



Understanding and improving
water quality on local catchment
scale: an example of cooperative
monitoring and research by
farmers and a regional water
authority.

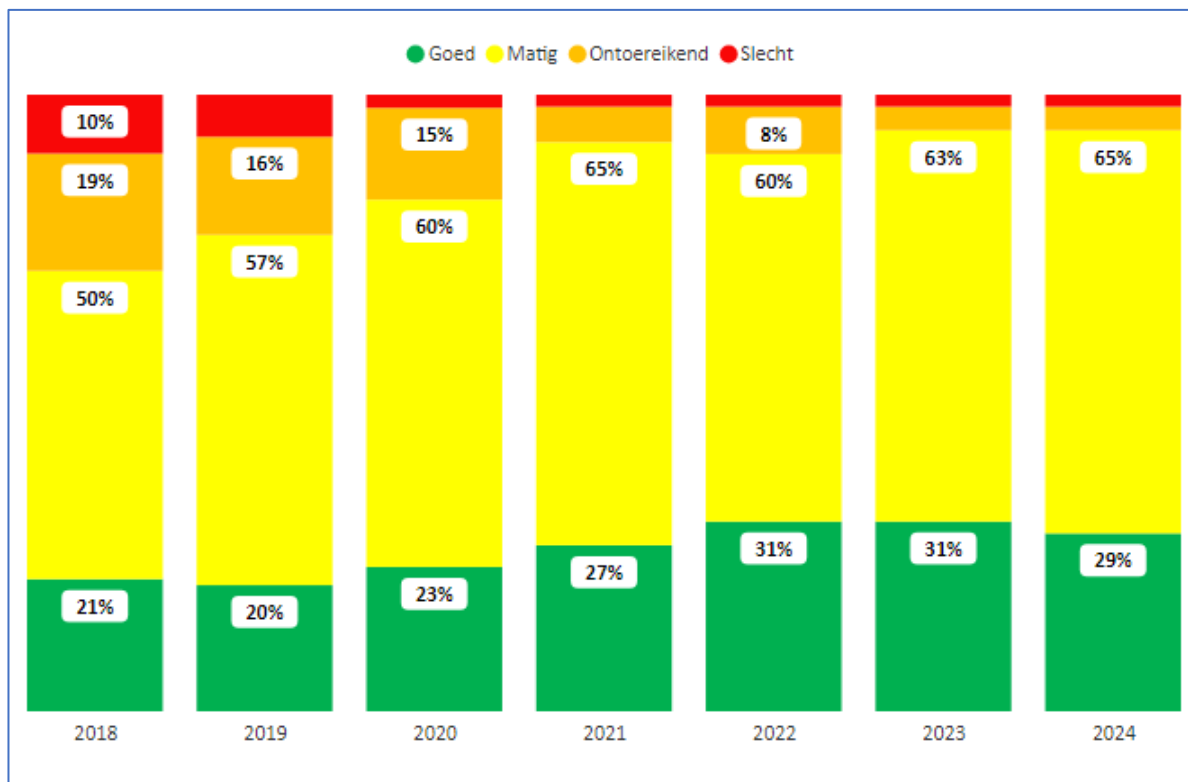
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J. Verstraten (Verstraten Melkvee vof)

LUWQ 2025
Århus, 03-06-2025

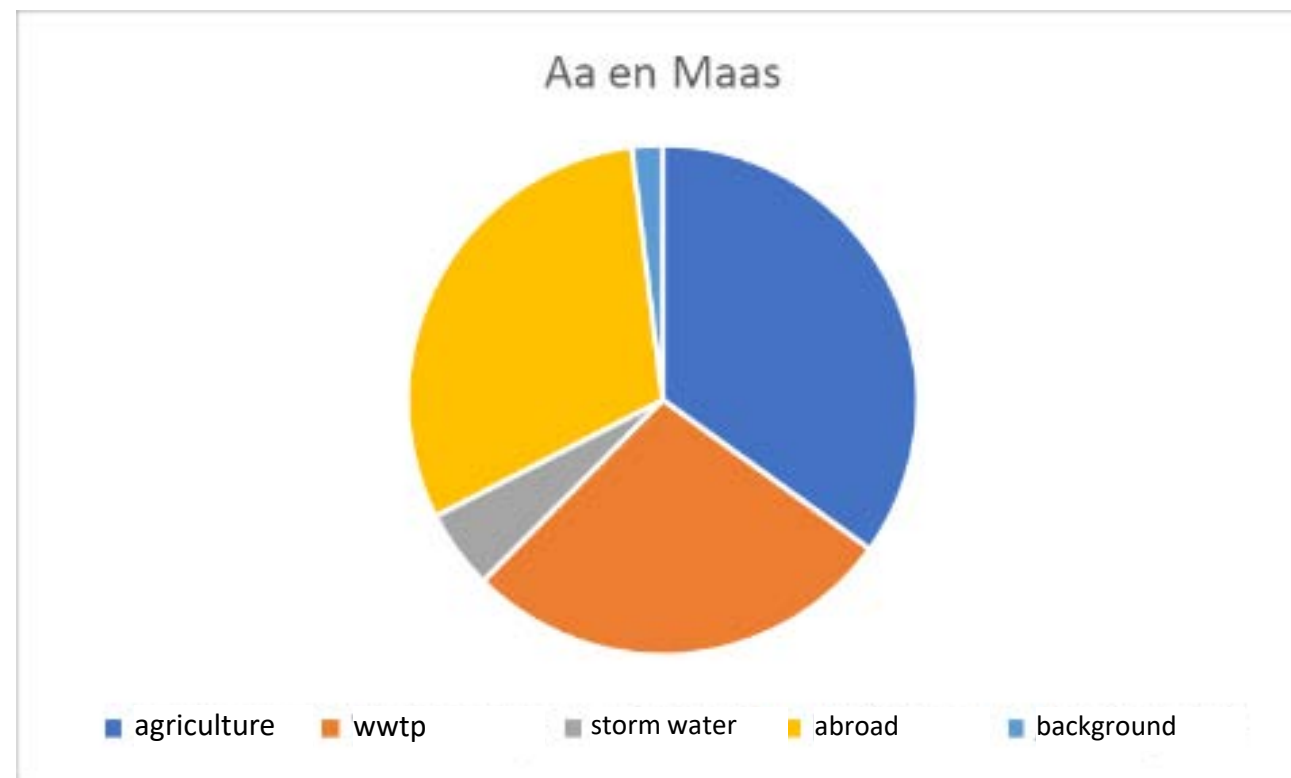
Aa en Maas – (still) not achieving WFD objectives

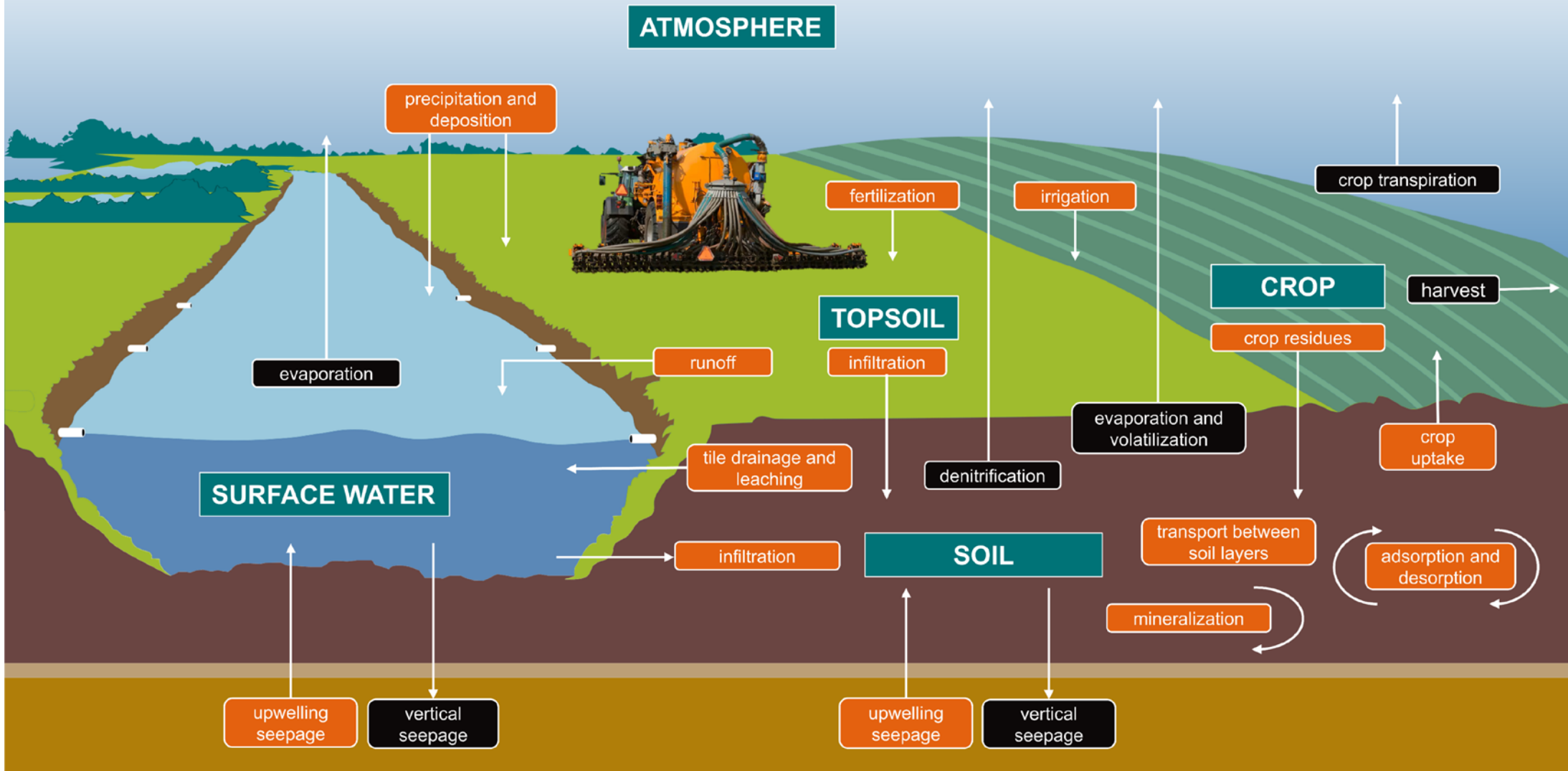


WFD – status for nitrogen

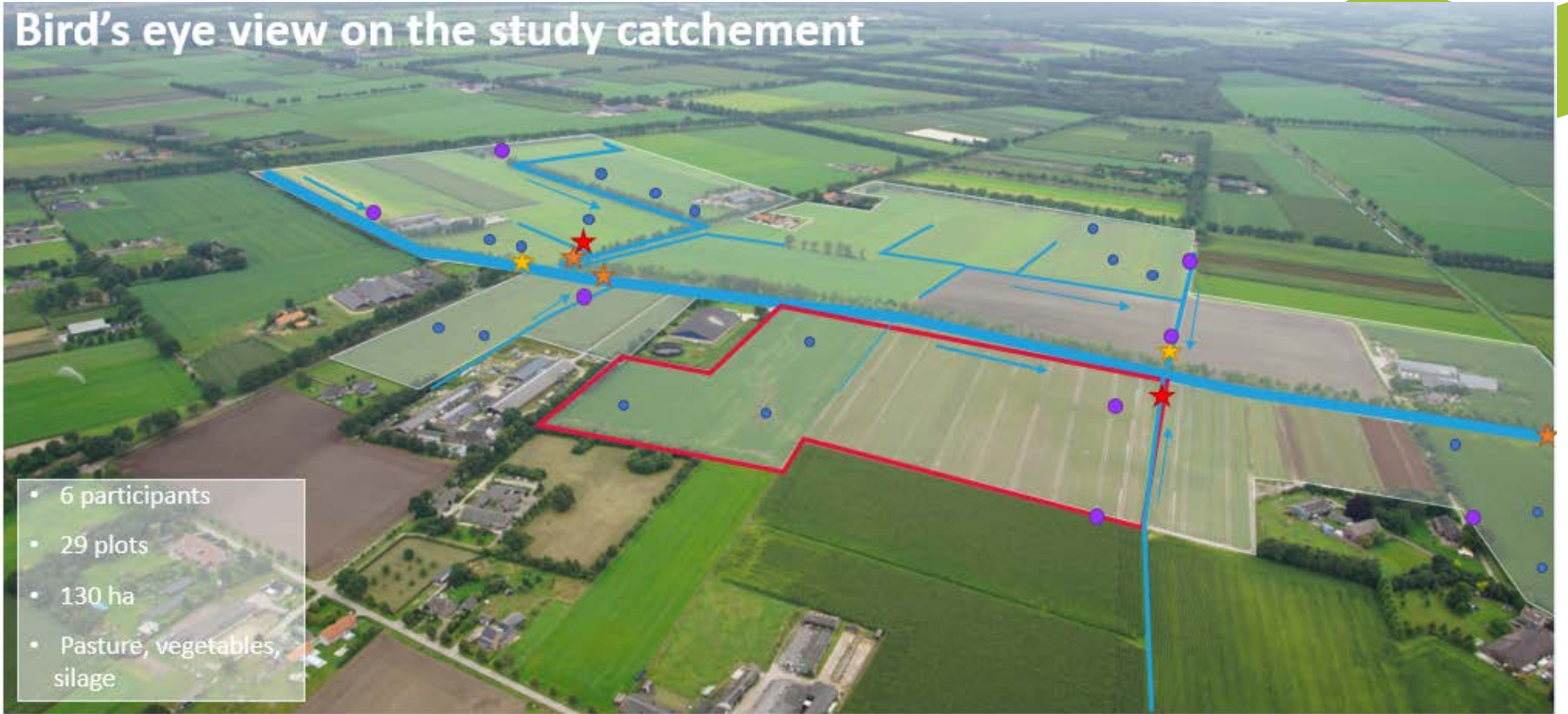


Nitrogen sources – entire catchment





Bird's eye view on the study catchement



★ sensor NO3

★ Sensor in drain

• Soil moisture

Scientific plots

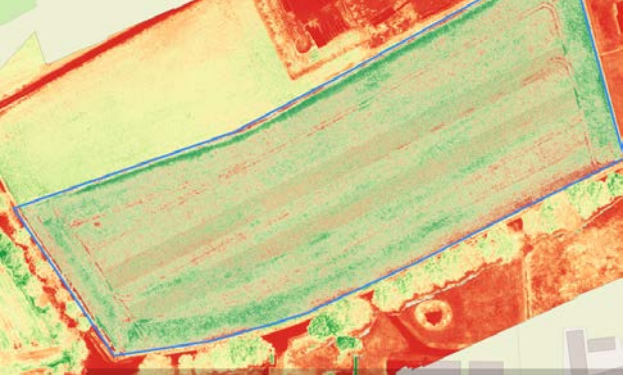
★ Sensor EC, pH, T

• groundwater

Water system with flow direction

Participating plots

Project Overview



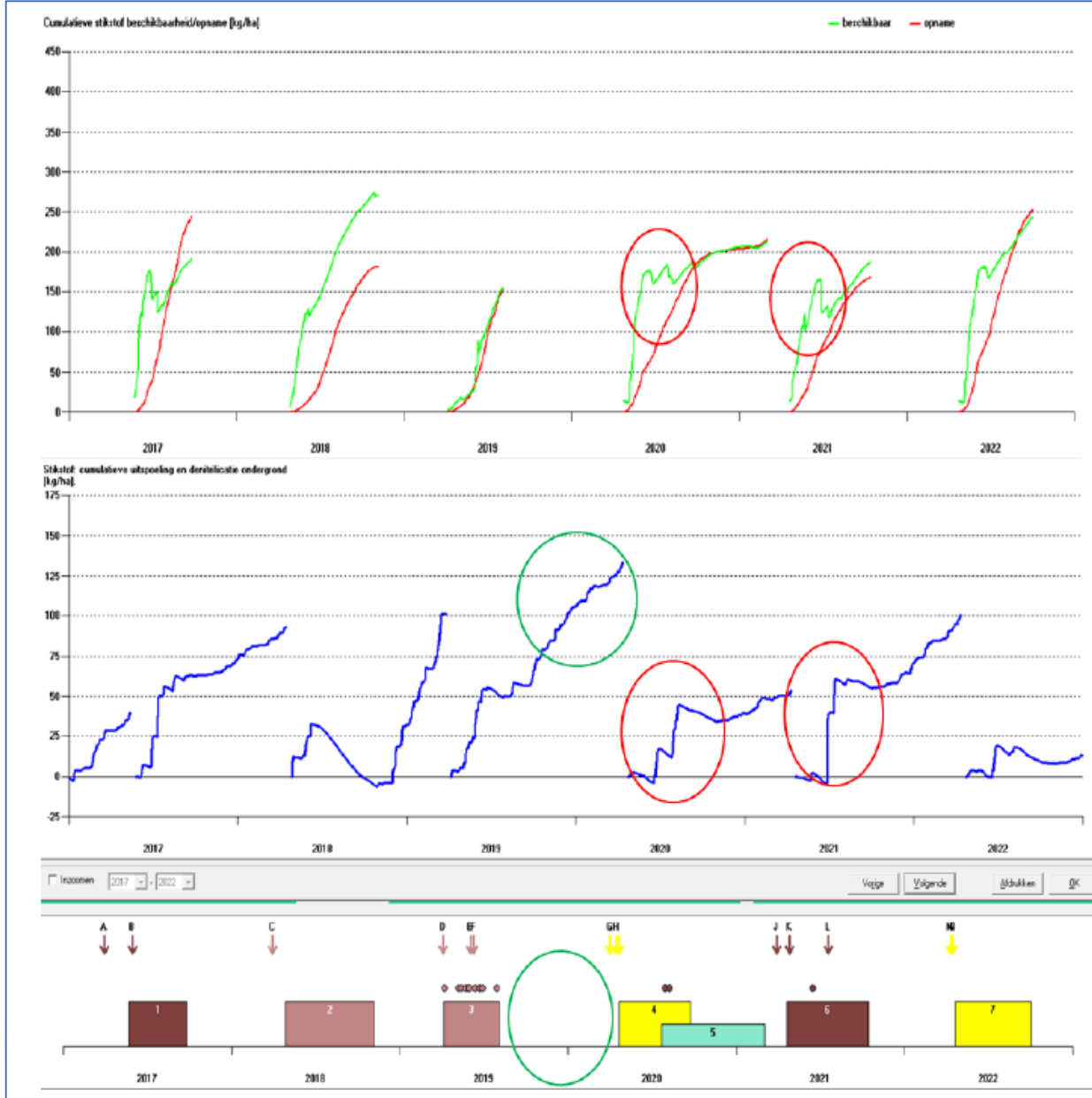
Take Home Messages after 6 years of joint fact finding

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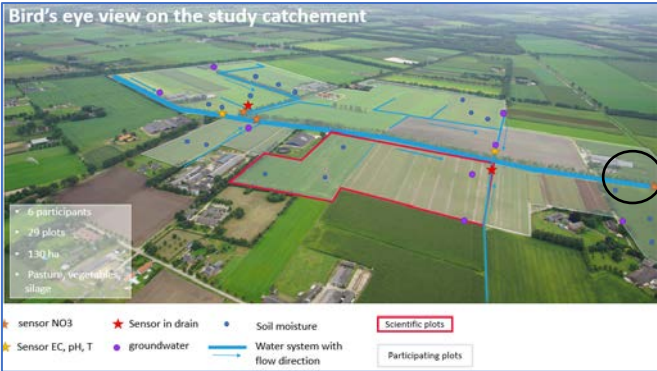
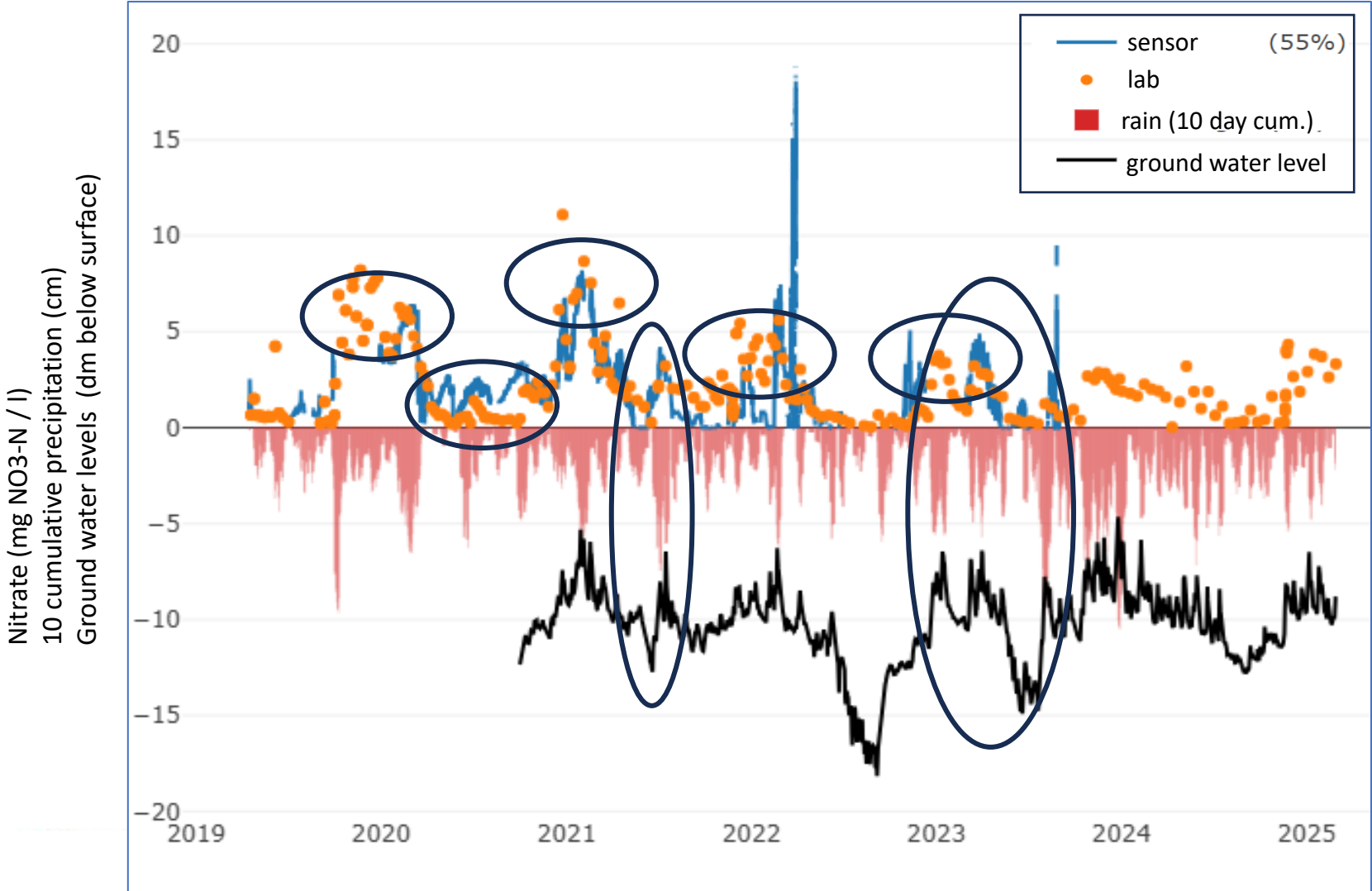
- 1. Match nutrient availability with crop uptake** This reduces risk of N and P losses to the environment
- 2. Delay between soil and water quality** seasonal activities determine nitrogen losses in winter
- 3. Best practices for nutrient loss reduction vary from plot to plot** Water quality in ditches is determined by all plots in the catchment area, however, not all plot contribute equally due to differences in (geo)hydrology, soil conditions, crop choice.

2. Match nutrient availability with crop uptake



- **NDICEA:** nitrogen & carbon planner (<https://ndiceaweb.eu/>)
- N availability (green), crop demand (red) and losses (blue)
- Red circles => moments with risk on nutrient losses: nitrogen is available in the soil, but no crop demand.
- Green circle: no catch crop after corn, more nutrient losses in winter.

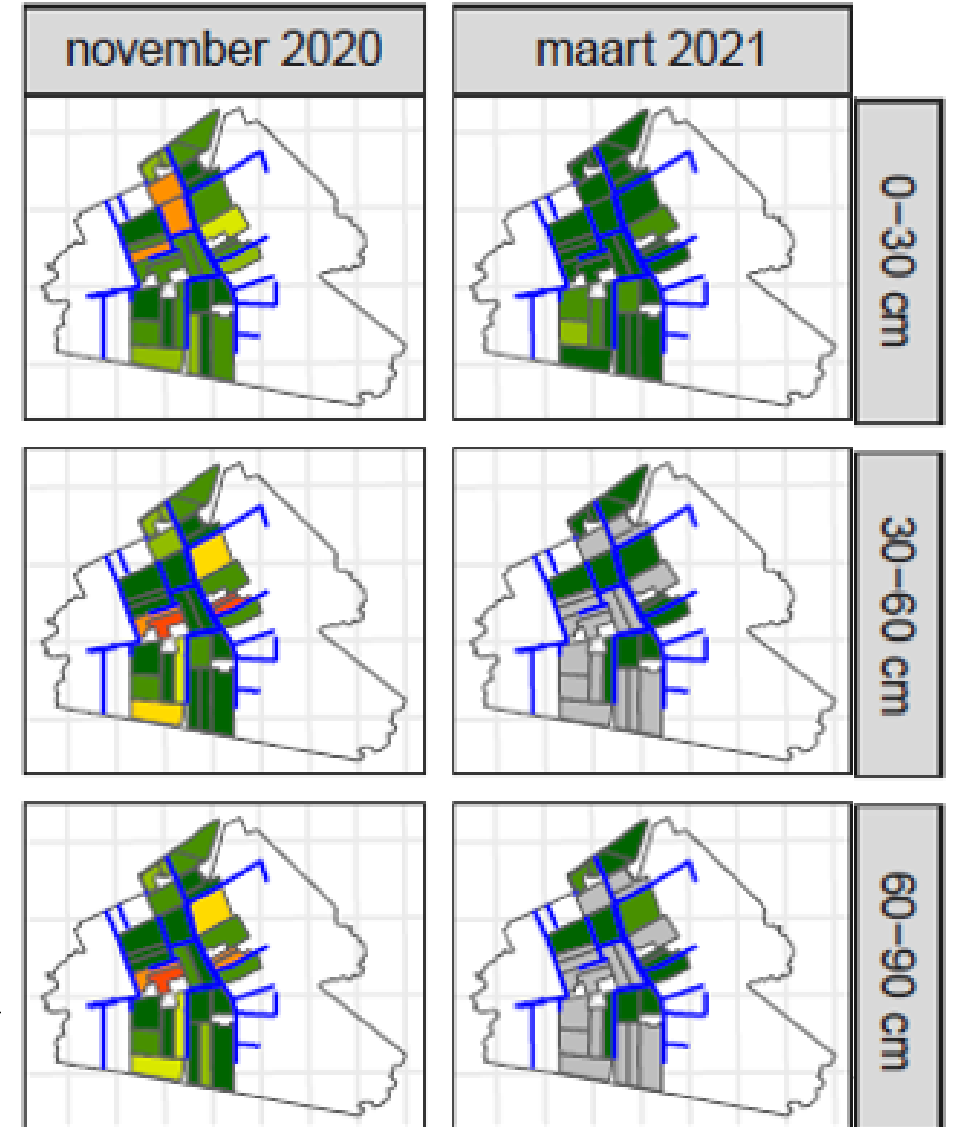
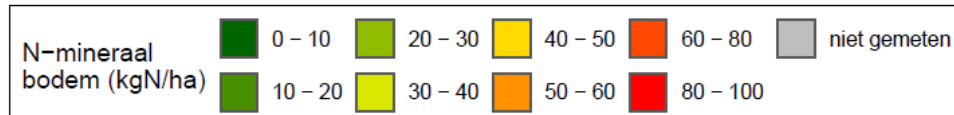
4. Water quality – delayed effects



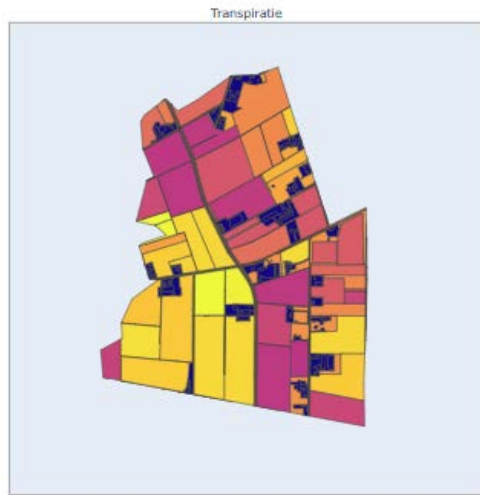
- Summer low, winter high NO3 concentrations
- Dry summer = higher concentrations following winter
- Years with a lot of grass = less leaching
- Ground water level is a good indicator for NO3

N mineral (NO₃ / NH₄) in soil

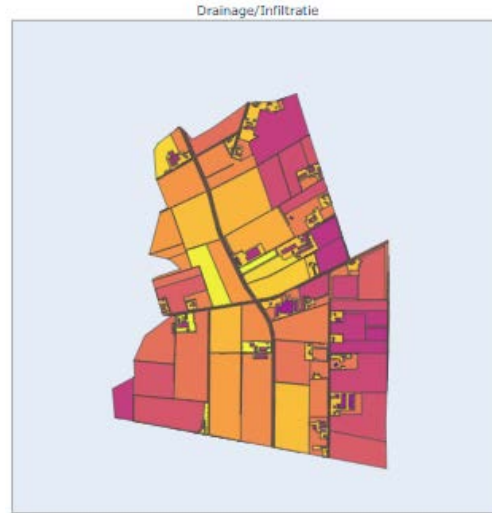
- Indicator for minerals in soil (kg / ha), translates to manure and fertilizer application (also in kg/ha)
- Autumn: often high(er) values (esp. with potatoes / vegetables)
- Early spring: all nitrogen is gone...



6. Best practice is different for each plot



Crop transpiration (mm/y)



Drain (mm/y)



Harvest (kg / ha / y)



N drain (kg/ha/y)

- **VATpy**: simplistic nitrogen balance model to identify farmer specific nitrogen leaching
- Shows variations in plots due to soil, hydrology, crop rotation etc
- Helps to tailor farm measures and activities for individual plots

Some final thoughts



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- **Achieving water quality objectives:** there's a lot that can be done on field level, but that comes with a lot of effort and commitment. This is not a one size fit's all approach.
- **Joint fact finding:** all fields in a catchment influence the water quality of a stream, not those just adjacent, so all should be involved. Joint fact finding also means measuring in water and soil.
- **Can get expensive quickly:** not scalable to our entire catchment area. Should be used in small areas to help changes getting started

Thank you for your attention!



Want to see more? And/or practice your Dutch?

- [Vlog sensorgestuurd boeren - YouTube](#)
- [Sensor Gestuurd Boeren: Meten is Weten - YouTube](#)
- [Sensor gestuurd boeren: afvoergolf](#)
- [Vlog grasproef – YouTube](#)
- [Sturen op bemesting van aardappels voor een betere waterkwaliteit – YouTube](#)
- [Mais: praktijkproef mineralen-efficiëntie van mais – YouTube](#)
- [Mais: praktijkproef maasteelt na het scheuren van grasland - YouTube](#)

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