National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Are Reactive Nitrogen Concentrations Useful Indicators For Too Much Nitrogen?

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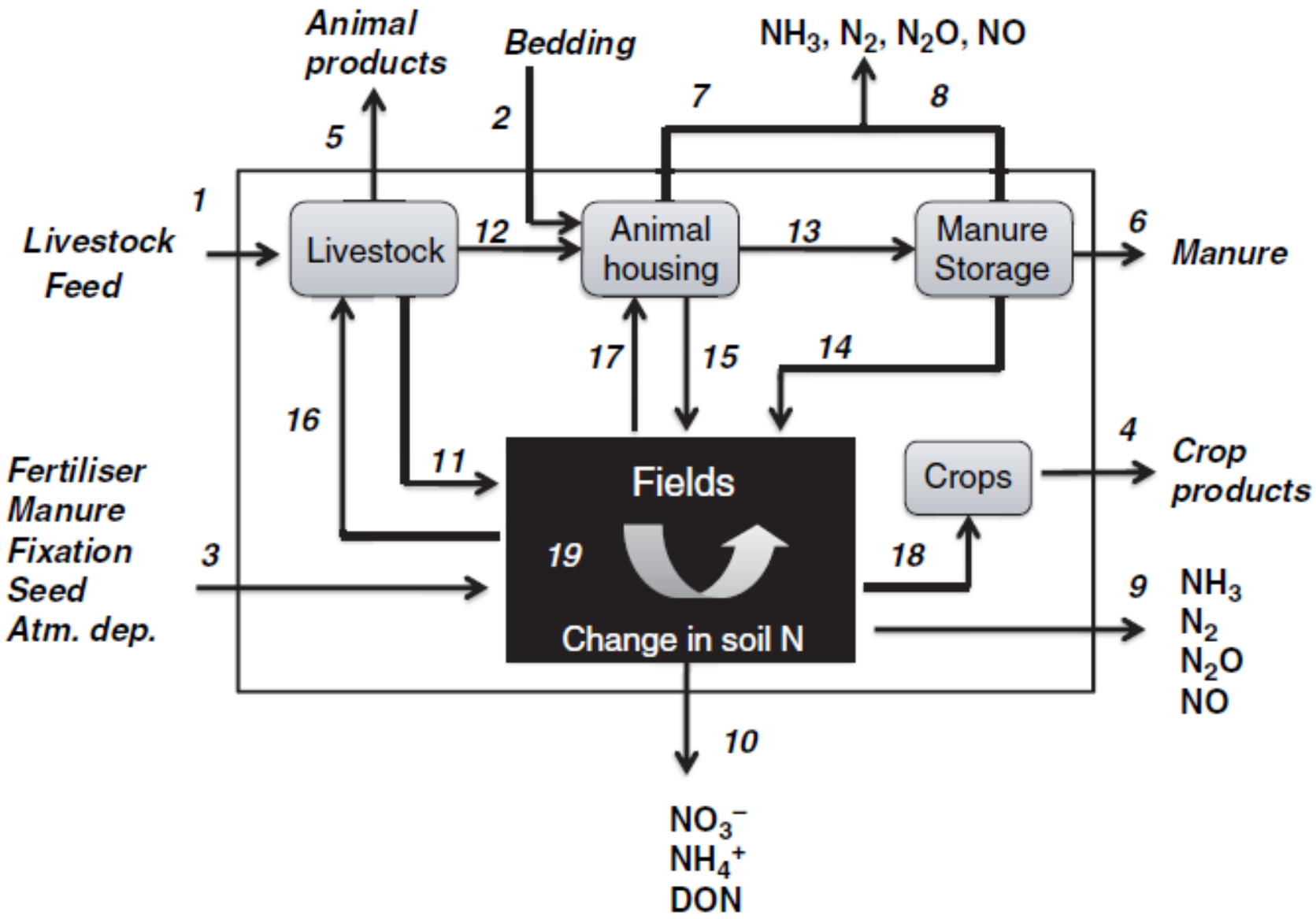
- For most ecosystems nitrogen is a limiting factor and too much nitrogen supply will cause harmful effects
- There are many different systems: agro-ecosystems, animal production, crop production, forests, heather, lakes
- There are many different scales: farm scale, regional scale, catchment scale, global scale



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- Point of view producer of emissions
- Point of view environmental authorities

- Need for nitrogen indicators to give an indication for the health of natural and agro ecosystems, as far as nitrogen is concerned

Nitrogen indicators on farm scale

- Milk urea content (= reactive nitrogen)
- Mineral nitrogen in soil (= N min, reactive nitrogen)

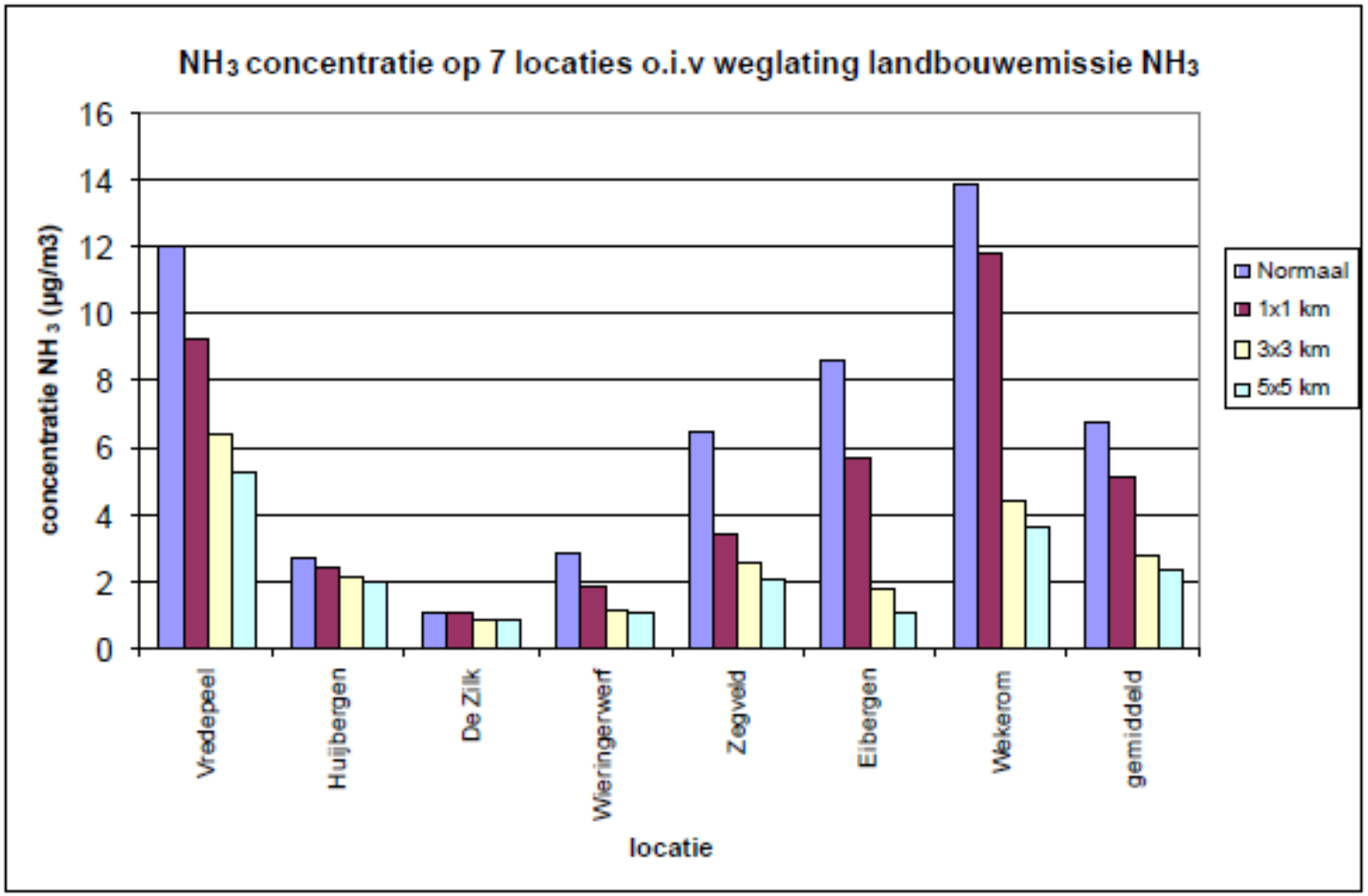
  - before plant growing season (adjust amount of synthetic fertilizer)

  - just after harvest of the crop
- Nutrient budget sheets (all input & output entries)

  - nutrient surplus per unit of area

  - nutrient use efficiency
- Leaching of nitrate (= reactive nitrogen)

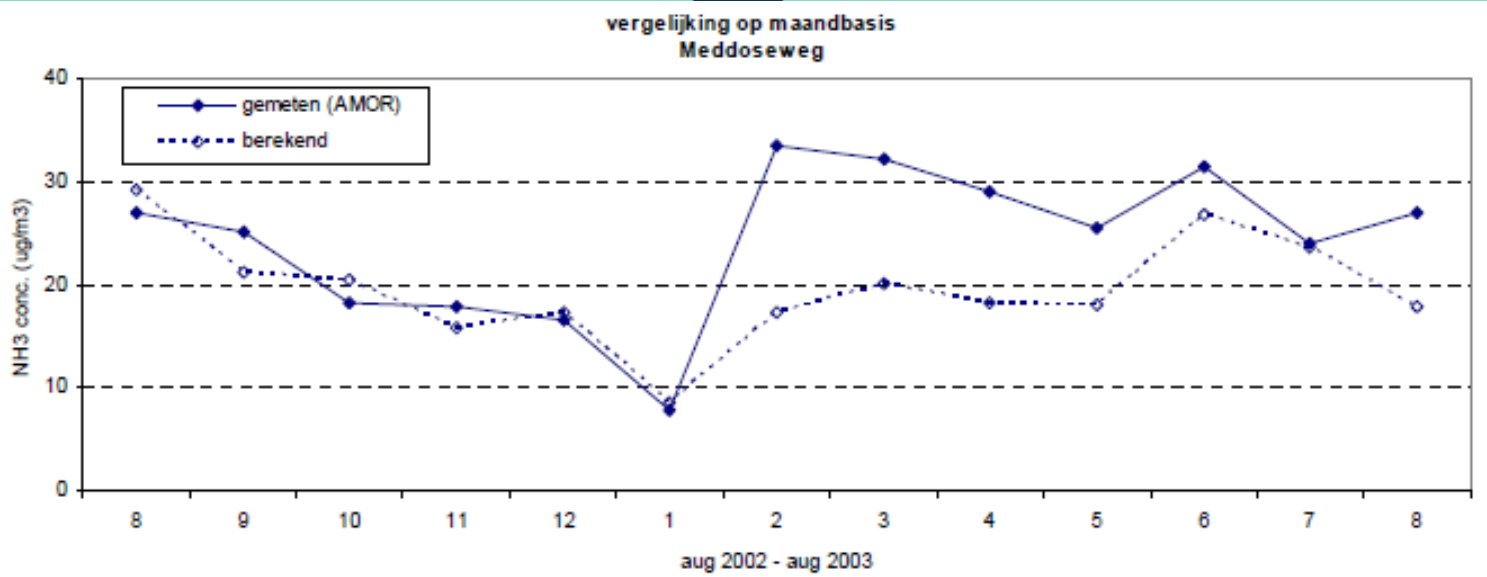
- Atmospheric concentration of ammonia is the resultant of different processes: emission, deposition, conversion and transport
- Ammonia emissions of field sources like application of animal manure and a growing vegetation depend on the atmospheric concentration of ammonia; so cleaner air will enhance these ammonia emissions
- Deposition of ammonia depends on the characteristics of the receiving surface

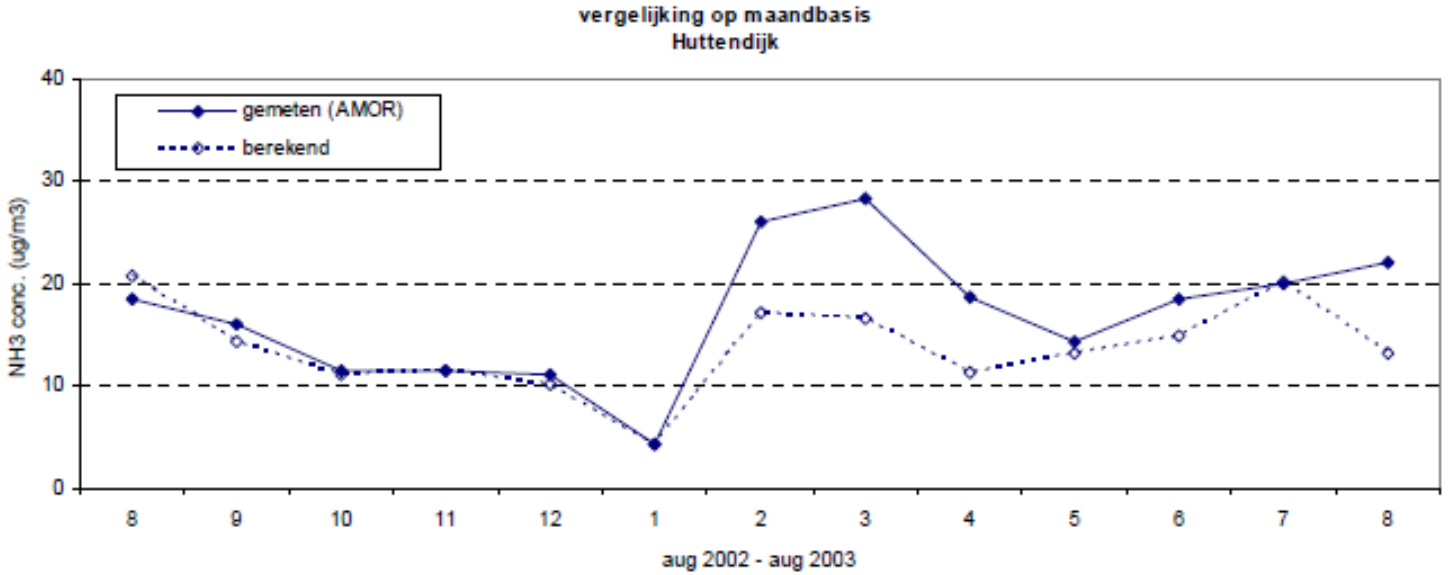


IMAG rapport 2002-03

Local reduction of ammonia emissions = 50%
will not always result in 50% reduction of ammonia concentration

Contribution area	Concentration before	Concentration External sources	Concentration Local sources	Concentration After reduction
25%	10	7.5	1.25	8.75
50%	10	5.0	2.50	7.50
75%	10	2.5	3.75	6.25





RIVM rapport 500.033.002

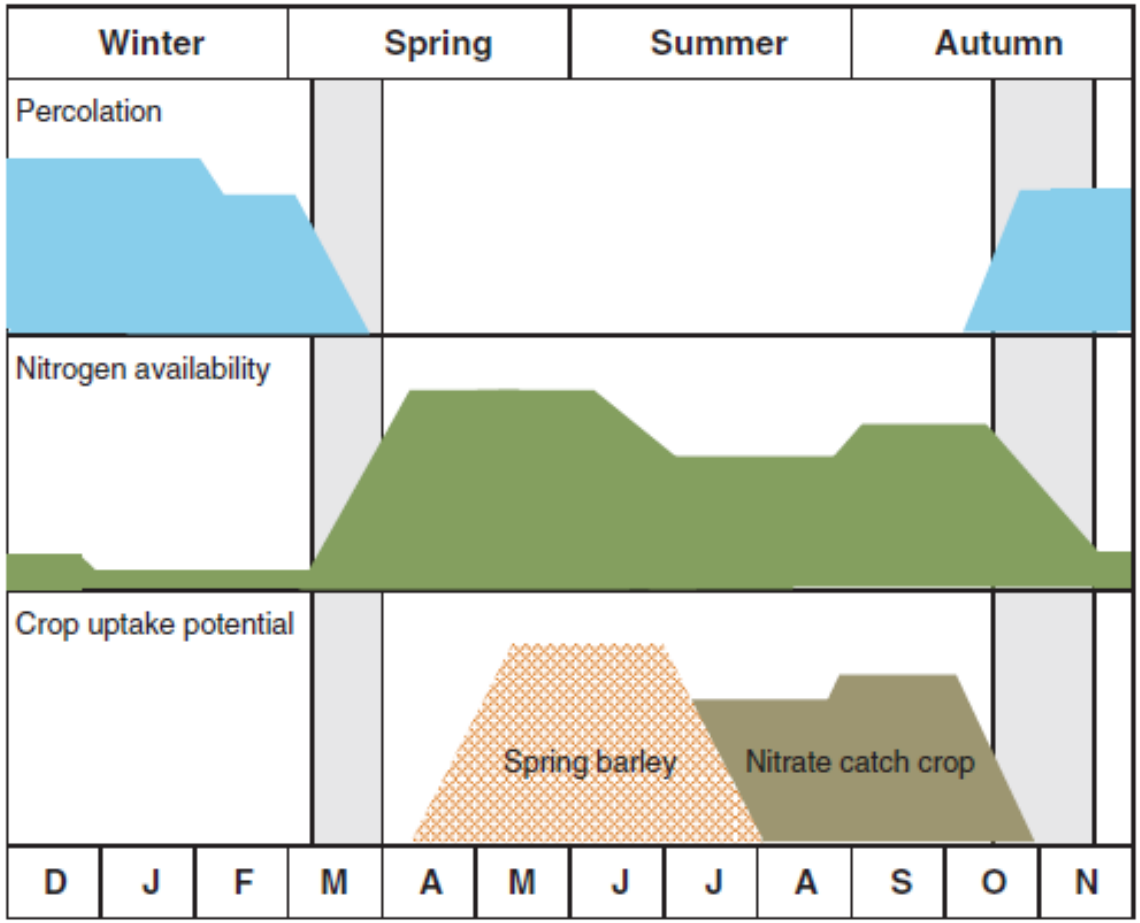


Figure 10.9 The seasonal dynamics of potentials for percolation (NO_3^- leaching loss), availability of mineral nitrogen (mineralisation + external inputs) and crop uptake under typical northwest European climatic conditions. The spring barley crop is under-sown with ryegrass acting as a catch crop. The vertical grey zones indicate periods with increased susceptibility to elevated NO_3^- leaching losses (from Christensen, 2004).

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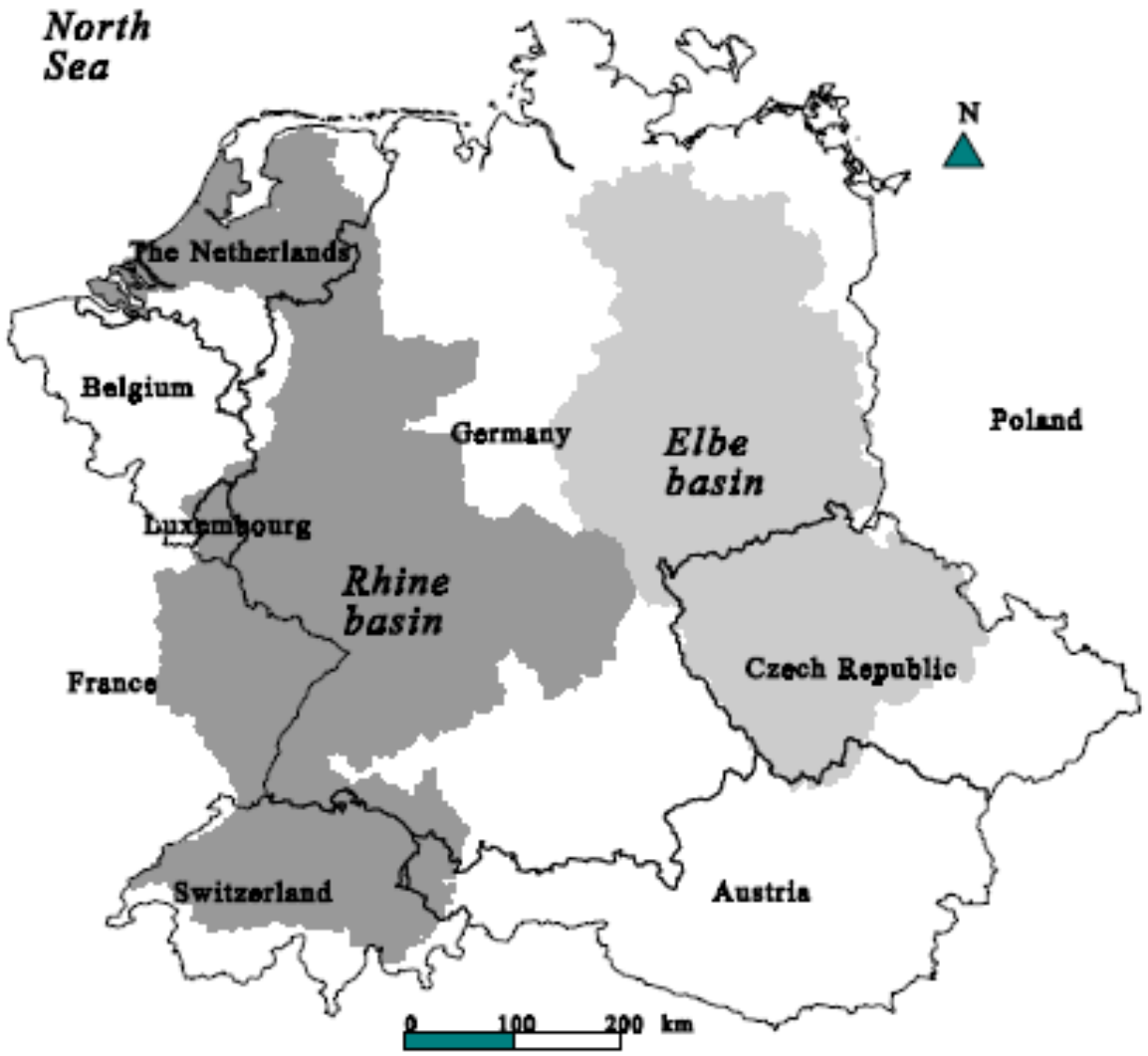

Figure 1. Location of the Rhine and Elbe basins.

De Wit, Hydrol. Process. 15, 743

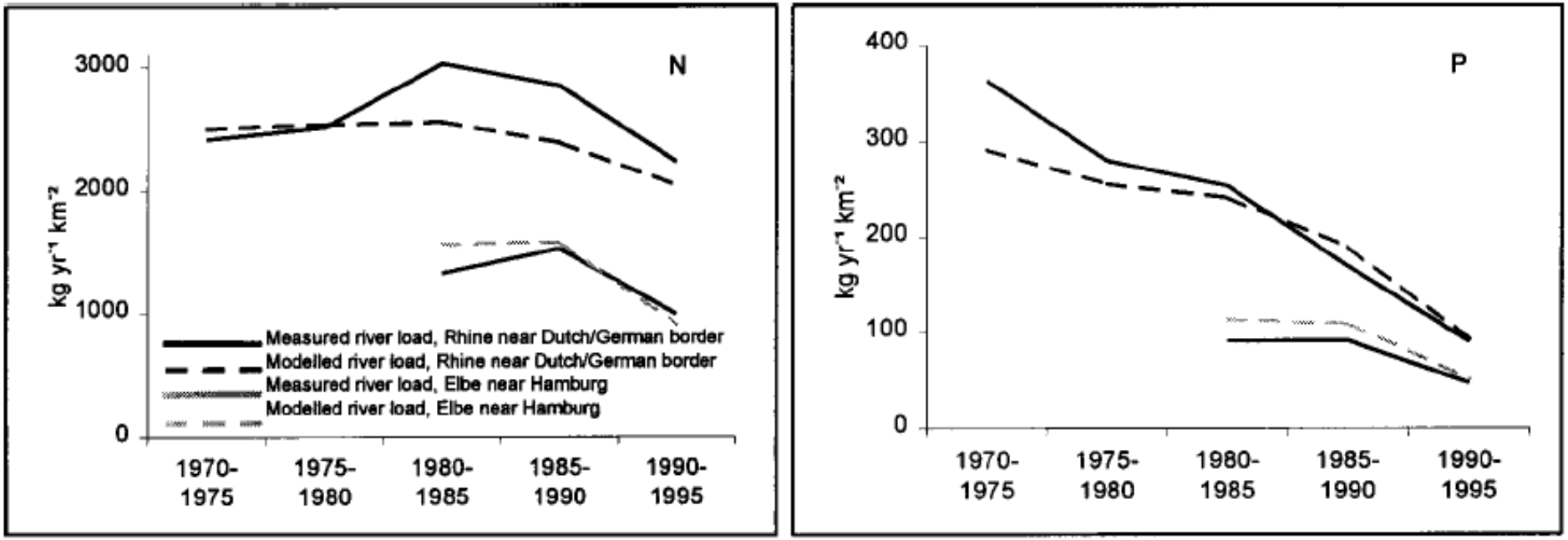

Figure 7. Measured and modelled trends of the area-specific N and P river load

De Wit, Hydrol. Process. 15, 743

Conclusion

There are much more details and drawbacks but the conclusion from these examples is that concentrations of ammonia in the atmosphere, nitrate in water, and mineral nitrogen in soil are useful as indicators for too much nitrogen.