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Trapping carbon in small ponds and wetlands

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There is no doubt that carbon (C) is on the move. Recent estimates have suggested that the global sediment flux in agricultural landscapes due to water and tillage erosion is 35±10 Pg C y-1. Some of this C is oxidised and lost to the atmosphere, other material may be deposited and burried in colluvium and some may be delivered through both surface and subsurface flow paths to surface waters. In many agricultural landscapes these surface waters may take the form of small ponds and wetlands (field wetlands). In this paper we explore the potential of field wetlands to trap particulate C and influence the fate of dissolved organic carbon within the context of a small agricultural catchments in England. Since 2008 the mitigation options for phosphorus and sediment project (MOPS) has established ten monitored field wetlands across three catchments in the UK at Crake Trees, Cumbria (silt soils, rainfall 1500 mm y-1), Whinton Hill Cumbria (sandy soils, rainfall 1200 mm y-1), Newton Rigg, Cumbria (Silt soils, rainfall c1200 mm y-1) and Loddington, Leicestershire (Clay soils, rainfall 650 mm y-1). Although originally designed to capture sediment and phosphorus, their potential for influencing catchment scale C dynamics is becoming apparent. The C contents of sediments from the three catchments are typically in the range of 1.8 – 3.0% at Crake Trees Catchment, 2.5 to 9% at Whinton Hill and 2.0 to 3.1 % at Crake Trees. At the high rainfall sites the wetlands trap upwards of 20 t y-1 of sediment equating to several hundred kilograms of C. There is also some evidence that the ponds and wetlands may influence DOC, with DOC concentrations falling from approximately 35 mg l-1 to 15 mg l-1 at the Whinton Hill site as water passes through a series of field wetlands. In this paper we will present data from the last two years of monitoring and consider the wider implications for C sequestration by ponds and wetlands in agricultural landscapes.