

WaTeREd Network Kickoff Workshop Summary

23 February 2017

Convenor: Kate Heal

Network Coordinator: Shasta Marrero; Facilitator/Impact coordinator: Andy Cross

Thanks to the University of Edinburgh's Academic Networking Fund for financial support for most of the workshop and thanks to GESA for providing support for coffee & tea.

Participants:

1. Kate Heal	GeoSciences	Land use & water resources
2. Andy Cross	GeoSciences/IAD	Impact co-ordinator
3. Shasta Marrero	GeoSciences	WaTeREd co-ordinator
4. Mikael Attal	GeoSciences	Sediments in rivers
5. Nicholle Bell	Chemistry	Peat soils & pore waters
6. Massimo Bollasina	GeoSciences	Climate of the Anthropocene
7. Alistair Borthwick	Engineering	Environmental fluid dynamics
8. Efthalia Chatzisyneon	Engineering	Ecotoxicology, new pollutants
9. Maria-Chiara Ferrari	Engineering	Polymers/membranes
10. Chris French	Biological Sci.	Microbial technology
11. Neil McKeown	Chemistry	Novel functional materials
12. Pete Nienow	GeoSciences	Glacier hydrology
13. Colin Pritchard	Engineering	Renewables
14. Martin Pullinger	Informatics	Socio-technical studies
15. Neil Robertson	Chemistry	Molecular materials
16. Giulio Santori	Engineering	Desalination
17. Madeleine Seale	Biological Sci.	Plant biol.-engin. interface
18. Andrea Semiao	Engineering	Wastewater treatment
19. Simon Shackley	GeoSciences	Technology studies
20. Hugh Sinclair	GeoSciences	Sediments/surface process
21. Darren Slevin	GeoSciences	crop water use, modeling
22. Catharine Ward Thompson	Landscape Arch.	Environment-behaviour
23. Martyn Wells	Royal Obs. Edin.	Remote sensing instruments

Structure of Meeting

Kate introduced the aim of WaTeREd (Water Technology and Research at Edinburgh) to establish a multidisciplinary network of water researchers across the University of Edinburgh to generate new collaborations and funding research bids. The capabilities of the network were explored by investigating what we currently have (expertise, facilities, external connections) and what is missing. Then everyone was divided into groups to discuss funding priorities in different fields of water research. These ideas were narrowed down and participants were able to choose

their favourite topic for the next session, which focussed on producing specific proposal outlines. The final activity looked at ways to sustain the WaTeREd network into the future.

Capability Mapping

Part 1: What is available in the network?

Facilities:

- FloWave facility
- Boat
- Field monitoring equipment - hydrology
- Lab analysis facilities for contaminants/pathogens
- Engineering labs
- Solar test site
- Computational power
- Desalinator
- Drones

Expertise (in addition to expertise listed on meeting contact list):

- Water-vegetation interactions
- Modelling and artificial intelligence for analysis of large datasets
- Remote sensing and data assimilation

Contacts/Networks:

- Links to India, Nepal, Bangladesh, China, East Africa
- Links to non-ODA countries
- British Geological Survey
- Centre for Ecology & Hydrology
- Scottish Water
- CREW (see description later in document)
- Companies: Ecometrica, SSE, Green Energy Mull
- SEPA, SNH
- NGOs: Practical Action
- International Institute for Environmental Studies <http://ii-es.com/>
- Scottish Consortium for Rural Research <http://www.scr.ac.uk/>

Part 2: What are we missing?

This depends on what projects the network is working on.

- Social scientists, law, political scientists, knowledge transfer facilitators - People who can help answer questions about who owns the water, facilitate implementation of the existing studies, work on the social and behavioural aspects of water use
- Bridging gap between small-scale lab studies to large-scale implementation
- Missing expertise: flood hydrology, tropical hydrology, lakes, water resource management (climate change impacts), public health/epidemiology/pollution, water politics, molecular biology
- Equipment: fluoride monitoring
- Water equivalent to the UK soil security research programme
- Coordination: no list of all water-related teaching at the university, no obvious first-year course in hydrology, no 'water institute' (like groups at Leeds, Lancaster)
- Recruitment and retention of students with physics/maths backgrounds
- Time
- Money

Funding Sources

Potential funding sources for research proposals generated through WaTeREd include.

- Global Challenges Research Fund (GCRF) (£1500M over 5 years)
- Newton Fund (£435M 2016-20)
- RCUK and cross-council calls/Innovate UK. Current relevant calls include:
 - India-UK Water Quality Research Programme. Deadline for notifications of interest **30 March 2017**
<http://www.nerc.ac.uk/research/funded/programmes/indiauk/news/ao/>
 - NERC Innovative monitoring approaches for infrastructure. 26 April brokerage event in Edinburgh. Deadline for outline proposals **15 June 2017**
<http://www.nerc.ac.uk/innovation/activities/naturalresources/oilandgasprog/roundt wo/>
- Leverhulme Trust
- PhD studentships as catalysts
 - HydroNation Scholarships (funded by Scottish Government). Call for projects on specific themes normally in early summer. Projects can include research outwith Scotland. <http://www.hydronationscholars.scot/index.html>
 - DTP/CDT funded projects
- CREW (see below) - calls for specific policy-relevant research

CREW (Scotland's Centre of Expertise for Waters)

CREW is a Scottish Government funded partnership between the James Hutton Institute and Scottish Universities which connects water research, policy and practice. CREW commissions demand driven research for its users (SEPA, Scottish Water, SNH and the Scottish Government). Research themes include: flood risk management and coastal erosion, protecting drinking water, river basin management planning, sustainable rural communities. Calls for proposals to address specific research topics are advertised periodically. To sign up for emails from CREW advertising project opportunities complete your contact information at the bottom of the CREW homepage <http://www.crew.ac.uk/>

If you would like further information about CREW contact Kate Heal who is the University of Edinburgh CREW contact.

Identifying Research Priorities

Participants were divided into groups by relevant topics, but also trying to mix up different schools and expertise. The groups identified research priorities specific to each topic.

Water Hazards & Risk (Flooding, water scarcity)

Specifically focused on developing countries, there are several issues:

1. During flooding, sewage contaminates drinking water. Currently missing: Real information on the ground about the actual pollutants, what areas are being flooded, historical information for the community.
2. Water shortages as glaciers melt - Himalayas (or similar)
3. Assessing the extent of pollutants in groundwater in developing countries and working towards management and purification measures.

Sustainable Landscapes (riparian zones, catchments, management)

First question is to define a landscape and potential areas/problems: rivers, dams, peatlands, cities, woodland, agriculture, mining, flooded deltas, coastal erosion. Overall, this leads to priorities of: Natural flood management, green infrastructure, land use, soil erosion, mining, energy (untapped from water/mining/air).

1. Monitoring - Lack of good monitoring of ecosystem changes, especially land-use, sediment fluxes, and water. Need long-term and short term monitoring as input into models.
2. System integration

3. Identifying 'green actions' that could be win-win situations. Smart, flexible, resilient designs to adapt to changing water resources.

Clean Water & Sanitation (treatment, wastewater)

1. To work towards clean drinking water and sanitation, need to be able to measure the quality of the water (pathogens/organics/inorganics) and how this changes through time. Measurement systems need to be cheap, easy-to-use, and effective, particularly for deployment in developing countries.
2. Water systems need to be able to adapt to changing needs going forward (different water sources, changing amounts of water).
3. Water recycling (wastewater a priority)
4. Management of water demand - reducing leakages in supply systems.

Water & Livelihoods (water-energy-food nexus)

1. Need for cheap, easy, effective water analysis.
2. Water demand management - looking at changes in land use or other practices that would lead to reduced use.
3. Water use (blue vs grey water) - what factors are most effective for monitoring use?
4. Political/social response to exporting water 'debt' due to manufacturing/food production occurring in other countries.

Summary of research priorities:

- 1) Cheap, easy, and effective water purification (including groundwater)
- 2) Monitoring (including sensor development) - quick & accurate
- 3) Water footprint (crops)
- 4) Runoff & water resources in a changing climate (Himalayas/Andes)
- 5) Large-scale monitoring of whole catchments (Critical Zone Observatory Style)
- 6) Sustainable designs to maximise benefits (architecture, etc.)

Project Proposals & Champions

Four projects were developed in more detail in groups with interested participants. A champion was selected for each project. If anyone is interested in pursuing these ideas further or working on a similar project, contact the champions listed below.

(1) Monitoring of meso-scale catchments

Champion: Mikael Attal

This project focuses on the Infrastructure necessary for integrated monitoring of meso-scale catchments across a range of end-members (environments, land-use, pressures) worldwide (similar approach to Critical Zone Observatories in the USA

<http://criticalzone.org/national/infrastructure/observatories-1national/>). The science questions would piggy-back on this infrastructure and could include, for example: What is the integrated

response of catchments to pressures like climate change? These areas could also be a place to design and test out solutions to problems. International connections could be used to choose catchments, but this project is large and will require large-scale planning and integrated international funding.

(2) Catchment scale runoff prediction in a large Himalayan catchment over next 100 years

Champion: Peter Nienow

This project combines atmospheric and glacial modelling with historic records to improve runoff predictions with changing climate. The methodology could involve selecting a catchment with a long-term flow record (~20 years) and using this to reparameterize models and improve runoff predictions. The project could be extended by including end users and looking at how the information will be used. The part-NERC supported India-UK Water Centre <http://www.iukwc.org/> launched in 2016 might be a potential funder.

(3) Water footprinting of crops

Champion: Martin Pullinger

This 'smart agriculture' project would use satellites/drones to create detailed models of crop water use to determine which areas on a farm could be improved in terms of water use efficiency and crop yields (recommendations in terms of fertilizer, new methods). This project combines modelling, remote sensing, and would include farmers or ground truthers. There is the potential for commercialisation.

(4) Cheap, easy, effective water purification at a domestic scale in the developing world

Champions: Neil Robertson & Neil McKeown

This project would combine expertise in chemistry and engineering to create domestic-scale water purification. The novelty stems from the different methods of purification, smaller scale, and cheaper price. This project goes hand-in-hand with developing monitoring to determine how well these systems are working and when they are at the end of their lifetimes. Funding could include Gates Foundation, other NGOs.

Sustaining the WaTeREd Network

The following ideas were presented as potential ways to maintain WaTeREd as a useful network for water-related university researchers.

- Digest emails (short emails with links to relevant proposals, meetings, etc.)
- Searchable online contact sheet - This would be a way to find interested collaborators based on their research interests, external links, countries they have worked in, etc. We hope to include a new category called 'Project Wish List' for research topics that you are interested in pursuing, but you may not have actively worked in before.
- Targeted workshops for specific funding calls/proposals as the need arises
- Funding to employ a PhD student to update materials/produce newsletters

- Including network support funding in impact statements of all proposals (Kate Heal can help supply some relevant text)
 - Requesting funds from schools to support the network
- Jointly supervise MScs/PhDs
- Coordinate university-wide water-related outreach opportunities
 - Water-related seminars: circulate information about local relevant seminars; organise University-wide high impact water-related seminars (e.g. in our Changing World seminar series; high profile World Water Day lecture)
 - Share ideas for local outreach/impact opportunities
- Maintaining leadership
 - Keep momentum in the group
 - Nudge others to lead proposals when good funding calls come up