Filter socks to mitigate runoff, soil and phosphorus losses under current and extreme rainfall events

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Date: 5th April 2017

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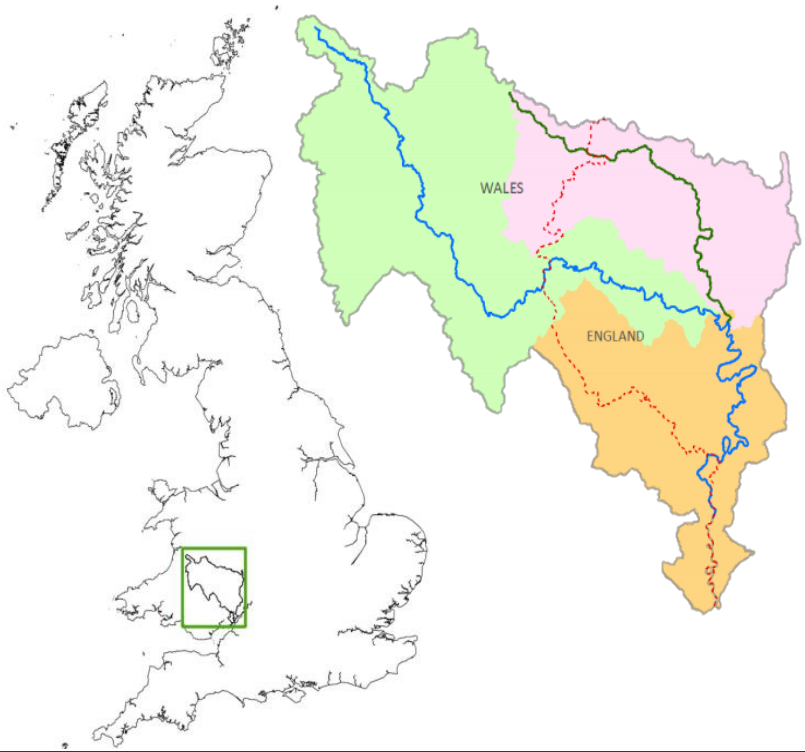
The bigger picture

83% of rivers failing WFD targets

70% sediments

60% nitrates

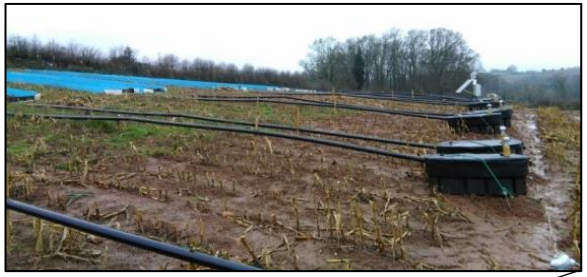
25% phosphates



River Wye catchment

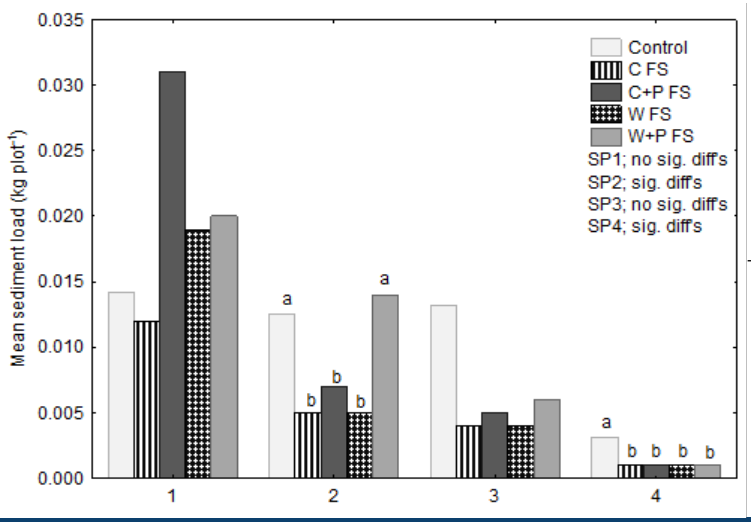
Targets
Phosphate; 0.05 mg P l^{-1}
Sediment; 0.10 mg l^{-1}

Phase 1



Measurables:
- Runoff volume
- Sediment load and concentration
- Nutrient concentrations (phosphate, nitrates)
- Precipitation and humidity

Treatments:
- Control (no filter sock)
- Compost filter sock
- Woodchip filter sock
- Compost + 'Nutriloxx' filter sock
- Woodchip + 'Nutriloxx' filter sock



Phase 2 materials:
- Kaolin
- Fullers Earth
- Calcium-rich ochre
- Iron-rich ochre
- Nutriloxx

Phase 2 and 3

Results summary

- Ochre treatments had P-removal efficiencies of between 35 and 99%.
- Calcium-rich ochre results consistently 63 - 99% P removal efficiency.
- Ochre treatments able to cope with high P-concentrations associated with leachate from woodchip columns of >50 mg P l^{-1}.
- Calcium-rich ochre met the water quality target (0.05 mg P l^{-1}).

Phosphate solution (low, medium or high concentration)

2 flushes of the same phosphate solution

Phosphate in leachate

Phase 3

Both ochre's and Nutriloxx used as FS fill media. FS tested under rainfall simulation (Cranfield Soil Management Facility).

- Range of rainfall intensities and durations.
- Range of FS fill media.
- Highly erodible soils and 27% slope.

Funding opportunities

1. **The long term efficiency and efficacy of filter socks and ochre:**
   - under repeated rainfall-runoff events
   - repeated flushes of PO_4^{3-}
   - When does saturation of the ochre occur?

2. **The impact of vegetation on the long-term efficacy of filter socks and ochre:**
   - Can efficiency of the ochre be enhanced through the addition of plants, for phytostabilisation uptake and mineralisation of PO_4^{3-}?
   - What plant and seeding rates are most effective?

3. **Manipulation of the ochre to increase efficiency:**
   - Can calcite be added to ochre to increase its sorbing efficiency?
   - How much calcite needs adding to increase the efficiency?

Thank you for your attention