Rural Development and Reforestation
CDM in Paraguay

Eiji Matsubara

JIRCAS
Rural Development Planning Division
Soil degradation in South America

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

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Degraded farm land</th>
<th>Stable farm land</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ha</td>
<td>%</td>
<td>ha</td>
</tr>
<tr>
<td>Argentina</td>
<td>55</td>
<td>20</td>
<td>223</td>
</tr>
<tr>
<td>Bolivia</td>
<td>15</td>
<td>14</td>
<td>94</td>
</tr>
<tr>
<td>Brasil</td>
<td>125</td>
<td>15</td>
<td>721</td>
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<tr>
<td>Chile</td>
<td>29</td>
<td>40</td>
<td>43</td>
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<tr>
<td>Paraguay</td>
<td>3</td>
<td>8</td>
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<tr>
<td>Total</td>
<td>227</td>
<td>17</td>
<td>1,118</td>
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Source: ISRIC/UNEP 1990
Soil degradation in Paraguay

Source: ISRIC, UNEP, 1990

ann. rainfall: 1,407mm
ave. temp.: 22.6°C
## Schedule of JIRCAS study

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<th>Item</th>
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<td>• Sign on agreement between relating institutes</td>
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<tr>
<td>• Baseline survey (1)</td>
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<tr>
<td>• Baseline survey (2)</td>
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<td>• Validation report</td>
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<td>• Registration procedures in CDM-EB</td>
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<tr>
<td>• Establishment of monitoring system and training</td>
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<td>• Extension of project activity to other area</td>
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<td></td>
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<tr>
<td>• First monitoring</td>
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<tr>
<td>• Verification by DOE</td>
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<td>• Preparation of guideline and manual</td>
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<td>• International seminar</td>
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</table>
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)

- Joint experiment plot with Asunción Univ.
- Agro-forestry
- Nursery
- Green manure crops
- Eucalypt forest for training

Asunción (91Km)
Route 1
Encarnación
Effectiveness of soil conservation and reforestation technology (including agro-forestry technology)

Receptiveness from farmers

Technical preference of farmers

Demo-farm

Model farm in community

Member farmer

T: Technology
Proyecto
PLAN INTEGRAL
COMUNIDAD: YTAKYTY

INFRAESTRUCTURA
Huevos.
Gallos.
Adquisición de: Máquina forestal
Vaca lechera galicia

CAPACITACIÓN
Peluquería, elaboración de productos de limpieza: Álvaro Batán.
Avicultura, vivero, leñero: Constancio Mascareño.

Calendario de 2006
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:
- Capacity building and training of farmers
- Female activities for income generation
- Introduction of micro-credit
- Soil conservation activities
- Activities for land productivity increase and production diversification
- Activities of reforestation CDM

Rural development based on CDM

Actual situation:
- Serious soil erosion & soil degradation
- Low productivity in agriculture and livestock
- Low income

Income from CER
Acquisition of CER (Carbon credit)
Outline of CDM

Non-Annex I country (Developing countries) → no emission cap

Annex I Party (Industrialized countries) → emission cap

CDM project activities

Investment for CDM project $$$$$

Acquired CERs are added and emission cap increases

Total emission cap of Annex I party

Baseline scenario

Present GHG emission

Projected GHG emission

GHG emission

Issue of CER

transfer

reduce

maintain

increase

CDM project activities

reduction

CER

CER: Certified Emission Reduction or “Carbon credit”
Result of questionnaire survey before starting reforestation

<table>
<thead>
<tr>
<th>1. Project area</th>
<th>Contents of survey</th>
<th>Result (number, ha, %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of community</td>
<td>18 communities</td>
<td></td>
</tr>
<tr>
<td>Respondents to questionnaire</td>
<td>345 farmers</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Reforestation request</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total area requested for reforestation</td>
<td>292.10 ha</td>
</tr>
<tr>
<td>Percentage of eucalypt reforestation</td>
<td>63.9 %</td>
</tr>
<tr>
<td>Average plantation area per farmer</td>
<td>0.90 ha/farmer</td>
</tr>
<tr>
<td>Total area of plots being more than 0.5ha of reforestation</td>
<td>71.26 ha</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Agro-forestry</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of farmers who want to introduce agro-forestry</td>
<td>105 farmers (30.4%)</td>
</tr>
<tr>
<td>Total area requested for agro-forestry</td>
<td>70.3 ha (24.1%)</td>
</tr>
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</table>

Actual reforested area by the JIRCAS project

<table>
<thead>
<tr>
<th>Farmers (number)</th>
<th>Reforestation area (ha)</th>
<th>Agro-forestry area within reforestation (ha)</th>
<th>Ratio of agro-forestry (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>239</td>
<td>255.70</td>
<td>-</td>
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<tr>
<td>Reforestation CDM (more than 0.5ha/plot)</td>
<td>167</td>
<td>215.16</td>
<td>52.35</td>
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</table>
Example of reforested plots

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

Legend
- reforested plot
GPS Coordinates of reforested plot

Plot of farmer "A"

<table>
<thead>
<tr>
<th>No.</th>
<th>Latitude</th>
<th>Longitude</th>
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<td>2</td>
<td>476894.00</td>
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<td>3</td>
<td>477006.63</td>
<td>7144795.07</td>
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<td>4</td>
<td>477052.00</td>
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<td>5</td>
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<td>13</td>
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<td>19</td>
<td>477092.00</td>
<td>7144536.00</td>
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</table>
Overview of reforested plots in the project area

District of San Roque González de Santa Cruz

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

Agro-forestry experiment in Grevillea plot

Experiment and demonstration of green manure crops
Seedling production in demonstration farm

- Sowing bed
- Pot filling
- Pot bed
- Seedling
Training of leader farmers for tree planting in demonstration farm

- Positioning
- Taking seedling out of pot
- Planting
- After training
Tree planting

Training of farmers

Distribution of seedlings

Planting

Eucalypt forest
Implementation of CDM project

Until registration of CDM

Formulation of PDD

Validation of the project

Registration in UNFCCC

Until issuance of CER

Monitoring

Verification of DOE

Certification of UNFCCC

Issuance of CERs

(Approval of Gov. of Paraguay)

Formulation by JIRCAS Methodology of small scale AR-CDM

Validation of DOE: 7-10/Mar/08

Approval of Paraguay: 25/Nov/08

Approval of Japan: 6/Mar/09

Registration of CDM Executive board in UNFCCC (CDM-EB): 6/Sep/09

Implementation by JIRCAS (area, location, diameter, etc.)

Verification of carbon removals by sinks

Certification of CERs by CDM-EB

Issuance of CERs by CDM-EB
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

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**: JIRCAS project in Paraguarí Department
- **In 1975**: Candidate new project in Caaguazú Department
- **In 1991**: Forest
Potentiality of extension of JIRCAS type rural development model

Bolivia
- Low income rural area
  - Soil degradation
  - Soil erosion

Brazil
- Low income rural area
  - Soil degradation
  - Soil erosion

Paraguay
- Department of Paraguari
  - San Roque Gonzáles
  - Acahay

Other Latin American Countries

Argentina
- Low income rural area
  - Soil degradation
  - Soil erosion

Other Latin American Countries

Other Department

Other Department
Thank you for your attention