

Water Challenges for the 21st Century

The amount of water on Earth is constant and should be sufficient to keep us going for centuries to come. However, our world is increasingly exposed to natural disasters, pollution, a volatile climate and socio-economic changes that threaten, among others, our water supply and sanitation.

It will take all of us to overcome what could prove to be our greatest challenge of the 21st century.

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Water is the key to life as we know it. From a purely biological role to being crucial for sustaining societies, economies and the environment, its importance is undeniable. After all, readers of the British Medical Journal selected water-based sanitation as the greatest medical milestone of the last century and a half. That is even more remarkable when it is compared with inventions such as vaccines, which are quite clearly on the minds of the world's population due to the COVID-19 pandemic.

Living with uncertainty

The water cycle, on which supply and sanitation services rely, shows signs of significant change. As a result, scientists are questioning the notion of stationarity that suggest that the statistical properties of the water cycle in the future will be similar to what happened in the past.

Irrigation for crop production now claims close to 70% of all freshwater appropriated for human use. With the world's population expected to increase to 9 billion, this could become unsustainable in the long term. Therefore, humanity will have to learn to live with the rise in demand and increased uncertainty associated with natural resources, including water.

Water is also closely related to meeting other challenges, most notably the provision of food and energy for the increasing, urbanized and affluent population. Furthermore, managing this 'nexus' of challenges will become increasingly difficult in the 21st century, and the world will have to get smarter about water consumption. So, how are we prepared for those challenges?

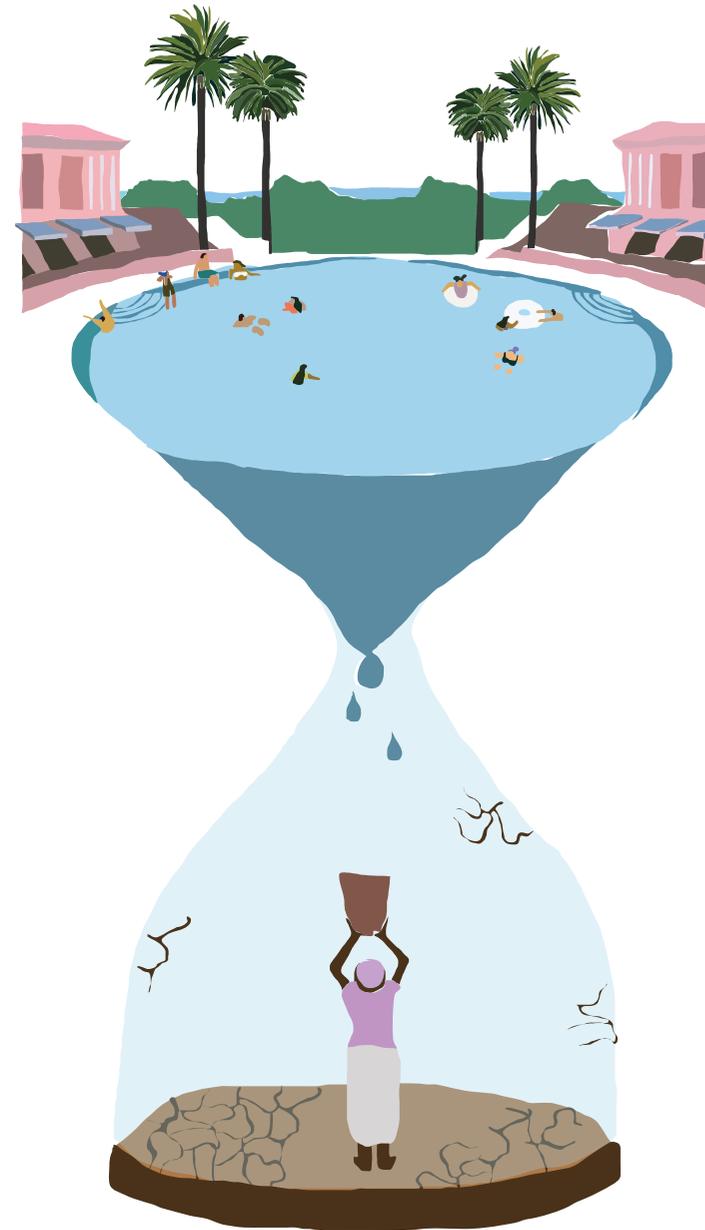


Illustration by Cristina Sanuy

Embracing digital transformation

The key developments that the global water sector is beginning to embrace are the digital transformation and the engagement of the public (users or beneficiaries of the services).

Digital transformation has already made a significant impact on how many water utilities use tools to support planning and operational decisions related to water and sanitation services they provide. In urban areas, simulation and optimization tools, combined with the proliferation of the technologies, have shown a great potential for improving utility decisions and customer service.

However, due to changes brought by the digitalization of our world, these utilities will likely have to deal with large volumes of data, often referred to as "big data". A similar trend can be seen in food production with smart farming and precision agriculture being tested. Decisions can be made for a particular local plant and hydrology conditions, which should improve agricultural efficiency and reduce water usage in this sector.

Making the invisible, visible

Water is sometimes considered as an "invisible utility" due to its infrastructure being largely out of sight and thus often taken for granted. However, customer expectations are increasing across sectors, as in the retail and financial services industries.

Due to the expected global trends, water utilities will have to make some difficult decisions about the use of resources, for example with freshwater, energy, chemicals, and the levels of investment in ageing infrastructure to meet customer service expectations. Such expectations will drive utilities to better understand and engage with those customers.

These challenges have already resulted in the emergence of new water leaders trained in hydroinformatics – where mixing big data with smart technologies will deliver more sustainable water solutions. This relatively new discipline aims to improve development, uptake and use of digital tools in the water sector and empower citizens to engage with water service provision on an individual level. ●