

Global Trends & Challenges

in Water Science, Research
and Management

Executive Summary



The global water challenge is unprecedented. Climate change, rapid urbanisation, increasing consumption and demand for food and energy, and changing land use, will leave few countries and communities unaffected. The demand for water and sanitation services is greater than it has ever been, and water has never been higher on the agenda. The Sustainable Development Goals (SDGs) not only provide a framework to address water challenges, they put water at the centre of the global agenda on sustainable development. This presents opportunities for the water sector to develop innovative solutions and scale-up best practice.

Water management is a complex, multi-disciplinary topic, and water professionals come in many different shapes. One of the unique strengths of IWA is bringing together experts from across the globe and specialisations into communities of practice, **IWA's Specialist Groups**. Connecting people from across disciplines and across national boundaries accelerates the science, innovation and practice that can make a difference in addressing water challenges and pushes the sustainability agenda.

The Global Trends and Challenges in Water Science, Research and Management compendium, draws upon the expertise of **IWA's Specialist Groups** who have identified the hot topics, innovations and global trends in water science, research and management that will have impact in solving global water challenges. The compendium highlights a diversity of approaches from detailed technical and scientific aspects to more integrated approaches. Some of the key trends include:

Trend one:

A revolution in water and wastewater systems with DNA-tools

DNA sequencing technologies are revolutionising our capabilities for identifying the vast number of microorganisms present in drinking water, wastewater and other water systems. The identification is getting fast and cheap, and reliable surveillance of water systems can soon take place. In parallel, the development of public databases with libraries of all relevant microbes in specific systems, e.g. wastewater or drinking water systems, containing all available knowledge about their function is being developed for surveillance, trouble shooting and optimisation purposes. It is expected that DNA technologies for onsite surveillance will be on the market within the next 3-5 years. They have the potential to completely transform the field and enable fast knowledge-driven water quality management.

Trend two:

Resources do matter

The Club of Rome announced it 40 years ago and recently strongly re-stated it: each of us must preserve and recycle the finite resources of this planet. The resources present in used water are a perfect example. The water, energy, nutrients, metals, plastics and much more that are embedded in used water is a valuable and increasingly viable part of a cyclical economy supply chain. Technology is moving fast and in the right direction; safety and quality can be assured; all that remains is changing mind-sets to ensure acceptance. Firstly, products should be judged by their quality and not by their origin, only then will potential markets for reclaimed water, energy and nutrients start to gain momentum. Secondly, we must be inventive and add value by transforming recovered resources into commodities that are desired and valued by consumers, and which constitute a true benefit for that consumer.

Trend three:

One Water, One Health

The concept of "One Water" is growing in importance across the globe. This trend assesses water as a whole and not in individual silos such as drinking water, wastewater or grey water. The fundamental importance of water to health adds a new dimension to the concept to become "One Water, One Health". This is increasingly important as climate change and growing demand increasingly impacts on water scarcity. The concept includes the detection and risk management of known and newly emerging contaminants and their transformational forms in water sources. Future technical and scientific developments will focus on the production of more quantitative information on pathogens in water, standardisation, multiplex assays and, critically, developing protocols for applying new techniques facilitating the automation of processes. Building and making available an interactive database for mass sequencing studies for non-specialised users remains challenging.

The 21st century will be defined by the transition to a knowledge economy that values knowledge resources - the quantity, quality and accessibility of information available to people - more highly than ever before in human history.

Our research into the trends influencing the science, research and management of water highlights that the integration of technologies and solutions, and the application of existing science and research, will invent new science. The desire for knowledge exchange and collaboration between research and practice is a strong driver, particularly beyond traditional topical and geographical boundaries, reflecting the globalised nature of both the challenges we face and the solutions we can develop.

Being part of the IWA network presents IWA members with the ability to break down the silos they often work in, and to connect internationally to share knowledge, build collaborations and explore opportunities for new solutions. In doing so, IWA's members are taking a lead towards a water-wise world.

To learn more about the current hot topics and future trends in the water sector the full Global Trends Compendium is available at www.iwa-network.org/resources/

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