

Predicting the effects of fertilizer policy on the nutrient leaching and runoff in the Netherlands

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Content

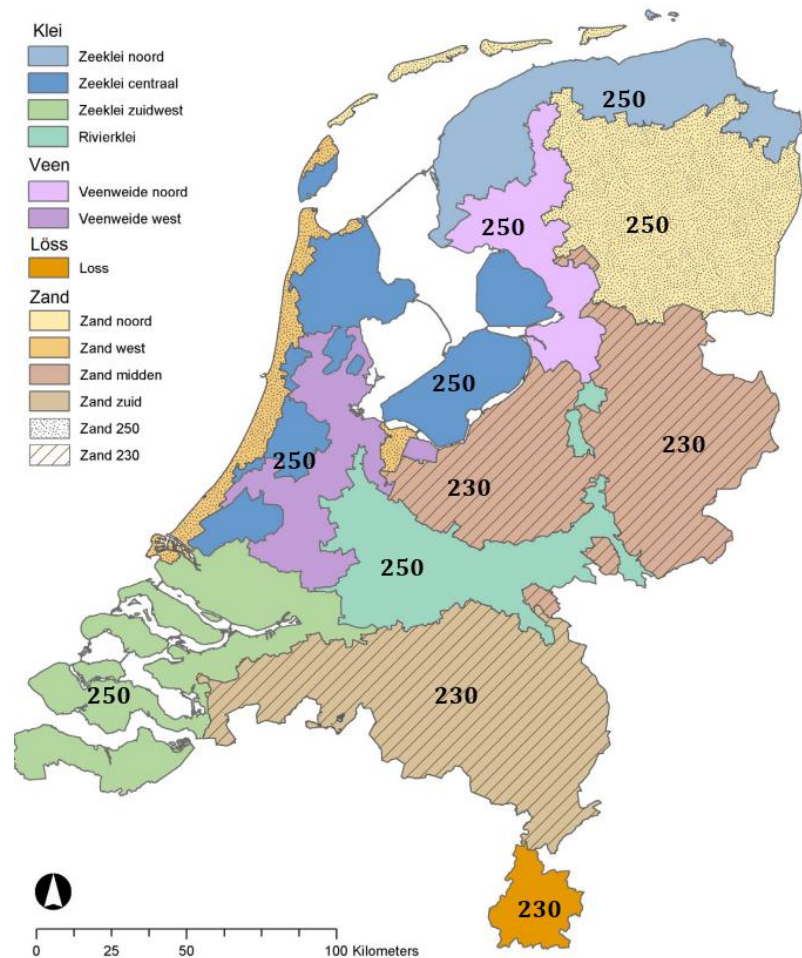
- Nitrate Action Programmes and Derogation of animal manure application rates
- Measures of 7the Action programme and the phasing-out of derogation
- Model suite for assessment
- Predicted nitrate concentration and N and P loss to surface waters
- Conclusions

Nitrate Action Programmes and Derogation

- Aims:
 - Meet water quality objectives from the Nitrates Directive and the Water Framework Directive (WFD)
 - Limitation of ammonia emissions (NEC Directive, UNECE Gothenburg Protocol, Birds and Habitats Directives)
- Consists of a suite of measures, intentions and research activities
- Derogation: maximum permitted application of cattle manure on dairy farms was 250 (or 230) kg N /ha/yr

Derogation

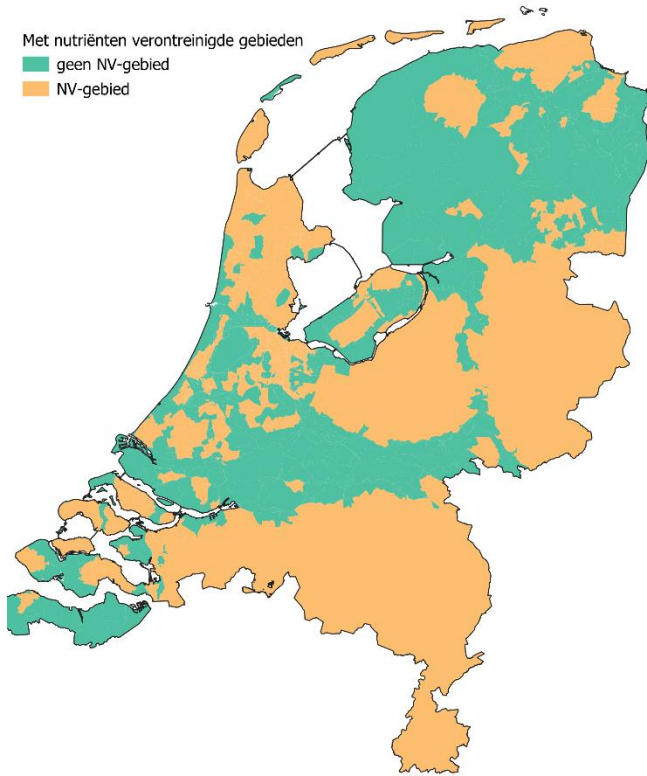
- N manure application standard for dairy farms
- 230 kg N /ha (2015 – 2022) in some region
- 250 kg N/ha (2006 – 2022) in other regions



Measures Action programmes and phasing-out of derogation

5 th AP 2014-2017	6 th AP 2018-2021	7 th AP 2022-2025	Phasing out derogation 2023-2025
<ul style="list-style-type: none"> • Legal value of pig slurry NUE increased to 80% • Conditions for derogation tightened • 20% reduction of permissible N application rates for crops prone to nitrate leaching in southern Sand+Loss district 	<ul style="list-style-type: none"> • N application standard for green manures • Stricter rules for manure spreading period for maize cultivation • Stricter rules for N application after ploughing grassland • Adjustment of phosphate application standards 	<ul style="list-style-type: none"> • Stricter rules for manure spreading period on arable land • Stricter rules for sowing of catch crops after maize on sandy and loess soils • If catch crop sowing date is exceeded on arable land: penalty • Rules for arable crop rotation on sand/loess soils (break crops) 	<ul style="list-style-type: none"> • Reduction of livestock manure application to 170 kg/ha N • Reduction of the manure production ceiling: -10% • Buffer strips (5, 3, 1, 0.5 meters wide) • Nutrient polluted areas N application standard -20%

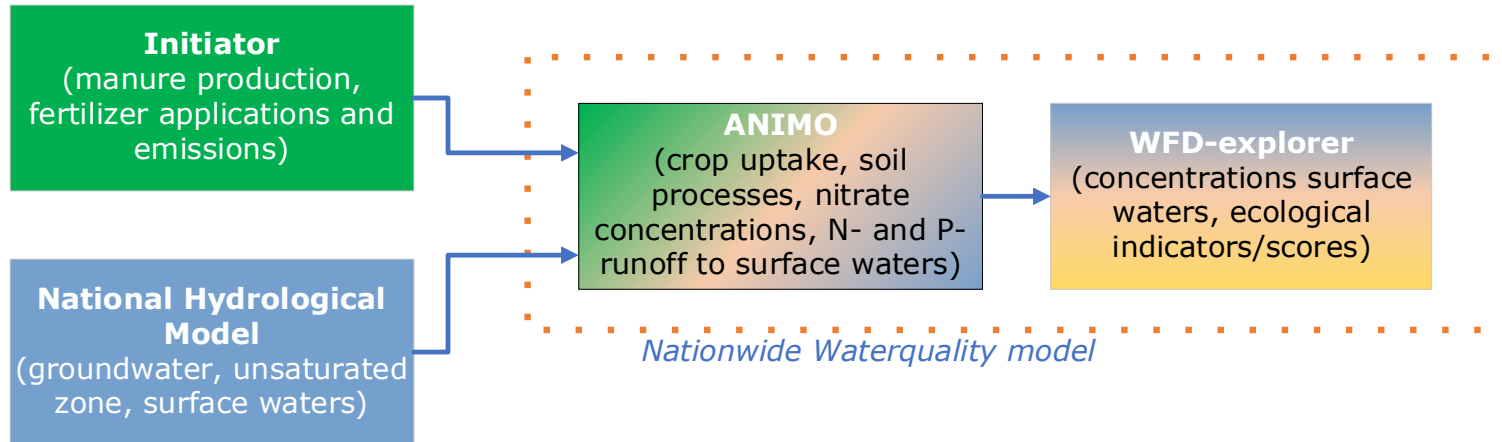
Nutrient polluted areas (2024 – 2025)



Combination of:

- Areas where nitrate in leachate from the rootzone are at risk
- Areas where surface water N and/or P concentrations exceed target levels

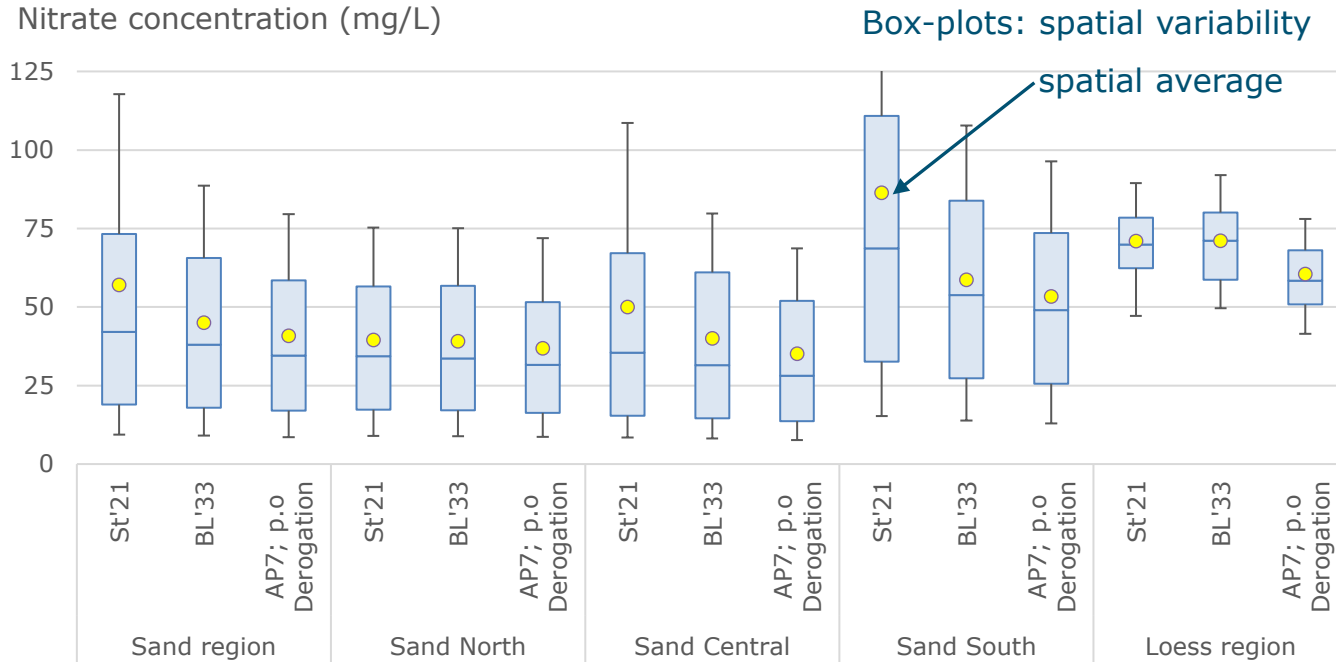
Model chain



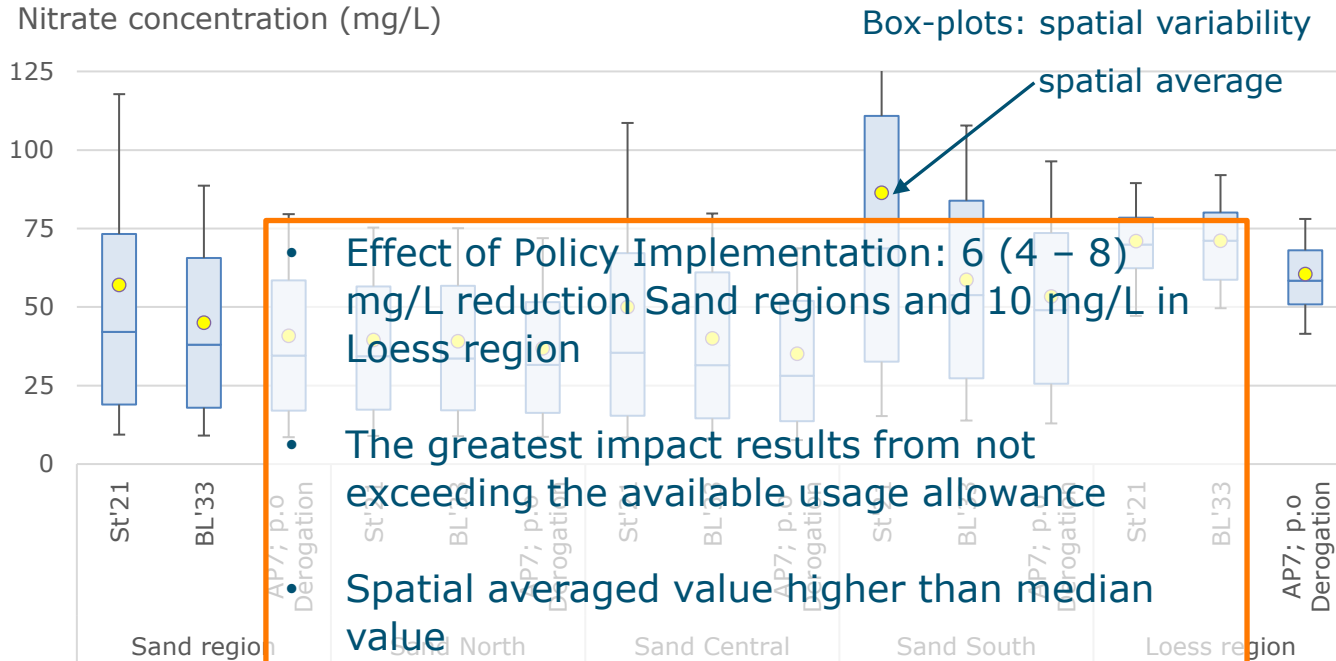
Scenario's

Status 2021	history until 2021
Baseline 2027; 2033	future agricultural developments, but no additional measures
Implemented policy	future agricultural developments + 7 th AP + phasing out derogation
Indication of sensitivity	<ul style="list-style-type: none">• Dry and wet conditions• Exceedance of nutrient use allowance• Voluntary measures beyond legal requirements

Results nitrate



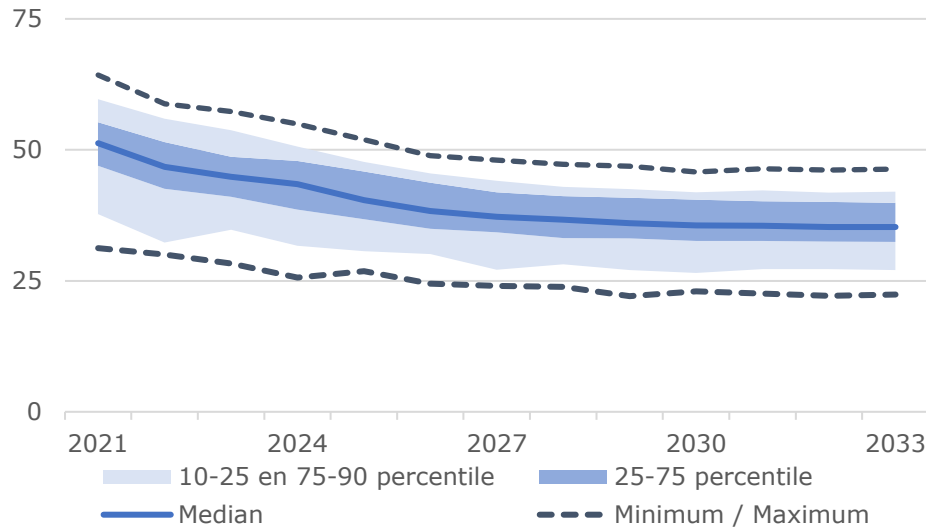
Results nitrate



- Effect of Policy Implementation: 6 (4 - 8) mg/L reduction Sand regions and 10 mg/L in Loess region
- The greatest impact results from not exceeding the available usage allowance
- Spatial averaged value higher than median value
- Average values for Sand south and Loess do not comply with 50 mg/L

Nitrate: dry and wet conditions

Predicted nitrate concentrations (mg/L) for 30 different weather conditions Sand Central region



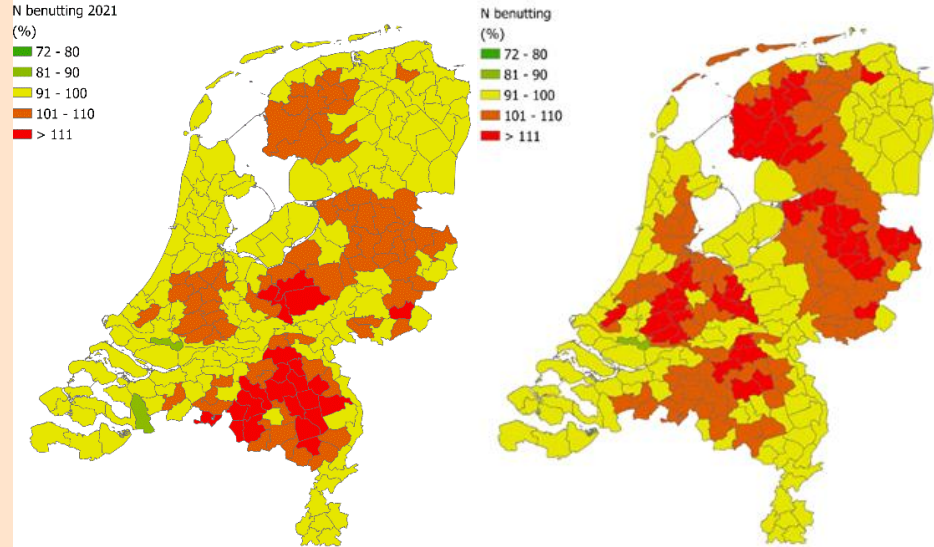
Nitrate concentrations may vary by 15–20 mg/L above or below the average as a result of dry or wet years

Nitrate: exceeding the available usage allowance

Ratio: N-fertilizer application / standard

Recent past

Eventual future



Nitrate

A shift from the Southern Sand District to regions that previously had extensive derogation and are now subject to a 20% reduction in the nitrogen application standard (Nutrient polluted areas).

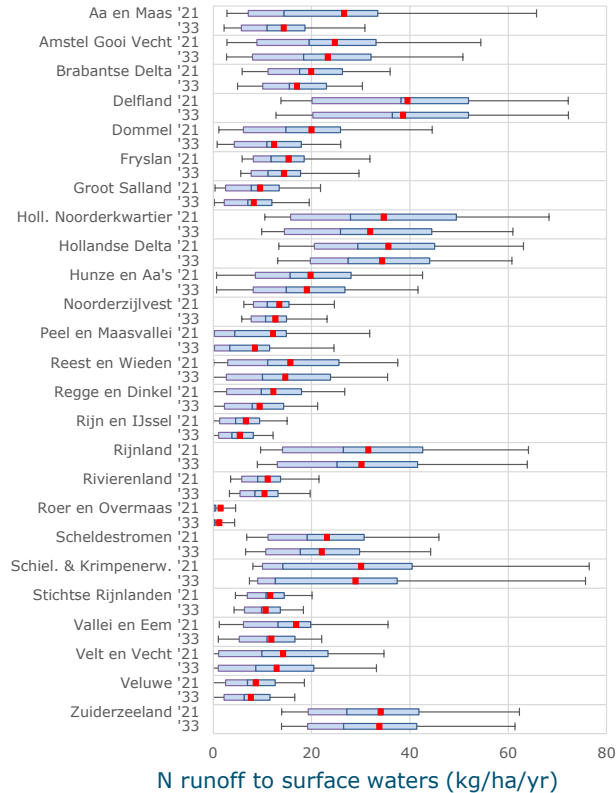
But the soils in those new regions are less prone to nitrate leaching

Nitrate: impact of voluntary measures beyond legal requirements

- Information collected from applications for eco-schemes (CAP) was used to estimate the implementation of measures.
- However, a previously voluntary measure (buffer strips), is now mandatory and no longer falls into this category.
- Effect: reduction in averaged nitrate concentrations by 2–7 mg/L
- If voluntary measures are effectively implemented the 50 mg/L threshold can be met in the Southern Sandy region as well.

N and P runoff to surface waters

management zones of regional water authorities



- Large variation between regions
- Large variation within regions
- Small areas with high leaching levels raise the overall average
- Greatest effect comes from not exceeding the available usage allowance
- Effect of the 7thAP + phasing out derogation:
 N runoff: 6–16% reduction
 P runoff: 1.6–7% reduction

Conclusions

- 7th NAP and phasing out the derogation: Largest effects on nitrate in nutrient polluted areas in the sandy regions.
 - -6 (4 – 8) mg/L Sand district
 - -10 mg/L Loess district
- Exceeding the nutrient use allowance in the past had a major impact on nitrate levels in 2021 and on the subsequent decline in some regions.
- Reduction of N and P runoff: contributes somewhat to achieving the targets, but insufficient for full target attainment.

Thank you very much!



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See also: #81 Effect of uncertainties in manure and fertilizer application on modelled N and P losses to surface and groundwater at different spatial scale
By Hans Kros, Friday 06-06-2025, 10:30-10:45, session B.5