Spatial targeting of catchment management interventions to improve drinking water quality using the CaRPoW framework

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Presentation Contents

1. The need for spatial targeting
2. Consultation with catchment management professionals
3. The CaRPoW framework
4. The River Ugie catchment
5. Results and discussion
6. Conclusions
Spatial Targeting?

- Catchment management increasingly adopted
- Scottish Water Sustainable Land Management (SLM)
- Catchments inherently heterogeneous
- Multiple pollutant issues
- Investment must be effective
Defining a Criteria

A criteria for a new framework was developed with input from...

... to benchmark what the industry requires
The CaRPoW Framework

\[
\text{Catchment Risk}_A = \]

Field/Land Unit Scale
- Potential Pollutant Load (Application Amount/Soil Value)
- Catchment Condition

Pollutant A

In Field Mobilisation

Source

Sub-Catchment/Catchment Scale
- Topographical Flow Pathway
- Landscape Barrier and Enhancement Features

Delivery

Water Body

Trusted to serve Scotland
The CaRPoW Framework

Pollutant A
- Field/Land Unit Scale
  - Potential Pollutant Load (Application Amount/Soil Value)
  - Catchment Condition
  - Source
  - In Field Mobilisation
- Sub-Catchment/Catchment Scale
  - Topographical Flow Pathway
  - Landscape Barrier and Enhancement Features
  - Delivery/Pathway Identification
  - Water Body

Pollutant B
- Field/Land Unit Scale
  - Potential Pollutant Load (Application Amount/Soil Value)
  - Catchment Condition
  - Source
  - In Field Mobilisation
- Sub-Catchment/Catchment Scale
  - Topographical Flow Pathway
  - Landscape Barrier and Enhancement Features
  - Delivery/Pathway Identification
  - Water Body

= Catchment Risk

Scottish Water
Trusted to serve Scotland
Example Output - Metaldehyde
## Best fit linear regression relationships between modelled and observed loads in the River Ugie (2012-2013)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Best Fit ($R^2$)</th>
<th>Significant (P &lt; 0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2, 4-D</td>
<td>0.5</td>
<td>Yes</td>
</tr>
<tr>
<td>Chlorotoluron</td>
<td>0.81</td>
<td>Yes</td>
</tr>
<tr>
<td>CMPP</td>
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<td>MCPA</td>
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<tr>
<td>Metaldehyde</td>
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<tr>
<td>Metazachlor</td>
<td>0.85</td>
<td>Yes</td>
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<tr>
<td>Nitrate</td>
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<td>Yes</td>
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<tr>
<td>Soluble Phosphorus</td>
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<td>Particulate Phosphorus</td>
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<tr>
<td>Sediment</td>
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</tr>
</tbody>
</table>
Shared Risks
Measure Selection – Metaldehyde and Chlorotoluron

(a) Shared high risk areas, (b) Source potential, (c) Mobilisation potential and (d) Connectivity potential
Conclusions

• Spatial targeting for catchment management required
• New framework needed to do this
• CaRPoW framework defines and compares risks of multiple pollutants
• Applied successfully to the River Ugie
• Next phase is to assess potential cost savings
Thank You
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