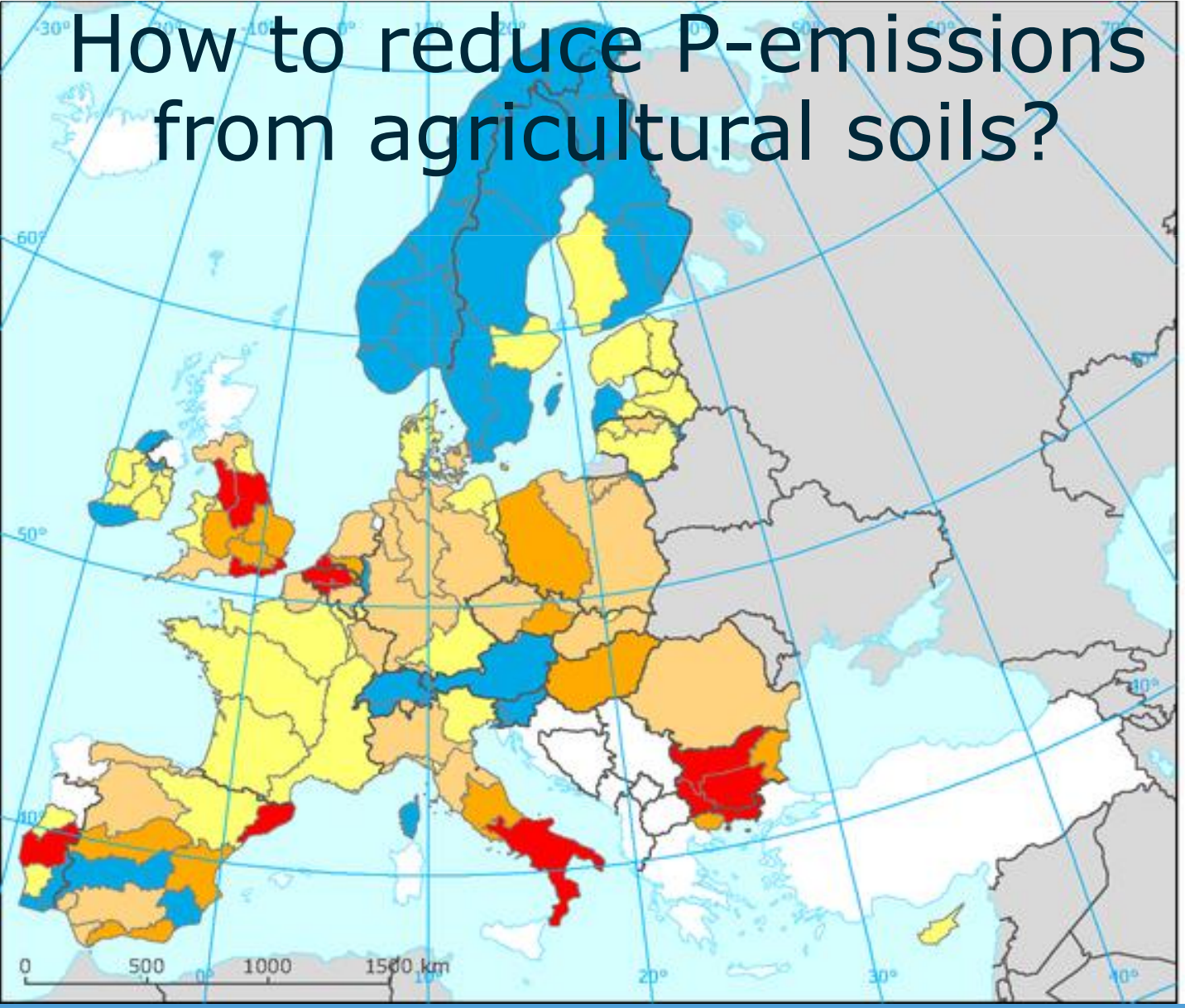
How to reduce P-emissions from agricultural soils?



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

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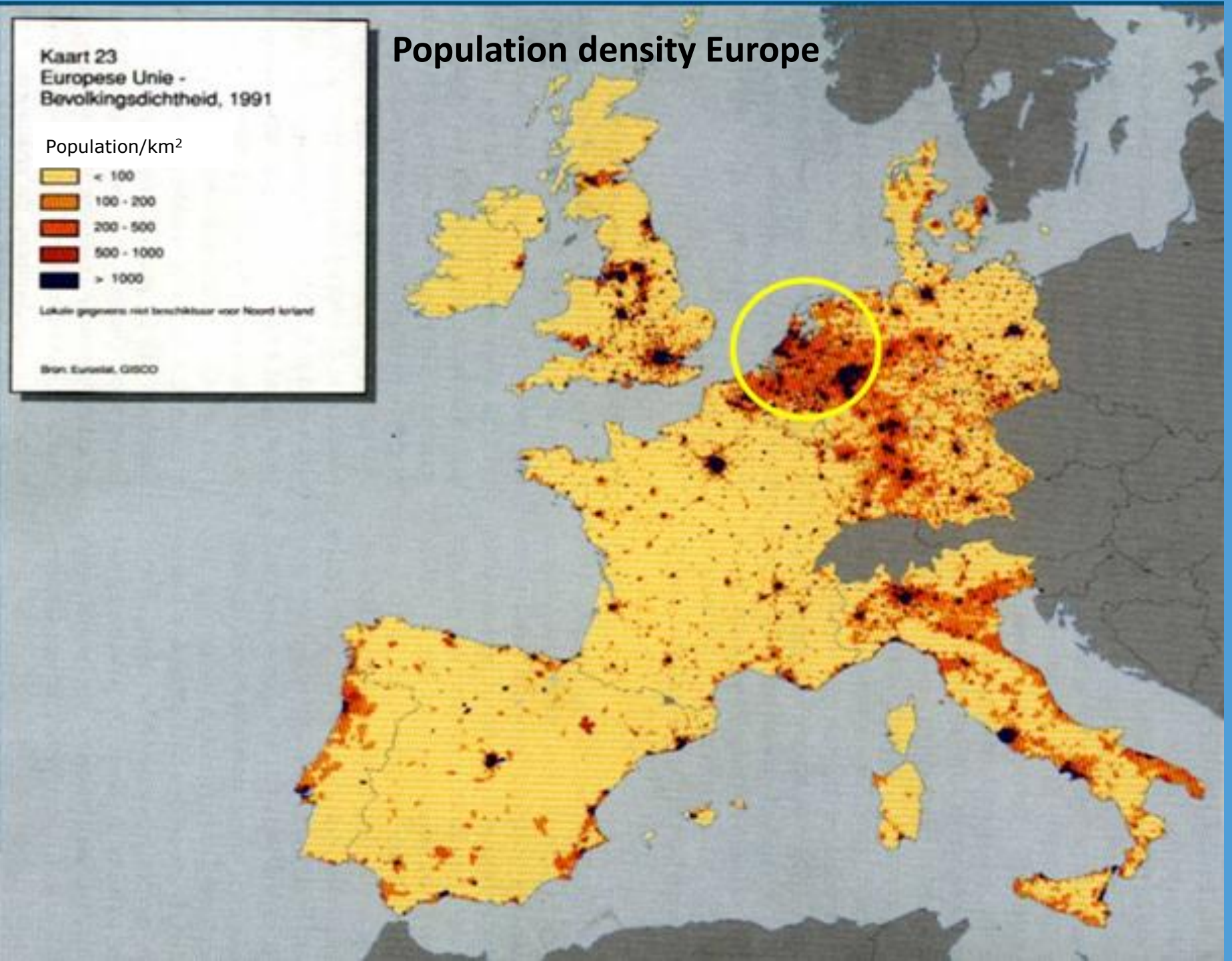
--------- What I learnt since 2009 --------

WFD harmonizes water quality objectives, ..

1

But does not harmonize the effort to meet these !

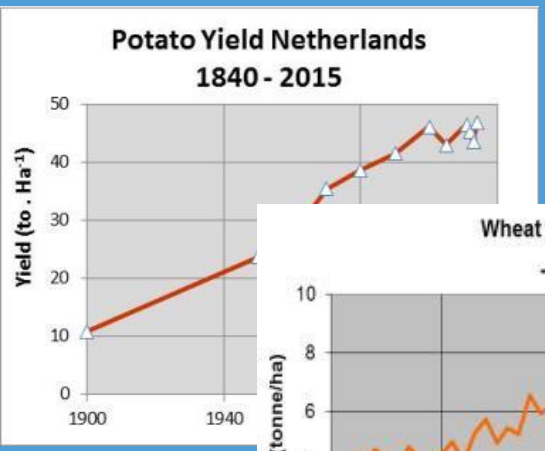
Population density Europe

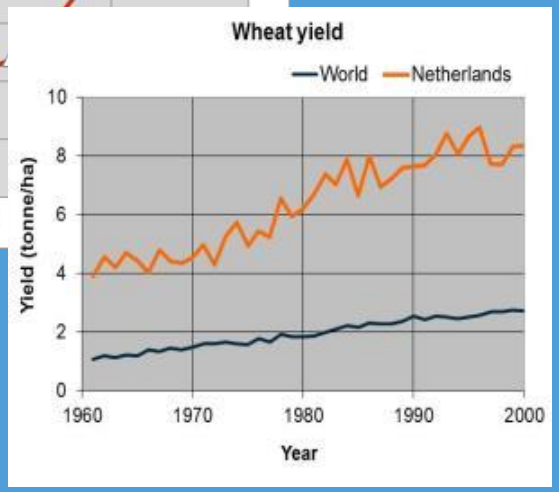



the Netherlands =
'sink' of NW-Europe

NL: 2nd largest producer agri-products

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





Livestock: ≈ 4.106 cattle
≈ 12.106 pigs
≈ 103.106 poultry

Greenhouses: ≈ 10.000 ha

Open air Horticulture: 45.000 ha (flowers, fruit)

Manure, Chemical Fertilizers, Pesticides

Diffuse Pollution

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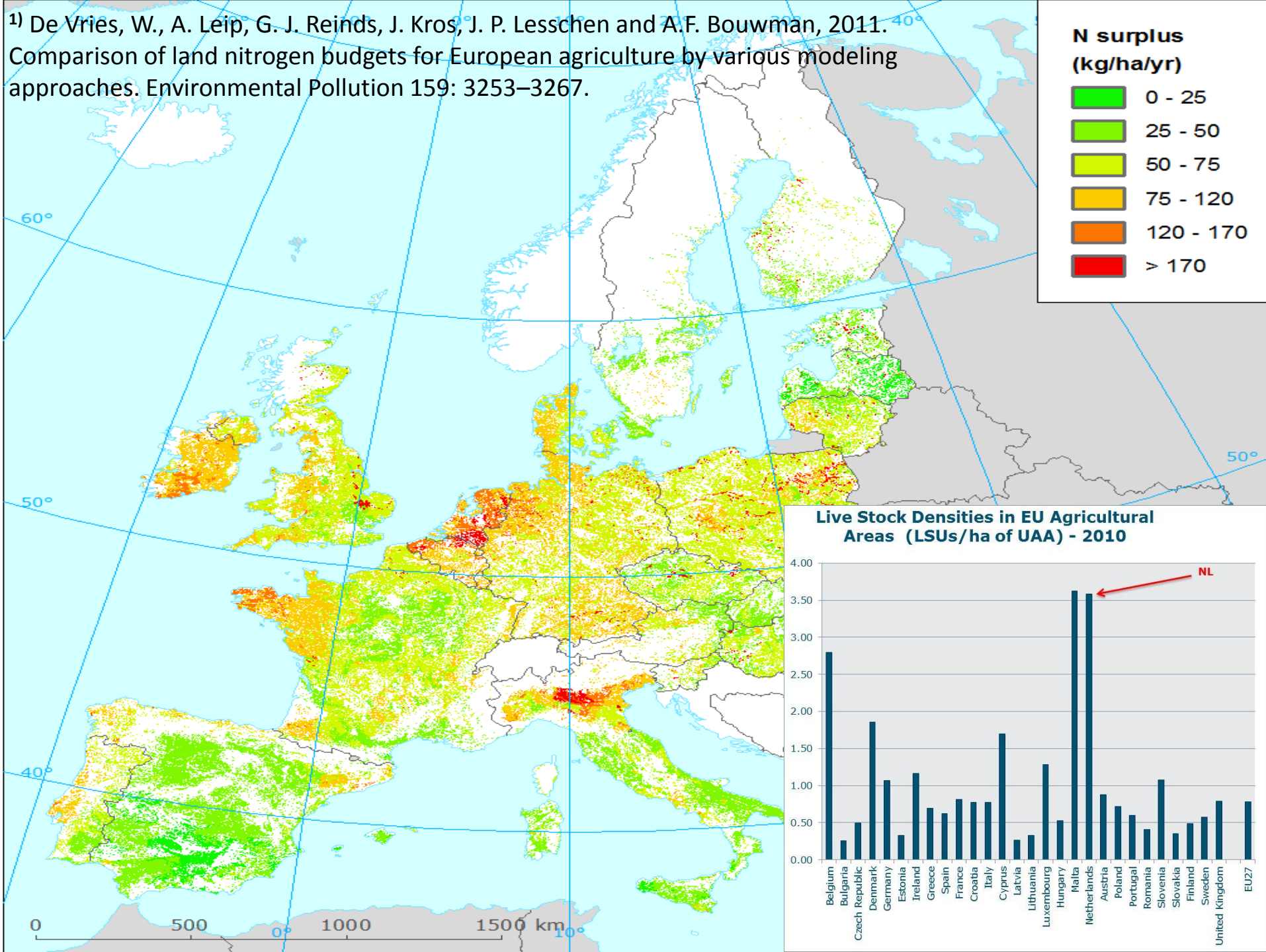
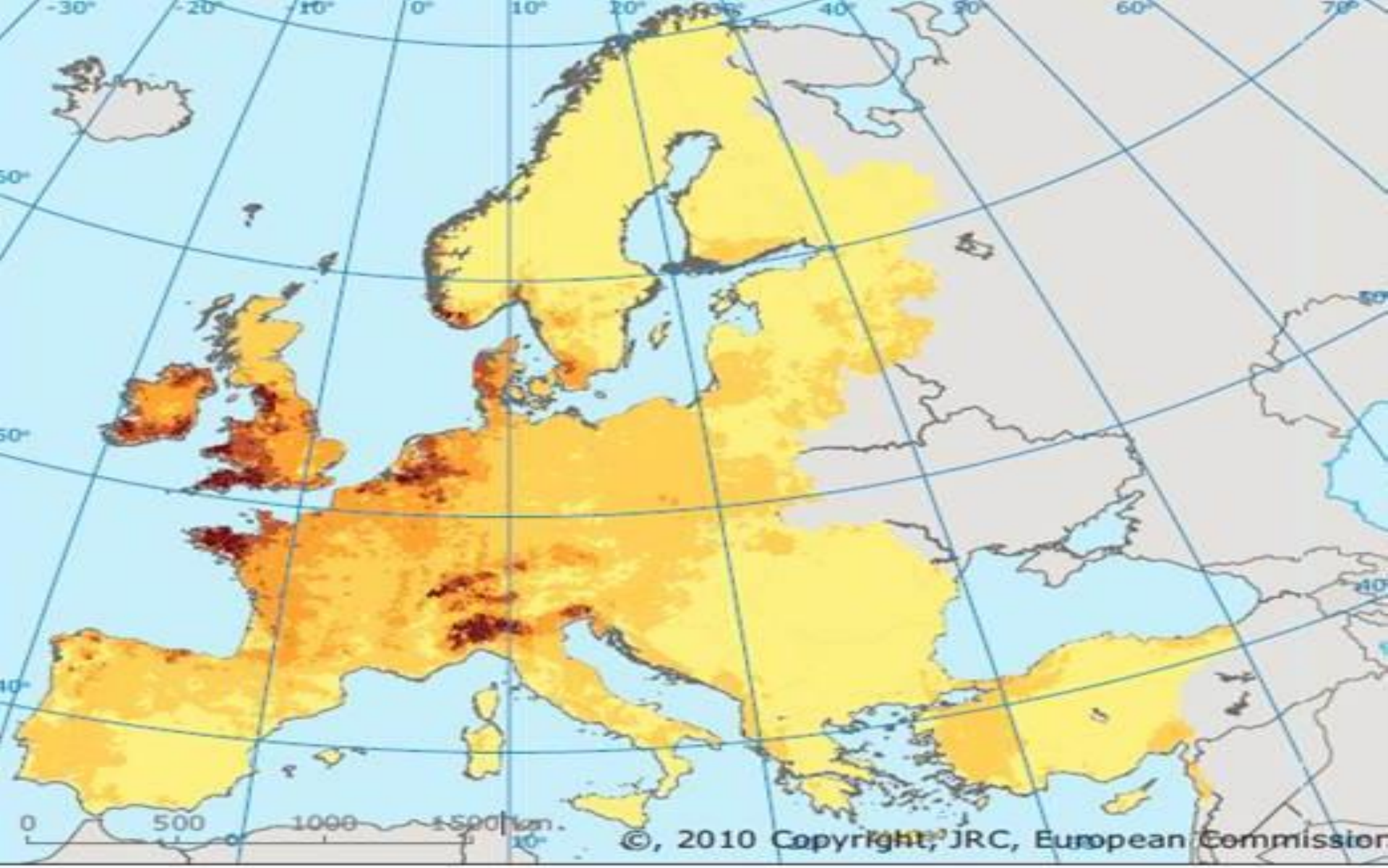
[1] De Vries, W., A. Leip, G. J. Reinds, J. Kros, J. P. Lesschen and A.F. Bouwman, 2011. Comparison of land nitrogen budgets for European agriculture by various modeling approaches. Environmental Pollution 159: 3253–3267.





Annual diffuse emissions of nitrogen to freshwater from agriculture kg.ha^{-1} (EEA 2012)

0–2 | 2–10 | 10–20 | 20–30 | >30 | Outside data coverage

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

2

Nitrate Directive

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

Use the WFD !

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What I learnt 2014

How experts from other countries think of NL:

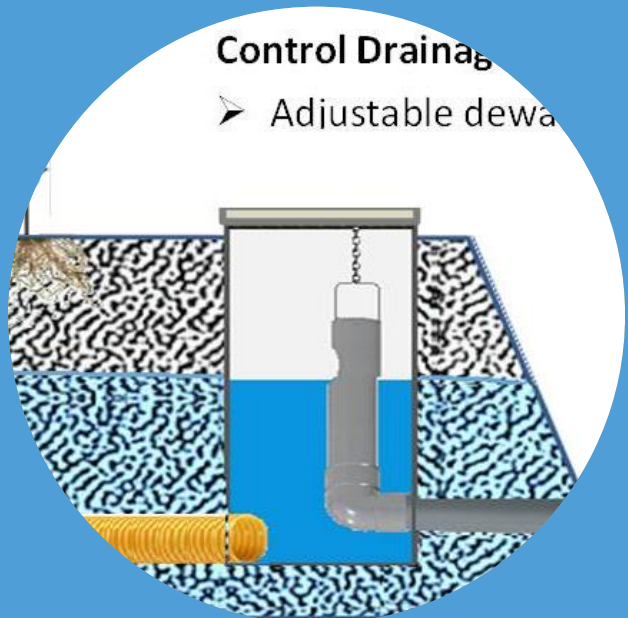
Conclusions

- 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

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

Mitigation options can reduce diffuse P-loads significant

4



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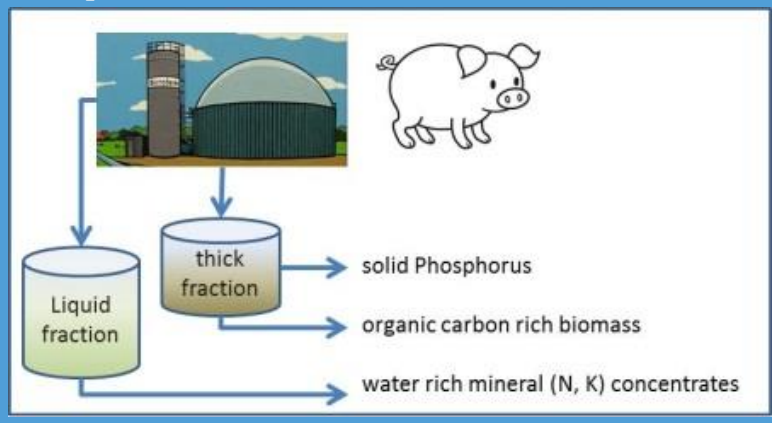
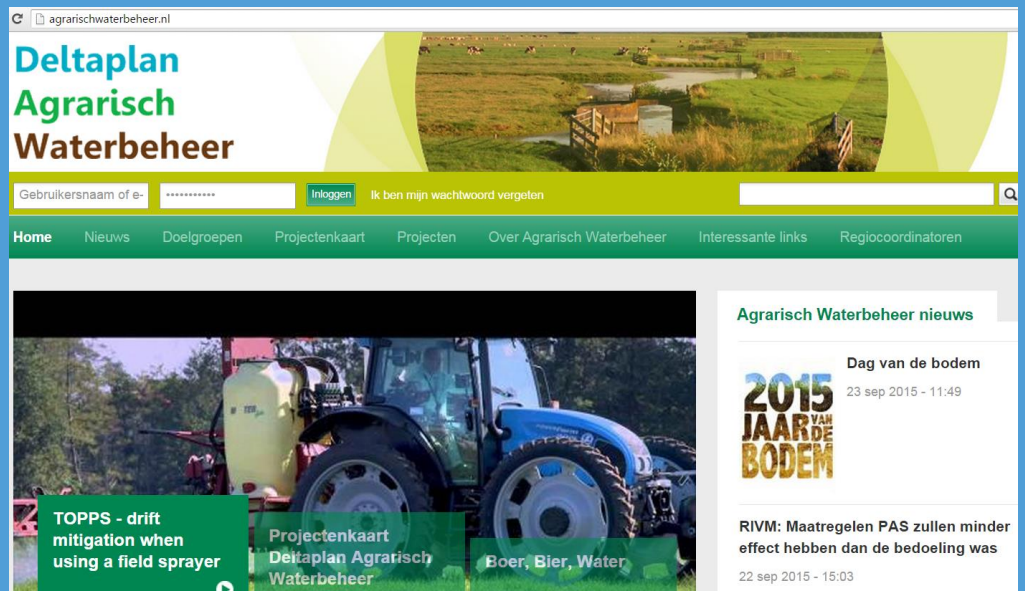
Policy NL to reduce N & P Agri-emissions

1) Restrictions Fertilizers (NAP)

2) Manure Treatment



3) Tailor made voluntary mitigation options



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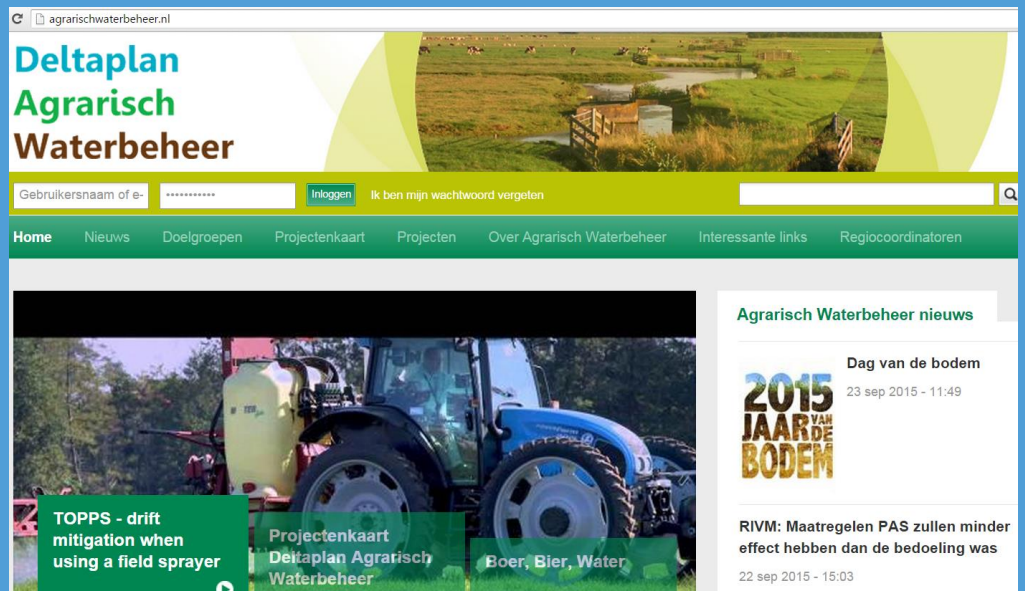
Research question:

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



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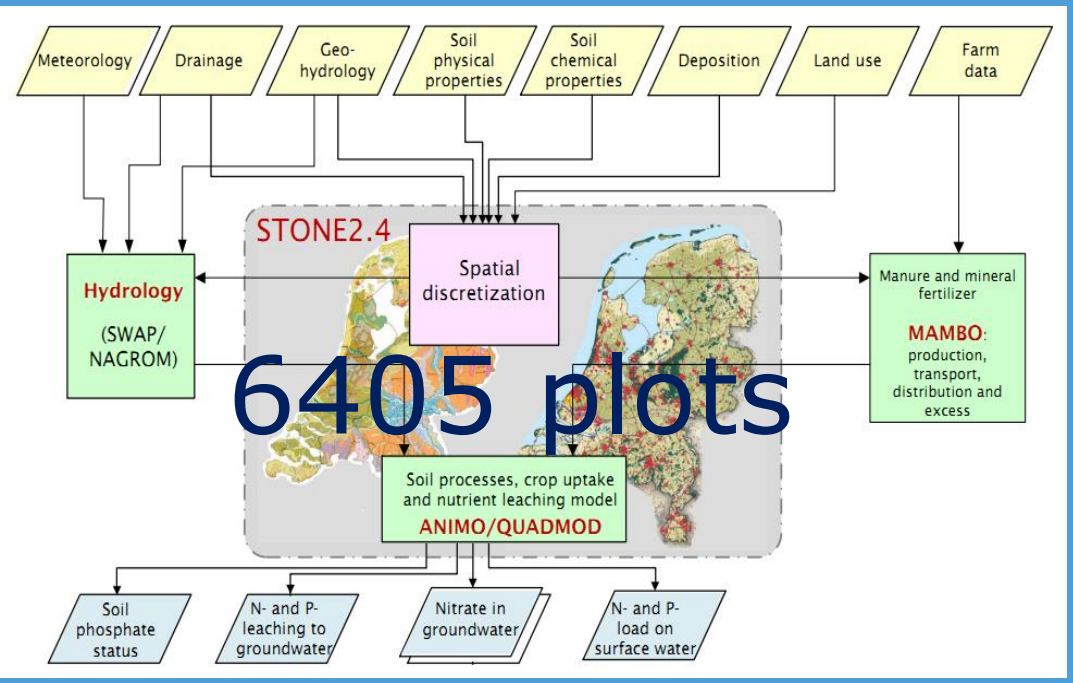
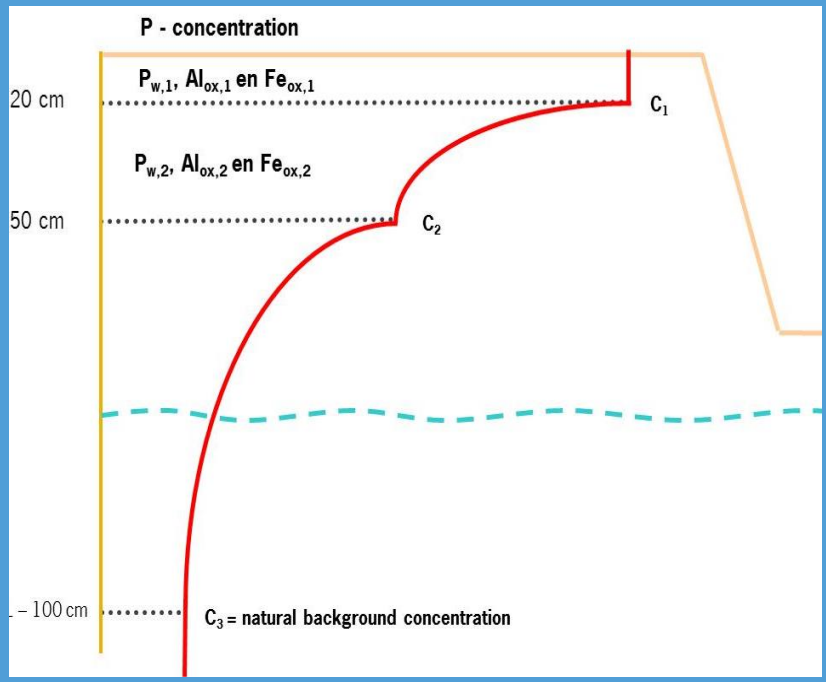
Method:
Downscaling National model STONE using PLEASE

STONE: process based dynamic model



PLEASE: conceptual static model



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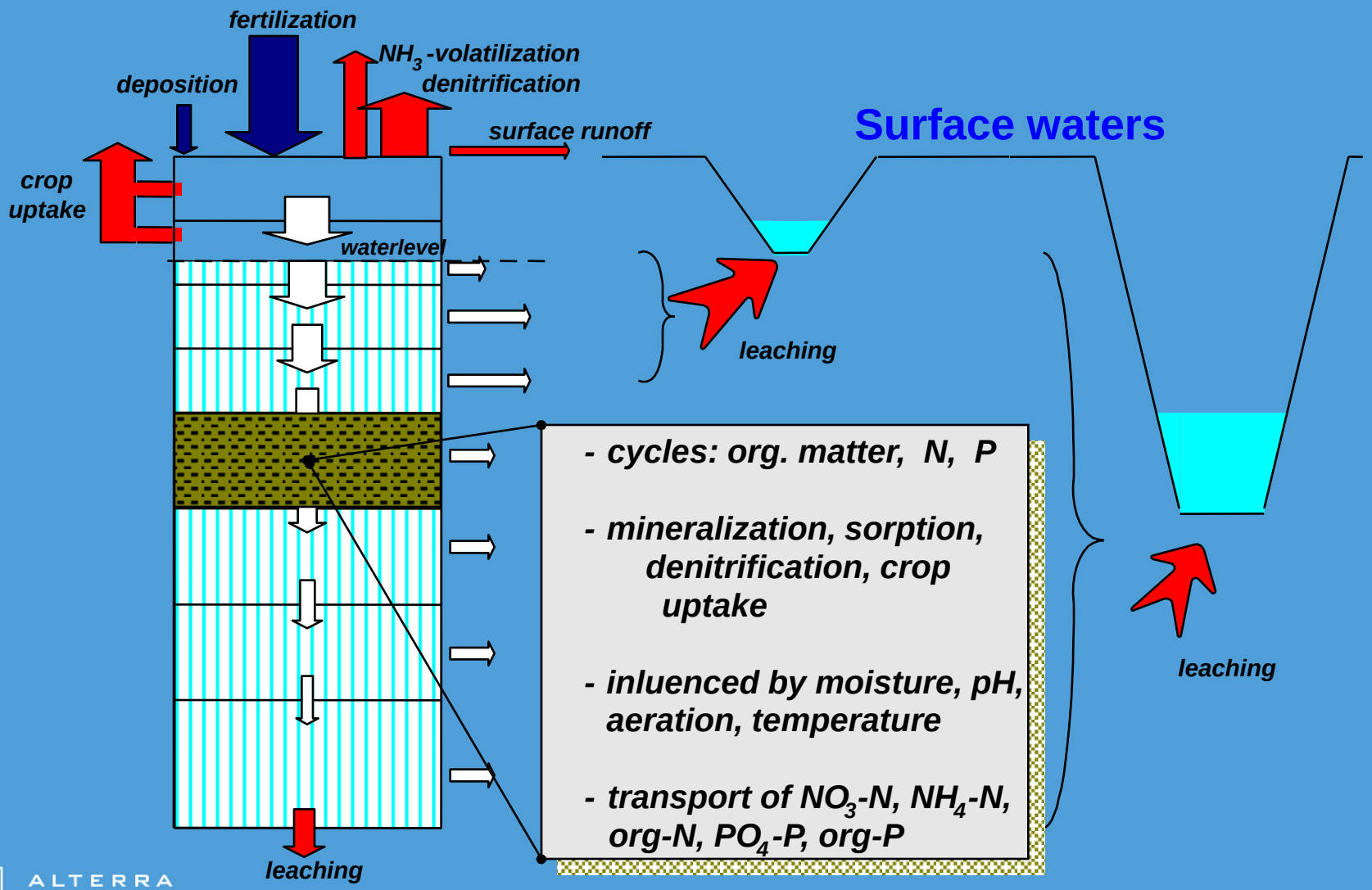
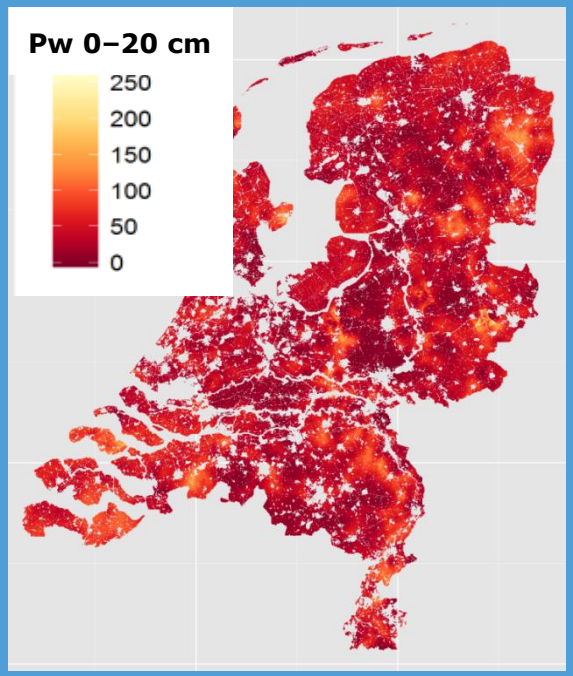
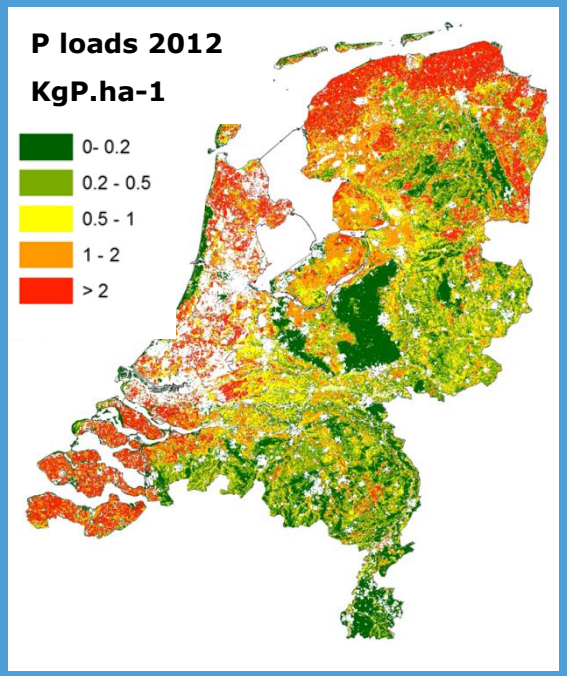
ANIMO, the unique module in STONE



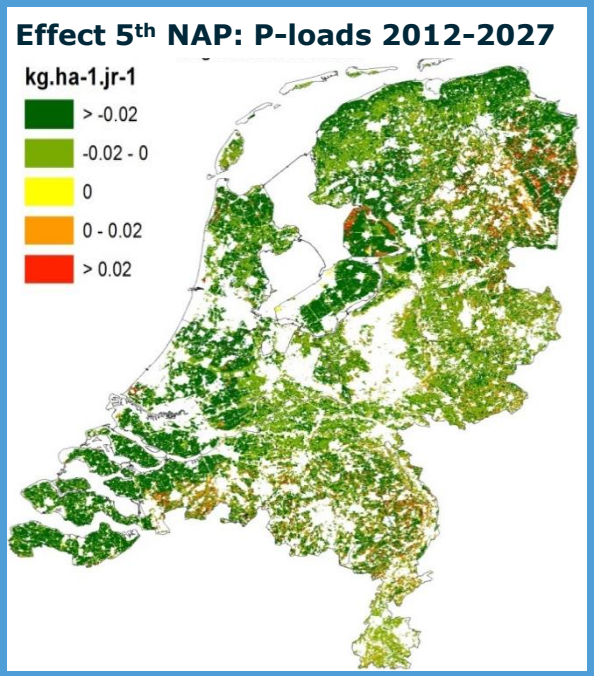
PLEASE: using maps Pw and groundwater level combination STONE: P-loads to surface water



PW-map

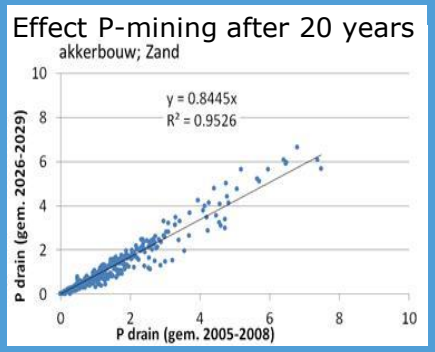


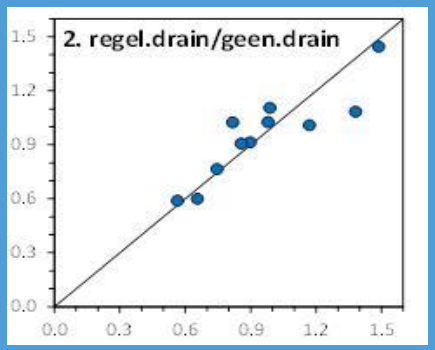
current P-loads surface water



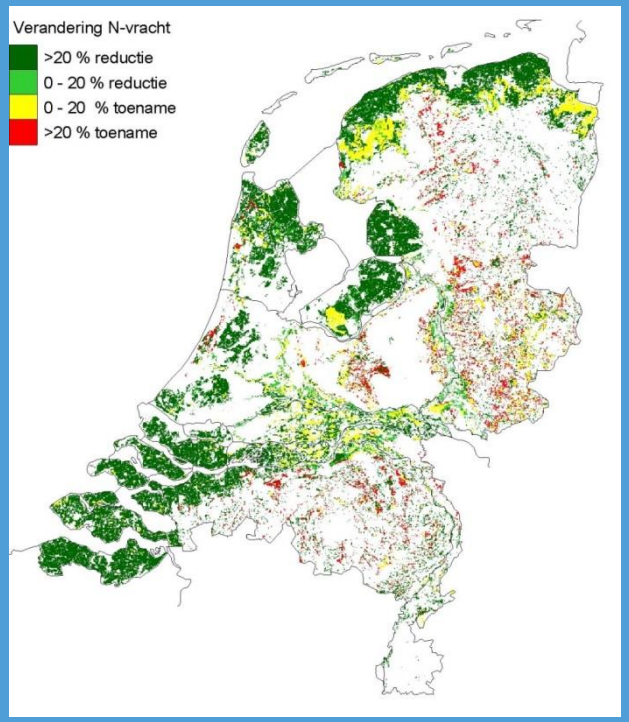
effect 5th NAP

STONE: derivation meta relationships measures
PLEASE: downscaling effect measures

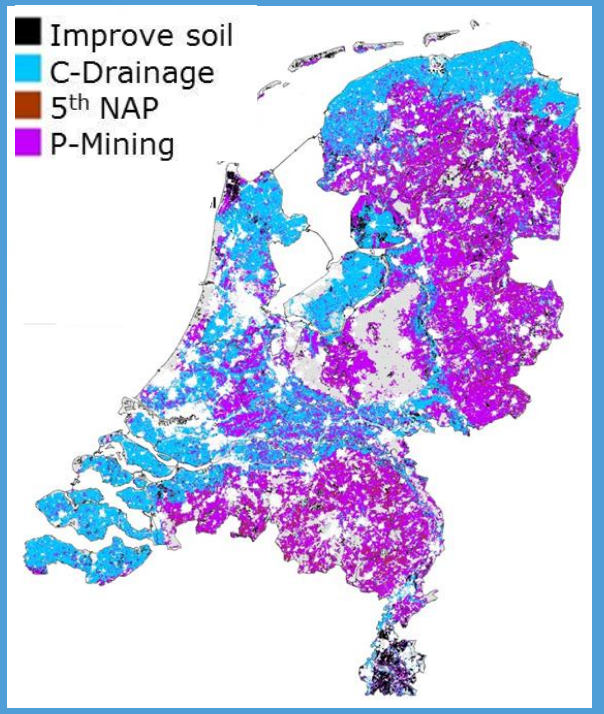




Meta Relations



Effect control Drainage



most effect measure

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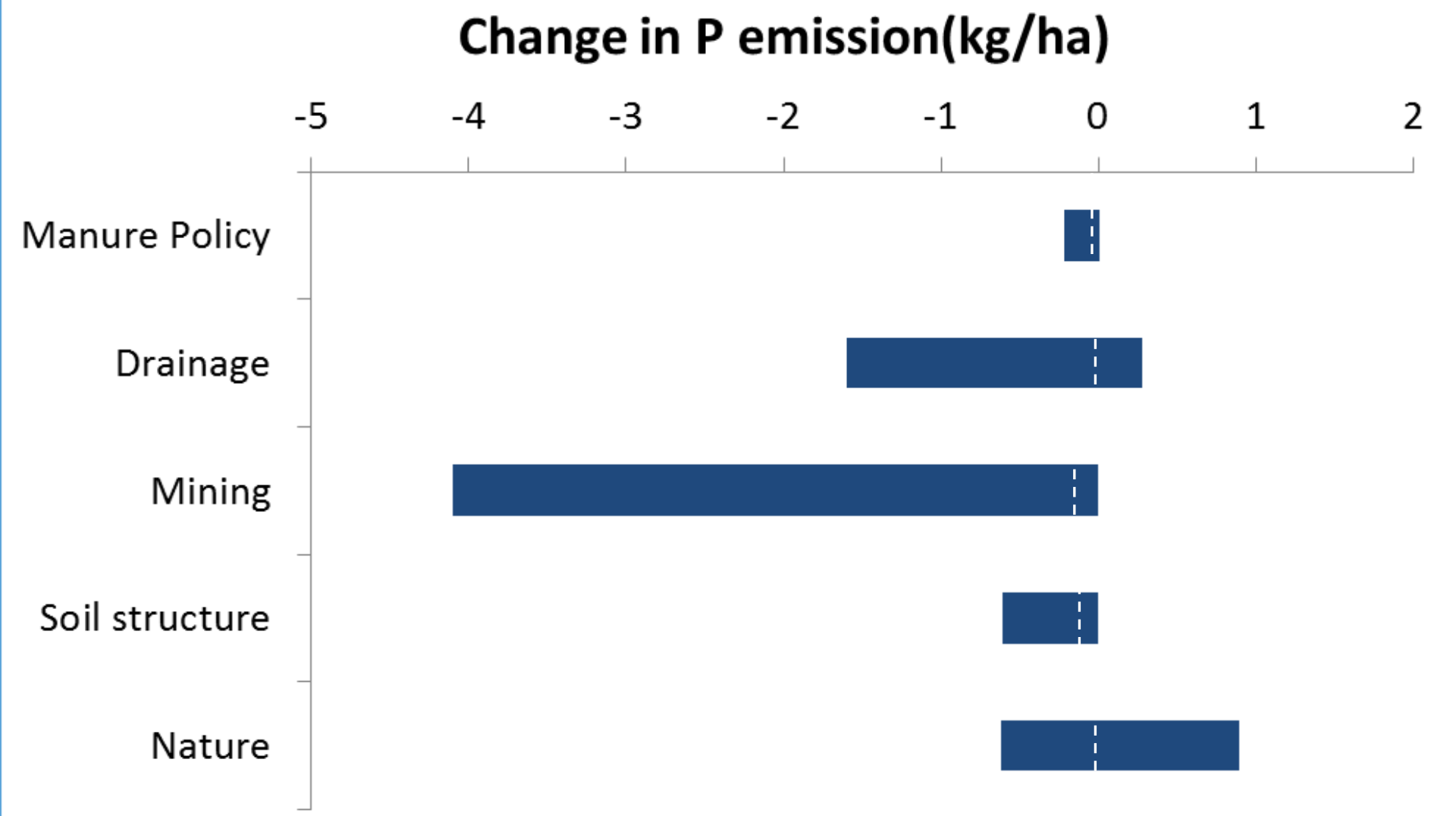
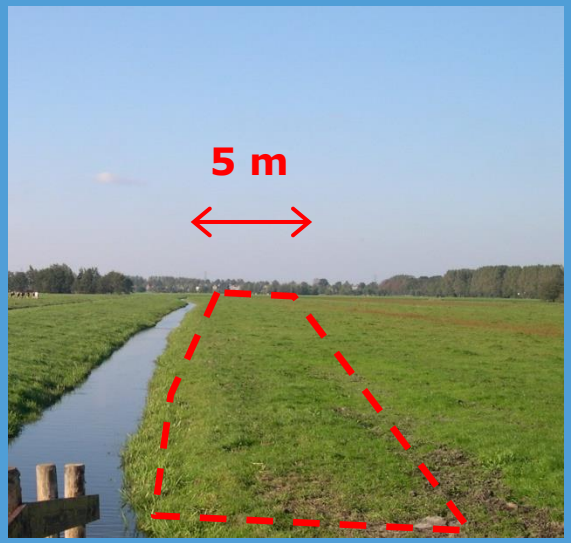
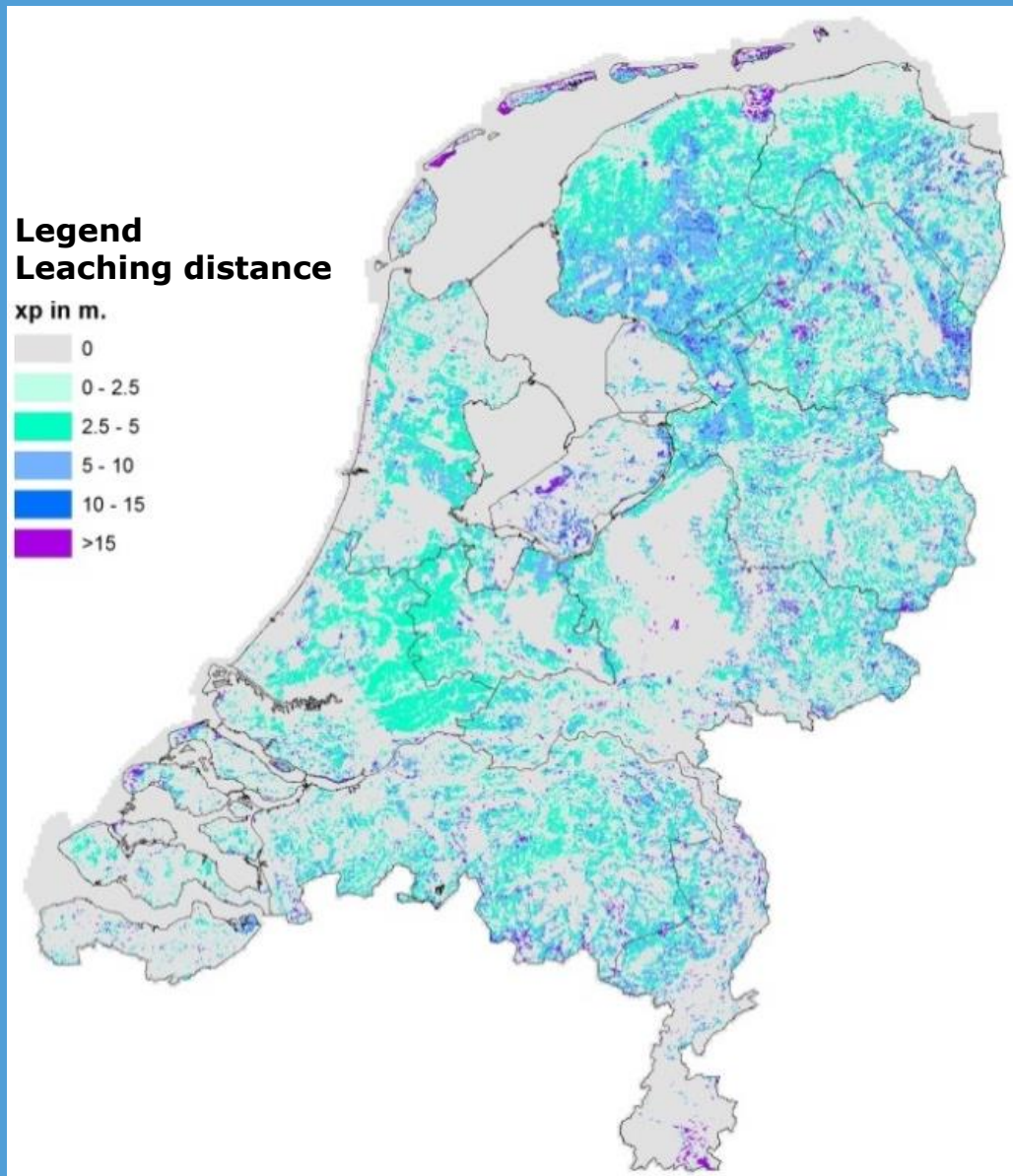

Change in P emission(kg/ha)
-5
-4
-3
-2
-1
0
1
2
Manure Policy
Drainage
Mining
Soil structure
Nature

P-mining quite ‘ drastic’

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





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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**

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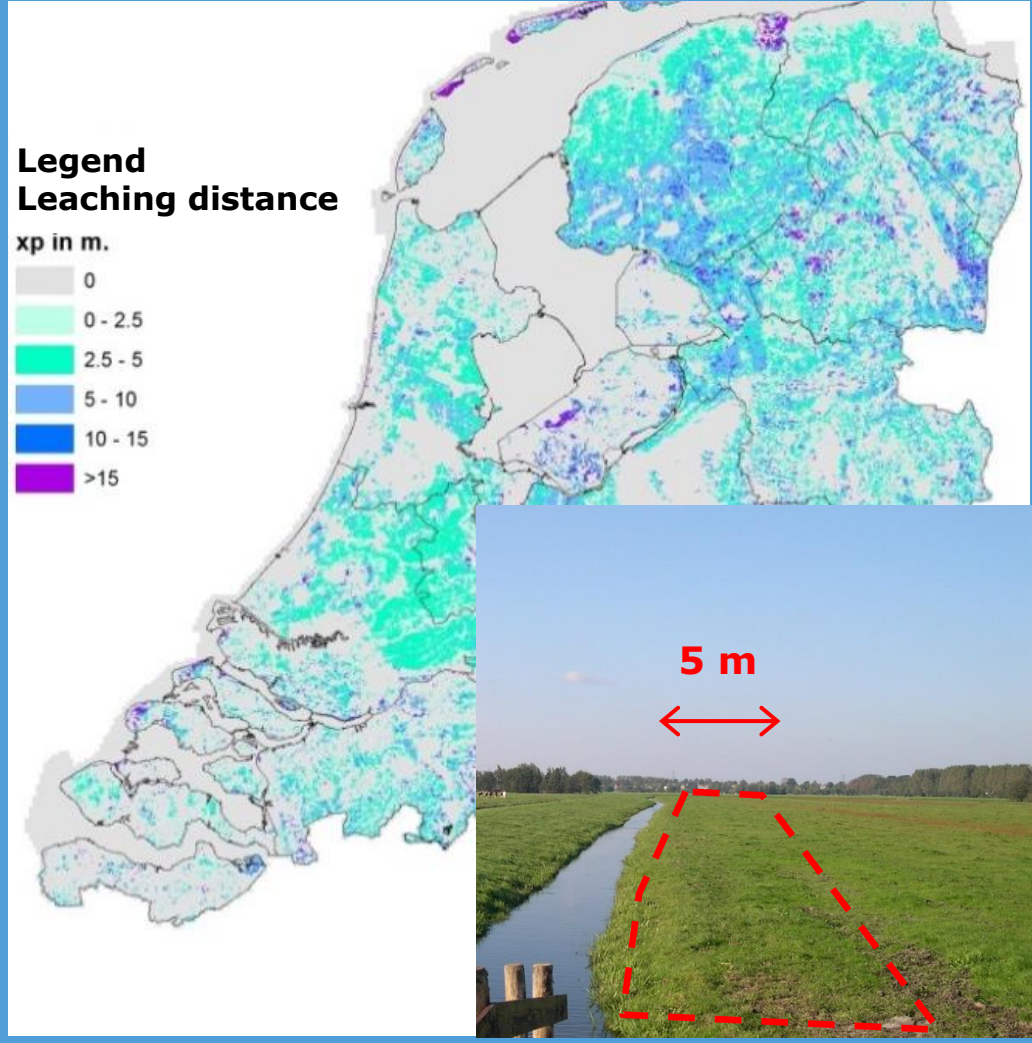

Bear in mind:

- P-mining quite ‘ drastic’

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

Conclusions

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Thanks for attention

Questions?