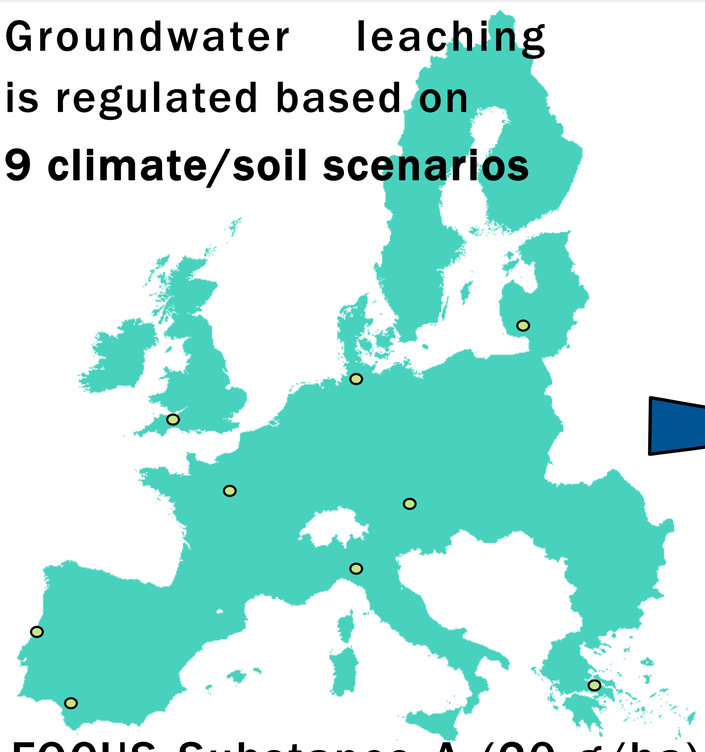
Next generation groundwater mitigation: a proposal for smarter environmental restrictions via spatial modelling

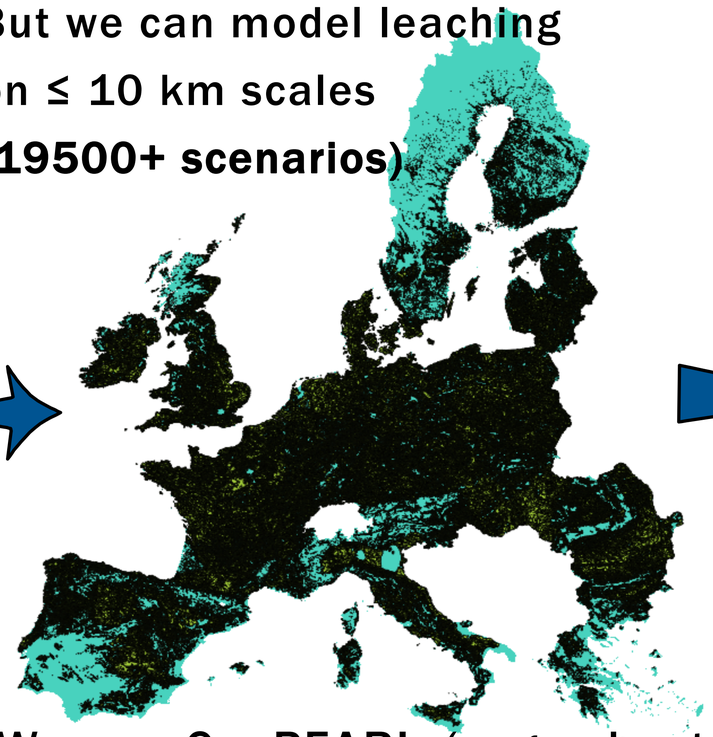
Thomas P.F. Dowling, Geospatial Insight
Sabine Beulke, James Garratt, Enviresearch Ltd.
Contact: sabine.beulke@enviresearch.com

Groundwater leaching is regulated based on **9 climate/soil scenarios**



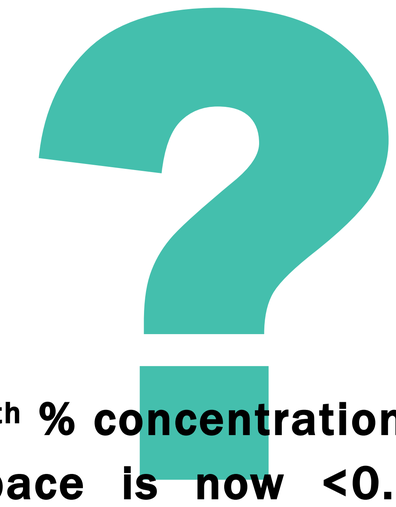
FOCUS Substance A (20 g/ha) fails application to sugarbeet at Tier 1 for scenarios C, H, K and N: **PEC_{GW} 0.2—0.3 µg/L.**

But we can model leaching on ≤ 10 km scales **(19500+ scenarios)**



We ran GeoPEARL (sugar beet 20 g/ha) for the UK:
That's **2000 separate PEC_{GW} values.**

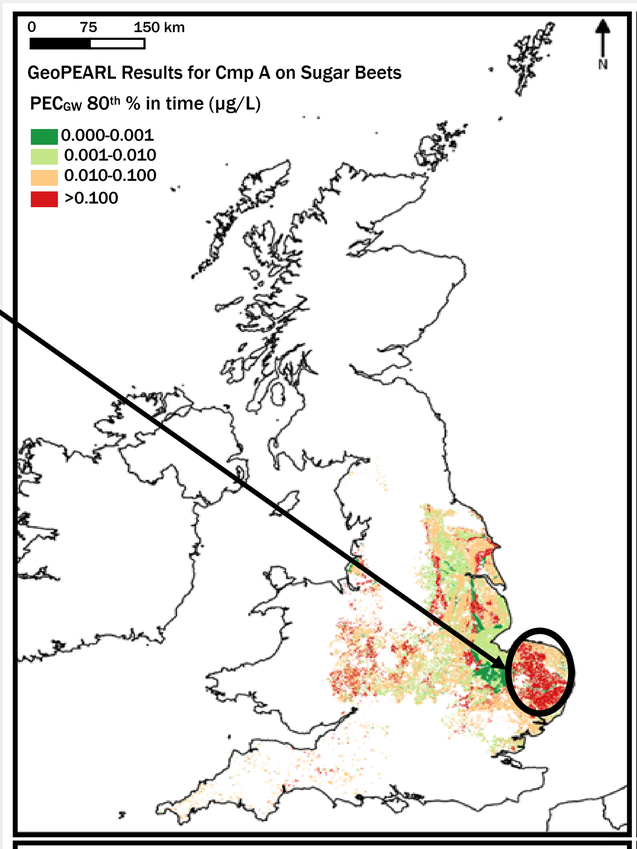
What would PPP Regulations look like at this level of precision?

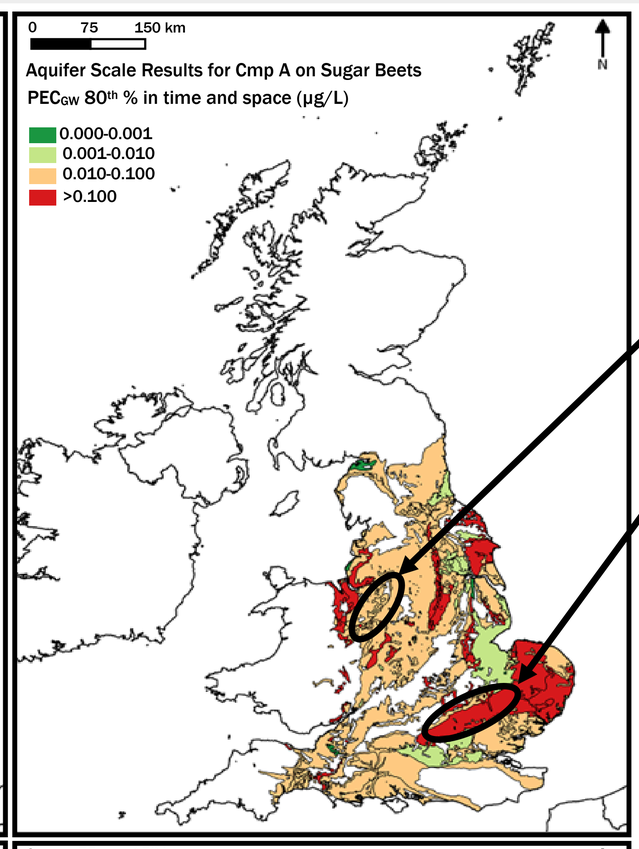


The 80th % concentration in time and space is now <0.1 µg/L. Does that equate to safe use in the UK?

We could use the individual pixels

- 80th % in space of 80th % in time (90th % overall) is <0.1 µg/L; no restrictions even though large areas fail?
- Regulate at farm level to avoid high risk areas
- Enforceable (via GPS)?



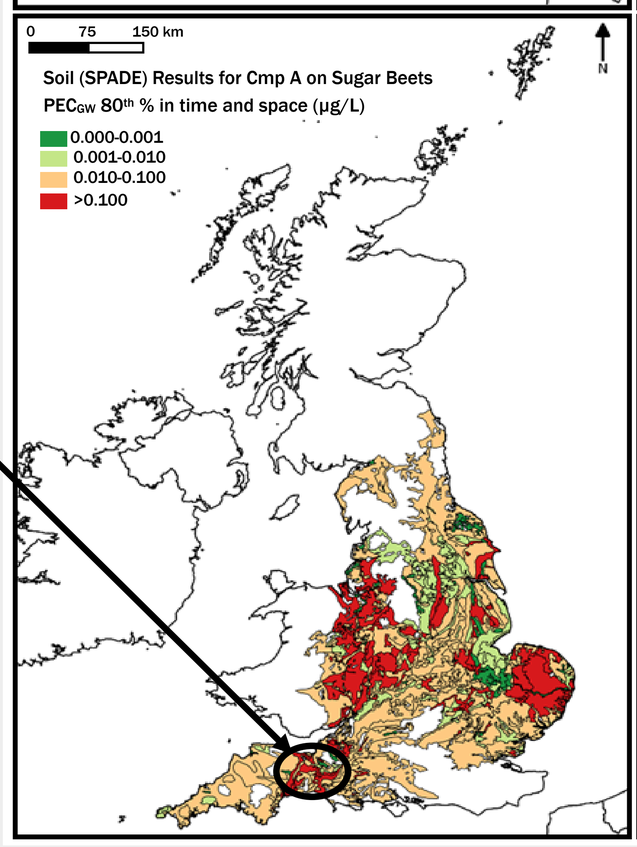


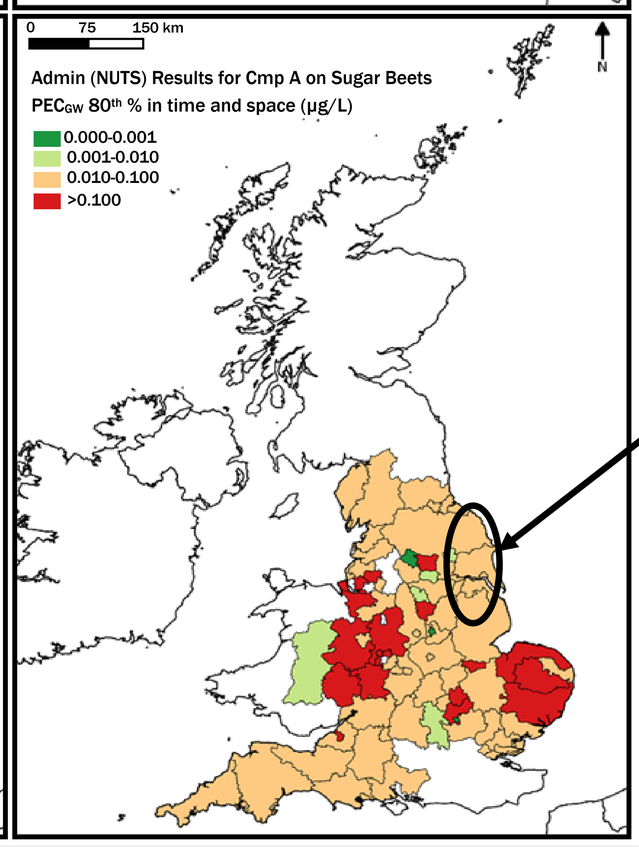
Restrictions based on aquifer re-charge zones

- Allow usage where leaching doesn't contaminate aquifers
- Protect potentially vulnerable aquifers
- Does this meet protection goals?

Restriction based on soil type

- Closely matches pixel results
- Less statistical merging of areas with different environmental behaviours
- EU-wide database
- Enforceable?





Restrictions based on administrative boundaries

- Clear enforcement framework
- Misses vulnerable regions due to clustering of different soil types
- Size bias due to differences in admin areas

Geospatial assessments precisely identify risk areas allowing safe usage to be tailored to local conditions. Migrating PPP restrictions to local scales would safely enhance farmers access to the products they need. But a more adaptable regulatory system is needed to handle the demands of such a dynamic mitigation framework.