Bog Growth-

Restoration of Sphagnum vegetation after peat extraction

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Renewable Resources from Wet and Rewetted Peatlands 2021
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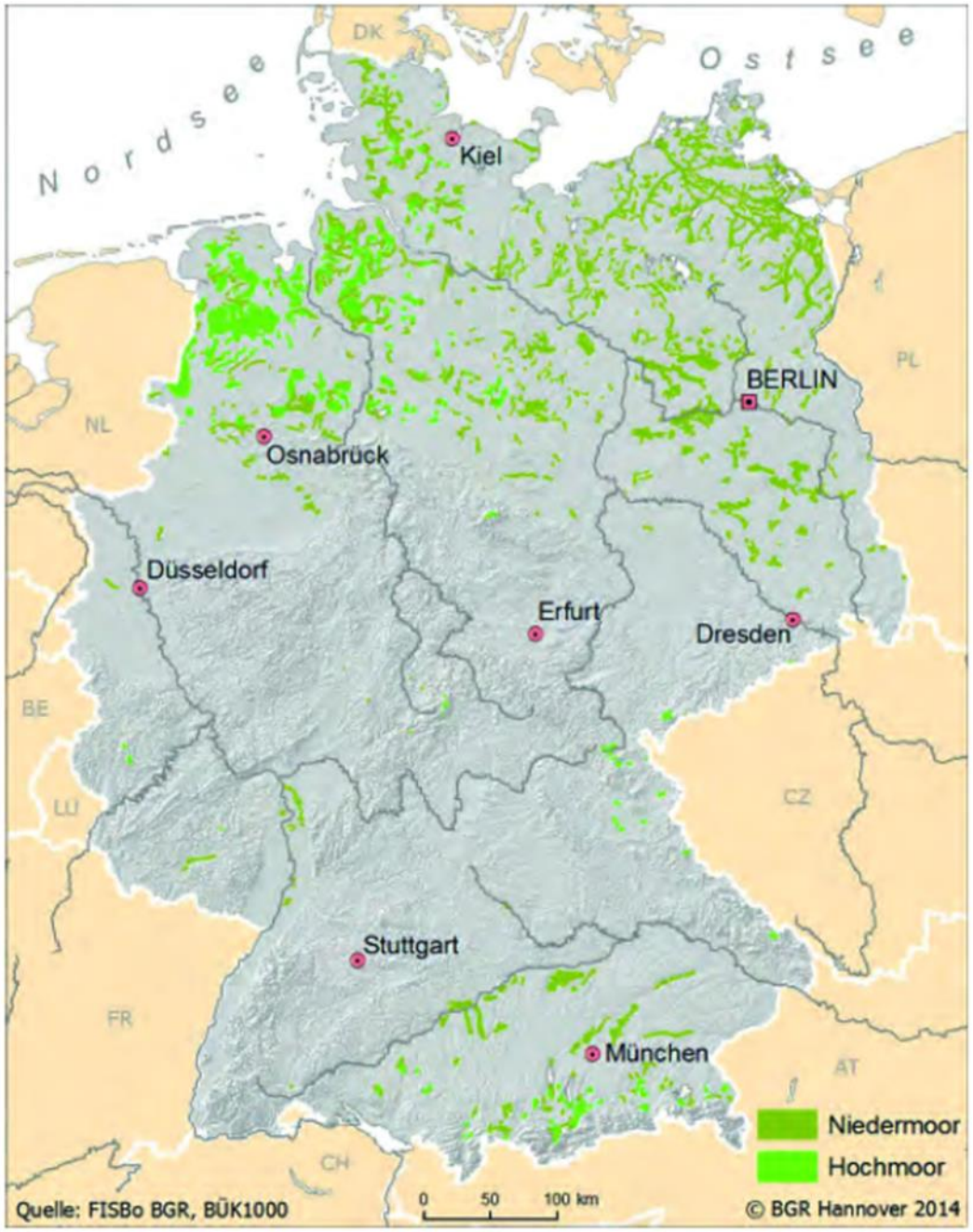

(Niedersächsisches Ministerium für Umwelt Energie und Klimaschutz, 2016)

Peatlands in Germany

- 5.1% of the total area of Germany are peatland (18,098 km²)
- 8% of German agriculture is located on peatlands
- 70% of the German raised bogs are located in Lower Saxony
  (LLUR, 2012)
- In Lower Saxony still peat cutting on approx. 9,000 ha, by 2040 rewetting on approx. 26,000 ha
  (Niedersächsisches Ministerium für Umwelt Energie und Klimaschutz, 2016)
- Climate relevance: Peatlands in Germany emit 5.3% (47 Mio. t CO_{2e}/a) of total German greenhouse gas emissions
  - Agriculture: 39 Mio. t CO_{2e}/a
  - Peat Cutting: 2 Mio. t CO_{2e}/a

  (Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit, 2020)
- Drained peatlands are thus the largest single source of greenhouse gases outside the energy sector
  (Drösler et al., 2011)

Classic raised bog restoration after peat cutting

Too wet (high methane emissions)

Mostly:

- Flooded raised bog restoration area (MIW)

4-15 t CO_2e./ha/a

Too dry (carbon dioxide emissions)

E.g.:

- Drier pipegrass peatland stage (MPT)
- Broom heath high bog degeneration stage (MGB)
- Other bog degeneration stage (MD)

6-12 t CO_2e./ha/a

± optimal (sources and sinks in balance)

E.g.:

- Near-natural high marsh (MH)
- Cotton grass-peat moss-fluctuating grassland (MWS)
- Peat moss lawn with beaked reed vegetation (MST)

0 t CO_2e./ha/a

(Biotoptypen nach: *Niedersächsisches Ministerium für Umwelt, Energie und Klimaschutz; Programm Niedersächsische Moorlandschaften; (2016)*)

Our research on accelerated raised bog restoration

Active introduction of peat mosses

- Research projects 2015-2021 on the cultivation of peat mosses and the potential for climate protection and biodiversity
- 5 ha moss area created after peat cutting (black peat)
- Scientific support by the University of Hanover and the Thünen Institute in Braunschweig
- Various Sphagnum species e.g.
  - *S. papillosum*
  - *S. magellanicum*
  - *S. palustre*

Leibniz Universität Hannover
Niedersächsisches Ministerium für Ernährung, Landwirtschaft und Verbraucherschutz
Amt für regionale Landesentwicklung Weser-Ems
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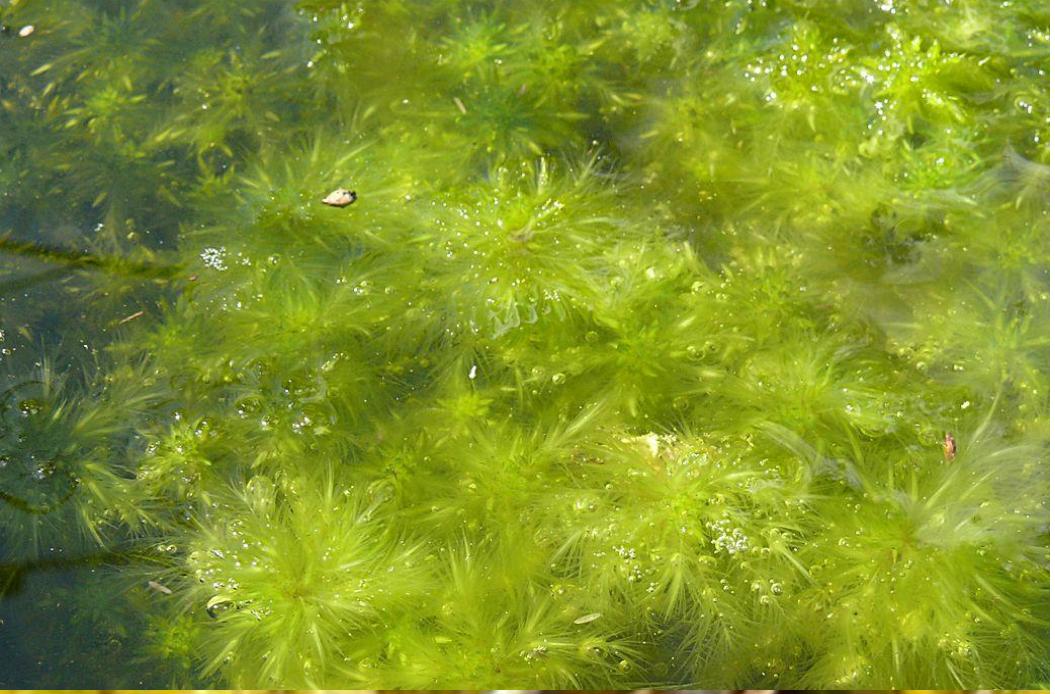


What are peat mosses?

Hollow peat mosses

- Live predominantly at high water levels or in flooded areas
- Smaller/fine leaves
- Low water storage capacity
- Rapid decomposition

→ **Often pioneer species**

Example: Sektion Cuspidata

Hummock peat mosses

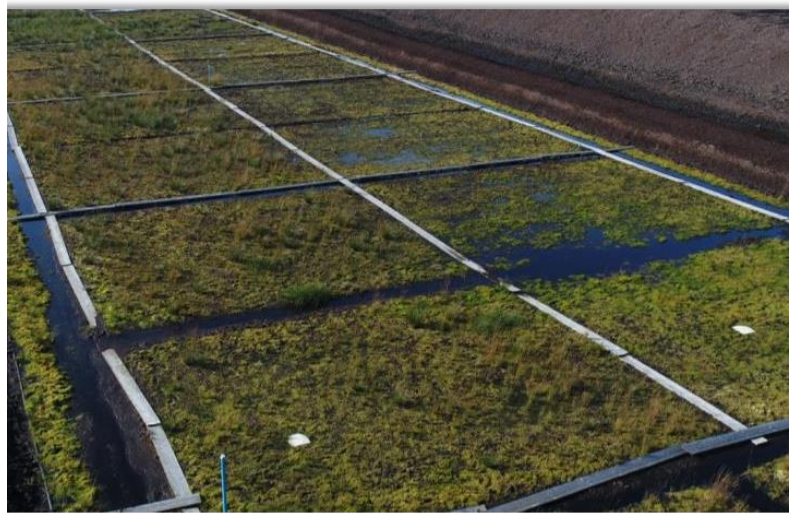
- Adapted to higher sites
- Mostly more stable/heavy growth forms
- High water storage capacity
- Low decomposition

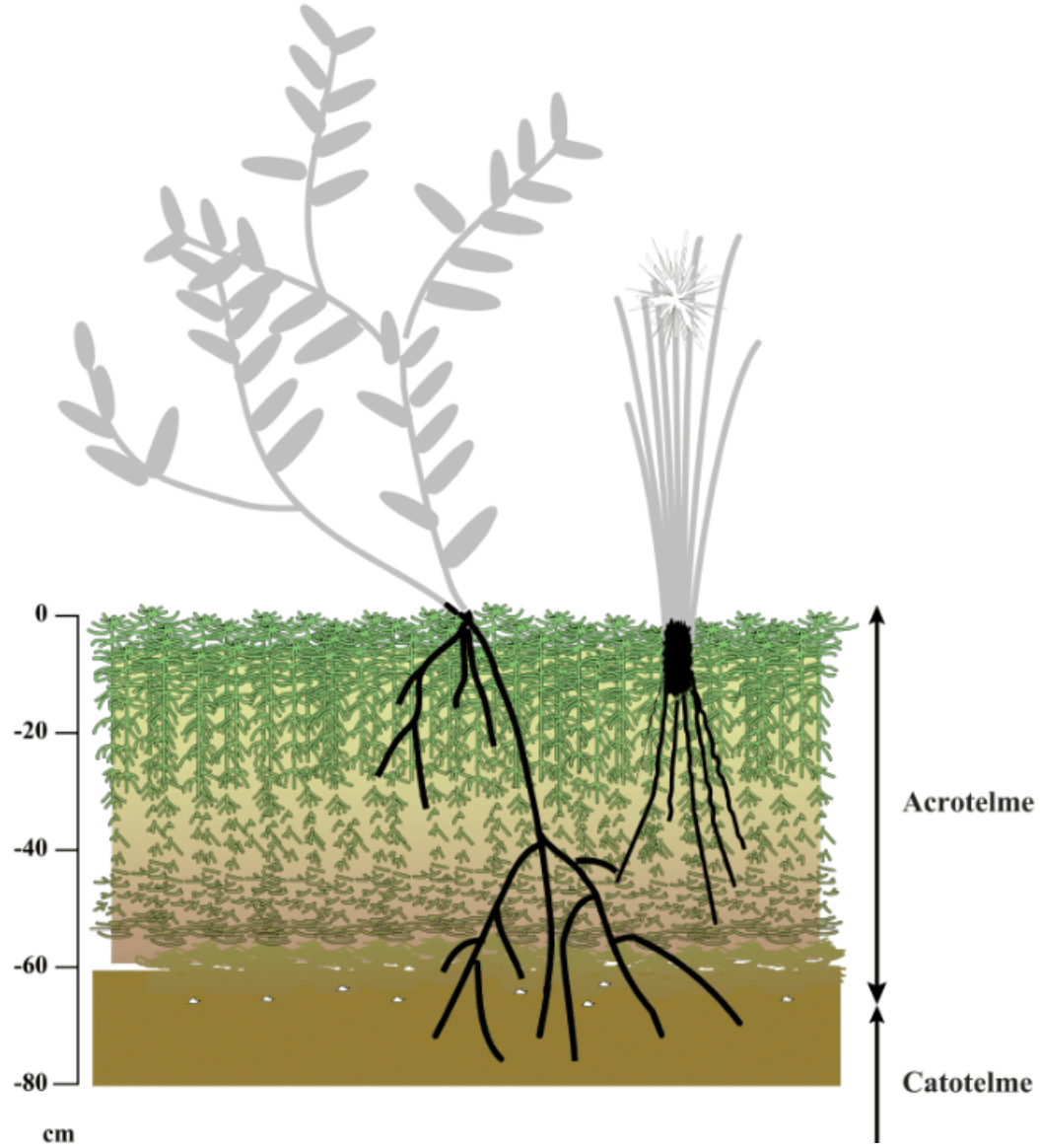
Example: Sektion Sphagnum, Sektion Acutifolia

→ Main peat forming

Project implementation

Project cultivation sites





Climate

Increasing the carbon sink (Acrotelm)

- Growing Sphagnum mosses binds carbon and sequester parts
- Our peat moss areas sequester up to. 2 t CO_2e/ha/year

Securing the carbon sink (Catotelm)

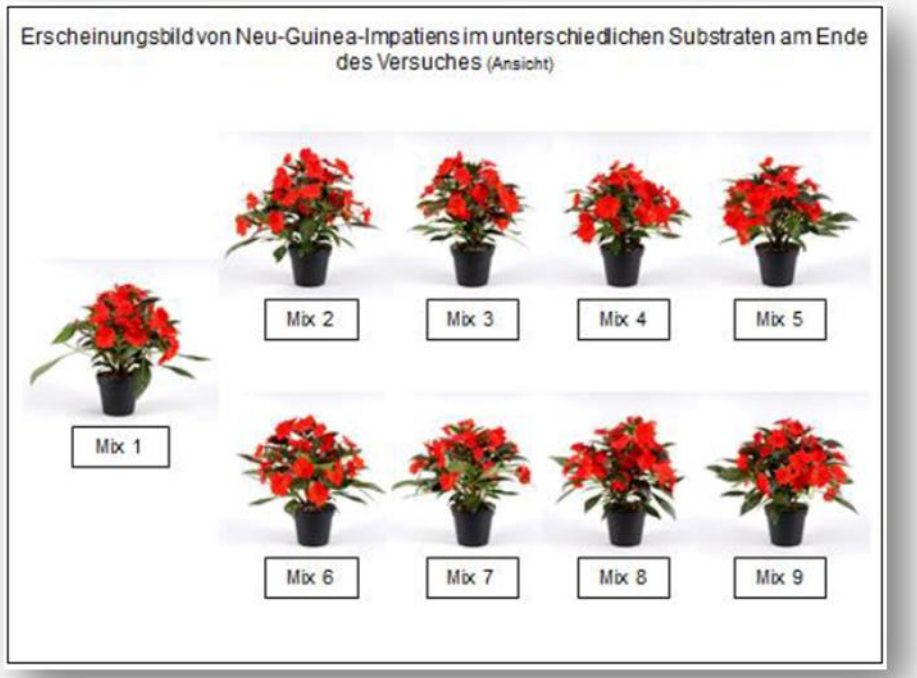
- Waterlogging stops oxidation in the long -term
- A 1m thick peat layer stores 1,800 t CO_2e per hectare
- This corresponds to 9 t CO_2e per hectare and year with a decomposition time of 200 years
- The intensity of decomposition depends largely on the use and depth of drainage

Biodiversität

- Immediate increase of bog-typical vegetation, e.g.
  - Seven Sphagnum species
  - Sundew
  - Rosemary heath
  - White beak reed
  - Cotton grass
  - Narrow-leaved cotton grass
- Creation of habitats for endangered and protected species, e.g.
  - Moor frog
  - Lapwing
  - Butterfly
  - Insects

Substrate suitability

- Hygenisation necessary due to very high incidence of weeds
- Successful culture tests; peat mosses are just as suitable as white peat



Cultivated hummock peat moss is an attractive growing media constituent

Challenges

Land availability

Water availbility

Automated irrigation

Low area productivity

Inoculation material & permits for harvesting

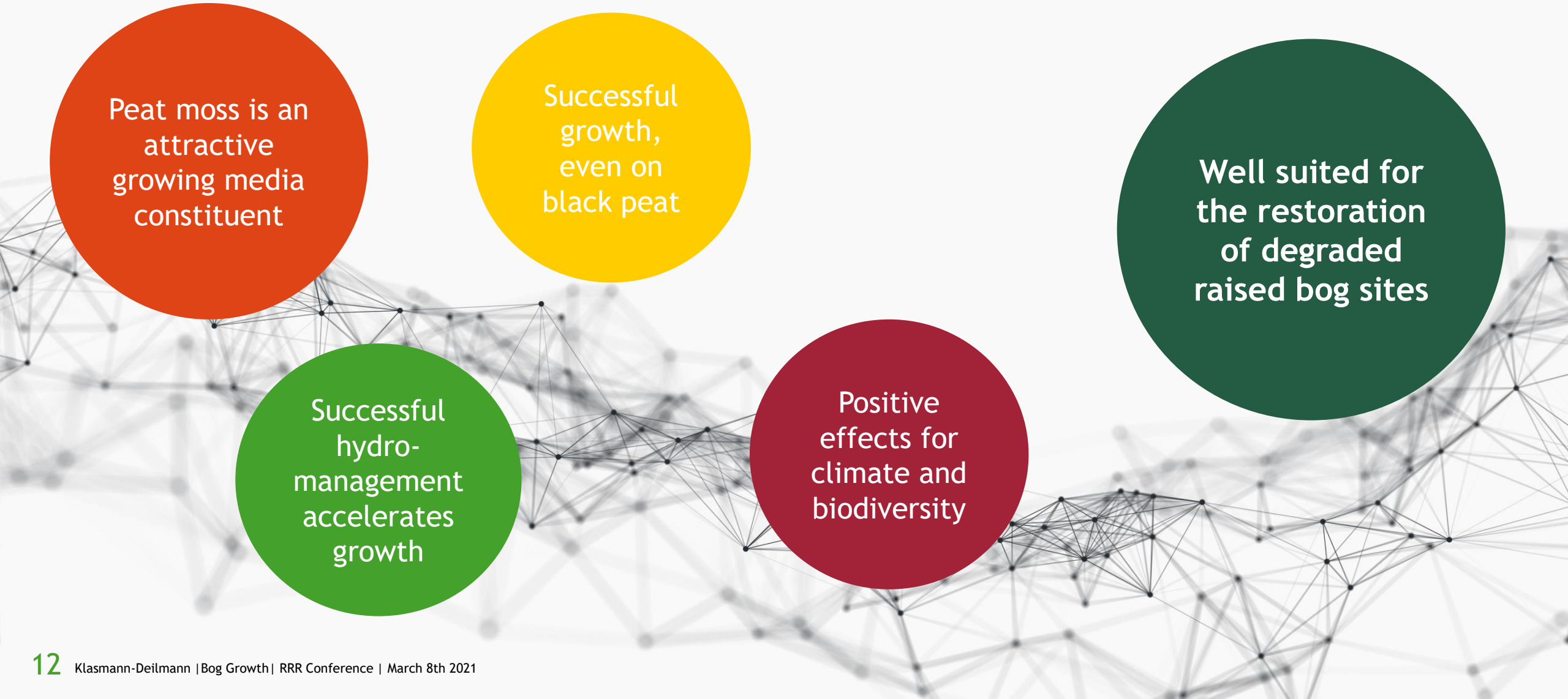
Wild weed management

Mowing

Hyginisation

Currently not economical as a peat substitute

Opportunities



Benefits…

… for climate

- Preservation of peat body
- Creation of a new sink
- Reduced CO_2-emissions by faster bog restoration

... for biodiversity

- Creation of habitat for endangered and protected plant and animal species
- Reintroduction of typical bog species
- Less site maintenance (mowing)

… for water

- Smaller eva-transporation
- Water retention
- Reduce risk of peatland fire

Conclusion

- Peat mosses are rare and protected in Germany
- Propagation is currently only carried out on small experimental sites, but
  - they are the key for the successful restoration of raised bogs
  - offers, if economical, a high-quality substrate feedstock
- Peat mosses can
  - make a significant contribution to climate protection ns biodiversity in raised bog restoration
  - and potentially become a high-quality peat substitute

What we do…

INNOVATION
Peat Bog Restoration

- Advice on project development and application
- Own Implementation of restoration projects
- Advice on project implementation
- Provision of peat moss for restoration
- Improve GHG calculation and CO_2-certificates
- Research on peatmoss restoration and improvement of water management

https://klasmann-deilmann.com/en/competencies/innovation/sphagnum/

Thank you for your attention!

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