

# science summary



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## Assessing land-use scenarios to improve groundwater quality: a Slea catchment study

Summary SC030126/TS

A report considering options for reducing agricultural diffuse pollution has been published by the Environment Agency as part of a European project, Water4all. It suggests that modifying agricultural land use within specific areas – those where the risks of nutrients leaching to groundwater are high – could significantly improve water quality in the UK and help meet water quality standards set by the EU.

Many European countries encourage land use practices which incorporate water quality management, but this approach is rare in the UK, where more emphasis has been placed on end-of-pipe water treatment. This strategy, however, appears increasingly expensive and unsustainable.

Meeting the requirements of the EU Water Framework Directive (WFD) poses challenges for water and land management – indeed, nitrate pollution has already been identified as a major reason why the UK may fail to meet WFD targets. The requirement to achieve ‘good ecological and chemical status’ in groundwaters by 2015 is particularly difficult for intensively-farmed areas which often suffer diffuse pollution from fertilisers, pesticides or livestock. Changes in farming practices may reduce these problems, but place further demands on farm businesses already facing an uncertain future from Common Agricultural Policy (CAP) reforms.

As part of the European Water4all project ([www.water4all.com](http://www.water4all.com)), the Environment Agency worked with the University of East Anglia to explore ways in which land use could be adapted to improve water quality in the UK. A pilot study was set up to investigate the effectiveness of a range of measures in reducing groundwater nitrate levels in a catchment area, working closely with local groups in the area.

The River Slea in Lincolnshire was chosen for its high groundwater nitrate levels and its suitability for exploring issues typical of lowland UK. Boreholes in the area’s limestone aquifer are an important source of public and private water supply and there have been

local concerns regarding pressures on water resources from population expansion (especially in the town of Sleaford) and agricultural demands.

Focus groups and interviews were set up with local stakeholders (farmers, civic groups, planners and so on) to draw up a set of possible future land-use scenarios for the area, listed below:

- Recent past (RP) - continuation of existing measures (such as Nitrate Vulnerable Zones);
- Impact of current policy reforms (CP) - likely land-use changes arising from CAP reforms, new agri-environment schemes and so on;
- Nitrate best practice (BP) – extension of CP with best practice measures (such as use of cover crops) to reduce nitrate leaching;
- Regional Nitrate Sensitive Areas (NSA) - use of practices from the 1990s NSA scheme;
- Land use protection zones (PZ) - use of zones (such as low input grass or woodland) in targeted areas such as well capture zones;
- Whole catchment change (WC) - conversion of 40 per cent of arable to grass or woodland and a reduction in livestock of 40 per cent.

A two-step modelling process was then used to simulate the effects of these scenarios on groundwater nitrate concentrations in the catchment.

The study found that nitrate concentrations could be reduced by up to 30 per cent by 2015 if some 40 per cent of arable land was converted to wood and/or grassland in the Slea catchment, or if protection zones were targeted in the vicinity of the main springs and boreholes in the area.

Land use protection zones were the most positively received scenario when the study’s findings were discussed with the local groups. There was local interest in exploring such measures, particularly the idea of creating more grass and woodland areas to the

