EU Water Framework Directive (WFD) Implementation

Key external stakeholders:
Policy makers, river basin managers, river basin users, local authorities, farmers

Practical implications for stakeholders:
A micro-simulation model was developed to aid assessment of the impact of nitrogen (N) reduction measures on farm N budgets and on farm income within the context of implementation of the WFD.

Main results:
- There is a statistically significant relationship between water quality and human activities in Irish rivers. Higher animal production, cereal production and septic tank densities have a negative impact on river water quality in Ireland. However the impact of agricultural activities has improved over time.
- Measures to reduce water pollution resulting from agricultural activities will come at a cost to farmers in Ireland unless the measures allow efficiency gains at farm level.
- If environmental policies are not to have a negative effect on farmers’ incomes, these policies need to be flexible as one-fits-all approach will not yield efficient results.
- The impact of mitigation measure on farm income differs in different years, indicating that market conditions may influence the economic outcome of environmental policies and, thus, such policies need to be flexible over time.
- Finally, protecting endangered water species and their habitat will come at a considerable cost to farming communities in the relevant catchments. Thus, careful cost-benefit analysis is required before putting forward concrete recommendations and policies.

Opportunity / Benefit:
The results obtained in this project are useful for informing policy decisions about the potential costs that will occur if a number of water pollution mitigation measures are introduced in an effort to reach objectives of WFD. The cost per unit abated for different mitigation measures allows one to rank the measures according to their cost efficiency at both the macro- and micro-level. Finally, as a result of this project, the effect of the Fresh Water Pearl Mussel (FWPM) protection measures (as indicated in the Sub-basin Management Plans) on farm income in the relevant catchments is assessed. This assessment provides information for policy-makers about the annual cost of such protection to farming sector. While the benefits are hard to assess due to data limitations, the cost of the protection may be deemed as disproportionate to the resulting benefits.

Collaborating Institutions:
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1. Project background:
Following introduction of the WFD in 2000 the EU Member States are required to bring all water bodies to good ecological status by 2015. The main contributions that impair water quality come from diffuse sources. Agricultural activities as well as other human activities are identified as one of the diffuse sources and, thus, there is an increasing pressure on agriculture to reduce potentially polluting emissions. In this project, the cost of potential mitigation measures on farm income in Ireland is assessed through developing a micro-simulation model. Micro-simulation models are widely used for assessing policy impacts where real-life experiments are impossible or too costly to conduct.

2. Questions addressed by the project:
- How would Nitrogen mitigation measures impact farm incomes in Ireland?
- What is the cost-efficiency ranking of these measures?
- Is the ranking of the measures the same across all farms?
- Does the ranking of the measures stay the same over time?
- What is the potential cost of protecting the FWPM for farms in the relevant catchments?

3. The experimental studies:
N/A

4. Main results:
Results show that agricultural activities are still associated with lower river quality in Ireland, however, other human activities (e.g. septic tank density) also have significant impact. On the other hand, afforestation is shown to be associated with the good water quality in Irish rivers. Measures to mitigate pollution from agricultural land to water bodies will result in a reduction in gross margin to most farms. The only mitigation measures that do not have negative impact on farm income are those that will lead to increased farm efficiency. However, the potential to mitigate losses of N through these measures is very small and, thus, may not be sufficient to meet the objectives of the WFD. The ranking for cost per unit abated (CPUA) for individual farms revealed that these ranking is not the same across all farms. Thus a measure that is cheapest for one farm may not the cheapest for another one. Furthermore, the national average ranking of the CPUAs is not constant over time, but depends on the prevailing market conditions. Finally, protection of the FWPM and their habitat will lead to high annual financial losses to farmers in the catchments where FWPM are present.

5. Opportunity/Benefit:
The results have the potential to inform decision-makers and policy-makers in particular about the economic impacts of pollution mitigation measures resulting from the WFD implementation that would affect farms in Ireland. Such information can be used in the Cost-Benefit analysis and a subsequent application for derogation. The results of this study are also useful to inform mitigation decision at farm level.

6. Dissemination:
Main publications:

PhD thesis completed “Modelling the Economics of Water Pollution Improvement in the Agricultural Context, 2015

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