



## Weather amplifications of agricultural diffuse pollution: developing climate-chemical indicators

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Agricultural diffuse pollution of water resources caused by losses of agro-chemicals and manure (including nutrients and pesticides) from land to water, is challenging and remains an issue due to the complex rainfall-runoff pathways between soil surface sources, soil and nutrient management, the heterogeneity of the agricultural landscape and biogeochemical cycling in receiving water bodies. Despite knowledge of catchment related processes and the influence of changes in weather driving water quality, these two factors are seldom explicitly taken into account when analysing changes and effects on water quality. The objectives of this study were to: i) identify catchment components based on characteristics prone to weather changes of diffuse nitrogen (N) and phosphorus (P) loss, ii) identify the relationship between the intensity of the North Atlantic Oscillation (NAO) and nutrient concentration trends in streams draining agricultural land, and iii) highlight policy issues for recovery and source management, taking into account these climatic and weather effects. Climate-chemical indicators of diffuse pollution were developed for 13 highly monitored catchments (1 – 31 km<sup>2</sup>) in Western Europe (Ireland, Norway and France). We found that local catchment-scale N and P concentrations correlated to the influence of larger, oceanic-scale climate patterns defined by the NAO index. These decadal oscillations, which amplify weather patterns, may override positive benefits of local management in some years or indicate greater benefits in other years and this is catchment specific. We propose a further development of integrated climate-chemical indicators with socio-political indicators of environmental improvement, against a back drop of expectations and targets. This will provide a new and important component to diffuse pollution and water quality management objectives.