

A CIWEM-CMS Conference

Integrated Water Management Priorities and Direction

October 21st Hamilton House, London

The aim of this conference is to explore and debate integrated water management and what it has to offer the water sector facing a wide range of new policy challenges. The conference will describe mechanisms for aiding the delivery of integrated solutions including, integrated catchment management, water cycle planning, partnership working, and the consideration of ecosystem services. The conference will aid the preparation of a report that will help identify priorities and mechanisms for more effective integration.

Sponsors

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Sponsorship: If you are interested in sponsoring this event please contact Lauren Goozee lauren@ciwem.org or Justin Taberham justin@ciwem.org or ring them on 0207 831 3110

Please circulate to colleagues who may be interested

A conference organised by CMS - Communications and Management for Sustainability in partnership with CIWEM

Welcome to the conference

This information gives the answers to some of the most frequently raised questions that arise at the conferences we organise.

Conference Outputs

- **The Power Point presentations** and delegate notes will be available shortly after the event on the CMS www.coastms.co.uk and CIWEM www.ciwem.org websites. We will notify you by email when these have been placed on the sites.
- The data from the questions posed and a short report will also be made available.

Questions – Bookings – Receipts – In house information If you have any questions during the event about bookings, finances, or logistics please see **Christina Beech** at the registration desk; she will be pleased to help.

Timing We will try to ensure that the conference runs on time to allow the allocated time for speakers and as importantly for discussion. A bell will be rung 5 minutes before the start of sessions.

Refreshment Breaks In running events in London over the last 15 years we have used two main refreshment breaks during the day that enable us to split the sessions and breaks more evenly. A sandwich buffet is available in the first break and sweet course during the second.

Food There is always ample food at the events and you can come back for more. Once you have collected your food **could you move away** from the serving table. Catering staff are on hand if you need anything, including extra drinks.

Delegate list A list of the delegates to 11 October is at the end of the delegate notes.

Evaluation form There is a questionnaire and evaluation form in your delegate pack; your views will help us improve future events. Please leave these at the registration desk along with your badge when you leave.

NB Valuables **If you have anything you value keep it with you i.e. do not leave laptops unattended.**

Before you leave Check you haven't left anything in the conference hall.

Please also take any **leaflets or reports**.

Programme

9.00 Registration and refreshments

9.45 Session 1 Welcome Chairman: Chris Barker Environmental Regulation Technical Director MWH

9.50 Introduction – Why now? Bob Earll CMS

10.00 Understanding integration – what can I do? Kevin Collins Open University

10.20 An EA perspective on integrated water management - Trevor Bishop Environment Agency

10.35 Integrated Water Management from Cloud to Coast Dr Kunle Akande
Associate Director, Halcrow

11.50 Integration – philosophy or fantasy? Professor David Butler
Centre for Water Systems, University of Exeter

11.05 Integrating flooding into water management Robert Cunningham RSPB

11.20 Discussion - Q & A – Points from audience - Panel

11.55 First break

12.40 Session 2 Integrated Water Management - Mechanisms and case studies
Chairman: Peter Bide Communities and Local Government

12.40 Water and Communities - Integrating water into spatial planning and the LDF
Robert Barker Baca Architects

12.55 Developing an integrated water management strategy to overcome conflicts between urban growth, water infrastructure and environmental quality; a case study from Ashford, Kent
Sean Furey CPRE - Protect Kent

13.10 Upstream Thinking: Delivering catchment management cost effectively with stakeholders
Martin Ross, Environmental Manager, South West Water

13.25 Discussion - Q & A – Points from audience - Panel

14.00 2nd break

Session 3: Session 3 Integrated Water Management – Mechanisms and case studies
Chairman: Chris Ryder Defra

14.40 The key elements of integrated catchment management Bob Harris
Defra & Sheffield University

14.55 Integrated catchment management and WFD Kieran Conlan Cascade Consulting

15.10 Integrated water management – A National Trust Perspective Rob Jarman National Trust

15.25 Discussion - Q & A – Points from audience - Panel

15.55 Concluding comments – Next steps

16.00 End

Integrated Water Management Conference - Pre-Meeting Note

Version October 6th 2010

October 21st, London

Bob Earll

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1. Introduction

The key function of this conference is to discuss and debate key ideas around integration for input into the Coalition Government's White Paper on the reform of the water industry. This note has evolved and served a number of functions

- to help organise the programme for the conference
- guide the interaction and questions to be posed at the event
- it will also help inform the post conference report and CIWEM work-stream on the White Paper

This initial set of programme ideas is based on the responses to the questions sent out by CIWEM in March 2010. The water sector is often portrayed as highly fragmented and working in isolated silos and yet some of the major policy drivers require an integrated and holistic view of water in relation to issues such as population growth, planning and development, WFD, land use, valuation and climate change. A range of mechanisms that will be covered by the conference now enable a much higher level of integrated working.

The aim of this conference is to explore, debate and understand integrated water management and what it has to offer the water sector facing a wide range of new challenges. The conference will describe mechanisms for aiding the delivery of integrated solutions including, integrated catchment management, water cycle planning, partnership working, and the consideration of ecosystem services.

Objectives

- To explore the current views in the UK on integrated water management
- To understand the drivers for a more integrated approach to water management
- To look at the benefits and costs, barriers and other detailed questions relating to integrated water management and priorities
- To look at ways of working in a more integrated manner that would offer clear benefits and address particular priorities
- To enable delegates to think through the elements of integration and how it can apply to their work
- To support the production of a CIWEM report on Integrated Water Management

2. An Introduction to Integrating Water Management

2.1 Timing – why now?

There are a number of reasons for holding this conference now:

- 1) The Coalition Government have set out their commitment to publish a Water White Paper by June 2011 as a precursor to legislation (Defra Structural Reform Plan July 2010)
- 2) The Government's key objective is to reduce the overall size of the public budget, integration could be an effective way of getting more for less expenditure. Their pursuit of the 'Big Society' also implies greater participation and partnership in projects on the ground (localism). The reverse of 'Big Government' implying more local engagement.

- 3) We are at the start of the next water planning cycle for PR14 and WFD 2015 – big ideas like this would take some time to permeate thinking. This theme links closely with the other work stream CIWEM are progressing on *Regulation for a Sustainable Water Industry*
- 4) All sorts of policy drivers are highlighting the need for better integration both within the water sector (e.g. WFD) and between water and other major interest areas e.g. energy, land-use, to improve delivery
- 5) Integrated solutions such as identified in the Flood and Water Management Act for surface water management or the SCAMP project are being recognised as *more effective* ways of delivering schemes
- 6) More effective means in many cases using the finances from a variety of organisations (partners) to deliver schemes that work (multiple objectives, multiple benefits, multiple funding streams). The lack of public finance or the need for its better use might be a considerable driver {The Total Place programme – looking at creating efficiencies between national and local projects}.
- 7) There are various catchment initiatives underway that are also leading to an interest in more integrated working:
 - Water Company post PR09 ‘catchment schemes’ – over 100 (from 2010)
 - The Defra Demonstration test catchment project
 - Virtual observatories – academic research initiatives

2.2 Terms

We need to be clear about several terms and qualify **who** the water sector is and **what** integration would be applied too. Some crude definitions to start with:

Integration The process of bringing different but related functions together to deliver more effective and sustainable outcomes....this would in the first instance imply a much closer operational link between flooding, water quality and water resources and the various links to the natural environment etc. Integration of water with *external* sectors e.g. energy, and land use.

Who - The water sector would include: policy makers and legislators, regulators, managers, water companies, consultants, and wider stakeholders engaged in water matters such as those working in local authorities, planning, urban architecture, highways, rural and farming, industry and NGOs.

What - Water subjects including policies, regulations, management and research for flood risk management, water resources, and water quality (including drinking water and pollution control), biodiversity and ecosystem services [not marine for this conference].

The integration and catchment diagram

The whole water industry is traditionally focussed on operation and work on a catchment scale and those that at the forefront of promoting a more integrated view of the water sector produce diagrams of the sort set out below

The catchment version // the Waste water version /// box diagram

Mapping how water is inter-connected may well help focus/prioritise actions

2.3 A general response

CIWEM in its activities and conferences routinely come across the general response about the lack of integration which is often put more routinely in terms of ‘silo’ or ‘not joined-up thinking’ or a ‘bunker mentality’ where activities, projects, schemes are undertaken with only one function in mind oblivious of other functionality or to the detriment of other functions. This has no philosophical basis other than appearing ineffective.

Figure 1 A Framework for Delivering Sustainability

Delivering Sustainability - Four basic concepts

1. **Time** – Taking the long term view [*Futurity*]
2. **Dimensions of sustainability** – Economic + Environment + Social + others Delivered together - *Holism, Integration*
3. **People** – Practitioners & Organisations [*Participation and decision making*]
4. **Process** - Time + Content + People -> Process; [*Adaptive management*]

ACTIVITY	STAGE							
	Policy	Strategy	Feasibility	Design	Construct	Operation	Decommissioning	
Visioning	XXX			XXX		XX		
Scoping	XXX	XXX	XXX	XXX				
Option Assessment	XXX	XXX	XXX	XX	X	X	XX	
Appraisal / Assessment	XXX	XXX	XXX	XX	X	X	XX	
Reporting (Statement)	XXX	XXX	XXX	XX	X	X	XX	
Planning (Management objectives, indicators)	X	X	X	XXX	XX	XXX	XX	
Implementation					XXX	XXX	XX	
Monitoring	X	X			XXX	XXX	XXX	
Audit					XX	XXX	XXX	
Review	X	X				XXX	XX	

Dimensions of Sustainability

Generic points:

The dimensions usually include a minimum of econ + social + environment but often other dimensions
 Often directly related to specific methodologies
 The idea of capitals e.g. social capital can also be applied to these dimensions

1. **Environmental** [Limits, systems, ecosystems goods and services]
2. **Social**
3. **Economics**
4. **Governance**
5. **Science & Information**
6. **Resource Management**

Governing Principles

Generic points:

The governing Principles are powerful ideas
 Cross cutting and applicable to *all* the sustainability approach components
 Often directly related to specific methodologies

1. **Futurity – A long term view**
2. **Integration**
3. **Holism**
4. **Participation and Decision making**
5. **Precaution**
6. **Equality**
7. **Process e.g. Adaptive Management**

Approaches to Sustainability

Generic Characteristics

- Key Idea sets – Sustainability approaches - packages of ideas
- They have arisen from different sources , organisations and conventions
- They including packages of key ideas content and principles
- Delivery involves looking at the content and principles together i.e. as packages
- They approaches are broadly equivalent
- They could lead directly to delivery though some are more user friendly than others
- 'Organisations' customise / select the approach they use to meet their particular needs

Examples: CSR, Ecosystem approach, ICZM, Sustainable communities, UK – five boxes, One Planet living etc

Methodology Sets

Generic Characteristics

- These are practical methodologies
- That have been applied /developed over many years
- Often independently of being applied to sustainability
- There are now a growing number [50+]
- They can be grouped into sets

Examples include:

Sustainability tools: Sustainability appraisal, computer methods, Futurity tools (Scenario analysis, visioning, Foresight, Future search
Environment: EIA, EMS, Decommissioning – methodologies related to life cycle of projects //
Risk Assessment techniques // Economics: Cost Benefit Analysis, Cost effectiveness analysis, Regulatory Impact assmt etc, Ecosystem services
Social: Societal Assessments, Well-being assmts [Quality of life]
Health: Health Impact Assessments//
Participation techniques//
Carbon: Audits etc; Reduction programmes// Planning and spatial planning// Change management

Figure 1 Charles Ainger's Diagram of Catchment Interactions
Figure 2 Bruce Durham's Diagram in relation to Water Re-Use [Permission of Veolia Water]

Collaborate with regulators - EA and DWI, in 'Catchment Consenting? – in data, models, solutions

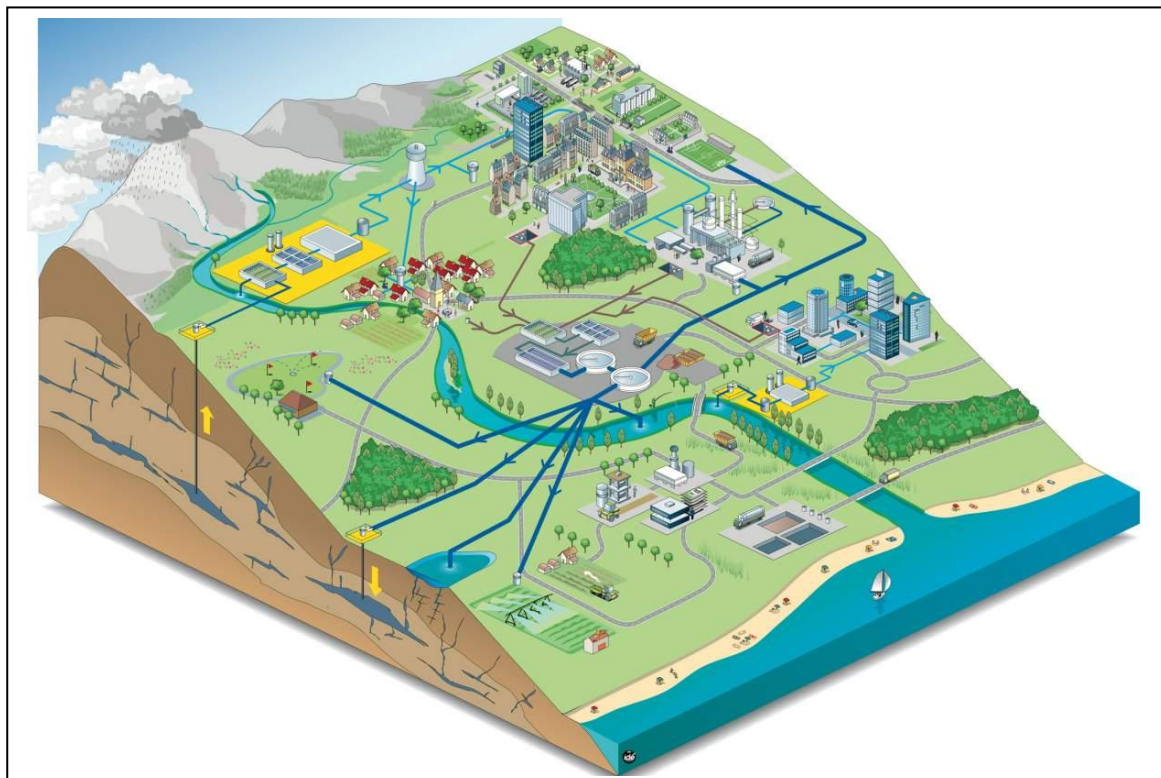
- Use 'service' outcomes; 'good ecological status'; 'water safety' – defined on a whole-catchment basis
- Collaborate to define both problems & solutions
- Combine statistical and deterministic catchment models - EAs & WatCos working together

'Overall, there is scope for much better data use, data quality, modelling and real-time data control to deliver greatest returns'
(Ofwat Stakeholder workshop: an 'Innovation Platform' in the Water Industry; 20/2/09)

The diagram, titled 'The Catchment Elements', illustrates the flow of water and pollutants through a catchment area. It is divided into two main regions: a 'Rural Catchment' (green) and an 'Urban Catchment' (purple). The Rural Catchment includes 'Diffuse Pollutants' (represented by a cow icon) and 'Baseflows' that contribute to the 'River'. The Urban Catchment includes 'Foul sewer' and 'SW sewer' lines that lead to 'CS' (Combined Sewer) and 'PS' (Pretreatment Station) facilities. These facilities feed into an 'Inlet CSO' (Combined Sewer Overflow) and a 'Storm Tank'. The 'Storm Tank' feeds into a 'WwTW' (Wastewater Treatment Works). The 'WwTW' produces 'Final Effluent' which is discharged into the 'River'. The 'River' also receives input from 'EO' (Effluent Outfall). The diagram shows the interaction between these elements and how they contribute to the overall catchment's water quality and flow.

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2.4 Delivering sustainability

The strongest philosophical driver for integration is the Government's policy toward sustainable development which requires that environmental and societal imperatives need to be integrated with and supported by effective economic, scientific and governance mechanisms (Map Page 6). Integration is one of the key sustainability principles highlighted in virtually every approach used to delivering sustainability (CIWEM Guidance on Delivering Sustainability). Combined with another principle – holism – where broad and encompassing view of issues is taken this is why we see people advocating more integrated solutions across society not just in relation to water management.

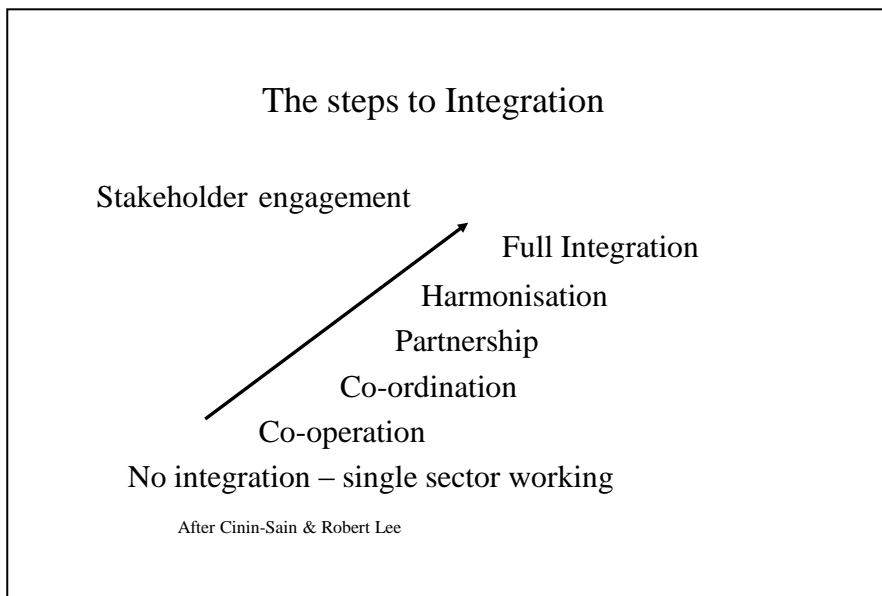
In developing or water stressed countries there are strong arguments for viewing water in a holistic /integrated manner because it is such a key resources and funds are limited. In the UK because water is relatively plentiful we tend to take it for granted until droughts or floods strike which then prompts backlash, reactive management. The water sector is so large in the UK that specialist groupings (water treatment, drinking water, FRM, water resources, groundwater etc) have evolved over time and have an effective critical mass to operate separately.

2.5 Degrees of integration – direction of travel

In integrated coastal zone management (ICZM) a model put forward by Cicin Sain and Robert Lee (Figure 3) outlines a spectrum of degrees of integration from none to fully integrated.

This is helpful in that it shows:

- a direction of travel
- and introduces a reality into what might be expected
- and what can be done at particular points.



The coastal and marine environment (R. Cincin-Sain) has been highly sectoralised (no integration) but this has begun to change with the introduction of various mechanisms

- No integration – sectors only meet at points of conflict
- Cross sectoral meetings – where different sectors share experience
- Partnership working – forums at various geographic scales
- Shared visions/ goals across sectors
- Co-ordination – groups across the industry with particular aims
- Integrated marine planning which aims to integrate views of all the sectors

This sequence is also paralleled by the level of stakeholder engagement from very little to a great deal; greater and more effective participation is also a key European and International driver (Aarhus Convention).

2.6 Policy Drivers forcing integration

There are a number of high profile policy and legislative drivers forcing better integration these include:

Climate change: Every part of the water sector is being and will be affected by climate change. The water sector's response to this is broadening its engagement with the public (over water resources and flooding) and the energy sector in particular.

Water Cycle Planning: It is particularly evident that planning professionals and architects in particular do not view water in a sectoral way. Water cycle planning driven by growing population growth and development pressure from central government (CLG) is becoming common place and various offers were made to the questions posed by CIWEM re presentations. Housing delivery in water stressed areas – no integration of policy objectives

The Water Framework Directive The spirit of the WFD is about integrated water management and it is viewed in many EU countries in this way. The outcomes of the first round of River Basin District Plans have been disappointing in the sense that the business as usual EA and Water companies model of measures is the predominant paradigm but many people have commented that this should not be so. Many have argued that the costs and range of measures should be applied much more widely across non-water sectors in order to deliver the WFD.

Flooding The Flood and water management Act deliberately sets out more integrated mechanisms to deal with urban flooding through surface water management plans and partnership working with flood authorities.

Ecosystem services This area, now the subject of a major UK wide initiative, is pulling together a wide ranging view of the way we value many aspects of both our environment and society that are not usually amenable to simple cost-benefit type assessment. This will mean that the broader value of particular projects can be assessed more effectively. Govt supposed to embed ecosystem services into all policy appraisals

2.7 The current situation, priorities, examples, history

Pre-privatisation A number of respondents to the questions went back to remind us that pre-privatisation there was a much more integrated view of water management on a regional and catchment scale. This might well be the case but we need to face the issues we have now and draw on the best practice of history.

The current situation An understanding of the current situation within the water sector would also be useful to explore precise points where better integration would be beneficial. This process might identify priorities for where better integration is needed

What is to be integrated?

- Policy
- Between sector policies – energy and water, waste and water (co-digestion)
- Legislation – calls for a single Water Act as in Germany (Prof Colin Green), rather than as now a series of individual acts that haven't been looked at together
- Management – catchment scale
- Scheme delivery – partnership working
- Within and between organisations – partnership working

It would be more helpful to know where there are specific areas (priorities) where a more integrated solution would offer real benefits and to identify these with **examples** and a weight of views from the audience. For example better integration between A and B or A and Z would lead to cumulative benefits.

Examples One could argue that there are at least two good examples at integrated water management in the UK:

- **the Periodic review process** where societal (CCW Water), Environmental (EA & NE) and economic (Ofwat) views are combined to drive the water industry forward; but there is a debate about how sustainability is delivered (who is the 'sustainability regulator'?)
- **Making Space for Water** the policy on flood risk management made a good attempt to reconcile the three main elements also in 2005/6

However, we often discover the need for better integration after high profile incidents which force action.

- **The 2007 Floods and the Pitt review** Although integrated urban drainage was much discussed as an idea it took the floods of 2007 and the Pitt Review to effectively introduce the integration needed between the rivers and coastal sector and the water industry drainage sector with the input of other key stakeholders not least local authorities. The Flood Forecasting Unit and the new discipline of hydro-meteorology are other products of this event but there is a need for better integration.

There are probably other priority areas in the map of where integration could be applied to most effect.

Catchment management and integrated catchment management

The reality of water management in the UK is that it is undertaken at the catchment or sub-catchment level. This is a deeply ingrained idea in the water sector and is based on everything from A level geography texts to the way industry runs itself. It is contrary to the regional river basin plans. The problem is that while many parts of the sector work at a catchment scale they don't work in an integrated way – we don't have *integrated* catchment management.

Interestingly GIS resource driven technologies would facilitate decision making across sectors. Belatedly, in the first RBD Planning round the Environment Agency fully acknowledged (2008) the importance delivering measures at a catchment scale.

2.9 Mindsets and water - Beware

Mindsets and water Although the Australians are held up as good examples of providing integrated catchment management the major drought that has just occurred is forcing a major rethink of what in effect has been a European mind set to catchment management. In this case the profound lack of water has forced many areas of policy to be changed. This is clearly a critical point because in flood prone or water stressed areas the way issues are dealt with will be different. The good ecological status of a dry summer river bed in Spain clearly has implications for the WFD! The way individuals mindsets are framed will depend on their context and experience.

We can't do it because 'it's too big, too complex, too many people' – well welcome to the real world - and in any event there are ways of breaking the challenge down

We'll do it but from our sectors point of view One might also be aware that various proponents will come at this from their sectors position this might be a useful starting point but logically water should be regarded as one resource For example - "We do it – its call integrated water resource management" – begging the question about what happens to flooding, or water quality etc

Understanding integration: what can I do?

Kevin Collins

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In recent years, the context of managing water in the European Union and globally has changed with an increased urgency to develop more holistic and integrated approaches.

On many levels, calls for integrated approaches to water managing are to be welcomed since they provide opportunities for drawing attention to the complex dynamics of water catchments. But they also pose a fundamental and largely unaddressed question: are current scientific and policy practices able to meet the demands of 'doing' effective integrated water management?

This question arises because integrated water management is increasingly experienced as a very 'messy' situation. Not least, the task of making sense of multiple scales and stakeholders perspectives' in the context of governance and institutional arrangements, which are themselves shaped by theoretical framings of a human-environment relationship and bio-physical processes and systems. The ensuing reliance on policy tools and practices which are not designed to make sense of, or accommodate, the systemic nature of complex situations serves to aggravate the frustration at why water management is not better integrated.

This presentation offers some insights on how we can think about integration. It draws on the discipline of systems thinking and practice to explore what we mean by integration, the reasons why it is difficult to progress and offers some practical suggestions and ways forward. Delegates will be invited to consider their own experiences in relation to the key aspects of integration raised in the presentation.

Environment Agency Perspective on Integrated Water Management

Trevor Bishop

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The management approach for water, across England and Wales, has largely developed organically over the last two decades. Legislative interventions have made positive changes to the regime but these have largely been directed towards specific components parts rather than aligning inter relationships.

Although the mode of integration may have been largely a product of evolution it is still generally regarded, by most international benchmarks, as a well performing model for which many others still aspire. This view may well be reinforced by significant delivery over recent years, particularly with regard to environmental performance, water services including security of supply, flood and coastal risk management, social equity and externalities such as energy/carbon management and land management.

It is, however, also well accepted that the pressures facing water management over the next 2 – 4 decades are likely to be unprecedented in nature. The scale of the challenge is likely to exceed our experience and our current approaches to planning, managing and regulating water may require revision if they are to be fit for purpose.

These future challenges and climate change in particular are likely to expose the interdependences between various aspects of current water management practice. Adaptive management will likely require integration management to be revisited at a range of levels from science through to regulation.

This journey has already started with important innovation initiatives from the water industry and regulators as well as other key partners. Momentum, however, will be key, financial pressures and conflicting agenda's will need to be carefully managed.

Integrated Water Management from Cloud to Coast

Dr Kunle Akande

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Website references: <http://www.halcrow.com/News/2009-News-archive/Halcrow-introduces-Cloud2Coast-or-C2C-Solutions/>, <http://hrc.engineering.cf.ac.uk>

The need for longer term strategic planning to deliver the goals of sustainable development and the importance of full stakeholder and public participation is recognised in government policy documents worldwide, consistent with the UN's Millennium Development Goals. Water sector needs, driven by climate variability, urbanisation and energy considerations, coupled with the challenges of investment planning, requires innovative solutions.

The Halcrow-Cardiff University strategic collaboration has resulted in an innovative approach for integrated water management. This result, expressed as Cloud to Coast or C2C solutions, is described in this presentation. The Cardiff University work started with a basic research of the C2C concept linked to Bathing Water compliance of an estuarine basin. But the requirements for practical application of the C2C approach are being developed further through a Halcrow C2C programme.

This presentation will describe recent activities related to the promotion of the C2C solutions philosophy. The activities include the development of a protocol for implementation of the concept, as a system based approach. The protocol involved an analytic component and a stakeholder participatory component dependent upon one another. Full implementation of the C2C philosophy will contribute to a better understanding of the pressures on land and water resources within the wider framework of long term strategic planning, for the benefit of industry and society.

The presentation will also highlight the three key differentiators of the Halcrow's C2C solutions technique namely:

- Adaptation of the Visual Environments Imaging and Visualisation or VEIV technology for conceptualisation of challenges and solutions through a Halcrow-supported, EngDoc programme
- Application of combined system, process and econometric models, addressing both water quality, water quantity and economic issues for all states of flow
- Identification of all associated economies of scope and scale

Integration – philosophy or fantasy?

Professor David Butler

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This presentation will demonstrate the benefits of a systems or integrated approach to the urban wastewater system. Traditionally, the sewer system, wastewater treatment plant and receiving water are considered separately and the design, operation and modelling of the various components is carried out in isolation. In so doing, interactions between the various components are not considered in detail and interactions, relationships and potential synergies are not discovered. The presentation will present work carried out over 10 years on the potential benefits of integration in this system. A semi-hypothetical, but well-characterised urban catchment has been studied in detail to establish what improvements can be made to the system if the integrated whole is considered, if the system can be controlled to a greater extent than is currently common and if state-of-the art optimisation techniques are used. Results will be presented on how river water quality can be either improved or maintained at lower cost, how energy consumption can be minimised whilst maintaining system performance and how river quality control is linked to urban flooding potential.

The outcome is the contention that taking an integrated perspective improves understanding leading to greater efficiency and enhanced performance. We can conclude that integration is not a wishful thinking or a fantasy but an important philosophy leading to increasing levels of service, greater protection of the environment and enhanced sustainability.

References

- FU, G., BUTLER, D. & KHU, S-T. Multiple objective optimal control of integrated urban wastewater systems. *Environmental Modelling and Software*, 23, 225-234, 2008.
- SCHÜTZE, M.R., BUTLER, D. & BECK, M.B. (2002). *Modelling, Simulation and Control of Urban Wastewater Systems*, Springer, London, 362 pp.

Website

<http://www.exeter.ac.uk/cws>

Integrating flood into water management

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Integration is, perhaps, an unhelpful term. It conjures up ideas of an ideal state where scientists will have developed their *unifying theory* of catchment management and where *ideal* outcomes can be predicted and delivered by public policy. In reality, complexity, uncertainty and underinvestment in monitoring along with lack of political will mean that even where legislative drivers for integration exist, little changes.

However, this presentation is not a counsel of despair but rather argues that at a time of radical cuts in public spending we need to recast our arguments for integration, placing less emphasis on grandiose conceptual theories and instead focus on efficiencies, benefits and savings.

And while the forthcoming Natural Environment Water white papers offer a platform for reform perhaps the biggest challenge will be faced at an operational level where accepted practice and localism agenda have the potential to militate against change.

Water and Communities - Integrating water into spatial planning and the LDF

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Water supply and water inundation (flooding) are set to become two of the most significant challenges of the 21st century and beyond. Climate change will result in reduced mean annual rainfall in many parts of the south and east of the UK and increased peak rainfall, leading to increased flooding. An increasing proportion of flood events are being caused by overland flow and surcharged sewers, during extreme weather events. Flooding in Hull in 2007 was predominantly from overland flows and 50% of the flooding in New Orleans in 2005 was from rainfall, following the failure of the pumping stations.

The space requirements for water, particularly to manage flooding can be considerable. Therefore space for water and blue infrastructure needs to be considered and planned for at a national, regional, local and development scale.

Blue infrastructure is set to become a major new guiding factor on the way our towns and cities planned. When considered from the outset this can bring many added features and improve the quality of our environment. When integrated into existing towns and systems this too can bring added value but may require more careful consideration with regards to connections with existing systems and extensive consultation with local interest groups.

This talk will demonstrate how blue infrastructure is being combined within developments in the UK to create better and more sustainable communities.

Developing an integrated water management strategy to overcome conflicts between urban growth, water infrastructure and environmental quality; a case study from Ashford, Kent

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Ashford, in East Kent, is a government-designated growth area. Between 2001 and 2031, the town is set to grow by 31 000 homes and 28 000 jobs, almost doubling in size. This raises numerous concerns about the ability of the local water infrastructure and Kentish Stour catchment to accept this pressure in the short and long term. The Ashford integrated water management study (AIWMS), set out to address all the issues around water quality, water resources, biodiversity and flood risk to allow Ashford's growth to occur without unacceptable environmental damage. The study reviewed current problems with the water environment, established the key constraints to growth that might arise from the proposed development and identified water management strategies to accommodate Ashford's expansion. The study revealed that overall the highest water priority was protecting and improving the water quality of the River Great Stour.

Since the study was completed in 2005 it has provided the framework for numerous collaborative projects between public bodies, water companies and house builders on innovative studies and pilot projects demonstrating the viability of increasing water efficiency of new-build homes; effective retro-fitting of water efficient measures into existing homes; introducing variable water tariffs; and using wastewater to irrigate willow coppice for use as a biofuel.

The process of integrated water management, as part a growth area planning, raised awareness and understanding of water issues among council officers, elected members and strategic bodies such as the Homes and Communities Agency. It also provided a focus for public awareness raising and engagement on water issues in the area. However, the study itself produced few truly integrated solutions. Of the two main ones that emerged: SUDS is already well documented but the strategic approach taken in Ashford should maximise the flood risk, water quality and habitat benefits; and the other, indirect effluent re-use, suffers from structural problems about which parties incur the costs and which reap the benefits, and how wastewater and water supply asset planning from two different water companies can progress successfully through the Ofwat Periodic Review process.

References and links

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Upstream Thinking: Delivering catchment management cost effectively with stakeholders

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Climate change is affecting the quality and quantity of raw water supplies collected in reservoirs and abstracted from rivers. South West Water promoted two series of actions from 2006 to 2009 to respond to this, based on moorland restoration on Exmoor and successfully reducing soil loss and pollution from farms. A more extensive programme of changes to uplands and farmed land was promoted in the last Periodic Review (PR09) with support from all environmental regulators, Ofwat and CCWater.

Our catchment management programmes rely on the co-operation of third parties as South West Water's direct landownership above our river abstractions and reservoirs is limited. The skills of Westcountry Rivers Trust, Devon Wildlife Trust, Cornwall Wildlife Trust and the Farming and Wildlife Advisory Group been mobilised as they have the ability to identify problems and implement improvements with the support of landowners and land managers.

The development of a private company/voluntary sector approach to addressing pollution in a long-term partnership offers targeted improvements which start field by field and extend to entire catchments, with minimal overheads and on-costs.

We are now implementing a 3,000-hectare restoration on Exmoor, a 110-hectare trial on Dartmoor and seven catchment-scale farmland improvements above key intakes and reservoirs. Fifteen further catchment investigations are being undertaken to examine risks and identify where further catchment-based interventions are likely to succeed. This programme of water quality and quantity protection is branded as 'Upstream Thinking'. It avoids costly longer-term water treatment upgrading and when assessed over 30 years, in line with Ofwat's instructions for PR09, offers a benefit to cost ratio of 65:1 or better. Dealing with water quality and quantity challenges at source offers long-term gains with multiple benefits, only a few of which are currently valued.

The current improvement programme for moorland and catchments raises £9.1m for local projects to restore the natural water-storage ability of uplands and limit the damage to rivers from farmland from 2010 to 2015. These projects are included in the South West River Basin Management Plan as they will contribute to 'Good Status' delivery for the Water Framework Directive. The cost to our water customers is an additional 65p on bills by 2015, compared to a PR09 'willingness to pay' for environmental improvements of £2.40 per customer.

In preparation for the reform of the Common Agricultural Policy and the next Periodic Review (PR14) South West Water is working with Natural England and other stakeholders to design a practical method of making eco-system service payments to reward best land management practices above our principal water sources.

Website

South West Water's website:

<http://www.southwestwater.co.uk/index.cfm?articleid=684&searchkey=upstream%20thinking>

The Key Elements of Integrated Catchment Management

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Concepts around the more integrated management of land, water and ecosystems bounded by river catchments have been developing since the early 1900s. However, it is only in the last 20 or 30 years that Integrated Catchment Management (ICM) has gained prominence as a potentially valid management approach. Different terminologies are used, including Integrated River Basin Management (IRBM), and Integrated Water Resource Management (IWRM) but they essentially describe the same concept, but using water as their primary focus. The most often used definition of what ICM is about was developed by the Global Water Partnership (GWP) in 2000, defining the concept as “*a **process** which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems*”. As such ICM is an emergent property of organisation, participation and knowledge, rather than an engineered process.

Several administrations (e.g. in Australia, New Zealand, South Africa, USA) have adopted integrated catchment management approaches for several years while, in Europe integrated approach to land and water management, without them specifically labelling it as such, are common (e.g. in Netherlands, Denmark, with also examples in the UK). The EU FP7 coordination action RiskBase (www.riskbase.info), synthesising experience from researchers, stakeholders and practitioners across Europe, suggested the integrated application of three key principles at the scale of the river catchment:

Being well informed: implying that a sound understanding of the functioning of the natural system, the socio-economic system and their interaction is the basis to river basin management.

Managing adaptively: using our best available understanding on how river ecosystems function will improve river basin management, but uncertainties will always remain because social and ecological systems, especially at larger scales, are extremely complex, dynamic and can respond in non-linear and unexpected ways. We can never know it all. We can cope with these uncertainties by applying the concepts of adaptive management, characterized as ‘learning-by-doing’ or “learning to manage by managing to learn”.

Taking a participatory approach: Participatory processes involve stakeholders in management and aim to enable them to exchange their views and opinions on problems and bring their knowledge to the table. By learning together to understand the land-water system in a better way, better solutions can be found.

Experience of others derived from applying these principles, shows that a sequence of activity should be followed for any given place such as:

- Understanding the system and the issues
- Building technical capacity to evaluate the problems
- Building collaboration within and between the stakeholders
- Improving water quality/hydromorphology
- Improving the ecosystem goods and services
- Monitoring/verification and reassessing the understanding if results are not as expected.

The paper will consider some of the ICM models as well as the governance and cultural requirements that may allow ICM to emerge as a process. The opportunities for change afforded by the WFD 2nd round of river basin plans and other European and national drivers coincide over a narrow window over the next year or so. The paper will conclude with a discussion of the UK situation and how we may (or may not) be able to adapt the learning from others and apply it to our own situation.

Integrated Catchment Management and the WFD

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The WFD can deliver integrated catchment management. However, to achieve this goal, which everyone now would appear to ascribe to, there has to be a shared vision about what integrated catchment management means. At present it means radically different things to different people. I will give examples of this and identify how the integration could be better defined.

I will then explore how integration within the auspices of WFD Cycle 1 RBMP has been promoted, and where further assimilation of strategic goals could be achieved. This will consider linkages between top down governance (central control of plans) through to implementation of bottom up local action. I will identify where we are as an industry in identification and implementation of WFD programmes of measures and what we should be doing to better define the basket of measures and activities that will promote catchment improvement through integrated thinking. I will touch on whether management at the water body scale is helpful or a hindrance.

In support of the above, I will describe studies we are undertaking to define national guidance and a toolbox to select Heavily Modified Water Body measures to achieve GEP, including the of cost benefit/effectiveness analysis. I will describe difficulties with consistent identification of measures, and how we intend to integrate cross-sectoral support to achieve the optimal catchment-based solutions.

Finally I will consider how the emerging Ecosystem Approach (linked to ecosystem services) flagged by Government in the Water and Natural Environment White Papers can be assimilated into integrated catchment management. This approach could unify technical and social goals in language that Treasury and Ofwat understand.

Reference

UKWIR and EA Project No. WR06, Heavily Modified Water Bodies. Report prepared by Cascade Consulting consortium.

Website

www.cascadeconsulting.co.uk

Integrated Water Management – a National Trust perspective

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The National Trust owns a lot of land – across a surprisingly wide range of geology, soils, river basins and landuses! In a study undertaken for us by Haycocks in 2005, we found that 43% of the land area of England & Wales drains to a National Trust boundary – we are a bit crucial to the water resources of the UK... so we should know what we have got and what we should do with it...

We have a Policy for Water – and a Policy for Soil – within a deep philosophy of respect for natural resources. Our vision is that surface water and groundwater should exit a National Trust site in better condition than when it entered and undiminished – indeed, in a more natural state.

We wish to work like an ‘environmental therapist’ – to revitalise our water resources and the living resources of the land.

In this context, we want to reduce our use of water. We want to switch from mining ‘fossil’ water to harvesting ‘renewable’ water – we have many opportunities to reduce our use of the mains and revert to local private supplies. In tandem we want to reduce our waste of water – to instigate deep efficiency measures and to re-use and recycle waste water. We have over 200 private water supplies serving NT sites and over 4000 private sewage treatment systems – we like these and want more of them – but recognise the responsibility they bear for competent and compliant management.

A river basin mentality underlies our approach to water – we should always know where we are in terms of ‘what’s upstream of us’ and ‘what’s downstream of us’; and we should always know how the use of the land is affecting or could affect water resources. Usually we don’t...

This presentation will set out our principles and practices for integrated water management and will refer to recent and current case studies.

Of especial interest will be an update on the **DEFRA Multi-Objective Flood Management Demonstration Project, being undertaken on the Trust’s Holnicote estate in West Somerset/Exmoor....**

...and an insight into our latest thinking on land capability, land use planning and carbon stewardship – all inextricably linked with water resource protection.

<http://www.nationaltrust.org.uk/main/w-sourcetosea.pdf>

http://www.nationaltrust.org.uk/main/w-chl/w-countryside_environment/w-coastline-sourcetosea.htm