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Comparison of European substance flow analyses (SFA) of phosphorus

Experiences regarding data quality and uncertainties
• Comparative analysis of seven European SFAs
  • Austria (Egle et al. 2014)
  • Germany (Gethke-Albinus 2012)
  • Sweden (Linderholm et al. 2012)
  • Netherlands (Smit et al. 2010)
  • France (Senthilkumar et al. 2012, 2014)
  • UK (Cooper & Carliell-Marquet 2013)
  • Switzerland (Binder et al. 2009)

• Focus of this presentation not on actual results but on the following two questions:
  • (i) how did the authors of the SFAs deal with data uncertainties?
  • (ii) where did data on mass flows, P concentrations and P flows used in the SFAs come from?
Data uncertainty has been considered very differently in the SFAs analysed:

<table>
<thead>
<tr>
<th>Country</th>
<th>Uncertainty analysis</th>
<th>Integration of uncertainties into calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>France</td>
<td>Cross-checking of data</td>
<td>No</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Descriptive approach</td>
<td>No</td>
</tr>
<tr>
<td>Austria</td>
<td>Hedbrandt &amp; Sörme (2001)</td>
<td>Uncertainty intervals for every flow</td>
</tr>
<tr>
<td>Sweden</td>
<td>Hedbrandt &amp; Sörme (2001)</td>
<td>Uncertainty intervals for total P surplus of system</td>
</tr>
<tr>
<td>UK</td>
<td>Combination of cross-checking and Hedbrandt &amp; Sörme (2001)</td>
<td>Uncertainty intervals for every flow</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Classification of data and validation of flows with high uncertainties</td>
<td>Uncertainty intervals for every flow (absolute and relative)</td>
</tr>
</tbody>
</table>
• Analysis of uncertainties and its integration in calculations of SFA/MFAs is receiving attention, however approaches (mainly based on classification of data) were applied differently
• Researchers’ task to provide more standardized methods/approaches in order to reduce the subjective character of uncertainty assessments and increase comparability between SFAs (see e.g. Laner et al. 2014)
Where did data come from?

Example: P in wastewater effluent

- Switzerland: own collection of data
- Austria: Ministry of Agriculture, Forestry, Environment and Water Management 2003, 2010
- Germany: Behrendt et al. 2003
- UK: UK Water Industry Research 2010
- White & Hammond 2006
- France: Balance calculations
- Ministry of Ecology, Sustainable Development and Energy
- Netherlands: Ministry of Agriculture
- Sweden: Statistics Sweden 2010
• Different data sources hamper the comparability of SFA results

• Centralized databases and standards for P-related data needed (for which mass flows, P flows and P content?)

• Comprehensive data monitoring as a basis for P flow monitoring (P flow monitoring tools could facilitate annual updates of (national) SFAs; example: P-MonitoringTool 1.0 developed by Binder et al. 2009 for the Swiss Federal Office of the Environment FOEN)


