Geophysical Research Abstracts
Vol. 17, EGU2015-6221-1, 2015
EGU General Assembly 2015

The role of high frequency monitoring in understanding nutrient pollution processes to address catchment management issues

Paul Quinn (1), Jennine Jonczyk (1), Gareth Owen (1), Nick Barber (2), Russell Adams (1), Greg ODonnell (1), and EdenDTC Team (3)

(1) University of Newcastle, Civil Engineering and Geosciences, Newcastle upon Tyne, (p.f.quinn@ncl.ac.uk), (2) University of Durham, Dept. of Geography, (3) Eden DTC Team www.edendtc.org.uk

The process insights afforded to catchment scientists through the availability of high frequency time series of hydrological and nutrient pollution datasets are invaluable. However, the observations reveal both good and bad news for the WFD. Data for flow, N, P and sediment (taken at 30 min intervals) from the River Eden Demonstration Test Catchment and several other detailed UK studies, will be used to discuss nutrient fluxes in catchments between 1km2 and 10km2. Monitoring of the seasonal groundwater status and the forensic analysis of numerous storm events have identified dominant flow pathways and nutrient losses. Nonetheless, many of the management questions demanded by the WFD will not be resolved by collecting these datasets alone. Long term trends are unlikely to be determined from these data and even if trends are found they are unlikely to be accurately apportioned to the activities that have caused them. The impacts of where and when an action takes place will not be detected at the catchment scale and the cost effectiveness of any mitigation method is unlikely to be quantifiable. Even in small well instrumented catchments the natural variability in rainfall, antecedent patterns and the variability in farming practices will mask any identifiable catchment scale signal. This does not mean the cost of the data acquisition has been wasted, it just means that the knowledge and expertise gained from these data should be used in new novel ways.

It will always be difficult to quantify the actual losses occurring at the farm or field scale, but the positive benefits of any mitigation may still be approximated. The evidence for the rate of nutrient removal from a local sediment trap, wetland and a pond can be shown with high resolution datasets. However, any quantifiable results are still highly localised and the transfer and upscaling of any findings must be done with care. Modelling these datasets is also possible and the nature of models have evolved in the light of improved data, particularly in the representation of storm driven flow pathways. Hence the aggregation and the impact of any management or mitigation will rely on having confidence that local activities are beneficial, that a basket of measures merit pursuing, and are worthy of funding. A novel set of data driven risk-based indices, impact models and new experiments are needed to show the worth of catchment scale management. The high frequency data have been useful to build knowledge but a quantifiable cause and effect remains an elusive goal at the catchment scale.