Carbon credits from peatland rewetting - climate, biodiversity, land use

Science, policy, implementation and recommendations of a pilot project in Belarus

Franziska Tanneberger & Wendelin Wichtmann
Carbon credits from peatland rewetting

The idea is good, but how to put it into practice?

DRAINED PEATLANDS ACCOUNT FOR ONLY 0.3% OF THE GLOBAL LAND AREA. AT THE SAME TIME, THEY ARE THE SOURCE OF A DISPROPORTIONAL 6% OF TOTAL HUMAN-CAUSED CO2 EMISSIONS, A PROBLEM NEEDS TO BE ADDRESSED. THE 'HOTSPOTS' ARE WELL-KNOWN: SOUTHEAST ASIA, CENTRAL AND EASTERN EUROPE, PARTS OF THE UNITED STATES AND NORTHEAST CHINA. THE SOLUTION IS OBVIOUS: RESTORE HIGH WATER LEVELS IN PEATLANDS. BUT MANY QUESTIONS REMAIN:

How does rewetting affect greenhouse gas fluxes? What about methane? Are the emissions measurable, verifiable and reportable? How can emission reductions from peatland rewetting be credibly linked to Kyoto Protocol commitments? Can they be sold on the voluntary carbon market? How does rewetting influence biodiversity? And, may rewetted peatlands still be used productively?

Belarus ranks 9th among the world’s countries in terms of peatland CO2 emissions and occupies 3rd place in emissions per unit land area. In recent years, tens of thousands of hectares of drained peatlands in Belarus have been rewetted.

This volume provides a synthesis of the challenges encountered and solutions adopted in a pilot project conducted in Belarus between 2008 and 2011. It presents data and conclusions from the project and relates basic principles to advanced applications, integrating science and politics, ecology and economy. The experiences and recommendations set forth in this volume will inspire practitioners, scientists and politicians alike.

The project 'Restoring Peatlands and Applying Concepts for Sustainable Management in Belarus - Climate Change Mitigation with Economic and Biodiversity Benefits' is financed by the Federal Republic of Germany through KfW Internationale in the framework of the International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). It is co-financed by the Royal Society for the Protection of Birds (RSPB), the Wildlife Conservation Society (WCS) and the Michael Lebach Foundation, Germany. It is carried out with support of the United Nations Development Programme (UNDP) in Belarus and the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus.

Franziska Tanneberger & Wendelin Wichtmann (eds.)

Carbon credits from peatland rewetting

Climate – biodiversity – land use

Schweizerbart
Science Publishers

Book published in 2011 in en/ru with 44 contributors
Why Belarus?

Present area of natural peatlands: 7% of the area (~1.5 mio ha)

Present area of drained peatlands: 7% of the area (~1.5 mio ha)
Belarus ranks 3rd among the world's countries in terms of peatland CO2 emissions per unit land area
What did the project do?

Key steps to selling carbon credits in Belarus

• Develop a standard for the voluntary market*
• Develop an assessment tool for emission reductions (ER)
• Gain rewetting experience
• Secure permanence and top up non-climate benefits
• Build capacity

* Belarus = non-Annex B country to Kyoto Protocol
Develop a standard for the voluntary market

- Verified carbon standard (VCS)
- Global benchmark standard
- VCS Peatland Rewetting and Conservation (VCS-PRC) established in March 2011
- Provides guidance on eligible project categories, GHG sources and carbon pools, baseline determination, leakage calculation, and GHG emission reductions and removals calculation
Develop an assessment tool for ER

- ER must be measurable, reportable and verifiable (MRV-able)
- Measuring GHG fluxes: too expensive for projects
- Meta-analysis: mean annual water level = the best single explanatory variable for annual GHG fluxes

Couwenberg et al. (2011)
Emissions strongly related to water level
Vegetation strongly related to water level

→ Use vegetation as indicator for emissions
Using vegetation as a proxy for GHG emissions

Advantages
• reflects longer-term water level conditions
• reflects factors that determine GHG emissions (e.g. nutrient availability, land use…),
• itself determines GHG emissions (e.g. aerenchyma mediated CH$_4$)
• allows fine-scaled mapping

Disadvantages
• slow reaction on environmental changes
• necessity to calibrate for different climatic and phytogeographical conditions.
GESTs with indicator species groups and with GWP

Applying GESTs in rewetting projects
• gap-filling
• regional calibration
• Belarus: 23 site types measured in 2010-2012

→ assign vegetation types to GWP based on published emission values/vegetation data, water level data/models, and expert knowledge
GEST assessment Ostrovskoe (704 ha)

7.8 t CO2-eq/ha/yr

ER in 2039: 4.5 t CO2-eq/ha/yr

Couwenberg et al. (2011)
GEST assessment Vygonoshansko (1050 ha)

Couwenberg et al. (2011)
## Expectations vs. reality: How to ‘loose’ 10 tonnes?

<table>
<thead>
<tr>
<th>assumptions</th>
<th>reduction (t CO2-eq/ha) – conservative</th>
</tr>
</thead>
<tbody>
<tr>
<td>original approach (1990 vs 2013-2017)</td>
<td>11.1</td>
</tr>
<tr>
<td>other reference (2013-2017)</td>
<td>5.1</td>
</tr>
<tr>
<td>other crediting period (2010-2039)</td>
<td>3.3</td>
</tr>
<tr>
<td>minus permanence</td>
<td>2.2</td>
</tr>
<tr>
<td>minus leakage</td>
<td>1.4</td>
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</tbody>
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Based on 8.5 t CO2-eq/ha for wet reeds and sedges
Selecting sites and implementing rewetting
Selecting sites and implementing rewetting

<table>
<thead>
<tr>
<th></th>
<th>UNDP/GEF and BMU/ICI project</th>
</tr>
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<tbody>
<tr>
<td>Total area rewetted</td>
<td>c. 36,000 ha</td>
</tr>
<tr>
<td>Sites</td>
<td>200-5,500 ha</td>
</tr>
<tr>
<td>Construction costs</td>
<td>25-50 Euro/ha</td>
</tr>
<tr>
<td>GEST survey costs</td>
<td>5-6 Euro/ha</td>
</tr>
</tbody>
</table>
| Total emission reduction  | 0-3 t CO2-eq/ha/yr           | (VCS criteria)
‘Quick and dirty’ check of available Belarusian peatlands

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Total area (ha)</th>
<th>Reduction * (t CO2-eq/ha/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All sites available for rewetting</td>
<td>77</td>
<td>76,071</td>
<td>0.2</td>
</tr>
<tr>
<td>Sites with net reductions</td>
<td>41</td>
<td>41,045</td>
<td>2.5</td>
</tr>
<tr>
<td>Sites with &gt; 5 t CO2/ha reduction</td>
<td>4</td>
<td>940</td>
<td>6.1</td>
</tr>
</tbody>
</table>

*Over 20 yr period; excl. permanence buffer, leakage etc.; poor vegetation data

→ Need to refine assessment and site selection
→ potentially low gain can be topped up by non-climate benefits
Securing permanence and topping up benefits

Wichtmann & Tanneberger (2011)
Securing permanence and topping up benefits

Rewetting + Wet land use (paludiculture) → Biodiversity + Substitution of fossil fuels
## Securing permanence and building capacity

### Other labs of the SPC of Bioresources

- **Inventory of potential sites for peatland restoration**
- **Organise administrative, technical, and practical rewetting**
- **Conduct vegetation monitoring, forest inventory, and biodiversity monitoring**

### International Centre for Sustainable Peatland Management

#### Science unit

- GHG-measuring team, vegetation team, remote sensing specialist
  - Check suitability of potential sites for GHG emission reduction
  - Quantify GHG emission reductions from peatland restoration
  - Improve GHG assessment and prediction tool
  - Peatland management team
    - Test and evaluate sustainable peatland management systems

#### Carbon trade unit

- Carbon trade team
  - Organize the site selection
  - Compile the Project Design Documents to trade CO₂-certificates from peatland restoration
## Lessons learnt Belarus

<table>
<thead>
<tr>
<th></th>
<th>Before project</th>
<th>Now</th>
</tr>
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<tbody>
<tr>
<td>Baseline</td>
<td>Historical</td>
<td>Forward looking</td>
</tr>
<tr>
<td>Emissions</td>
<td>Mean values (cf. IPCC)</td>
<td>Conservative values (cf. VCS)</td>
</tr>
<tr>
<td>Rewetting</td>
<td>optimal</td>
<td>realistic (= partly insufficient)</td>
</tr>
<tr>
<td>Site selection</td>
<td>random</td>
<td>low ER potential (forested, abandoned)</td>
</tr>
<tr>
<td>Est. emission reduction</td>
<td>10 t CO$_2$-eq/ha/y</td>
<td>2 t CO$_2$-eq/ha/y</td>
</tr>
</tbody>
</table>

→ a painful process, but now there is something that can be verified and sold
Many thanks for contributions to all project partners of the BMU-ICI project in Belarus 2008-2011...

...and to you for your attention!