Peatlands restoration in Germany – a potential win-win-win solution for climate protection, biodiversity conservation and land use

Author:
Johannes Förster mainly based on MLUV 2009, Schäfer 2009

Short title: Peatlands restoration for carbon sequestration, Germany

Key Message: Restoring peatlands together with innovative land use practices reduces carbon emissions; sustains wetland ecosystem services and biodiversity; and generates additional income from commodities adapted to peatlands such as reed or alder forests.

Suggested citation: Förster, J. mainly based on MLUV - Ministerium für Landwirtschaft, Umwelt und Verbraucherschutz Mecklenburg-Vorpommern (2009), Schäfer (2009), TEEBcase: Peatlands restoration for carbon sequestration, Germany, (2010), available at: TEEBweb.org.

Reviewer: Dr Stephan Möckel

What was the problem?

Over 930,000 ha of peatlands in Germany have been drained to increase the area available for agricultural production. The area that peatlands once occupied has been transformed from a carbon sink into a carbon source – emitting around 20 million tCO_2-equivalents every year (Schäfer 2009). Lowering of the water table and tillage has destroyed these areas of high biodiversity with valuable ecosystem services (water storage and purification, the fixation of nutrients and pollutants, and the sequestration and storage of carbon). Furthermore, the release of nutrients and pollutants from drained peatlands decreases water quality and causes eutrophication of rivers and lakes.

Up until the 1990s, in Mecklenburg-Vorpommern, a state in north-eastern Germany, 97% of a peatlands with an area of about 300,000 ha were drained. After this period, the demand for land for cattle ranching and fodder production decreased, reducing the need for draining. Also, the high costs of maintaining drainage infrastructure and equipment raised questions about its economic benefit. Further, with climate change predictions projecting a reduction in precipitation over north-east Germany, this meant that the country began focusing on adaptive strategies that required enhancement of water storage in the landscape (MLUV MV 2009).

What was done to solve it and what was the role of policy makers?

In 2000, the Ministry of Agriculture, the Environment and Consumer Protection of the state of Mecklenburg-Vorpommern formulated a peatlands restoration strategy (MLUV MV 2009), mainly financed through the state and the EU. The ministry also commissioned a study to assess alternative land use options for peatlands, taking into account ecosystem services of intact and undrained peatlands and focusing particularly on the potential for biomass production and carbon sequestration. The University of Greifswald analyzed the economic potential of different land use options and developed a model (called GEST) for assessing

the carbon sequestration potential of peatlands (based on their ecological condition and vegetation cover) (Couwenberg, 2008).

What has been achieved?

Between 2000 and 2008 an area of 29,764 ha (equivalent to about 10% of the area of drained peatlands in Mecklenburg-Vorpommern), has been restored. This means that emissions of about 300,000 tCO_2-equivalents every year are avoided (with an average of 10.4 tCO_2-equivalents per hectare) (Schäfer 2009). When assuming a marginal cost of damage caused by carbon emissions of 70 € per tCO_2 (Federal Environment Agency 2007), the effort to restore peatlands avoids damage from carbon emissions of up to 21.7 million € every year, on average 728 € per hectare of restored peatlands.

While the total damage costs of carbon emissions on drained peatlands can exceed 1400€ per hectare, the process of revitalizing peatlands requires considerable initial investment. In Mecklenburg-Vorpommern, the initial cost of restoration ranges between 3000 - 5000 € per hectare in cases where land is purchased from farmers. This price is steep but the initial investment occurs only once – while the emissions are avoided annually. Prices for avoided emissions range between 30 € to 50 € per avoided tCO_2-equivalent (pers. comm. T. Permien, 2010). This is a low price compared to other emission reduction strategies which can be reduced even further if restored peatlands are used for alternative land uses that do not degrade the carbon stock. However, in other German states with greater land use pressure the initial cost for purchasing land for restoration can be higher, increasing the price for the avoided emissions.

Further, it is important to consider the cost of forgone income from conventional agriculture (an average 585 € per hectare per year in 2007/2008 (MLUV MV 2009)) and foregone subsidies (which often exceed an additional 300 € per hectare) and which are directly attributable to number of hectares. Subsidized income from conventional agriculture not only provides incentives for harmful land use – but makes rehabilitation more costly (as reflected in the land price).

Alternative land uses on restored peatlands can generate income as well as avoid carbon emissions, thereby lowering opportunity costs. Alternative land uses include extensive grazing, the production of reed or sphagnum mosses and the growth of alder forests. These so-called “paludicultures” allow for the production of commodities while maintaining the functions and services of peatlands. Sphagnum mosses can be used as substrate in horticulture, reed can be used as building material and for biofuel production, and wood from alder forests can be used for the production of high quality furniture (Schäfer 2009).

Table 1: Land use practices on drained and restored peatlands. Carbon value is based on a carbon price of 70 € per tCO_2. Source: adapted from Schäfer 2009.

Land use practice on <u>drained</u> peatlands	**Value per hectare**
Conventional fodder production (value of fodder without subsidies)	585 €
Land use practice on <u>restored</u> peatlands	**Value of avoided carbon emissions per hectare**
Sphagnum mosses	595 €
Reed	805 €
Alder forest	1225 - 1750 €

Further strategies for the implementation of alternative land use practices that maintain ecosystem services are currently under investigation. One strategy is to attract corporate

and private investors by offering “Moorfutures” (carbon credits via the voluntary carbon market).

This example shows that land use practices that take into account the services provided by natural ecosystems can sustain important services such as carbon storage while generating income for land users.

References:

Couwenberg, J., Augustin, J., Michaelis, D., Wichtmann, W., Joosten, H., (2008) Entwicklung von Grundsätzen für die Bewertung von Niedermooren hinsichtlich ihrer Klimarelevanz. DUENE e.V., Greifwald.

Permien, T. und Ziebarth, M (in press).: Moor- und Klimaschutz in Mecklenburg-Vorpommern - Momentaufnahmen einer erquicklichen Beziehung, Archiv für Forstwesen und Landschaftsökologie.

Schäfer, A. (2009) Moore und Euros – die vergessenen Millionen. Archiv für Forstwesen und Landschaftsökologie 43, 156-160.

Schäfer, A. and H. Joosten (eds.) (2005) Erlenaufforstung auf wieder vernässten Niedermooren. DUENE e.V., Greifswald, 68p.

MLUV MV (2009) Konzept zum Schutz und zur Nutzung der Moore. Fortschreibung des Konzeptes zur Bestandssicherung und zur Entwicklung der Moore. Ministerium für Landwirtschaft, Umwelt und Verbraucherschutz Mecklenburg-Vorpommern, Schwerin, 109p.

Federal Environment Agency (2007) Economic Valuation of Environmental Damage. Methodological Convention for Estimates of Environmental Externalities. Dessau, 85p. URL: http://www.umweltdaten.de/publikationen/fpdf-l/3482.pdf (last access May 12, 2010)