

16 Dec, 2009

# Rural Development and Reforestation CDM in Paraguay

**Eiji Matsubara**



**JIRCAS**

**Rural Development Planning Division**

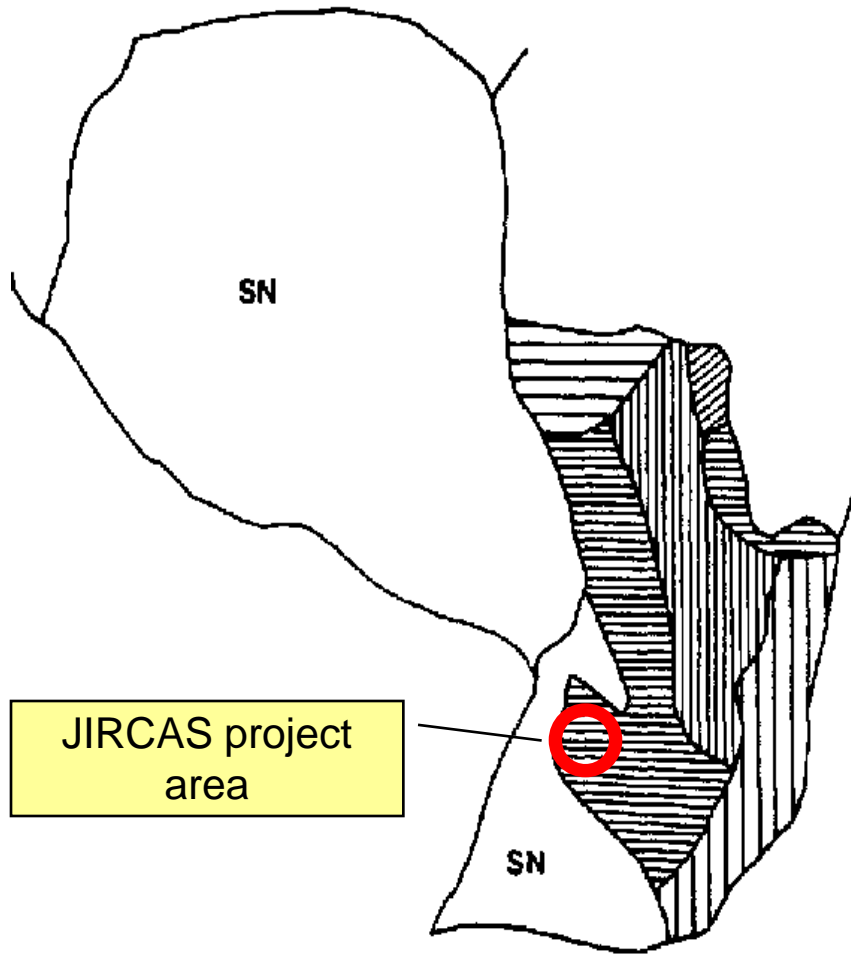
# Soil degradation in South America

- Degradated farm land by activities of human beings ( million ha, %)








| COUNTRY   | Degradated farm land |    | Stable farm land |    | Total |
|-----------|----------------------|----|------------------|----|-------|
|           | ha                   | %  | ha               | %  | ha    |
| Argentina | 55                   | 20 | 223              | 80 | 278   |
| Bolivia   | 15                   | 14 | 94               | 86 | 109   |
| Brasil    | 125                  | 15 | 721              | 85 | 846   |
| Chile     | 29                   | 40 | 43               | 60 | 72    |
| Paraguay  | 3                    | 8  | 37               | 92 | 40    |
| Total     | 227                  | 17 | 1,118            | 83 | 1,345 |

Source : ISRIC/UNEP 1990

# Soil degradation in Paraguay

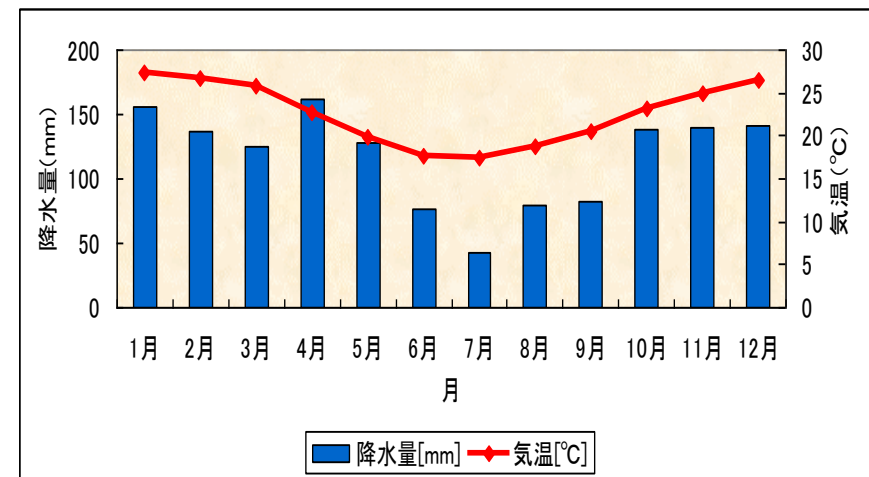


## LEYENDA

-  Tierra Estable
-  Erosión hídrica medio
-  Erosión hídrica alta
-  Erosión hídrica muy alta
-  Deterioro químico bajo
-  Deterioro químico me
-  Deterioro químico alto



ann. rainfall : 1,407mm

ave. temp. : 22.6°C



Source: ISRIC, UNEP, 1990

## Schedule of JIRCAS study

| Item                       | 2004   | 2005    | 2006  | 2007  | 2008  | 2009   | 2010  |
|----------------------------|--|---------|---|---|---|--|---|
| Study on soil conservation |   |         |   | (completed)   |   |  |   |
|                            | Phase 1  | Phase 2 |   |   |   |  |   |
| Study on reforestation CDM |  |         |   |   |   |  |   |
|                            |  |         | <ul style="list-style-type: none"> <li>•Sign on agreement between relating institutes</li> <li>•Baseline survey (1)</li> <li>•Decision on tree species</li> <li>•Questionnaire survey to farmers</li> </ul> | <ul style="list-style-type: none"> <li>•Survey on reforestation</li> <li>•Baseline survey (2)</li> <li>•Tree planting (1)</li> <li>•Preparation of PDD</li> <li>•Validation by DOE</li> </ul> | <ul style="list-style-type: none"> <li>•Revision of PDD</li> <li>•Tree planting (2)</li> <li>•Governmental approval on CDM project</li> <li>•Validation report</li> </ul> | <ul style="list-style-type: none"> <li>•Registration procedures in CDM-EB</li> <li>•Establishment of monitoring system and training</li> <li>•Extension of project activity to other area</li> </ul> | <ul style="list-style-type: none"> <li>•First monitoring</li> <li>•Verification by DOE</li> <li>•Preparation of guideline and manual</li> <li>•International seminar</li> </ul> |

# Soil erosion in project area

Typical sheet erosion in cotton field



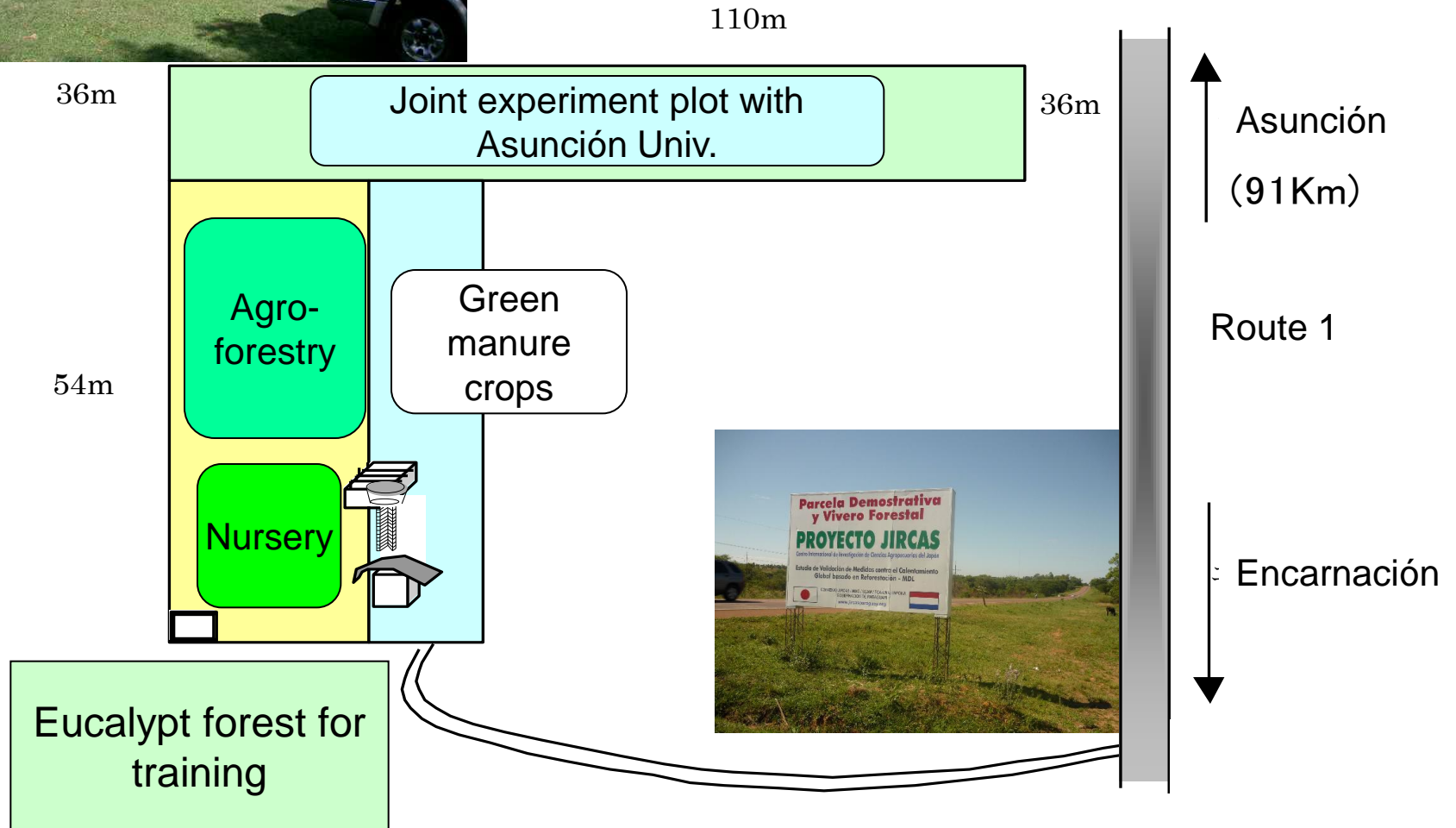
# Basic concept

- 1. Build “**thinker farmer**” who will not depend on outside assistance**
  - Farmer selects technology/ activity by himself and take responsibility
- 2. Project pays importance to activities relating to farmers’ awareness change from dependence to independence**
  - First activity concentrates on farmers’ awareness change
  - Let farmers prepare their own plan for farm management and community development
  - Project provides minimum physical incentives to promote rural development

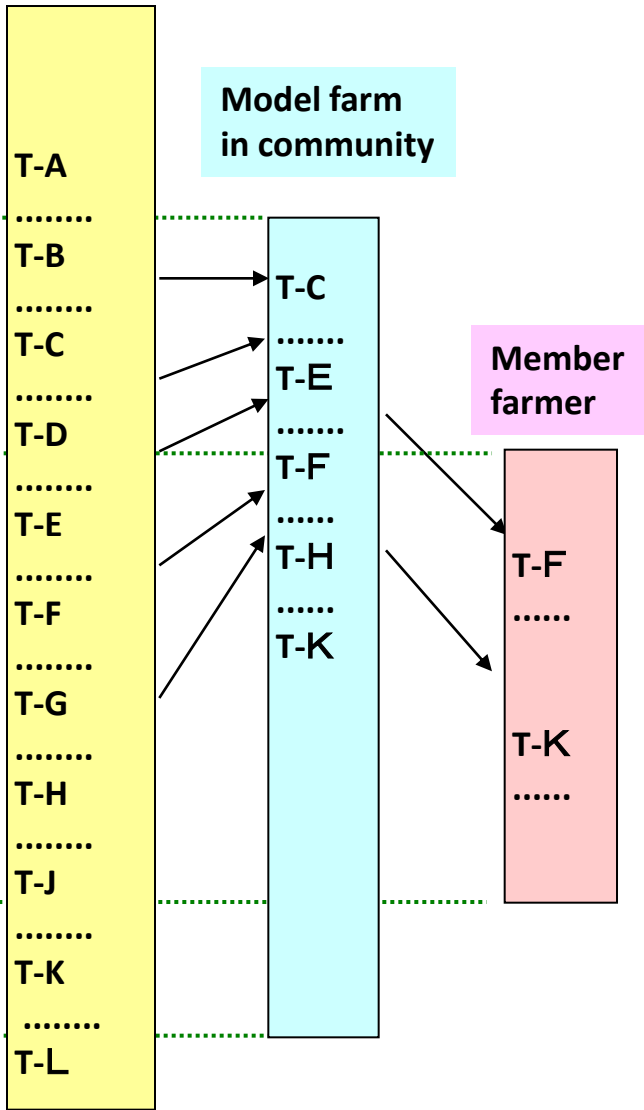
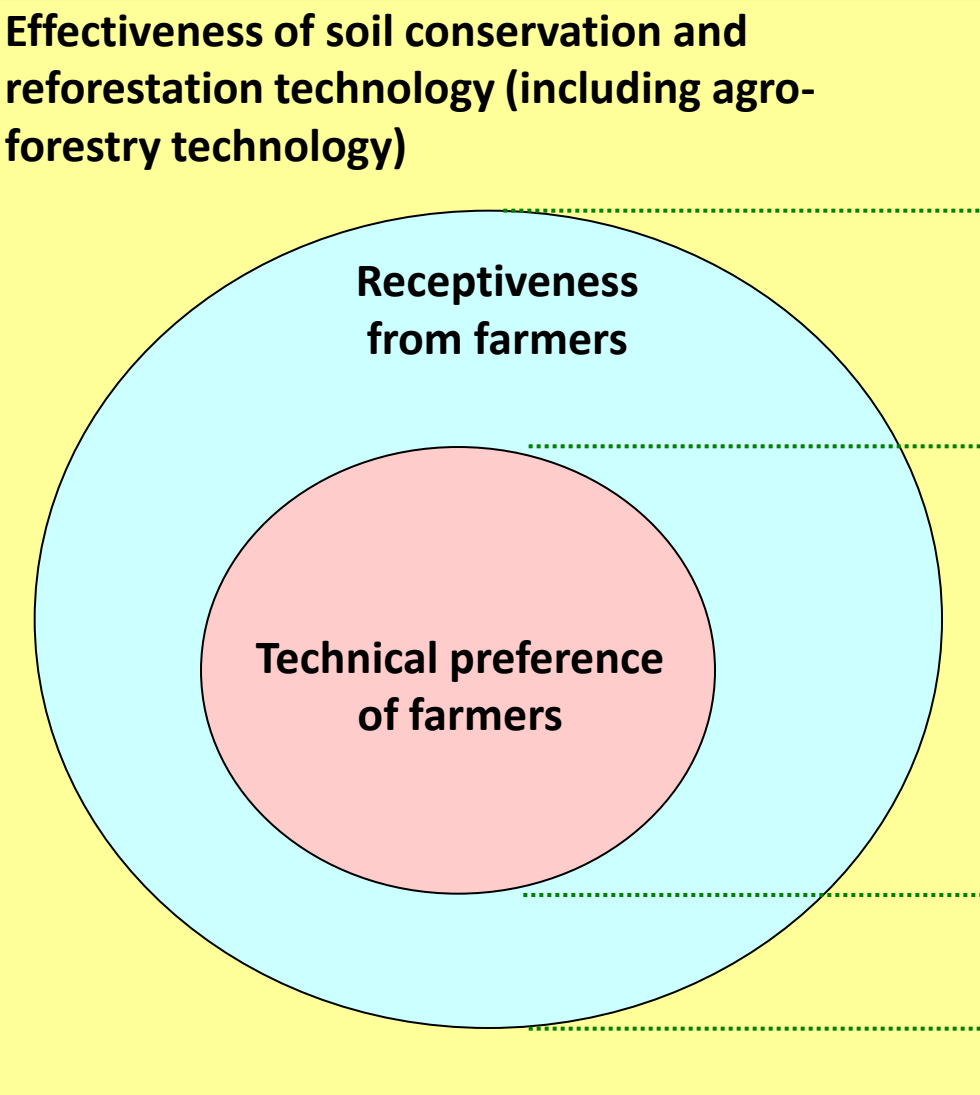




# Demonstration farm (1.42ha)



**Demo-farm**



T: Technology





# Proyecto PLAN INTEGRAL

## COMUNIDAD: Y T A K Y T Y



### INFRAESTRUCTURA

Huerta.  
Gallinero.  
Adquisición DE: Máquina Fecundadora  
Vaca Lechera Holandesa

### CAPACITACION

Pelusería, Elaboración De Productos  
De Limpieza: Aldina Brites.  
Avicultura, Vivero, Jardinería: Coostancio  
Mascareño.



2009

| ENERO |    |    |    |    |    |    |
|-------|----|----|----|----|----|----|
| L     | M  | M  | J  | V  | S  | D  |
|       |    |    |    |    |    | 1  |
| 2     | 3  | 4  | 5  | 6  | 7  | 8  |
| 9     | 10 | 11 | 12 | 13 | 14 | 15 |
| 16    | 17 | 18 | 19 | 20 | 21 | 22 |
| 23    | 24 | 25 | 26 | 27 | 28 | 29 |
| 30    | 31 |    |    |    |    |    |

| FEBRERO |    |    |    |    |    |    |
|---------|----|----|----|----|----|----|
| L       | M  | M  | J  | V  | S  | D  |
|         |    |    | 1  | 2  | 3  | 4  |
| 5       | 6  | 7  | 8  | 9  | 10 | 11 |
| 12      | 13 | 14 | 15 | 16 | 17 | 18 |
| 19      | 20 | 21 | 22 | 23 | 24 | 25 |
| 26      | 27 | 28 |    |    |    |    |
|         |    |    |    |    |    |    |

| MARZO |    |    |    |    |    |    |
|-------|----|----|----|----|----|----|
| L     | M  | M  | J  | V  | S  | D  |
|       |    |    | 1  | 2  | 3  | 4  |
| 5     | 6  | 7  | 8  | 9  | 10 | 11 |
| 12    | 13 | 14 | 15 | 16 | 17 | 18 |
| 19    | 20 | 21 | 22 | 23 | 24 | 25 |
| 26    | 27 | 28 | 29 | 30 | 31 |    |
|       |    |    |    |    |    |    |

| ABRIL |    |    |    |    |    |    |
|-------|----|----|----|----|----|----|
| L     | M  | M  | J  | V  | S  | D  |
|       |    |    |    |    | 1  | 2  |
| 3     | 4  | 5  | 6  | 7  | 8  | 9  |
| 10    | 11 | 12 | 13 | 14 | 15 | 16 |
| 17    | 18 | 19 | 20 | 21 | 22 | 23 |
| 24    | 25 | 26 | 27 | 28 | 29 | 30 |
|       |    |    |    |    |    |    |

| MAYO |    |    |    |    |    |    |
|------|----|----|----|----|----|----|
| L    | M  | M  | J  | V  | S  | D  |
| 1    | 2  | 3  | 4  | 5  | 6  | 7  |
| 8    | 9  | 10 | 11 | 12 | 13 | 14 |
| 15   | 16 | 17 | 18 | 19 | 20 | 21 |
| 22   | 23 | 24 | 25 | 26 | 27 | 28 |
| 29   | 30 | 31 |    |    |    |    |
|      |    |    |    |    |    |    |

| JUNIO |    |    |    |    |    |    |
|-------|----|----|----|----|----|----|
| L     | M  | M  | J  | V  | S  | D  |
|       |    |    |    |    | 1  | 2  |
| 3     | 4  | 5  | 6  | 7  | 8  | 9  |
| 10    | 11 | 12 | 13 | 14 | 15 | 16 |
| 17    | 18 | 19 | 20 | 21 | 22 | 23 |
| 24    | 25 | 26 | 27 | 28 | 29 | 30 |
|       |    |    |    |    |    |    |

| JULIO |    |    |    |    |    |    |
|-------|----|----|----|----|----|----|
| L     | M  | M  | J  | V  | S  | D  |
|       |    |    |    |    | 1  | 2  |
| 3     | 4  | 5  | 6  | 7  | 8  | 9  |
| 10    | 11 | 12 | 13 | 14 | 15 | 16 |
| 17    | 18 | 19 | 20 | 21 | 22 | 23 |
| 24    | 25 | 26 | 27 | 28 | 29 | 30 |
| 31    |    |    |    |    |    |    |

| AGOSTO |    |    |    |    |    |    |
|--------|----|----|----|----|----|----|
| L      | M  | M  | J  | V  | S  | D  |
|        |    | 1  | 2  | 3  | 4  | 5  |
| 6      | 7  | 8  | 9  | 10 | 11 | 12 |
| 13     | 14 | 15 | 16 | 17 | 18 | 19 |
| 20     | 21 | 22 | 23 | 24 | 25 | 26 |
| 27     | 28 | 29 | 30 | 31 |    |    |
|        |    |    |    |    |    |    |

| SEPTIEMBRE |    |    |    |    |    |    |
|------------|----|----|----|----|----|----|
| L          | M  | M  | J  | V  | S  | D  |
|            |    |    |    |    | 1  | 2  |
| 3          | 4  | 5  | 6  | 7  | 8  | 9  |
| 10         | 11 | 12 | 13 | 14 | 15 | 16 |
| 17         | 18 | 19 | 20 | 21 | 22 | 23 |
| 24         | 25 | 26 | 27 | 28 | 29 | 30 |
|            |    |    |    |    |    |    |

| OCTUBRE |    |    |    |    |    |    |
|---------|----|----|----|----|----|----|
| L       | M  | M  | J  | V  | S  | D  |
|         |    |    |    |    |    | 1  |
| 2       | 3  | 4  | 5  | 6  | 7  | 8  |
| 9       | 10 | 11 | 12 | 13 | 14 | 15 |
| 16      | 17 | 18 | 19 | 20 | 21 | 22 |
| 23      | 24 | 25 | 26 | 27 | 28 | 29 |
| 30      | 31 |    |    |    |    |    |

| NOVIEMBRE |    |    |    |    |    |    |
|-----------|----|----|----|----|----|----|
| L         | M  | M  | J  | V  | S  | D  |
|           |    |    |    |    |    | 1  |
| 2         | 3  | 4  | 5  | 6  | 7  | 8  |
| 9         | 10 | 11 | 12 | 13 | 14 | 15 |
| 16        | 17 | 18 | 19 | 20 | 21 | 22 |
| 23        | 24 | 25 | 26 | 27 | 28 | 29 |
| 30        |    |    |    |    |    |    |

| DICIEMBRE |    |    |    |    |    |    |
|-----------|----|----|----|----|----|----|
| L         | M  | M  | J  | V  | S  | D  |
|           |    |    |    |    |    | 1  |
| 2         | 3  | 4  | 5  | 6  | 7  | 8  |
| 9         | 10 | 11 | 12 | 13 | 14 | 15 |
| 16        | 17 | 18 | 19 | 20 | 21 | 22 |
| 23        | 24 | 25 | 26 | 27 | 28 | 29 |
| 30        | 31 |    |    |    |    |    |



# Erosion control by building contour ridge in field



Forage crops like elephant grass, cameroon grass, sorghum are planted on contour line or built ridge





**Extension of lupine culturing as winter green manure crop in the project area**

Objective

Increase of farmers' income

Activities of JIRCAS

Rural development based on CDM

Capacity building and training of farmers

Soil conservation activities

Female activities for income generation

Activities for land productivity increase and production diversification

Introduction of micro-credit

Activities of reforestation CDM

Income from CER

Acquisition of CER (Carbon credit)

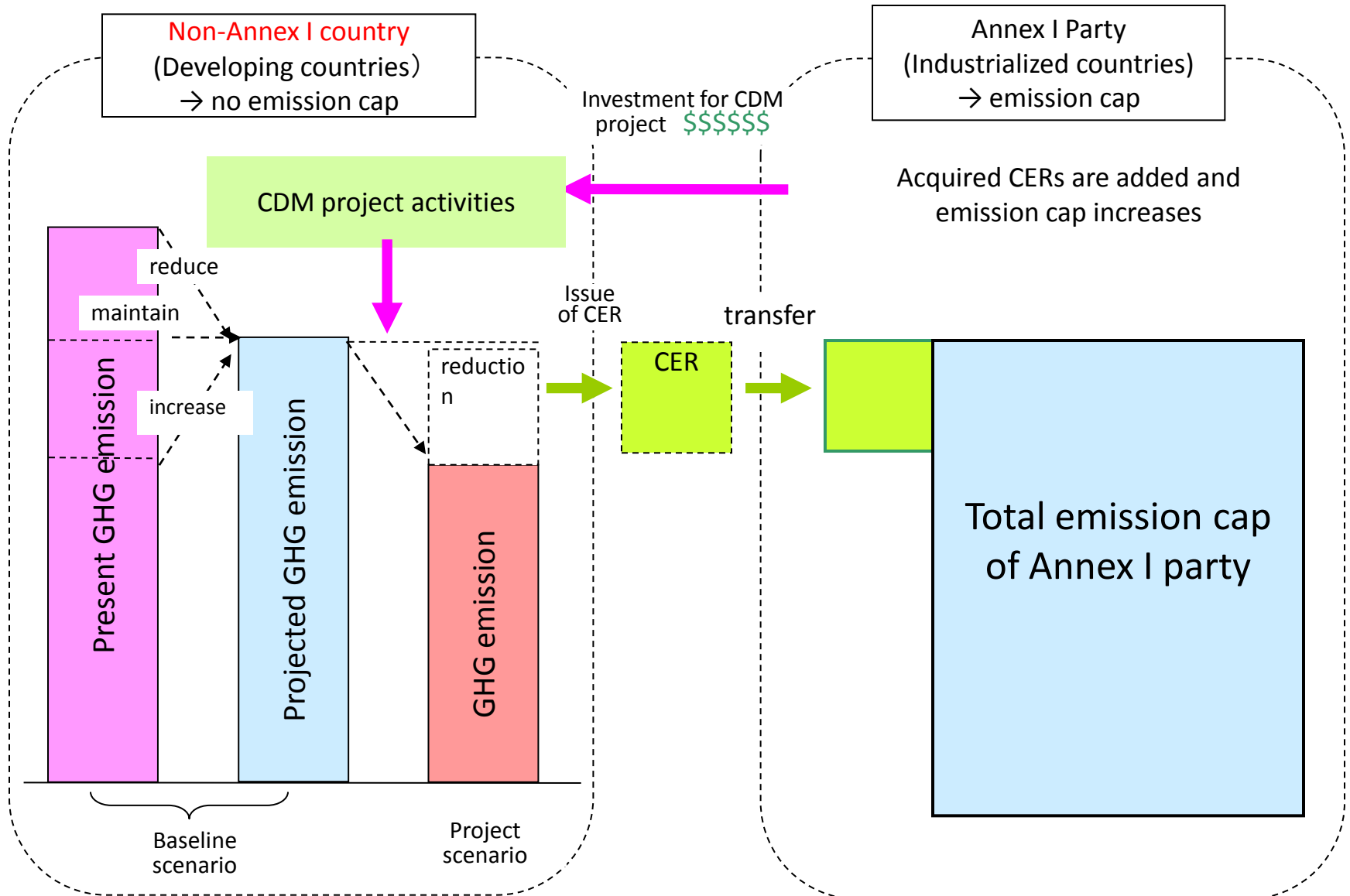
Actual situation

Serious soil erosion & soil degradation

Low productivity in agriculture and livestock

Low income

# Outline of CDM



CER: Certified Emission Reduction or "Carbon credit"

## Result of questionnaire survey before starting reforestation

|                          | Contents of survey   | Result (number, ha, %) |
|--------------------------|--|------------------------|
| 1. Project area          | Number of community  | 18 communities         |
|                          | Respondents to questionnaire                               | 345 farmers            |
| 2. Reforestation request | Total area requested for reforestation                     | 292.10 ha              |
|                          | Percentage of eucalypt reforestation                       | 63.9 %                 |
|                          | Average plantation area per farmer                         | 0.90 ha/farmer         |
|                          | Total area of plots being more than 0.5ha of reforestation | 71.26 ha               |
| 3. Agro-forestry         | Number of farmers who want to introduce agro-forestry      | 105 farmers (30.4%)    |
|                          | Total area requested for agro-forestry                     | 70.3 ha (24.1%)        |

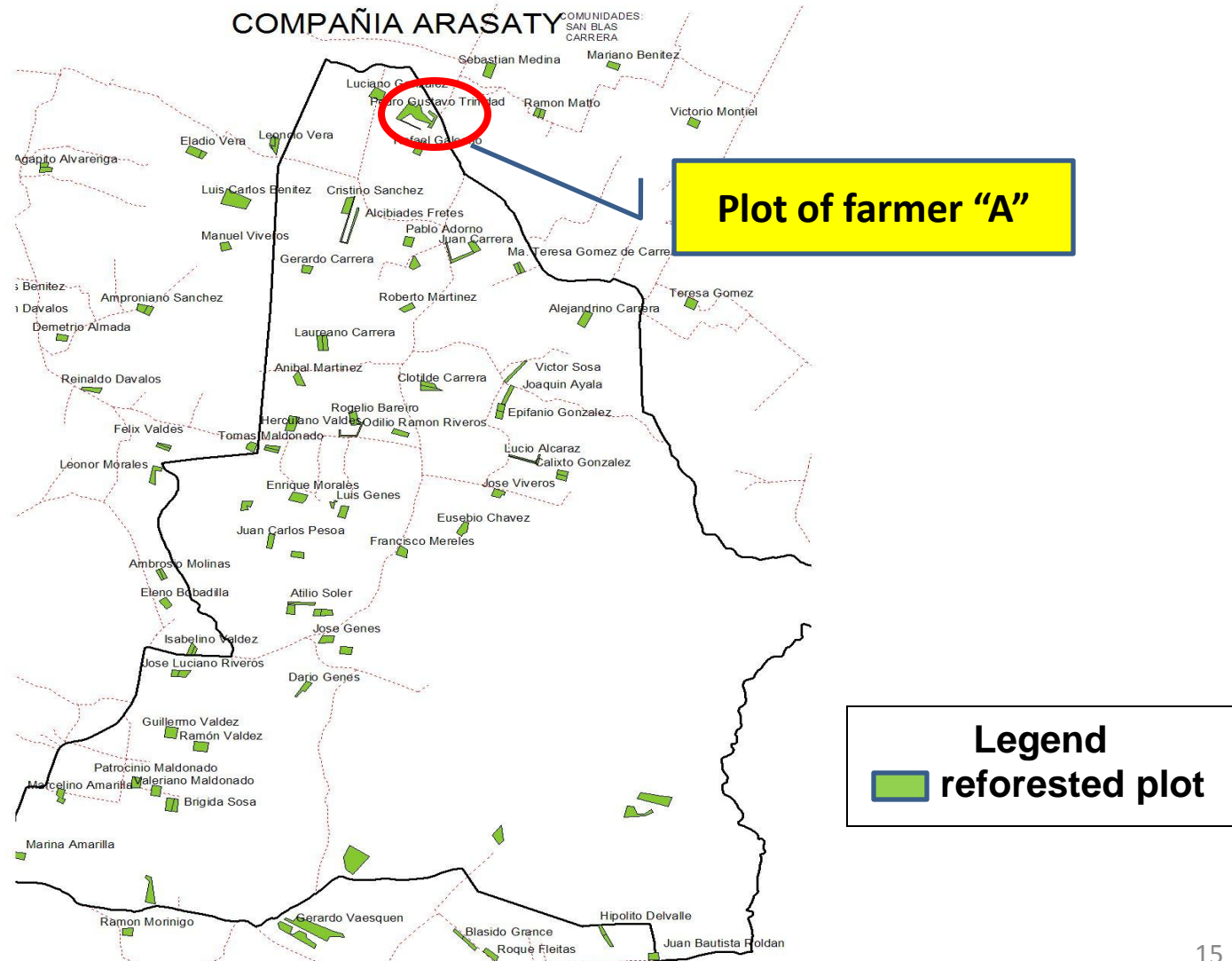
## Actual reforested area by the JIRCAS project

|  | Farmers (number) | Reforestation area (ha) | Agro-forestry area within reforestation (ha) | Ratio of agro-forestry (%) |
|--|------------------|-------------------------|--|----------------------------|
| Total                                    | 239              | 255.70                  | -  | -                          |
| Reforestation CDM (more than 0.5ha/plot) | 167              | 215.16                  | 52.35  | 24.3                       |



# Example of reforested plots

## San Blas community and Carrera community in District of San Roque González de Santa Cruz



# GPS Coordinates of reforested plot

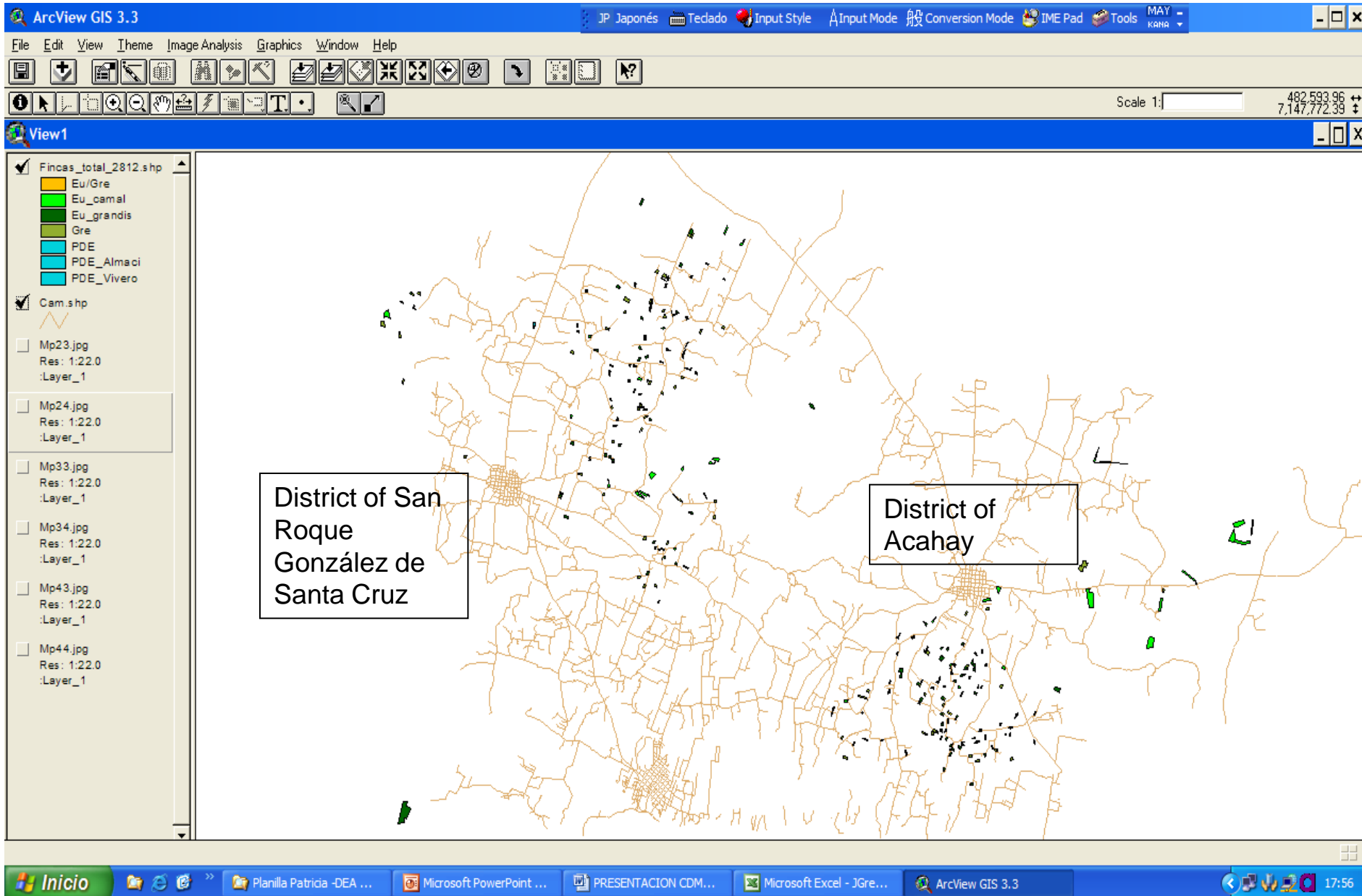
## Plot of farmer "A"



| No. | Latitude  | Longitude  |
|-----|-----------|------------|
| 1   | 477089.89 | 7144532.95 |
| 2   | 476894.00 | 7144640.00 |
| 3   | 477006.63 | 7144795.07 |
| 4   | 477052.00 | 7144741.00 |
| 5   | 477070.00 | 7144770.00 |
| 6   | 477093.00 | 7144752.00 |
| 7   | 477105.00 | 7144693.00 |
| 8   | 477182.00 | 7144608.00 |
| 9   | 477201.00 | 7144646.00 |
| 10  | 477151.00 | 7144696.00 |
| 11  | 477227.00 | 7144656.00 |
| 12  | 477173.00 | 7144548.00 |
| 13  | 477148.00 | 7144558.00 |
| 14  | 477171.00 | 7144589.00 |
| 15  | 477064.00 | 7144623.00 |
| 16  | 477047.00 | 7144639.00 |
| 17  | 477009.00 | 7144680.00 |
| 18  | 476929.00 | 7144625.00 |
| 19  | 477092.00 | 7144536.00 |

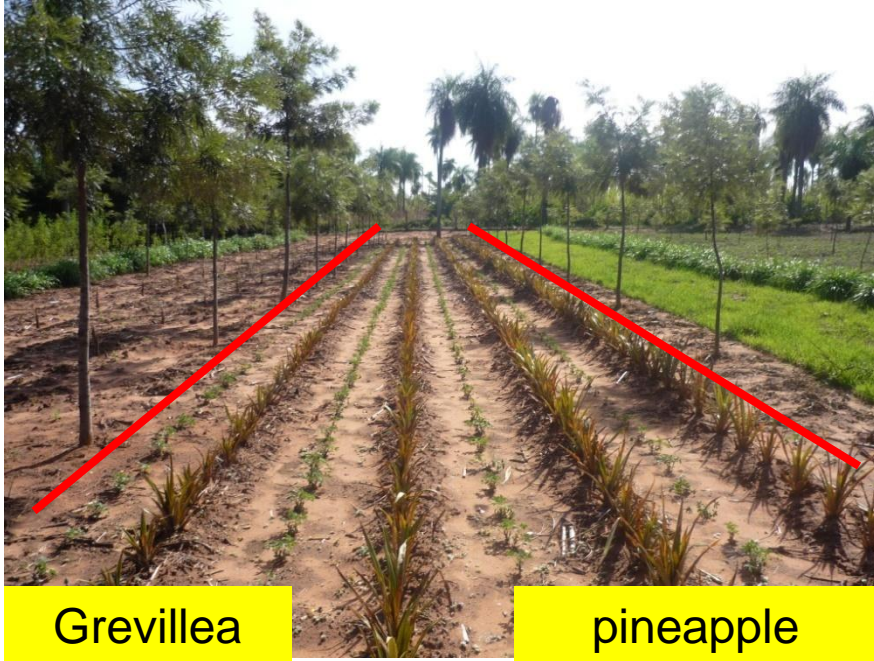
 reforested plot

# Overview of reforested plots in the project area





# Demonstration activities of agro-forestry and recuperation of soil fertility in demonstration farm

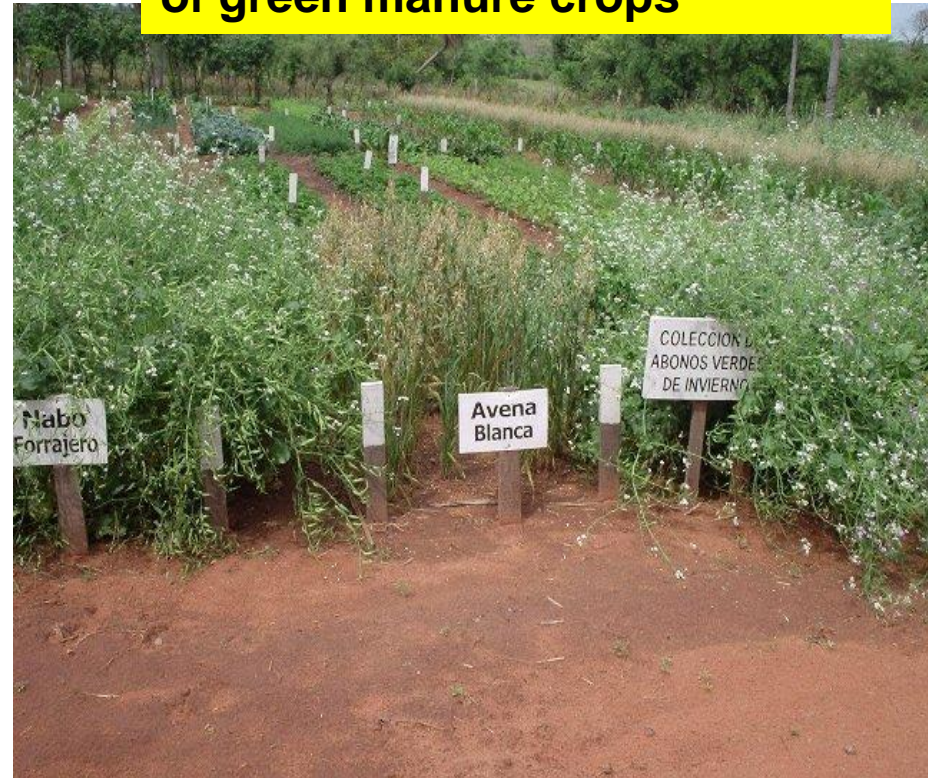


Grevillea

pineapple

**Agro-forestry experiment  
in Grevillea plot**

**Experiment and demonstration  
of green manure crops**



Nabo  
Forrajero

Avena  
Blanca

COLECCION DE  
ABONOS VERDES  
DE INVIERNO



# Seedling production in demonstration farm





# Training of leader farmers for tree planting in demonstration farm





# Tree planting



Training of farmers



Distribution of seedlings

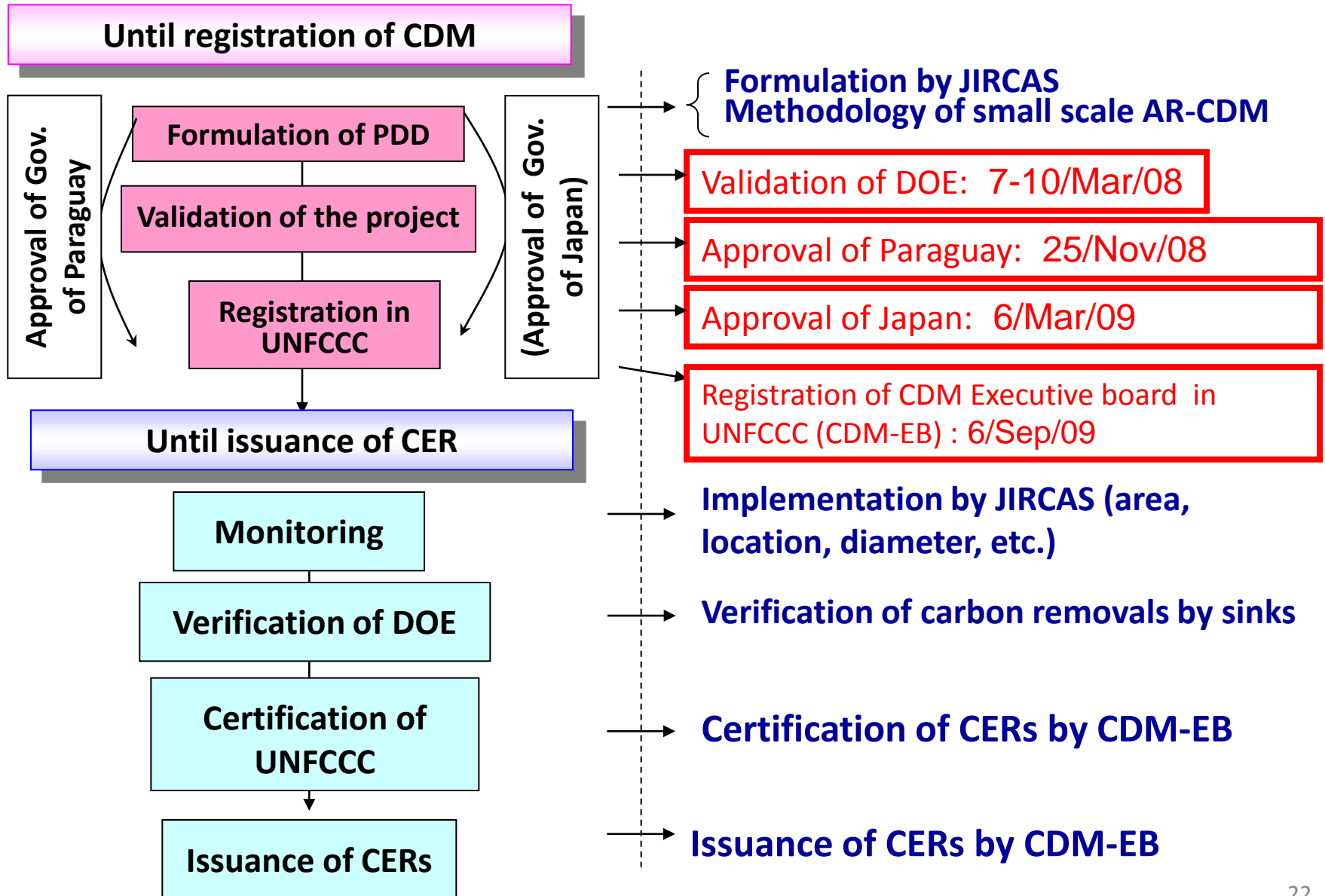


Planting



Eucalypt forest

# Implementation of CDM project





## Actual situation of reforested plot



Agro-forestry with *Grevillea robusta* (plant pineapple after plowing)



Pure forest of *Eucalyptus grandis* (after trimming)

# Activities for rural development

- ◆ Diversification of crop production including bio fuel trees
- ◆ Kitchen garden (vegetables)
- ◆ Aquaculture
- ◆ Beekeeping
- ◆ Improvement of stove
- ◆ Handicraft
- ◆ Microcredit



Kitchen garden

**Micro project of farmers group (MIG) assisted by the project is implemented with farmer's cost sharing of 30%.**



# Examples of rural development (group activities) in 2009



Kitchen garden  
(7 communities, 91 families)



Chicken raising for egg collection  
(5 communities, 54 families)

Besides above, handicraft training toward commercialization (2 communities, 43 families), introduction of pineapple production (3 communities, 5 farmers), microcredit (1 community, 1 women's group), stove improvement, marketing training, preparation for soil conservation contest, etc. are implemented.



# From kitchen garden to full-scale cash crop production



**Onion production for market  
in Rincón Costa community**



**Preparing to ship tomatoes in  
3 de Febrero community**

**Examples of production development which started  
from kitchen garden (technical transfer and seed  
supply) to commercialization**



# Extension of project output



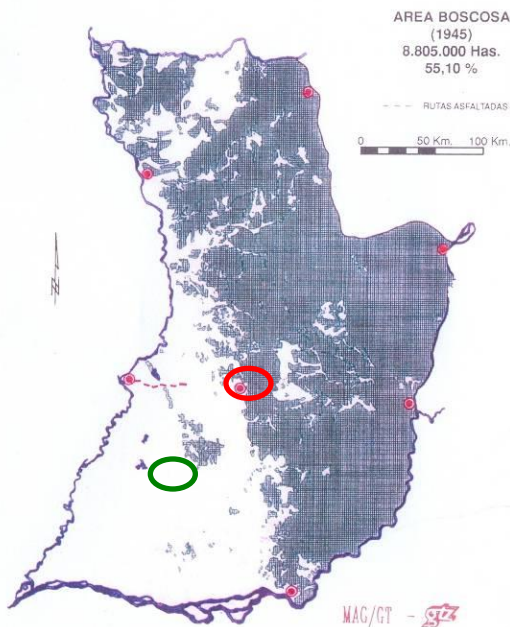
Meeting with candidate community members in **Caaguazú Department** and JIRCAS project team



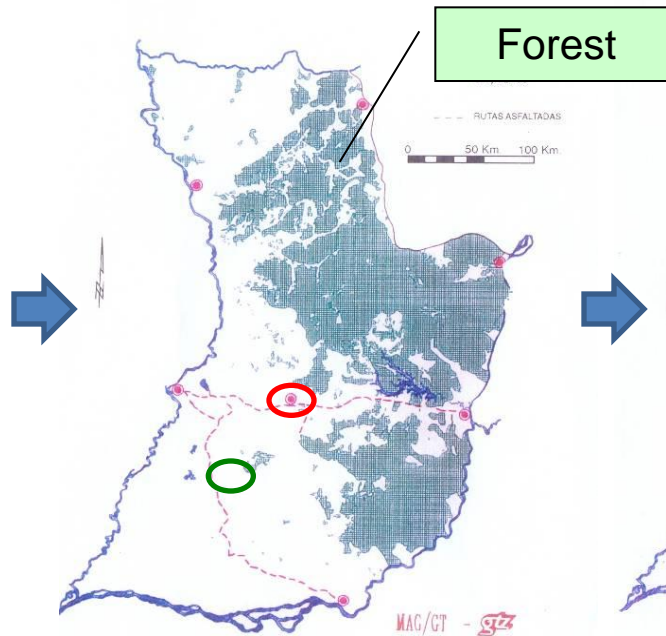
Training of tree planting for **Oñondivepá** (local NGO) staff in JIRCAS demonstration farm

# Location of projects and long-term change of forest cover in eastern Paraguay

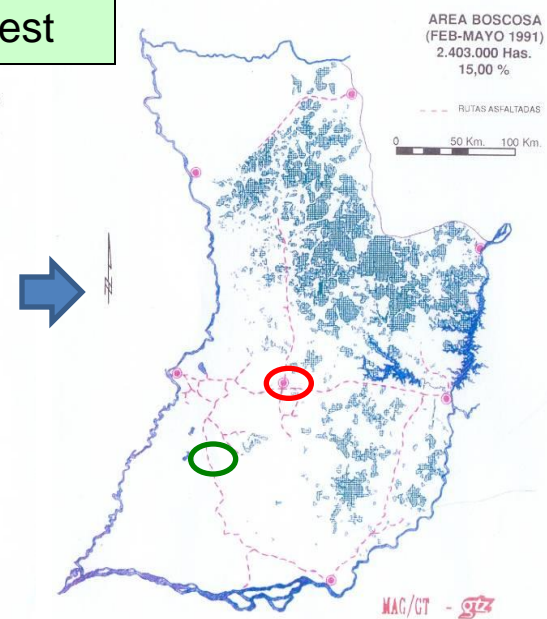
In 1945



In 1975



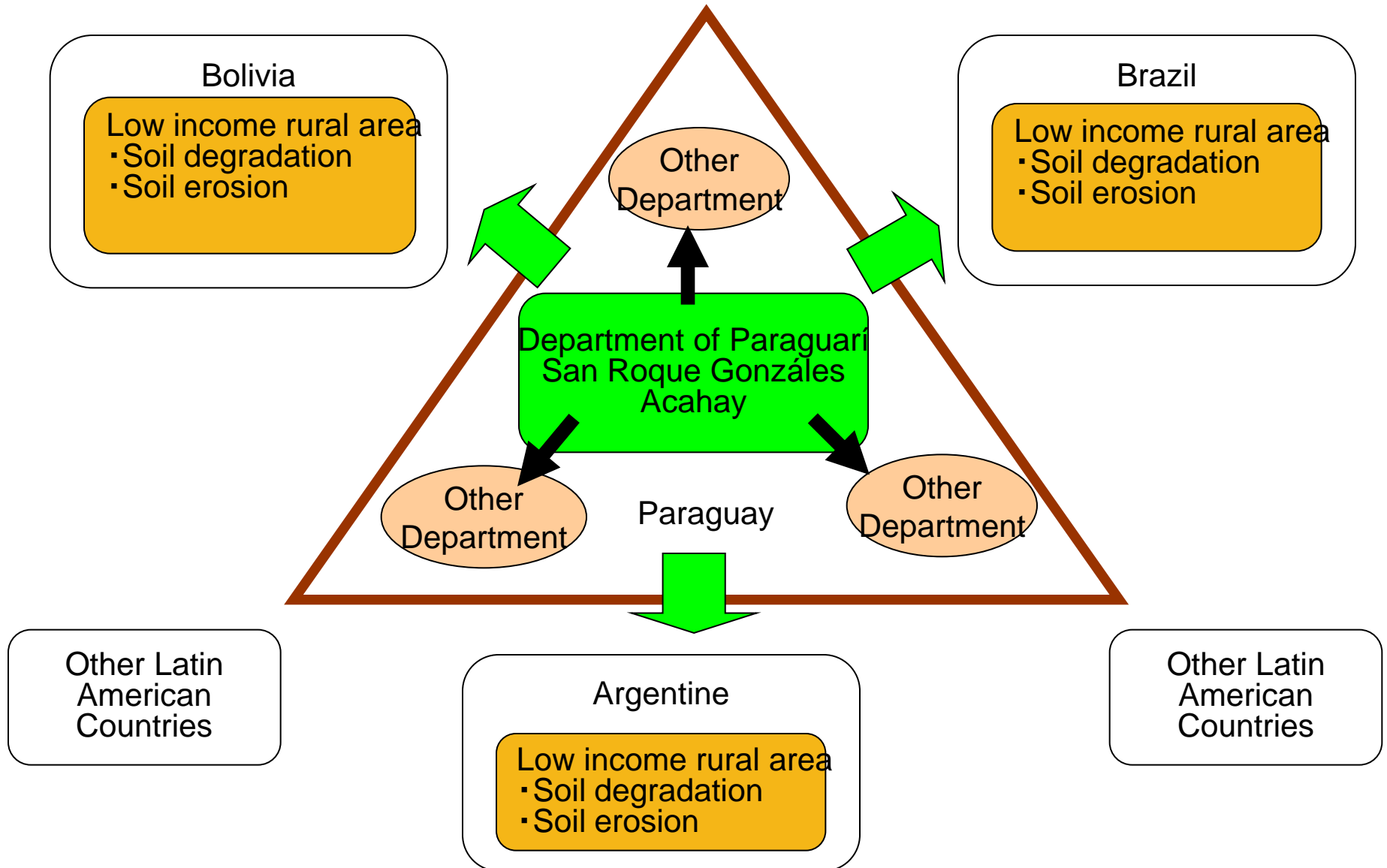
In 1991



○ JIRCAS project in Paraguari Department

○ Candidate new project in Caaguazú Department

# Potentiality of extension of JIRCAS type rural development model





**Parcela Demostrativa  
y Vivero Forestal**

**PROYECTO JIRCAS**

Centro Internacional de Investigación de Ciencias Agropecuarias del Japón

Estudio de Validación de Medidas contra el Calentamiento  
Global basado en Reforestación - MDL

 CONVENIO JIRCAS / MAG / SEAM / FCA / JICA / INFOVA  
GOBERNACIÓN DE PARAGUARI  
[www.jircas.org/paraguay.org](http://www.jircas.org/paraguay.org)



Thank you for your attention