

**12th Meeting of the Steering Committee
of Policy Area Nutri
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DESIRE

Marina Abramchuk



J.Peters



L. Lachmann

ERNST MORITZ ARNDT
UNIVERSITÄT GREIFSWALD



Wissen
lockt.
Seit 1456



Partner in the

GREIFSWALD
MIRE
CENTRE





DESIRE

Development of sustainable peatland management by restoration and paludiculture for nutrient retention in the Neman river catchment



ERNST MORITZ ARNDT
UNIVERSITÄT GREIFSWALD



Wissen
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Seit 1456



Start with important pathways!

Three Strategies

Reduce point sources



Reduce diffuse sources



Improve retention





Marshes and farmland border a stretch of the Mississippi River near its headwaters in Minnesota. Credit: Nathan Benn/Corbis/Getty

**5 times
more
efficient in
nitrate
decrease!**

ENVIRONMENTAL SCIENCES • 29 January 2018

How Mother Nature cleans dirty water

Wetlands beat pasture land at scrubbing nitrate pollution from rivers.

Amy T. Hansen et al. Contribution of wetlands to nitrate removal at the watershed scale. *Nature Geoscience* volume 11, pages127–132 (2018)

DESIRE focuses on PEATLANDS (organic soils)



Neman Basin area:
97,900 km²

Total length:
937 km

	Average (1995-2014)	Year 2014	2014 vs. average (%)
Flow (m ³ s ⁻¹)	611	484	79
TN load (t)	40611	32645	80
TP load (t)	1989	1150	58

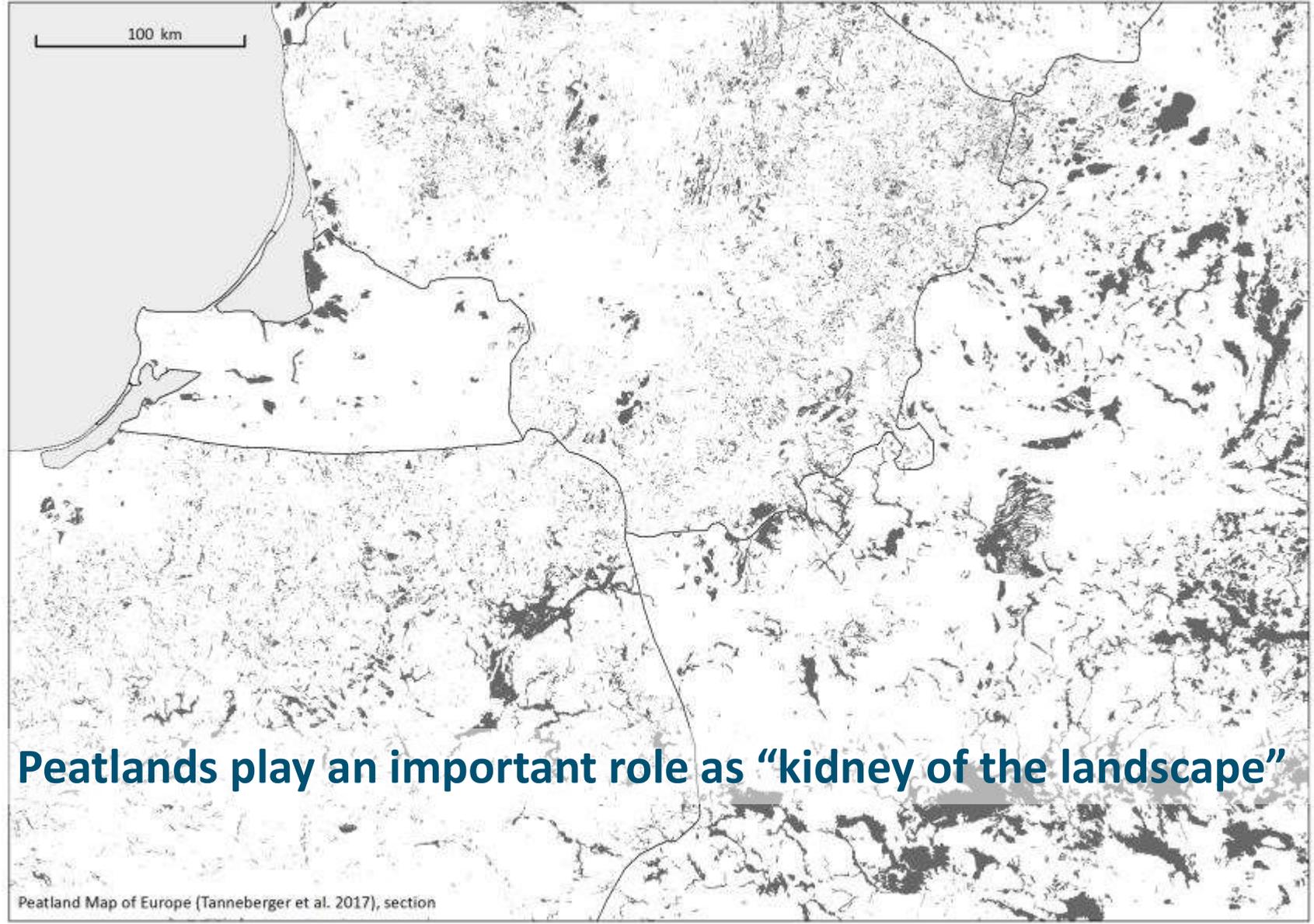


Peatlands (organic soils) in the Neman river basin



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Peatlands play an important role as “kidney of the landscape”

Peatland Map of Europe (Tanneberger et al. 2017), section

Problems of drained peatlands utilisation

- Environment
 - Nutrient release to the environment
 - High greenhouse gas emissions
 - No biodiversity values
- Technology
 - Subsidence of soil surface
 - Water management costs and technics
- Economy
 - Low quality of fodder
 - Pasture meat production not economic
 - Payments of subsidies are necessary
 - High social costs



N-losses from drained peatlands

Nitrogen fluxes (kg N ha⁻¹ a⁻¹) from fen peatlands in northern Germany

Data after Trepel et al. 2000, Schleuß et al. 2002, Schrautzer 2004

Vegetation type	sedges	wet meadow	ext. grassland	int. grassland
Nutzung	keine	1 Schnitt	Weide	3 Schnitte
Medium water table	-10 cm	-25 cm	-25 cm	-50 cm
Inputs				
Deposition	20	20	20	20
fertilization	0	0	60	160
Mineralisation	30	100	100	300
Outputs				
harvest	0	80	60	200
Denitrifikation	20	30	50	80
N-leaching	5	10	15	20
Input sum	50	120	180	480
Output sum	25	120	125	300
N-Saldo (Einträge – Austräge)	25	0	55	180
Assessment	peat formation	peat losses	peat loss and	eutrophication

Nutrients release from the catchment area

minimum general values from literature

	kg ha⁻¹ a⁻¹
N	20
P	0,2
K	30
Mg	10

Peatlands & Nutrients

- Natural peatlands can absorb and store nutrients in the peat soil

→ **preserve intact mires**

- Drained peatlands release stored nutrients into the surface waters

→ **rewet degraded peatlands**

- Rewetted peatlands can filter nutrients from neighbouring agricultural lands

→ **establish peatlands as Wetland Buffer Zones**



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- With harvesting of biomass nutrients can be exported and economic value generated
→ **use rewetted peatlands in paludiculture**

New concept for sustainable
peatland utilisation →

Paludiculture*

- **Cultivation of biomass on wet and rewetted peatlands**
 - bog: peat moss
 - fen: Common Reed, Reed Canary Grass, Sedges, Alder, Cattail...
- **Utilisation of biomass for industry and energy**
 - peat conservation
 - reducing GHG emissions
 - replacing fossil resources

* „palus“ – lat.: swamp



agriculture + peat preservation + water and nutrient retention:

Paludiculture!



Paludiculture

Wet grasslands



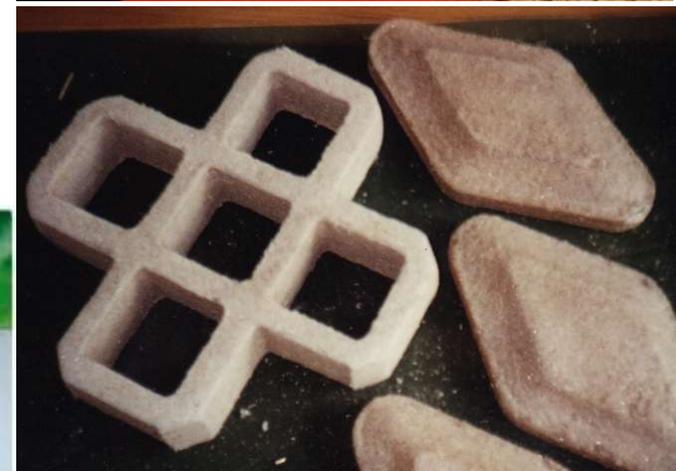
Cultivation of paludicrops



Products from reeds

- Quality reed
 - Bundles for roofing
 - Culms for mats production
 - construction boards
 - Insulation material

- Production of reed biomass for other purposes



Energetic Utilisation

Direct burning of

- Round bales,
- chips,
- pellets or briquettes



Biogas

Bio-refinery

...





**Examples for paludiculture
potential for additional
nutrient retention**

PALUDI
KULTUR



cinderella

**Wet meadow with Reed Canary Grass, Sedges and herbs
productivity: 2 – 5 t DM/ha*a**

→ 1,3 – 3,2 kg P, 17,5 kg N; 3,5kg S;

Polder Seewiese at Lake Kummerow, rewetted ~2000; Foto W. Wichtmann 2016



PALUDI
KULTUR



cinderella

**Common Reed (*Phragmites australis*)
for construction material, energy
productivity: 3,8 – 6,5 (>25 t) DM/ha*a**

→ 1,4 – 4 kg P; 21 – 50 kg N



PALUDI
KULTUR



cinderella

**Sedges (*Carex* spp.),
for energy (combustion, biogas)**

3 – 4,5 t DM/ha*a

→ 4 - 6 kg P; 37 - 63 kg N;

www.kuleuven-kulak.be

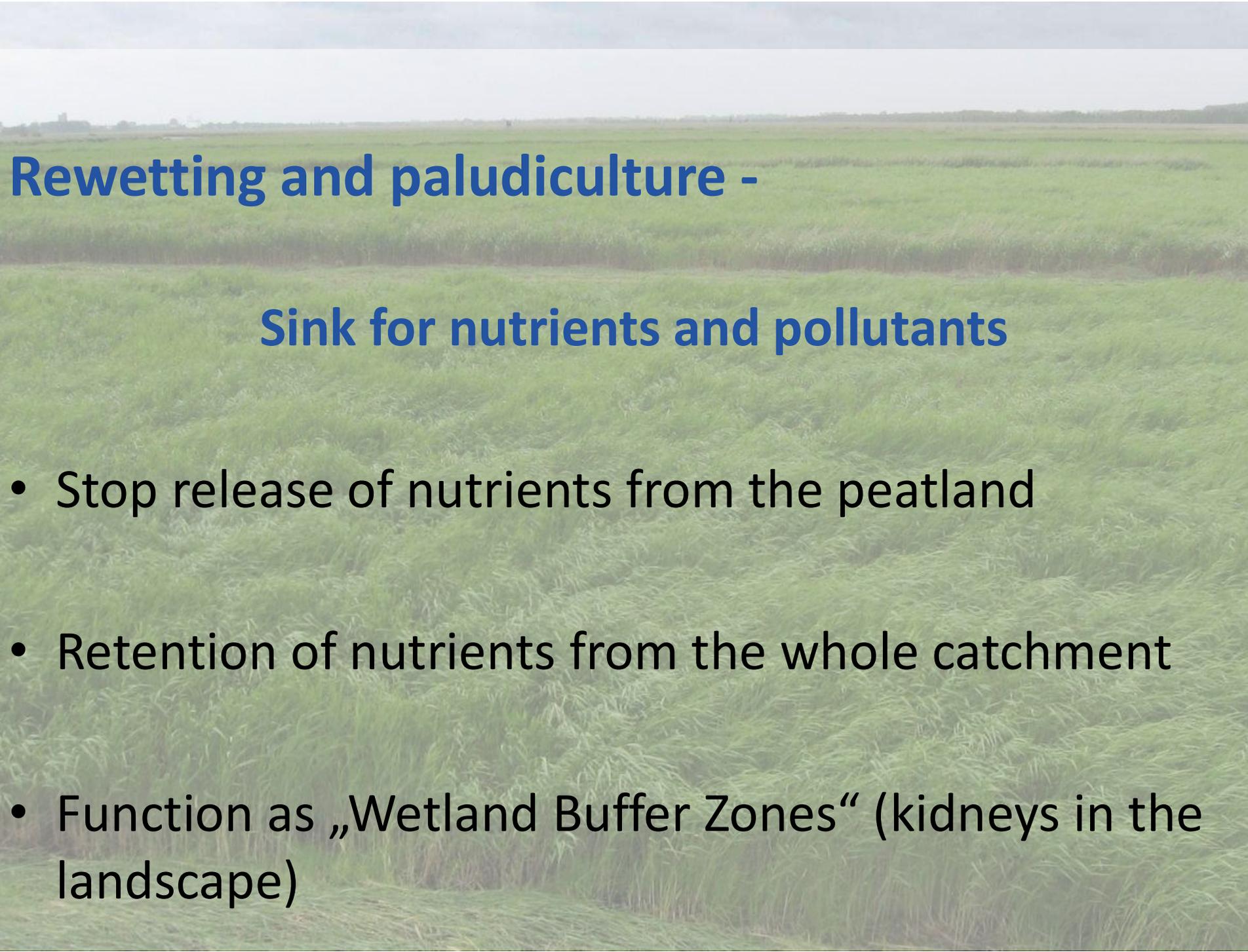


**PALUDI
KULTUR**



cinderella

Cattail (*Typha spec.*)
for construction, insulation, fodder
Productivity : 5 – 8 (22 t) DM/ha*a
→27 kg P; 150 – 600 kg N



Rewetting and paludiculture -

Sink for nutrients and pollutants

- Stop release of nutrients from the peatland
- Retention of nutrients from the whole catchment
- Function as „Wetland Buffer Zones“ (kidneys in the landscape)



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DESIRE - objectives

To increase efficiency of peatlands management in the Neman catchment for reduced nutrient release to its waters and the Baltic Sea

- Formulate Peatland chapters in basin management plans
- Guidelines for paludiculture for nutrients reduction
- Implementation of pilot sites
- Form a transnational platform for knowledge exchange
 - Harmonize policies and coordinated joint implementation of sustainable river basin management





Thanks for your attention!

On behalf of the DESIRE project team:

Marina Abramchuk

Michael Succow Foundation, Partner in the GMC

marina.abramchuk@succow-stiftung.de

