

The Agricultural Catchments Programme – innovation for farming and the environment

The Agricultural Catchments Programme is based on a partnership with farmers and other stakeholders, and aims to support productive agriculture while protecting water quality, writes GER SHORTLE.

"We have not inherited the world from our forefathers; we have borrowed it from our children" – ancient Kashmiri proverb.

The Agricultural Catchments Programme aims to support farmers in handing on economically and environmentally sustainable farms to their children. It will do this through partnership, innovation and integration of Teagasc's strengths in research and technology transfer. A team of researchers and advisers is working closely with farmers to carry out research at catchment scale and facilitate the sharing of information and experience, thus speeding up knowledge dissemination and maximising its impact. This new model has potential applications across the whole farming sector.

Why now?

Achieving economic and environmental sustainability for Irish farming is essential and has never been more urgent. Agriculture and food is an indigenous Irish sector that accounts for 6.3% of GDP, 8.2% of employment and 10.5% of total exports. It is crucial that Ireland maintains a strong farming sector that can grasp opportunities to increase production, while protecting and improving the environment.

The Nitrates and Water Framework Directives are the main environmental drivers of the Agricultural Catchments Programme. The Nitrates Directive (ND) aims to



minimise nutrient losses to water bodies from agriculture and is based on managing the rate, timing and accumulation of nutrients to avoid excessive or untimely transfer to water. Statutory Instrument No. 101 of 2009 – Good Agricultural Practice (GAP) for Protection of Waters Regulations – puts Ireland's National Action Programme (NAP) into law. These regulations cover a range of farm practices including limits on nitrogen and phosphorus applications, closed fertiliser spreading periods, manure storage requirements and restrictions on winter ploughing. These measures cover the whole country, with only minor variations from region to region.

The Water Framework Directive (WFD) combines a range of EU water directives, including the ND, and includes chemical and ecological standards. Implementation will be regionalised under the WFD using the River Basin District Management Plans, which may have specific measures tailored to each district. In addition to surface waters and groundwater covered by the ND, the WFD includes transitional and coastal waters, and under it all water bodies and groundwater-dependent terrestrial ecosystems must reach "good ecological status" by 2015, or at least be managed so as to move towards that status.

Why a catchment programme?

The ND requires EU Member States to monitor and evaluate the effectiveness of their action programmes and this programme helps to fulfil Ireland's obligation in

this regard. The catchments' scale, at five to 11 square kilometres, provides a real representation of farming being carried on in catchments with other non-agricultural nutrient sources and buffering capacities. The catchment scale also offers opportunities to scale up policies to larger catchments or national scale; this would not be feasible using field or plot scale studies.

The Programme approach

The Programme integrates intensive advice with cutting-edge catchment science in an innovative approach to knowledge transfer. Farmer involvement is essential and DAFF has set up a consultation and implementation group (CIG) to facilitate this at national level. At local level, the programme adviser is the main contact with farmers. The adviser's role is to support the farmers in carrying on a viable farm business while protecting the environment. This means facilitating the implementation of the GAP measures while working towards high profit levels. Each adviser covers two catchments dealing with approximately 40 farmers, and uses individual and group contact with farmers to facilitate the transfer of information.

The advisers also collect economic and physical data on the farms, which will be used to analyse any impacts of changes in farm practices in the catchments. Each adviser works with a technician, whose primary role will be data collection and maintenance of instrumentation in the catchments.

The major scientific challenge for the programme is to provide evidence to evaluate the GAP measures. The Programme research team has developed research protocols to do this. They will look at nitrogen and phosphorus sources in the catchments and how they are linked with the supply of nutrients available for transport and loss to water and the movement of water through the soil pathways from farms to receiving waters in the catchments.

The researchers will analyse and model the data to look for links between changes in agricultural practices and indicators of change in the catchments. To facilitate this work, instrumentation is being installed in the catchments to measure quality and quantity of surface and ground water and weather data.

Objectives

The Programme is funded by the Department of Agriculture, Fisheries and Food (DAFF), which sets broad objectives for it. These objectives have guided the design of the programme and shaped the approach that is being taken.

These are:

- to establish baseline information on agriculture in relation to both the ND and the WFD;
- to provide an evaluation of the GAP measures and the derogation in terms of water quality and farm practices;
- to provide a basis for a scientific review of GAP measures with a view to adopting modifications where necessary;
- to provide better knowledge of the factors that determine farmers' understanding and implementation of the GAP;
- to provide national focal points for technology transfer and education for all stakeholders in relation to diffuse nutrient loss from agriculture to water; and,
- to include monitoring that may be necessary for the purposes of the WFD.

Selecting catchments

The selection of catchments was influenced by EU guidelines, which suggest that monitoring efforts should be concentrated in "areas of intensive crop and livestock production ...with elevated nitrate concentrations... adjacent to existing or projected eutrophication areas...with similar land use, soil type or agricultural practice".

Using these guidelines the Teagasc Spatial Analysis Unit developed a new Geographic Information System (GIS)-based selection methodology for the programme. National catchment data provided by the EPA was used to generate a list of 1,300 catchments to select from. A range of data covering land use, livestock density, housing density, geology, soils, and nutrient loss risk was used in a multi-criteria decision analysis (MCDA) approach. Selection criteria were given weightings that reflected their relative impact on the catchments' suitability for inclusion in the programme.

Farmed area was maximised within two broad categories of catchments, grassland and tillage. Stocking rate and forage area were maximised in selecting the grassland catchments, while for tillage catchments the percentage of arable was maximised. Across all catchments, housing density, forestry, peat and non-agricultural land use were minimised. Catchments were also ranked by risk of loss of nitrogen or phosphorus to water, based mainly on soil permeability rankings. Shortlists of catchments were drawn up based on the MCDA rankings and these sites were visited to assess their practical suitability in terms of access, availability of services, ease of establishment of monitoring sites and other factors.

Six catchments have been selected using this methodology. Two of these are catchments with a high proportion of tillage; one on free-draining soils where the greatest risk is of nitrogen loss through leaching, and one on heavier soils where phosphorus loss through surface run-off is more likely. Of the four grassland sites, one has a high nitrogen loss risk while the others are predominantly at risk of phosphorus loss with varying levels of nitrogen loss risk. A site on pure limestone geology and dominated by groundwater pathways remains to be selected. The GIS methodology described above was designed for surface water-dominated catchments and so does not suit limestone areas. Wide consultation with experts in the field and existing survey data are being used to help identify suitable sites. This selected site is likely to be west of the Shannon in the extensive karst area of Galway/Mayo and will require substantial on-site investigation to delineate its zone of groundwater contribution.

Looking ahead

Farming has shaped the Irish landscape while providing a living for generations of Irish people. The challenge is to protect this environment while maintaining profitable farm businesses. This programme aims to help farmers to meet this challenge in the catchments and across the whole country.

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