Development of cost effective nitrogen management strategies: Scenario evaluation with the DSS FyrisCOST

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• **Goal.** The aim of the FyrisCOST project is to support the development of cost effective management programs for the agricultural sector which reduce nutrient loads to lakes, watercourses and the sea by relating the cost of management measures to their environmental effects.

Catchment Science 2011, Dublin
FyrisCOST integrates existing information into a single presentation platform based on catchments, sub-catchments, fields (blocks)

- Hydrological modelling: FyrisNP
- Nutrient loss modelling:
  - SOILNDB (N)
  - ICECREAM DB (P)
  - Includes crop rotations, WWTP and septic systems

- Costs and program scenarios
• What will be available in the model?
  – Relational database I: effects of measures related to specific parameters
  – Relational database II: cost of measures related to specific parameters
  – Characterization of parameters for specific catchments: with and without measures (baseline) or with combinations of measures (programs)
Drivers and Users

• Policy drivers: WFD and BSAP
  – Environmental goals
  – Cost effectiveness/proportionality?

• Stakeholders
  – Farmers
  – Authorities (Board of Agriculture, Water Authorities, EPA, county agencies,…)
  – Policymakers (Department of Agriculture, national politicians, EU politicians)

Catchment Science 2011, Dublin
FyrisCOST

Loggbok

Datum: 9/9/2011
Kommentarer:
Measures in the Lower Lagan River

• Three N abatement measures financed through the EU Rural Development Program
• Catch crops w/fall plowing (900 SEK/ha)
• Catch crops w/spring plowing (1500 SEK/ha)
• Spring plowing only (500 SEK ha)
Measures in the Lower Lagan River

- **Scenario 1: Baseline**
  - Modelled distribution based on PLC 5 data

- **Scenario 2: Cost efficient reduction**
  - How much less would it cost if there were a cost efficient distribution of measures

- **Scenario 3: Budget efficient reduction**
  - How much reduction could be paid for with the same budget and efficient distribution of measures
<table>
<thead>
<tr>
<th>Scenario</th>
<th>N red (tons)</th>
<th>Total cost (£ ’000)</th>
<th>Av cost (£/kg)</th>
<th>Δ in red (tons)</th>
<th>Δ in red (%)</th>
<th>Δ in costs (£ ’000)</th>
<th>Δ in costs (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>34,5</td>
<td>168,8</td>
<td></td>
<td>4,9</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Scenario 2</td>
<td>34,5</td>
<td>136,9</td>
<td>3,9</td>
<td>31,9</td>
<td>-19%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario 3</td>
<td>42,2</td>
<td>168,8</td>
<td>4,0</td>
<td>7,7</td>
<td>+20%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Scenario 2: Catch crops w/fall plowing in sub-catchments 8,6,12
Scenario 3: As in Scenario 2 but includes subcatchments 5 13
Participation in Program Measures

• Uptake by farmers
• Swedish Board of Agriculture survey (Emmerman et al 2010)
  – 2000 farmers that grew catch crops in 2006 but did not apply for compensation in 2009
  – 500 farmers (25%) still farming chose not to apply
  – 70% of those farmers (350) replied that the subsidy was too low
Cost effective measures: The ideal

• “the most cost effective measures are those designed to attain specific environmental performance goals”

• “targeted on those farmers best able to address environmental problems”

• “leaving farmers flexibility to meet the goals.”

Cost effective measures: The reality

- ”Targeting based on political criteria will reduce cost-effectiveness if it results in a different but sub-optimal allocation of resources, and it may limit desired environmental outcomes when public expenditures are essential but limited.”

  – Guidelines for Cost-effective Agri-environmental Measures (OECD, 2010), p. 19
What do we need?

• Policies that increase cost efficiency and make it possible to get greater reductions for the same budget
  – Targeted measures
  – Differentiated payments (reverse auctions)
• Larger budgets
  – Financed by taxpayers
  – Financed by discharge sources (permits, article on crop permits forthcoming in JAWRA)
• More information
• Other ways for reducing losses
  – New measures
    Less agricultural land (in sensitive areas)
Roadblocks

• EU RDP agri-environmental program restrictions
  – Compensation limited to income losses
  – Measures can’t be funded from multiple sources
• Limits in scientific knowledge
  – Too little investment in research
• Public opinion
  – Special interests
• ”Much research has been driven by efforts to save jet fuel. Having more than doubled in price in recent years, it now accounts for about half of airlines’ operating costs. Even slight gains in efficiency pay off….”

— Changes in the air (The Economist Sep 3-9, 2011)
Thank you for your attention!