

# Taking Responsibility for Water

*United Kingdom Water Research and Innovation Framework 2011 – 2030*

*Summary*



## Vision

*By 2030 the UK will be a key contributor in providing integrated solutions in water security and sustainability such that individuals, communities and businesses benefit from productive, equitable water systems and ecosystem services. In consequence, health improves, communities develop, the green economy grows and the environment is protected and enhanced.*

### **Achieving the vision**

In our increasingly interconnected and interdependent world, achieving the vision will only be possible if the UK takes account of broader associated economic and societal goals, and recognises the various roles that research and innovation can play in addressing these national and global challenges for society and the economy.

Research and innovation will play a significant role in achieving a sustainable and secure water resource in future. Science and technology has long been a major driver for UK and global prosperity, and has helped meet the ever increasing demands on the water sector. Deploying new technologies, processes and knowledge that help make the global water sector more innovative and profitable will be even more critical in the future.

The high-level goals that will be addressed through UK research and innovation actions on water include:

- a) Embedding responsibility for water in all individual, corporate, economic and policy decisions.
- b) Enabling access to water and sanitation as these are key factors in human well-being.
- c) Developing, at appropriate regional and temporal scales, approaches to water safety, security and

sustainability that take account of a changing climate, a growing population and competing land use pressures.

- d) Achieving efficient operation of the human water cycle (abstraction, supply, use and reuse or waste water treatment) in response to these pressures whilst minimising energy consumption and providing protection for the water environment.
- e) Accounting for changes in the frequency and duration of extreme and high impact events (including climatic, natural and human induced events) and improving the management of these events (from prediction and preparedness to recovery).
- f) Maintaining, valuing and developing ecosystem functions and protecting biodiversity in support of secure and sustainable water resources and the delivery of ecosystem services.

To have impact on society and the economy, outcomes from research must include improved decision making and increased capacity and capability in innovation. Decision makers and innovators need outputs such as the foresight, knowledge and tools needed to help choose between different options. Such outputs strengthen the evidence base and increase opportunities to develop best practice and new products and services.

*"I am delighted that the UK Water Research and Innovation Partnership composed of private, public and third sector bodies has been convened to address urgent and important water challenges, and has set out a clear and ambitious framework for the future that builds on existing collaborative actions."*

**Sir John Beddington, Government Chief Scientific Adviser**

## The need for a Framework

Water is our most vital resource. It needs to be valued worldwide if resource efficiency is to be achieved and the opportunities, challenges and complexities of the coming decades are to be taken, met and resolved.

The importance and value of water cannot be underestimated as it plays a fundamental role for business and society, and in the environment.

The UK is a world leader in water research, particularly in the global water cycle and its interaction with climate change. However, UK water research and innovation currently lacks a strategic approach to the highly diverse and interrelated challenges.

Stakeholders engaged in UK water research and innovation from the public, private and third sectors have developed a UK Water Research and Innovation Framework to encourage dialogue about water and prioritise areas for action on relevant research and innovation between now and 2030.

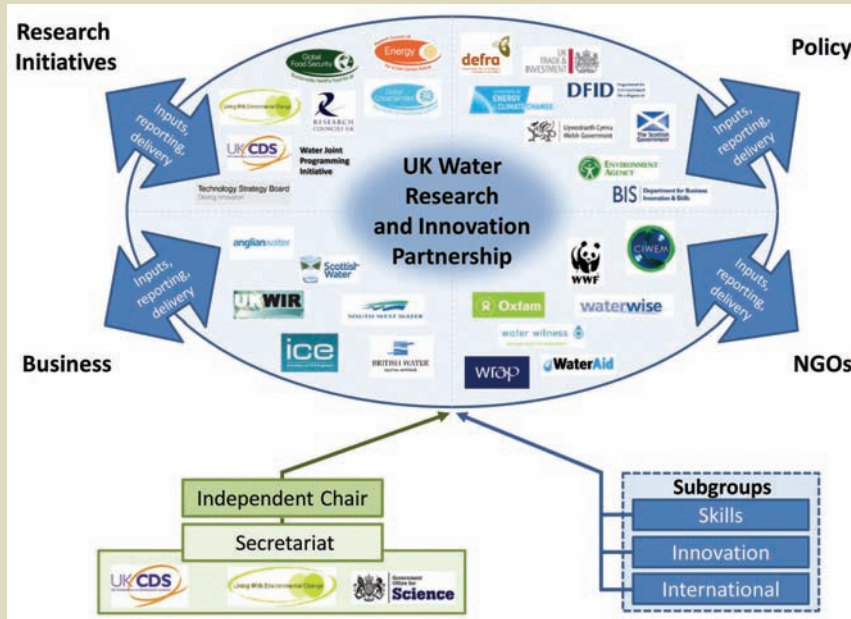
The intention of the Framework is to highlight key water research and innovation priorities and mechanisms to ensure better coherence and co-ordination of different public funding schemes for water research and innovation, working closely with UK and international organisations in the private and third sector.

The Framework is based on recognition that government, research organisations, academia, NGOs and industry working with other users of water need to provide the evidence to support effective decision-making, joined-up policies, and a co-ordinated coherent approach to the development and dissemination of new knowledge, technologies and skills.

Making changes to the way we manage and use water in the future will need a strong and robust evidence base supported by appropriate research and innovation. Collaboration within the UK, with the EU and its member states, and other international stakeholders will help the UK contribute to future global water security.

Priorities identified in the UKWRIF cover research and innovation on the value of water, the resilience of water infrastructure, water-related natural hazards, integrated water resource management, and water security in low and middle income countries. More specific areas where progress is needed include the evidence base for upcoming water abstraction regimes, water footprinting, mapping the dynamics of water resources with respect to upcoming environmental change and sharing hydrological data internationally.

Proposed governance for taking forward the UKWRIF



## Implementing the UKWRIF

The research and innovation priorities identified in the Framework will be taken forward by the UK Water Research and Innovation Partnership (UKWRIP) the aims of which are to:

- Convene the key UK stakeholders and representatives from linked initiatives concerned with UK and global water security to work together to achieve common goals;
- Develop a UK water research and innovation strategy with a clear vision, activities and deliverables;
- Build on and enhance UK capability in science and engineering in this area which has a high international status and is the foundation of innovation;
- Strengthen and build bridges between academic communities, policy, business and society across the world to maximise knowledge exchange, develop solutions and optimise business growth;
- Provide an international context to the challenges the UK faces so that the UK can contribute to the evidence base to help address both national and international policy goals; and
- Provide, for the first time, an overarching framework and mechanism to commission, prioritise and deliver water research and innovation across the UK.

UKWRIP partners will represent existing research initiatives, policy and industry and NGOs as the primary delivery agents. The partnership aims to foster engagement with broadly relevant water research and innovation challenges within and between existing initiatives and activities, bringing value and connectivity across those endeavours.

The Partnership will utilise dynamic sub-groups, with flexible membership and resource, to allow partners to contribute relevant expertise and resources to particular focal areas.

### Innovation in water

Innovation in water, from deploying new technologies, processes and knowledge, offers many outcomes, for example decreasing carbon footprints, and helping to alleviate inequalities in access to water.

#### Reducing carbon footprints and materials used

Anglian Water have worked closely with their supply chain to reduce carbon footprints and material use. Work with new designs of air valves has saved 93% of the embedded carbon and reduced the weight from 25kg to 1kg.



#### Innovative use of mobile phones in Africa

**Smart Water Systems** - Oxford University, in partnership with Rural Focus Ltd. (Kenya) and ZamDex (Zambia), have developed a new innovative approach to promoting water security in Africa. This couples mobile banking and smart water metering, to reduce water payment transaction costs and non-revenue water losses. see <http://owfp.ouce.ox.ac.uk/was/smart-water-systems.php>



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<b>Water - Selected Key Facts</b>	
<b>Water use</b>	<ul style="list-style-type: none"> <li>• Demographic changes and societal trends will place more demand on water resources.</li> <li>• A balanced human diet of 3000 kcal/day calculated at 20% animal and 80% vegetable, requires 3-4 m<sup>3</sup> of water per day or 70 times the 50 litres needed per capita for basic daily household water needs.</li> <li>• Heating water is a major use of energy within UK homes.</li> </ul>
<b>Water infrastructure</b>	<ul style="list-style-type: none"> <li>• The UK has over £250 billion invested in water infrastructure of varying age and condition, managed by the regulated water industry who spend about £8 billion per year on capital and operating costs.</li> </ul>
<b>Business and the economy</b>	<ul style="list-style-type: none"> <li>• The 2007 floods cost the UK approximately £3.5 billion, and flooding events are likely to become more frequent, posing the greatest risk to UK infrastructure.</li> <li>• The water industry is worth over £10 billion p.a. in the UK and £500 billion p.a. globally, growing over 10% per annum in some countries.</li> <li>• The European drought of 2003 cost the European economy over €8.2 billion and the Barcelona drought in 2007/8 cost the Catalan economy 1% of GDP.</li> </ul>
<b>Environment and climate change</b>	<ul style="list-style-type: none"> <li>• Predicting patterns of future rainfall is a major uncertainty in climate models, although a prolonged dry spell caused drought in the east of UK in 2011, overall summer rainfall was 18% higher than average.</li> <li>• Most of the world's freshwater is frozen e.g. in Antarctica and Greenland, and warmer global temperatures mean sea-levels could rise (about 0.5m by the end of the century).</li> <li>• Ocean acidity has increased by about a third since the beginning of the industrial revolution most likely from carbon dioxide dissolving in seawater; this threatens marine ecosystems.</li> </ul>
<b>Farming and food</b>	<ul style="list-style-type: none"> <li>• Globally, farming accounts for 70% of the use of all freshwater (blue water) that is abstracted from rivers, lakes and aquifers, compared with 20% for industry, and 10% for municipalities.</li> <li>• Globally, irrigation consumes nearly 1,800 km<sup>3</sup> of blue water annually, with rainfed crops consuming an additional 5,000 km<sup>3</sup> of green water.</li> <li>• Imported food and fibre account for 62% of the UK's total water footprint.</li> <li>• Amount of water needed to produce one kg of grain-fed beef and poultry is at least 15 m<sup>3</sup> and about 5 m<sup>3</sup> of water respectively, but grains, pulses, and root crops require less than two m<sup>3</sup>/kg.</li> </ul>
<b>Sanitation and health</b>	<ul style="list-style-type: none"> <li>• The water industry in the UK spends at least £225 million per year to treat potable supplies for pesticides, nutrients, faecal organisms and suspended matter (soil erosion).</li> <li>• 1.1 billion people in the world do not have access to safe drinking water, roughly one-sixth of the world's population.</li> <li>• 2.2 million people in low and medium income countries, mostly children, die each year from diseases associated with lack of access to safe drinking water, inadequate sanitation and poor hygiene.</li> </ul>

Short form references for key facts supplied in order of bullet points. Full details can be found in the complete UKWRIF document (see web link below).

*Water Use:* 2030 Water Resources Group (2009) and Royal Commission on Environmental Pollution (2011); Stockholm International Water Institute et al (2005); DTI (2002 onwards).

*Water Infrastructure:* obtained from OFWAT 2009 and 2010 data.

*Business and the Economy:* Environment Agency (2010); 2030 Water Resources Group (2009); EU DG Environment (2007), SAM Study (2007); Martin-Ortega & Markandya (2009).

*Environment and Climate Change:* based on Met Office data; IPPC (2007); Natural England commissioned report (2009).

*Food and farming:* UNESCO (2003), FAO (2006, 2007), Molden (2007); Foresight "Global Food and Farming Futures" Synthesis Report C2; Chapagain & Orr (2008) for WWF; Stockholm International Water Institute et al (2005)

*Sanitation and health:* Wildlife Link from Defra (2002); WHO/UNICEF JMP (2004); WHO (2000).

The full UK Water Research and Innovation Framework text can be found at: <http://www.bis.gov.uk/assets/bispartners/goscience/docs/t/11-1390-taking-responsibility-for-water-research-and-innovation-framework> and by email from [office@lwec.org.uk](mailto:office@lwec.org.uk)