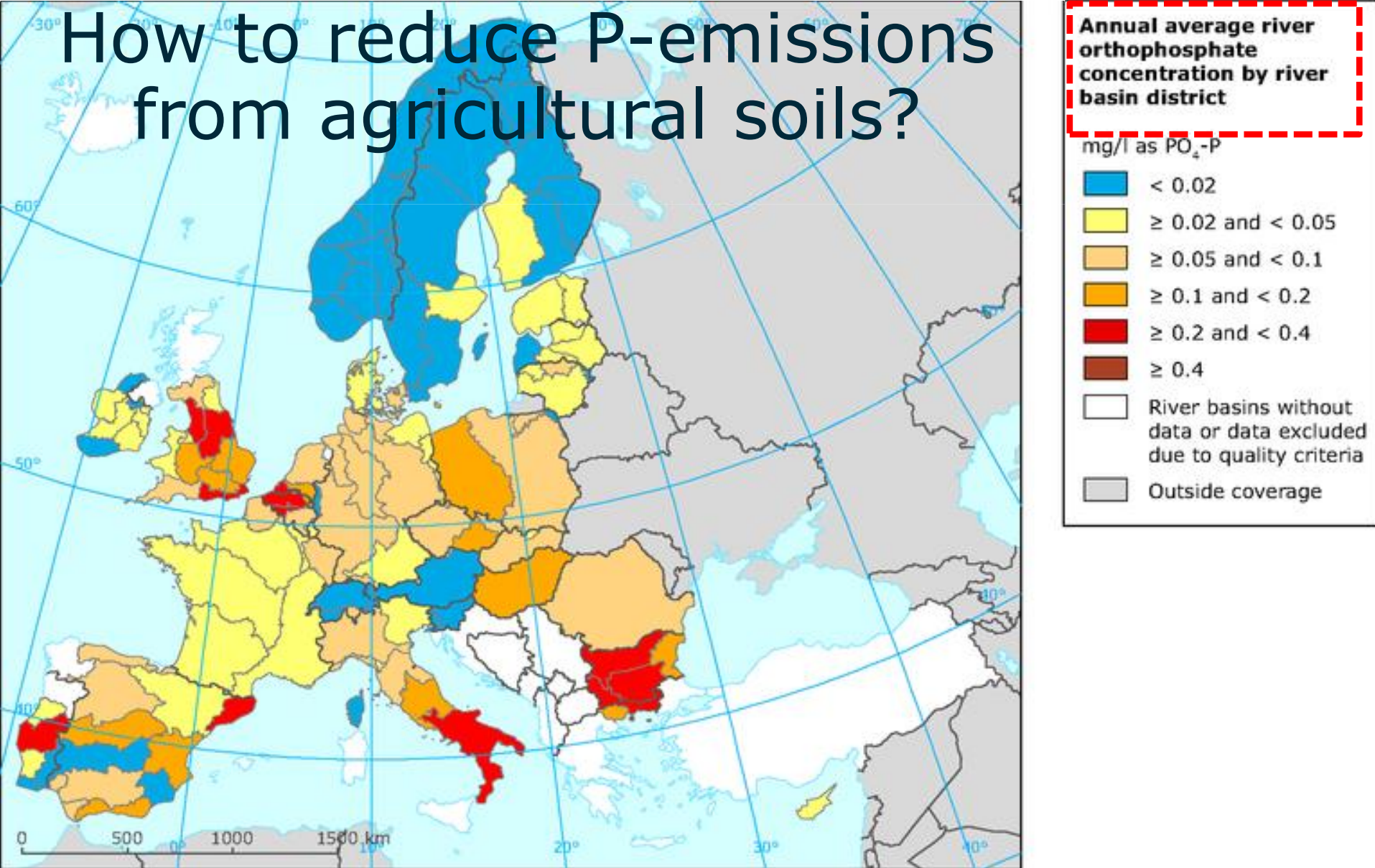


How to reduce P-emissions from agricultural soils?



Peter Schipper, Caroline van der Salm, Harry Massop, Piet Groenendijk, Leo Renaud, Rob Hendriks, Harry Massop, Dennis Walvoort

----- What I learnt since 2009 -----

WFD harmonizes water
quality objectives, ..

1

*But does not harmonize the
effort to meet these !*



Population density Europe

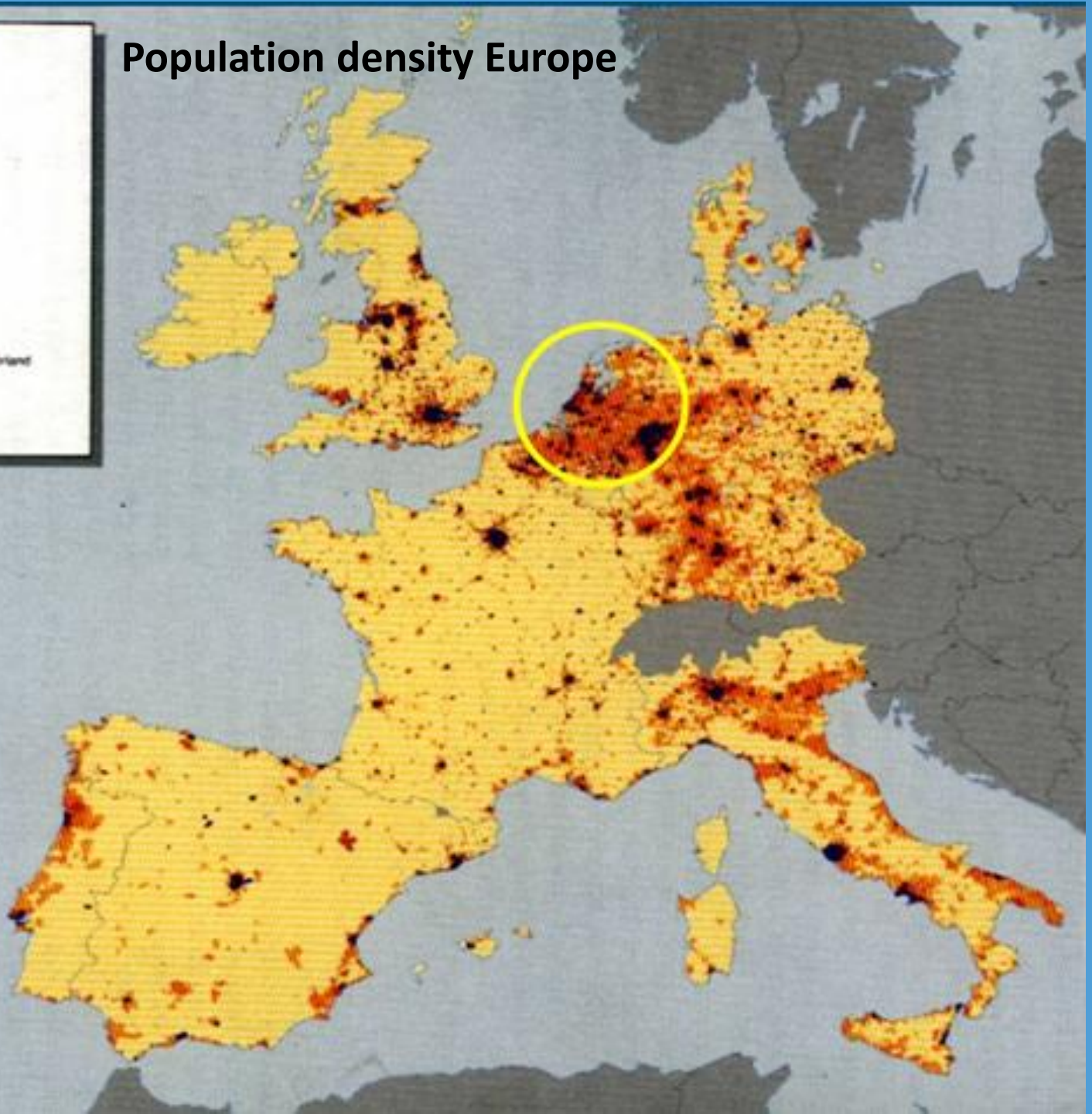
Kaart 23
Europese Unie -
Bevolkingsdichtheid, 1991


Population/km²



Lokale gegevens niet beschikbaar voor Noord-Ierland

Bron: Eurostat, GISCO





the Netherlands =
'sink' of NW-Europe

NL: 2nd largest producer agri-products

- Export Agro products \approx 80 billion euro (20 % of total)
- 1 out of 10 jobs

Livestock: \approx 4.106 cattle
 \approx 12.106 pigs
 \approx 103.106 poultry

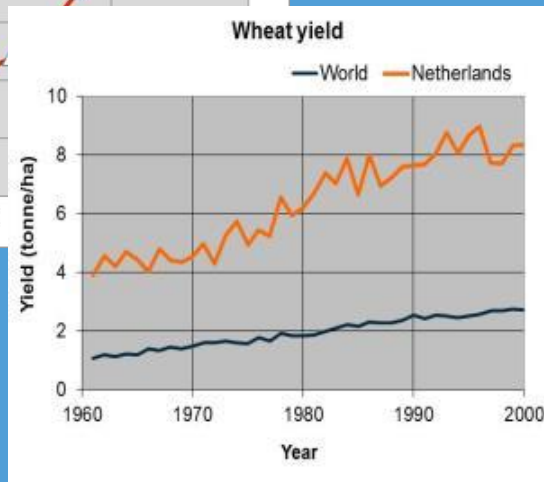
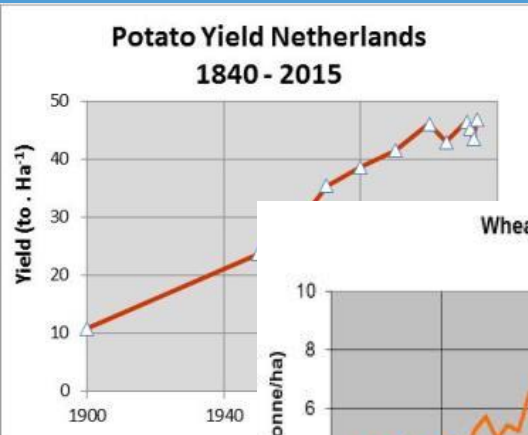
Greenhouses: \approx 10.000 ha

Open air Horticulture: 45.000 ha (flowers, fruit)

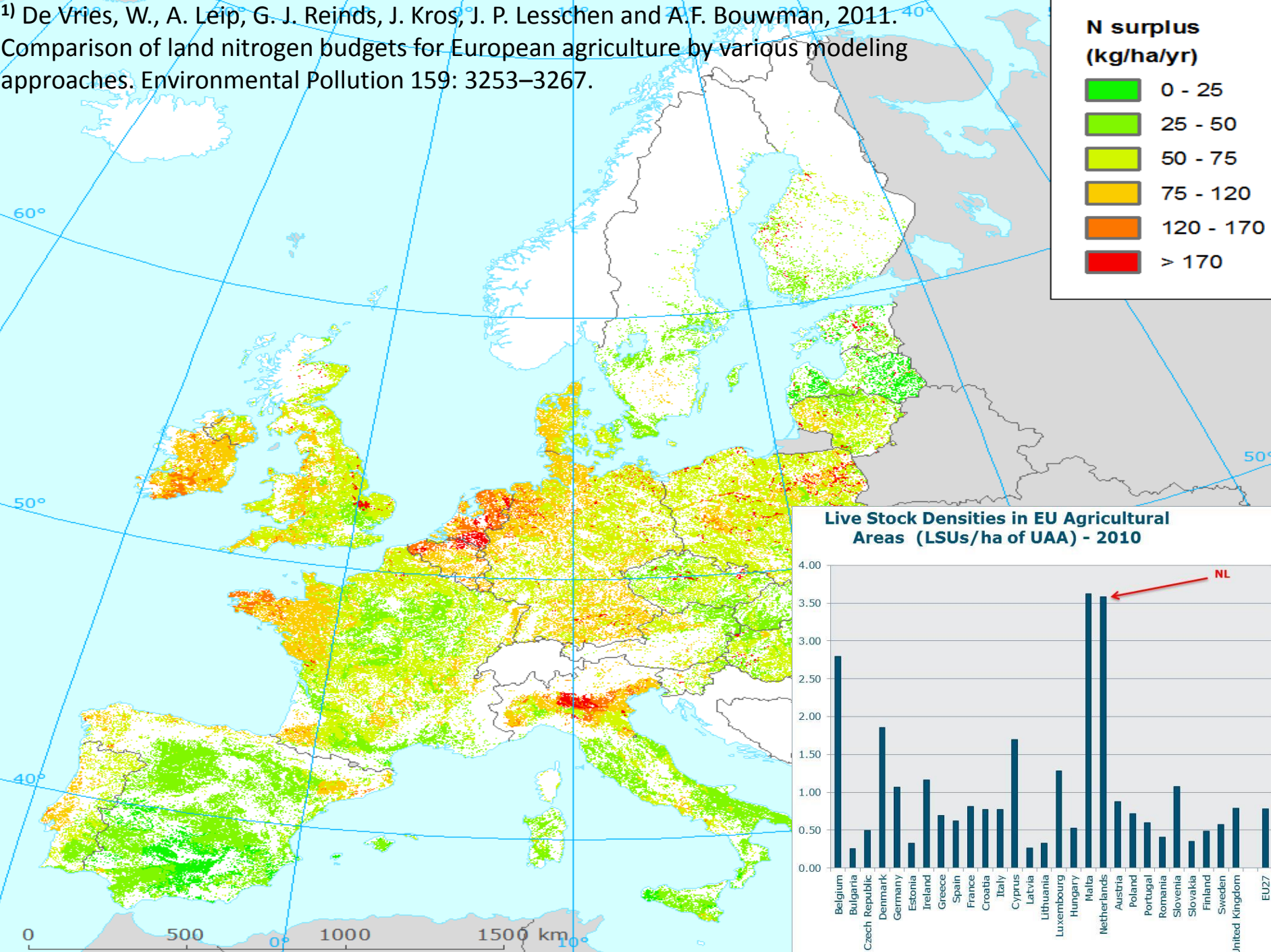
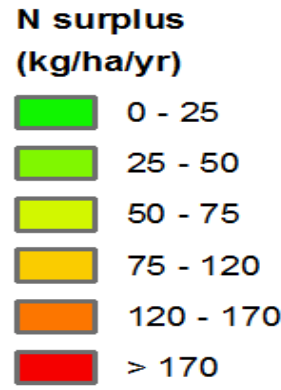


Manure, Chemical Fertilizers, Pesticides

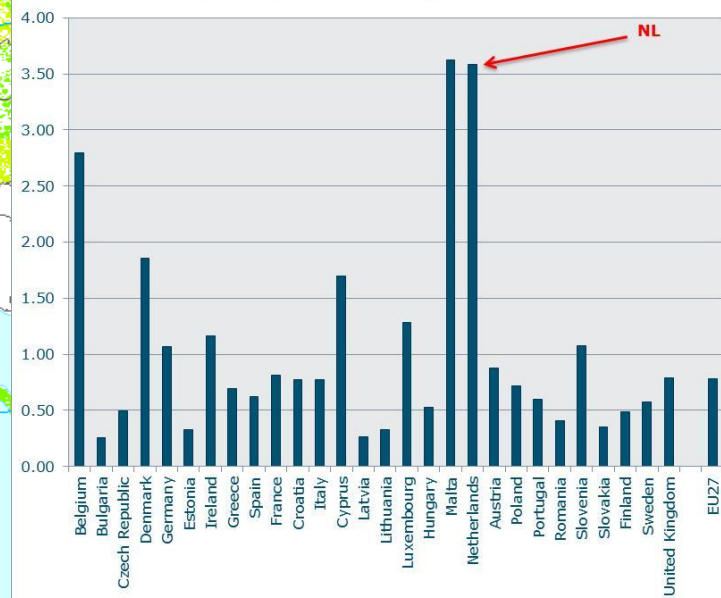
Diffuse Pollution

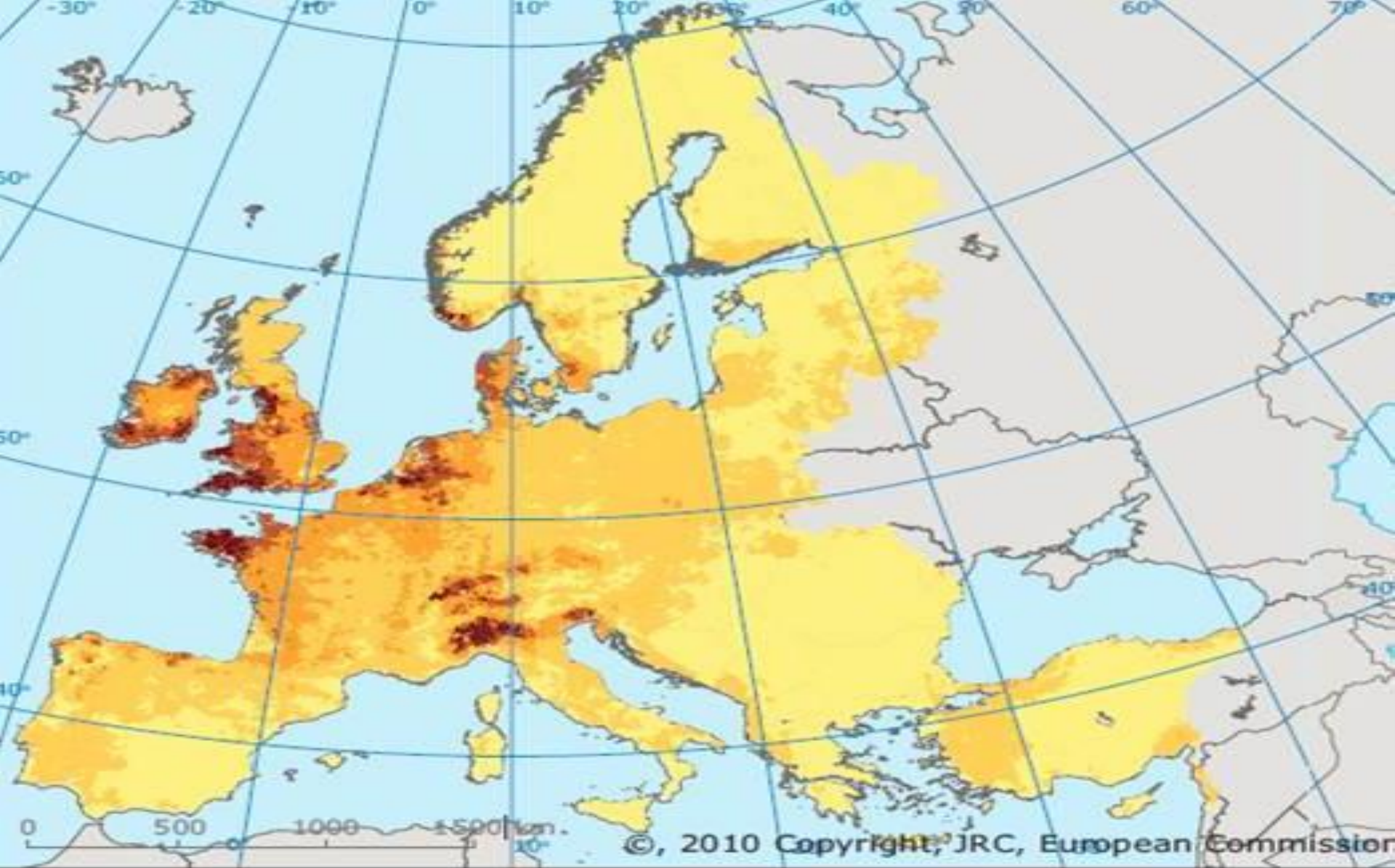


1) De Vries, W., A. Leip, G. J. Reinds, J. Kros, J. P. Lesschen and A.F. Bouwman, 2011. Comparison of land nitrogen budgets for European agriculture by various modeling approaches. Environmental Pollution 159: 3253–3267.



Live Stock Densities in EU Agricultural Areas (LSUs/ha of UAA) - 2010





Annual diffuse emissions of nitrogen to freshwater from agriculture $\text{kg}\cdot\text{ha}^{-1}$ ([EEA 2012](#))



----- What I learnt since 2009 -----

Nitrate Directive

2

is NOT the vehicle to enforce measures needed for good Surface Water quality

Use the WFD !



EU:s Nitrate directive

Establish a Code of Good Agricultural Practice
The objective of reducing nitrate pollution **should** cover:

- **periods** when the **land application of fertiliser is inappropriate**;
- the land application of fertilisers to **steeply sloping ground**;
- the land application of fertiliser to **water-saturated, flooded, frozen or snow-covered ground**;
- the conditions for land application of fertiliser **near water courses**;
- the capacity and construction of **storage vessels for livestock manure**, including measures to prevent water pollution by run-off and seepage into the groundwater and surface water of liquids containing livestock manure and effluents from stored plant materials such as silage;
- **procedures for the land application**, including rate and uniformity of spreading, of both chemical fertiliser and livestock manure, that will maintain nutrient losses to water at an acceptable level

C. Jakobsson 5/2003

7



----- What I learnt 2014 -----

How experts from other countries think of NL:

Conclusions

- NL has made much progress in policy implementation, but much still remains to be done
- Water quality results: there is yet a long way to go!
- Pressures from agriculture, urbanisation, emerging chemicals and climate change high in the Netherlands – **extraordinary pressures require extraordinary efforts and better integration**
- Climate change and land use beginning to be tackled: work of the Delta Commission, implementation of the Floods Directive and energy efficiency in the water industry, biodiversity strategy - **but more needs to be done, especially in agriculture**
- To do this : also need for streamlining governance structures, better use of economic instruments and development of innovative solutions, cfr. also OECD peer review in 2013

Peter Gammeltoft
Head of Unit for Water, DG Environment



Mr Peter Gammeltoft
in Chemical

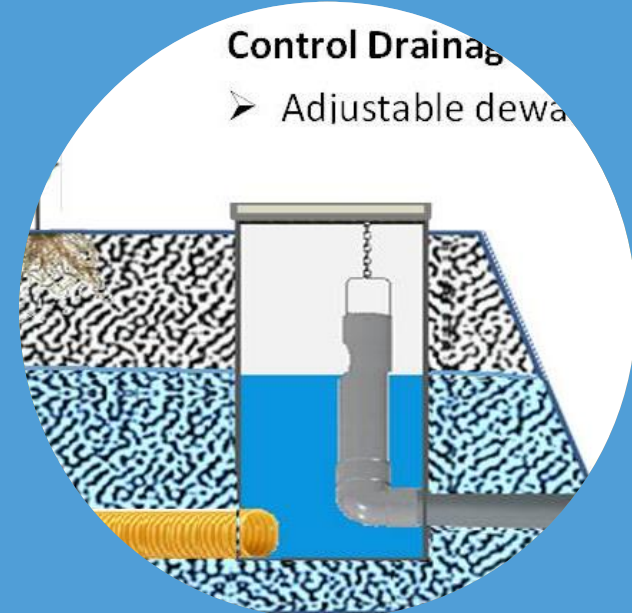
Experience:

- European 2006
- European

----- What I learnt recently -----

Mitigation options can
reduce diffuse P-loads
significant

4

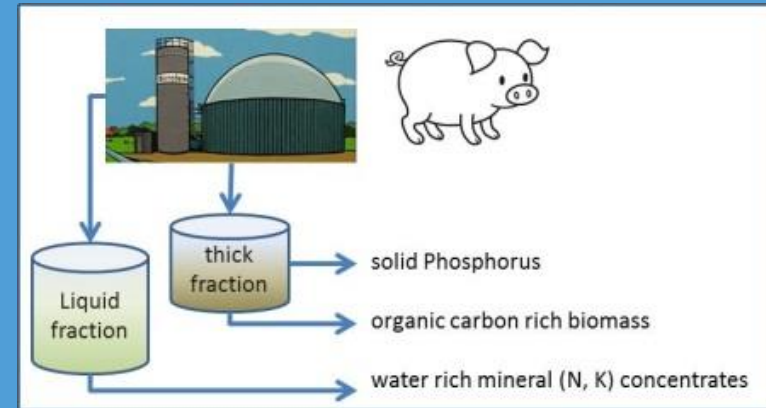


Policy NL to reduce N & P Agri-emissions

1) Restrictions Fertilizers (NAP)



2) Manure Treatment



3) Tailor made voluntary mitigation options

A screenshot of the website 'Deltaplan Agrarisch Waterbeheer'. The page features a green header with the title and a search bar. Below the header is a navigation menu with links like 'Home', 'Nieuws', 'Doelgroepen', etc. The main content area shows a large image of a tractor in a field. On the right side, there is a 'Nieuws' section with a headline 'Dag van de bodem' and a date '23 sep 2015 - 11:49'. At the bottom, there are three smaller images with captions: 'TOPPS - drift mitigation when using a field sprayer', 'Projectenkaart Deltaplan Agrarisch Waterbeheer', and 'Boer, Bier, Water'.

Research question: Tailor made P-options: where effective?

- 5th Nitrate Action Plan
- P-mining agricultural soils
- Control Drainage
- Solve soil compaction
- ...

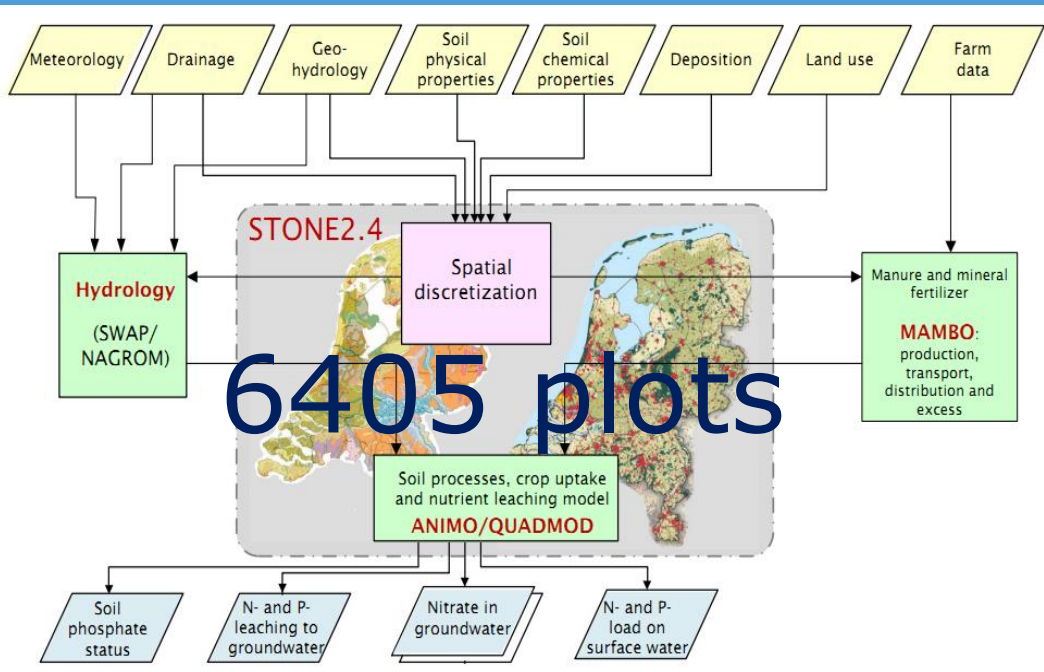
3) Tailor made voluntary mitigation options

The screenshot shows the website agrarischwaterbeheer.nl. The main header features the text "Deltaplan Agrarisch Waterbeheer" in blue and green, with a background image of a green field. Below the header is a login form with fields for "Gebruikersnaam of e-" and "Inloggen", and a link "Ik ben mijn wachtwoord vergeten". A navigation menu includes links for Home, Nieuws, Doelgroepen, Projectenkaart, Projecten, Over Agrarisch Waterbeheer, Interessante links, and Regiocoördinatoren. The main content area displays a large image of a blue tractor with a yellow tank, and a news section titled "Agrarisch Waterbeheer nieuws" with a sub-heading "Dag van de bodem" and a graphic for "2015 JAAR VAN DE BODEN".

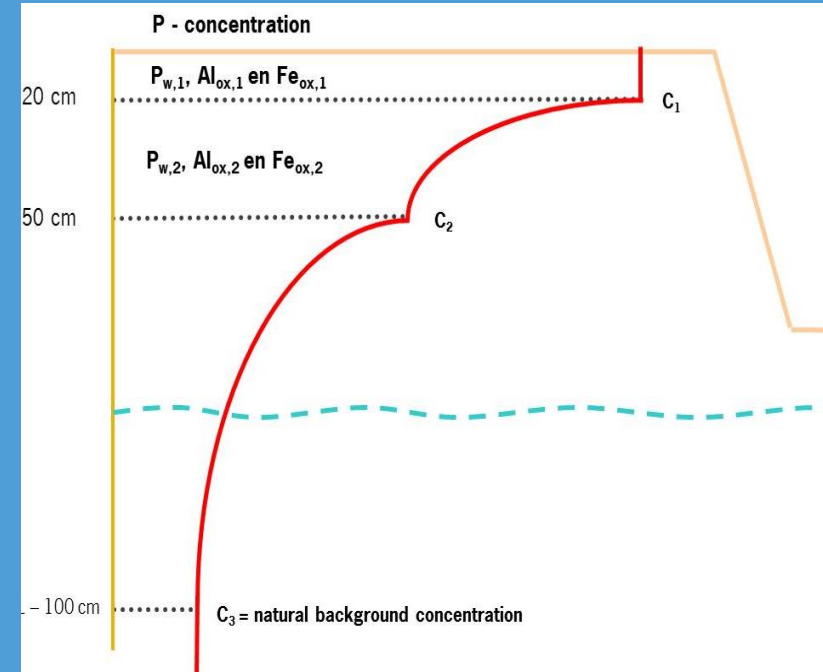
Method:

Downscaling National model STONE using PLEASE

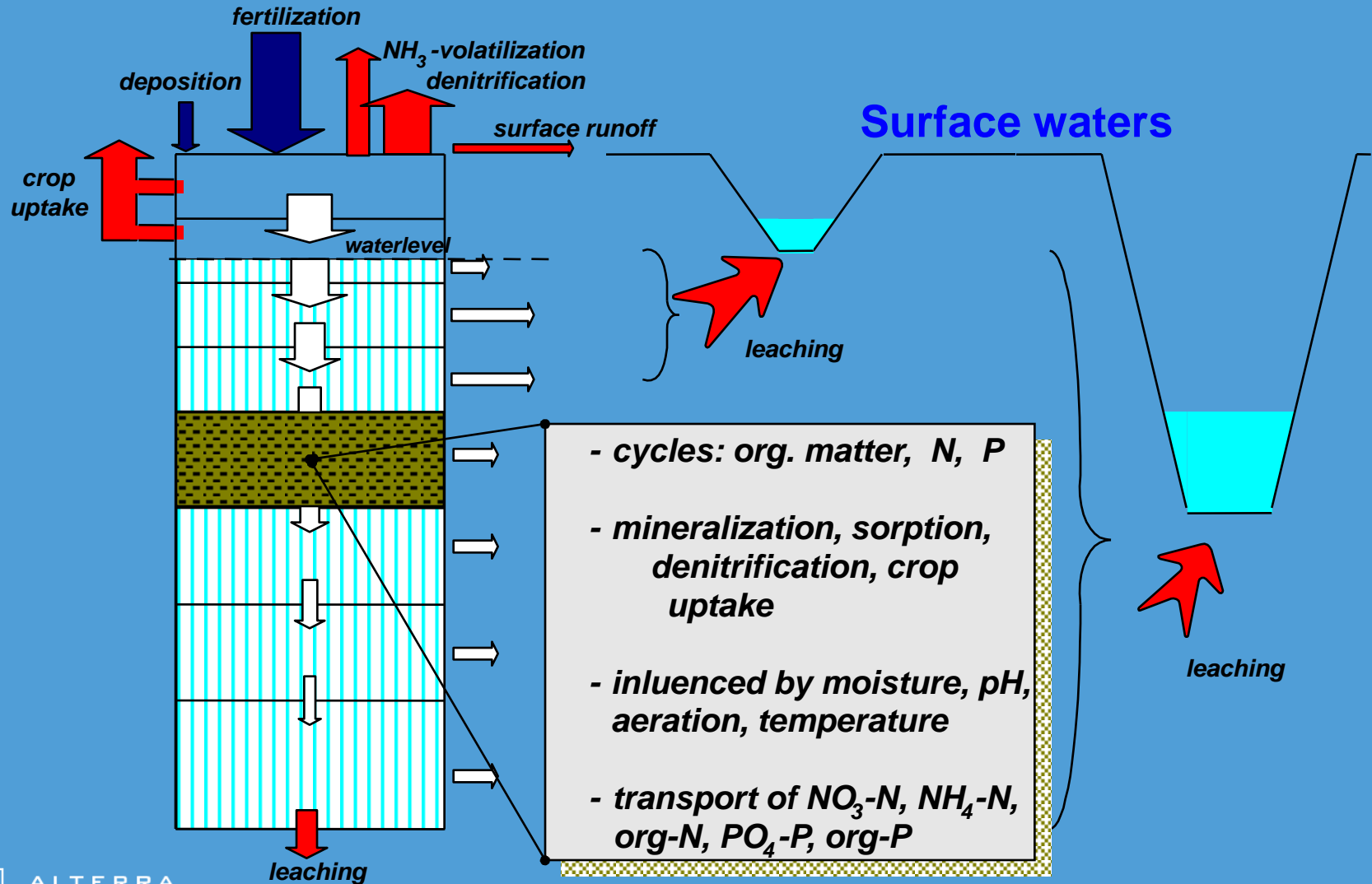
STONE: process based dynamic model



PLEASE: conceptual static model



ANIMO, the unique module in STONE

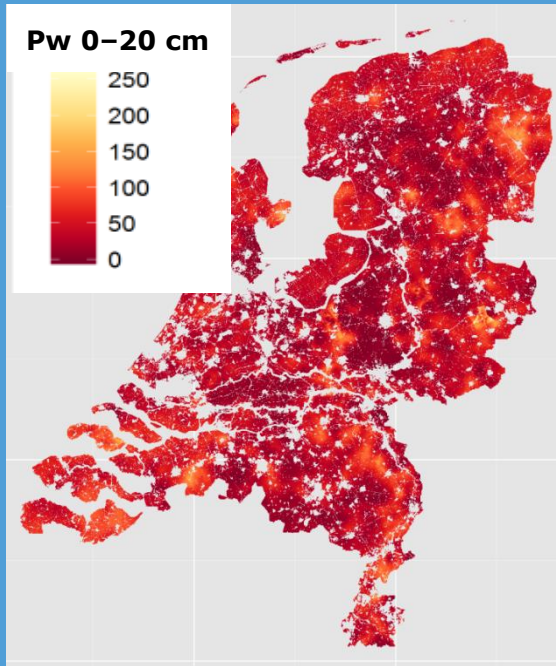


ALTEERRA

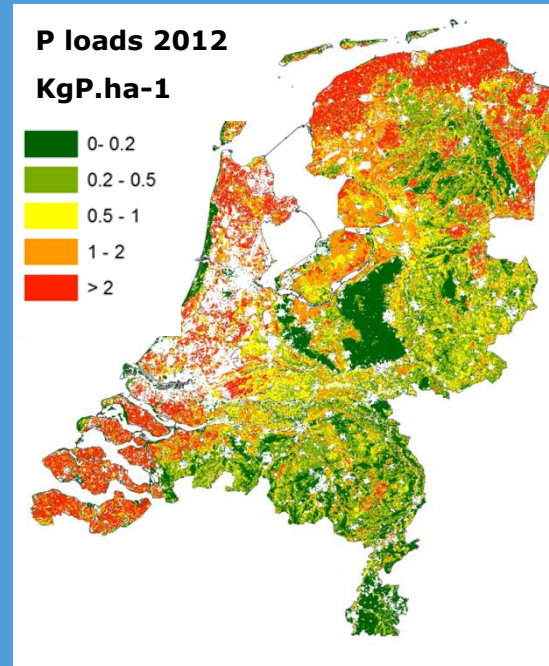
W

Groundwater

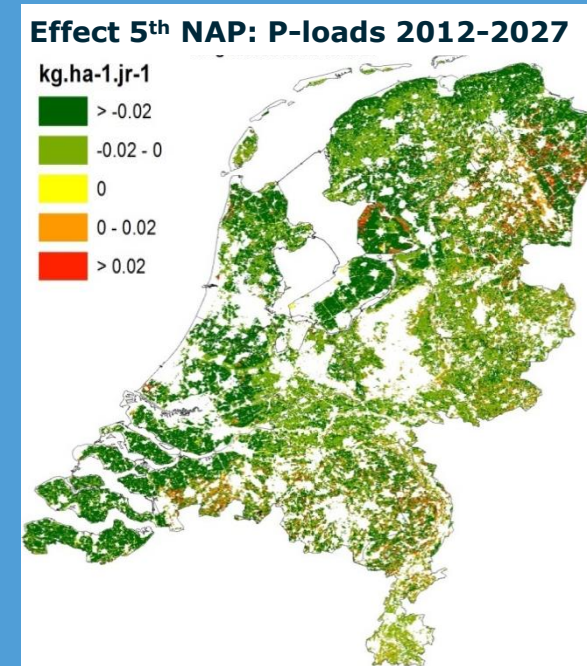
PLEASE: using maps Pw and groundwater level combination STONE: P-loads to surface water



PW-map



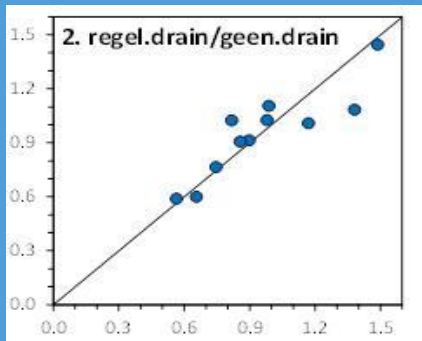
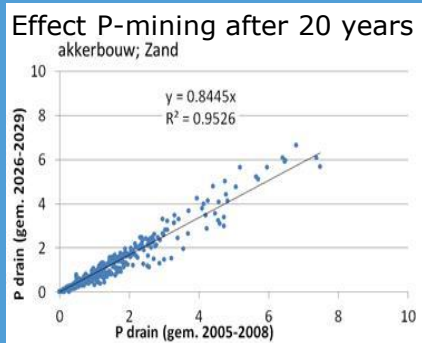
current P-loads surface water



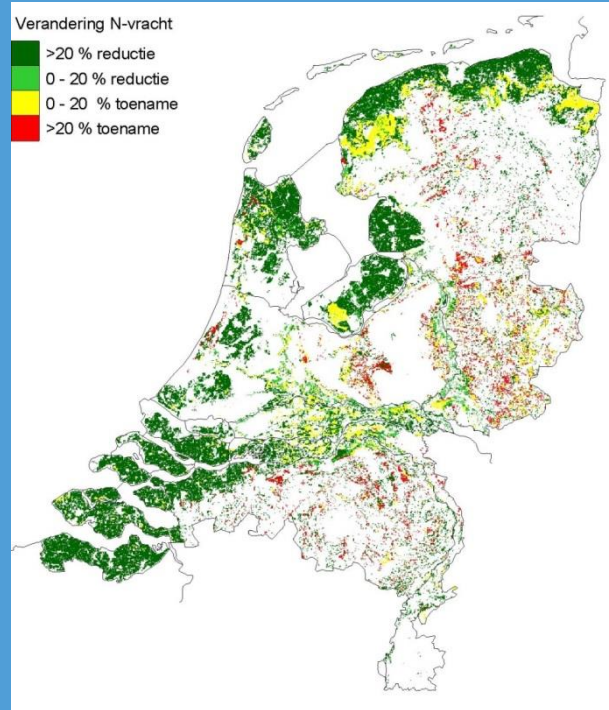
effect 5th NAP

STONE: derivation meta relationships measures

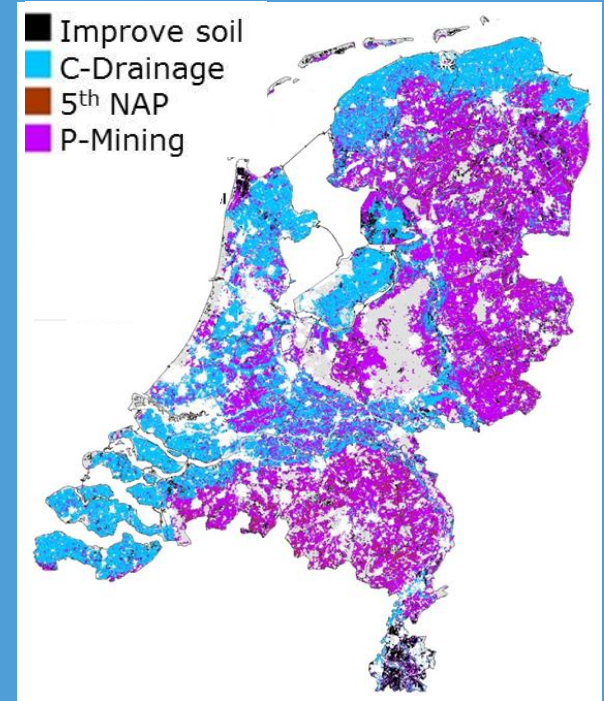
PLEASE: downscaling effect measures



Meta Relations



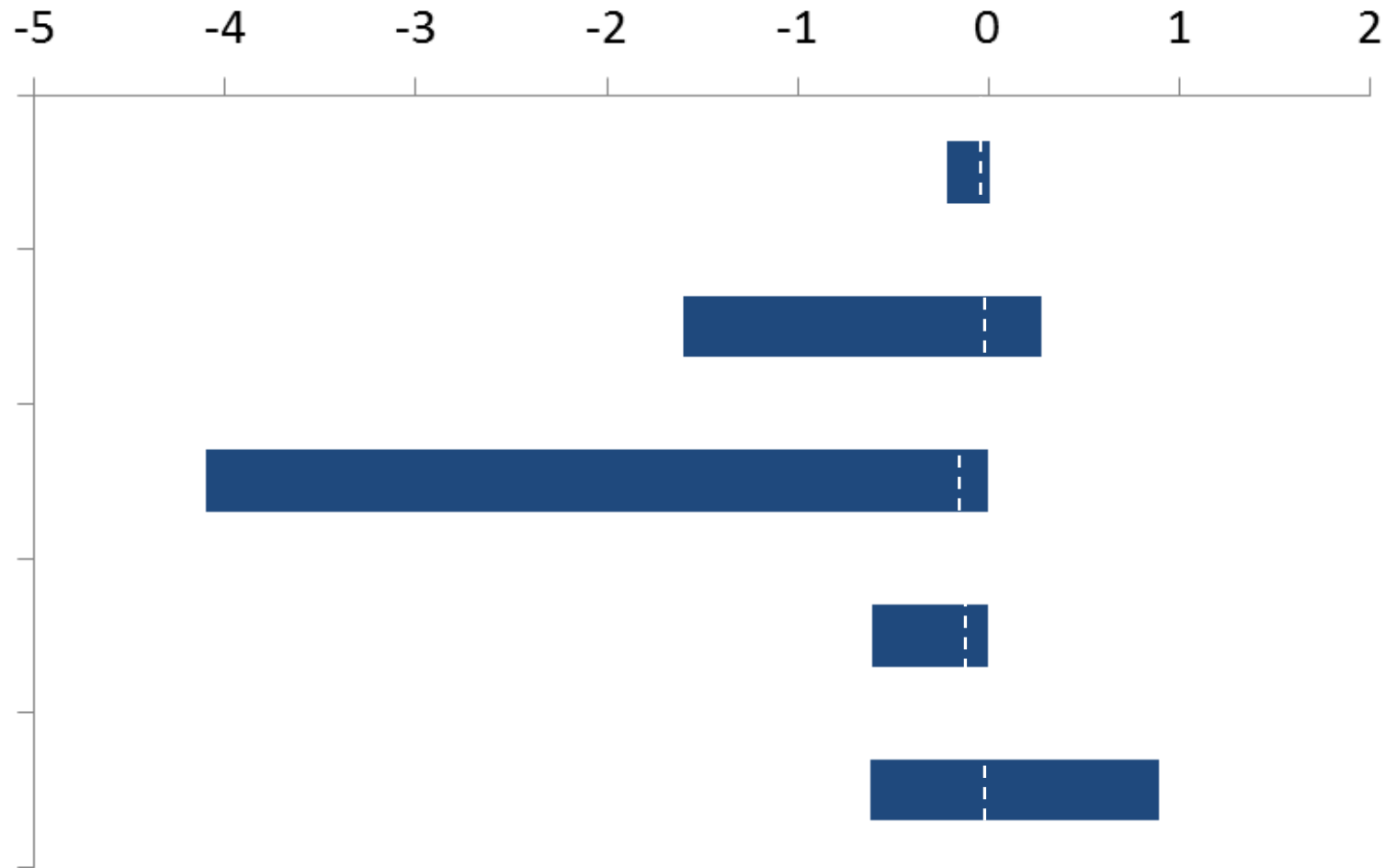
Effect control Drainage



most effect measure

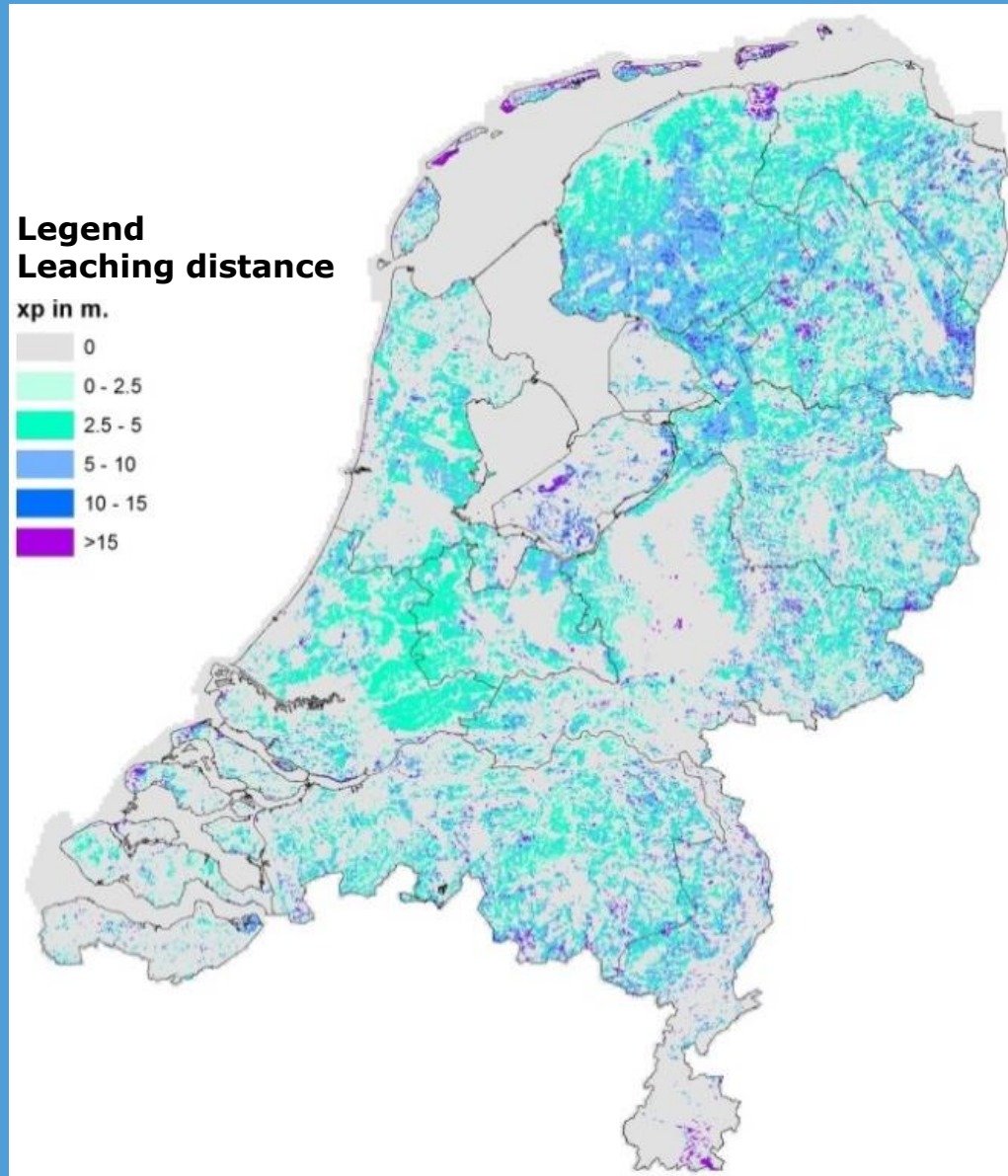
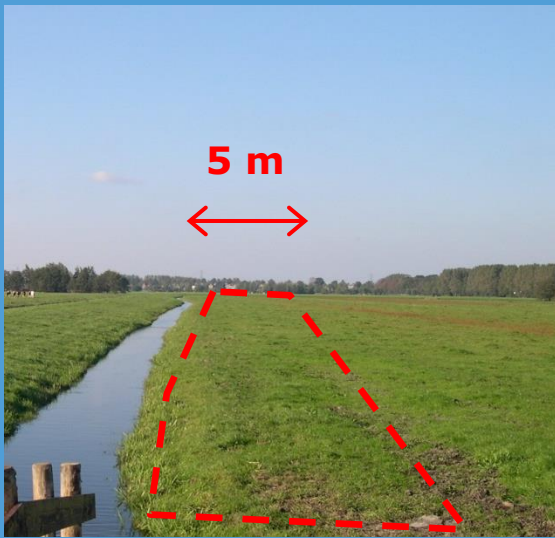


Change in P emission(kg/ha)



P-mining quite 'drastic'

But most of the P loads originate from a short distance (5 m) to de ditch



Conclusions

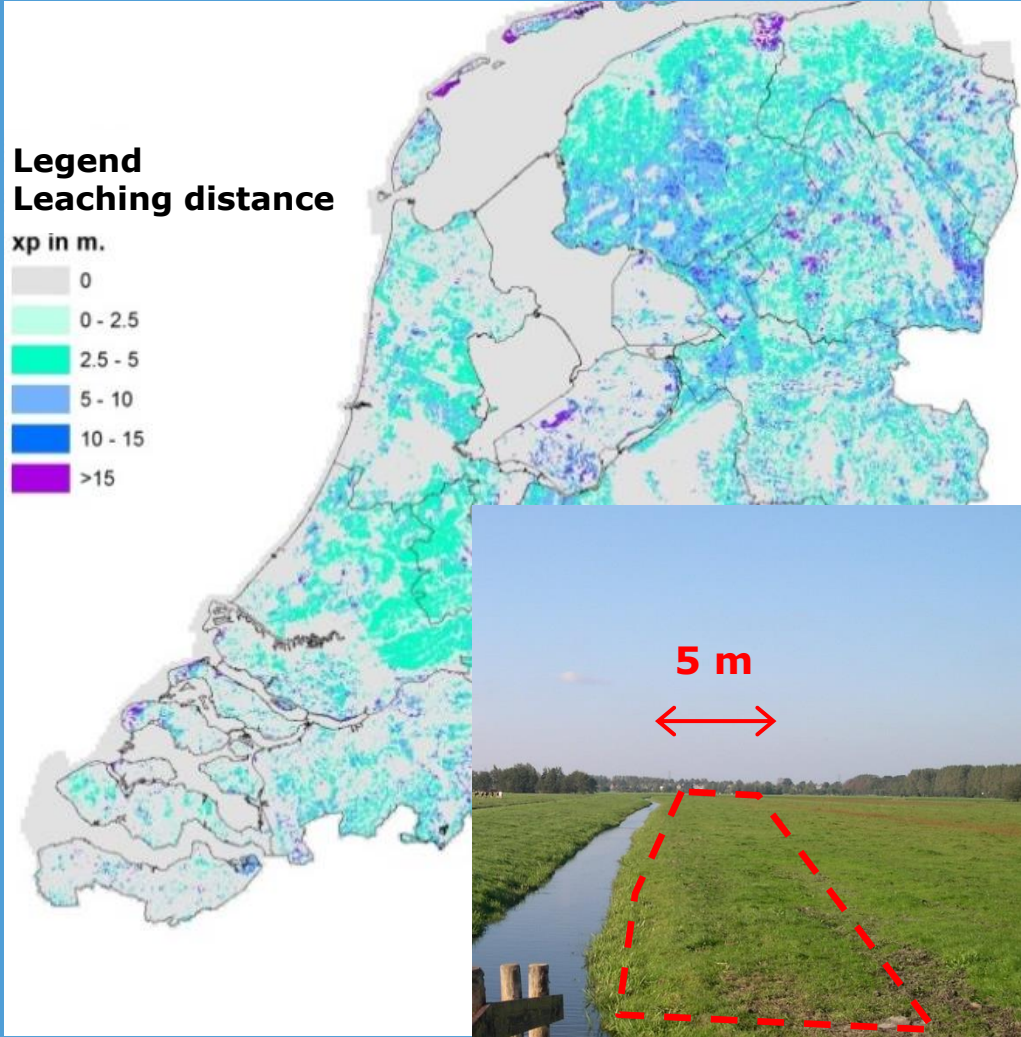
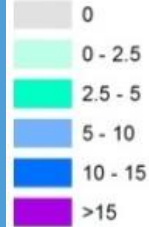
- 5th Nitrate Action Programme: limited effects P-loads
- Large differences in effects mitigation options (kg, spatial)
- P-mining and Control Drainage can be very effective
- Many parcels in NL: risks for rapid surface runoff

Bear in mind:

- P-mining quite 'drastic'
- Control drainage depends on configuration
- Solve compaction = win-win Farmer & Water Quality
- **Tailor Made solutions → Tailor Made Support at farm level**

Legend Leaching distance

xp in m.



Bear in mind:

- P-mining quite 'drastic'

But most P loads originate in many places < 5 m from the ditch



Conclusions

- 5th Nitrate Action Programme: limited effects P-loads
- Large differences in effects mitigation options (kg, spatial)
- P-mining and Control Drainage can be very effective
- Many parcels in NL: risks for rapid surface runoff

Bear in mind:

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- Control drainage depends on configuration
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Thanks for attention
Questions?