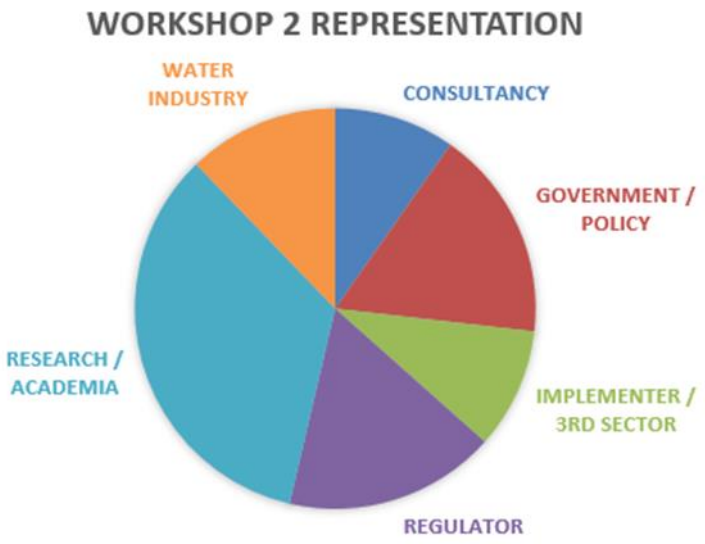
Catchment Management for Water Quality Forum - Workshop 2
29th October 2014 – London
Meeting Notes

The purpose of this workshop was to present the draft case studies and further develop the scope of the case studies with the stakeholders, including the ways in which the case study questions could be answered using models and data.

41 people attended from 29 organisations, with broad representation.



The format of the day consisted of brief presentations of the Case Studies followed by break out groups that considered the individual Case Studies. The workshop participants were asked to select two Case Study "tickets" allowing them the opportunity to participate in their development. During the breakout sessions, participants were asked to discuss and comment on:

- If the scope of the draft case study is correct and useful, or whether it needs adjusting
- What scenarios it should cover (e.g. what control measures / scale / outputs / formats etc.)
- Who the likely users might be and what outputs / outcomes they might be interested in
- What policy instruments are the case studies relevant to.

During these discussions it was also requested that stakeholders make notes on post-it notes to help the Consortium identify appropriate and desirable data / models for inclusion in the framework.

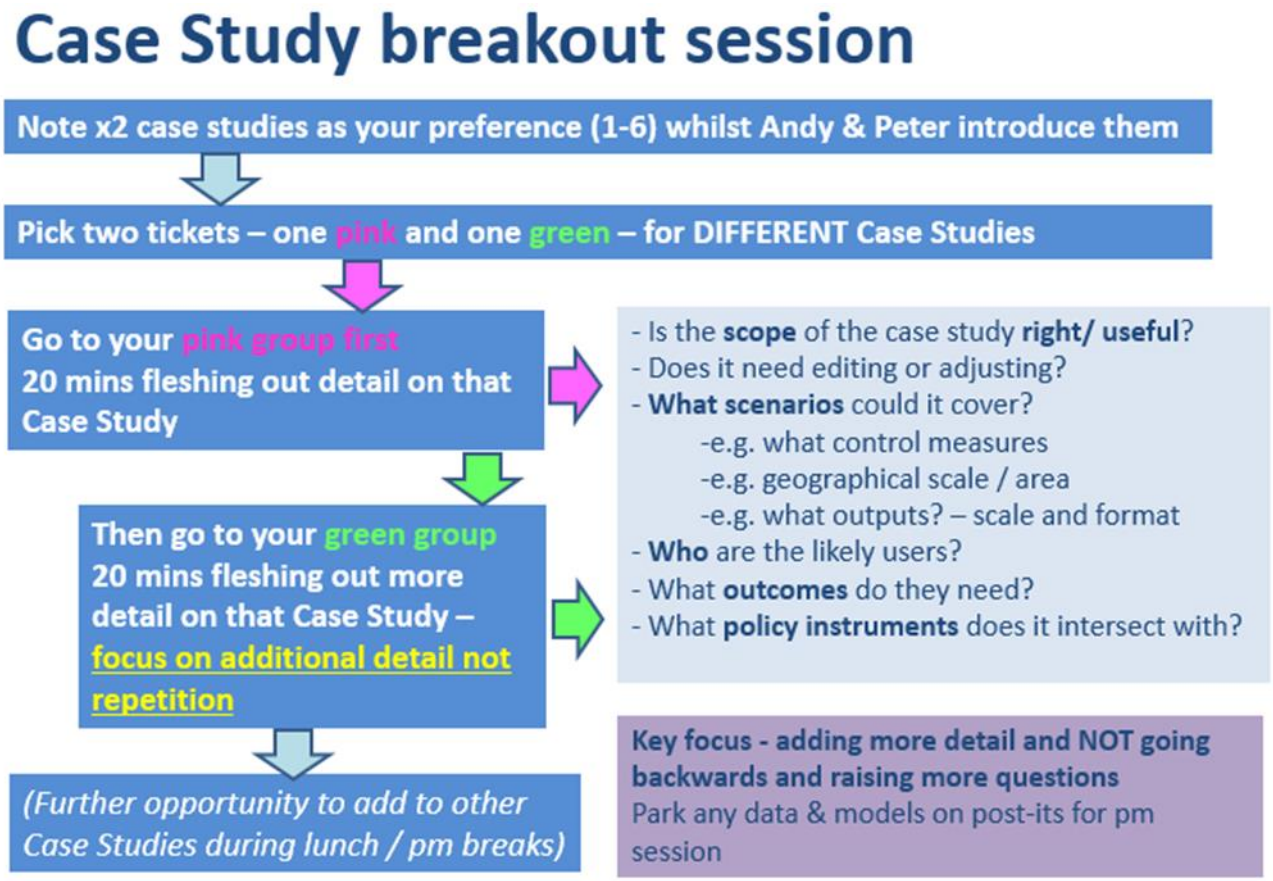
The information gathered in this second Form workshop was then used to flesh out the detail of the Case studies which were released as part of the first funding call to the Community Fund (April 2015).

Workshop 2 Attendance

Organisation	Name	Grouping
Aberystwyth	David Kay	RESEARCH / ACADEMIA
ADAS	Steve Anthony	CONSULTANCY
ADAS	David Lee	CONSULTANCY
Affinity Water Limited	Sophie Mortimer	WATER INDUSTRY
Anglian Water Group	Sam Carr	WATER INDUSTRY
Atkins	Claire Allaway	CONSULTANCY
Atkins	Peter Daldorph	CONSULTANCY
Canals Trust	Alice Hill	IMPLEMENTER / 3RD SECTOR
CEH	Bridget Emmett	RESEARCH / ACADEMIA
CEH	Jack Cosby	RESEARCH / ACADEMIA
CEH	Richard Williams	RESEARCH / ACADEMIA
CEH	Matt Fry	RESEARCH / ACADEMIA
CREW	Jannette MacDonald	RESEARCH / ACADEMIA
DEFRA Agri Environment Policy	Oliver Edmonds	GOVERNMENT / POLICY
DEFRA Joint Water Evidence Group	Stuart Kirk	GOVERNMENT / POLICY
Defra R&D	Dan McGonigle	GOVERNMENT / POLICY
Defra R&D	Tristan Ibrahim	GOVERNMENT / POLICY
Dwr Cymru Welsh Water	Philippa Pearson	WATER INDUSTRY
Environment Agency	Hannah Green	REGULATOR
Environment Agency	Tom Rolls	REGULATOR
Environment Agency	Nick Hopwood	REGULATOR
Environment Agency	Alwyn Hart	REGULATOR
Environment Agency	Linda Pope	REGULATOR
Environment Agency	Neil Murdoch	REGULATOR
Forestry Commission	Vince Carter	GOVERNMENT / POLICY
Forestry Commission	Tom Nisbet	GOVERNMENT / POLICY
Glasgow University	Robert Willows	RESEARCH / ACADEMIA
James Hutton Institute	James Sample	RESEARCH / ACADEMIA
James Hutton Institute	Andy Vinten	RESEARCH / ACADEMIA
Leeds University	Adrian McDonald	RESEARCH / ACADEMIA
National Farmers Union	Nicola Dunn	IMPLEMENTER / 3RD SECTOR
Natural England - Biodiversity delivery	Russ Money	REGULATOR
Northern Ireland	Rachel Cassidy	GOVERNMENT / POLICY
Northumbrian Water Group	Teresa Meadows	WATER INDUSTRY
Oxford University	Paul Whitehead	RESEARCH / ACADEMIA

Organisation	Name	Grouping
Reading University	Andy Wade	RESEARCH / ACADEMIA
Rivers Trust	Dave Johnson	IMPLEMENTER / 3RD SECTOR
Rothamstead	Adrian Collins	RESEARCH / ACADEMIA
Sheffield University / DTC	Bob Harris	RESEARCH / ACADEMIA
Thames Water	Raquel Coca Fernandez	WATER INDUSTRY
Westcountry Rivers Trust	Russell Smith	IMPLEMENTER / 3RD SECTOR

Workshop 2 Case Study Breakouts



Case Study 1: Are pollution control measures cost effective? An assessment of costs and benefits of mitigation measures to reduce pollutant concentrations in river-systems.

Case Study Relevance to Questions Raised by Forum Members

Lead: Richard Williams

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

End Users: Water Industry

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 pollution of borehole supplies and pesticide and DOC (naturally derived but influenced by management) contamination at surface water intakes. Water companies incur costs in treating sub-standard raw water at their intakes. Upstream mitigation measures could reduce the levels of losses of pollutants from agriculture and hence reduce costs 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.

Questions to breakout groups (Session 3):

- Is the scope of the question right?
- Does it need editing / adjusting?
- What scenario would be most useful?
- What outcome would you want?
- Any more likely users?
- What policy instruments does it intersect with?

Link to Workshop Questions by General Theme:

Effectiveness of measures / mechanisms

- *Capture uncertainty in effectiveness of measures – understanding timescales of response and implications for economics.*
- *What is the actual outcome of different catchment management options in terms of Water Company deployable outputs?*

Environmental economics / socio-economics

- *How far can we get for a given amount of money; how far do we need to get to and by when; what's the best way of getting there and what should we do first; what kind of magnitude of intervention is appropriate ;what are the costs and effectiveness of different measures applied at different geographical scales (local - national)?*

Measures selection and optimisation

- *Land management and use/what do we target? Triage phase.*

Case Study 2: Are pollution control measures future proof? An assessment of the effectiveness of pollution control measures under scenarios of climate and land cover change at the catchment scale.

Case Study Relevance to Questions Raised by Forum Members

Lead: Andy Vinten

Purpose: To demonstrate the effectiveness of measures given future projections of climate and land cover change at the catchment scale.

End Users: Catchment Managers

Background / Narrative: Future population growth, climate change, changes in nutrient supply, agricultural intensification and other land use changes may cause deterioration of water quality in some areas; other areas may see an improvement. Models can be used to quantify how future trends may affect water quality, taking into account uncertainty in future conditions. Models may also be used to assess whether measures put in place to improve water quality today are likely to remain effective in the future, thereby helping water managers and policy makers design 'future proof' measures.

Questions for breakout groups (Session 3):

- Is the scope of the question right?
- Does it need editing / adjusting?
- What scenarios would be most useful?
- What outcome would you want?
- Any more likely users?
- What policy instruments does it intersect with?
- Which catchment?

Link to Workshop Questions by General Theme:

Future pressures and extrapolation of impacts

- *Potential effects of future trends such as population growth, climate change; land-use change, food security and nutrient supply need to be better quantified.*
- *What are the implications of climate change and agricultural intensification for water quality?*
- *Future proofing – climate change and other impacts*
- *How will future land use and climate change affect pressures e.g. N, P, Sediment in water*

Evidence of outcome

- *Can models help to target measures and provide an estimate of the level of confidence that they will work? No point in investing customers money if uncertainty high*

Uncertainty, confidence and communication

- *What is the uncertainty associated with modelling the different effectiveness of measures?*

Case Study 3: Are pollution control measures likely to affect other ecosystem functions? An assessment of the effects on biodiversity and other ecosystem services of measures designed to improve water quality at the catchment-scale.

Case Study Relevance to Questions Raised by Forum Members

Lead: Peter Daldorph

Purpose: To demonstrate the effectiveness of measures on total pollutant loads and the consequences of measure implementation for other outcomes.

End Users: Catchment Managers

Background / Narrative: What is the effectiveness of agri-environment measures in reducing pollutant loads and enhancing other ecosystem services at a catchment scale? Is the cost of measure implementation disproportionate to the potential co-benefits and trade-offs, given the uncertainty in the agricultural load (and thus agriculture's contribution to the total load), and the uncertainty in the estimate of pollutant reductions achieved.

Questions to breakout groups (Session 3):

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- What policy instruments does it intersect with?

Link to Workshop Questions by General Theme:

Effectiveness of measures / mechanisms

- *Capture uncertainty in effectiveness of measures – understanding timescales of response and implications for economics.*
- *What is the combined impact of multiple pressures, biological response, and the effectiveness of measures*

Evidence of outcome

- *Can models help to target measures and provide an estimate of the level of confidence that they will work – no point in investing customers money if uncertainty high*

Integration / focus / scaling

- *Integration of models across receptors / objectives to identify co-benefits and trade-offs; to help justify / prioritise action depending on local objectives, priorities and characteristics*

Uncertainty, confidence and communication

- *What is the uncertainty associated with modelling the different effectiveness of measures?*

Case Study 4: Can results of pollution control measures be reliably estimated at local scales? An assessment of the uncertainty in ecological responses to phosphorus control measures at the river basin scale.

Case Study Relevance to Questions Raised by Forum Members

Lead: Andy Wade

Purpose: To demonstrate the sources of errors and their effects estimating algal response to phosphorus mitigation errors. Including errors associated with data (for calculating loads), modelled loads and in-stream river models.

End Users: Catchment Managers

Background / Narrative: There are many sources of uncertainty in trying to predict the results of a particular intervention action in the catchment on the quality of water in a receiving water body. These include uncertainties in the measured data (used for generating loads and assessing model performance), in models used to in-fill measured data (temporally and spatially), in the effectiveness of a particular mitigation measure and in the river models that deliver the final result. This case study will try to estimate where these uncertainties lie for the case of assessing the effectiveness mitigation methods that reduce P loads to rivers in reducing ecological response e.g. algal growth. How do the uncertainties in the modelling process compare with the actual changes predicted? How can we reduce uncertainty?

Questions to breakout groups (Session 3):

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- What scenario would be most useful?
- What outcome would you want?
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Link to Workshop Questions by General Theme:

Future pressures and extrapolation of impacts

- *Potential effects of future trends such population growth, climate change; land use change, food security and nutrient supply need to be better quantified.*

Uncertainty, confidence and communication

- *How does using different input datasets affect the model outputs and hence the evidence base upon which to base action?*
- *What is the uncertainty associated with modelling the different effectiveness of measures?*

Effectiveness of measures / mechanisms

- *What is the combined impact of multiple pressures, biological response, and the effectiveness of measures?*

Source-Pathway-Receptor Evidence

- *Need to be clear that problem is excessive biological activity not P concentration per se. Therefore need to understand conditions leading to this. Account not just chemistry but residence times / temperature and light intensity – function of weather and shading. – any other factors?*

Case Study 5: Can results of pollution control measures be reliably estimated at national scales? An assessment of the uncertainty in effectiveness of measures to reduce pollutant concentrations at the national scale.

Case Study Relevance to Questions Raised by Forum Members

Lead: Steven Anthony

Purpose: To model changes in pollutant concentration and associated uncertainties at national scale. To consider timescales over which an effectiveness signal may become apparent in the monitoring record.

End Users: Policy makers

Background / Narrative:

- Identifying water quality improvements at large spatial scales is difficult due to a range of factors that are often poorly constrained (e.g. monitoring uncertainty, extent of compliance pre- and post- measures, weather variability, catchment response etc.)
- These factors mean that pollution control measures are likely to behave differently in different places
- Modelling can be used to explore these uncertainties, potentially providing insight into the timescales over which water quality improvements may become apparent
- Inconsistencies between modelled and observed datasets highlight knowledge gaps

Questions to breakout groups (Session 3):

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- What policy instruments does it intersect with?

Link to Workshop Questions by General Theme:

Effectiveness of measures / mechanisms

- *Capture uncertainty in effectiveness of measures – understanding timescales of response and implications for economics*

Uncertainty, confidence and communication

- *How does using different input datasets affect the model outputs and hence the evidence base upon which to base action?*
- *What is the uncertainty associated with modelling the different effectiveness of measures?*

Evidence of outcome

- *Link models to monitoring*

Case Study 6: How are estimates of the effectiveness of pollution control measures affected by quality and quantity of data? An assessment of the effects of input data uncertainty (scale and source) on national scale assessments of water quality (and other ecosystem services and biodiversity).

Case Study Relevance to Questions Raised by Forum Members

Lead: Jack Cosby

Purpose: To demonstrate the sensitivity / uncertainty in outputs of models at various scales resulting from differences or uncertainties in input driving data.

End Users: Policy makers, NGO's, Catchment Managers, Water Industry

Background / Narrative:

How do different input datasets affect model outputs and hence the evidence base upon which to base action? The question covers many familiar aspects of the effects of data quality and quantity on model outputs such as the resolution of spatial data, the frequency of time-series data, and the quality of observed data (lab errors, are the correct things being measured, etc.). But there are additional considerations that may contribute to the uncertainty or reliability of input data ranging from IPR issues which may affect the choice of datasets, to whether there is benefit of being able to include local data to improve on national data when the scale of model outputs is local. The questions of propagation of uncertainty as models are chained, how uncertainty affects model comparisons, and whether uncertainty can be translated into risk should be considered.

Questions to breakout groups (Session 3):

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Link to Workshop Questions by General Theme:

Uncertainty, confidence and communication

- *How does using different input datasets affect the model outputs and hence the evidence base upon which to base action?*
- *What is the uncertainty associated with modelling the different effectiveness of measures?*

Evidence of outcome

- *Link models to monitoring*