

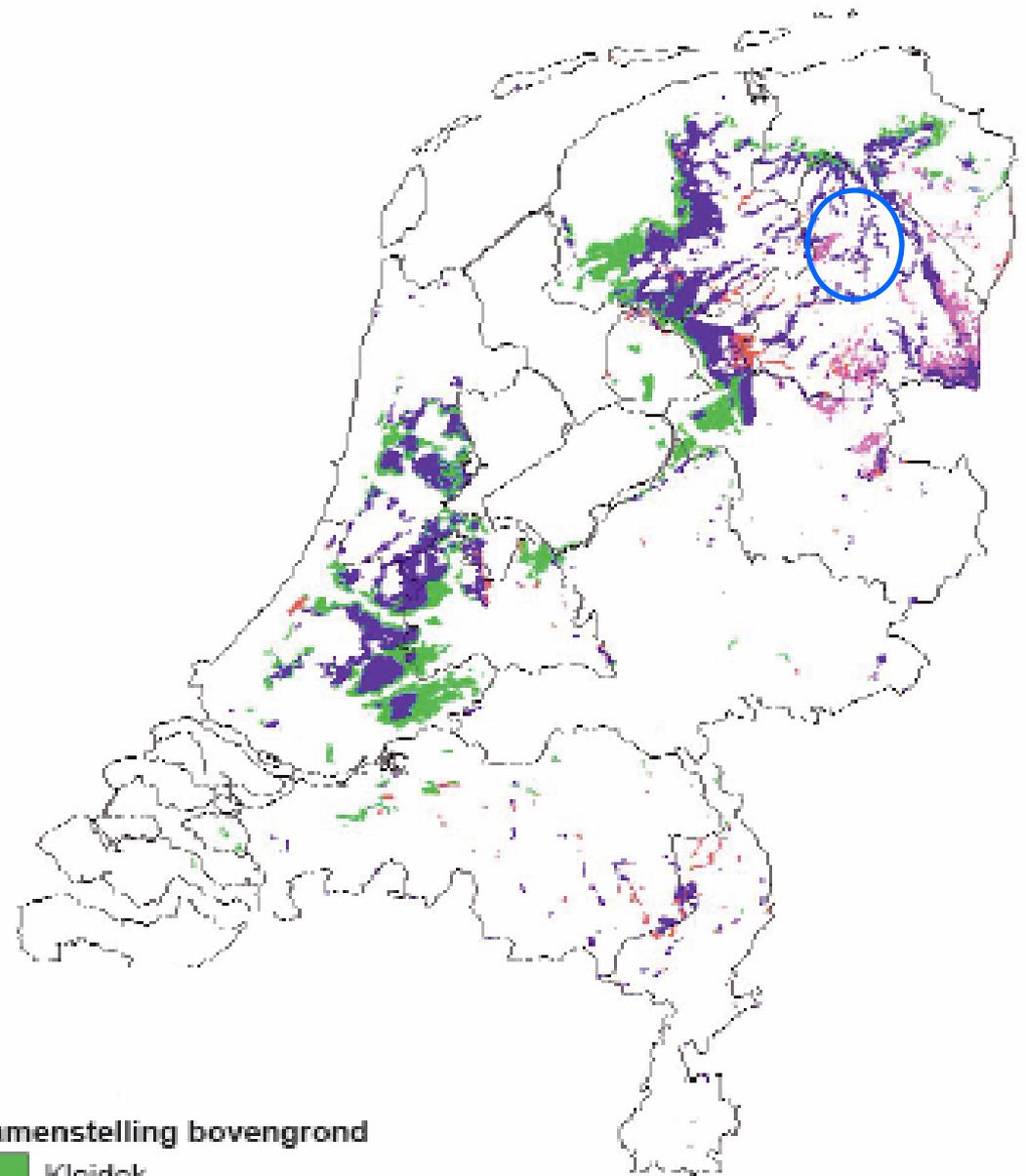
# Peatland restoration and paludiculture for clean and safe water

A.P.Grootjans@rug.nl

Or why alternative peatland  
use is bogged down in the  
Netherlands

# Peat soils in NL: 290,000 ha

Agriculture: 223,000 ha  
Nature areas: 67,000 ha



## Samenstelling bovengrond

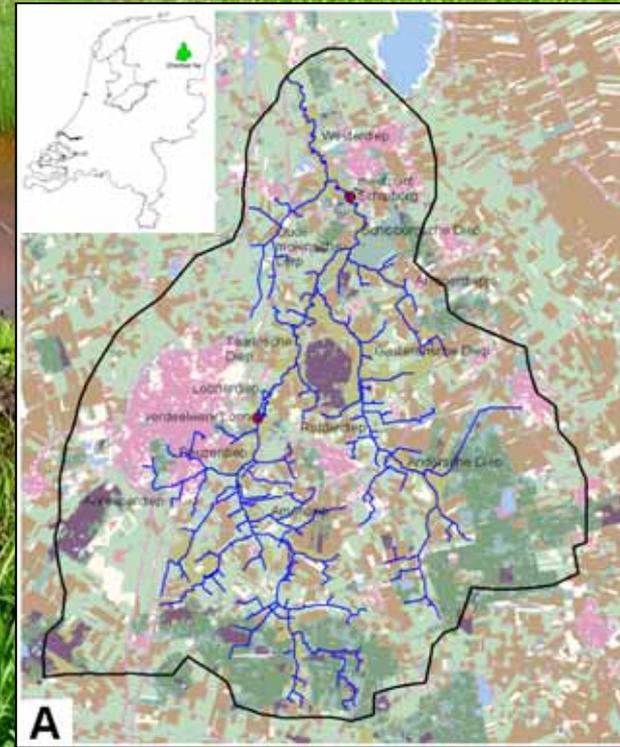
- Kleidek
- Moerig
- Veenkoloniaal (moerig en zandig)
- Zanddek

After: Van de Akker (2007)

# First the good news: Drentsche Aa: large scale rewetting

Restoration of marshes and hay meadows since 1965

Landscape park: 30,000 ha  
Nature reserve: 10,000 ha  
Hay meadows: 2,500 ha







Re-Rewetted: > 500 ha



After 10 years of discussion it was decided to eliminate all former agricultural ditches in an area of > 500 ha, thus preventing emissions of c. 400 ton CO<sub>2</sub> eq./yr (Hoetz 2013); carbon credits up to 5-10,000,- €/yr.)

## Comment of one of our nature managers:

- That is very nice!!
- But so much administrative work, make a plan, monitor the effects, try to sell the carbon credits... etc. In order to get money for nature management and rewetting projects I just have to fill in some simple forms;
- ----→ no need to change!!!

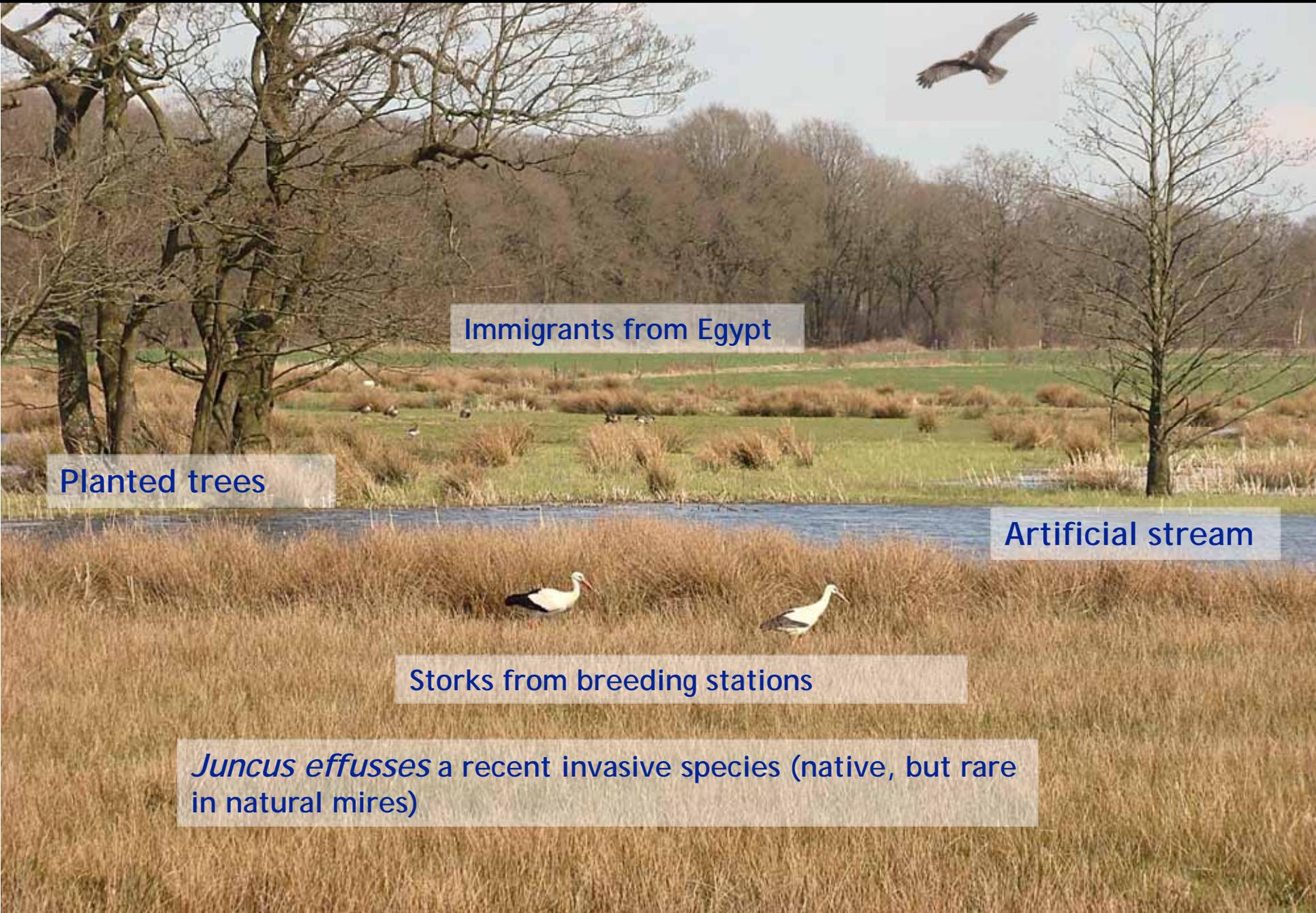
-----→ The high subsidies for Nature Conservation prevent alternative use of peatlands in nature areas

# Experiments with rewetting and top soil removal

Drentsche Aa, Lage Maden after 13 years



# Development of 'new' nature on former agricultural areas



Immigrants from Egypt

Planted trees

Artificial stream

Storks from breeding stations

*Juncus effusus* a recent invasive species (native, but rare in natural mires)

# Experiments with no-management (wilderness concept)

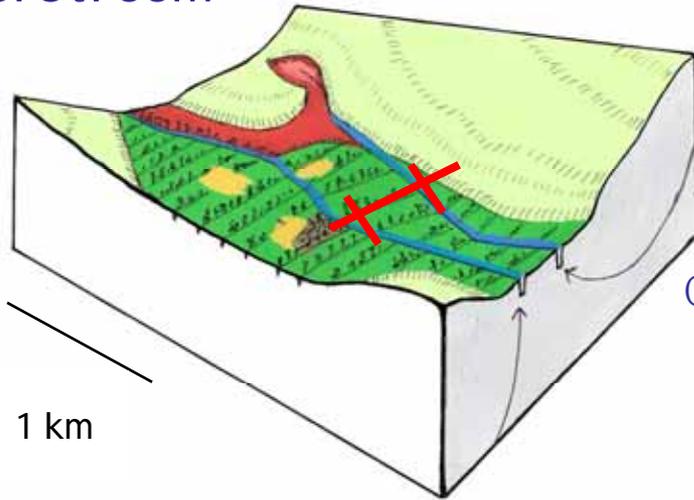
2007



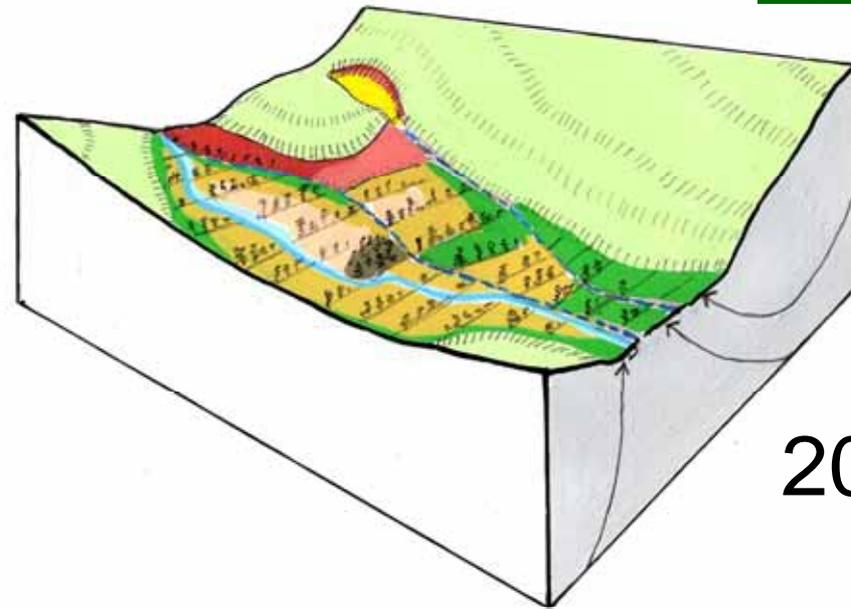
# Experiments with no-management

Elperstroom

2007



Cost of digging the drainage channels in 1974; 1 million Dutch guilders



2008

Cost of closing all the ditches again: 1 million Euro's, most of the area was never used by farmers



# Experiments with no-management

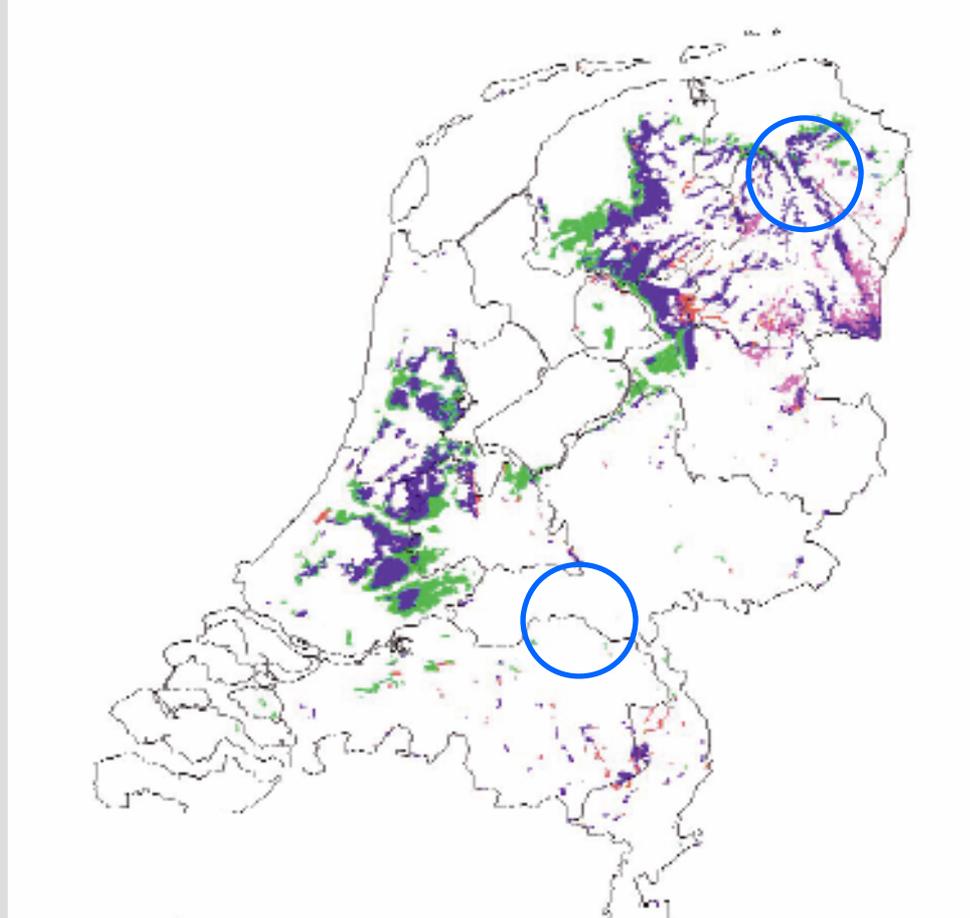


2017

# Still more good news: promoting ecosystem services

Water  
conservation  
areas;

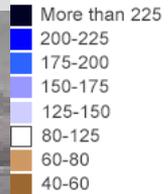
creating flood  
meadows



# Somerset Levels 2014

Record January rainfall in some areas

Rainfall Jan 2014\*  
% of 1981-2010 average



\*Data from 1-28 January 2014

Source: Met Office



Only twice the average rainfall → flooding at high costs

# Sommerset Levels 2014



It took 3 months to pump dry leaving a multi billion £ bill

# Sommerset Levels 2014



Oeps!!!

# Groningen Museum The Netherlands



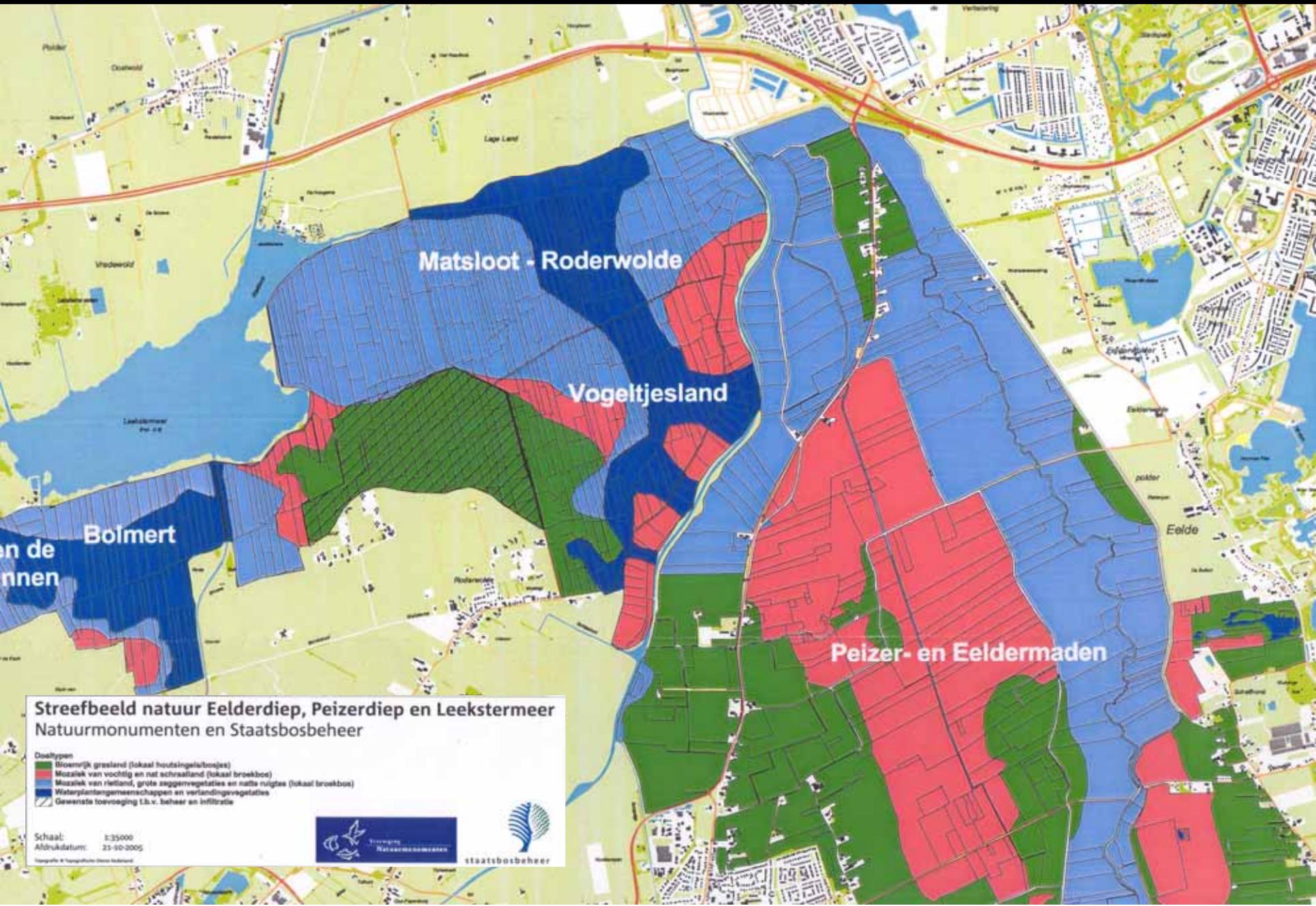
Like a thief, flood water comes through the backdoor or the windows



Water level rise was only 20-30 cm due to one intensive summer shower, predicted by our weather service

**Oeps!!!**

# Water conservation south of the city of Groningen



## Streefbeeld natuur Eelderdiep, Peizerdiep en Leekstermeer Natuurmonumenten en Staatsbosbeheer

- Doeeltypen**
- Blauwgroen: Bloemrijk grasland (lokaal houtsingels/bosjes)
  - Rood: Mosaiek van vochtig en nat schraalland (lokaal broekbos)
  - Blauw: Mosaiek van rietland, grote zeggervegetaties en natte riettes (lokaal broekbos)
  - Wit: Waterplantengemeenschappen en verlandingsvegetaties
  - Blauw met streepjes: Gewenste toevoging t.b.v. beheer en infiltratie

Schaal: 1:35000  
Afdrukdatum: 23-10-2005



Creating water conservation area; promoting ecosystem services

Creating water conservation areas is not always very difficult

# Lippe in Germany 2007: a lot, of fairly clean surface water



**Remove a little dike**

A photograph showing a flooded road. The road is partially submerged in water, with a small waterfall-like drop-off on the right side. In the background, there is a mound of earth with a wooden viewing platform on top. The sky is overcast, and there are bare trees. Two people are walking on the road in the distance.

Make a nice view point

Just leave the road



Call it a protected area

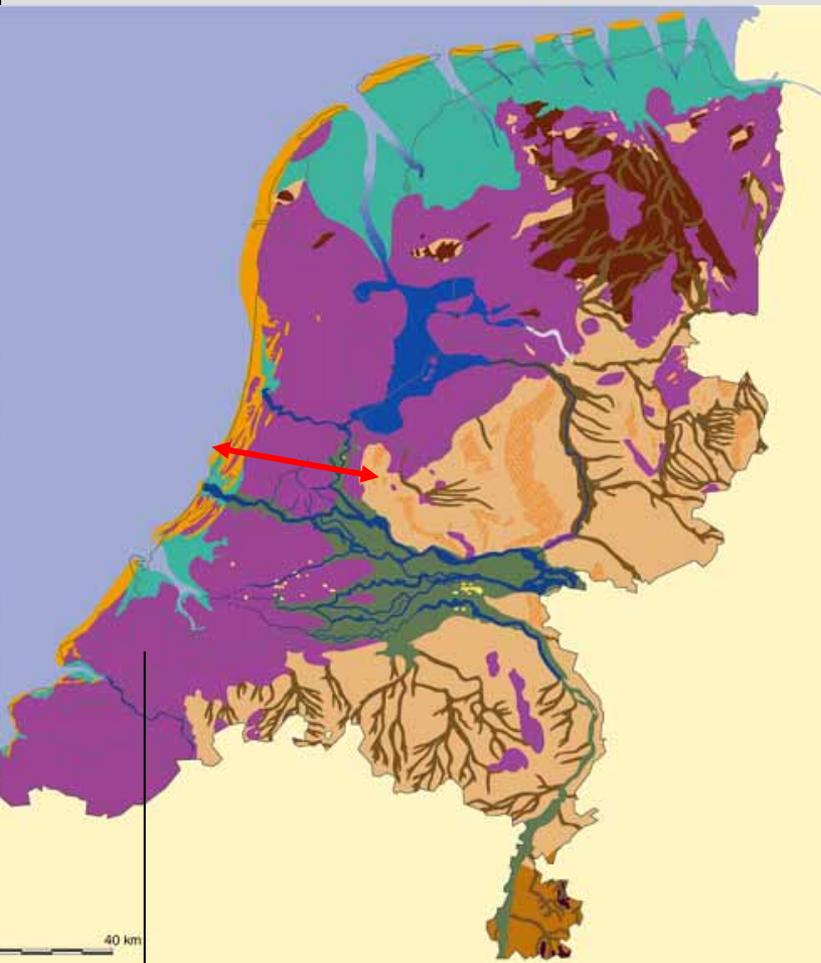
Provide a nice seat



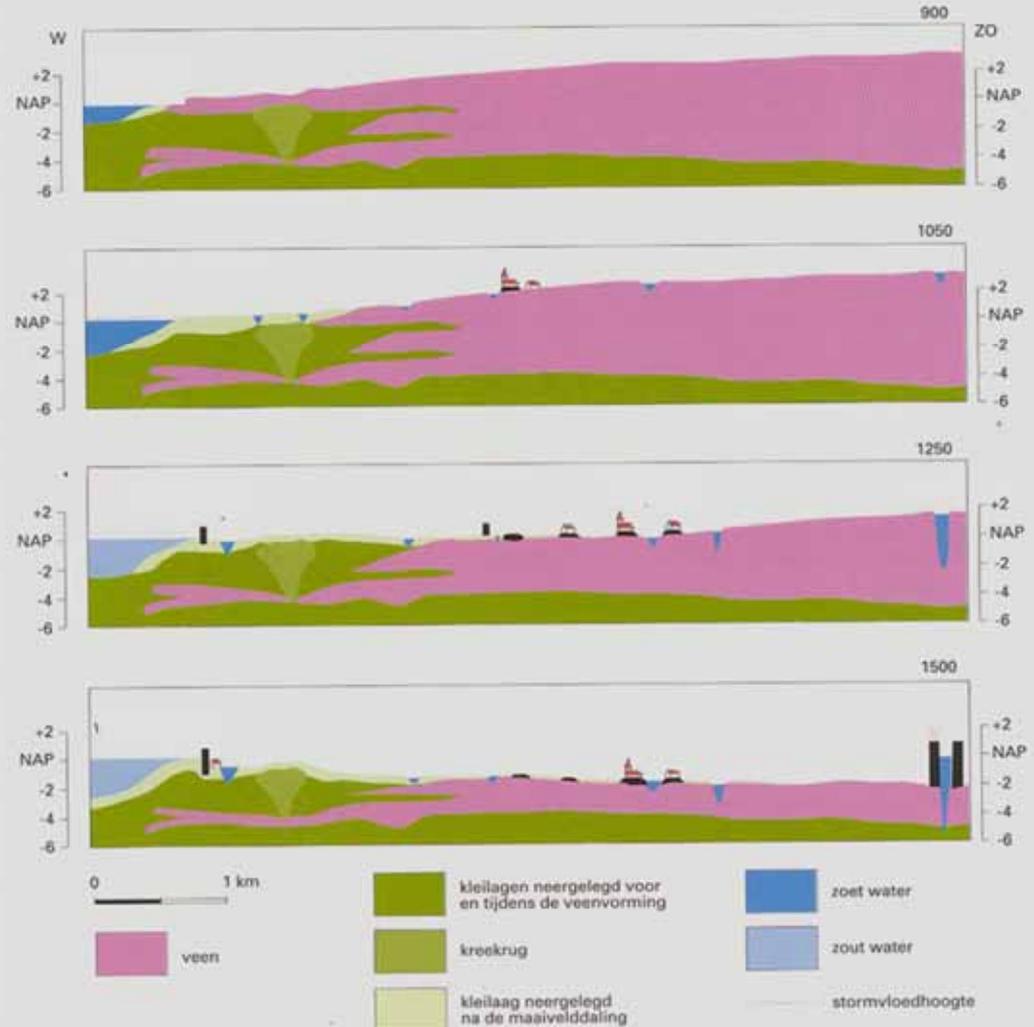
**Ready!**

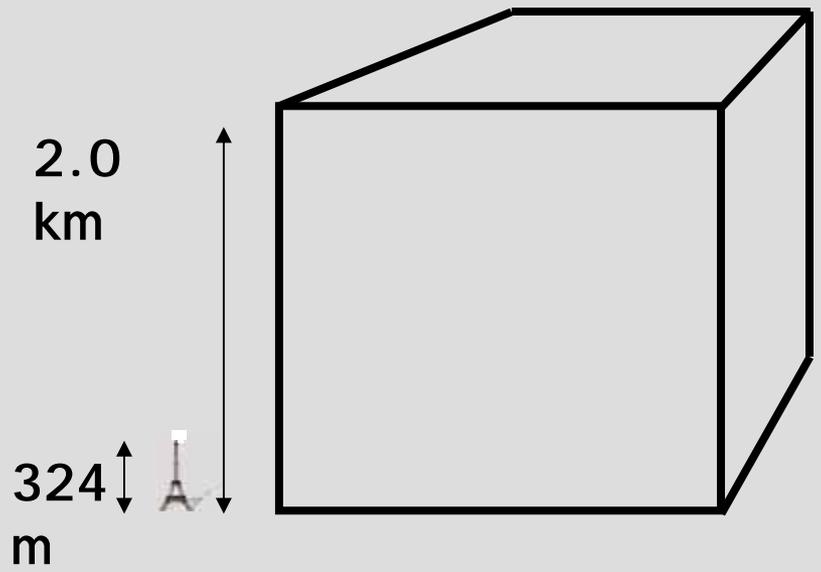
# Then the bad news: large scale subsidence of the peat

## Original mires in the Netherlands

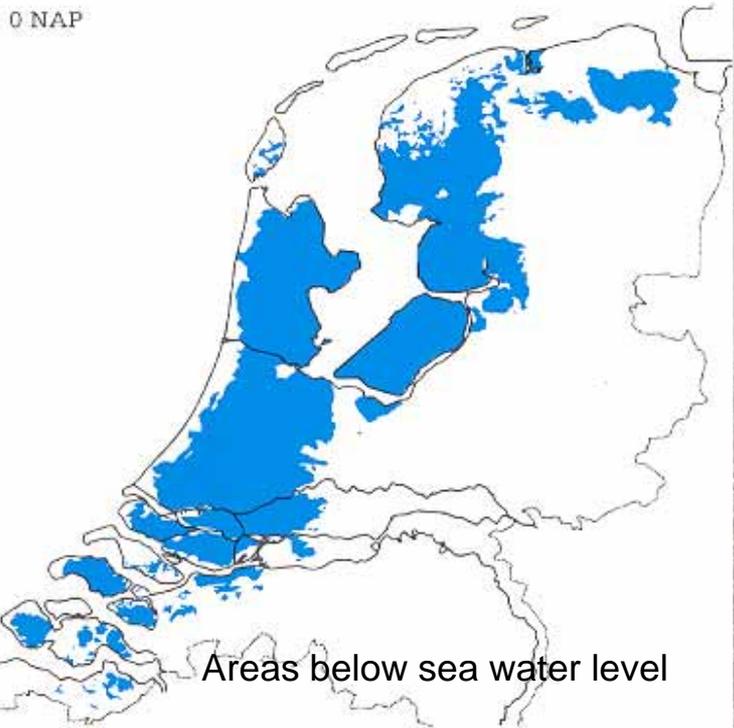


peat



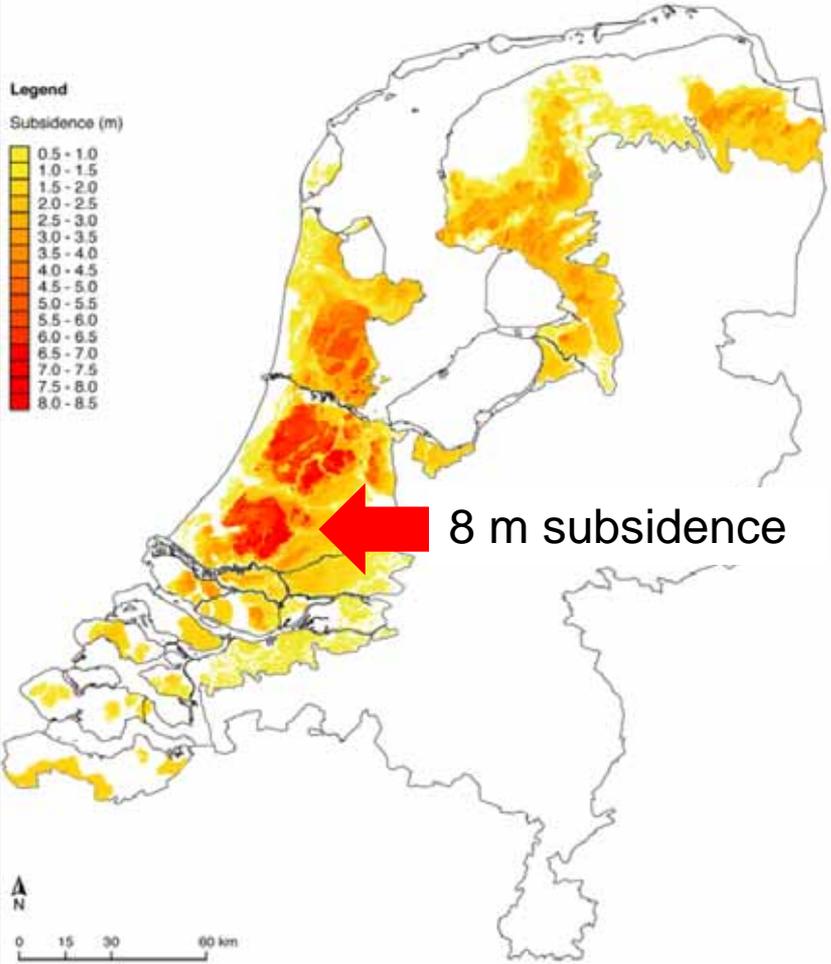


c. 8 km<sup>3</sup> peat has been cut;  
and not without consequences

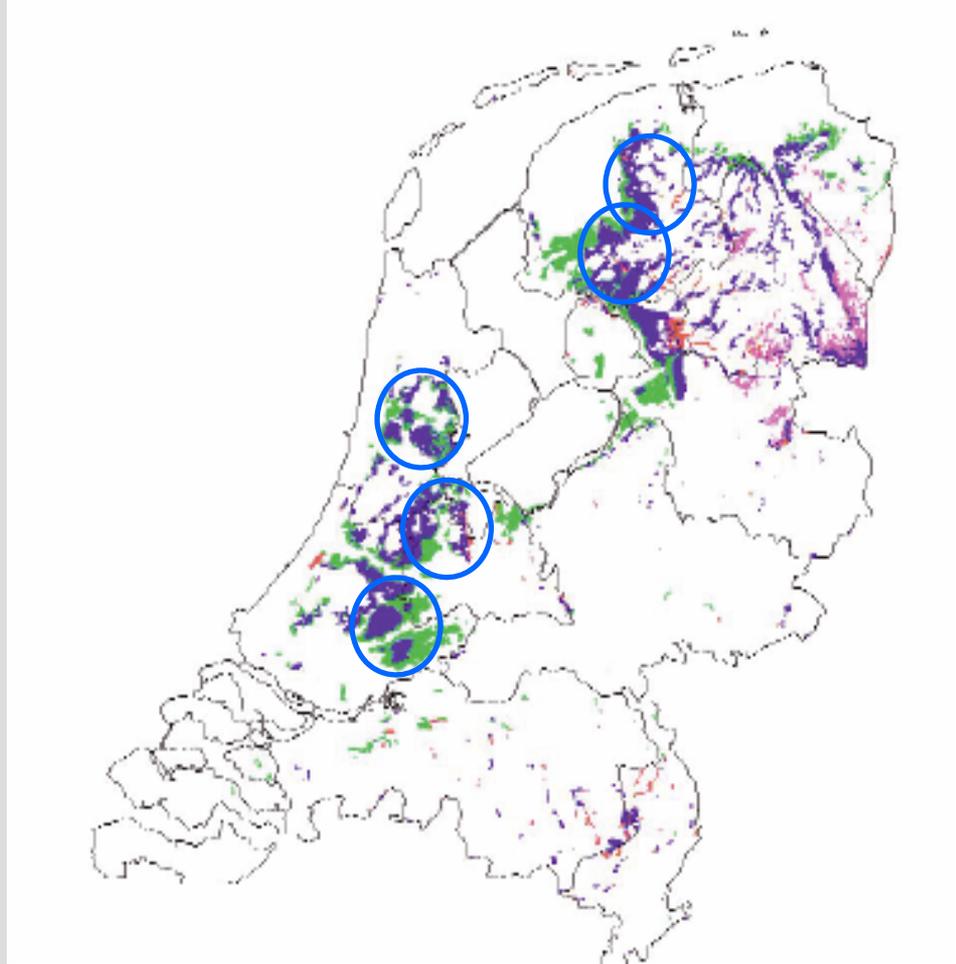


# bogged down by 1000 yr of peatland drainage and subsidence

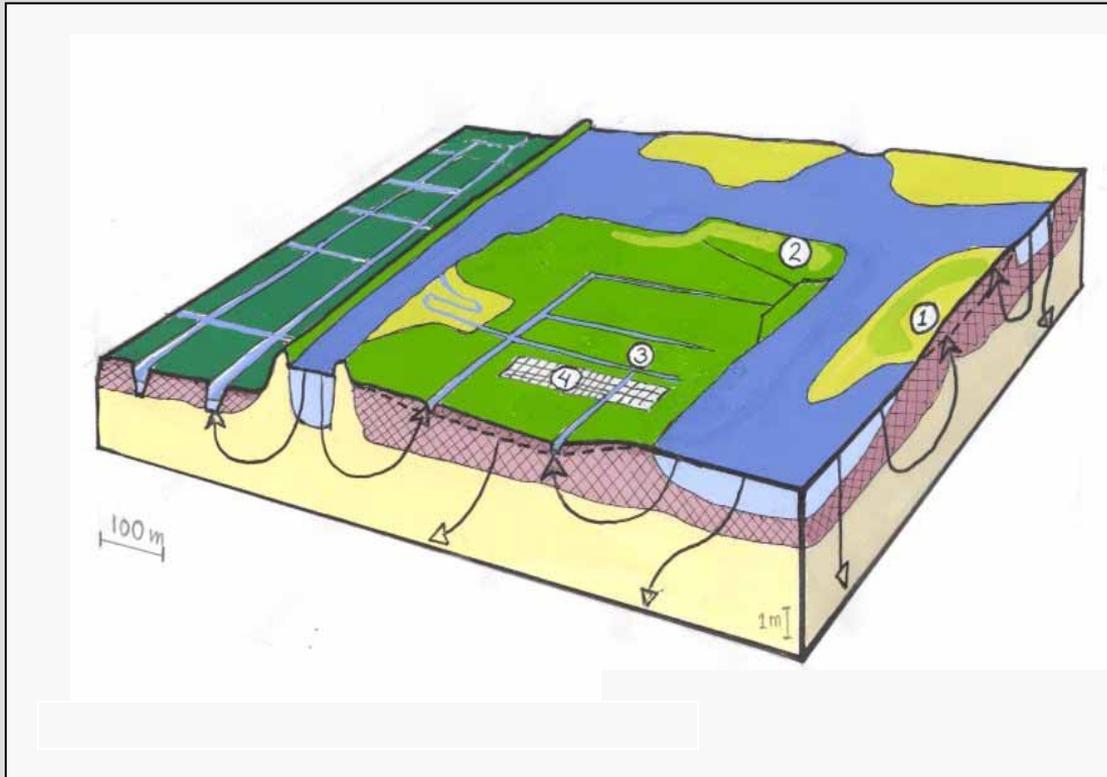
## Peat soil subsidence in NL



## Cattle breeding on peat soils in NL

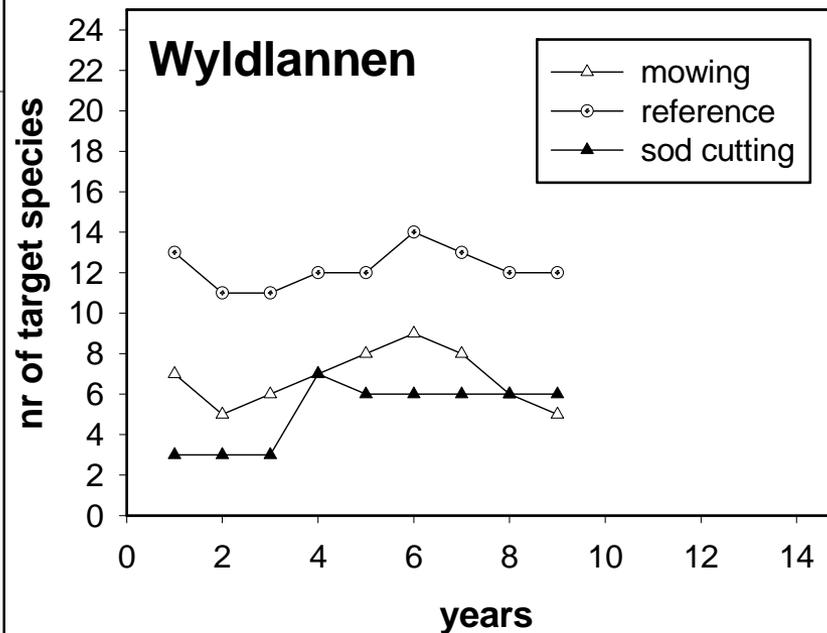
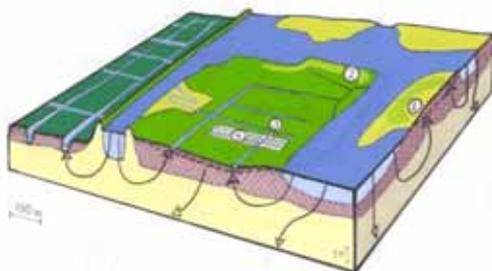


# Nature areas in polder areas



**Low lying polder area causes infiltration  
in the whole wetland area**

# Polder area Friesland; Attempt to restore fen meadows



**Complete failure!**

# Drainage of peat causes subsidence; a lot!!!



1939



2013



..... and increases possibilities to store wood!!!

# What is the problem?



# The „Gouda“ problem



Ban on  
Gouda  
cheese: too  
expensive!!!

After: Joosten 2016, (Putin 2013)



# Government goals for agricultural peat areas

- Arresting or considerable reduction of soil subsidence;
- Perspectives for agriculture/cattle breeding must remain;
- Conservation and development of the cultural landscape;

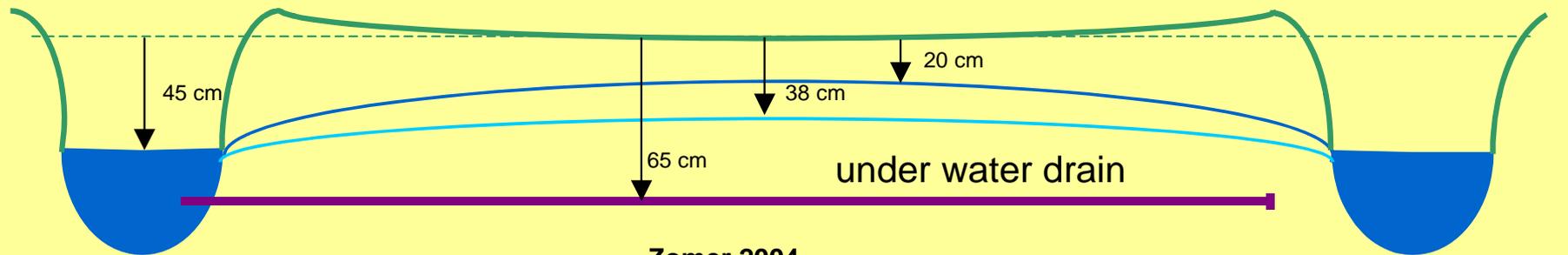
red; not a solution, but increasing the problems

# Under water drains: solution!!

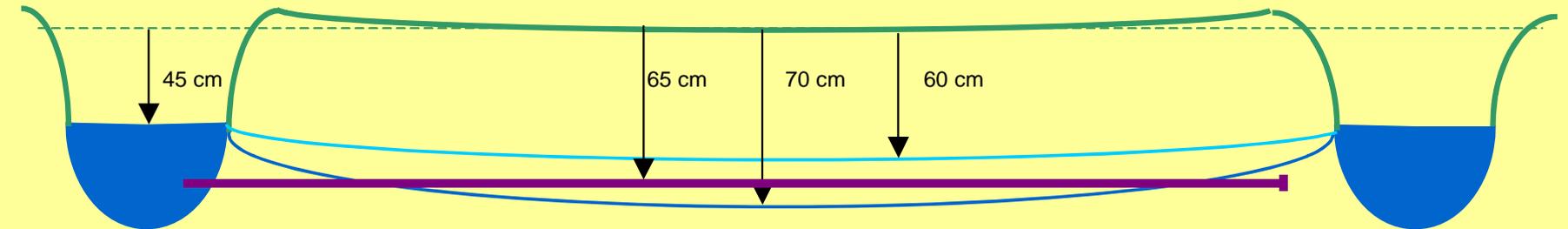
Laag slootpeil

Drains at every 8 m

Winter 2003/2004



Zomer 2004



Estimated cost for the Netherlands ca. 400 million Euro = 6 km of new high way  
(v.d. Akker 2007) = total annual budget of the Dutch Nature Conservation

# Under water drains: solution?

- Conclusion Researchers: decrease in summer water **levels** 0-50% (but on average less than 15%), Advantage also drainage in wet periods increases, so more intensive agricultural is possible (v.d.Akker 2007).
- Conclusion Water Board (Stowa): **speed of peat oxidation and soil subsidence** can be reduced by 50%.
- Conclusion Politician Province of Friesland: **problems of subsidence in peatland can be solved, no need to change!!!**

# Under water drains: who will pay the bill?

- National Government: not us!! (standing policy since 1980-ties).
- Water Boards: It is our duty to maintain existing water levels, so we tax all inhabitants of our region.  
→ City people pay the bill.
- Provincial Government and European Union. Yes this is innovative, we will give subsidies.
- Financial problems can be solved..... no need to change!!!
- → So, new investments in maintaining old problems

# Under water drains: solution?

Lessons in the Dutch language and culture



Kaaskop = Cheese head

# Drastic changes are needed

1989

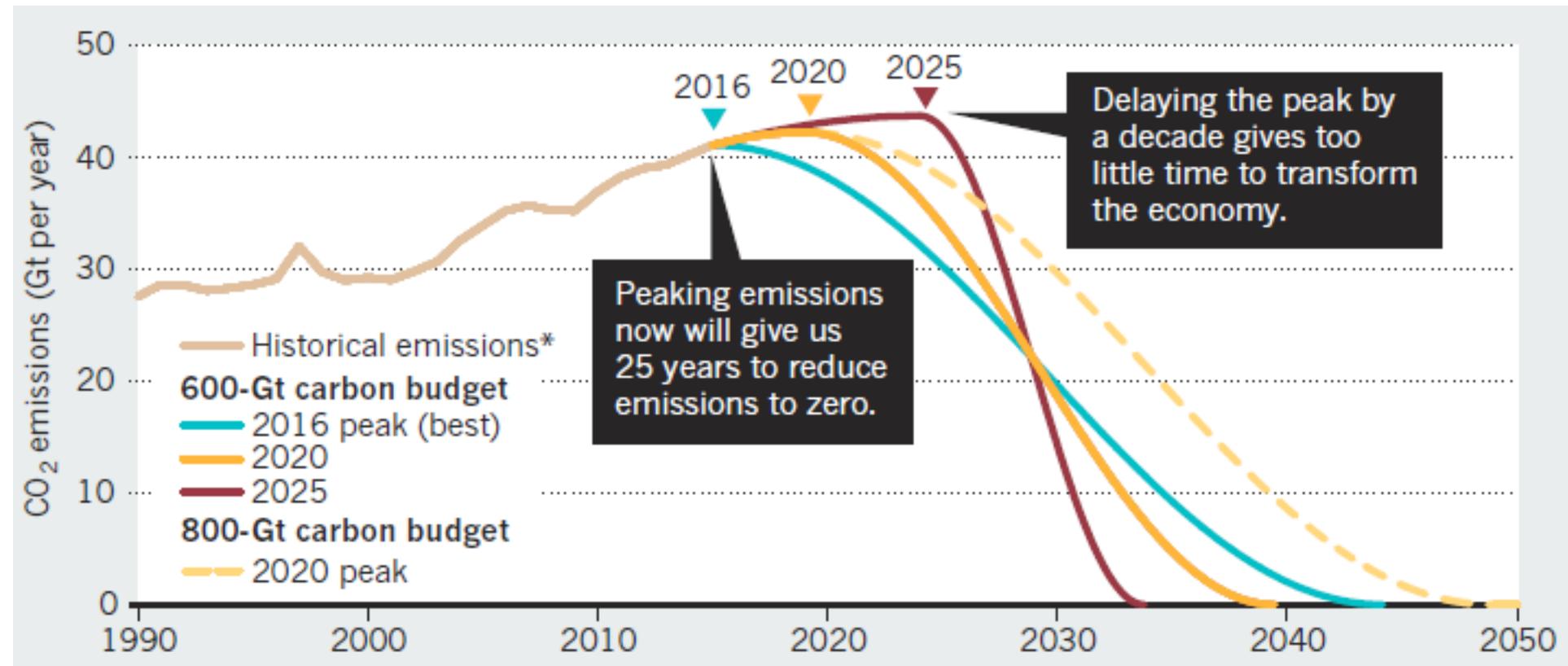


- But it does not have to be done in 1 year.
- We have time (see Paris agreements), but within the next 3-8 years concrete steps have to be announced
- But these compromises with present agricultural practices have to stop

1990



# Back to 0 emissions in 2050 and starting the decrease within the coming few years

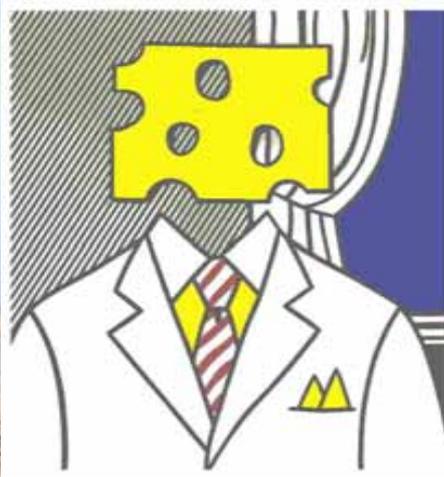


[HTTP://GO.NATURE.COM/2RCPC](http://go.nature.com/2RCPC)

# Conclusions

- In many EU countries the continuation of agricultural use in peatland areas is driven by subsidies.
- Costs of maintaining agricultural use in drained peatlands are steeply increasing due to subsidence of the peat (damaging both rural and urban infrastructure)
- Citizens that do not directly profit from the intensive drainage of peatlands are paying the bills.
- Paludiculture is by far the most sensible thing to do;
- → **Ban on Gouda cheese produced on drained peat soils.**
- However, new investments in infrastructure and in modern equipment to harvest these areas are urgently needed.
- Money that is now spend on continuing the degradation of peat soils (subsidies to both farmers and nature protection agencies) has to be transferred to organizations and private companies that are willing to use peatlands in a more sustainable way.

# Questions?



And do not become a cheese head