

# experience SINGAPORE



How innovation is shaping the next chapter of Singapore's water story

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# ED'S NOTE



Dear readers,

Water sustainability is one of the key global challenges of our time. While humankind has made significant progress in increasing access to clean drinking water and sanitation, many people still lack access to these basic services. According to the United Nations, around 700 million people in 43 countries suffer today from water scarcity. Two-thirds of the world's population could be living under water-stressed conditions by 2025.

In 2015, the Water Resources Institute (WRI) ranked Singapore as one of the most water-stressed countries in the world. Our continued ability to ensure water security and sustainability is a matter of national survival. Fortunately, Singapore's water story today is one of turning adversity into opportunity, and relentless innovation. This issue's Focus story (pages 3 to 5) "Turning the Tide" charts Singapore's journey to becoming self-sufficient in water over the course of a few decades, and how technology is driving the next chapter of its water story.

Central to this water story is PUB, the national water agency. Aside from undertaking innovative efforts to ensure water sustainability in Singapore, PUB's effective communication and engagement strategies have also helped ensure that water conservation is second nature to most Singapore residents. On pages 8 and 9, we speak to Mrs Cindy Keng, the Director of the agency's 3P Network, to learn how this year's *The Climate is Changing* campaign was executed using insights gleaned from past experiences.

In this issue's Joining Hands story (pages 10 and 11) "No Role Too Small", we highlight the various ways we can come together to develop solutions for a better tomorrow. Our Reflections story (pages 6 and 7) showcases the Singapore Cooperation Programme's courses, which continue to run in spite of the COVID-19 pandemic. We invite you to join us as we continue to discover more ways in which we can make the world a better place for future generations.

*Sheryl Shum*

**Acting Director  
Strategic Communications Directorate  
Ministry of Foreign Affairs, Singapore**

## KEEP IN TOUCH!

Share with us your memories, photos and experiences in Singapore under the Singapore Cooperation Programme.  
Email us at [mfa@mfa.gov.sg](mailto:mfa@mfa.gov.sg)



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## experience SINGAPORE

A NEWSLETTER OF THE SINGAPORE COOPERATION PROGRAMME



**MINISTRY OF FOREIGN AFFAIRS  
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focus

# TURNING THE TIDE

Technology – the driving force for the next chapter of Singapore's water story.

**Come 21 June 2021**, hundreds of like-minded global leaders, experts and practitioners in the water industry will gather online over the course of a fortnight for this year's Singapore International Water Week (SIWW). Presented as a fully virtual event, its programme line-up will include close to 100 keynotes, thematic webinars and workshops on best practices and solutions spanning the urban water cycle. Participants can also look forward to a virtual expo featuring over 120 exhibitors and their cutting-edge technologies for the world of water.

SIWW has traditionally been an in-person event, but it has had to adapt to the restrictions posed by the global COVID-19 situation. Such adaptability has been characteristic of Singapore's approach to water, as it continually attempts to make the best of a challenging situation. Singapore has come a long way from its water vulnerabilities in the 1960s, to ensuring a diversified and sustainable supply of water

today through its Four National Taps — local catchment, imported water, desalinated water and NEWater.

## TAPPING ON TECH

Key to the Singapore water story is its emphasis on research and development. PUB, its national water agency, has partnered with other agencies in the Singapore Government to develop a vibrant water sector involving over 200 companies and 25 research centres. This thriving ecosystem caters to both local and international needs by developing solutions for the world.

Singapore also supports the research and development of water technologies of the future through a robust funding scheme that includes \$670 million set aside by the National Research Foundation. Through this funding scheme, PUB hopes to increase Singapore's water resources and improve water quality and

“

We are doing all we can to maximise every drop of water, but we all have to do our part to #MakeEveryDropCount.

**Prime Minister Lee Hsien Loong, in a Facebook post marking World Water Day 2021**

security, while reducing production costs. Some of these technological advancements include:

- **SWAN:** Short for Subnero Water Assessment Network, SWAN is a fleet of cost-efficient and highly versatile robotic swans that monitors the water quality of Singapore's reservoirs. They collect water samples, which are essential in providing important data on water quality at any given time. PUB's collaboration with the National University of Singapore on this initiative was expanded to include a partnership with Subnero Pte Ltd. The expansion has enabled the scalable collection, management and visualisation of data gathered by the robotic swans.



PHOTOS: PUB

SINCE 2008, THE SINGAPORE INTERNATIONAL WATER WEEK HAS BEEN BRINGING TOGETHER GLOBAL WATER LEADERS, EXPERTS AND PRACTITIONERS TO DISCUSS PRESSING WATER CHALLENGES.

## MEETING FUTURE NEEDS

30 million gallons — the amount of fresh drinking water that can be produced per day at Singapore's fourth and latest desalination plant, the Keppel Marina East Desalination Plant. Strategically located next to the Marina Reservoir, it is the first large-scale, dual-mode desalination plant in Singapore, capable of treating both the saltwater and freshwater that surrounds it.

Beyond its strategic location, the plant also boasts a unique design that embraces sustainability and urban liveability — situating its treatment facilities underground allows for the creation of nearly 20,000 square metres of open green rooftop space for community and recreational activities.

The Keppel Marina East Desalination Plant opened in February this year. Explaining its importance, PUB Chief Executive Officer Mr Ng Joo Hee said, "Seawater desalination is one of Singapore's 'four national taps'. Unlike the other three taps — imports, rainfall and recycled water — it is a practically limitless source. It is also weather-resistant and always available, rain or shine, as a source of life-giving water. The availability of desalination makes Singapore's water supply immensely resilient. And the KMEDP coming online further strengthens Singapore's water security."



- **Deep Tunnel Sewerage System:**

Used water in Singapore flows through an underground superhighway network known as the Deep Tunnel Sewerage System (*see sidebar for more*). Comprising deep tunnel sewers, the network uses gravity to transport water to centralised water reclamation plants at the coastal areas. To maintain these long, dark and narrow tunnels, which go as deep as 55 metres, PUB requires a fleet of miniature unmanned aerial vehicles (UAVs). It is partnering UAV developer Aerolion Technologies to build a UAV capable of

navigating these challenging conditions. The first phase of development has proven successful and researchers have progressed to the second phase, which focuses on improving the accuracy of the data collected. This phase will also see the expansion in the variety of data collected.

### A SHARED CONCERN

Much of Singapore's water success also depends on its population, which has embraced the importance of water conservation over the years. This was made possible through the country's various national water conservation campaigns, some of which go as far back as 50 years ago. There is no doubt that the message has evolved



### DID YOU KNOW?

**Almost a quarter of the world's population have difficulties accessing a clean and safe water supply.**

SOURCE: UNITED NATIONS

over time to cater to emerging needs and new challenges such as climate change. For instance, an early iteration of a water conservation campaign was launched in the wake of a prolonged drought in 1972. It carried a simple "Water is Precious" message (*learn more about Singapore's water conservation communications efforts on page 8*).

Beyond public communications, PUB also works closely with schools and communities to instil the importance of water conservation. Water conservation topics are a regular feature in school curriculums, as they help students understand Singapore's water challenges. PUB places great emphasis on school outreach as it is important to educate and inculcate good water habits in children from an early age. Older Singaporeans will also be familiar with water-rationing exercises, during which the water supply to houses would be disrupted for up to 14 hours a day.

● SINGAPORE'S DEEP TUNNEL SEWERAGE SYSTEM GOES AS DEEP AS 55 METRES.





PHOTO COURTESY OF KEPPEL INFRASTRUCTURE

Occasions like World Water Day are also celebrated by the Singapore community. The latest edition in March 2021 saw over 400 partners coming on board the month-long celebrations, with more than 60 businesses and retailers offering “blue-themed discounts and promotions” to support the nationwide #GoBlue4SG community

● PLEDGING TO SAVE WATER DURING WATER CONSERVATION CAMPAIGNS.



● CHILDREN LEARN ABOUT THE IMPORTANCE OF WATER CONSERVATION AT AN EARLY AGE.

movement. Schools also got in on the action, with over 80 schools conducting water-themed activities every Wednesday in March to help the young ones understand the importance of water conservation. By encouraging and supporting initiatives like these, PUB ensures that water conservation remains a top-of-mind priority across the population.

Efforts are also being made to help Singaporeans reduce their water consumption: the PUB’s Smart Meter Programme will oversee the installation of 300,000 smart meters at residential, commercial and industrial premises by 2023. This will allow the use of digital technologies to track one’s water usage and set water-saving goals. Since 2019, the government has also restricted the sale and supply of appliances with low water-efficiency ratings.

These efforts have certainly borne fruit – Singapore’s per capita household water consumption has declined from 165 litres in 2003 to 141 litres in 2019. By ramping up water conservation efforts across the nation, PUB hopes to lower this figure to 130 litres by 2030.

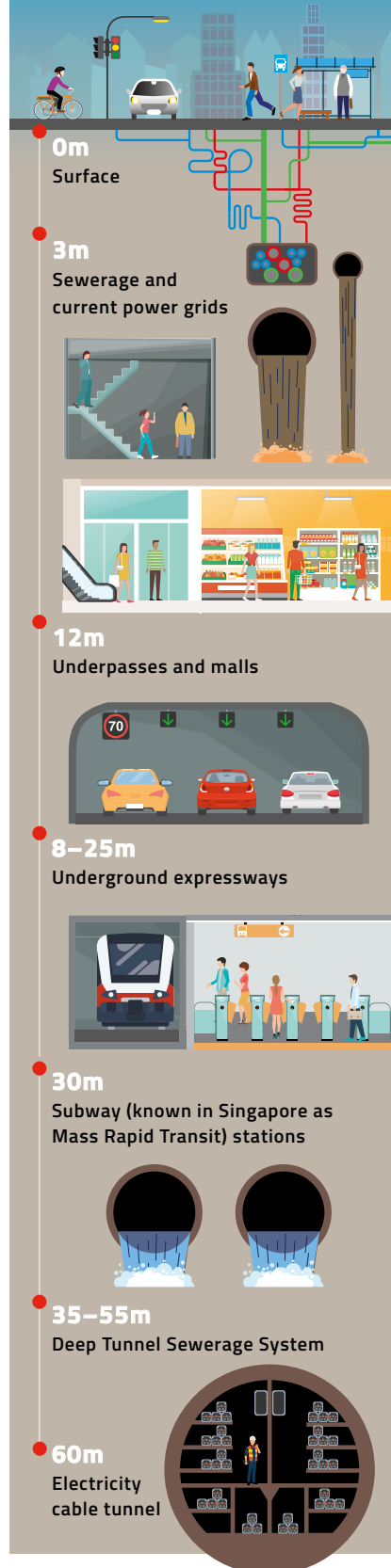
## COMING FULL-CIRCLE

PUB’s 2020 water conservation campaign was centred around Singapore’s past water and sanitation issues. The collaterals featured the night soil man, water rationing in Singapore in 1963, clean-up of the Singapore River and a flooded shophouse with a little girl in it. Following the serendipitous discovery that the little girl in the photo was a young Ms Elaine Teo, PUB interviewed her to find out more about her story. Needless to say, the photo brought back precious memories of the days when Ms Teo and her family were staying in that shophouse.

Scan this QR code to watch PUB’s interview with Ms Teo:



## DEEPER AND DEEPER



# FACING THE FUTURE AS ONE

## Singapore-Google Joint Training Programme: Propelling ASEAN'S Digital Economy – Role of Digital Data Governance

20 – 21 APRIL 2021

Organised in partnership with Google LLC and the Infocomm Media Development Authority, the course saw senior officials from across ASEAN engaging in dialogues on the growing importance of the digital economy, innovation, and good digital data governance. Participants also had the opportunity to hear from various guest speakers, including major e-commerce players, privacy lawyers and regulators.

### DID YOU KNOW?

When fully operational in the early 2040s, Singapore's Tuas Port will be the largest fully-automated container terminal in the world. It will have a total capacity of up to 65 million 20-foot equivalent units (TEUs). To boost efficiency, productivity and environmental sustainability, the Tuas Port will have intelligent data-driven operations management systems, full-electric automated guided vehicles, and smart engineering and power management platforms.



## Japan-Singapore Partnership Programme for the 21<sup>st</sup> Century: Port Management

5 – 9 APRIL 2021

Conducted under the auspices of the Japan-Singapore Partnership Programme for the 21<sup>st</sup> Century (JSPP21), participants were exposed to the growing complexities in port management over the course of five days. They also gained a better understanding of the challenges in strategic port planning and key port management issues faced in this day and age.



## Initiative for ASEAN Integration: Sustainable Development and Urban Planning

15 – 19 MARCH 2021

Conducted with the support of the Initiative for ASEAN Integration (IAI) at the Cambodia-Singapore Cooperation Centre, participants learned about Singapore's policies, strategies and frameworks in sustainable urban development, integrated land use and environmental planning.

From education to sustainable infrastructure, courses by the Singapore Cooperation Programme continue to equip government officials around the world for tomorrow's challenges.



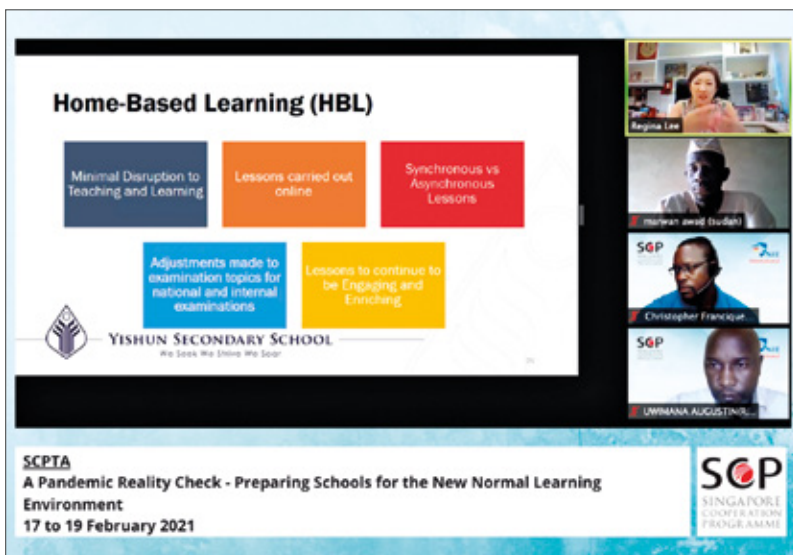
### Singapore-United Nations Environment Programme Joint Training Programme: Environmental Leadership Programme for Sustainable Infrastructure

1 – 5 MARCH 2021

Organised in partnership with the United Nations Environment Programme (UNEP), the course provided a platform for participants to engage in discussions with experts from UNEP and Infrastructure Asia. Their discussions delved into the opportunities and challenges in developing sustainable infrastructure, and the policy conditions to enable and address them. Green financing, and nature-based and integrated infrastructure solutions were also spotlighted.

#### DID YOU KNOW?

Up to SGD19 billion of public sector green infrastructure projects have been identified for the issuance of green bonds by the Singapore Government. One such project is Tuas Nexus. It will be Singapore's first integrated waste and water treatment facility and is set to be completed in phases from 2025 onwards.



### A Pandemic Reality Check – Preparing Schools for the New Normal Learning Environment

17 – 19 FEBRUARY 2021

Conducted by the National Institute of Education International, the course shed light on the best practices implemented by Singapore's schools and institutions to adapt to new circumstances brought about by the COVID-19 pandemic. Participants had the opportunity to hear first-hand from school principals about the challenges, stress and fatigue experienced by educators and students alike, as well as the measures to overcome them.

#### LOOK OUT FOR THESE

Continued opportunities for knowledge exchange on the topics of governance, healthcare, sustainability and more:

- Managing Coastal Biodiversity under Urbanisation Pressures  
5 – 9 July 2021
- Integrated Urban Transport Planning and Management  
12 – 16 July 2021
- Technology and Courts of the Future  
26 – 30 July 2021
- Leaving No One Behind: Sustainable WASH Services in a Rapidly Changing Context  
2 – 13 August 2021
- Healthcare Management in the COVID-19 New Normal  
30 August – 3 September 2021

Visit our website (<https://www.scp.gov.sg>) for more information and course application.

MRS CINDY KENG AT THE MARINA BARRAGE, WHICH PERFORMS FLOOD CONTROL FUNCTIONS AND ALSO SERVES AS A WATER SUPPLY SOURCE AND LIFESTYLE ATTRACTION IN SINGAPORE.



in singapore

# DRIVING HOME A TIMELY MESSAGE

Director of PUB's 3P Network, Mrs Cindy Keng, brings us through her experience in conceptualising and executing a public water campaign.

**Earlier this year**, Singapore's Mass Rapid Transit (MRT) commuters would have found it hard to miss a series of eye-catching posters, including one that featured the country's famous Merlion submerged in rising seawater amid raging storms. These posters, part of *The Climate is Changing* campaign, were the brainchild of Singapore's national water agency PUB. They emphasised the need for Singaporeans to take action to protect their homes and livelihoods against the effects of unmitigated climate change. "These dramatic visuals raised eyebrows and generated a lot of conversations about the effects of climate change, which helped to garner public attention on this topic," said

Mrs Cindy Keng, Director of PUB's 3P Network department.

## THE CLIMATE IS CHANGING CAMPAIGN

Every year, PUB embarks on a campaign to educate the public on the importance of water conservation and how everyone has a part to play. Past campaign messages often focused on promoting water conservation and building a water-conscious culture. This year, the team decided to broaden the narrative. This year's *The Climate is Changing* campaign was anchored around the theme of climate change and its impact on PUB's work in four key areas: enhancing flood resilience, strengthening coastal defences,

safeguarding water security, and reducing our carbon footprint through the use of clean energy.

*The Climate is Changing* campaign went beyond raising public awareness of the impact of climate change on Singapore's coastlines, water supply and weather. It also sparked interest and conversations among the community, who realised the importance of acting early.

## INSPIRATION FOR THE CAMPAIGN

Following the Singapore Government's launch of the Singapore Green Plan 2030, PUB believed it was an opportune moment to spotlight PUB's water sustainability efforts to help Singapore adapt to climate change. The Singapore Green Plan 2030, unveiled in February, introduced several new sustainability efforts, initiatives and targets. For the water sector, this includes encouraging water conservation and water-efficient practices in households and industries.





PUB has a very long and respectable heritage, but at the same time, it is driven by a relentless pursuit of innovation to create a more resilient and sustainable water future for Singaporeans. And I'm very inspired by that.

Mrs Cindy Keng on what inspired her to join PUB

### TAILORING THE MESSAGE TO DIFFERENT AUDIENCES

To capture the attention of Singaporeans, this year's campaign launched with a video commercial titled *The Climate is Changing*. It ran on multiple platforms, including free-to-air TV, social media and out-of-home spaces, to reach different audience segments. PUB created accompanying visuals to highlight a hypothetical future — an extreme and unpredictable one — and what climate change could cost us. PUB also embarked on a phased communications approach to generate buzz and sustain media coverage throughout March 2021 (*learn more about this in the sidebar*).



THESE IMPACTFUL ADVERTISEMENTS WERE PLACED AROUND SINGAPORE TO REMIND THE PUBLIC ABOUT THE POTENTIAL COST OF UNMITIGATED CLIMATE CHANGE ON SINGAPORE.

### CHALLENGES IN COMMUNICATING WATER-RELATED MESSAGES

A survey commissioned by PUB in 2020 found that over 90 per cent of households surveyed recognised the need for water conservation, with more than three-quarters of them agreeing to take personal responsibility in using water wisely. The findings were encouraging but the awareness did not translate into action for most people. For instance, only a third of the households surveyed regularly rinsed vegetables in a container instead of under running water, and used half-flush when possible. Everyone can play their part in protecting Singapore's water security, by adopting wise water-saving habits and making every drop count.

Many individuals also think that the impact of climate change is inconsequential and would not be felt anytime soon. The mindset — that addressing the potential consequences of climate change is not urgent — has to change.

### PLUGGING THE GAPS IN WATER SUSTAINABILITY EFFORTS

In addition to marketing campaigns and various online engagement efforts, PUB also rallied Singaporeans to do their part through community engagement initiatives. While there were no large-scale events planned for this year's campaign due to the COVID-19 pandemic, PUB worked with over 400 passionate partners to support the water cause. Of note was the collaboration with popular fashion retailer Uniqlo, which found success in highlighting the importance of water sustainability. It also imparted water-saving tips to shoppers.

By educating the public one individual at a time on their individual impact on climate change, we can collectively make a positive change to the future of water sustainability over time.

SINGAPORE'S SKYLINE LIT UP IN BLUE IN SUPPORT OF WORLD WATER DAY 2020.



## LAUNCH, SUSTAIN, RALLY CALL

How PUB managed *The Climate is Changing* campaign, in the words of Mrs Keng:

**1** “At the beginning of March, we focused on **drumming up interest** for the campaign launch, which received a fair amount of coverage across both mainstream and marketing trade media channels.”

**2** “Thereafter, we **amplified** the awareness and reach of our various Water Month activities. We piqued the interest of different media (broadcast, print, online,

lifestyle, parenting sites) by pitching tailored content based on their target audiences.”

These activities included Water Wednesdays, which saw over 80 schools dedicating every Wednesday in March to water-themed activities for students. “Blue deals”, which included blue-themed discounts and promotions, were also offered at over 50 retailers and businesses islandwide

throughout March, in support of water conservation.

**3** “Building on the momentum, our efforts culminated in World Water Day, which featured our signature ‘City Turns Blue’ effort. A record 44 landmarks and buildings in Singapore lit up in blue. This stark visual was a **reminder** to the public of the importance of water conservation.”

joining hands

# NO ROLE TOO SMALL

From researching for ways to tackle the climate emergency to widening access to potable water, everyone has a part to play in conserving and sharing water resources.

## THE NEXT FRONTIER

According to the International Union for Conservation of Nature (IUCN) — an international organisation working on conservation, environmental, ecological and sustainability issues — the impacts of climate change will have consequences on global water security. Meanwhile, a study by the International Food Policy Research Institute indicates that 4.8 billion people would face water stress by 2050 if climate change is not mitigated.

Enter *Earth 300*, an emission-free research vessel to study and mitigate the impacts of climate change. Scheduled to sail around the world from 2025, this state-of-the-art laboratory is the brainchild of Earth 300 Ventures, a Singapore-based corporation. On board *Earth 300* will be 160 of the world's leading scientists in fields as diverse as marine biology and

astronomy. They will conduct on-site sustainability research aboard the vessel's 22 purpose-built laboratories, which will be fitted with technologies including artificial intelligence, robotics, machine learning and real-time data processing. Since climate change is more than a scientific problem, the scientists will also be joined by economists, engineers and entrepreneurs, who will use their expertise to value add to the research operation. Each voyage that *Earth 300* embarks on will also play host to 20 students, whose journeys will be fully sponsored for.

Beyond embarking on the journey to address long-term environmental challenges, Earth 300 Ventures has also launched an accelerator programme to promote advances in environmental technology. The Earth 300 Accelerator focuses on grooming and nurturing promising start-ups dabbling in nature-friendly innovation. It is currently working with Chipsafer and WOW, which are two of the firms in the accelerator programme, to develop tracking technology that will help monitor environmental conditions globally, and spearhead an initiative to encourage plastic waste reduction in schools, respectively.

Mr Aaron Olivera, founder and CEO of Earth 300 Ventures, explained that the inspiration for *Earth 300* was the dead corals he saw during a diving trip. At the launch of *Earth 300* in March 2021, Mr Olivera said, "I started thinking, how great would it be if we could inspire a global renaissance and bring together the smartest and the latest and greatest architects and artists and inventors and scientists of the day."

EARTH 300 IS AN EMISSION-FREE RESEARCH VESSEL THAT IS SCHEDULED TO SAIL AROUND THE WORLD FROM 2025.





THROUGH THE SINGAPORE INTERNATIONAL FOUNDATION'S WATER FOR LIFE PROGRAMME, RURAL COMMUNITIES ACROSS THE REGION GAIN ACCESS TO POTABLE WATER.

## DID YOU KNOW?

THE LEE KUAN YEW WATER PRIZE (LKYWP) HONOURS OUTSTANDING CONTRIBUTIONS BY INDIVIDUALS OR ORGANISATIONS TOWARDS SOLVING THE WORLD'S WATER CHALLENGES. NAMED AFTER SINGAPORE'S FIRST PRIME MINISTER LEE KUAN YEW, THE LKYWP HAS MADE A MARK IN THE GLOBAL WATER ARENA AS THE PREMIER WATER PRIZE AMONG ITS PEERS.



THE SINGAPORE WATER MANAGEMENT SERIES IS A FLAGSHIP PROGRAMME AT PUB'S SINGAPORE WATER ACADEMY.

## THE GIFT OF LIFE

We have nine years to make the United Nations 17 Sustainable Development Goals 2030 a reality. One of these is universal access to clean water and sanitation. While Singapore may no longer struggle with water shortages, Singaporeans, especially those from an older generation, have not forgotten those days without access to potable water. This has spurred many of them to contribute through the Singapore International Foundation (SIF)'s Water for Life programme, which provides rural communities access to drinking water using clean water technology.

Lasting approximately four to five days, these trips saw SIF volunteers heading to rural communities to assemble and install bio-sand filters. These filters, which make use of modern materials, are key to producing potable water for the communities. They are modelled after the traditional slow sand filters of the 1800s, whereby water flows through layers of filtration sand and gravel to remove pathogens.

The conditions that volunteers sometimes find themselves in are not always ideal. During a trip to Cambodia in 2011, they grappled with knee-deep floods after heavy rain pounded the Mekong delta. But they pressed on, eager to do their bit for the underprivileged communities. Said one volunteer at that time, "Although their living conditions may look inhospitable compared to where we come from, they are proud of their country and proud to host foreigners like us. We learn more about the difficulties they face every day." Volunteer trips may have been suspended for now due to COVID-19 but SIF continues to explore other ways to provide assistance.

## SHARING BEST PRACTICES

In addition to supporting research and water accessibility, Singapore also shares knowledge and best practices

with other countries through PUB's Singapore Water Academy. The Academy conducts various training programmes, including its flagship Singapore Water Management Series. Covering the four topics of water quality management, sustainable urban stormwater management, water supply networks and water reuse, the series aims to offer water professionals practitioner-based technical solutions in urban water sustainability.

There are also dedicated programmes for international participants. These include the Singapore Cooperation Programmes (SCP) sponsored by Singapore's Ministry of Foreign Affairs, as well as the Temasek Foundation Water Leadership Programme, jointly conducted by the Singapore Water Academy and NUS Lee Kuan Yew School of Public Policy, Institute of Water Policy.

A NEWSLETTER OF THE  
SINGAPORE COOPERATION PROGRAMME

## RISING TO THE CHALLENGES

Singapore faced drought, floods and water pollution in its early years. Through innovation, it has built a diversified water supply from four water sources: water from local catchments, imported water, NEWater (high-grade recycled water) and desalinated water.



joining hands

Measuring 300m in length, the *Earth 300* research vessel offers an open-source platform for the global scientific community to take advantage of, while also providing a backdrop for citizen science and intrepid, meaningful exploration.