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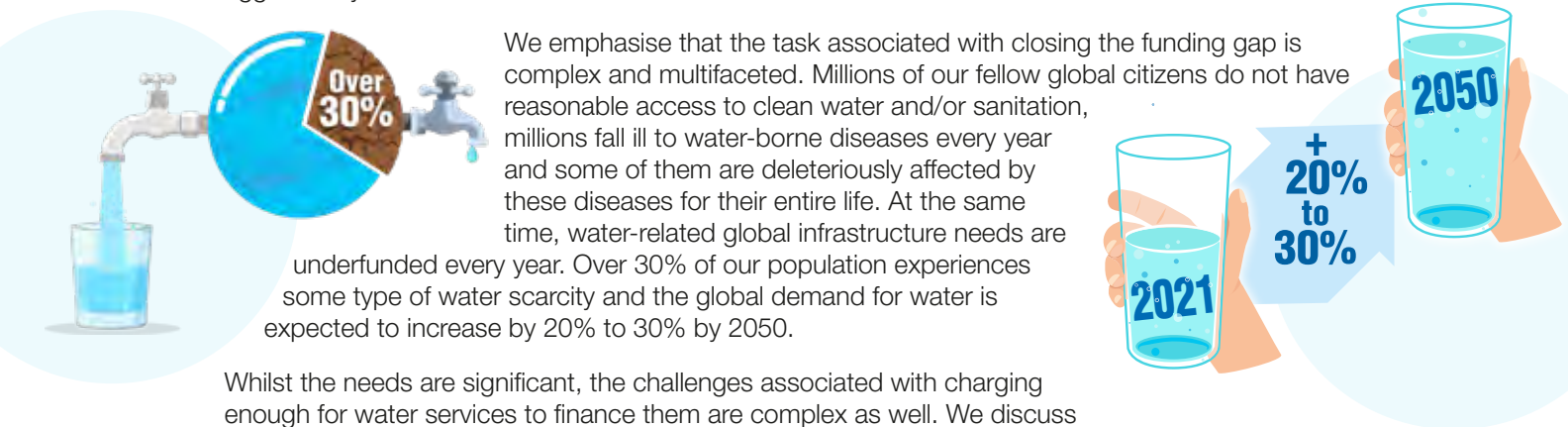
/Executive summary and recommendations

/SOW 2021



In this, the second 2021 FIDIC *State of the World* report, we build upon some of the challenges mentioned in the previous report, *Time to \$Tn-vest*. There are two major themes in the document. The first theme addresses the need for the global community to establish a proper value on water so that water services are priced in a manner that meets the challenge of universal provision, sustainability and investment requirements. In doing so, the myriad of operations, maintenance and any asset expansion needs can be sustainably funded. The second theme is a reminder of the many serious water resources issues which have financial and social costs which are closely linked to climate change and/or global warming.

The first theme focuses on the expected increase in the global demand for water, the energy-food-water nexus and the challenges associated with properly charging for water and sanitation services to ensure that we properly fund entities providing these services so that current and future generations are properly served. We emphasise that this is not the case now and it will not be the case for future generations unless we act more aggressively.



We emphasise that the task associated with closing the funding gap is complex and multifaceted. Millions of our fellow global citizens do not have reasonable access to clean water and/or sanitation, millions fall ill to water-borne diseases every year and some of them are deleteriously affected by these diseases for their entire life. At the same time, water-related global infrastructure needs are underfunded every year. Over 30% of our population experiences some type of water scarcity and the global demand for water is expected to increase by 20% to 30% by 2050.

Whilst the needs are significant, the challenges associated with charging enough for water services to finance them are complex as well. We discuss some of these ranging from affordability for the poorest among us to the inelasticity associated with some large users (such as energy production and agricultural practices). To satisfy the global needs, government assistance, involvement of the private sector, proper planning, innovative strategies and other approaches will be necessary.

The identification of new sources of sustainable funding as well as providing proper oversight of those funds particularly in the developing world is, in our view, an enormous critical success factor. To engage such funding on a significant scale it is therefore important that all parties across the infrastructure sector, including governments, be transparent and clear about the credentials they require and the standards they expect.

We must solve the funding problem soon because more challenges are on the way. Some of these challenges are delineated in the second theme explored in this report. Water-pricing policies should provide adequate incentives for customers to use water resources efficiently, and thereby contribute to environmental objectives.

By 2100, sea levels could rise one to four feet and an eight-foot rise cannot be ruled out by that time. The pH of our oceans has been relatively stable for millions of years at around 8.2. Since the industrial revolution, however, it has dropped to about 8.1. This sudden rate of acidification is unparalleled in 66 million years and has a long-term impact on marine life.

The American National Oceanic and Atmospheric Administration estimates that the average surface temperature of our oceans has risen by about 0.9 degrees °C.

Plastics have benefited humans in many ways, but not without negative environmental consequences. The indiscriminate disposal of plastics, however, is having an increasing insidious impact on our waterways and drinking water. Concerns are increasing about microplastics and micro resins. They are being found in virtually all our oceans and are likely entering the food chain as they are being ingested by aquatic life and there is uncertainty about their impact.

There is also growing concern over the occurrence of contaminants of emerging concern (CECs) in the aquatic environment. New analytical techniques are constantly being developed to discover countless numbers of CECs in wastewater treatment plant effluents, surface and groundwater systems and even in drinking water.^{[xxxv], [xxxvi]}



The emerging issues range across the entire range of water systems, one climate model predicts that the number of extreme rainstorms worldwide will double with each one-degree Celsius increase in global warming.^[iv]

Coral reefs are being damaged or destroyed by rising water temperature, ocean acidification, rising sea levels, and a reduction of photosynthesis (light penetration). This is negatively impacting marine life (Life below water SDC 14) food supplies and tourism. They are also an important carbon sink. The reduction of the aforementioned would therefore mean potentially more pressure on rising greenhouse gas emissions into atmosphere, exacerbating climate changes.



The World Water Institute estimates that one quarter of the world's population live in countries facing extreme water stress and there are more than 500 dead zones in our oceans due to untreated wastewater.

Flooding problems due to increasingly intense storms are being exacerbated by the diminished ability of saltwater marshes and wetlands to mitigate the impact of storm surges. Damage to wetlands and saltwater marshes is also reducing the world's capacity to capture carbon before it is discharged to the atmosphere as a greenhouse gas.

Despite our ability to provide adequate treatment, it is estimated that 80% of wastewater is discharged without it. In addition, more than 80,000 synthetic organic chemicals, many of which are CECs mentioned previously, are used daily in domestic, commercial, or industrial applications^[v]. These chemicals are designed to improve our quality of life in a number of ways by increasing the global rate of agricultural production (e.g., pesticides), protecting human and animal health (e.g., pharmaceuticals), improving hygiene (e.g., personal care products), or advancing industrial production (e.g., plasticisers). However, many of them are persistent and treatment of them is a challenge.

Glacier melting is causing flooding problems which is impacting property, agriculture and water quality in the short term. In the longer term, it will cause even more water scarcity.

Overuse of water sources, especially groundwater without adequate recharge, is already an issue, with piezometric surfaces/water tables being significantly depressed due to over-pumping. It is therefore not only an issue for future generations but also current ones, further use and pressure on such extraction will only serve to intensify the water scarcity problem for future generations.

FIDIC's 2015 report suggested that of the myriad of water challenges the world faces, the following four are most important:

- 1) Providing everyone access to clean water and sanitation.
- 2) Closing the demand-supply gap.

- 3) Planning for climate change including robust adaptation; and
- 4) Adequately investing in natural infrastructure (aging and new)

These challenges are still with us and we must work harder to properly address them. Our success in resolving our water challenges will, to a large degree, depend on the value individuals place on them as well as the level of importance more global citizens place on the threats to our environment from climate change. As these concerns grow, we should expect to see the political pressure for action to increase.

It is critical that we succeed if we are to avoid the many deleterious consequences of failure. As Dr James W. Patterson, President of the American Academy of Environmental Engineers and Scientists, stated “The scientific community is in agreement that the earth’s rising temperatures are fuelling longer and hotter heat waves, more frequent droughts, more extreme rainfall events and more powerful hurricanes.”²

This increasing global agreement about the water challenges we face may be creating an opportunity to involve more stakeholders in exploring solutions. In doing so, we must achieve the United Nations sustainable development goals, especially goal 6 and, to a degree, goal 14.

Currently, the global water challenges are numerous, complex and perhaps not well enough understood from a ‘value’ or ‘cost’ point of view. However, this may be changing for the better. Potential consequences of climate change, global warming and the associated water-related challenges are appearing more frequently in all elements of the media. A look at the references to this document is a testament to this. While some are from technical journals, others are from more commonly read non-technical periodicals.

Toward the end of the FIDIC *State of the World* report on water challenges, there was mention of the need for engineers and scientists to involve others in searching for solutions to our vexing problems.

Now, six years later, the need to involve more of our fellow citizens is even clearer. The Covid-19 pandemic has provided an opportunity to do so. The July 2020 issue of *Time* magazine “*One Last Chance*”³ was largely dedicated to climate change. A portion of the article mentioned that the pandemic just may have contributed to the shift in collective thinking. A question from the article is worth repeating. “Will a newfound respect for science and a fear of future shocks lead us to finally wake up (i.e., to the climate change threats) or will the desire to return to normal overshadow the threats lurking just around the corner?”

Through constructive dialogue about the issues, involvement of all stakeholders, looking at the big picture and encouraging innovation, we can hopefully keep the right amount of attention on our water challenges. As difficult as they are, there are a lot of reasons for optimism. Our environment, while threatened, is resilient (the restoration of sea grass along portions of the east coast of the USA is just one example⁴) and with some help



from innovative engineers and scientists, we can meet the challenges we face and build a better world for future generations. We will discuss this more in the next report.

It is beneficial to provide some actionable recommendations related to the subject matter being discussed. Thus, for this report on *Establishing the Value of Water - the Business Case for Change*, FIDIC offers the following three recommendations.



Recommendation 1: To increase the perception of value, to reduce waste and to ensure that critical water systems are available for future generations, FIDIC recommends that prices (i.e., rates/costs/prices) for water, wastewater, ecosystems and stormwater services be established with the assistance of qualified professionals and should be sustainable enough so that they recover operational costs, allow for maintenance, rehabilitation and expansion to allow for adequate use by future generations, while also providing reasonable, perhaps subsidised charges for the poorest among us". In addition, policies should be put in place to encourage conservation.



Recommendation 2: To increase the perception of value, the understanding of the complexity of water issues and to reduce costs, FIDIC recommends that more stakeholders be involved in developing approaches to address water-related issues. More local community involvement and consideration of utilising total cost concepts like TOTEX, along with customer input, will help ensure that the right projects are developed to effectively address the right issues and that solving one problem does not cause another.



Recommendation 3: To truly embrace the SDGs and resolve the issues of those without access to safe drinking water and adequate sanitation, FIDIC recommends constructive dialogue with governments, the private sector and NGOs to identify and implement realistic solutions. FIDIC commits to be more proactive in working with governments, the private sector, international funding institutions, NGOs, COP and others in developing solutions to this vexing and insidious problem.

