

CATCHMENT MANAGEMENT

Integrating catchment management research

UKWIR is working with the Environment Agency to deliver pilot catchment based studies testing source-pathway-impact models and focusing on the opportunities and barriers to the delivery of sustainable environmental management.

This 'Catchment Project' will build on and integrate UKWIR's collaborative projects on diffuse pollution, source apportionment and integrated catchment regulation. Its overall aims are to:

- identify alternative and potentially more sustainable approaches to water and wastewater treatment
- assess the costs and benefits (including carbon mitigation) of alternative approaches
- take account of future potential changes (land use, population growth, climate change)
- identify and address regulatory and practical issues (barriers, constraints, opportunities) in implementing more sustainable approaches
- consider transferrability of results to other catchments and the policy implications of significant changes to current frameworks and systems, including WFD compliance.

Table 1, below, indicates the provisional timetables in relation to the AMP5 chemicals investigation programme (CIP) and the WFD process.

NERC/UKWIR

A joint NERC/ UKWIR workshop, held in April 2009, and involving **Professor Louise Heathwaite**, NERC Team Leader for Sustainable Use of Natural Resources, identified catchment management as the top water research priority.

A follow-up workshop was held in October bringing together the water companies with representatives from other stakeholders, including the Natural Environment Research Council, academics, Defra and the Environment Agency. The purpose was to discuss ways to improve collaboration in research, with an emphasis on catchment management.

Simon Jackman, Head of Knowledge Exchange at NERC informed delegates that NERC are leading a major Government and Research Council initiative called *Living with Environmental Change* (LWEC), which will invest around £1bn in the next 10 years.

However, NERC currently does not have a single research programme addressing catchment management. Instead, there are several research programmes that include aspects of catchment management as follows:

- Flood Risk from Extreme Events (FREE)
- Virtual Observatory
- Changing Water Cycle (CWC)
- Storm Risk Mitigation
- Macronutrient Cycles (proposed for 2010)
- Biodiversity, Ecosystem Services and Sustainability (proposed for 2010)
- Valuation of Natural Resources and Biodiversity (proposed for 2010)

(more information can be found at: www.nerc.ac.uk/research/programmes)

Additionally, Defra has initiated a catchment sensitive farming initiative and a number of NGOs are promoting demonstration projects around the country. (www.defra.gov.uk/foodfarm/landmanage/water/csf/programme.htm)

The long and the short

The 2009 Periodic Review is now coming to a climax but already UKWIR is looking to the research needed to support the next Review in 2014

The recent Advisory Group Meeting in Warwick (described on page 2) prioritised next year's programme of research incorporating the likely key issues expected to be addressed at PR14.

Apart from this five year cycle, research needs to look further ahead, especially given the influence of climate change and the implementation of the European Water Framework Directive.

Catchment management is integral to this and UKWIR is joining up with major players in the sector to consolidate the work, as described on this page.

Looking even further ahead, the UKCP09 climate scenarios have recently been issued and the industry needs to investigate how these affect all aspects of water companies' business over this century.

UKWIR has carried out a 'rapid assessment' project assessing the impact of the new scenarios (see page 3) as a precursor to more detailed investigations.

UKWIR Project Manager, **Brian Ellor** of United Utilities and manager for many of UKWIR's wastewater projects, related how the interim Ofwat determination supports water company plans for more than thirty catchment management schemes.

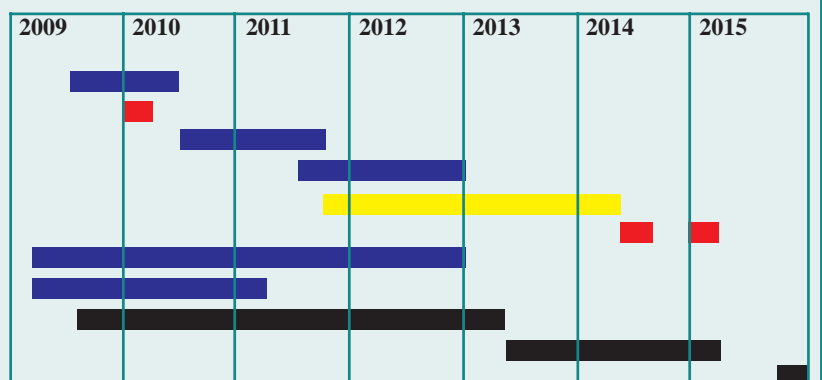
It also promotes a national sampling and analysis programme for a wide range of chemicals at an estimated cost of more than £30M between 2010 and 2012.

Following the presentations there were a series of breakout sessions to discuss the issues and will contribute to a report of the event.

A list of recent UKWIR catchment management reports is given on page 4.

Table 1. Project timetables and regulatory requirements

- Development of the chemicals investigation programme (CIP)
- Water company final business plans completed
- CIP monitoring programme
- CIP options appraisal reporting
- Technology development
- Company draft and final business plans PR14
- Source apportionment and catchment study
- Integrated catchment regulation
- River basin management plans
- Review the plans
- Directive objectives for the river basin management plans



Prioritising the research

Over recent years UKWIR has honed the process that gathers research proposals from members and then enables them to achieve maximum value from the available funding through providing means for discussion, prioritization and selection of the most needed projects.

The timing of the research also needs to dovetail with the five year Periodic Review cycle with outputs available well in time to influence and contribute to water companies' business plans.

An UKWIR workshop held in April gathered stakeholders together to identify the issues pertinent to the next Periodic Review.

These included such issues as environmental and carbon accounting, climate change, next generation CBA adaptation, impact of monitoring, measuring and managing risk and matching aspirations for demand management.

Warwick workshop

The prioritising stage came to a head on 23 September at the UKWIR Advisory Group meeting at Warwick University.

UKWIR Board Member, **Julian Dennis**, Wessex Water's Director of Environment, Science and Sustainability, welcomed the delegates from England, Wales, Scotland and Northern Ireland.

He also welcomed **Rick Karlin**, Deputy Director of one of UKWIR regular collaborators, the Water Research Foundation in the USA who took the opportunity to brief delegates on their research programme and the opportunities for collaboration.

UKWIR Director, **Mike Farrimond**, then set the scene by describing the development of



Julian Dennis introduces WRF's Rick Karlin

the 2010/11 research programme.

From the beginning of this year until 1 May the UKWIR website was open for members to submit 'short form' proposals. After a period for consolidation, the website was open in June and July for the completion of full research proposals.

Figure 1 illustrates the need to prioritise projects as the cost of all the proposals far exceeds the eventual funding available. The exact number of projects that will go ahead will depend on the extent of collaborative funding, the final tenders and the subscriptions from UKWIR members on-line.

In August representatives from member companies voted on the proposals on-line.

From this sixteen projects were selected to go ahead and twenty nine were rejected. This left thirty eight projects for delegates to discuss and cast their final vote.

The delegates were reminded how the proposals fit in with UKWIR's short, medium and long term research themes, the latter illustrated in table 2.

They were also made aware of the important issues the UKWIR Board had identified.

- commitment to climate change projects beyond 2010/11
- climate & energy & collaboration
- the OFWAT price determination
- CAVE Review and Defra consultation.

With so many projects to judge, a smooth running of the day was vital.

The facilitator, **Chris Overton**, had set up an electronic voting system which was instrumental in keeping the momentum and finishing on schedule.

Following this workshop much endeavour has taken place to finalise the programme that will begin in 2010.

Project Managers have been appointed and project steering groups established. Tender documents are being prepared and by the time this newsletter is out, the website will be open for 'expressions of interest' from potential contractors.

Projects are due to go out to tender in January and, following tender evaluation in February, projects will begin in April 2010. By which time the selection for the 2011/12 year will have begun

You can visit www.ukwir.org to see details of the latest research programme.

Roadmaps

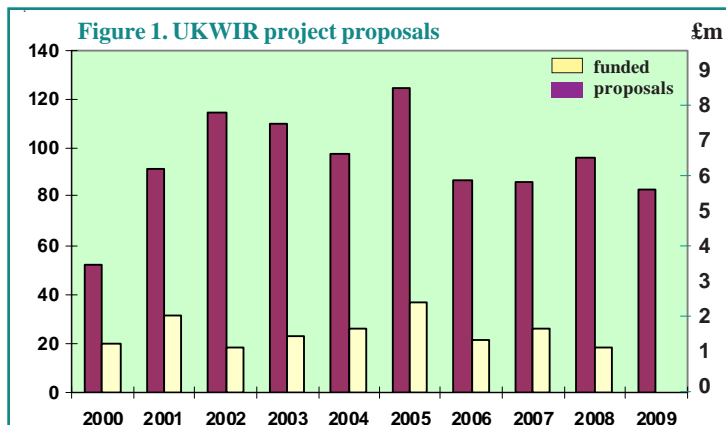
As part of the process of developing the research programme, UKWIR is extending and updating a series of R&D Roadmaps that were first compiled two years ago.

Over the coming months the following will be discussed and updated:

- Biosolids wastes & energy
- Climate change
- Customer
- Leakage
- Sewerage
- Wastewater
- Water resources

Table 2. Medium and long-term needs

THEMES	Water resources	Water treatment	Water distribution	Sewerage	Wastewater treatment	Waste management
Asset Stewardship			Impact of climate change on assets	Sustainable drainage/CSOs; Ground-water Directive		
Customer Service	Water efficiency/customer behaviour					
Supply & Demand	Climate change adaption and mitigation					
Environmental & Public Health Protection	Emerging chemicals and pathogens			Implications of the WFD, Priority and dangerous substances		
Sustainable Development	Chemical usage; climate change mitigation; carbon impacts; incentivising innovation & sustainable solutions; energy management					
Economic efficiency/Regulation		Telemetry (data for regulators) and remote sensing				



Delegates consider before voting at Warwick

Looking at chlorine's future

An UKWIR project, *Chlorine Usage, Availability and Trends*, was undertaken to help plan effectively for medium to long term changes in either the availability or acceptability of chlorine for water treatment.

A survey of chlorine use by UK water companies showed the total UK annual usage to be around 12,600 tonnes of chlorine equivalent comprising, chlorine gas, sodium hypochlorite and the production from on-site electrolytic chlorination.

Around 75 per cent of the total chlorine use is for disinfection, with the majority of the remainder being used for iron and manganese removal.

Dependent

The study found that the water industry is heavily dependent on chlorine supplies manufactured in the UK.

Other companies provide chlorine gas, supplied by the main UK manufacturer, in cylinders and drums and some of these companies have contingency plans for importing chlorine gas.

Several water companies have contingency plans for moving cylinders or drums between their sites, in case of a short term failure of supply.

The project report is reassuring in terms of potential negative pressures on the use of chlorine.

The CO₂ emissions from chlorine manufacture and transport are not a major factor in water supply overall. They are likely to reduce further as manufacturers strive to achieve lower energy targets with implementation of new technology. Thus the acceptability of chlorine on environmental grounds is unlikely to become a significant factor.

No potential regulatory changes appear to be on the horizon, emanation either from the Drinking Water Directive or from the proposed revision to the Directive, which would make chlorine less acceptable in terms of its disinfection performance.

On examining the bi-products from the disinfection process, the study judged it is unlikely that any changes to by-product standards will impact on the acceptability of chlorine in the foreseeable future.

The non-chlorine alternative disinfection processes reviewed in the study (UV, ozonation and membrane treatment) are unlikely to replace chlorine in its entirety due to the requirement to maintain disinfection through the distribution system.

Costly alternative

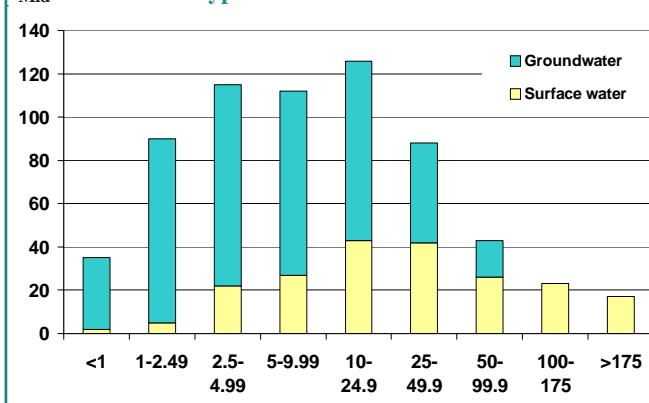
Such alternative treatment processes have the potential to appreciably reduce chlorine requirements but the associated capital and operating costs will be very high, compared with the cost for chlorine.

Energy use and greenhouse gas emissions would also be greatly increased for ozone, UV and membrane treatment.

Chlorinous taste and odour complaints account for a significant proportion of total customer water quality contacts but there is no indication that these have increased nationally over the past five years.

This suggests that water companies are managing chlorine residuals in drinking water to limit the impact on customer acceptability.

Figure 2. Number of works using chlorine by size and raw water type



CLIMATE CHANGE

Assimilating the climate scenarios

At an UKWIR project dissemination workshop in October, UKWIR Client Manager for Water Resources, **Luke de Vial** said that the central assumptions in the UKCP09 climate scenarios are not much different from the earlier 2002 scenarios.

There had been several delays in issuing the latest scenarios leaving little time to incorporate them in the water companies' Water Resources Management Plans.

They require, among other things, predicting future changes in river flow for the 2020s for seventy catchments across the UK.

It had been decided to undertake a 'rapid assessment' project to find out whether there are any big surprises or significant issues. It also helps to set out a roadmap of the work to be carried out over the next three years.

Indeed UKWIR are to carry out two projects in collaboration with the Environment Agency in the new year.

- *Impact of UKCP09 Projections on the Demand for Water* will supply

reliable demand estimates in assessing the supply/demand balance.

- *Impact of UKCP09 Projections on River Flows and Groundwater Recharge* will also be carried out in conjunction with *BGS, NERC and CEH*.

Dr. Steven Wade, from the contractor HR Wallingford, said that the science is now stronger and there is more information available. Thus there are opportunities for water resources planners to estimate risks, appraise options and give a stronger case for investment.

The extra detailed information, though, means end-users have to work harder and smarter to get the most out of this information.

He listed the stakeholder requirements that the UKCIP09 scenarios plus additional research can meet:

- a better understanding of climate risks and uncertainties
- a central estimate of the climate impacts for next 30 years – for supply and demand forecasts

- an estimate of the spread of climate impacts for the next 30 years – for headroom
- the probability of exceeding thresholds/'tipping points' – e.g. long droughts and systemic risks
- a 'sound' approach to meet regulatory requirements and for customers, consultees and investors
- a practical approach that can be implemented by water companies and their consultants.

To apply the scenarios in full would require applying a data set of 10,000 climate projections. It was decided to see if there was a 'best' small set of samples.

In the end a set of twenty one dataset of twenty 'smart' samples and five simple climate scenarios 'mid', 'wet', 'dry', 'medium-wet' and 'medium dry' were derived.

The workshop also afforded company representatives to air their experiences and concerns about the UKCP09 scenarios thus far.

Drought code of practice

In 2006 UKWIR carried out a review to identify where improvements could be made to the regulations and legislation to simplify the management of demand during droughts.

One of the recommendations was that the industry, through UKWIR, should develop a code of practice relating to water use restrictions.

Code of Practice and Guidance on Water Use Restrictions is a voluntary code designed to aid water companies when updating their drought plans and when evaluating the implementation of water use restrictions during a drought.

The Code ensures a consistent and transparent approach and deals with how to communicate clearly with customers.

The guidance also:

- summarises the proposed changes to the legislation and the impact of these
- recommends definitions for key terms in the legislation
- provides information relating to water using activities that companies can restrict during times of drought
- provides information to help companies decide how and when to impose different types of restriction.

The guidance is designed to complement water companies' statutory drought plans without contravening them.

It is suggested that this guidance is revisited and updated if necessary each time there is a change in legislation and every three years when the water company drought plans are updated.

Leakage's natural rate of rise

Factors Affecting the Natural Rate of Rise of Leakage addresses the thorny issue of the hypothetical annual increase in leakage that would occur if neither reported nor detected leaks are repaired nor other leakage control interventions are carried out.

A best practice method for calculating the natural rate of rise (NRR) from district meter area night flows and leak repair data was developed in an earlier UKWIR project.

The study looked at how the NRR is related to network infrastructure characteristics such as mains length and number of properties, mains material and age and network pressure. A fifth characteristic, 'network disruption' also appears to be an important aspect that is recommended for further investigation.

The project also incorporated a desk study investigating the factors that influence leak visibility and the measurement of leak flows over time in order to assess how a leak grows.

This edition features a listing of UKWIR publications issued since the last newsletter.

CLIMATE CHANGE

09/CL/01/10 Carbon Accounting in the Water Industry: Non-CO₂ Emissions (I 84057 532 8) £100

CUSTOMERS

09/CU/01/4 Issues Regarding the Potential Adoption of Supply Pipes: Costs, Customer Service and Regulatory Impacts (I 84057 537 9) £250

009/CU/04/6 Debt Collection Performance and Income Deprivation (I 84057 531 X) £500

DRINKING WATER QUALITY

09/DW/11/3 WHO and EUREAU Support - Progress 2007-2009 (I 84057 538 7) £100

09/DW/13/1 Chlorine Usage, Availability and Trends (I 84057 540 9) £400

WASTEWATER TREATMENT & SEWERAGE

09/WW/05/4 Maximising the Value of Biogas: Vol. 1, Summary Report (I 84057 534 4) £200

09/WW/05/5 Maximising the Value of Biogas: Vol. 1, Technical Report (I 84057 535 2)

WATER MAINS & SEWERS

09/WM/08/38 Exploring the Cost Benefit of Separating Direct Surface Water Inputs from the Combined Sewerage System (I 84057 533 8) £100

09/WM/08/38 Linking Distribution Mains Rehabilitation to Performance (I 84057 539 5) £600

09/WM/08/40 Factors Affecting the Natural Rate of Rise of Leakage (I 84057 530 1) £300

WATER RESOURCES

09/WR/07/13 Code of Practice and Guidance on Water Use Restrictions (I 84057 536 0) £40

The following are the main recent collaborative reports relating to integrated catchment management (reference article on page 1)

04/WW/17/2 Priority hazardous substances, trace organics and diffuse pollution (WFD) - series of reports (I 84057 322 8) £470

04/WW/17/3 Priority hazardous substances, trace organics and diffuse pollution (WFD) - series of reports (I 84057 334 1) £470

04/WW/17/4 Priority hazardous substances, trace organics and diffuse pollution (WFD) - series of reports (I 84057 332 5) £470

04/WW/17/5 Priority hazardous substances, trace organics and diffuse pollution (WFD) - series of reports (I 84057 333 3) £470

07/CL/04/10 Effect of climate change on river flows and groundwater recharge: a practical methodology (I 84057 443 7) £200

07/CL/06/5 Climate change, the aquatic environment and the Water Framework Directive (I 84057 434 8) £300

07/SL/02/7 Application of phosphorus in biosolids to agricultural soils (I 84057 449 6) £250

07/WW/17/7 Dangerous substances and priority hazardous substances/priority substances under the WFD (I 84057 464 X) £500

07/WW/17/9 Ribble SIMCAT pilot study: assessment of relative contributions & impact of control measures on water quality (I 84057 489 5) £200

08/WW/20/3 Water Framework Directive: sustainable treatment solutions for achieving good ecological status (I 84057 501 8) £250

08/WW/23/5 Methodologies for catchment based consents (I 84057 561 6) £200

08/WW/25/5 Development of a procedure for estimating emissions of pollution inventory substances from WwTWs (I 84057 498 4) £300

UKWIR research reports are available for purchase via the internet on www.ukwir.org

UKWIR PEOPLE

UKWIR collaborates with a number of research organisations across the world. One of key contacts is **Rick Karlin** who is Director of Partnerships at the Water Research Foundation in the USA.

Collaboration with the Foundation goes back many years and has included projects on drinking water quality, climate change and automatic meter reading.

The Foundation currently contributes to the *Water Mains Failures Database* and is involved in the Large Diameter Trunk Mains Failures project.



Statements contained in the UKWIR Newsletter do not necessarily represent the views of UKWIR or the Water Industry

If you wish to receive electronic copies of UKWIR NEWS, just send an email to mail@ukwir.org.uk