

The Hyporheic Network: Record of workshop discussions, 11-12 July 2007

Workshop number: Day 1, Group 3
Workshop leader: Gareth Old, CEH

Workshop goal:

“Identify knowledge gaps in each scientific discipline working at the GW-SW interface, and consider whether existing science in one discipline can be used to fill gaps in another, or whether interdisciplinary research is needed (and what it is).

Outcomes:

- **Identify the knowledge gaps in each discipline**
- **Consider cross-discipline knowledge transfer possibilities**
- **Develop outline for interdisciplinary research to fill gaps”**

Record of workshop:

1. Identify knowledge gaps in each discipline

Biogeochemical cycling and reactive transport

How much and what are the controls on:

Transport, retention and transformation of chemicals

What is the heterogeneity?

Scale issues:

We have some understanding of reactive transport on small scale.
Difficult to assess its importance at the large scale.
Is it relevant at the catchment scale?

Temporal issues are important and require further understanding.

Kinetics: Biogeochemical and apparent kinetics (depending on flow pathway)

Complicated simultaneous temporal and spatial changes require further understanding.

What are the most important organisms? How do they react as a community? What is their sensitivity to environmental conditions and flow transport.

A framework of agreed controls is needed.
There is a need for predictive capability.

How important is the Hyporheic Zone compared to riparian?

Geomorphology and habitat

Causes of dynamics: Quality and quantity of fine sediment.
What is the role of disturbance? Structure and habitat available.
What is the natural situation? How perturbed is it?
Impact of anthropogenic modification to river structure
What is the importance of large scale geomorphology e.g. glacial legacy
What is the variability of geomorphology in time?
There is a need to develop/apply geophysical methods
Scale issues are important.

Microbial and invertebrate ecology

What is the value of specific organisms in ecosystem service?
What are the trophic dynamics?
Hyporheic Zone versus benthic: same behaviour?
Our knowledge of the biology is very basic.
Knowledge of sensitivity is limited.
Invertebrates may indicate subsurface flow systems. May protect inverts when river dries up.
In UK little is known about Hyporheic Zone invertebrates.
What is the connection between GW and SW communities?

Modelling GW-SW

How well do models represent the hyporheic zone?
Models need verification but there is a lack of accurate field data.
Are models generic or site specific? Need better understanding to produce generic models.
Need better understanding of uncertainties when upscaling models.
There are issues of timescale: differences between GW and SW.
Numerical issues.
Model coupling.
Models are only as good as understanding- need to be clear of their scope.
Stochastic modelling?

2. Cross discipline knowledge transfer and interdisciplinary research outline

Biogeochemistry : Need to consider the impact of physical processes.
Work across disciplines to address scale mismatch. E.g. scale of analysis of GW may be very different from biogeochem.

Look outside obvious disciplines. E.g. Oceanography, chemical engineering, mining, soil science, wastewater. May learn a lot and find techniques we can apply.

Don't re invent the wheel.

Need a balance between different levels of complexity.

Define questions that need answering across disciplines.

Would be a good idea to decide on a place to focus research (international research site/network)

Need to consider how much we are disturbing the system by measuring it!