Testing the efficacy of on-farm pollution mitigation measures in agricultural catchments of the Hampshire Avon DTC.

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The Location

Hampshire Avon
1700 km²
Upper catchment mainly rural
75% of this land is agricultural
Arable and dairy farms
River Sem sub-catchment
Greensands and clay soils
Dairy farming

Dairy farming
### The Problem: Agriculture

<table>
<thead>
<tr>
<th>Agricultural Activity</th>
<th>Effect</th>
<th>Consequence</th>
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<tbody>
<tr>
<td>Increased stocking density</td>
<td>Soil compaction</td>
<td>Enhanced water runoff</td>
</tr>
<tr>
<td>Heavy machinery</td>
<td>Soil compaction</td>
<td>Enhanced water runoff</td>
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<tr>
<td>Yearly round cultivation and vertical</td>
<td></td>
<td>Soil loss to rivers</td>
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<td>fertiliser and slurry</td>
<td></td>
<td>Presence of vulnerable weather</td>
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<td>Increased transportation of nutrients to rivers</td>
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<td>Degraded infrastructure</td>
<td>Impervious surfaces with badly maintained storage.</td>
<td>Direct transportation of sediment and nutrients to rivers.</td>
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Mitigation: Farm Infrastructure Repair

High volumes of sediment and nutrients transported along track to river

Sourced from fields and the farmyard as well as the eroding the track itself
Mitigation: Farm Infrastructure Repair

Resurfaced the track with a culvert alongside to catch runoff.

Culvert carries runoff through a tunnel and into a pond.

Pond acts as a sediment sink before reaching the ditch in high flow.
Mitigation: Farm Infrastructure Repair
Bed Disturbance Experiments: Stored Bed Sediment
Method by Lambert & Walling (1988)

Time-integrated Sediment Traps: Suspended Sediment
Method by Phillips et al. (2000)

Both methods are affordable, replicable and sustainable.

“Farmer Self-Monitoring”

Gives a representative sample of all the sediment in suspension for the time period it is left in situ.

Incorporates storm events and does not require constant attention
Bed Storage Sediment

Track resurfacing and settling system

![Graph showing Bed Sediment (g/m³) and Discharge m³/s over months from January 2013 to February 2015. The graph includes data for both upstream (u/s) and downstream (d/s) Bridge, as well as Discharge.]
Total Phosphorus concentration in trapped suspended sediment of the River Sem.
Testing Effectiveness: Sampling Methods

Dustpan Sampler: Collecting Farmtrack Runoff
Testing Effectiveness: Sampling Methods

Water Quality: Colorimeter
Affordable, simple and quick
Shows changes in water quality with distance from the farm track
Measures: nitrate, nitrite, phosphates and ammonia.

Water Quality: Multi-parameter Probe
Affordable, simple and quick
Gives an instantaneous indication of water health
Measures: temperature, pH, DO, ORP, TDS and EC
Water Quality of Settling System

Phosphate concentrations during low flow and high flow

Higher flow

Lower flow
Water Quality of Settling System

Total Phosphorus (mg kg⁻¹)

- Dec-12
- Apr-15

Ditch Cores
Summary

Results are based on a particular site, with a particular land use, geology, topography and climate.

Focus here is on monitoring methods for mitigation measures.

It is important to know that the mitigation measures are effective at reducing agricultural pollution.

Evident changes to the river since mitigation, but further analysis may show that other factors have contributed to these improvements.
Thank you

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