Retours d'expériences de restauration et de valorisation de tourbières de plaine

Colloque

15-16 MAI 2017

Ruffieux

Conservatoire d'espaces naturels Savoie

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L'EUROPE S'ENGAGE pour le Rhône et la Saône avec le FEDER

agence de l'eau
RHÔNE MÉDITERRANÉE CORSE
établissement public de l'État

university of groningen

Radboud University Nijmegen

HYDROLOGICAL RESTORATION OF PEATLANDS

REVIEW OF EXPERIMENTS AND TECHNIQUES IMPLEMENTED

GROOTJANS ALBERT PIETER

Université de Groningen (Pays-Bas)

Avec le soutien financier de :

UNION EUROPÉENNE

L'EUROPE S'ENGAGE pour le Rhône et la Saône avec le FEDER

agence de l'eau RHÔNE MÉDITERRANÉE CORSE

Hydrological restoration of peatlands

review of experiments and techniques implemented

A.P.Grootjans@rug.nl

university of groningen

Radboud University Nijmegen

For wetlands and peatlands:

Restoring functional landscapes

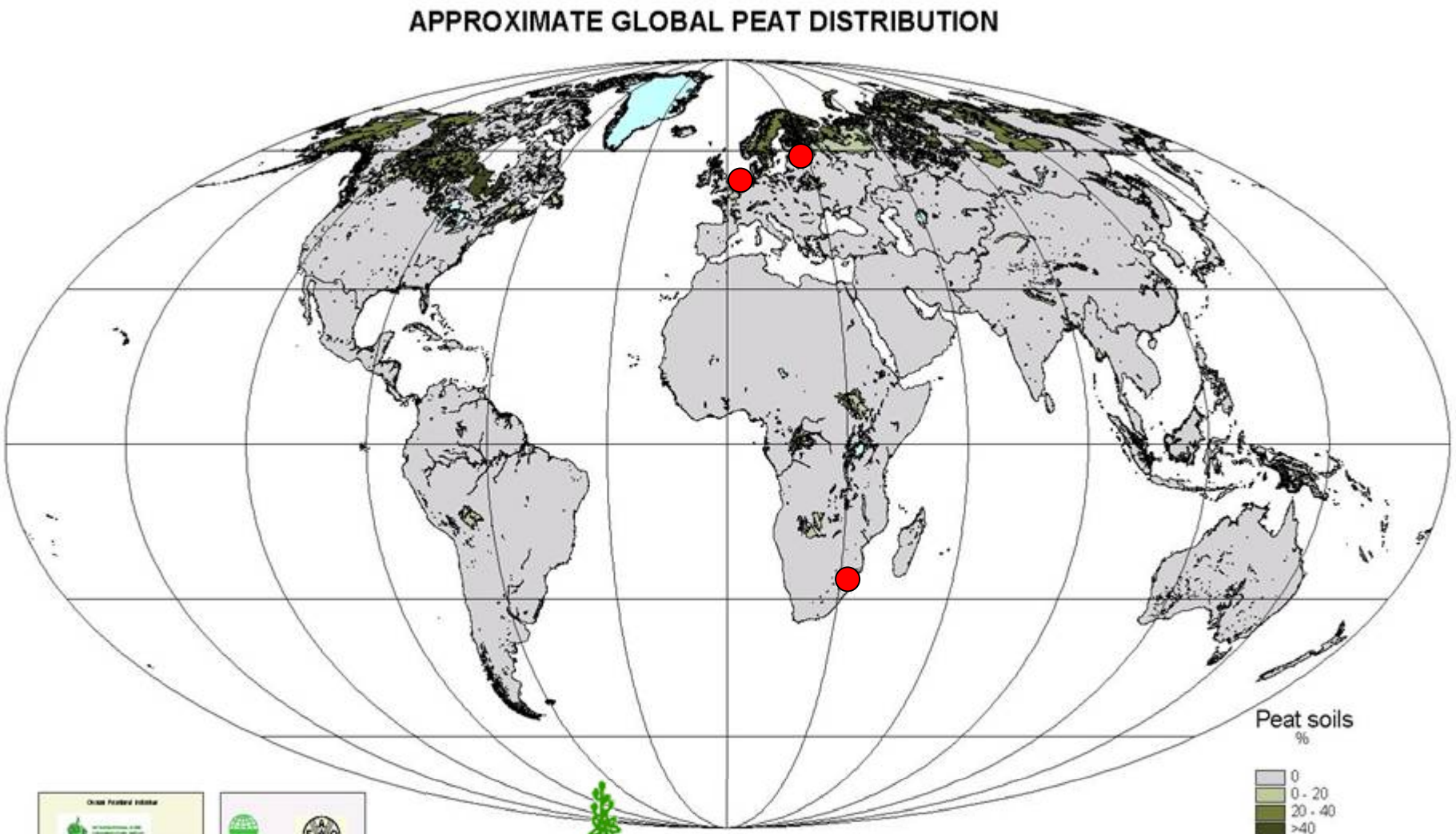
= restoring hydrology

Two questions:

- **How similar are the hydrological systems?** (i) small coastal wetlands, (ii) small coastal mires, (iii) large coastal mires
- **Restore wetlands to what state?** Lake district Friesland, The Netherlands, Drentsche Aa brook valley, NL

- **How similar are the hydrological systems? (i) small coastal wetlands, (ii) small coastal mires, (iii) large coastal mires**

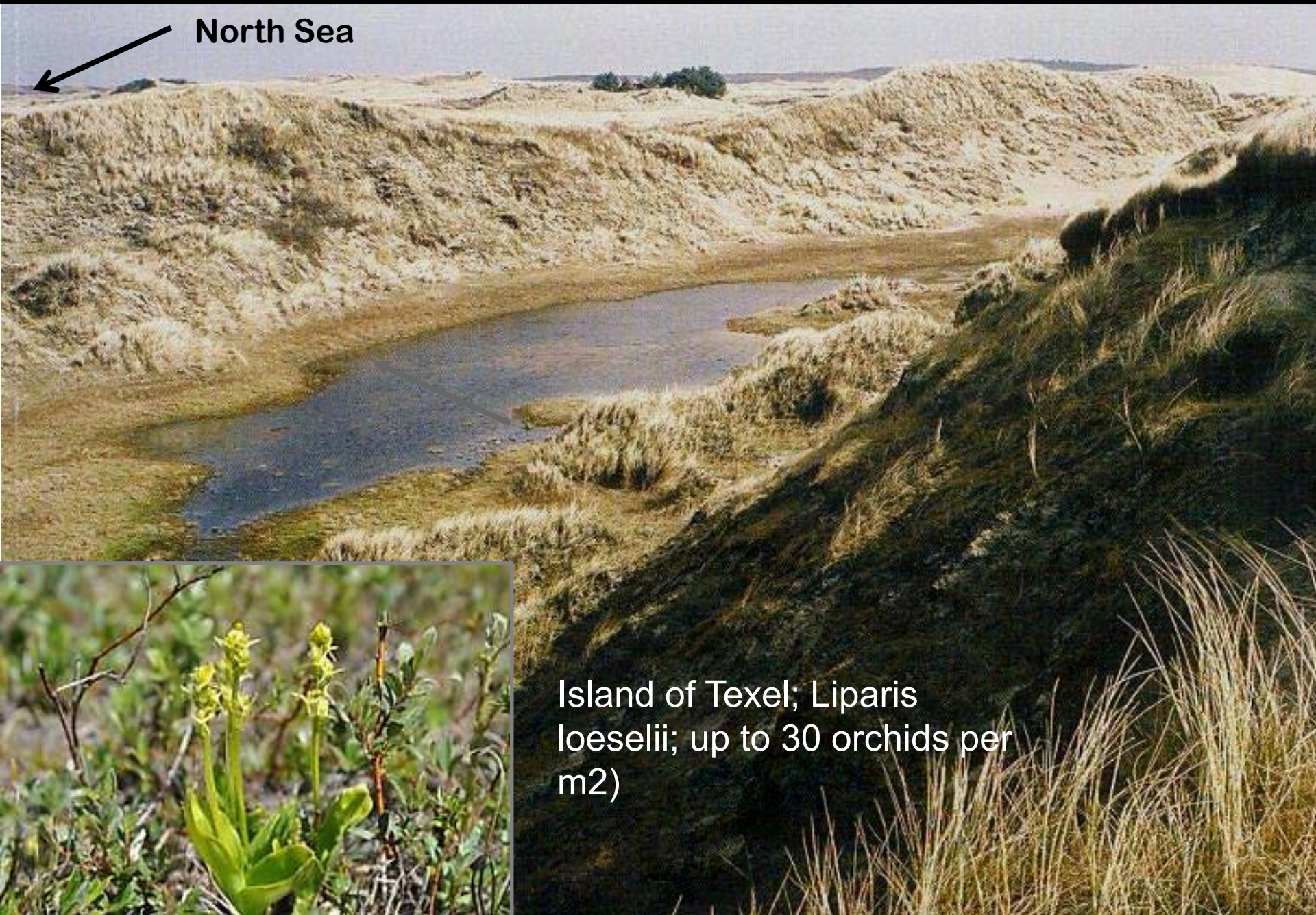
● Mires discussed in this talk



INTERNATIONAL MIRE CONSERVATION GROUP

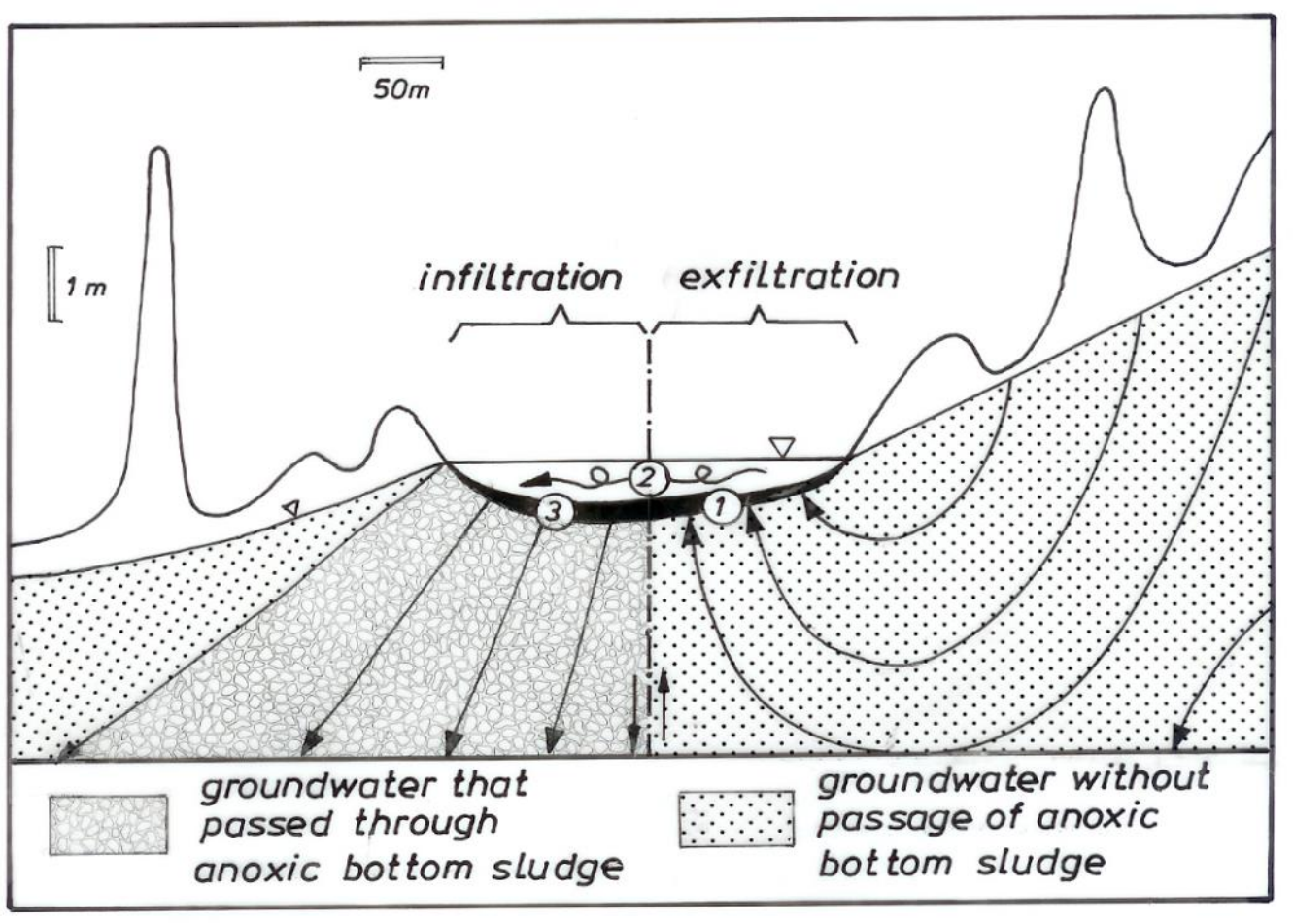
www.imcg.net

Inter dune wetland, Netherlands



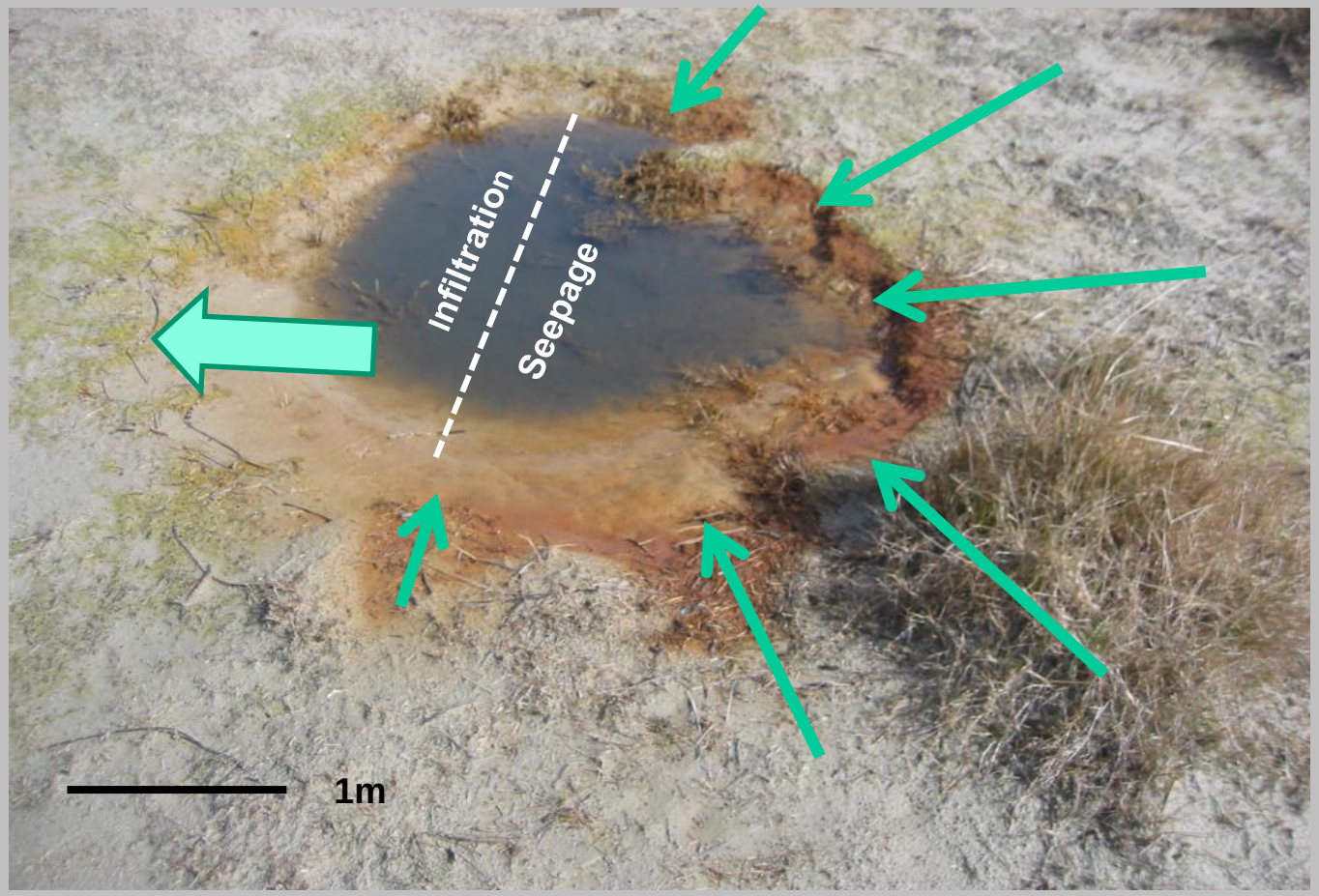
Island of Texel; Liparis loeselii; up to 30 orchids per m2)

Hydrological principles of a through-flow wetland

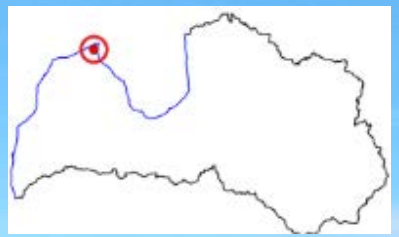


Stuyfzand & Moberts 1979

Hydrological system of a dune wetland,1year old

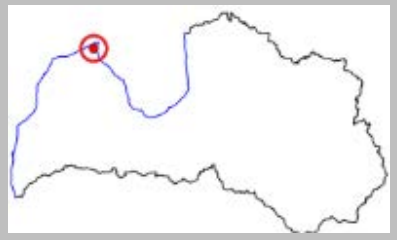


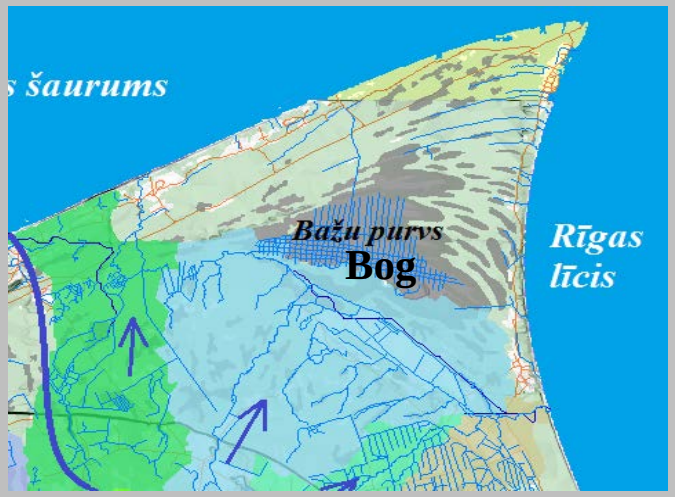
Inter-dune peatland Latvia, 8000 years old

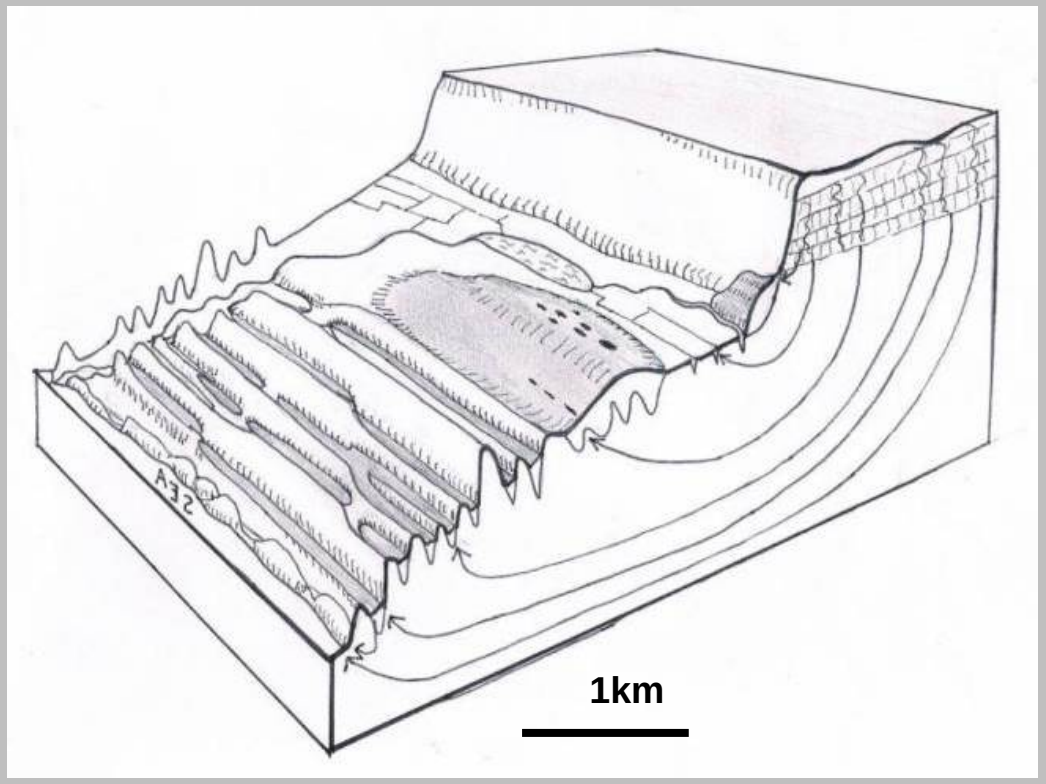


Peatlands in Slitere National Park Latvia

The next valley mire does not reflect a clear groundwater influence; the vegetation is predominantly a bog vegetation.



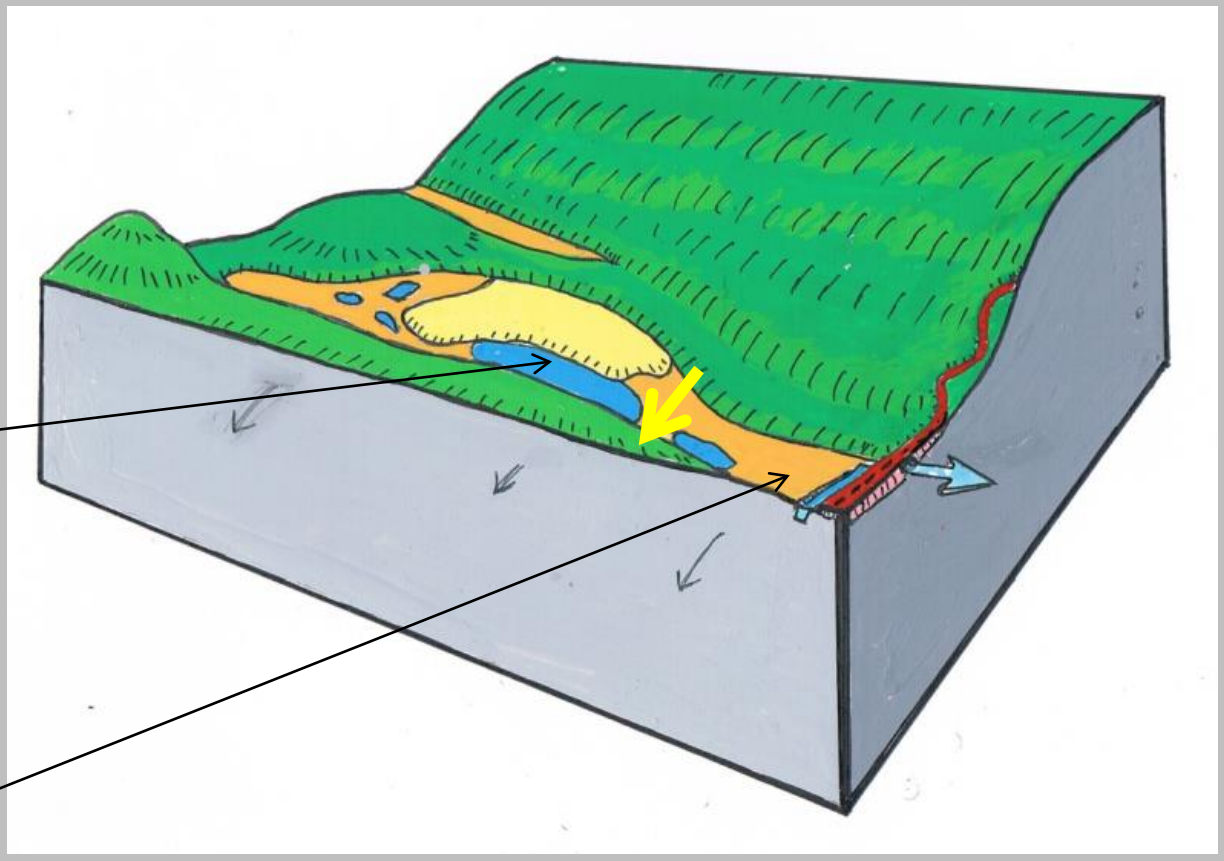




These large difference in vegetation in neighbouring dune mires appear to be caused by difference in groundwater flow. One valley is fed by mineral-rich groundwater, the others are not. The mineral groundwater probably comes from far away. Most likely from the area where the elevated old coastline is situated. This area is probably also providing the Bazu bog with groundwater

Peatlands in Slitere National Park Latvia: problems; increased succession; more shrubs

The inter dune wetland consists of fens, bogs and two lakes. There is no visual outlet in the valley,

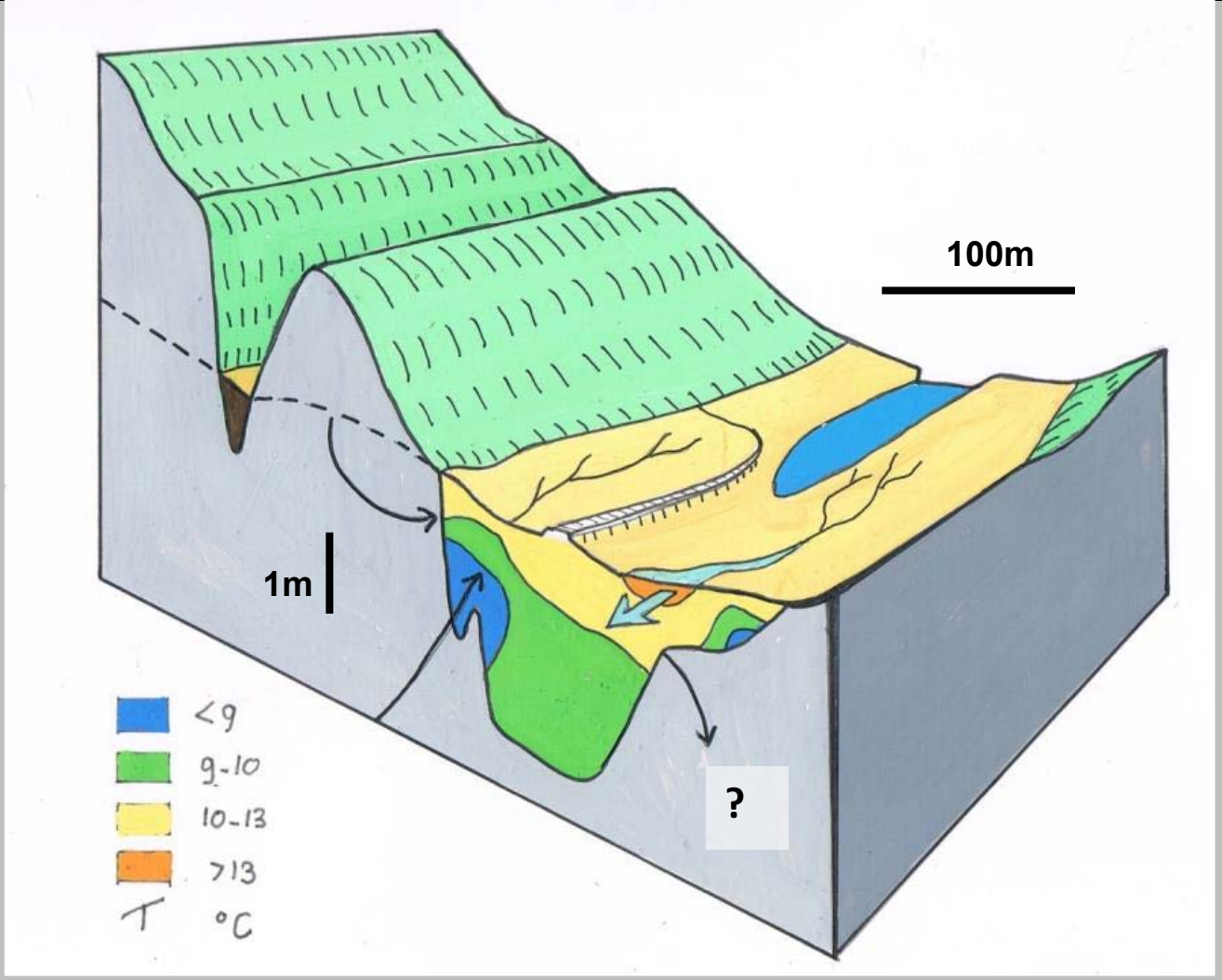


Overview of Peterzera mire with bogs (yellow), fens (orange)and lakes (blue).

Peterezera Mire; overview of the left part of the transect

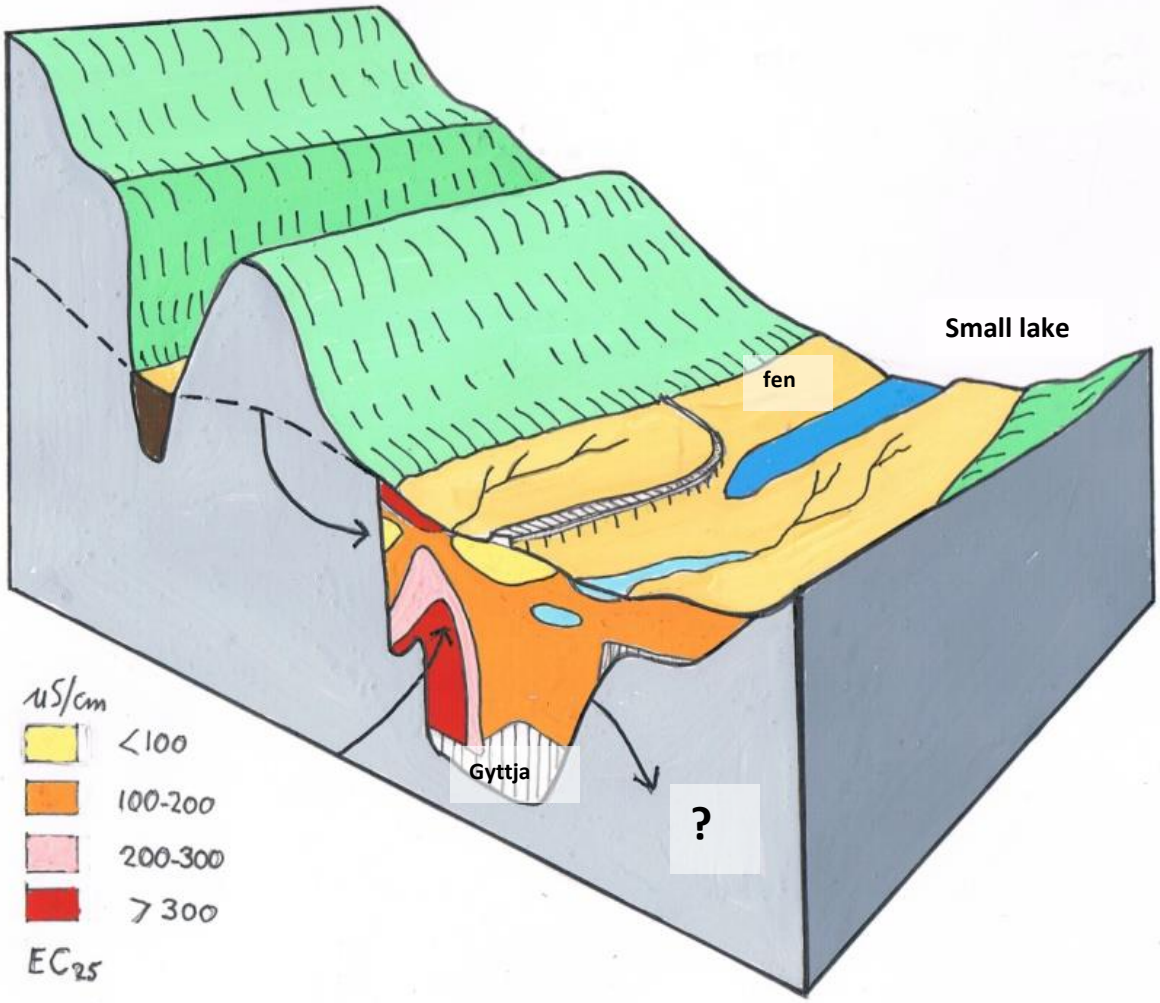
Methods used; field measurements: Temperature, Redox and Electrical Conductivity, pH.

Interpretation of temperature measurements



On the left end side cold groundwater (<9 degrees) enters the valleys. These low temperatures indicate the presence of deeper groundwater that could have come from far away. The temperature measurements in the middle of the valley clearly show that the warm surface water is influencing deeper soil layers, confirming the idea of underground surface water flow here.

Interpretation of EC measurements



The Electrical Conductivity (EC) reflects the amount of dissolved minerals. High values point to the presence of calcareous groundwater. Very low values point to rain water.

High values are present at the left end side of the valley. Calcareous groundwater enters the values in deeper layers on the right, via an old and small dune ridge that now is completely overgrown by peat. In the middle of the valley groundwater, surface water and precipitation water appear to mix.

This drainage systems, situated outside the borders of Slitere National Park, discharges surface water from the forest and from the agricultural enclave. In times of heave rain the force of water is so strong that the considerable erosion is triggered.

Further down in the system the erosive flood water that has been concentrated by the culvert is doing intensive damage to the old stream and several sections of the stream have collapsed. This erosion will become much worse if the source of the problem is not solved. We recommend to start with controlling the water flow before the culvert and use the dam to stop the intensive flow of surface water through the culvert.

It would be best to reconsider the whole drainage system. Because it is very possible that it affects large section of the National Park

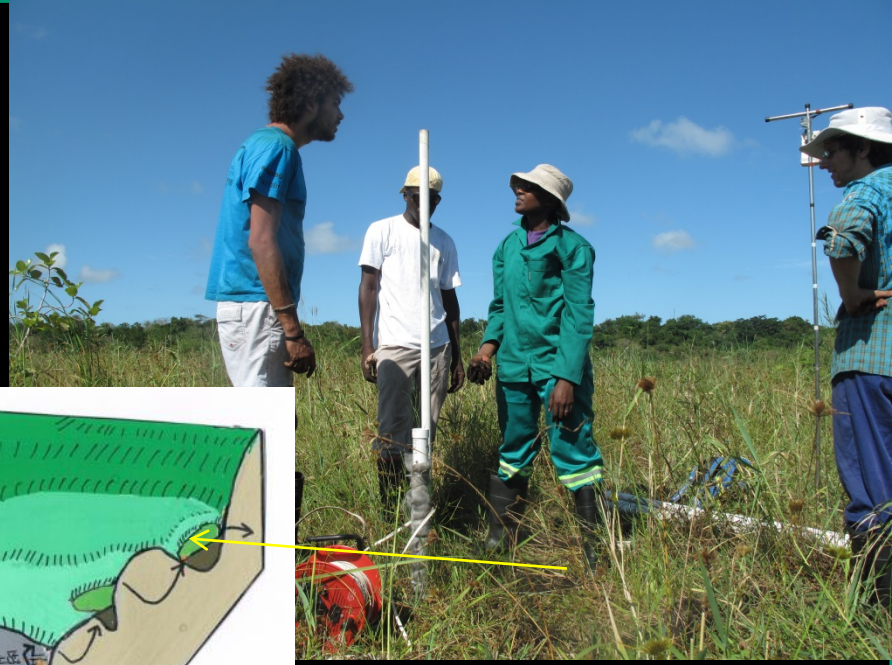
Vazi wetlands, South-Africa;

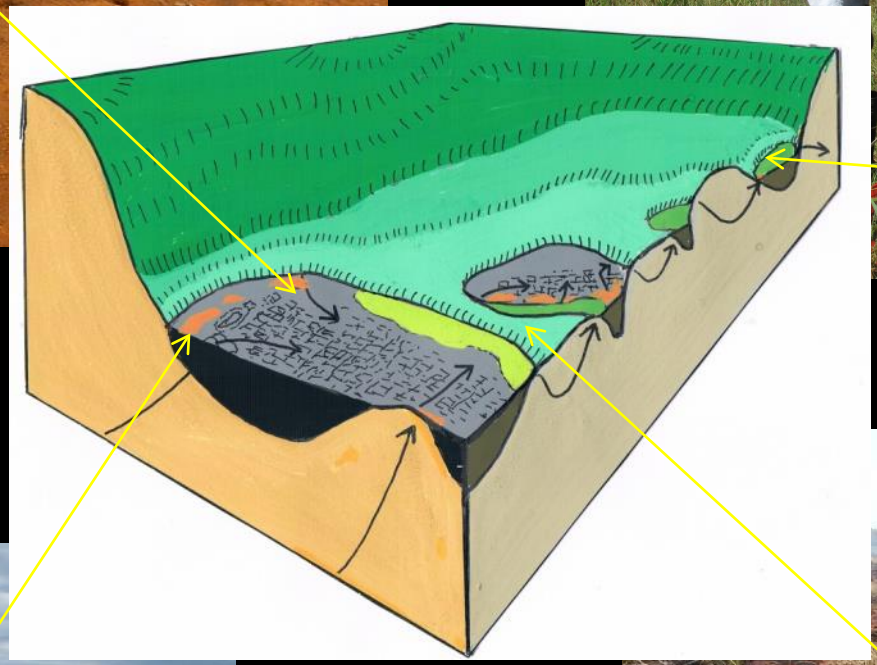
destroyed by Forest plantations

Samer Elshehawi, Lulu Pretorius, Sihle Bukhosini, Piet-Louis Grundling, Marvin Gabriel and *Johannes Van der Plicht*

Vazi mires South Africa, 7000 years old

Vazi mires: drying out and burning regularly since 1998

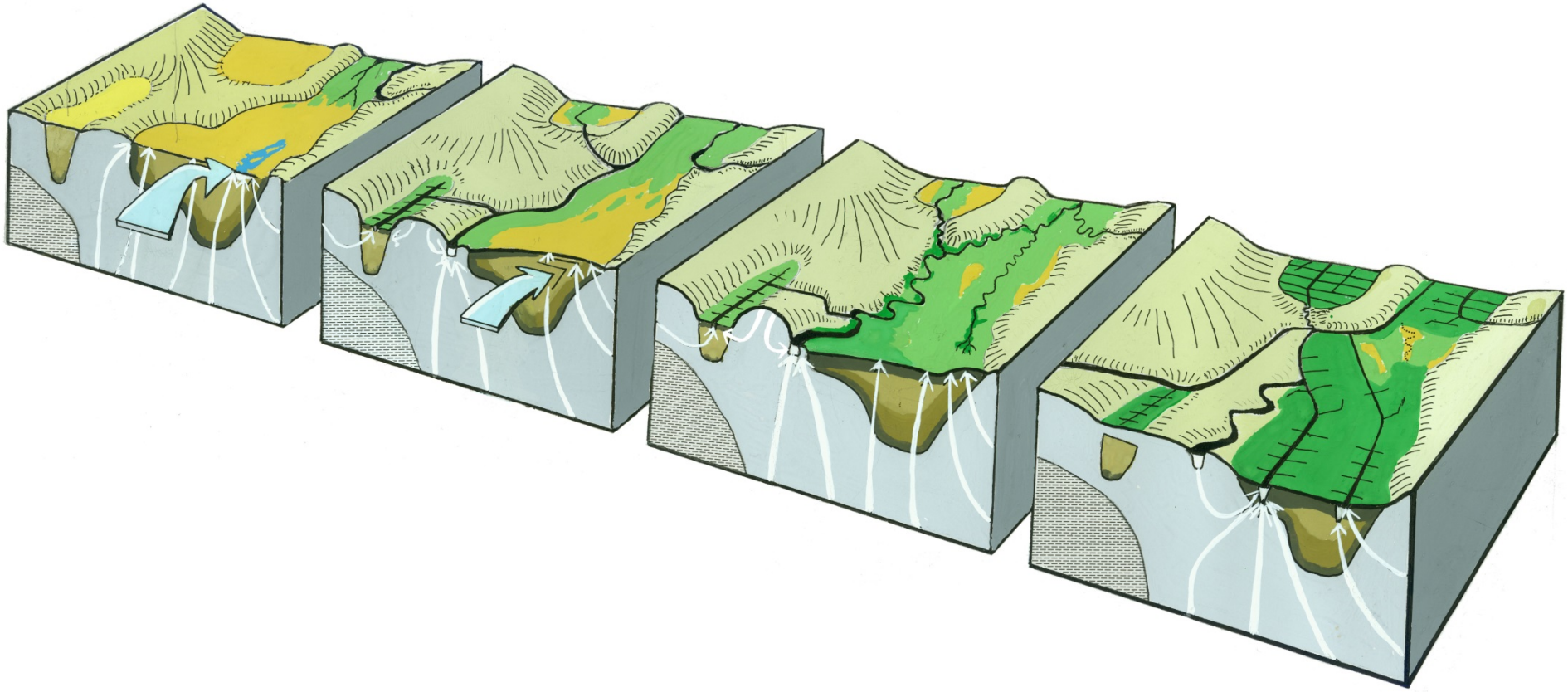




- Restore wetlands to what state?

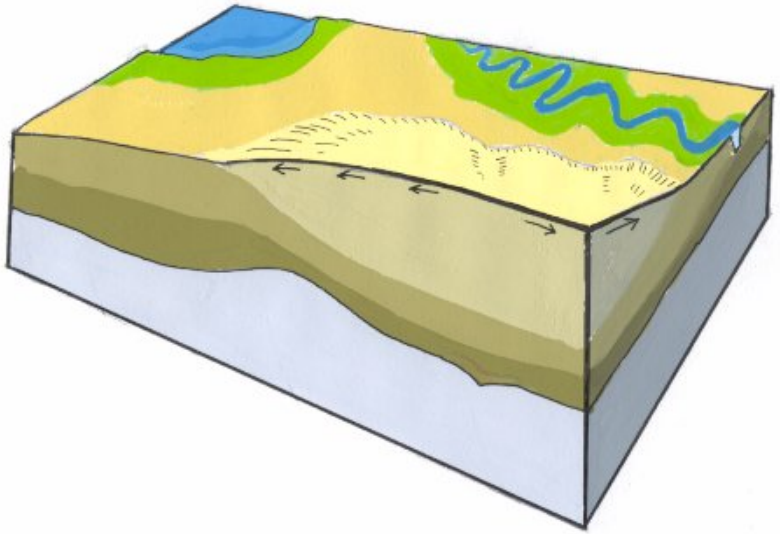
Stages in mire devlopment

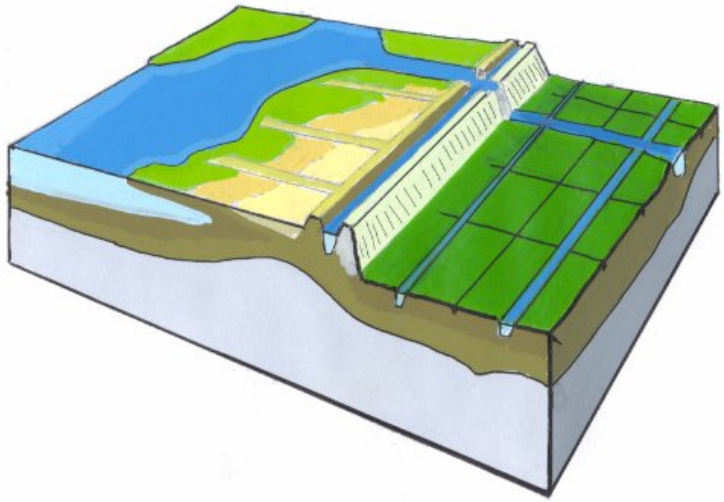
fens/bogs changed into grasslands



Goal not possible;

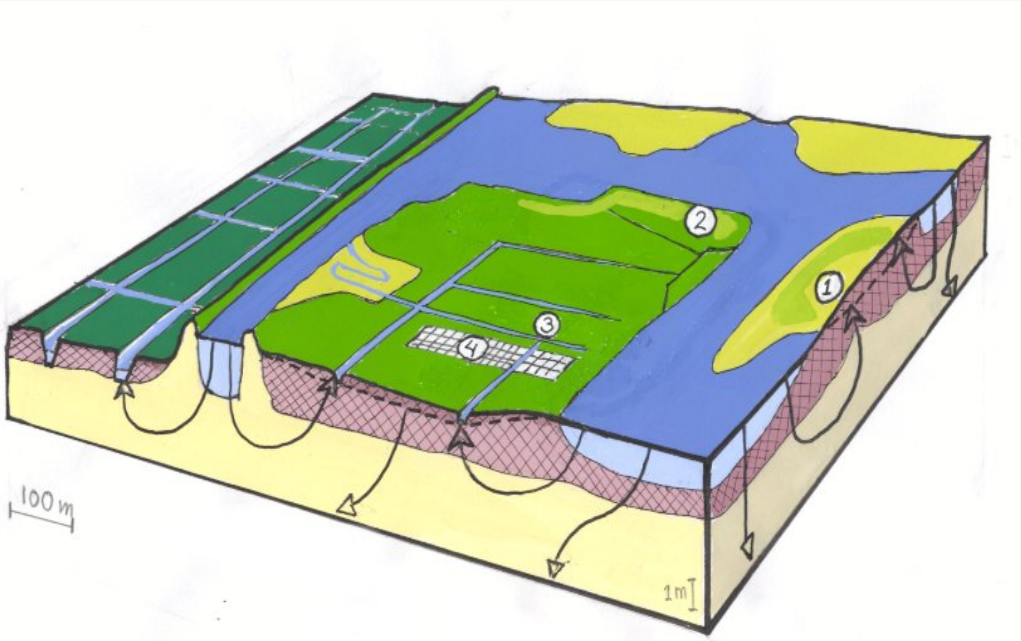
fens/bogs changed into terrestrializing lakes





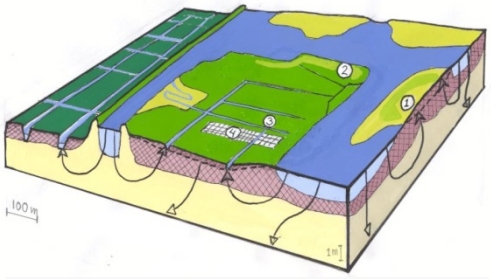
- Peat has been burned
- Hydrology changed irreversibly

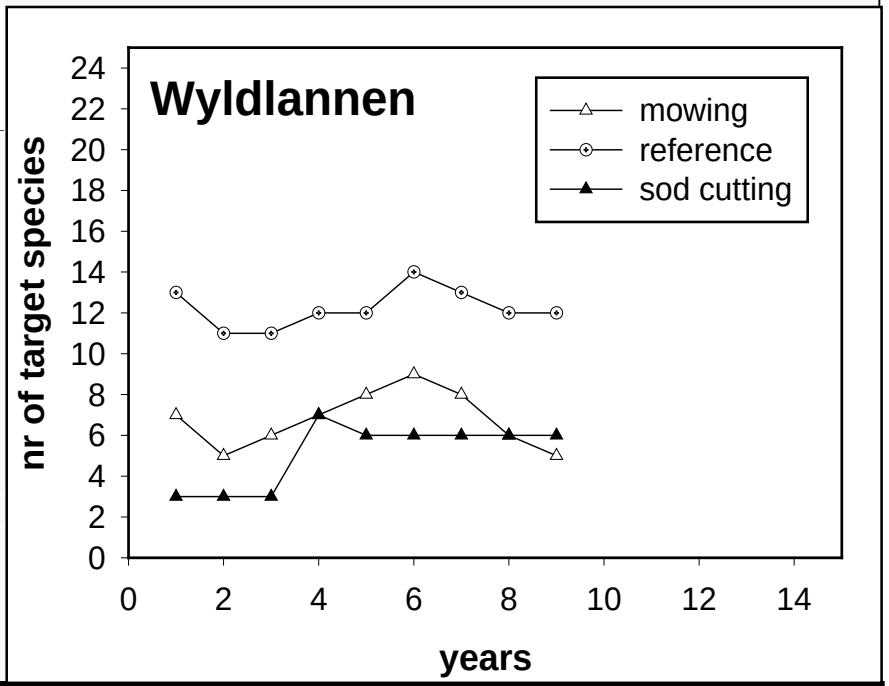
Present situation



Low lying polder area causes infiltration in the whole wetland area

Polder area Friesland;
Attempt to restore fen meadows





Complete failure!

Drentsche Aa: large scale rewetting

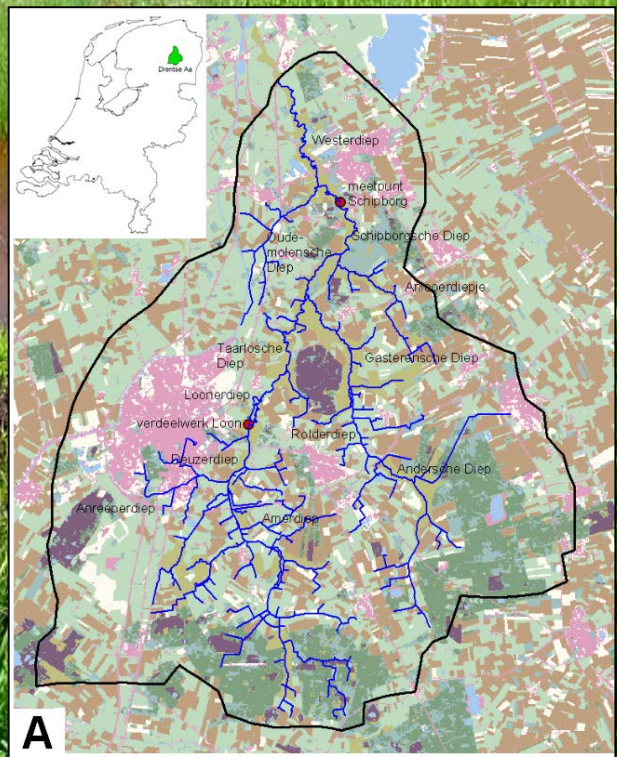
Restoration of marshes and hay meadows since 1970

Landscape park: 30.000 ha

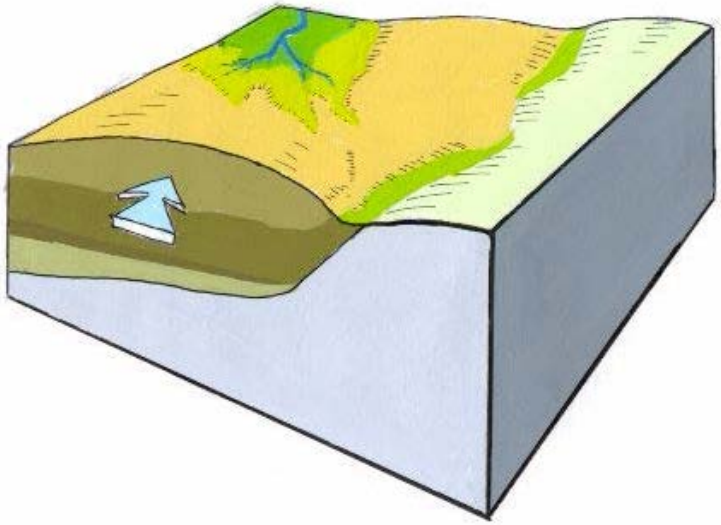
Nature reserve: 10.000 ha

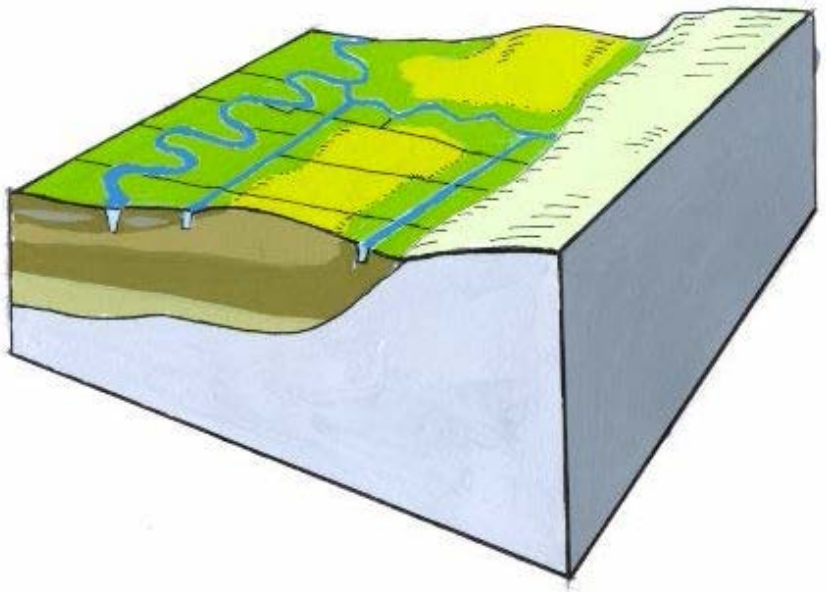
Hay meadows: 2.500 ha

Rewetted: 500 ha



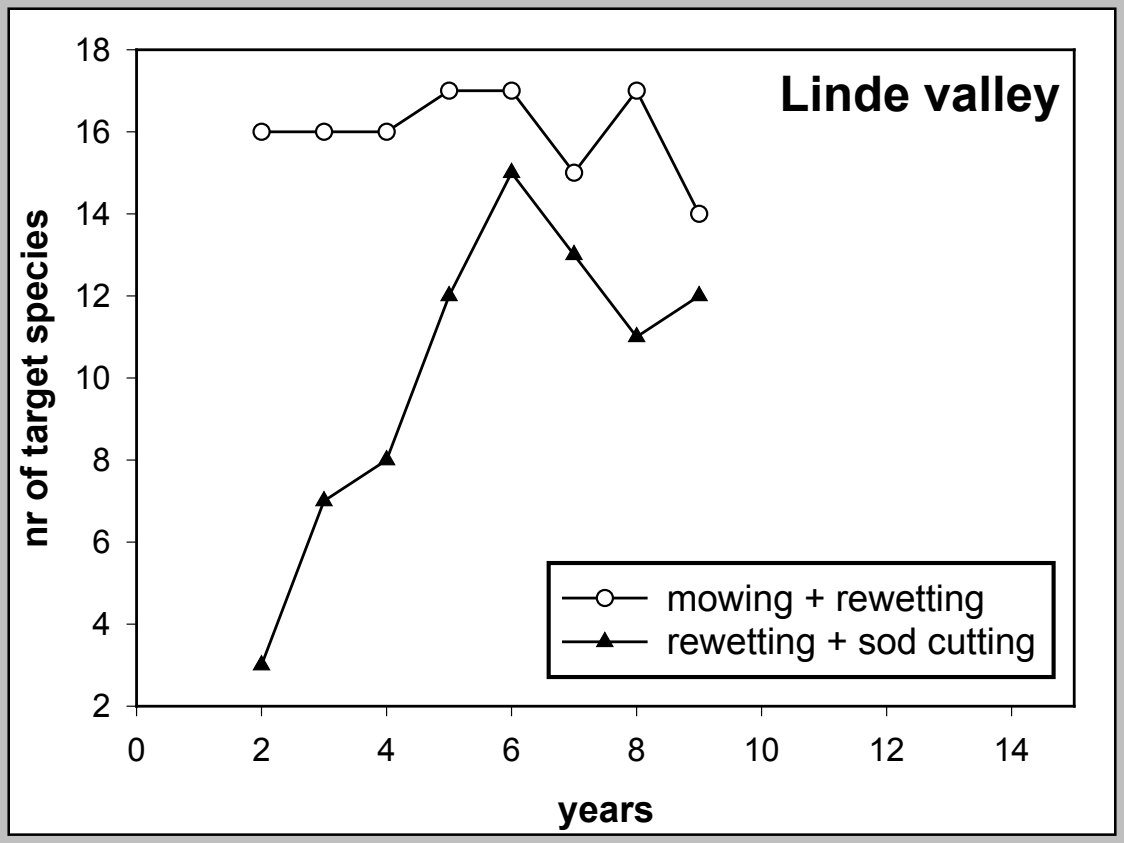
Almost all “typical” stream valley vegetation types are man-made





- Lowering of peat surface
- Streams and ditches are more or less constructed

Linde valley Friesland



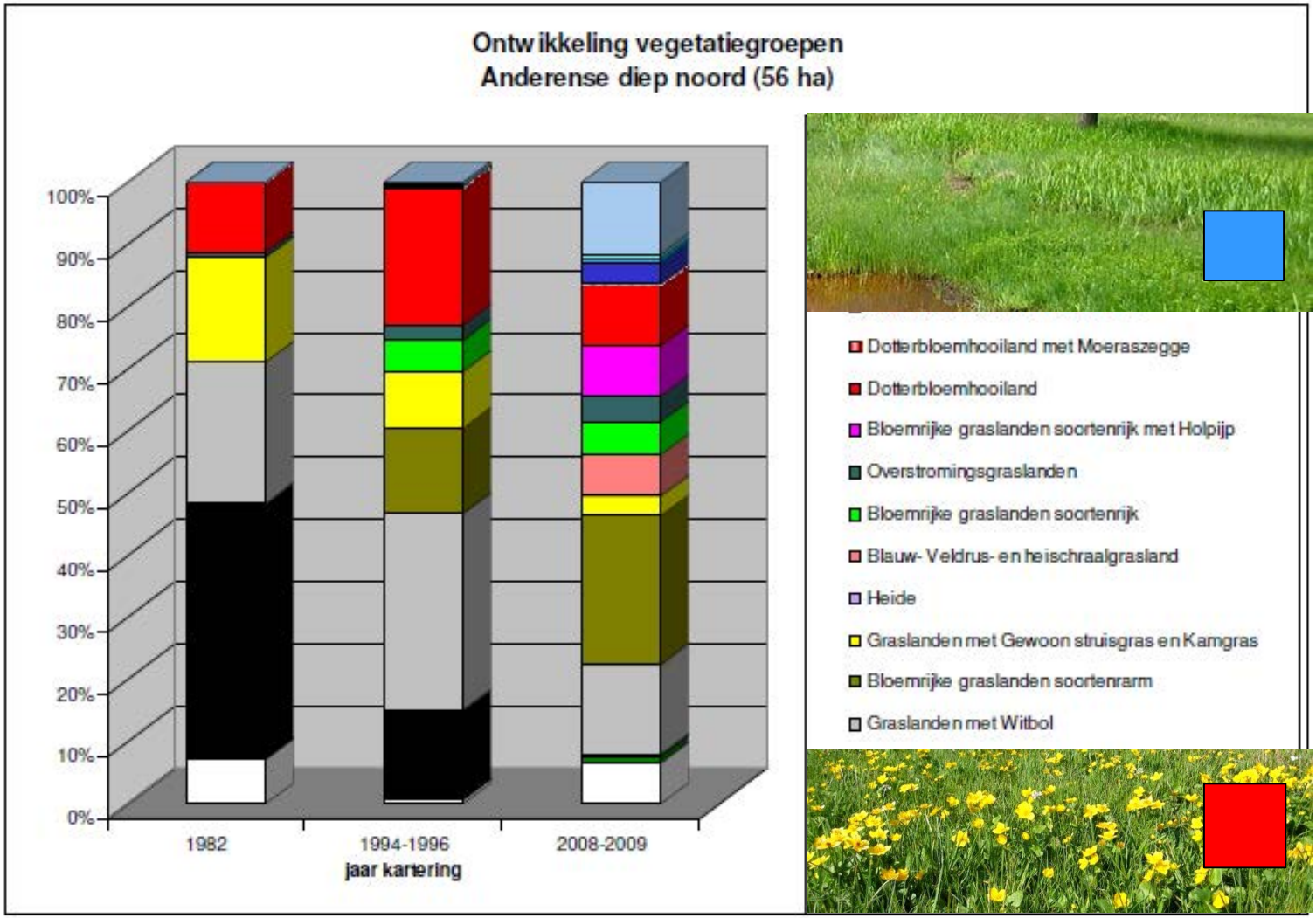
Restoration OK when hydrological conditions are OK.

From Grootjans et al 2002;
see also Klimkowska et al. 2007, 2008

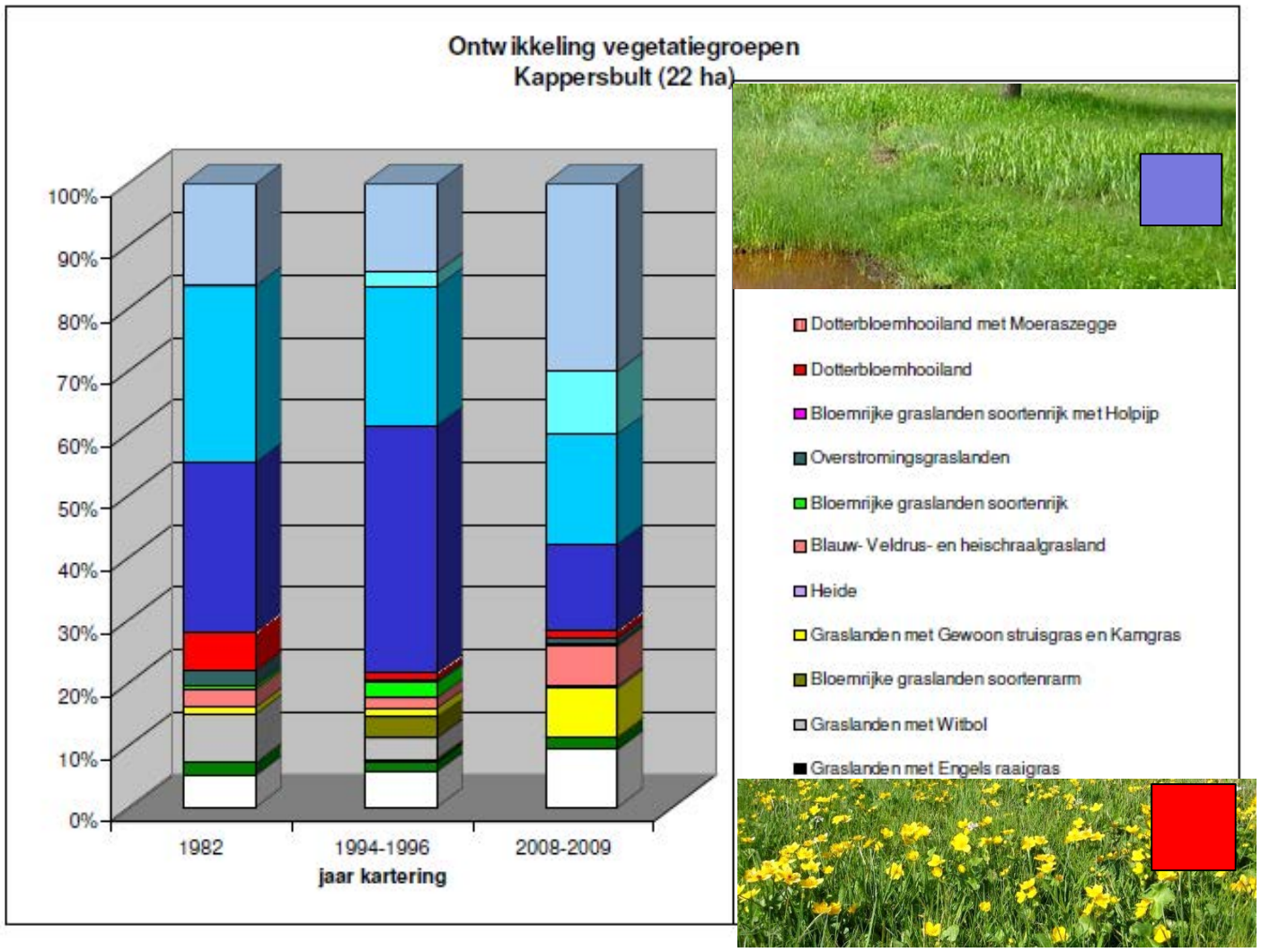
Drentsche Aa: large scale rewetting

After more than 10 years of discussion, all ditches have been closed within a 500 ha peatland area, which has led to recovery of both marshes and meadows……. and to a reduction of emissions of greenhouse gases (c. 400 ton CO2 eq./yr = carbon credits of at least 5-10.000 €/jaar)

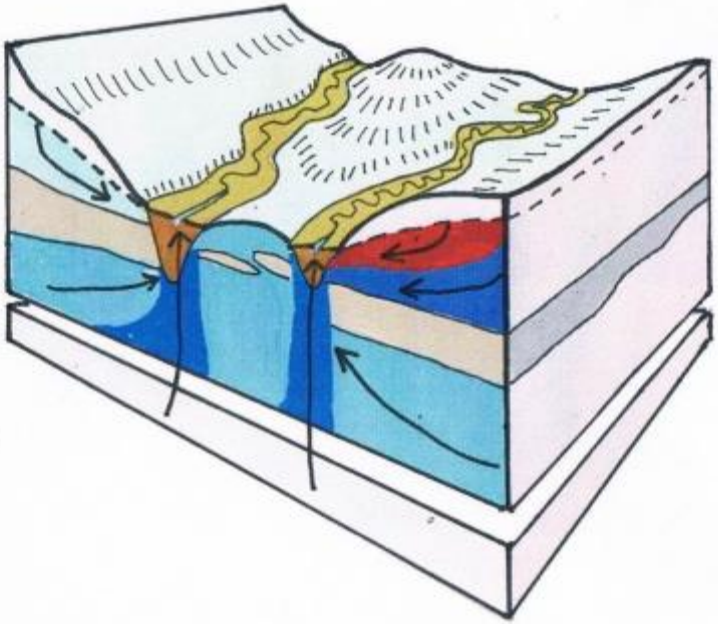
After 25 years very positive results in most areas

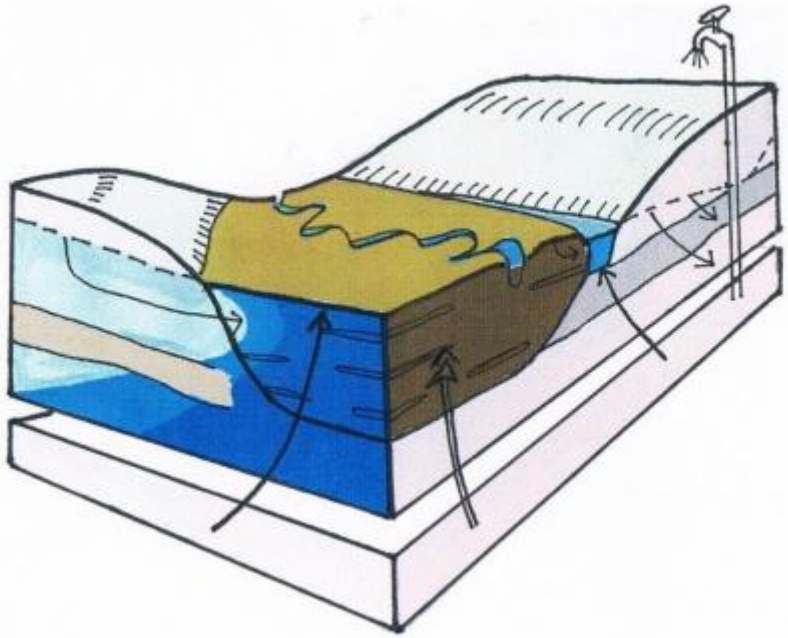


Groundwater abstraction prevents restoration in some areas



However, problems still exist

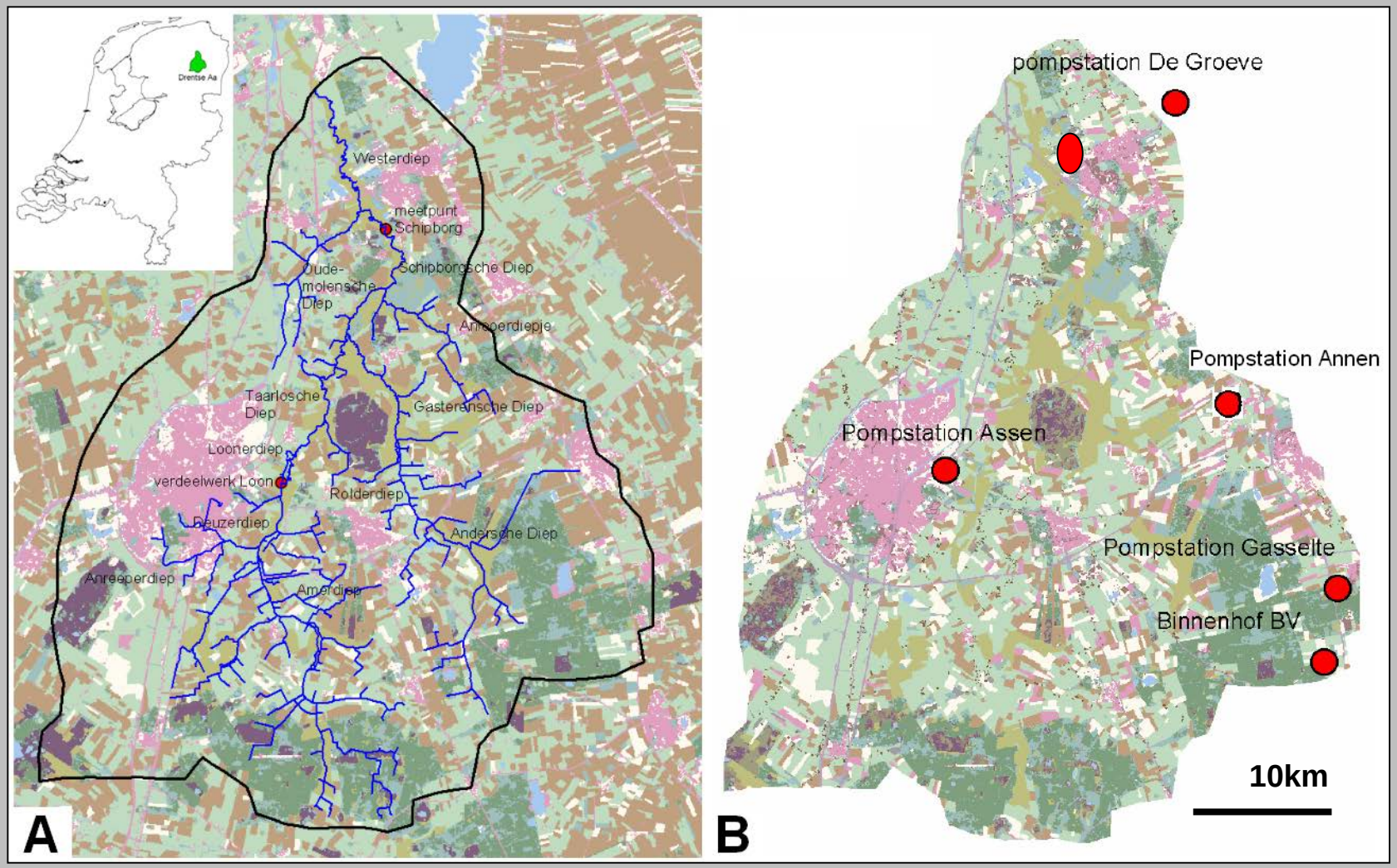




kalkarm grondwater
kalkrijk grondwater
matig vervuild grondwater
sterk vervuild grondwater

Such as groundwater abstraction in some areas

Groundwater abstraction in the Drentsche Aa



Groundwater abstracted facility for production of drinking water

Conclusions

- We cannot repeat history.
- We can conserve part of our natural heritage, but not all.
- Natural processes should be unchained in our large nature reserves.
- In stream valleys priority should be given to restoring hydrological systems.

Conclusions

- Developing alder forests and eutrophic marshes in stream valleys is environmental friendly (reduces greenhouse gas emissions) and conserves peat.
- Peatlands are often patient patients; they are not in a hurry.
- Long term planning is more important than short time solutions. Do not jump to restoration


Questions?