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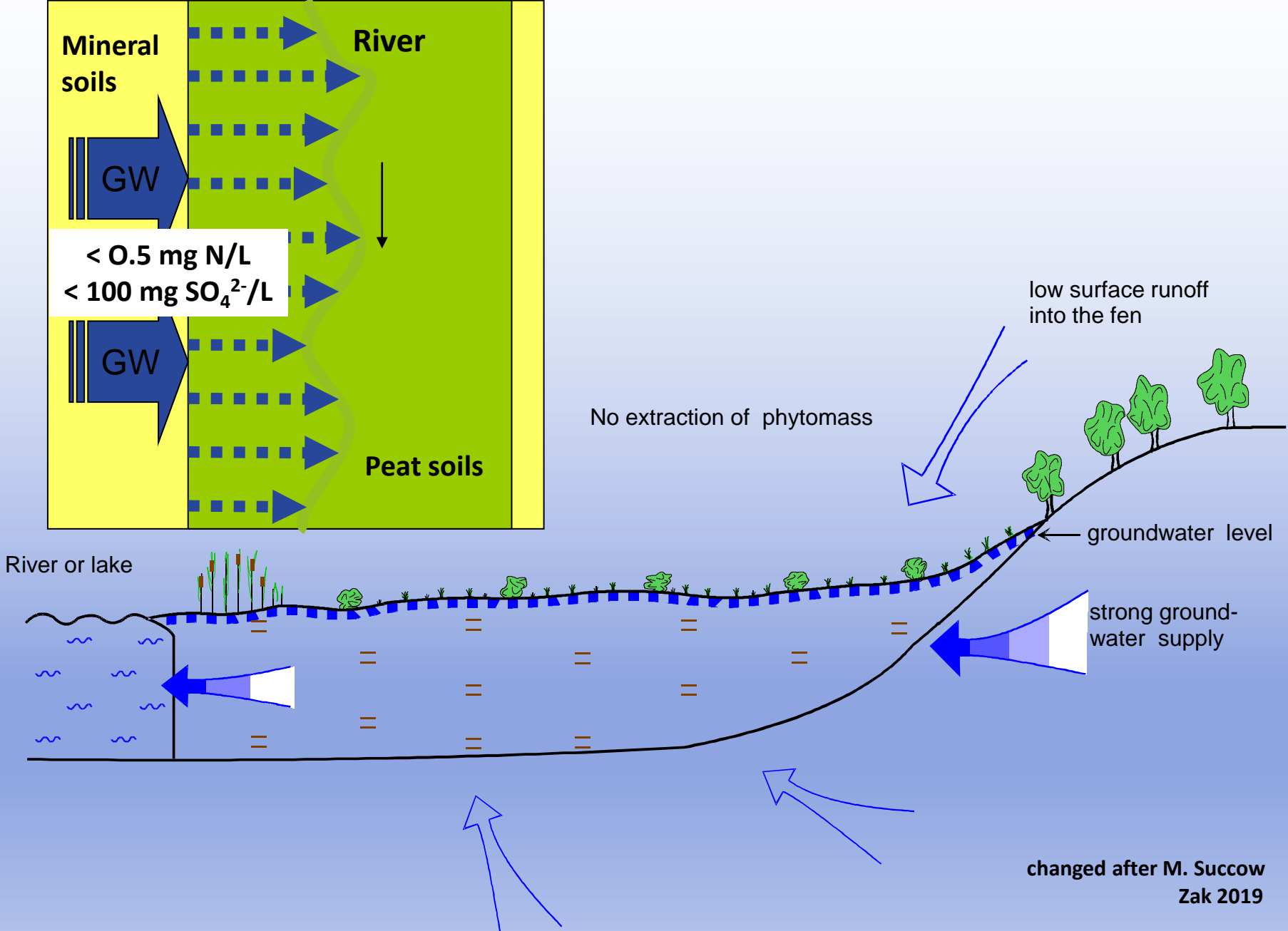
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Paludiculture and rivers

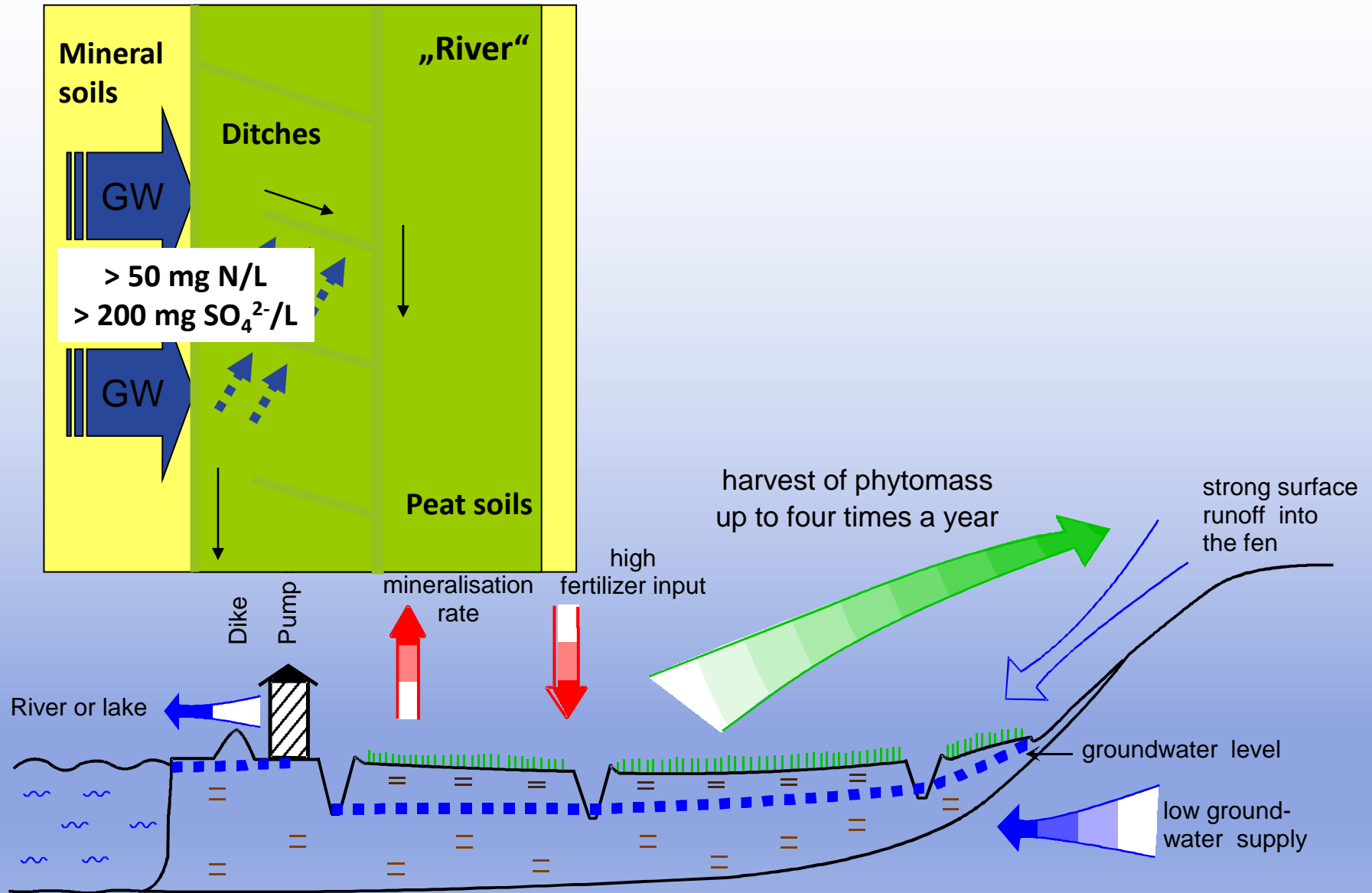
Wendelin Wichtmann



Natural status of a growing fen. Example: percolating mire (until ~ 1770)



Intensively used, deeply drained fen since ~ 1970)



Rewetting of peatlands

Two options:

- leave the site to its own devices → natural development
- implement paludiculture → regular management
→ → provision of ecosystem services with different focuses



Paludiculture, productive use of wet peatlands*

- Agricultural or silvicultural use of wet and rewetted peatlands
- spontaneously grown or cultivated biomass from wet peatlands is used under conditions in which the peat is conserved or even newly formed
 - allows the re-establishment and maintenance of additional ecosystem services of wet peatlands

*Wichtmann et al. 2016



Paludiculture is

Peat preservation + agriculture/silviculture

→ wise use of peatlands



What are the main requirements

- **Site conditions (e.g. fen peatlands in temperate zone)**
 - permanent wet conditions in which the peat is conserved or even newly formed
 - low emissions of greenhouse gases and nutrients
- **Agriculture**
 - Paradigm shift from drainage to management of rewetted peatlands
 - Vegetation: spontaneously grown or cultivated plant species
 - productive use of biomass



Plants that thrive in temperate wet peatlands

Gramineous, mosses or arboreal vegetation



Reed Canary Grass



Common Reed



Cattail



Sedges



Black Alder



Peat Mosses

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

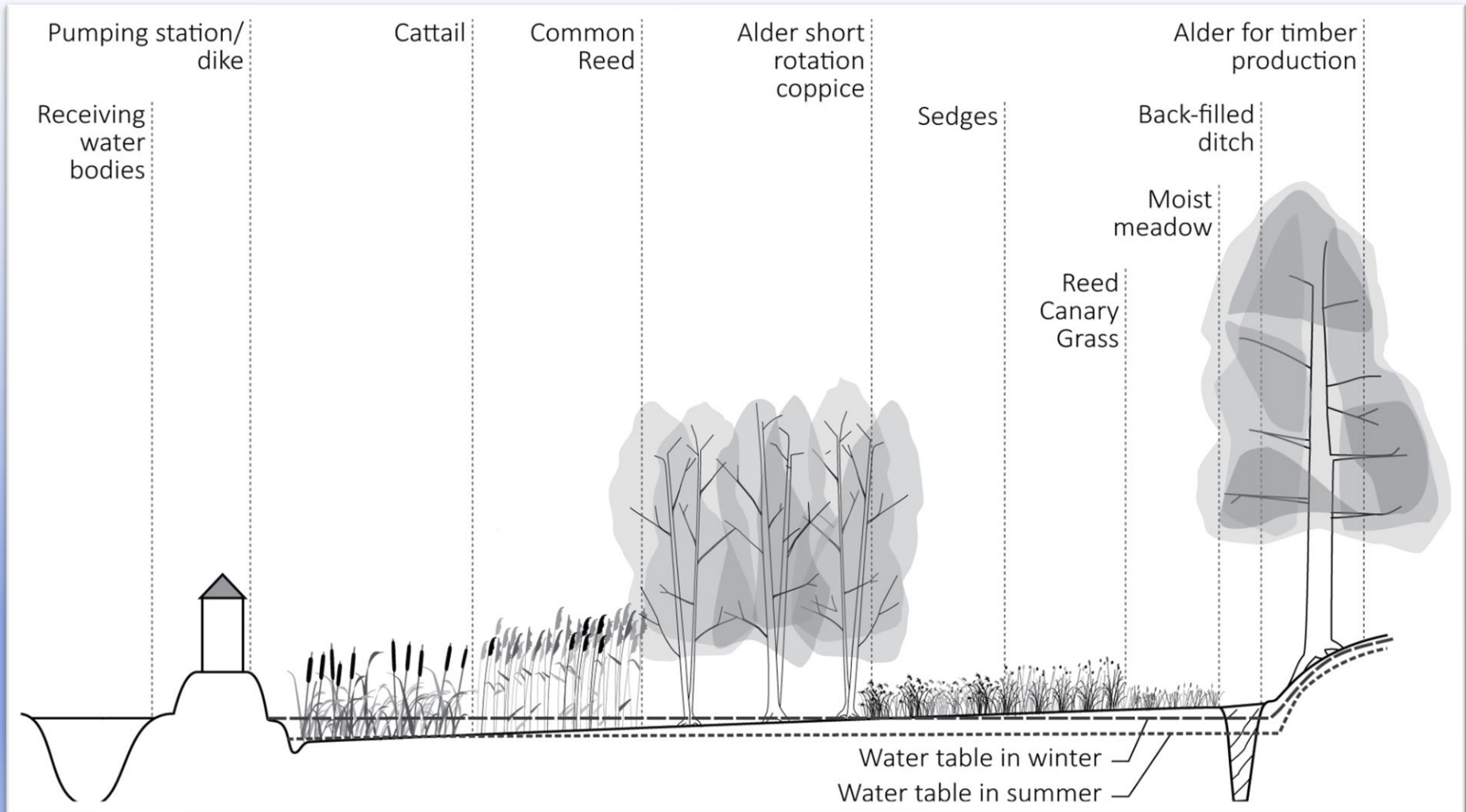
(Trepel et al. 2000, Schleuß et al. 2002, Schrautzer 2004)

Vegetation type	Sedge reed	Intensive grassland
utilisation	no	3 cuts
Medium water table	-10	-50
deposition	20	20
ferilization	0	160
mineralisation	30	200
Sum of inputs	50	480
export by harvest	0	200
Denitrification	20	80
N-leaching	5	20
Sum of outputs	25	300
N-saldo	25	180
Evaluation	Peat formation	Degradation and eutrophication

If the sedges are harvested once a year, the saldo will even be negative

Holsten & Trepel 2016

Mix of different land use options in a rewetted polder



Management / Harvesting

One step – bundles



Two steps – chopped biomass

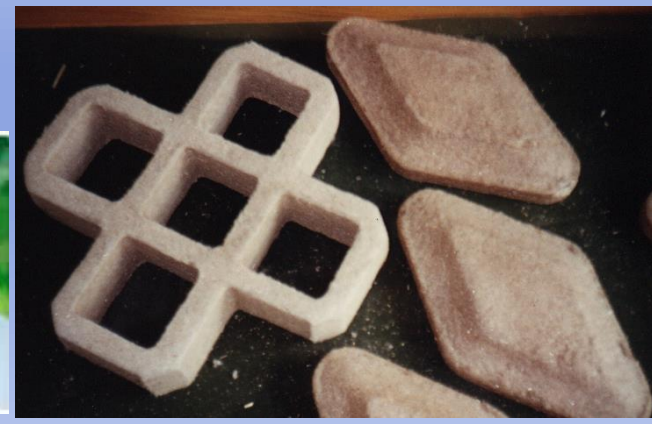


Three steps – round bales



Products from reeds (Quality Reed and Cattail)

- Bundles for roofing
- Culms for mats production
- Construction boards
- Insulation material
- Form bodies
-



Options for energetic utilisation

- Round bales
- Pellets
- Briquettes

→ Direct burning

- Silage for biogas
- Bio-char
- BTL
- Bio-refinery
-



A field study of Paludiculture plant species

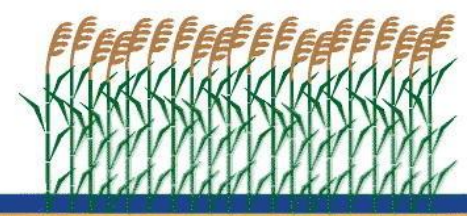
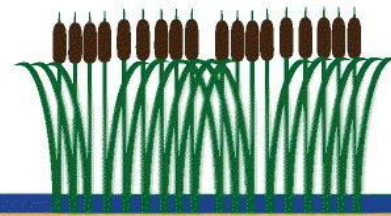
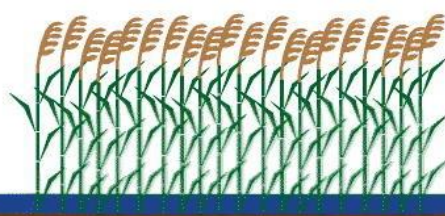
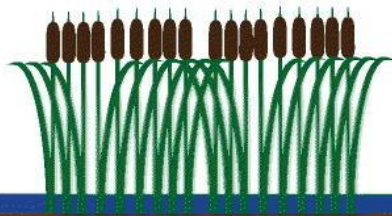
on rewetted/wet organic and mineral soils

Typha latifolia

Phragmites australis

Typha latifolia

Phragmites australis



rewetted organic soils

rewetted mineral soils

Biomass production $10-30 \text{ t dm (ha}^{-1} \text{ y}^{-1})$
Nutrient removal potential N $100-600 \text{ kg} \cdot \text{P } 20-80 \text{ kg} \cdot \text{K } 50-450 \text{ kg (ha}^{-1} \text{ y}^{-1})$
N:P ratio *T. latifolia* N:P 5-9 • *P. australis* N:P 8-25

Harvest period Summer, Autumn, Winter
Stand age younger < 3 years > older
Soil characteristics broad range

Providing different Ecosystem-Services

is the driving force for implementation of Paludiculture

- **Production services - biomass for**
 - material and energetic use
 - use as fodder or food (comestibles)
- **Regulation services**
 - Soil protection
 - Site adapted biodiversity (nature near habitats)
 - Water quality protection (retention of nutrients)
 - Water quantity (harmonisation of discharge)
 - Climate protection (mitigation of GHG emissions)
 - Climate adaptation (resilience to flooding)
 - Archives (landscape and human history)



Wet livelihoods in Iraq: <https://static.messynessychic.com/wp-content/uploads/2014/11/paradiselost.jpg>



Many thanks for your attention

www.greifswaldmoor.de