



A Catchment Systems Engineering (CSE) approach to managing intensively farmed land

Jennine Jonczyk (1), Paul Quinn (1), Nicholas Barber (2), Mark Wilkinson (3), and Greg O'Donnell (1)

(1) CEGs, Newcastle University, Newcastle upon tyne, United Kingdom (jennine.jonczyk@ncl.ac.uk), (2) Geography, Durham University, Durham, United Kingdom (n.j.barber@durham.ac.uk), (3) JHI, Aberdeen, United Kingdom (Mark.wilkinson@hutton.ac.uk)

Rural land management practices can have a significant impact on the hydrological and nutrient dynamics within a catchment which can dramatically alter the way it processes water, exacerbating nutrient losses from the system. A collaborative and holistic approach for managing potential conflicts between land management activity for food production alongside the aspiration to achieve good water quality and the need to make space for water can ensure the long-term sustainability of our agricultural catchments.

Catchment System Engineering (CSE) is an interventionist approach to altering the catchment scale runoff regime through the manipulation of hydrological flow pathways throughout the catchment. By targeting hydrological flow pathways at source, such as overland flow, field drain and ditch function, a significant component of the runoff generation can be managed, greatly reducing erosive soil losses. Coupled with management of farm nutrients at source many runoff attenuation features or measures can be co-located to achieve benefits for water quality.

Examples of community-led mitigation measures using the CSE approach will be presented from two catchments in Northumberland, Northern England, that demonstrate the generic framework for identification of multipurpose features that slow, store and filter runoff at strategic locations in the landscape. Measures include within-field barriers, edge of field traps and within-field sediment filters and sediment traps which demonstrate how sediment can be trapped locally (including silt and clay fractions) and be recovered for use back on the land.

Deliverables from this CSE approach includes the reduction of downstream flood risk and capturing of sediment and associated nutrients. The CSE approach allows for a more natural flood and nutrient management approach which helps to restore vital catchment functions to re-establish a healthy catchment system.