



PAPER 7

Characterisation of water bodies in Ireland in relation to agricultural pressures

Martin McGarrigle

Environmental Protection Agency, Regional Inspectorate, Castlebar, Co. Mayo, Ireland.

This paper outlines the approach taken to relating agricultural pressures to water quality in Irish rivers on a national scale for the purposes of the Water Framework Directive (WFD). The Article 5 Report required under the directive required inter alia “a review of the impact of human activity on the status of surface waters and on groundwater”. This entailed the identification of pressures and the assessment of impacts on surface waters arising from these pressures. A wide range of pressures was assessed: urban wastewater treatment plants, storm overflows, major industrial point sources and diffuse pressures such as road and rail networks, hydromorphological pressures as well as diffuse agricultural pressures, which are obviously important in an Irish context where most large cities are coastal and inland land use is predominantly agricultural. Ireland has over 4000 river water bodies defined for the purposes of the WFD Article 5 report. Less than half of these have monitoring data (albeit with the monitored water bodies tending in general to be the larger and more important water bodies). The river water bodies for which water quality data were available were used to develop a model that could provide a risk assessment for the unmonitored water bodies. Over 3000 river monitoring points were analysed in relation to their upstream land use patterns. Land cover was based on CORINE 2000 land cover maps and biological quality elements and their supporting physico-chemical elements were used to represent the ecological status of the water bodies. Subsets of almost 800 individual catchments were chosen to be hydrologically independent (i.e. not nested physically) in a semi-random manner and their water quality compared with the catchment land use. A stepwise logistic regression analysis was used to derive ‘thresholds’ for land use intensity that gave a 75% high probability of having Good ecological status in a river as it flows out of a catchment. This analysis suggested that for rivers in catchments with less than 38% of their area under pasture had a 75% or greater probability of being of Good ecological status sensu WFD. Similar thresholds were 1.3% for tillage or ploughed land and a much smaller 0.03% for urban area. In all cases quite wide confidence limits applied to the estimates. The empirically observed relationships were used to predict the pressures and risk of failing to meet the objectives of Good status required by the WFD. The results informed the design of the monitoring programme for the WFD. Some further characterisation was undertaken to help confirm some of the more uncertain risk assessments with local authority staff and River Basin Districts undertaking some 2000 risk assessments on small streams.