WATER RESOURCE MANAGEMENT

Rethinking water management in a changing climate

It is ironic that water, the most essential resource for life, is also the medium through which an increasingly hostile climate is presenting itself; water brings life but also threatens it in anger. Water managers have long been aware of this dual nature of water, but as climate change gains momentum, the stark impact of freshwater scarcity and extreme weather events running in parallel is compelling a rethink on how water should be managed. Article by Dawid Bosman, Senior Manager: Strategic Advisory at the Trans-Caledon Tunnel Authority.

Climate change has arrived, like an unwelcome guest in our home, and will bring ever more trauma and disruption in the years and decades to come. Early in 2024, and again in 2025, news came that the global average temperature of the prior year had increased by more than 1.5°C, relative to the pre-industrial level. This was disturbing news; as recent as 2021, the projection was that this threshold would only be breached by 2040. And yet, here we are. The collective commitment by 196 industrialised nations to reduce greenhouse gas emissions were lacking in ambition or execution, and the latest trajectory from the Intergovernmental Panel on Climate Change (IPCC) is that the global average temperature increase should reach 2.7°C by 2100 – also referred to as an intermediate trajectory. We are learning that the mitigation of global warming is proving very hard to do. More focus will now shift to adaptation, how we reconfigure our economies, cities, agricultural activity and catchment basins to be more resilient to the climate disruption that is upon us.

The 6th Assessment Report (AR6) of the IPCC elaborates on the impacts. It projects that in the near term, every region in the world will face "further increases in climate hazards" and "increasing multiple risks to ecosystems and humans". It anticipates an increase in heat-related human mortality and

morbidity, food-, water-, and vector-borne diseases, mental health challenges, flooding in coastal and other low-lying cities and regions, biodiversity loss in land, freshwater and ocean ecosystems, and a decrease in food production in some regions. The risks and projected adverse impacts, along with losses and damages, will escalate with every increment of global warming. And, with further warming, climate change risks will become increasingly complex and more difficult to manage.

It is a tragedy that vulnerable communities, often reliant upon climate sensitive livelihoods, will be hardest hit by climate change and in particular, the loss of ecosystems; this will provide further impetus to migration, growing inequality and urbanisation. This is the broad spectrum of challenges that our economies will need to adapt to, and it will require exceptional leadership to do so.

The global water sector will be in the center of this turmoil. Intuitively, this makes sense; so much of the effects of climate change are delivered through the hydrological cycle. The AR6 points out that for every degree Celsius rise in average temperature, the atmosphere can hold about 7% more moisture, resulting in more severe storms and greater precipitation volumes.

The water sector will need to adapt, fundamentally, in several ways. Whereas sustainable water management practices remain foundational, there is now also the need for vast investments in resilient infrastructure, such as flood barriers to protect critical infrastructure, aquifer storage, and the mainstreaming of non-conventional water resources such as large-scale desalination and reuse. Innovation will be required to develop new business models for sustaining this diverse portfolio, such as the dual use of surface water infrastructure for both storage and flood protection.

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The good news is that we can already produce as much water as we need, within a manageable envelope of cost, energy and environmental impact. We also know how to deal with too much water, through green and grey infrastructure. While all this is expensive, there is an opportunity here; adaptation to climate change can reverse decades of under-investment in water infrastructure and technology, because the models adopted are equally applicable to closing the water infrastructure gap and building environmental protection.

The key challenge lies in developing the capacity within the global water sector to attract and meaningfully absorb a vast surge in capital flow. A 2024 white paper by Global Water Intelligence (GWI) and XPV Water Partners titled 'Investing in a water-secure future' tried to quantify this surge. It found that 69% of insured losses arising from climate-related disasters were likely caused by extremes of droughts and floods, which points to at least this proportion of climate adaptation expenditure having to be spent on managing water more acutely. The GWI and XPV researchers estimate that in 2024 the capital employed in water security came to $4,321 billion, of which the public sector carried about $3,000 billion. However, by 2034, this figure could stand at $12,580 billion, with the public sector comprising only $5,700 billion. Overall, it comes to a three-fold increase in capital deployed in water security within a decade, largely the result of climate change, and a five-fold increase in the private share of that, largely because of weakness of public balance sheets and the growth of water as a strategic theme for investors.

So, what should the strategy be to respond to these challenges? GWI has an interesting perspective on it. As for the influx of private capital, water can offer the returns necessary to sustain a surge in capital employed; the fundamental importance of water for the economy and for life on earth is simply strong enough. But it would require that fund managers begin to recognise water security as a risk in every investment made. Water managers, in turn, need to make better connections between water and money, and deliver the financial returns necessary to attract the investment needed by the water sector.

To summarise and conclude: As our efforts to mitigate climate change stutters, we are facing a distressing climate future, to which we will need to adapt. Much of the adaptation will involve how water is being managed, dealing with unprecedented scarcity or excess, and requiring innovation of both infrastructure and business models. The sector will see a vast influx of capital, increasingly from private balance sheets. Water managers will need to generate returns that could attract private money. While the product has a most compelling value proposition, robust governance will be non-negotiable. As things stand, the water sector, here and abroad, is not ready for what is to come. The urgent imperative must be to build institutional capacity and strategize for what is to come.