Geophysical Research Abstracts
Vol. 13, EGU2011-13301, 2011
EGU General Assembly 2011

Establishing a Demonstration Test Catchment in Eastern England for monitoring diffuse pollution runoff from intensive arable agriculture

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In England and Wales only 27% of waterbodies have reached 'good ecological status' and there are obligations through EU and national legislation to address this problem. Much of the degradation is caused by agriculturally-derived pollutants (namely phosphorus, nitrogen and sediment), and therefore a suite of mitigation measures is required to reduce pollutants at source. However, the evidence to support mitigation measures is largely based on plot-scale experimentation such that we do not fully understand how measures behave in combination or when applied over larger scales. It is still not fully possible to predict or monitor the effectiveness of mitigation at the point of impact which may be several kilometres downstream from the source and possibly several years from the point at which pollutants enter the water.

The UK Department for Environment, Food and Rural Affairs is establishing a nationally co-ordinated programme of work through funding of the Demonstration Test Catchment (DTC) Project to observe changes in water quality on manipulated areas versus "business-as-usual" control areas to provide evidence of the effectiveness of agricultural diffuse pollution mitigation measures at the farm to catchment scale. Water quality data, collected at nested spatial scales, is to be compared with farm practice information using correlation and other statistical approaches to increase the weight of evidence supporting approaches to mitigating diffuse water pollution. Monitoring activities in the DTC Project are intended to provide quantitative and qualitative evidence that will provide an improved conceptual understanding of catchment processes, including the sources, pathways and receptors driving diffuse pollution from agriculture to support future modelling activities.

The River Wensum Demonstration Test Catchment in East Anglia, UK, is one of three instrumented catchments (including the River Eden in Cumbria and the River Avon in Hampshire) taking part in this co-ordinated research platform. The River Wensum is a national Site of Special Scientific Interest and a European-designated Special Area of Conservation due to its importance as a Chalk river habitat. The underlying Cretaceous Chalk aquifer is overlain by an extensive cover of Quaternary deposits including glacial tills and sands and gravels that support intensive arable agriculture. To monitor diffuse pollution runoff from agriculture and other sources such as road runoff, animal manure and sewage sources, the Wensum DTC Project is installing a network of sensors in the Blackwater sub-catchment, one of the larger headwater tributaries, with six monitoring points forming a nested approach, collecting high resolution data for a period of at least three years. The suite of measurements will include flow, temperature, dissolved oxygen, electrical conductivity, pH, total phosphorus, total reactive phosphorus, nitrate, ammonium and turbidity which, at two of the sites, will be captured every 15 minutes and data telemetered to a website twice daily. The nested monitoring approach will capture data downstream of areas of on-farm mitigation measures. A specific objective is to understand the processes affecting pollutants as they propagate throughout the catchment, whether via the subsurface, shallow drainage or across land and in transport downstream (including macro-nutrient cycling, transformations and attenuation). In this presentation, we will discuss our experimental design in the Wensum DTC, describe the process of setting-up the catchment experimental sites and the choice of agricultural measures to be tested, and also discuss data from the first six months of baseline monitoring of diffuse pollution runoff.