

Towards effective policy and innovation to mitigate the impact of legacy soil phosphorus on waterbodies in NW European agriculture

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Need for effective phosphorus (P) policy and innovation

- Many waterbodies in NW Europe have P concentrations > environmental thresholds
- Some in NW Europe have high P contents (legacy)
- Agricultural diffuse P loss is an important contributor, change to reduce



Current approach for reducing agricultural P losses

- Large variation in NW Europe (no general European P directive)
- Mix of legislation and (voluntary) mitigation measures
- Flanders (Belgium), The Netherlands, Republic of Ireland, Northern Ireland: limitation of P fertilisation to 40-115 (FI), 50-100 (NL), 0-286 (RI) and 0-250 (NI) kg P₂O₅ ha⁻¹ y⁻¹ depending on
 - crop type
 - measured soil P content

Current approach for reducing agricultural P losses

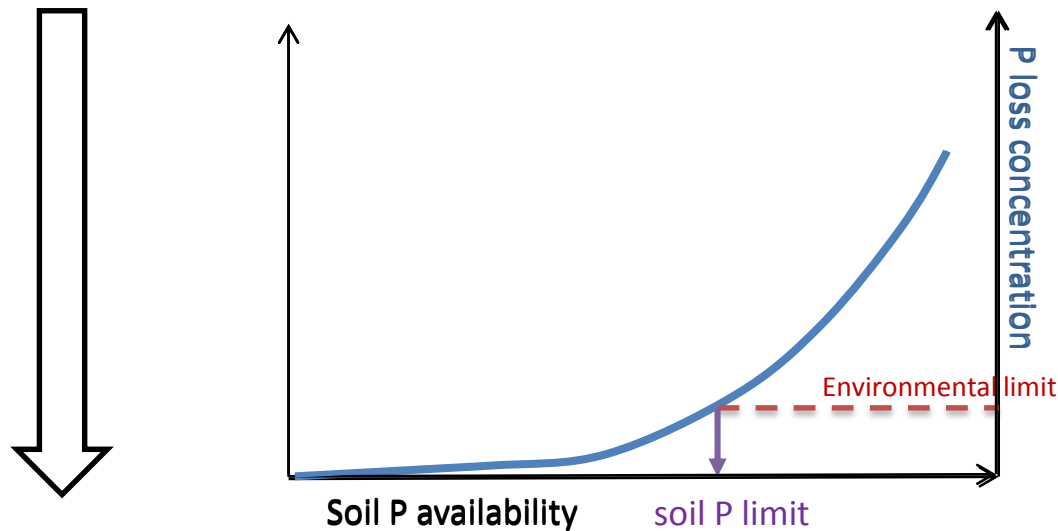
- England & Wales:
 - No direct P legislation
 - Encouraging and facilitating best practice on farms
 - Catchment-specific voluntary action by farmers
- Denmark:
 - Tax on mineral P in feed
 - Expanding or changing farms draining into Natura 2000 areas overloaded with P have restrictions for the manure P surplus (depending upon the P class)

More effective approach

- Legislation for general limitation of fertilisation
- Mitigation measures for specific high P loads

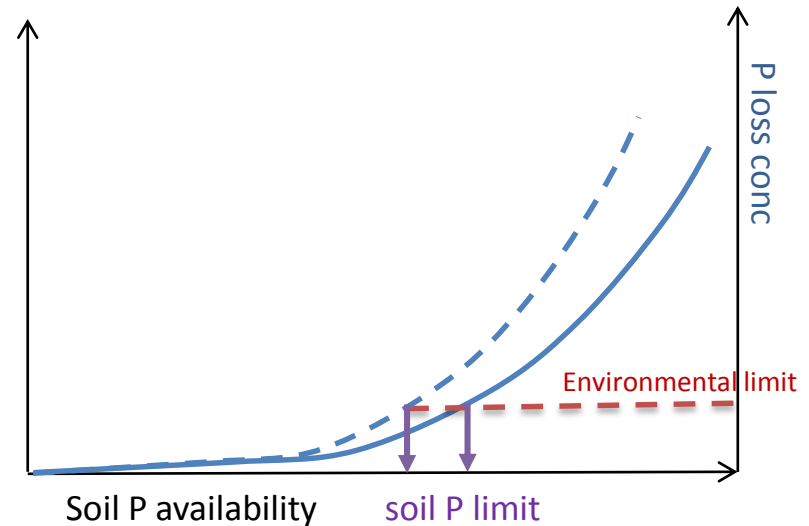
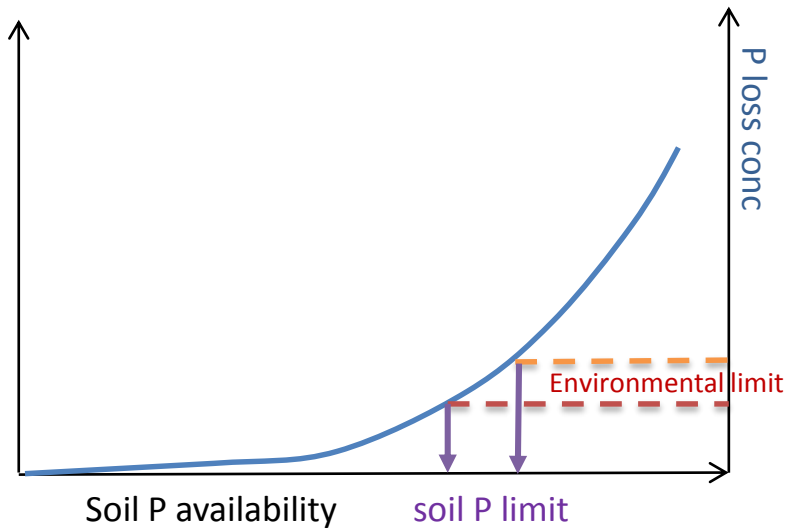
1. More effective legislation: differentiation of P application limits

Maximum acceptable P concentration in a specific water body (ecology, WFD)



Maximum acceptable P content in a soil in the water body catchment

1. More effective legislation: differentiation of P application limits

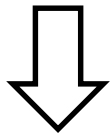


1. More effective legislation: differentiation of P application limits

- Soil P limit can be differentiated to:
 - Catchment
 - Soil type
 - Hydrological connectivity of the soil with the water body (transport)
- Models and P risk index (scoring system) can help to set soil P limits based on P loss estimates

1. More effective legislation: differentiation of P application limits

Maximum acceptable soil P content



Specific P application limits

Measured soil P	Allowed P application
>> soil P limit	<< crop P export
> soil P limit	< crop P export
< soil P limit	> crop P export
<< soil P limit	>> crop P export

1. More effective legislation: differentiation of P application limits

- The more factors (soil type, transport) that are taken into account for setting the soil P limits
 - the better directed and more effective
 - the more complex
- Current soil P limits in Flanders, Ireland, Northern Ireland and the Netherlands are
 - not differentiated
 - based on agricultural needs (not environmental)

2. More effective mitigation measures: directed at high P loads

- High P loads: result of high P concentration or high volumes
 - even low P concentrations can result in high P loads
 - Importance of transport and hydrology!
- This approach is especially needed when transport factors are not taken into account in legislation (P limits)
- Identification of high P loads by mechanistic models or P risk index

2. More effective mitigation measures: directed at high P loads

Choice of mitigation measure:

- Site-specific
- Focusing on most important loss factor (source or transport)
- Focusing on main transport route (e.g. buffer strips)
- Cost-effective (e.g. P 'filtration')
- Input from all stakeholders

Results?

- Ultimate goal: P concentration decrease in water bodies
 - But: not often observed yet
 - Reasons:
 - High soil P reserves >> fertilisation dose and crop P export → very slow soil P decrease
 - Legacy P in buffer strips and river sediment
- => Legislation and mitigation measures should not be evaluated by evolution of water body P concentration during the first 20-30 years

Thank you

