Combining environmental benefits with Kyoto Protocol targets: case studies

Bucarest Romexpo Exhibitional Center, 22 April 2008
GBEP side event on “Opportunities and challenges for a sustainable development of bioenergy”

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The Company
Established in 1969, AGROTEC is a leading consulting firm operating at both national and international level in the fields of agricultural, rural development and environment.

AGROTEC's mission is to support Local Institutions by providing them technical assistance in those sectors of activity in which it is specialized (Agricultural and Rural Development, Fisheries and Aquaculture, Landscaping and Natural Resources, Environment and Renewable Energy, Agribusiness, Agroindustry and Marketing, Poverty Alleviation and Food Security, Livestock and Animal Health, Evaluation of Structural Funds and Projects, Supply of Laboratory equipment and commodity aid).
Environment and Energy

Agrotec has been following very closely the issue of climate change, which is nationally and internationally recognised as fundamental for environmental sustainability. Thanks to its alliances with prestigious institutes and Universities, Agrotec has been managing numerous climate change projects in various developing countries, mainly in the context of forestry and agriculture, leading it to become one of the major Italian consultancies in this field.

Policy advice and Strategic Planning
Environmental legislation
Climate Change,
Carbon sequestration
Development of methodologies for GHG accounting
Carbon inventories
Environmental Impact Assessment (EIA)
Strategic Environmental Assessment (SEA)
Environmental Monitoring
The objective of the UN Convention on Climate Change is stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

The 1997 Kyoto Protocol strengthens the Convention by committing Annex I Parties to individual, legally-binding targets to limit or reduce their greenhouse gas emissions.

The individual targets for Annex I Parties are listed in the Kyoto Protocol’s Annex B lead to a total cut in greenhouse-gas emissions of at least 5% from 1990 levels in the commitment period 2008-2012.
## Countries included in Annex B to the Kyoto Protocol and their emissions targets

<table>
<thead>
<tr>
<th>Country</th>
<th>Target (1990** - 2008/2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU-15, Bulgaria, Czech Republic, Estonia, Latvia, Liechtenstein, Lithuania, Monaco, <strong>Romania</strong>, Slovakia, Slovenia, Switzerland</td>
<td>-8%</td>
</tr>
<tr>
<td>US</td>
<td>-7%</td>
</tr>
<tr>
<td>Canada, Hungary, Japan, Poland</td>
<td>-6%</td>
</tr>
<tr>
<td>Croatia</td>
<td>-5%</td>
</tr>
<tr>
<td>New Zealand, Russian Federation, Ukraine</td>
<td>0</td>
</tr>
<tr>
<td>Norway</td>
<td>+1%</td>
</tr>
<tr>
<td>Australia</td>
<td>+8%</td>
</tr>
<tr>
<td>Iceland</td>
<td>+10%</td>
</tr>
</tbody>
</table>
Overall reduction in emissions levels of Annex I Parties determined by a sensible decrease in the emissions of countries with economies in transition, despite of the increased emissions of industrialized countries.

http://unfccc.int/ghg_emissions_data/items/3800.php
UNFCCC and the Kyoto Protocol

Greenhouse gas emissions excluding LULUCF

<table>
<thead>
<tr>
<th>Year</th>
<th>Annex I EIT Parties</th>
<th>Annex I non-EIT Parties</th>
<th>All Annex I Parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>1991</td>
<td>-11.6</td>
<td>-0.1</td>
<td>-5.3</td>
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<td>1992</td>
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<td>1993</td>
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</tr>
<tr>
<td>1994</td>
<td>-30.6</td>
<td>2.3</td>
<td>-14.5</td>
</tr>
<tr>
<td>1995</td>
<td>-32.1</td>
<td>3.2</td>
<td>-16.9</td>
</tr>
<tr>
<td>1996</td>
<td>-33.2</td>
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</tr>
<tr>
<td>1997</td>
<td>-36.4</td>
<td>6.3</td>
<td>-21.3</td>
</tr>
<tr>
<td>1998</td>
<td>-38.8</td>
<td>6.7</td>
<td>-23.8</td>
</tr>
<tr>
<td>1999</td>
<td>-39.4</td>
<td>9.0</td>
<td>-25.2</td>
</tr>
<tr>
<td>2000</td>
<td>-38.7</td>
<td>8.2</td>
<td>-26.5</td>
</tr>
<tr>
<td>2001</td>
<td>-38.3</td>
<td>8.6</td>
<td>-27.4</td>
</tr>
<tr>
<td>2002</td>
<td>-38.6</td>
<td>9.9</td>
<td>-28.7</td>
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<tr>
<td>2003</td>
<td>-36.5</td>
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</tr>
<tr>
<td>2004</td>
<td>-36.1</td>
<td>11.0</td>
<td>-30.3</td>
</tr>
<tr>
<td>2005</td>
<td>-35.2</td>
<td>11.0</td>
<td>-30.6</td>
</tr>
</tbody>
</table>

Note: (1) The Parties that are allowed to use a base year other than 1990 have also provided data for their respective base year as per COP decisions 9/CP.2 and 11/CP.4. These Parties and their base years are Bulgaria (1986), Hungary (average of 1985-1987), Poland (1988), Romania (1989) and Slovenia (1986); (2) For Croatia, Greece and Turkey, data from their 2006 submissions are used; for 2005, 2004 values are used as the latest available estimate; (3) The 1991 data for the Russian Federation used in this graph are obtained by the interpolation of the 1990 and 1992 data. The reported 1991 value for the emissions from the energy sector appears to contain a technical error (182,722.3 Gg compared with 2,382,402.0 Gg in 1990 and 2,017,364.5 Gg in 1992).

http://unfccc.int/ghg_emissions_data/items/3800.php
Emission reduction targets

Direct human induced Land Use
Land Use Change and Forestry activities (art. 3.3-3.4 KP)

Activities: afforestation, reforestation, deforestation
revegetation, forest management, cropland management, grazing land management

Removals of GHG from the atmosphere associated to LULUCF activities are referred to as "carbon sinks"
The Kyoto Protocol defines three “flexibility mechanisms” to lower the overall costs of achieving its emissions targets.

These mechanisms enable Parties to access cost-effective opportunities to reduce emissions or to remove carbon from the atmosphere in other countries.

While the cost of limiting emissions varies considerably from region to region, the benefit for the atmosphere is the same, wherever the action is taken.

Under the mechanisms of Joint Implementation (JI) / Clean Development Mechanism (CDM), an Annex I Party may implement a project that reduces emissions (e.g. energy efficiency) or increases removals by sinks (e.g. a reforestation project) in the territory of another Annex I Party/non Annex I Party, and use the resulting emission reduction units (ERUs/ CERs) towards meeting its emission target under the Protocol.
Site selection criteria

Eligibility - Not forested at 31 December 1989
Additionality - Outside of already existing afforestation activities

No land tenure or land use conflict
Low human pressure
Carbon accounting rules

Baseline scenario

Time since project start

Carbon stock per hectare

- C uptake by project
- Natural regeneration
- Constant C stocks
- Natural degeneration
- Anthropogenic degeneration
Leakage

A leakage effect is “the net change of anthropogenic emissions by sources and/or removals by sinks of greenhouse gases which occurs outside the project boundary, and which is measurable and attributable to the project activity”.
Calculations of net anthropogenic GHG removals by sinks

Verifiable changes in carbon stocks within the project boundaries

The increase in emission of the GHG by sources

ACTUAL NET GHG REMOVALS BY SINKS

BASELINE & LEAKAGE

NET ANTHROPOGENIC GHG REMOVALS BY SINKS

Carbon credits
Project phases

CDM project activity cycle

- Design
  - Validation/registration
  - Monitoring
  - Verification/certification
  - Issuance

- Accreditation/designation

- Carbon credits

PP: Project Proponent
DOE: Designated Operational Entity
EB: Executive Board
DNA: Designated National Authority

Project Design Document (PDD) and Methodology (Baseline and Monitoring) based on IPCC GPG

http://cdm.unfccc.int/CommonImages/ProjectCycleSlide
PREPARATION AND DESIGN OF THE UKRAINE REFORESTATION BIOCARBON FUND PROJECT

Japanese Grant TF No. TF054610; Project ID No. P092158
The problem:
Radioactive contamination
High frequency of fires over former croplands spreading further radionuclides

(Yoshida, Muramatsu, Ban-Nai, 1996)
Objectives - to re-establish **4352.7** hectares of natural forests on abandoned agricultural lands in the territory of Ghytomir and Kiev oblasts, near Chernobyl. The abandoned agricultural lands are particularly fire prone in respect to forest, and fire in these open areas has proven to be an effective means of distributing radioactive contamination to surrounding inhabited areas.

Activities - Project areas reforested with endemic tree species including: 40% of mixed stands made up Scotch pine (*Pinus sylvestris*) and Birch (*Betula pendula*) and 60% of pure birch stands. Preference was given to birch in order to minimize the risks related to pure pine plantations therefore to guarantee the future permanence of the plantation, especially regarding fire and pests.

Benefits - The project will bring the lands back into the economic cycle resulting in creation of new jobs (level of occupation estimated as 80-125 thousands p/d), potentially non contaminated timber production (1 million m³ in 50-80 years) and sanitary improvement of the area, through immobilization of radionuclids in the environment, improved water quality and conservation of biodiversity as well as CO₂ sequestration from the atmosphere.
Historic trend of Afforestation/Reforestation on non-forest land in the Kiev and Ghytomyr oblasts

<table>
<thead>
<tr>
<th></th>
<th>Actual (ha)</th>
<th>Expected* (ha)</th>
<th>Actual (ha)</th>
<th>Expected* (ha)</th>
<th>Actual (ha)</th>
<th>Expected* (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Ghytomyr</td>
<td>0</td>
<td>400</td>
<td>0</td>
<td>400</td>
<td>0</td>
<td>400</td>
</tr>
<tr>
<td>Kiev</td>
<td>40</td>
<td>500</td>
<td>45</td>
<td>500</td>
<td>164</td>
<td>500</td>
</tr>
</tbody>
</table>

Actual rate of afforestation compared with the planned rates according to the state Program “Forest of Ukraine”.
The baseline scenario is represented by abandoned agricultural fields covered by weeds, where natural regeneration and background afforestation take place at a very low rate.

Agricultural land abandoned since 1986
Rate of background afforestation: 0.28 % yr$^{-1}$ (1994-2004)
Rate of natural regeneration: 0.1% yr$^{-1}$
Trend of carbon stock in baseline scenario

Trend of carbon stock in project scenario

Mean carbon accumulation: 0.21 t C/ ha yr

Ukraine Reforestation Biocarbon project

GHG removals by sinks (Project and baseline scenario)
### Ukraine Reforestation Biocarbon project

#### Carbon credits

<table>
<thead>
<tr>
<th>Year</th>
<th>Carbon Credits (1000 tonne CO₂ eq.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>0</td>
</tr>
<tr>
<td>2008</td>
<td>100</td>
</tr>
<tr>
<td>2010</td>
<td>200</td>
</tr>
<tr>
<td>2012</td>
<td>300</td>
</tr>
<tr>
<td>2014</td>
<td>400</td>
</tr>
<tr>
<td>2016</td>
<td>500</td>
</tr>
<tr>
<td>2018</td>
<td>600</td>
</tr>
<tr>
<td>2020</td>
<td>700</td>
</tr>
<tr>
<td>2022</td>
<td>800</td>
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<td>2024</td>
<td>900</td>
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<td>2026</td>
<td>1000</td>
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<tr>
<td>2028</td>
<td>1100</td>
</tr>
<tr>
<td>2030</td>
<td>1200</td>
</tr>
<tr>
<td>2032</td>
<td>1300</td>
</tr>
</tbody>
</table>

- **Annual carbon credits**: 2.6 tonnes CO₂ eq. /ha yr (average up to 2028)
- **Total carbon credits (2028)**: 232800 tonnes CO₂ eq.
ALBANIA
Community – Based Carbon Sequestration
Loan/Credit Grant Number TF 053325
The Problem:
Land degradation has been identified as a major issue for Albania. Currently, highly degraded land is subject to uncontrolled grazing which prevents the development of a protective vegetation cover. It is essential that a vegetative cover is established soon, to halt erosion.
Albania Community Based Carbon Sequestration

Objectives
To undertake a carbon sequestration project through afforestation and reforestation of degraded lands, by setting aside and protecting land to make natural re-growth possible, leading to enhanced sources of livelihood and incomes in poor rural areas, reduced soil degradation, improved water quality and conservation of biodiversity.

Activities
Interventions financed under the NRDP include: (a) protection of land from grazing by fencing therefore promoting natural seeds sources and enabling natural regeneration or re-growth; (b) supplemental planting at 200-500 seedlings per ha to enrich species diversity and to stabilize highly eroded areas, and (c) basic silvicultural operations (coppicing, cleaning and thinning).
The afforestation/reforestation activities will cover 6,316.7 ha distributed over five regions, in 24 communes that are among the poorest in the country, with a median poverty rate of 42%.

Benefits
Over 80,000 people will benefit from this project through short and medium term employment, reduction of maintenance costs of irrigation and drainage infrastructure, reduction of the cost of water treatment and reduction of flood risk.
Albania Community Based Carbon Sequestration

5 Regions

- Kukes
- Shkodder
- Dibra
- Elbasan
- Korce

Districts 10
Communes 24
Villages 107
N of Plots 200
Av_area 30 ha

Total project area: 6050 ha
Net Carbon sequestration by the Albanian Project

\( \sim 470,000 \text{ tCO}_2\text{eq} \) in 20 years for 6,300 ha

Annual carbon credits: 3.7 tCO\(_2\) ha\(^{-1}\) yr\(^{-1}\)
Excluding animal grazing and human disturbance the land degradation process can be reversed.
Albania Community Based Carbon Sequestration
With each successive rotation, the benefit of fossil fuel substitution accumulates, whereas the growth rate of the sink kept in perpetuity diminishes as the stand grows to maturity.

On the other hand stands kept in perpetuity may have significant environmental benefits (biodiversity, soil erosion, slope stability, etc.)

(Kirschbaum, 2003)
Thank you for your attention!