



# GeoPEARL in The Netherlands

a regulatory perspective

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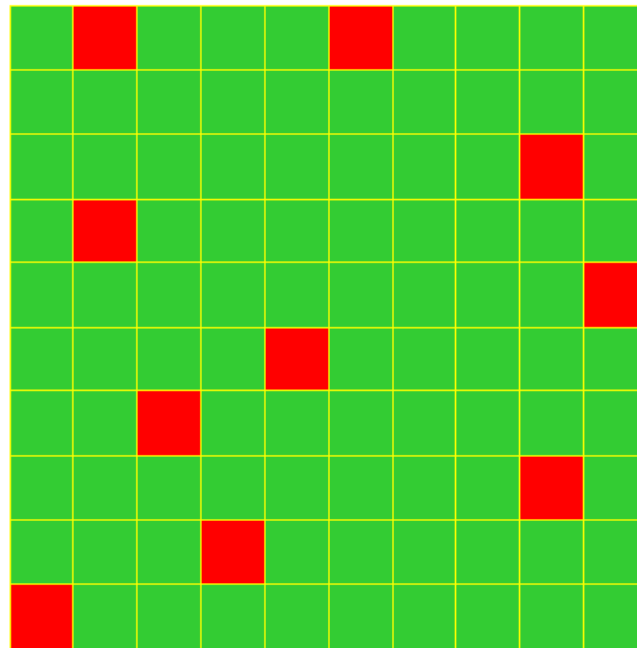
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# Overview

- NL specific protection goal
- NL decision tree for leaching
- GeoPEARL
- Options
- Regulatory practice
- Developments

# Specific protection goal

the long-term median concentration at 10 m depth should not exceed the value of  $0.1 \mu\text{g/L}$  under at least 90 % of the area of potential use



Van der Linden et al. (2004; RIVM report 601450019)

# Decision tree for leaching to GW

## Tier

1

Calculations with FOCUS Kremsmünster



2

Calculations with GeoPEARL (1 m–ss.)  
Additional field/lysimeter/lab experiments to improve  
estimations with GeoPEARL  
Monitoring shallow groundwater (0-1 m below gw)



3

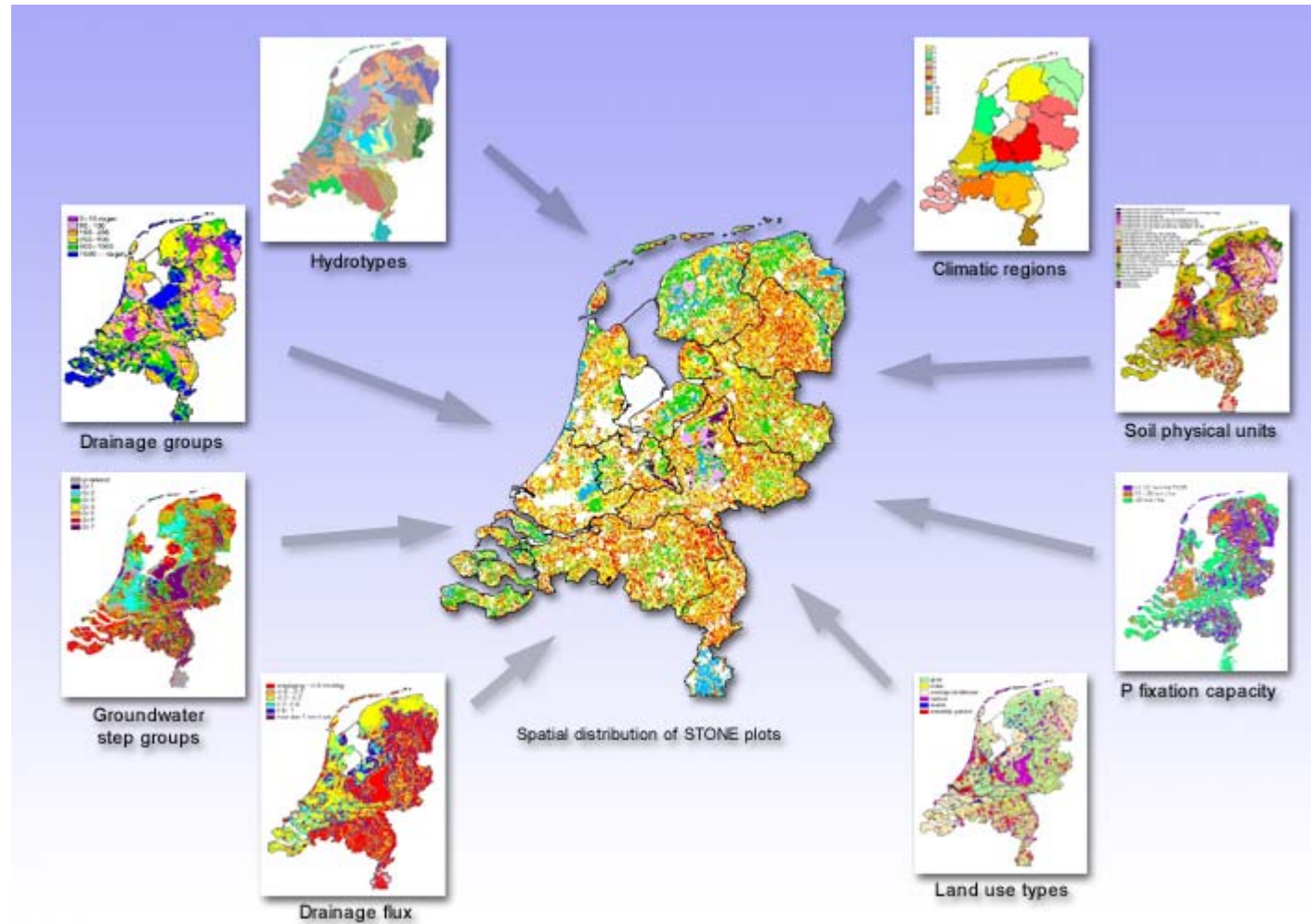
Transformation rate in water-saturated zone  
Monitoring deep groundwater (ca. 10 m–ss.)

# GeoPEARL 3.3.3

- spatially-distributed model for pesticide leaching to groundwater in NL
- Core is PEARL model
- PEARL is run for unique combinations (plots) of:
  - soil
  - climate
  - land-use
  - hydrogeological units



# Spatial schematisation



Tiktak et al. (2003; RIVM report 716601007)

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# GeoPEARL assessment

- minimum of 250 zones
- potential area of use
- for each plot and crop-type, the model is run for 26, 46 or 66 years
- median leaching concentration
- 90th percentile in space



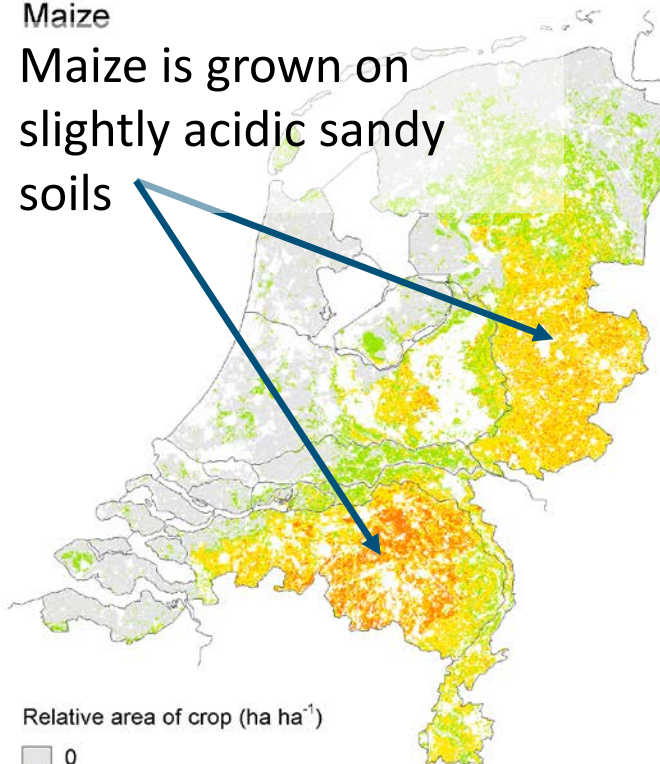
$> 0.1 \mu\text{g/L}$   
or  $> 0.01 \mu\text{g/L} ?$

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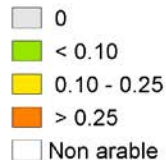
# Effect of area of use

## Maize

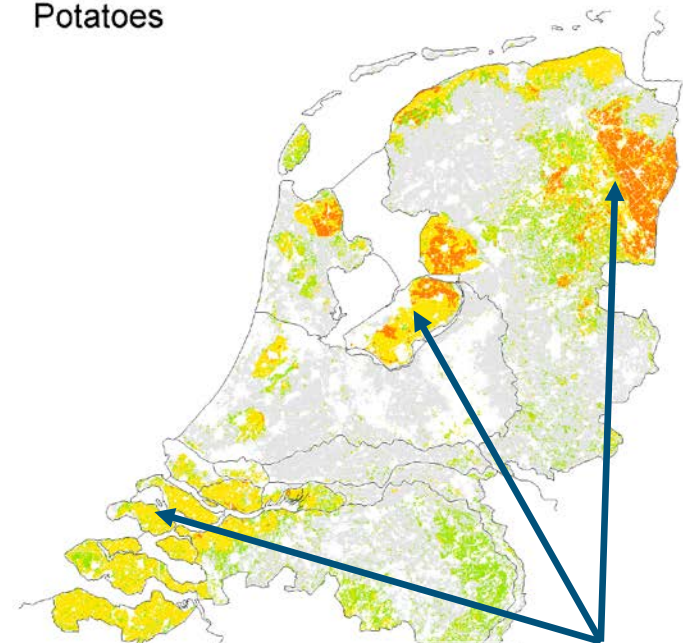
Maize is grown on slightly acidic sandy soils



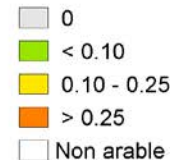
Relative area of crop (ha ha<sup>-1</sup>)



## Potatoes



Relative area of crop (ha ha<sup>-1</sup>)



Potatoes are grown on light sandy clay soils and in former peat excavation areas



# Effect of area of use

Leaching concentration of NLE in maize

( $\mu\text{g L}^{-1}$ )

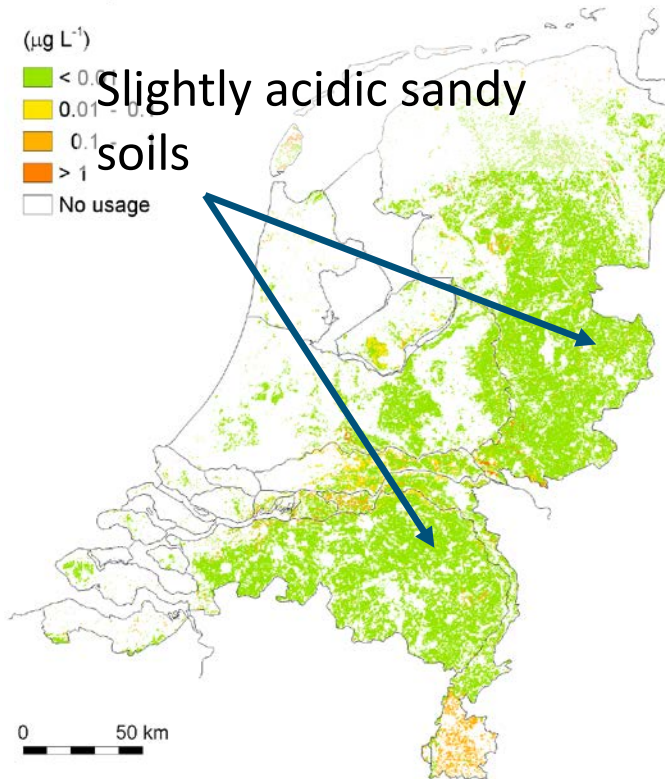
< 0.01

0.01 - 0.1

0.1 - 1

> 1

No usage



Leaching concentration of NLE in potatoes

( $\mu\text{g L}^{-1}$ )

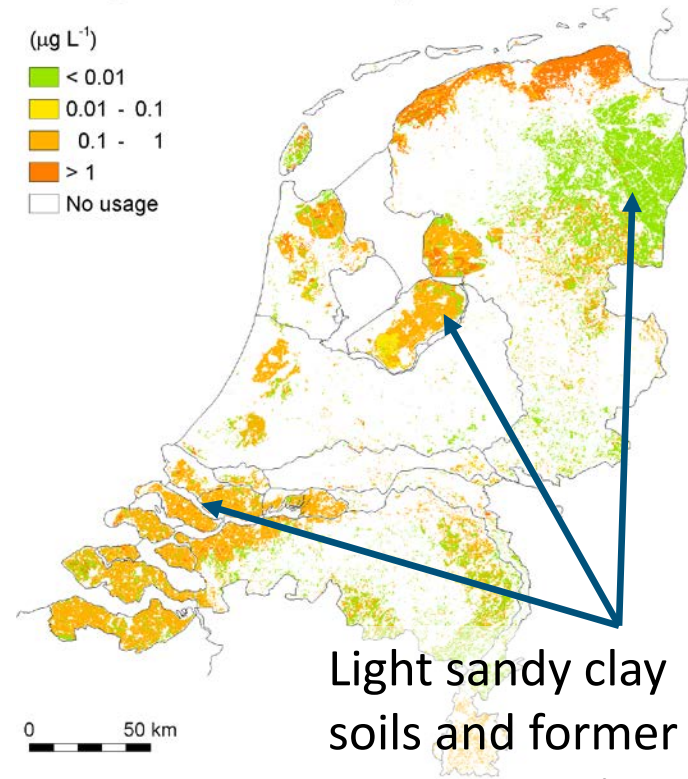
< 0.01

0.01 - 0.1

0.1 - 1

> 1

No usage



Substance with pH-dependent sorption behaviour

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# Options of GeoPEARL assessment

- sorption:
  - $K_{OM}$  dependent on pH
  - $K_F$  dependent on soil texture, organic matter content, sesqui-oxide content
- degradation:
  - pH
  - clay content
  - organic matter content

# Options of GeoPEARL assessment

- plot selection on soil properties:
  - pH
  - soil texture
  - organic matter content
  - sesqui-oxide content
- number of plots/zones

# Regulatory practice

- GeoPEARL used for majority of PPP
- crop-specific restrictions for use in groundwater protection areas
- soil dependent substance properties included regularly
- few restrictions/mitigations based on plot selection

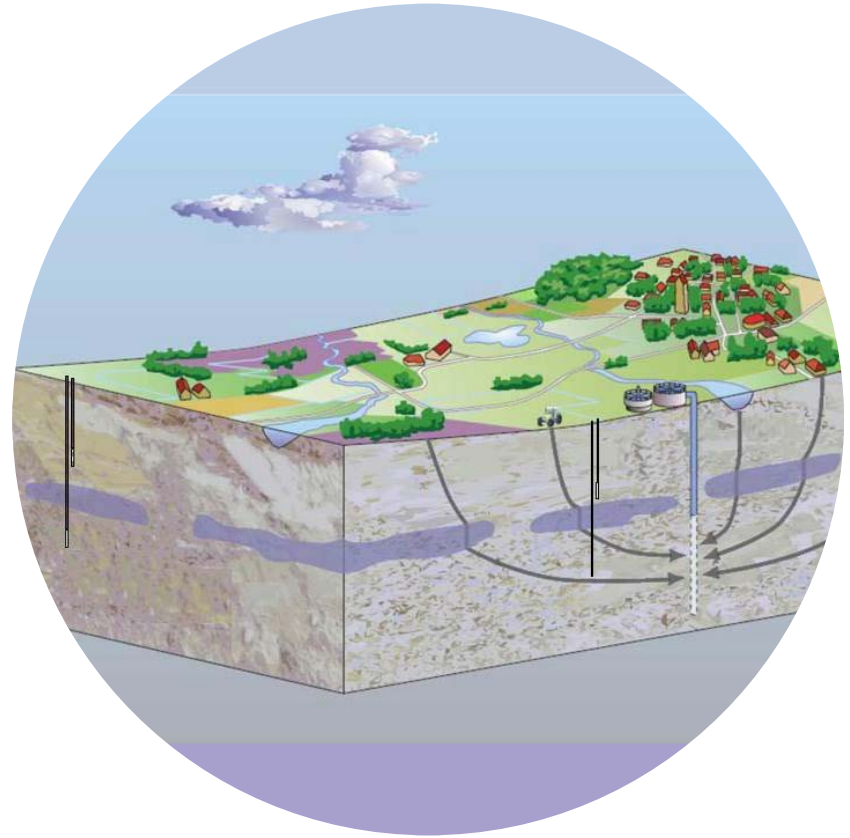
# Developments

- GeoPEARL 4.4.4
  - updated organic matter map
  - generally lower OM content
- Tier 1 calibrated
- Safety factor needs to be reassessed
- Future developments
  - update land-use map
  - update hydrological model



# Thank you for your attention

## Questions?



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