

# Outcomes from the First Modelling Workshop

2<sup>nd</sup> July 2013 – Hebden Bridge

## *Aim*

The aims of the first workshop were to:

1. Present the pilot objectives, programme of workshops and ground rules
2. Present results from preliminary stakeholder interviews
3. Identify system variables

The purpose of these notes is to provide an overview of the first modelling workshop, present the outcomes for those stakeholders involved and to allow for any stakeholders that missed the first workshop to keep informed of the process.

## *Opening presentations*

The workshop opened with a presentation of the pilot objectives, the methodology (i.e. a schedule of the workshops and other activities) and the catchment objectives. The catchment objective list, which formed the basis of later modelling activities was developed in consultation with key stakeholders through previous meetings, and summarises our collective objectives for the Hebden Water catchment.

A second presentation introduced the group to Bayesian Networks as an approach to understanding the cause and effect relationships that exist in a system. Modelling the environmental system in such a way allows us to identify the most probable effects of interventions, given our understanding of how the different elements of the system are interlinked. These links may be built on evidence from data, local knowledge, experience and/or expert opinion. There is scope within the approach to say how confident we are in our understanding of individual links. For example, we understand the link between the type of tree cover, and the amount of water that will get through that cover and hit the ground well, and will be able to represent this relationship quantitatively. Other relationships may be built on local experience of previous floods and others may have very little evidence to explain them although we know that they must exist.

A copy of either presentation can be provided on request by e-mail.

## *Modelling activities*

The workshop then split down into two smaller groups for the modelling activities. Taking each of the catchment objectives in turn, the groups identified:

- a) Actions that could be taken to achieve the objective (interventions)
- b) Factors that affect which these interventions are going to be successful (implementation factors), including those that are outside of our control (drivers)
- c) Any intermediate factors that lie between each intervention and the objective we are trying to achieve (intermediate factors)

They then categorised those variables into the following categories:

Category	Description	Flood risk examples
Objective	The thing you wish to affect through managing the system better. They may be things you want to improve, or things you wish to prevent from worsening.	Flood probability, river habitat quality, economic loss, water quality
Intervention	The things you wish to implement in order to achieve the objectives. These are the management options.	Manage burning of the moor, increase woodland cover, install sustainable drainage schemes, train land managers
Intermediate factors	These provide the link between the objective and the intervention.	Interception, infiltration (example links between increase woodland cover and flood probability)
Drivers	Things we cannot change, but control the environmental system in some way.	Rainfall, population, government policy, state of economy
Implementation factors	Things that directly affect whether an intervention will be successfully implemented (immediately and in the future).	Land availability/funding (for "increase woodland cover"), landowner support (for "manage burning of moor")

### *Workshop outputs*

The variables suggested by the working groups are summarised in the attached table. This is by no means exhaustive, and will grow during subsequent workshops.

### *Next steps*

In the next workshop we will work to organise those objectives into a network structure. This means we will look at the cause and effect relationships that exist between them. We will further identify how all of the catchment objectives are linked in one environmental system. This network structure will form the basis of the model that we are building.

Thanks to John Woods of the Environment Agency for support facilitating the workshop and to Christina at Treeresponsibility for catering.

The next workshop will take place on **Tuesday 23<sup>rd</sup> July** in **The Terrace Room, Hebden Bridge Town Hall**. Refreshments from **6:45pm for a 7:00pm start**.

If you have any questions before the second modelling workshop, please get in touch.

Shaun Maskrey  
University of Nottingham

A34 School of Geography, University Park, NOTTINGHAM, NG7 2RD  
0115 951 5383  
07887 398337  
[lgxsamas@nottingham.ac.uk](mailto:lgxsamas@nottingham.ac.uk)

## List of variables

Objectives	Interventions	Factors affecting implementation	Drivers
Surface runoff - volume	Plant trees	Community engagement	Rainfall
Surface runoff - speed	Sphagnum moss	Community agreement	Climate
Interception	Reduce bare ground	Funding	Topography
Storage	Green roofs	Legal frameworks	Legal
Stormwater on roads	Permeable paving	Time	Planning
Stormwater on paths	Terracing	Social conventions	Economy
Water sensitive - retrofit	SUDs	Land ownership	Time frame
Water sensitive - planning	Drainage length	Organisational barriers	Politics
Awareness - before	Drainage volume	Educational barriers	
Awareness - during	More effective land drains/gulleys	Awareness	
Awareness - after	Ponds	Denial	
	Hedgerows	Responsibility	
	Better drainage of roads/paths	Expectation	
	Stopping burning	Leadership	
	Remove weirs	Availability of space	
	Naturalise water courses	Environmental impact	
	Dredging	Impact on heritage	
	Channel lowering	Insurance	
	Channel widening	Knowledge of peat bog interventions	
	Flood storage	Cost	
	Surface storage	Ground plant cover	
	Grazing	Land cover	
	Re-wild moorland	Density of tree cover	
	Rain gardens	Closure of roads	
	Ponds	State of moorland	
	Promote re-vegetation	Identifying routes of flow	

Bankside management  
Keep drains clear  
Property level protection  
Diversion of surface water  
Retrofitting  
Advise builders  
Raise awareness of best practice  
Laminated 'what to do' card  
Preparation list

Knowing which residents to target  
Reservoir volume/management  
Accessibility of information