

Brief Highlights of Workshop Discussion

**7th International
Phosphorus Workshop**

9-13 September 2013

Uppsala, Sweden

Themes

- ✓ P mgt. in a changing world
- ✓ Pathways of P transport
- ✓ Monitoring, models, & risk
- ✓ Integrating manure in arable systems
- ✓ Identifying appropriate mitigation
- ✓ Implementing mitigation measures



P mgt. in a changing world

- ✓ Use Accuracy of soil P tests? Are they adequate for current crops and environmental needs?
- ✓ Subsoil P?
- ✓ Need plant genetic / breeding to adapt plants
- ✓ General thought is that climate will increase production in Northern Europe and decrease it in Southern Europe

Transport pathways

- ✓ Past experiences may have biases
- ✓ Still difficult to measure subsurface processes and pathways of transport
- ✓ GIS-based classification of the 'Hydrology of Soil Types' will be useful spatial assessment tool
- ✓ Relevancy of batch experiment to catchments

Transport pathways

- ✓ What are the main pathways in your country
- ✓ Can we make a priori assessment of processes from the literature
- ✓ Given complexity, how can we generalize from single catchment studies

Monitoring, models & risk

- ✓ Long-term monitoring is essential
- ✓ New developments within sensors and tracers can improve monitoring
- ✓ Model uncertainty needs to be communicated
- ✓ Modeling at different scales needed
- ✓ Transparency and engagement with stakeholders is expected

Monitoring, models & risk

Monitoring

- ✓ How do we design monitoring programs for the purpose of monitoring?
- ✓ How do we design cost-effective monitoring?
- ✓ What intensity of monitoring is needed?

Monitoring, models & risk

Modeling

- ✓ What is the value of high data requiring models without the data?
- ✓ Can we model the impacts of measures at a catchment scale?
- ✓ What are the uncertainties in P loss predictions?

Monitoring, models & risk

Communication

- ✓ How do we create common ground between model limitations and stakeholder expectations?
- ✓ Use/misuse of model results and feedback from users to modelers



Manure and cropping systems

- ✓ Developing cost-beneficial manure by-products
- ✓ Algal harvesting
- ✓ No more flushing toilets
- ✓ Manure is not just P
- ✓ Meat tax
- ✓ Drivers may need to be regulatory (e.g. tax)
- ✓ Farmers would need improved guidance

- ✓ Many chemical amendments for manure – cost effectiveness and end-product P availability
- ✓ Treating the soil may be an excuse to avoid dealing with the basic problem
- ✓ Research on types of plants for buffer zones
- ✓ How should buffer zones be best managed

Pre-field

We need both
Local conditions

Edge of the field

- constructed wetland?
- buffer strip
- filters
- Two-stage ditches
- P-ponds / Utilization of drainage channel as treatment wetland
- Site-specific buffer zones
- Adjusting ditch-bank-slopes

Transport of manure

Nutrient extraction

On-field

- Liming / Gypsum addition
- Balanced P fert.
- Pasture/grazing management
- Erosion control
- Grassed waterway
- Reducing slope length by modifying field size
- Crop rotation
- Crop breeding - P mining
- Soil health management (soil tillage)

Location of the countermeasure

Multiple functions/effects

General vs. site-specific
→ Defining criteria

P form

Legislation/taxes

How do we address legacy-P?

Recipient restoration?



Implementation of mitigation

- ✓ More comparative studies on policies in different countries and how it works
- ✓ A certification system of conservation measures is needed - US has practice standards
- ✓ Simple P mass balancing might be useful
- ✓ Some pollution can't be avoided; i.e., storm event?
- ✓ Is it fair to treat farmers differently from each other? Is it fair for taxpayers to subsidize farmers?























































































































































