m./ha)
M_{woody_max} = maximal above-ground biomass of woody perennials that would have occurred in the absence of the project activity (t d.m./ha)
g = annual increment in biomass of woody perennials (t d.m./ha/year)
Δt = time increment = 1 (year)
n = running variable that increases by Δt = 1 for each iterative step, representing the number of years elapsed since the project start (years)

Below-ground biomass

The living biomass carbon pools in existing trees are expected to increase and the ones in the below-ground biomass of grasslands are expected to be constant, therefore, the average belowground carbon stock is estimated as follows:

$B_{B(t=0)} = 0.5 * (M_{grass} * R_{grass} + M_{woody\ (t=0)} * R_{woody})$

if: $M_{woody\ (t=n-1)} + g * \Delta t < M_{woody\_max}$ then
$B_{B\ (t=n)} = 0.5 * [M_{grass} * R_{grass} + (M_{woody\ (t=n-1)} + g * \Delta t) * R_{woody}]$

if: $M_{woody\ (t=n-1)} + g * \Delta t \geq M_{woody\_max}$ then
$B_{B\ (t=n)} = 0.5 * (M_{grass} * R_{grass} + M_{woody\_max} * R_{woody})$

Where:
$B_{B(t)}$ = carbon stocks in below-ground biomass at time t that would have occurred in the absence of the project activity (t C/ha)
M_{grass} = above-ground biomass in grass on grassland at time t that would have occurred in the absence of the project activity (t d.m./ha)
$M_{woody\ (t)}$ = above-ground biomass of woody perennials at time t that would have occurred in the absence of the project activity (t d.m./ha)
R_{woody} = root to shoot ratio for woody perennial (t d.m./t d.m.)
R_{grass} = root to shoot ratio for grassland (t d.m./t d.m.)
g = annual increment in biomass of woody perennials (t d.m./ha/year)
Δt = time increment = 1 (year)
n = running variable that increases by Δt = 1 year for each iterative step, representing the number of years elapsed since the project start (years)
0.5 = carbon fraction of dry matter (t C/t d.m.)

There is no use of fertilizer within the project boundary and thus, there are no project emissions.

The estimation result of the baseline net GHG removals by sinks is summarized as follows:

Cropland/ Grassland	Item	Value	Unit	Comments
Cropland				
Above-ground	Tree Volume (t=0) (Palms)	11.20	m3/ha	Asunción University
	Tree Volume (t=0) (Others)	1.20	m3/ha	Asunción University
	Tree Volume (t=20) (Palms)	27.22	m3/ha	
	Tree Volume (t=20) (Others)	3.70	m3/ha	
	Density of tree (Palm)	0.50	t.d.m/m3	Table 3A.1.9
	Density of tree (Other)	0.62	t.d.m/m3	Table 3A.1.9
	M(t=0) (Palms)	5.60	t.d.m/ha	
	M(t=0) (Others)	0.74	t.d.m/ha	
	M(t=20) (Palms)	13.61	t.d.m/ha	
	M(t=20) (Others)	2.29	t.d.m/ha	
	Carbon fraction of dry matter	0.50		
	BA(t=20) (Palms)	6.80	t C/ha	
	BA(t=20) (Others)	1.14	t C/ha	
	BA(t=20) (Palms) (DBH<10cm)	0.01	t C/ha	
	BA(t=20) (Others) (DBH<10cm)	0.07	t C/ha	
	BA(t=20)	8.02	t C/ha	
Below-ground	Mwoody(t=20)	16.05	t C/ha	Including trees of “DBH<10cm”
	Rwoody	0.48		Table 3A.1.8 Other, "Woodland/savanna"
	BB(t=20)	3.85	t C/ha	
	BA(t=20)+BB(t=20)	11.87	t C/ha	
Area		24.08	ha	
B(t)		285.98	tC	
ΔCBSL, crop		1,049.0	t CO2-e	B(t)*44/12
Grassland				
Above-ground	Tree Volume (t=0) (Palms)	4.70	m3/ha	Asunción University
	Tree Volume (t=0) (Others)	2.30	m3/ha	Asunción University
	Tree Volume (t=20) (Palms)	9.27	m3/ha	
	Tree Volume (t=20) (Others)	3.85	m3/ha	
	M(t=0) (Palms)	2.35	t.d.m/ha	
	M(t=0) (Others)	1.43	t.d.m/ha	
	M(t=20) (Palms)	4.64	t.d.m/ha	
	M(t=20) (Others)	2.39	t.d.m/ha	
	BA(t=20) (Palms)	2.31	t C/ha	
	BA(t=20) (Others)	1.19	t C/ha	
	BA(t=20) (Palms) (DBH<10cm)	0.01	t C/ha	
	BA(t=20) (Others) (DBH<10cm)	0.15	t C/ha	
	BA(t=20)	3.66	t C/ha	
Below-ground	Mwoody(t=20)	7.32	t C/ha	Including trees of “DBH<10cm”
	Rwoody	0.48		Table 3A.1.8 Other, "Woodland/savanna"
	BBwoody(t=20)	1.76	t C/ha	
	Mgrass(t=0)	6.2	t.d.m/ha	Table 3.4.2 Tropical Moist & Wet
	Rgrass	1.58		Table 3A.1.8 Grassland, Temperate/sub-tropical/tropical grassland"
	BBgrass(t=0)	4.90	t.d.m/ha	
	BB(t=20) (tree and grass)	6.66	t C/ha	
	BA(t=20)+BB(t=20)	10.32	t C/ha	
Area		57.43	ha	
B(t)		592.51	tC	
ΔCBSL, grass		2,172.0	t CO2-e	B(t)*44/12

ΔCBSL		3,221.0	t CO2-e	

C. 2. Estimate of the actual net GHG removals by sinks:

The carbon stocks at the starting date of the project activity are the same as the projection of the baseline net GHG removals by sinks at t = 0 as indicated in the following formula:

$$N_{(t=0)} = B_{(t=0)}$$

For all other years, the carbon stocks within the project boundary $(N_{(t)})$ at time *t* can be calculated as follows:

$$N_{(t)} = \sum_{i}^{I} (N_{A(t)i} + N_{B(t)i}) * A_i$$

$N_{A(t)i} = T_{(t)i} * 0.5$
$N_{B(t)i} = T_{(t)} * R * 0.5$
$T_{(t)i} = SV_{(t)i} * BEF * WD$

Where:

$N_{A(t)i}$	=	carbon stocks in above-ground biomass at time *t* of stratum *i* achieved by the project activity during the monitoring interval (t C/ha)
$N_{B(t)i}$	=	carbon stocks in below-ground biomass at time *t* of stratum *i* achieved by the project activity during the monitoring interval (t C/ha)
A_i	=	project activity area of stratum *i* (ha)
$T_{(t)i}$	=	above-ground biomass at time *t* under the project scenario (t dm/ha)
R	=	root to shoot ratio, dimensionless
0.5	=	carbon fraction of dry matter (t C/t dm)
$SV_{(t)i}$	=	stem volume at time *t* for the project scenario (m^3/ha)
WD	=	basic wood density (t dm/m^3)
BEF	=	biomass expansion factor (over bark) from stem volume to total volume (dimensionless)

The SVs for *Eucalyptus grandis* and *Eucalyptus camaldulensis* were obtained from the study: *"Estudio sobre el plan de Reforestación en la Región Oriental de la República del Paraguay",* conducted by Japan International Cooperation Agency (JICA) in March 2002.

The SV for *Grevillea robusta* was obtained directly from the study: *"Determinación de Escenarios de Crecimiento Volumétrico de Grevillea robusta A. Cunn"*, conducted by Asunción National University in April 2007.

The applied SVs were determined as merchantable volume without limbs, small trees etc.

The wood density adopted is 0.528181 for *Eucalyptus grandis*, 0.538346 for *Grevillea robusta* and 0.650174 for *Eucalyptus camaldulensis*. These values were obtained from the study: *"Determinación de*

la Densidad Específica de la Madera de Eucalyptus camaldulensis, E. grandis y Grevillea robusta A. Cunn", conducted by Asunción National University in April 2007.

The values of R and BEF were obtained from Table 3A.1.8 and 3A.1.10 of GPG LULUCF respectively.

Although some farmers will use organic fertilizer mainly for garden farming, it will be outside of the project areas for reforestation. Organic fertilizer (a mix of 13.3tonnes of manure and 7.7tonnes of coconut husk) is used for the seedlings in the nursery established outside of the project area. Project emissions ($GHG_{PROJ,(t)}$ - tCO_2e / year) is estimated in accordance with "Estimation of direct nitrous oxide emission from nitrogen fertilization" (Version 01).

C. 3. Estimated leakage:

Leakage is estimated to be 15 per cent of the *ex-ante* actual net GHG removals by sinks achieved during the first crediting period, since the displacement of activities in croplands and grasslands represents more than 10 per cent of the total project area and less than 50 per cent (paragraph 31, AR-AMS0001 Version 04.1).

Cropland/Grassland	Project area	Displacable area (cropland)	Percentage
Cropland	**81.51 ha**	**22.87 ha**	**28 %**

Cropland/Grassland	Average grazing capacity	Displacable cattle	Percentage
Grassland	**51 heads**	**22 heads**	**43 %**

The following formula is used to calculate leakage:

$$L_t = \Delta C_{ACTUAL,t} * 0.15$$

C. 4. The sum of C. 2. minus C.1. minus C.3. representing the net anthropogenic GHG removals by sinks of the proposed small-scale A/R CDM project activity:

The net anthropogenic GHG removals by sinks
= C.2 −C.1−C.3
=22,321−3,221−9,240
=9,860 t CO_2 e

C. 5. Table providing values obtained when applying equations from the approved methodology:

Year	Estimation of baseline net GHG removals by sinks (tonnes of CO_2 e)	Estimation of actual net GHG removals by sinks (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of net anthropogenic GHG removals by sinks (tonnes of CO_2 e)
Year 1	3,221	0	0	-3,221
Year 2	0	3,123	468	2,655
Year 3	0	9,236	1,385	7,851
Year 4	0	2,226	334	1,892

Year 5	0	-472	0	-472
Year 6	0	5,989	898	5,091
Year 7	0	5,550	833	4,717
Year 8	0	2,685	403	2,282
Year 9	0	-234	0	-234
Year 10	0	9,061	1,359	7,702
Year 11	0	1,398	210	1,188
Year 12	0	-10,041	0	-10,041
Year 13	0	-27,690	0	-27,690
Year 14	0	2,523	378	2,145
Year 15	0	7,626	1,144	6,482
Year 16	0	2,372	356	2,016
Year 17	0	-847	0	-847
Year 18	0	4,632	695	3,937
Year 19	0	4,315	647	3,668
Year 20	0	869	130	739
Total (tonnes of CO_2 e)	**3,221**	**22,321**	**9,240**	**9,860**

SECTION D. Environmental impacts of the proposed small-scale A/R CDM project activity:

D.1. Provide analysis of the environmental impacts, including transboundary impacts (if any):

No significant negative environment impacts will occur as a result of the project activity. It is unlikely that the project sites with *Eucalyptus* and *Grevillea* will cause negative impacts over groundwater resources since the sites are fragmented into very small parcels far enough from each other to become a critical mass to cause negative impacts. Therefore, the project does not carry the inherent problem that large monoculture *Eucalyptus* plantations have.

Furthermore, farmers opted to plant *Eucalyptus* in sloping areas in order to control soil erosion which can be considered as a positive impact for both the project sites and also adjacent areas by avoiding accumulation of sediment from the project sites.

On the contrary, *Eucalyptus* trees are considered to provide a positive impact to some farmers such as small-scale beekeepers, because having *Eucalyptus* tress will increase honey production.

There is no relevant impact over the air quality. Planting trees may act as windbreak to indirectly protect existing flora and fauna from winds.

The project may also have a positive impact on fauna, since planting trees may attract birds and other animals by providing shaded places.

D.2. If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken an environmental impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to support documentation:

No negative environment impacts will occur as a result of the project activity.

According to the Decree No. 14281/96 which regulated the Law No. 294/93, the Environmental Impact Assessment is not required for the afforestation and/or reforestation project activities whose land area is less than 1,000 ha. Moreover the Basic Environmental Questionnaire (*Cuestionario Ambiental Basico*) is not applied to such a project in which small scale farmers participate and the project area of reforestation is dispersed within 2 Districts. On the basis of the determination on the project in which less than 1,000ha of cropland and grassland are reforested, SEAM conceded a Licence of Emvironmental Strategy (*Licencia Ambiental Estrategica*) to JIRCAS.

D.3. Description of planned monitoring and remedial measures to address significant impacts referred to in section D.2. above:

Not applicable.

SECTION E. Socio-economic impacts of the proposed small-scale A/R CDM project activity:

E.1. Provide analysis of the socio-economic impacts, including transboundary impacts (if any):

Agriculture is the main source of income for local communities in the project area. However, the production is very low, and annual income per capita in the project area is around half of national average. The percentage of people living under poverty line in the project area to the total population of each district is 45 % in *Acahay* and 38 % in *San Roque González de Santa Cruz.*[*24]

To maximize the socio-economic benefit, the project activity design was prepared with a participatory approach. Public participatory methods were adopted in interviewing and consulting with farmer households in the project areas to understand the local farmers/communities' preferences, wishes and concerns, so that the proposed small-scale A/R CDM project activity would better respond to their desires for livelihood development (see Section F below). The main socio-economic benefits of the Project include:

(1) Sustainable fuel wood supply
(2) Strengthening social cohesion
(3) Technical training and demonstration
(4) Income generation

There is no negative impact that is considered significant by the project participants or the host party. On the contrary, the socio-economic impacts are expected to be positive.

E.2. If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken a socio-economic impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to support documentation:

Not applicable.

[*24] Source: "Indicadores Básicos para Focalizar el Gasto Social en Paraguay", Dirección General de Estadística, Encuestas y Censos (DGEEC), http://py/publicaciones/biblioteca/ibf/IBF034.htm.

E.3. Description of planned monitoring and remedial measures to address significant impacts referred to in section E.2. above:

Not applicable.

SECTION F. Stakeholders' comments:

F. 1. Brief description of how comments by local stakeholders have been invited and compiled:

Comments by stakeholders have been invited using participatory rural appraisal (PRA) methodology. Comments were collected though meetings and survey with all farmers involved with the project activity.

The first meeting was held on 29 June 2006 where the outline and merits of the project were explained to participating farmers. The participation in the meeting was solicited by direct contact with the leaders of the farming communities.

The second meeting was held during 1st and 4th of August 2006 where all participating farmers and their leaders in the identified villages were invited to comment and express their interests in participating in the project. JIRCAS requested individual leaders of the communities to announce the meeting date and to encourage farmers' participation to the meeting. This indirect method, through leaders, has been the most effective way of soliciting participation in these communities.

F. 2. Summary of the comments received:

The summary of the comments received from the two meetings is as follows.

Date of meeting	29 June 2006
Place of meeting	Demonstrative Farm of the Project
Number of people attended	16 community leaders and 6 farmers
Summary of comments	1) Very supportive of the reforestation project 2) What farmers are interested in are soil conservation and agro-forestry through reforestation

Date of meeting	1~4 August 2006
Place of meeting (number of people attended)	1 August 2006 - San Juan Village (5), Maria Auxiliadora Village (9), Rincon Sur Village (18), Rincon Costa Village (11) 2 August 2006 - Cabello Village (7), 20 de Julio Village (6), Arasaty Carrera Village (11), San Blas Village (12) 3 August 2006 - 3 de Febrero Village (8), Yukyty Village (10), Moquete Village (16), Aguaiy'mi Village (6) 4 August 2006 - Tape Guazŭ Village (7), Itakyty Village, Laguna Pyta Village (9), Mbokayaty Village (14)

Summary of comments	1) All participants including small-scale farmers showed high interest in reforestation activities. 2) Expressed their need for continuous technological support. 3) Expressed interest in planting tree species that would lead to profits from timber and fruit sales 4) Believe the use of timber would reduce fossil fuel consumption. 5) Believe reforestation is good for environment. 6) Expressed concern for *Melia azedarach var gigantea* (Chinaberry tree**)** which they believe die when they mature. 7) Expressed concern for *Eucalyptus sp.* whose high absorption of ground water caused by its high growth speed might cause negative impacts on other crops.

The summary of the comments received from other parties is as follows.

Date of meeting	27 June 2006
Place of meeting	Governor's office in Department of Paraguarí
Attendant	Governor
Summary of comments	1) Expressed his expectation for the new project. 2) Requested the enlargement of the project area, if possible.

Date of meeting	16 January 2008
Place of meeting	Mayor's office in San Roque González de Santa Cruz, Department of Paraguarí
Attendant	Mayor
Summary of comments	1) Expressed his satisfaction for the achievement of the project. 2) Commented the project outcome will extend to other area if farmers' consciousness changes. 3) Expressed no endangered fauna or flora exists within the city except the area around Ypoá Lake.

F. 3. Report on how due account was taken of any comments received:

As seen in the summaries of comments above, most comments from participating farmers were positive and in favor of the project.

The concerns expressed by the farmers about the durability of Chinaberry tree were taken into account, and instead of Chinaberry tree, the farmers decided to plant *Grevillea robusta* (Silver-oak).

As for the concern expressed with regards to *Eucalyptus sp.* plantations, JIRCAS has suggested to avoid the problem by planting *Eucalyptus* trees only as borders between roads or adjacent households and/or plant them in a dedicated plot without mixing them with other crops. Farmers plan to follow these suggested solutions.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROPOSED SMALL-SCALE A/R CDM PROJECT ACTIVITY

Organization:	Japan International Research Center for Agricultural Sciences
Street/P.O.Box:	1 – 1 Ohwashi
Building:	-
City:	Tsukuba
State/Region:	Ibaraki
Postfix/ZIP:	305-8686
Country:	Japan
Telephone:	+81 29 838 6313
FAX:	+81 29 838 6316
E-Mail:	
URL:	http://www.jircas.affrc.go.jp/
Represented by:	
Title:	Principal Engineer
Salutation:	Mr.
Last Name:	Matsubara
Middle Name:	
First Name:	Eiji
Department:	Rural Development Planning Division
Mobile:	
Direct FAX:	+81 29 838 6693
Direct tel:	+81 29 838 6686
Personal E-Mail:	eijimatu@affrc.go.jp

Organization:	Instituto Forestal Nacional
Street/P.O.Box:	Ruta Mariscal Estigarribia Km 10,5
Building:	-
City:	San Lorenzo
State/Region:	
Postfix/ZIP:	
Country:	Paraguay
Telephone:	+ 595 21 570516
FAX:	+ 595 21 570516
E-Mail:	**www.INFONA.mag@gmail.com**
URL:	
Represented by:	
Title:	Director General
Salutation:	Mr.

Last Name:	Noguera
Middle Name:	Daniel
First Name:	Manuel
Department:	Dirección General de Educación y Extensión Forestal
Mobile:	(0981) 992 390
Direct FAX:	+595 21 524382 / +595 21 570960
Direct tel:	+595 21 524382 / +595 21 570960
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

It is confirmed by Paraguayan government that the financial plans for the project do not involve public funding such as ODA from Annex I countries.

Confirmation letter from Paraguayan government was issued by Minister of Agriculture and Livestock of Paraguay on October 22, 2007.

Annex 3

DECLARATION ON LOW-INCOME COMMUNITIES

A written declaration that the proposed project activity is implemented in low-income communities is given by *Secretario del Ambiente*, the DNA of *Paraguay,* on 29 of October, 2008.

Presidencia de la República
SEAM
Secretaría del Ambiente

SEAM Nº 265/08

Asunción October 29th, 2009

Señor
Japan International Research Center for
Agricultural Sciences (JIRCAS)

The Secretary of **the Environment of the Republic of Paraguay, as Designated National Authority (DNA),** within the scope of the Mechanism of Clean Development of the Kyoto Protocol, makes mention of the Project **"Reforestation of croplands and grasslands in low income communities of Paraguari Deparment, Paraguay".**

The Designated National Authority, sets down indicators inherent to the population object of development of the proposing project, extracted from the document **Paraguay: Poverty and Inequality of Income at District level** from the year 2004, provided by the Main directorate of Statistic, Surveys and Censuses according to Note D.G. Nº 808 and considering the data on the percentage of poor population and the Department of Paraguari, it is determined that the department is located between the communities of low income of the country.

Sincerely.

PRESIDENCIA DE LA REPUBLICA
SECRETARIA DEL AMBIENTE

Abog. Jose Luis Casaccia
Designated National Authority
of the Republic of Paraguay
Environmental Secretary

Annex 4
Project data: Coordinates of the reforested parcels

San Roque Gonzalez de Santa Cruz

Community	Code	Latitude	Longitude
San Blas			
	RSB1-1		
		477688	7141207
		477665	7141145
		477731	7141123
		477745	7141157
		477778	7141179
Carrera			
	RC6-1		
		478087	7144632
		478105	7144691
		478087	7144705
		478039	7144728
		478017	7144669
		478048	7144646
	RC12-1		
		480114	7145977
		480074	7145991
		480048	7145941
		479997	7145844
		479946	7145865
		479929	7145826
		479982	7145797
		480070	7145922
		480085	7145918
	RC13-1,2		
		479441	7146407
		479417	7146447
		479320	7146202
		479321	7146122
		479353	7146123
		479342	7146120
		479381	7146188
		479366	7146187
		479349	7146195
		479343	7146184
		479323	7146194
		479421	7146436
Rincon Sur			
	RRS2-1		
		476076	7141773

		476109	7141860
		476103	7141849
		476028	7141881
		476024	7141869
		476007	7141792
	RRS4-1		
		475813	7141559
		475930	7141530
		475920	7141487
		475804	7141511
	RRS10-1		
		476401	7141931
		476302	7141893
		476322	7141844
		476326	7141819
		476421	7141850
		476414	7141879
	RRS18-1		
		476219	7143265
		476132	7143278
		476124	7143212
		476125	7143183
		476191	7143180
		476197	7143196
	RRS28-1		
		477548	7142264
		477512	7142338
		477487	7142392
		477520	7142410
		477520	7142411
		477537	7142356
		477586	7142285
		477583	7142280
	RRS30-1		
		476568	7140063
		476438	7139947
		476406	7139948
		476428	7140092
Rincon Costa			
	RRC1-1		
		475937	7144370
		475947	7144440
		475911	7144470
		475901	7144475
		475878	7144492

		475838	7144425
		475866	7144415
		475881	7144411
		475892	7144355
		475884	7144339
		475863	7144317
	RRC3-1		
		475369	7144314
		475234	7144377
		475203	7144326
		475328	7144261
	RRC3-3		
		476173	7143991
		476143	7143886
		476071	7143915
		476106	7144019
	RRC8-1		
		474852	7144764
		474812	7144646
		474748	7144677
		474793	7144801
	RRC9-1		
		475154	7144751
		475172	7144783
		475285	7144720
		475260	7144681
Moquete			
	RM9-1		
		473557	7138921
		473549	7138853
		473546	7138842
		473491	7138863
		473454	7138861
		473462	7138938
		473477	7138938
	RM10-1		
		473427	7139783
		473486	7139739
		473513	7139840
		473441	7139867
	RM13-1		
		475364	7138765
		475373	7138844
		475323	7138856
		475261	7138866
		475253	7138780

		475311	7138771
	RM14-1		
		475264	7139668
		475283	7139722
		475235	7139780
		475224	7139760
		475245	7139734
		475223	7139672
	RM16-1		
		472969	7137008
		473078	7136951
		473053	7136888
		473030	7136825
		472925	7136882
		472949	7136946
	RM17-1		
		474884	7137564
		474861	7137620
		474913	7137609
		474919	7137559
		474943	7137354
		474863	7137374
	RM17-2		
		475939	7137124
		476169	7136980
		476168	7136997
		476041	7137083
		476049	7137147
		475948	7137200
		475924	7137218
		475816	7137175
		475887	7137158
		476231	7136951
		476246	7136980
		476171	7137047
		476166	7137058
		476099	7137108
		476079	7137077
	RM17-3		
		475988	7137220
		475997	7137229
		476057	7137197
		476089	7137240

		476360	7137059
		476391	7137107
		476479	7137045
		476393	7137056
		476313	7137018
	RM17-4		
		476502	7137856
		476461	7137785
		476507	7137661
		476534	7137649
		476510	7137859
		476539	7137891
		476673	7137794
		476547	7137639
		476531	7137650
	RM17-5		
		477646	7138034
		477573	7138068
		477603	7138081
		477667	7138058
		477705	7138044
		477732	7138068
		477767	7138012
		477762	7137942
		477729	7137907
	RM17-6		
		478760	7138192
		478771	7138166
		478824	7138155
		478940	7138192
		478970	7138222
		478961	7138233
		478900	7138188
		478843	7138198
		478824	7138246
		478778	7138268
	RM17-7		
		478846	7138308
		478928	7138286
		478986	7138275
		479093	7138260
		479120	7138346
		479073	7138367
		478935	7138378

		478863	7138385
Aguai'y Mi			
	RA10-1		
		466532	7143225
		466508	7143243
		466446	7143238
		466433	7143282
		466391	7143284
		466434	7143281
		466319	7143282
		466312	7143393
		466503	7143357
Mbocayaty			
	RMb1-3		
		477384	7135253
		477371	7135180
		477443	7135177
		477476	7135220
		477457	7135259
	RMb4-1		
		476420	7134298
		476331	7134308
		476301	7134220
		476346	7134236
		476397	7134223
	RMb8-1		
		477745	7134610
		477795	7134580
		477924	7134517
		477935	7134540
		477818	7134600
		477763	7134632
	RMb11-1		
		476321	7135535
		476211	7135547
		476227	7135652
		476328	7135649
	RMb18-1		
		476954	7134850
		476940	7134875
		476967	7134938
		477043	7134935
		477058	7134893
		477012	7134871
		477000	7134886

Acahay

Community	Code	Latitude	Longitude
Yukyty			
	AY1-1		
		486012	7131047
		485979	7130920
		486029	7130901
		486032	7130875
		486024	7130823
		486003	7130731
		486072	7130722
		486092	7130826
		486146	7130982
		486146	7131017
3 de Febrero			
	A3F2-1		
		488348	7130085
		488371	7130158
		488402	7130246
		488450	7130234
		488417	7130170
		488409	7130116
		488393	7130109
		488382	7130081
	A3F4-1		
		487971	7129406
		488006	7129446
		487865	7129564
		487836	7129520
	A3F4-2		
		487696	7130024
		487669	7130042
		487632	7129976
		487656	7129960
	A3F4-3		
		487771	7129982
		487750	7129994
		487709	7130021
		487659	7129953
		487699	7129921
		487717	7129907
	A3F6-1		
		487330	7130395
		487295	7130406
		487231	7130414

		487211	7130364
		487269	7130341
		487306	7130329
	A3F9-1		
		486711	7130565
		486693	7130492
		486695	7130454
		486763	7130428
		486764	7130467
		486780	7130521
	A3F9-2		
		486878	7130641
		486913	7130621
		486806	7130415
		486776	7130426
	A3F10-1		
		486708	7129823
		486729	7129896
		486777	7129875
		486788	7129871
		486815	7129859
		486792	7129790
		486763	7129800
		486753	7129801
	A3F11-1		
		486872	7130015
		486905	7130002
		486831	7129874
		486797	7129886
	A3F14-1		
		486350	7130840
		486294	7130856
		486267	7130744
		486324	7130734
Itakyty			
	AI3-1		
		488485	7131902
		488452	7131835
		488406	7131857
		488412	7131882
		488385	7131874
		488392	7131891
		488425	7131941
	AI5-1		
		488832	7131204
		488733	7131241

		488727	7131240
		488760	7131185
		488763	7131184
		488836	7131322
	AI14-1		
		488251	7130422
		488341	7130417
		488333	7130356
		488246	7130361
Maria Auxiliadora			
	AMA7-1		
		490452	7129463
		490466	7129433
		490466	7129389
		490446	7129357
		490398	7129332
		490395	7129315
		490450	7129328
		490481	7129364
		490483	7129436
		490469	7129480
		490507	7129495
		490502	7129430
		490510	7129419
		490517	7129416
		490521	7129440
		490529	7129479
	AMA14-1		
		492010	7130012
		491977	7130119
		491915	7130124
		491884	7130213
		491796	7130218
		491829	7130028
San Juan			
	ASJ1-1		
		487799	7128660
		487810	7128656
		487829	7128649
		487844	7128645
		487816	7128555
		487799	7128553
		487777	7128556
		487757	7128554

	ASJ10-1		
		488022	7128257
		487989	7128187
		488062	7128170
		488104	7128254
Cabello			
	Aca6-1		
		487638	7128928
		487610	7128930
		487574	7128929
		487565	7128846
		487600	7128829
		487632	7128820
20 de Julio			
	A20J4-1		
		489322	7131186
		489272	7131186
		489274	7131128
		489304	7131134
		489363	7131139
		489369	7131199
	A20J5-1		
		488907	7130939
		488830	7130943
		488800	7131017
		488800	7131064
		488857	7131065
		488833	7131204
		488900	7131191
		488913	7131187
		488912	7131106
	A20J6-1		
		488865	7130261
		488899	7130249
		488924	7130163
		488838	7130174
	A20J7-1		
		490043	7131087
		490023	7131016
		489937	7131050
		489964	7131140
Laguna Pyta			
	ALP1-1		
		484697	7129813
		484720	7129848
		484777	7129927

		484733	7129947
		484684	7129878
		484692	7129870
		484664	7129831
	ALP3-1		
		484012	7127883
		483850	7127931
		483869	7127994
		484027	7127951
	ALP5-1		
		484792	7128573
		484786	7128542
		484666	7128541
		484666	7128567
		484603	7128583
		484610	7128611
	ALP7-1		
		483865	7128667
		483844	7128677
		483818	7128689
		483782	7128596
		483807	7128578
		483834	7128566
	ALP10-1		
		484037	7129862
		484011	7129870
		483951	7129876
		483903	7129880
		483897	7129837
		483949	7129834
		484029	7129833
Tape Guazu			
	ATG1-1		
		485981	7131609
		485956	7131617
		485921	7131632
		485928	7131570
		485885	7131531
		485904	7131523
		485936	7131508
		485961	7131563
Other communities			
	AOC4-1		
		493252	7133692

		493248	7133693
		493243	7133738
		493258	7133740
		493269	7133813
		493219	7133809
		493206	7133810
		493149	7133806
		493156	7133753
		493164	7133713
		493171	7133679
		493160	7133665
		493164	7133612
		493276	7133172
		493366	7133181
		493398	7133648
		493353	7133684
		493248	7133689
		493376	7133183
		493400	7133200
		493427	7133307
		493435	7133368
		493431	7133452
		493428	7133475
		493423	7133525
		493415	7133592
	AOC4-2		
		493118	7134726
		493176	7134711
		493189	7134688
		493172	7134635
		493076	7134663
		493015	7134415
		492975	7134427
		492865	7134493
		492912	7134638
		492932	7134631
		492931	7134610
		492957	7134604
		492959	7134622
		493023	7134791
		493124	7134766
		493039	7134632
	AOC5-1		
		498800	7135966

		499185	7136103
		499147	7136223
		499050	7136169
		499029	7136184
		498767	7136091
	AOC5-3		
		498793	7135437
		498613	7135473
		498799	7135859
		498831	7135666
		498812	7135633
		498827	7135593
	AOC5-4		
		499131	7135446
		499056	7135465
		498822	7135513
		498804	7135435
		498960	7135401
		499268	7135402
		499388	7135422
		499396	7135483
		499226	7135463
		499155	7135454
	AOC7-1		
		495921	7133121
		495980	7133051
		496062	7133436
		495977	7133387
	AOC7-3		
		495585	7132126
		495483	7132033
		495472	7131947
		495452	7131764
		495562	7131751
		495593	7131786
		495621	7131869
		495605	7131937
		495671	7132102
	AOC18-2		
		493825	7139813
		493792	7139772
		493857	7139678
		493884	7139697
		493888	7139720
		493889	7139894

Annex 5

Summary of post registration changes

1. JIRCAS started the distribution of seedlings to farmers from July 25, 2007, after training of leader farmers. Before the planting of seedlings, training to beneficial farmers was made by leader farmers and JIRCAS in each community. Planting was carried out in two years from 2007 to 2008.

   When the pre-monitoring was carried out in 2010, the following matters were found out;

   1) Among the beneficial farmers, who have received supply of seedlings, some of them could not plant seedlings as planned due to labor shortage, and some of them have even abandoned the continuation of reforestation activity due to severe damage by drought after planting.
   2) Some farmers, who did not follow the instruction from leader farmer or JIRCAS, established a plantation with poor growth trees, accumulated less carbon stock than expected, and in quite a few cases, resulted in negative carbon stock if taking into account of baseline carbon stock assumed to be lost after planting.

   JIRCAS postponed the monitoring activity till 2012, to examine and try the method to improve the plantations of poor growth farmers.

2. In 2012, JIRCAS started the preparation of the monitoring, and decided 70 parcels with 81.51 ha, which seems to be above or equal to the baseline carbon stock or to be assumed exceeding the baseline carbon stock in near future, as objective parcels of the monitoring. The remaining parcels are excluded from the monitoring and from the project boundary.

3. The application to the project of changes specific to afforestation or reforestation project activities, which have been applied during first monitoring period based on applicable provisions in the Project standard that do not require prior approval by the Board ("Guidelines on Accounting of Specified Types of Changes in A/R-CDM Project Activities from the Description in Registered Project Design Documents", Version 02.0), is indicated below;

   1) Changes in year-wise areas planted, possibly resulting in a part of the project area not being planted;

   JIRCAS provided seedlings based on the reforestation plan, however, some farmers did not plant a part or a whole parcel. Those non-planted area was excluded from monitoring activity.

   2) Changes in species composition, if the changes are demonstrated at verification to be consistent with the baseline identification and additionality demonstration made at the validation stage;

   The species planted in one parcel (code number: RRS28-1), included in the initial plan and consistent with baseline identification and additionality, was different from the plan. The species was changed from *Grevillea robusta* to *Eucalyptus grandis* due to the beneficial farmer's intention.

   3) Changes in stocking density, if the changes are demonstrated at verification to be consistent with the baseline identification and additionality demonstration made at the validation stage;

   There is a variation of stocking density in the plantations, because the planting spacing, which farmers set, was sometimes short of accuracy due to farmers' capability. At the moment of forest survey, the difference of stocking density in each parcel was taken into account.

   4) Changes in timing and choice of silvicultural operations;

The farmers who carried out thinning were rare, because the parcels with good growth of trees are few and farmers are reluctant to cut trees in general.

5) Changes in stratification for sampling;

Stratification was changed to just tree species, not 3 factors as tree species, planting year and planting spacing, set in the initial plan in PDD-2694 Ver03, because pre-monitoring results in 2010 indicated that there was no significant difference of planting year and planting spacing in the planted parcels.

6) Changes in type of sample plots (e.g. temporary, permanent, point-sampling);

Sample plots were changed from the permanent plots in randomly selected parcels to one plot permanently established in every parcel.

7) Changes in the project boundary (limited to reduction in project area), if the changes are demonstrated at verification to be consistent with the baseline identification and additionality demonstration made at the validation stage;

Project boundary was diminished from 240 parcels to be reforested, as mentioned in PDD-2694 Ver03, to 70 selected parcels which accumulated carbon stock greater than or equal to the baseline carbon stock, or be assumed in near future to exceed the baseline carbon stock, till the first monitoring event.

8) Changes in parameters, equations, or methods used in tree biomass estimation, if the applicability of the changed parameters, equations, or methods is demonstrated at verification using the "Tool for demonstration of applicability of allometric equations and volume equations in A/R CDM project activities" when available, or if the changed parameters, equations, or methods do not result in a decrease in precision of the estimate of tree biomass;

The equations to estimate tree biomass by species were established in the monitoring activity according to "Tool for demonstration of applicability of allometric equations and volume equations in A/R CDM project activities".