

Field Wetlands Reduce Diffuse Pollution from Agricultural Land

Field Wetlands as Mitigation Options

Field wetlands are small constructed wetlands located in unproductive areas of agricultural land. They have been designed to trap sediment and nutrients from runoff pathways including surface runoff, field drains, and ditches. As agriculture is an important contributor to diffuse pollution, trapping sediment and associated phosphorus and nitrogen on farmland is essential to improve water quality and help the UK meet the requirements of the EU Water Framework Directive.

Effectiveness

Research undertaken between 2008 and 2012 from ten trial field wetlands located on farms in Leicestershire and Cumbria has shown that field wetlands are very effective at trapping eroded sediment. Up to 26 tonnes of sediment were stored in field wetlands annually, equating to the following sediment trapping rates:

- Clay sites: 0.01 – 0.07 tonnes ha⁻¹ yr⁻¹
- Silty sites: 0.02 – 0.4 tonnes ha⁻¹ yr⁻¹
- Sandy sites: > 0.5 tonnes ha⁻¹ yr⁻¹

Nutrients transported with sediment in runoff were retained in sediment in the field wetlands at the following rates:

- Total phosphorus: 0.01 – 1 kg TP ha⁻¹ yr⁻¹
- Total nitrogen: 0.02 – 2 kg TN ha⁻¹ yr⁻¹

Data from one intensively monitored wetland collected daily over nine months also shows water quality in runoff through the wetlands improved considerably, with the following effects found in measured nutrients:

- Total phosphorus: 60% reduction in mean concentration, from 3 mg l⁻¹ to 1 mg l⁻¹.
- Total nitrogen: 35% reduction in mean concentration, from 14 mg l⁻¹ to 9 mg l⁻¹.



Field wetland intercepting surface runoff during a rainfall event at Crake Trees Manor, Cumbria. This wetland also traps sediment from a field drain which flows all year round.

Provisional Costs and Likely Uptake

Field wetlands are easy and cheap to construct using on-farm machinery or by bringing in contractors. Field wetlands used in this trial cost between £280 and £3100, depending on sizes and designs. Shallow (0.5 m) designs which only receive surface runoff are cheapest, while deep (1.5 m) field wetlands, and those which receive drain, ditch or stream inputs, are more expensive. Construction costs are also higher for wetter soils. On-going maintenance and farm-scale costs are likely to be minimal, but further information on these factors will be available at the end of the project. Focus groups with stakeholders are also underway to consider the practicalities of using field wetlands as mitigation options for reducing diffuse pollution from agricultural land.

Further Information

The MOPS2 project continues until March 2013. This research is funded by the UK Department for Environment, Food and Rural Affairs (Defra) under contract WQ0127. To find out more about the MOPS projects, or if you have comments or queries, please view our website: mops2.diffusepollution.info or email us at: mops@lancaster.ac.uk.