



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

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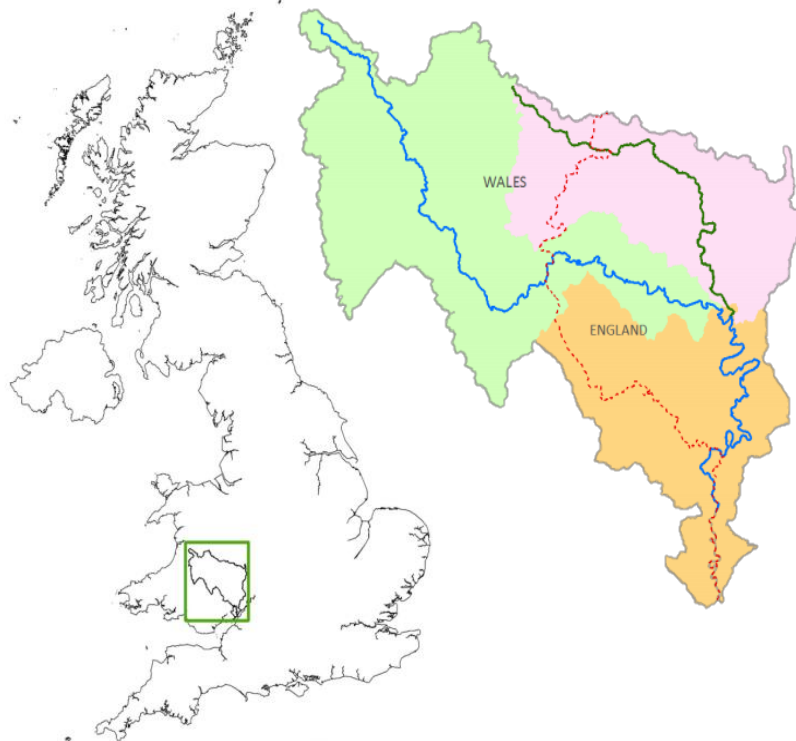
The bigger picture

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

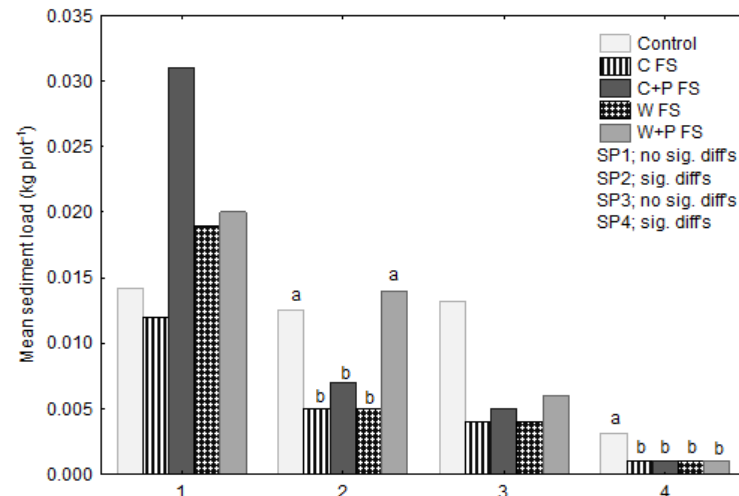


Measurables:

- 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 $>50 \text{ mg P l}^{-1}$.
- Calcium-rich ochre met the water quality target (0.05 mg P l^{-1}).



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