

Demonstration Test Catchments (DTC) Project

Activity Report

January-March 2011

Demonstration Test Catchments

Overall DTC Project

Summary - The DTC project has been picking up momentum over the past 6 months. Setting up 3 outdoor laboratories from scratch is neither easy nor quick; negotiations with the local farming and landowner communities, agreeing access, getting planning permission and negotiating research rights takes time. However, most monitoring kit is now in place, functioning well and baseline data is being collected. In the individual DTC Consortia work continues on three fronts: 1) monitoring and the continued characterisation of sub-catchments; 2) detailed discussions with farmers about what measures are feasible/acceptable, and; 3) development of local communities of practice. At national level, three of the five components have been competitively tendered and let, and attention is now being paid to meld these cohesively together. Specifications for the remaining two components, which will be tendered/let in the coming financial year, are being developed. The promotion of DTC continues as we seek to develop strong and strategic links with other partners in order that the research platform is sustained beyond Defra core funding. DTC is already helping with policy development, particularly with respect to the use of agricultural measures and approaches to catchment management.

Knowledge Exchange – The Knowledge Exchange component of DTC was competitively tendered and let to a consortium led by the University of Newcastle and Lancaster University. The start-up meeting with KE participants from each of the DTC Consortia was held in Solihull in early March. Discussions have continued with a number of relevant initiatives and organisations *inter alia*: Defra's Integrated Farm Advice project; the National Trust; FWAG; LWEC; VO; Syngenta; BGS; CEH; VO; WWF; GCWT. A joint workshop is being planned with LWEC about better linking a number of separate initiatives in the area of integrated land and water management. Discussion with the NERC Macronutrients Programme has resulted in the 3 DTC catchments being included in this programme's 5 preferred catchment locations for research.

Exploratory discussions have also been held about establishing links with Scottish and Irish initiatives. The DTC programme was presented to a Scottish audience at Macaulay Inst (Aberdeen) and a meeting with SEPA/Scottish Government is scheduled for May. An international conference is planned in collaboration with the Irish Agricultural Catchments Programme (Teagasc /DAFF) in Dublin (14-16 Sept 2011) – see flyer www.jorireland.com/events/CatchmentScience2011/.

A workshop was held in association with a RELU project on Integrated Catchment Management which has been influential in helping develop policy on catchment management approaches, culminating in the Ministerial announcement on 22 March about Defra's preferred approach.

Data Platform – The data platform component was competitively tendered and let to the Freshwater Biological Association in partnership with Kings College, London. A start-up meeting was held in March.

Measures – Development of thinking on the Measures Component continues. A 2nd workshop was held in February (see agenda item).

Modelling – see agenda item

Outline of Progress in the Consortia

Avon - www.avondtc.org.uk

Fieldwork – The high spec station has been installed at Ebbesbourne Wake (River Ebble target sub-catchment) and connected to mains electricity. Instrumentation calibration is in progress. Autosampler stations complete with flow cells have also been installed at Ebbesbourne Wake and Priors Farm and Cools Cottage on the River Sem. Weekly grab samples for water and particulate chemistry analysis is being undertaken at all 7 target sub-catchment outlet monitoring stations.

Flow structures for discharge monitoring have been installed on the River Sem at Priors Farm and Cools Cottage. Good progress has been made with respect to securing EA consents for installing monitoring infrastructure in the River Tamar Associate DTC.

320 porous pots for soil drainage monitoring purposes have been installed (100 in the control sub-catchment of the River Wylfe, 160 in the EA WPZ sub-catchment at Cholderton, 60 in the manipulated sub-catchment of the River Ebble). A further 80 pots are still to be installed in the manipulated sub-catchment on the River Wylfe. Cross sector source apportionment of sediment and organic pollutants (e.g. slurries and manures) is underway in the Cools Cottage and Priors Farm sub-catchments on the River Sem and also the Caudworthy Water and River Neet sub-catchments on the River Tamar. Laboratory analysis for tracers of inorganic and organic particulates is progressing well.

Baseline farm spatial surveys have begun, recording connectivity issues and run-off pathways during heavy rainfall and areas of poaching and erosion. These surveys have focused so far on the Priors Farm manipulated sub-catchment on the River Sem and the Kingston Deverill control sub-catchment on the River Wylfe. 100% of the farmers in the Cools Cottage and Priors Farm sub-catchments have been engaged and visited. Similarly in the River Tamar DTC target sub-catchments all farmers have been engaged by WRT.

Data gathered from the farm spatial surveys are helping target the most relevant mitigation measures for use in the Avon manipulated sub-catchment. At present the most suitable measure to target in the Priors Farm sub-catchment is thought to be fertilizer input. In the Brixton Deverill sub-catchment overwintering tramline management and in-field and riparian buffer strips seem the most appropriate. Further discussions with farmers and the EA will aid final decisions. We are working in partnership with the ECSFDI to use a CSF Capital Grant Special Project award to improve a problem farm track in one of the manipulated sub-catchments.

Knowledge Exchange - The Hampshire Avon DTC Local Launch was held on the 18th January at the Mercure White Hart hotel, Salisbury. The event was well attended with members of the project consortium, DEFRA, EA, Natural England, the NFU, Wiltshire Wildlife Trust, Wessex Water and champion farmers. A local stakeholder engagement event was recently hosted by WRT in the Caudworthy Water target sub-catchment to introduce the DTC and SWW funded mitigation initiatives.

Candidates for the PhD project and PDRA post at the Universities of Reading and Bristol respectively examining ecosystem functional response to on-farm mitigation and data uncertainties, have been interviewed and the posts accepted. Plans are in place to align a Masters programme in Civil Engineering at the University of Bristol with the Avon DTC programme. This partnership will be used as a means of enhancing data collection on sub-catchment key attributes.

Fieldwork – The Eden Rivers Trust is leading on the farmer engagement process in the Eden. The **Pow Beck** sub-catchment is characterised by intensive dairy, beef, sheep, pig, and poultry farming with P and NO₃ the main concerns. A telemetered rain gauge and a water monitoring cabinet have been installed in the control sub-catchment. The land owner/occupier of the 2 km² outlet on the mitigation catchment still needs to be identified. The **Morland Beck** sub-catchment is characterised by improved grazing (cows & sheep) where sediment is the main concern. All of the farmers in the 2 km² mitigation sub-catchment are now fully supportive, but negotiations with the land owner in the 2 km² control catchment continue. A weather station has been installed, while an autosampler and sonde remain to be installed, alongside lower spec monitoring stations. The **Dacre Beck** sub-catchment is an upland site characterised by improved grazing (cows & sheep) where P and sediment are the main concerns. Land owners at the 10 km² outlet and 2 km² control catchment are co-operative, while negotiations with the land owner in the mitigation catchment are starting. An autosampler and sonde remain to be placed in each 2 km² control sub-catchment, alongside lower spec monitoring stations.

The monitoring stations at all 10 km² sub-catchment outlets will gauge temperature, dissolved oxygen, pH, electrical conductivity, turbidity, ammonium and chlorophyll, while the Pow and Morland high-spec outlet stations will also be equipped to measure flow, nitrate, total P and reactive P. Spot samples have been taken at each of the nine catchment sites, in collaboration with colleagues at the Penrith EA, alongside biological samples for diatom analysis. These were chemically analysed by both the EA and CEH labs, for inter-laboratory comparability purposes, whilst the biological analyses were performed at Lancaster. A second round of chemical and biological sampling took place in mid-March and this regime will continue on a monthly basis. All sites with access agreements have been surveyed for streambed cross-sectional data, in order to assess the feasibility of installing weirs and other in-stream structures.

Initial plans for and approaches to experimental measures include improvements to slurry stores and hard standings; streamside fencing; storage ponds; wetlands; swales and active buffer-zones; tramline interception features in arable areas; winter cover crops; wetlands; and the introduction of woodland planting and stock density changes (Dacre).

During February and March, 21 boreholes were drilled in the Pow and Morland sub-catchments into the superficial Quaternary deposits and core material was collected for analysis at Lancaster University. This has helped with the development of conceptual models, e.g. highlighting the potential importance of water-saturated sand lenses within the superficial deposits. Piezometers have been installed between 2 and 20 metres depth and water levels will be monitored to provide insight into the hydrological processes operating within the catchments. Water quality samples will also be collected to detect changes in shallow groundwater quality resulting from measures implemented through the DTC project. Collaboration with the BGS, which has conducted a parallel drilling project examining the heterogeneity of the drift deposits, has been strengthened with the first elements of a research facility focussing on shallow groundwater systems being installed. An independently-funded PhD student will begin research focussed on geophysical characterisation of shallow superficial deposits in the Pow catchment during Spring.

Knowledge Exchange - The Newton Rigg Farm Demonstration Centre will be completed by June. The Newton Rigg campus is already functioning as a base for the field operatives and also for hosting meetings, the latest of which was a joint event with the Sensors for Water Interest Group (SWIG) in March, attended by over 40 delegates. One outlet station and two weather stations are fully functional, with on-line data being collected, which can be viewed at www.timeview2.net. The EdenDTC team have formed a successful partnership with the local EA who are involved in many aspects of the project ranging from surface water monitoring to site selection and engagement. The local EA Senior Environment Officer has attended management/team meetings and provides a single point of contact to allow a smooth exchange of contacts and information, including historical flow and rainfall records.

Wensum – www.wensumalliance.org.uk

Fieldwork – Two high-spec monitoring stations in the Blackwater sub-catchment of the Wensum have been installed and commissioned. Sampling every 30 minutes, current measurements include temperature, DO, pH, EC, turbidity, NH₄ and chlorophyll. The kiosks are also equipped to measure flow, NO₃, total P and reactive P. A weather station and network of rain gauges are informing event-based monitoring with data being interrogated via the Hydrologic Timeview and Meteor Data Centre web portals. Other completed installations include two locations with multi-level boreholes for monitoring groundwater levels and water quality in the Chalk aquifer and overlying Quaternary deposits. Core material has been recovered by the BGS for pore water extraction from the glacial deposits for chemical and stable isotope analysis.

Twice-weekly grab sampling at six monitoring locations in the Blackwater sub-catchment and monthly, catchment-wide sampling in the Wensum is continuing. Laboratory staff at UEA have been analysing the samples and setting up protocols and spreadsheets for analysing and recording chemical data, with the data stored on a secure server at UEA. As part of mapping soil characteristics in the Blackwater sub-catchment, the BGS has collected c.50 samples across the area. Each sample is being analysed for: particle size distribution; TOC (%); bulk density (g cm⁻³); and dithionite extractable aluminium and iron content (mg kg⁻¹). A first ecological survey at nine locations in the Blackwater sub-catchment was undertaken by the EA in autumn 2010 with recorded invertebrate and diatom results and BMWP, ASPT and number of taxa results expected in April 2011.

Knowledge Exchange - The Consortia has been working with the land agent in preparing the Salle Estate's Entry-Level Stewardship application. An ELS agreement is expected to result in 6 m buffers alongside all water course margins, to extend 6 m margins to fields where they are presently not included and to allow natural regeneration of redundant field corners. There is a willingness among local farmers to employ minimum tillage methods or measures such as over-wintered stubble prior to sugar beet planting. More generally, there is a preference for planting autumn-sown crops. A target for minimum tillage would be several large arable fields that border some of the stream courses. Precision farming methods are also a possibility. There are some existing no- or low-input grassland areas in riparian zones with the possibility of extending areas of wet woodland and in developing scrapes and constructed wetlands with the aim of slowing hydrological flow paths.

Knowledge exchange activities have been centred around farm visits with an emphasis on demonstrating the monitoring equipment installations. A high-profile visit was made by Chinese scientists from the Agro-Environmental Protection Institution, Ministry of Agriculture, Beijing and other leading Chinese Universities. A presentation was given in November 2010 on the Wensum DTC project to representatives of the East of England ECSFDI Stakeholder Group, including Anglian Water, Essex and Suffolk Water and the NFU. This meeting provided an opportunity to network with other agencies involved in tackling diffuse pollution issues in the Eastern region.

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