



LM0308: Catchment Management for Water Quality

Case Study 3: Costs and benefits of mitigation measures to reduce pollutant concentrations for the protection of drinking water in river-systems upstream of intakes.

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Purpose: To demonstrate benefits of reduced compliance risk and water treatment costs against different upstream pollution control measures taking into account the costs involved by both water companies and other actors.

Policy driver(s)	Drinking Water Directive (Drinking Water Inspectorate) Economic regulation (OFWAT) Water Framework Directive (Environment Agency)
Enduser(s)	Government Agencies (OFWAT, Drinking Water Directive; Environment Agency), Water companies
Pollutant(s)	Nitrate, phosphorus, metaldehyde
Measures	Water company selected measures (catchment and water treatment)
Scenario if appropriate	Application of range of diffuse pollution control measures
Outcome / output	Percentage reduction in peak concentrations, frequency and duration of exceedance of drinking water standards. Predicted impacts on eutrophication/phytoplankton growth (phosphorus). Economic cost-benefit.
Scale / Location	Selected catchment upstream of a drinking water supply intake, following discussion with water company (catchment scale). Location likely to be in South East England although to be confirmed
Risks	Uncertainties related to the degree to which water companies will wish to become involved in the case study Availability of metaldehyde model and the outcome of the community fund call with regard to bringing in expertise on metaldehyde Availability of metaldehyde data IPR issue surrounding SAGIS flows data if SAGIS is used

Background / Narrative:

Water companies need to provide drinking water that meets strict water quality standards. Some of these standards relate to pollutants that arise from land management systems (including agricultural production) operating within water supply catchments. Obvious examples are nitrate and pesticide pollution upstream of surface water river and reservoir intakes. Phosphorus can also cause problems in surface storage reservoirs as a result of eutrophication.

Water companies incur costs in treating sub-standard raw water at their intakes or being required to blend water between sources. They also incur a risk of non compliance that can result in regulatory fines. Upstream mitigation measures could reduce the levels of losses of pollutants from agriculture and hence reduce costs and compliance risk to the water industry. However, such mitigation methods themselves also incur costs to farmers and other land owners. This case study will try to demonstrate approaches to examine the costs and benefits of these two approaches to pollution control to provide an optimum solution for surface waters at the catchment scale. It will also test the benefits of this modelling approach with water industry representatives.

Basic approach:

The intention of this case study is to use selected models to test impacts of measures. Because of the drinking water standards are in the form of maximum permissible concentrations, time series models will be selected; possibly SWAT and INCA to test the impact of a range of agricultural measures as agreed with the water company for a selected catchment. For metaldehyde, the possibility of using expertise SWAT) outside the consortium via the community fund or a modified version of one of the INCA suite of models will be considered.

Farmscoper, along with more specific information on metaldehyde, may be used to estimate the impact and costs of the selected measures which will then be linked to the models. Costs associated with water treatment and management of risk by the operator at an appropriate level of detail will provided by the water company.

Models to be used:

- Farmscoper
- INCA and/or SAGIS models for N & P
- Metaldehyde model (SWAT; yet to be specified)

Data to be used:

- Inputs
 - Agricultural census data
 - Robust Farm Type counts
 - Point and diffuse loads
 - Catchment data required to set up INCA (update existing model) – e.g. River Wensum

- Outputs
 - Agricultural pollutant reductions at intake for specified chemicals
 - Cost of scheme measures
 - Benefit value in terms of compliance risk and treatment requirements (qualitative and quantitative)
 - Commentary from the water company on benefits
- Validation
 - Water company river monitoring data

Other requirements:

- Economic input from water company
- Metaldehyde model via community fund
- Metaldehyde data from water company

Workplan:

- Engagement with water company in the selection of a suitable catchment (e.g. Anglian Water, Thames Water, Essex and Suffolk Water). Discussions have already taken place with Anglian Water.
- Decision on modelling approach based in part on outcome of community fund
- Scenario simulation with Farmscoper to determine reduction in the agricultural load for the selected pollutants
- Collation of cost information
- Method to input measures impacts into river models
- Run models

Milestones:

- Scope out Case Study (Feb 2015)
- Establish arrangement with water company and select catchment (this will also depend on the availability of models (Feb 2015)
- Develop model documentation for the Platform (March 2015)
- Establish modelling approach to metaldehyde (April 2015)
- Start conditioning and ingestion of data and models with documentation into Platform including model input and outputs (June 2015)
- Completion of first model application outputs and testing with Community Forum (Nov 2015)
- Start conditioning and ingestion of external data and models into Platform (June 2016)
- Iteration to identify benefits of model coupling (Nov 2016)
- Final report (Mar 2017)

Link to Enduser Questions:

Effectiveness of measures / mechanisms

- Assess the effectiveness of measures in relation to peak concentrations and compliance risk
– understanding economic implications for the water company and polluter

Uncertainty, confidence and communication

- How much certainty is associated with the measures and model outputs and how useful are they to the water company for decision making
- How much information water companies will wish to share in relation to commercial sensitivities
- Availability of a metaldehyde model and outcome of community funding call

Integration / focus / scaling

- Catchment scale, upstream of an intake. Need to consider relevance for other types of sources