Paludiculture for biodiversity and climate - economics of rewetted peatlands

„European Conference on Biodiversity and Climate Change, Science, Practice and Policy“
Bonn, Germany, 12-13. April 2011

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Paludiculture for biodiversity and climate - economics of rewetted peatlands

Paludiculture is

• the cultivation of biomass on wet and rewetted peatlands
• an ecosystem based approach to climate change adaptation and mitigation
Peatlands and Biodiversity

Joosten 2007
Peatlands and climate

Peatlands
• cover “only” 3% of the land area
• but contain 30% of the world’s soil carbon
• an equivalent of 60% of all atmospheric carbon
• as much carbon as all terrestrial biomass

Peatlands are important for the global carbon cycle

Source: Lappalainen 1996
Peatlands and climate

Peat 106 t CO$_2$ per TJ

(Couwenberg 2007)
Peatlands are endangered

Humans have destroyed > 50 million ha of mires:
- 50 % by agriculture
- 30% forestry
- 10 % by peat excavation

Source: Couwenberg & Joosten 2001
Hot spots of GHG-Emissions from peatlands

Globally, degraded peatlands emit 2 Gtons CO$_2$

Source: Hooijer et al. 2006.
## GHG-Emission ranking

<table>
<thead>
<tr>
<th>Top five World 2008</th>
<th>Mt a⁻¹</th>
<th>Top five Europe 2008</th>
<th>Mt a⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>500</td>
<td>Finland</td>
<td>50</td>
</tr>
<tr>
<td>Europe</td>
<td>164</td>
<td>Germany</td>
<td>32</td>
</tr>
<tr>
<td>Russia</td>
<td>161</td>
<td>Poland</td>
<td>24</td>
</tr>
<tr>
<td>USA (lower 48)</td>
<td>67</td>
<td>Sweden</td>
<td>15</td>
</tr>
<tr>
<td>China</td>
<td>66</td>
<td>UK</td>
<td>10</td>
</tr>
</tbody>
</table>

*without extraction and fires
Source: after Joosten 2009*
A real dead end street

Peat: 106 t CO₂ per TJ
Biogas on drained peatlands: 880 t CO₂ per TJ

(Couwenberg 2007)
# GHG-Emissions Germany

<table>
<thead>
<tr>
<th></th>
<th>Mt CO$_2$ a$^{-1}$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total$_{2007}$</strong></td>
<td>957</td>
</tr>
<tr>
<td><strong>Peatlands</strong></td>
<td>32</td>
</tr>
<tr>
<td>- Agricultural use of peatlands</td>
<td>20</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th></th>
<th>Mt CO$_2$ a$^{-1}$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Useful for comparison</strong></td>
<td></td>
</tr>
<tr>
<td><strong>National Allocation-Plan (NAP II) 2007-12:</strong></td>
<td></td>
</tr>
<tr>
<td>Energy and Industry</td>
<td>15</td>
</tr>
<tr>
<td>Households and Traffic</td>
<td>22</td>
</tr>
</tbody>
</table>
Business as usual or Paludiculture?

GHG-Emissions

Carbon sequestration + Substitution of fossil fuels

Paludiculture

Business as usual

Carbon storage vs. time
Management strategies

• **Conservation**
  - conserving the peat carbon stock
  - rewetting already drained peatlands

• **Sequestration**
  - maintaining/restoring net carbon sequestration capacity

• **Substitution**
  - rewetting formerly drained peatlands
  - substituting fossil materials by renewable biomass

Peatland management is a reliable tool for climate change mitigation with significant GHG-benefits

after Joosten 2009
**GHG-emissions, mean water level and land-use**

- **arable land, high intensity grassland**
- **low intensity grazing**
- **nature protection grassland**
- **Reed canary grass**
- **Black alder**
- **Common Reed**

Reduction of CO₂ emissions: > 15t/ha

After Cowenber et al. 2008
Paludiculture on wet and rewetted

- **fens**
  - Black Alder (*Alnus glutinosa*)
  - Reed (*Phragmites australis*)
  - Cattail (*Typha* spec.)
  - Sedges (*Carex* spec.)
  - Reed canary grass (*Phalaris arundicea*)

- **bogs**
  - Peatmoss (*Sphagnum* spec.)
From the wood to the kitchen into the bedroom

High quality timber

Furniture from solid wood
Reed, habitats and rooftops

Photo: Schäfer

Photo: Schäfer

Photo: Tanneberger

Tanneberger 2008
From a snow crawler to a paludipillar...

Photo: Schäfer
Paludi-biomass for combustion

Briquettes

Pellets

Photo: Lachmann

Photo: Schröder

Photo: Schröder
Cattail for construction and insulation
GHG-mitigation cost* for bioenergy

* mitigation cost are the cost of avoiding an extra tonne of greenhouse gases

Source: Isermeyer 2009
## Paludiculture is cost efficient

### Mitigation costs EUR je t CO₂

<table>
<thead>
<tr>
<th>Reed</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alder</td>
<td>0-2</td>
</tr>
</tbody>
</table>

Source: Schäfer 1997, Schäfer 2005

### Useful for comparison:

| Hydro- and Wind-power | 22-70  |
| “Biogas”             | 52-387 |
| “Bio-Fuels”           | 193-578 |

Source: [www.co2-emissionen-vergleichen.de](http://www.co2-emissionen-vergleichen.de), BMELV 2007
Paludiculture is

- a climate change mitigation tool that benefits
  - rural economy, tourism
  - biodiversity
  - water quality and retention

more benefits can be made
- by using rewetted peatlands for biomass cultivation
- to replace fossil fuels and fossil raw materials
- without rivalry to food production
- to generate income from biomass production

Photo: Schäfer
Paludiculture

- is cost efficient and ready for use
- is in conformity with the European policy that envisages the replacement of fossil fuels with biomass
- turns out to species-rich meadow habitats, reed-marshes, alder forests and other valuable habitats as well
- is in line with the “stop the loss goal” of the biodiversity strategy of the EU
Paludiculture is Paludifuture!

http://vip.paludikultur.de
http://vip.paludiculture.com

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Developing and implementing sustainable productive utilisation of rewetted peatlands

Thank you for your attention!