The impact of chronic and acute hydrochemical disturbances on stream ecology; implications for agricultural policy

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INTRODUCTION

In Ireland, the two main threats to water quality are nutrient transfers from municipal (point) and agricultural (diffuse) sources. Diffuse nutrient losses from agriculture are closely linked with storm (i.e. acute) events whereas municipal point sources pose a chronic pressure, particularly during summer baseflows when dilution effects are minimal. This project is investigating the effect of chronic and acute sources of nutrients and sediments on the ecological status of headwater streams.

METHODS

Analysis of existing data

Ecological data have been collected in five agricultural catchments every May and September since 2009 as part of the Agri-Catchments Programme (ACP) with chemical data collected every ten minutes at each outlet. These datasets will be analysed to identify correlations between pressures and responses to those pressures.

Catchment scale ecological sampling

Ecological sampling will be undertaken in five ACP catchments along with two high-status control catchments. Monthly sampling of macroinvertebrate and diatom communities will take place between May and September. Sampling before and after three storm events will help assess the impact of acute events on ecological communities.

Controlled laboratory experiments

Artificial river channels will be used to assess the acute and chronic inputs of nutrients and sediment on ecological communities.

JUSTIFICATION

Existing data have shown that there is a general trend of declining ecological quality in September compared to May in the study catchments (Fig. 1 & Fig. 2). However, the reason for this decline is not clear. Regular sampling of the streams over the intervening summer months will help identify the causes of the declines. Sampling high status control sites will facilitate seasonal comparisons between the five study catchments and naturally occurring seasonal changes in ecological community structure.

IMPACT

Outcomes from the project will help inform policymakers of the main pressures affecting ecological communities in agricultural catchments. The information will facilitate targeting of specific measures to alleviate some of the pressures associated with input of nutrients and sediment to watercourses; this in turn will help Ireland fulfil its obligations under the Water Framework Directive.

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