



WATER SECURITY
Knowledge Exchange Programme



Specific Priority Subject 2.2 Summary Report

Improving drought prediction, communication and impact assessment

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Acronyms

WSKEP Water Security Knowledge Exchange Programme

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Summary

This report is the Summary Outcomes Report of the WSKEP Specific Priority Subject Workshop 2.2 on **‘Improving drought prediction, communication and impact assessment’**. It includes an introduction reporting the key recommendations resulting from the Workshop. This document will be made available on the Programme website www.wskep.net. The full Participants Outcomes Report was distributed to all participants of the Workshop.

Disclaimer

This document reflects only the combined views participants at the Workshop.

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Contents

Document Information	2
Document History	2
Acronyms	2
Acknowledgement	2
Summary	2
Disclaimer	2
Contents	3
1. Overview	4
1.1. Introduction	4
1.2. What is the big science issue / challenge	4
1.3. Networks and alliances	4
1.4. The Water Security KE Programme	5
2. The workshop and report	5
3. Towards a shared understanding of the Priority Subject Area	6
4. Making the most of current research activity	7
5. Identify areas for potential future research activity / collaborations	7
6. Improving alliances and networks	10
7. How do we maximise the value of the Water Security KEP?	10

1. Overview

1.1. Introduction

Droughts are challenging as they manifest themselves in different ways with different levels of severity. They can persist for long periods of time and can lead to serious economic, social and environmental consequences. A further complication is climate change and how this will affect drought frequency, duration and spatial extent in the future. Water company water resource management plans, drought plans and environmentally-driven sustainability reductions offers impetus for improvements in drought research but there are many additional end-users to inform future directions. Drought prediction and communication of drought forecasts is fraught with difficulty and can only be improved with a better understanding of stakeholder needs, integration of data, modelling capability and expertise.

1.2. What is the big science issue / challenge

The workshop highlighted several opportunities to improve drought prediction, communication and impact assessment, including:

1. Improved measurement or calculation of rainfall, recharge and soil moisture.
2. Improved access to existing data and integration of models and expertise.
3. Proactive communication and engagement with the public and between researchers and end-users to raise awareness of the issues and to help bring about behavioural change.

The key directions emerging from the workshop demonstrates that there are challenges both in improving accuracy of drought prediction/forecasting through advancing science but also in communication of the science outcomes. There was also significant interest in the multi-faceted nature of drought in particular consideration of the financial, political and sociological implications. Better tools for water resource management under drought conditions were also seen as a priority area.

1.3. Networks and alliances

There already exist a large number of networks with an interest in water management and drought. Discussion at the workshop recommended a rationalisation or amalgamation of existing networks as the most productive option for a unified drought alliance.

The wide range of stakeholders with an interest in drought research is seen as a potential challenge and communication from networks must be tailored for different sectors to overcome this. There is a role for networks to improve public perception, communicate uncertainty and manage expectations.

In order to maximise links between researchers and end-users it is necessary to engage with end-users at the research initiation stage and throughout the life of the project such that research is driven by outcomes required by end-users. Greater emphasis on communicating the outcomes of research and the relevance to end-users is required along with increased accessibility to research outputs.

1.4. The Water Security KE Programme

There were promising new connections made at the workshop and many participants were positive about following up on the issues identified. There was some concern over the longevity of the WSKEP and the need to deliver tangible outcomes. In addition to fostering cross-collaboration through a longer-term alliance, participants felt that the WSKEP should establish a portal for data sharing and promotion of water-related research projects. In this way interested parties can influence at the inception stage as well as have access to final research reports and project outcomes.

2. The workshop and report

This workshop was the ninth in a series being run on behalf of the Water Security Knowledge Exchange Programme (WSKEP) with funding from NERC. It was organized by HR Wallingford.

Nine Priority Subjects were identified at a national consultation event held in June 2011. The theme of this workshop was '**Improving Drought prediction, communication and impact assessment**'.

The workshop was designed to support the following key aims:

- increase awareness and uptake of research outputs in the focus area of 'Improving Drought prediction, communication and impact assessment'
- identify user needs and potential future research projects
- strengthen research/user group collaboration and networks

The workshop was divided into 4 sessions with initial presentations (available separately) as follows:

Session 1 Setting the scene and making connections
Introduction: Graham Leeks, CEH Wallingford

Towards a shared understanding of Priority Subject Area
Introduction: Professor Denis Peach, Chief Scientist, British Geological Survey

Session 2 Making the most of current research activity
Researcher's Point of view: Ian Holman, Cranfield University

Session 3 Identify areas for future research activity/collaborations

Future Research – funding and collaborations: Neil Runnalls, CEH Wallingford.

Session 4 Alliances, networks and advice to the WSKEP

Introduction: Hans Jensen, CEO UKWIR Ltd

The majority of the workshop time was devoted to opportunities for participative working among the 48 delegates. This report features the outcomes from those interactions as written up by delegates during the sessions. As such this report is primarily aimed as an ‘aide memoire’ for participants.

Elements from this report will be used to inform further development of the Water Security KEP.

3. Towards a shared understanding of the Priority Subject Area

Table groups discussed the contextual presentation by Denis Peach and noted key insights and issues, supported by a brief narrative, that enrich the Priority Subject Areas, as follows:

Ref	Insight/issue
3.1	Corporate memory of drought
3.2	Better models needed for recharge, spatial accuracy, soil moisture measurement
3.3	What indicators can we use to characterise drought that is relevant to different users (eg health, farming etc)
3.4	If we could predict droughts better, how would that change what we do – management, behaviour etc?
3.5	Water storage connectedness, - vulnerability of systems infrastructure is key
3.6	How much water do ‘we’ want to leave for the environment? How much do we want to pay for it?
3.7	Problems of doing research in/during droughts which are infrequent and communicating associated increasing uncertainty
3.8	How do we deal with severe situations when we have no data?
3.9	What is the likelihood of a 3 rd dry winter?
3.10	Infrastructure- water metering- affordability SMART
3.11	Communication- understanding the framework, weather forecast?, connecting with the public
3.12	Outcomes ahead of questions- proactive not reactive.

3.13	Does society still need better perception/understanding of uncertainty in forecasts and value/cost of water?
3.14	Are we missing water quality in forecasts of impact? Turbidity, chemistry, temperature (ecology)
3.15	Difficult to forecast with sufficient confidence- develop risk/frequency/heterogeneity dynamics
3.16	Understand drivers (regulatory, abstraction, rainfall, global climate patterns, users impacted) of the different kinds of drought (including back analysis of the current drought)
3.17	Linking prediction and climate variability with triggers for drought management actions
3.18	How do we understand the link between financial and political exposure and drought response?

4. Making the most of current research activity

This session gave participants the opportunity to learn more about current research programmes and to make new connections to add value to research taking place. Ian Holman gave an overview of research projects.

Individuals then gave a short introduction to research work they were involved with. Other participants had the opportunity to connect with programmes that interested them. Comments were captured, and participants logged their interest. 25 connections were identified across 8 research programmes.

5. Identify areas for potential future research activity / collaborations

Neil Runnalls CEH Wallingford gave an introduction to funding programmes in this area of work. Through table group discussions, individuals were invited to identify key propositions where further research/activity could be of value in taking forward this Priority Subject Area.

Twenty propositions were developed. These were roughly grouped in common themes by participants and discussed, as follows:

Ref	Propositions for further research / activity
5.1	Recharge –temporal (including seasonal) and spatial
5.2	Measurement of Soil moisture profiles and link to predicting droughts. Building results into recharge models sensitive to space and time
5.3	Analysis of seasonal pattern of rainfall in historic record and predicting future change in rainfall intensity for better hydrological modelling

5.4	Large scale weather patterns (especially blocking highs). Is past key to the future?
5.5	Better multi-seasonal weather forecasting, understanding caused relationships during weather/climate/hydrology and hydro-ecology
5.6	Drought indicators. We have a range of tools and approaches. But we need a better way of turning the indicators to suit a purpose
5.7	Health Impacts and Drought. What are the triggers? –Metal Health, Physical Health - 'Developed countries'
5.8	WSKEP to do: Multi-criteria data analysis and experts view on difficult issues. Eg on links between NAO and drought rainfall platforms
5.9	Storage transfer and recharge in catchment and socio economics
5.10	Treated and Grey water use- Dual supply for general household-Carbon energy savings and drought resilience
5.11	Integrated models to provide insight into recharge -inc. thresholds, non-linearity (social, economic, environmental) - inc. Dealing with trends and extremes
5.12	Map the models-Rationalization and integration of modelling approaches
5.13	Better interdisciplinary working to improve/link datasets and models (Funding!)
5.14	Raise awareness and find ways to translate into behavioural change (to avoid damaging impacts)
5.15	Communication amongst different communities
5.16	Public engagement in drought science and ground water
5.17	Communication of hydrological cycle. General understanding behaviour or practice change? Involve public in current situation
5.18	Balancing social, economic and environmental values
5.19	Hydro-Ecology, Dynamics and Temporal Variability
5.20	Water resource operation to manage risk under climate change

Prioritisation

Following the discussion, delegates were given 3 sticky dots to indicate the three propositions they believed should be given priority consideration. The table below shows the results of this prioritisation:

Ref	Proposition	Dots	Position
5.1	Recharge –temporal (including seasonal) and spatial	26	1
5.2	Measurement of Soil moisture profiles and link to predicting droughts		
5.3	Analysis of seasonal pattern of rainfall in historic record and predicting future change in rainfall intensity for better hydrological modelling		
5.14	Raise awareness and find ways to translate into behavioural change	24	2
5.15	Communication amongst different communities		
5.16	Public engagement in drought science and ground water		
5.17	Communication of hydrological cycle		
5.11	Integrated models to provide insight into recharge	23	3
5.12	Map the models-Rationalization and integration of modelling approaches		
5.13	Better interdisciplinary working to improve/link datasets and models		
5.18	Balancing social, economic and environmental values	14	4
5.19	Hydro-Ecology, Dynamics and Temporal Variability		
5.6	Drought indicators. We have a range of tools and approaches. But we need a better way of turning the indicators to suit a purpose	10	5
5.7	Health Impacts and Drought. What are the triggers?		
5.9	Storage transfer and recharge in catchment and socio economics	9	6
5.10	Treated and Grey water use- Dual supply for general household-Carbon energy savings and drought resilience		
5.20	Water resource operation to manage risk under climate change	6	7
5.4	Large scale weather patterns (especially blocking highs). Is past key to the future?	5	8
5.5	Better multi-seasonal weather forecasting, understanding caused relationships during weather/climate/hydrology and hydro-ecology		
5.8	WSKEP to do: Multi-criteria data analysis and experts view on difficult issues	3	9

6. Improving alliances and networks

Hans Jensen, CEO UKWIR Ltd, gave an overview of alliances and network approaches that help foster research and practice in this area.

Delegates, in table groups, were then invited to make suggestions for steps to further improve communication and networking, as follows:

Ref	Suggestions to improve networks/communication
6.1	Stop creating new networks – At Research Council level rationalise of existing networks at Proposal/impact stage
6.2	We need a 'UK Water Forum' (in broadest sense) (currently exists in separate silos)
6.3	Google Bot for hydrology- Trawls the web for gw related R+D/events
6.4	4 Common goals development with previous research presented/disseminated get rid of barriers like IPR
6.5	Learning/sharing takes time, need time off from the day job and organisations support
6.6	Bring end users and researchers together at the early stage in the research programme
6.7	Secondments –Dynamic two way exchange between previously unlinked organisations – Trust and Knowledge Building
6.8	Reaching out to more non-hydro stakeholders (e.g. in ecology, health, emergency services) and decision makers

7. How do we maximise the value of the Water Security KEP?

Table groups were invited to suggest ways to maximise the value of the Water Security Knowledge Exchange programme, as follows:

Ref	Insights for WSKEP
7.1	Web portal to publicise research in progress and planned. Links to more detailed info and reports
7.2	Can WSKEP promote Data Sharing? (and meta data) It costs a fortune.

7.3	WSKEP to facilitate the presentation and dissemination and results of research in detail (with funding)
7.4	Keep focus on outcomes
7.5	Common theme bite-size challenges
7.6	Dating agency between researchers and funders
7.7	Manage network non-creation
7.8	Keep WSKEP alive longer than 3 years