The Aquarius approach on mitigation of phosphorus losses

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Farmers as water managers under changing climatic conditions

With the aim to reach Good Ecological Status under maintained farming conditions and production

The Interreg IVB North Sea Region Programme
Main conclusions

• General regulations and voluntary support schemes are not sufficient to mitigate phosphorus losses
  Because: Phosphorus losses from arable land in Sweden can vary from 0.02 - 2 kg ha\(^{-1}\) yr\(^{-1}\)

• A measure program must be locally adapted to be cost-effective

• A water management plan on farm level is needed
River Smedjeån – pilot catchment
River Smedjeån catchment

Water bodies and present Ecological status

[Map showing ecological status with different colors indicating high, good, moderate, poor, bad, and HMW statuses.]

[Map inset showing the location of Smedjeån Basin within Sweden, Denmark, and Germany.]
Net-anthropogenic P-load: 2550 kg/year (60% from agriculture)
Variation in transports of P from different agricultural soil types in Sweden (10-year means)

(The Swedish Environmental Monitoring programme)
These natural and man made conditions lead us to the following strategy:

- Adaptation of agricultural practices in a tight cooperation with the farmers
- Focus on P-losses from erosion sensitive areas
- Increase of the P-retention capacity in soils and through constructed wetlands
- Combat flooding of arable land by increased storage capacity in the upland and by reserving areas for controlled flooding
The Ordinance on environmental concern in agriculture and the Swedish Regulation on Environmental Considerations in Agriculture gives the obligations for all farmers.

Swedish policy instruments

Swedish financial support schemes and subsidies to mitigate phosphorus losses

- Perennial ley farming
- Construction of wetlands and ponds
- Catch crops
- Buffer zones
Water management plans on individual farm level

Present conditions:

High animal density has increased the light soluble phosphorus concentration of the soils

As a mean value the phosphorus application exceeds the official recommendations by 11 kg P per ha and year

Decrease of P-fertilization is needed
Water management plans on individual farm level

Present conditions:

Surplus of added N, P, K at individual farms compared to recommendations from the Swedish Board of Agriculture

- N
- P
- K

kg/ha

1 2 3 4 5 6 7 8 9 10
**Constructed wetlands in River Smedjeån catchment**

**Edenberga wetland**

<table>
<thead>
<tr>
<th>P mean concentrations (μg/l) over one year of flow proportional sampling</th>
<th>In</th>
<th>Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edenberga wetland</td>
<td>31.4</td>
<td>14.4</td>
</tr>
<tr>
<td>Tot-P</td>
<td>5.7</td>
<td>5.1</td>
</tr>
<tr>
<td>PO-P</td>
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</tbody>
</table>
Buffer strips of standardized width is not a cost efficient measure to stop erosion of P to streams and ditches
Risk of erosion - classification

- High risk
- Average risk
- Low risk
- No risk
- Lake
- Stream
Coming up…

Tuning at the individual farm of agricultural practices, wetlands buffer zones

Water management plan on farm level that improves water quality through land management and at the same time optimizing production

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Next step…

Water management plans on farm level with a cost effective combination of measures including

- tuning of agricultural practices
- catch/cover crops during winter season
- construction of wetlands
- buffer zones
Thanks for listening!

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