World Water Congress 2026: Reflections from Glasgow

By: Prof Sharon Velasquez Orta

Travelling to the World Water Congress by train was an opportunity I could not miss. The three-hour journey provided a chance to reflect on previous congresses I had attended in Vienna and Busan, and on how the water sector continues to evolve. One noticeable difference this time was the fully digital registration process. From registration to accessing programme information, everything was managed electronically. While undoubtedly efficient, it also reflected a broader trend seen across many sectors where digitalisation increasingly replaces opportunities for personal interaction.

Day 1

Arriving on Monday morning, I attended the opening keynote by Cees Buisman from Wetsus, who highlighted the growing importance of micronutrient recovery and the challenge of global zinc deficiency. Among the solutions discussed was the development of more sustainable nutrient cycles, including the recovery and return of nutrients from manure back to agricultural land.

The presentation then broadened to consider our global water footprints, with insights from the UNESCO-IHE Value of Water Research Report Series. Rather than viewing water purely through a traditional mass balance approach, the discussion focused on understanding the wider environmental consequences of water use and trade. Within this context, the water footprint methodology provides an important framework for connecting water management, food security, international trade, environmental sustainability and climate resilience. A particularly interesting example was the ecological restoration of China's Loess Plateau, where large-scale vegetation recovery has generated multiple benefits, including improved ecosystem health, increased green water consumption and enhanced blue water availability. Another topic was the growing concern surrounding endocrine-disrupting compounds and their implications for drinking water quality. The use of natural flocculants was presented as one strategy for reducing the need for chemical additives during water treatment. However, the issue requires interventions well beyond treatment processes alone, including source control and broader environmental management.

The role of wastewater as a resource rather than a waste stream was another recurring theme. Examples included technologies for recovering valuable products from sludge, such as bioplastics and other circular economy materials. The morning concluded with a panel discussion featuring Ulrik Gernow, Valerie Naidoo, Amanda Lake, and Angela MacOscar, who explored the need for stronger innovation principles to accelerate the adoption of emerging technologies across the water sector.

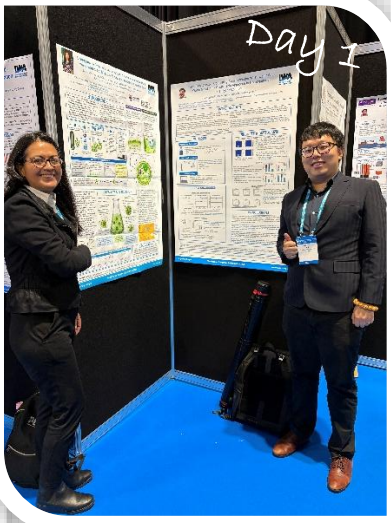
Afterwards, I participated in an interactive workshop exploring how artificial intelligence can help shape the future of the water industry, provided by researchers from the University of Michigan, USA. The session provided a fun environment to exchange ideas with industry professionals and discuss practical pathways for embedding AI into water management, operations and decision-making. All materials from the workshop can be accessed here: Sewer Tycoon Jr by the Digital Water Lab

The exhibition was a valuable part of the event and notably free to attend, providing access to a broad audience beyond registered delegates. Country pavilions, including the UK corridor, hosted a series of seminars and panel discussions running alongside the technical programme.

Among the highlights were the extensive poster sessions, where I had the opportunity to present our collaborative research on wastewater metal recovery using microalgae and engage in valuable discussions with researchers, utilities and technology providers. The IWA Innovation Hub showcased several promising technologies and start-ups. One particularly interesting example was NOAH Water Systems (Belgium), which presented a decentralised domestic wastewater treatment solution integrating advanced oxidation, centrifugation and an electrochemical nutrient recovery cell. The system was supported through remote monitoring and software-based operation, demonstrating how digital tools are increasingly being combined with treatment technologies. Another notable innovation was Phosphix, which is developing technologies for recovering high-quality, metal-free phosphorus products, contributing to more sustainable nutrient management and resource recovery strategies.

Operational demonstration of integrated water tech.





Showcasing wastewater recovery innovation.

The day concluded with an address from Sir Jon Cunliffe, Chair of the UK's Independent Water Commission, who reflected on the Commission's work and its 88 recommendations to the UK Government. These recommendations have helped shape a more integrated vision for water management and informed the Government's publication of the January 2026 White Paper, *A New Vision for Water*, which sets out plans for significant reform and restructuring of the water sector in England and Wales. The presentation provided a timely reminder that technological innovation alone will not solve water challenges. Effective governance, regulation and long-term strategic planning remain equally important in delivering resilient and sustainable water systems.

Day 2:

The keynote presentation delivered by Paula Kehoe (REGEN/BILD, USA) focused on the challenge of scaling decentralised water and sanitation systems. She emphasised that we are at a pivotal moment in rethinking water management and recognising the potential of on-site water treatment. A typical decentralised treatment train may include a membrane bioreactor

(MBR), UV disinfection, and chlorine dosing to ensure water quality for reuse applications. Paula shared several inspiring examples demonstrating how these systems are being deployed in practice. One notable case was the San Francisco Urban Water Management System, which enables neighbourhood-scale on-site water treatment and reuse. A key challenge identified was the need for skilled operators to maintain and oversee these systems, with associated costs often falling to property owners. Another example highlighted a commercial office development in Miami, where rainwater and air-conditioning condensate are collected and treated for toilet flushing, irrigation, and cooling applications. Similarly, the Denver Water Operations Complex incorporates on-site wastewater treatment and reuse for toilet and urinal flushing, as well as landscape irrigation. At the residential scale, HonuWater Ltd was showcased as a company that is trading compact on-site sanitation solutions for single-family homes. The discussion highlighted several benefits of decentralised water systems, including improved public health protection, enhanced drought resilience, reduced flood risk, and the creation of new employment opportunities through emerging business and service models.

I attended part of the Water Industry Forum, where representatives from water utilities around the world were asked how they would prioritise an additional 20% capital investment over the next five years. The top priority, receiving approximately 30% of the votes, was the renewal of ageing assets, including improvements to treatment reliability, network condition, and leakage reduction. This was followed by climate adaptation measures (20%), including resilience to floods, droughts, heatwaves, wildfires and compound climate events, alongside backup power systems and leakage management. Third place (18%) was given to investments supporting the circular economy, including water reuse, resource and energy recovery, operational efficiency, and demand flexibility. Other priorities identified included catchment protection, blue-green infrastructure, liveability initiatives, and system expansion.



When discussing the enabling conditions needed to achieve these ambitions, participants identified long-term adaptive regulation as the most important factor (34%), followed by integrated planning (20%) and strengthening workforce, supply chain, and partnership capacity (16%).

The principal action emerging from the discussion was the need to develop and communicate a customer-facing, long-term water transition pathway that links infrastructure renewal, climate resilience, circular economy principles, and catchment management (39% of votes). Participants also emphasised the importance of regulatory and appraisal reforms that better recognise whole-life environmental,

climate, social, liveability, and resilience benefits.

Moving to the technical sessions on Nature-Based Solutions, I had the opportunity to present our work on the valorisation of microalgal biomass generated during wastewater treatment for biofertiliser and fungicidal applications.

Several presentations focused on integrated constructed wetlands, showcasing how these systems can be designed to enhance solids capture, optimise hydraulic performance, improve flow distribution and settling characteristics, and deliver wider environmental benefits. Beyond treatment performance, these systems can create valuable habitats, support biodiversity, and provide a range of ecosystem services.

Large-scale case studies were presented from Saudi Arabia, where constructed wetlands are being applied for municipal wastewater treatment, and from the oil production sector, where nature-based approaches are being incorporated into industrial wastewater management strategies.

The UK Pavilion on the exhibition floor hosted a panel session entitled *Rolling Out Innovation Tools*, where representatives from Ofwat discussed opportunities available through the Water Innovation Fund to accelerate innovation across the UK water sector. Industry experts also shared practical advice on market development, commercialisation pathways, and strategies for supporting new technologies and businesses.

I also participated in the launch of the newly published *Methods for Faecal Sludge Analysis*, which is freely available through IWA. Following a lively Kahoot-based quiz on fecal sludge characterisation and analysis, participants were rewarded with complimentary printed copies of the publication. The day concluded with a keynote lecture by Prof Xiaochang Wang, who discussed the increasing challenges posed by climate change, including the growing frequency and intensity of heatwaves, droughts, and wildfires. He argued that cities must increasingly plan for multiple water sources and consider what he described as the reliability paradox in water management: highly reliable systems can create a false sense of security if they are not designed to cope with extreme and rapidly changing conditions. The presentation provided a timely reminder that future urban water systems will need to balance efficiency with adaptability, ensuring resilience in an increasingly uncertain climate.

Day 3:

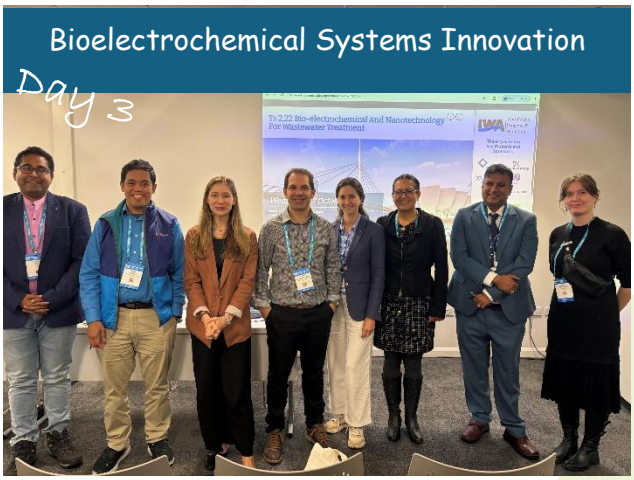
Rather than attending the plenary session, I chose to participate in a networking event organised by the Women in Water community. It proved to be a valuable session, providing an opportunity to meet and have one-to-one conversations with inspiring professionals from across the water, utilities, and consultancy sectors. Something interesting I learned was how large organisations, such as supermarket chains, manage their water services and billing with the emergence of a model in which a business works through a single supplier who coordinates water services across different regions of the UK, enabling the company to receive a single consolidated bill. This approach has been developed through collaboration between UK water providers, consultants and government. Offering businesses a more streamlined and efficient way of managing their water accounts. I continued in this hub with now a session from Tara McGeehan, President of CGI UK and Australia, who shared her perspectives on leadership and the realities of managing a large international organisation. Among her reflections was the remarkable story of Professor Wangari Maathai (1940-2011), the Kenyan environmental activist

and founder of the Green Belt Movement, who became the first African woman to be awarded the Nobel Peace Prize. Her journey provided a powerful reminder of the impact that vision, persistence, and environmental stewardship can have on society.

Later in the day, I had the privilege of co-chairing, alongside my colleague Dr Sovik Das (India), the technical session on Bioelectrochemistry and Nanotechnology for Wastewater Treatment. The session showcased a range of cutting-edge technologies aimed at advancing resource recovery and contaminant removal. Researchers from the University of Barcelona presented their scale-up studies on ammonia recovery from wastewater using bioelectrochemical systems, reporting recovery rates of approximately 30-50 g NH_4-N m^{-2} day^{-1}. Research teams from the United Kingdom and Finland shared their experiences integrating bioelectrochemical systems within constructed wetlands, demonstrating varying levels of technical success and highlighting opportunities for further optimisation and scale-up. Additional presentations from researchers in the United States and Australia explored innovative applications of electrochemical processes, including the use of electrons to facilitate PFAS removal and to promote struvite precipitation for nutrient recovery from wastewater streams. These developments demonstrated the diversity of bioelectrochemical technologies within the water sector.

Beyond the formal programme, the conference provided a valuable opportunity to reconnect with colleagues, learn about their latest research activities, and discuss collaborations.

This marked my final day at the Congress before returning home to resume my own activities. As always, these events provide far more than technical knowledge; they offer perspective. Leaving Glasgow, I was reminded of the scale of the global challenges facing the water sector, but also of the remarkable community of researchers, practitioners, utilities, policymakers, and innovators working together to address them. I returned with renewed motivation and optimism about the collective efforts being made towards a more resilient and sustainable water future.



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