SDG 6 & COVID-19

Accelerating Progress Towards SDG 6 in the Asia-Pacific Region in the Context of COVID-19 Recovery
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Preparation of this paper is coordinated by the Economic and Social Commission for Asia and the Pacific through its Environment and Development Division. The report was authored by Caroline Turner in collaboration with Alexander David Lee-Emery. The authors wish to acknowledge contributions by Stefanos Fotiou, Katinka Weinberger, Curt Garrigan, Solene Le Doze, Dennis Joone Lee, and colleagues from the Sustainable Urban Development Section (SUDS) whose inputs were integral to the production of this report.

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ISSN:
Tracking number:
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Summary

The 2019 novel coronavirus (COVID-19) outbreak has highlighted the importance of water, sanitation, and hygiene (WASH) in protecting human health. However, while the Asia-Pacific region has seen significant progress towards SDG 6 targets during the past 20 years, the region still faces critical challenges due to scarce water resources, rapid population growth, and poor public infrastructure. These challenges coupled with the COVID-19 pandemic not only impede on the region’s progress towards SDG 6 but also cascade onto other interlinked SDGs such as poverty, gender equality, and climate change. Although the pandemic has had mixed impacts on SDG 6, it is imperative to accelerate progress towards SDG 6 during and post-COVID-19 to meet the 2030 targets.
# Abbreviations

<table>
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<th>Description</th>
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<tr>
<td>AOD</td>
<td>Aerosol Optical Depth</td>
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<td>CHL-A</td>
<td>Chlorophyll A</td>
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<td>COVID-19</td>
<td>Coronavirus Disease 2019</td>
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<td>IWRM</td>
<td>Integrated Water Resource Management</td>
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<td>NO₂</td>
<td>Nitrogen Dioxide (GHG)</td>
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<td>ODA</td>
<td>Overseas Development Assistance</td>
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<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
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<td>PPE</td>
<td>Personal Protective Equipment</td>
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<td>SDG</td>
<td>Sustainable Development Goals</td>
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<td>UNESCAP</td>
<td>United Nations Economic and Social Commission for Asia and the Pacific</td>
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<td>UNICEF</td>
<td>United Nations International Children's Emergency Fund</td>
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<td>WASH</td>
<td>Water, Sanitation, and Hygiene</td>
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I. Introduction

Access to clean water is fundamental to human health. Clean, safely managed water, sanitation, and hygiene are recognized as priority interventions for primary health prevention and are estimated to reduce the global disease burden by almost ten percent (Hall et al., 2020). The 2019 outbreak of coronavirus (COVID-19) solidified this reality as the world witnessed firsthand the contribution water, sanitation, and hygiene (WASH) has in disease prevention.

COVID-19 is a highly communicable disease, transmitted by contact and airborne particles and was declared a ‘Global Pandemic’ in March 2020. In response to the rapid increase of COVID-19 infection rates, the World Health Organization (WHO) developed a set of recommendations to curb the spread of COVID-19 which included stay-at-home orders, social distancing, curfews, mandatory use of personal protective equipment (PPE), quarantines, and school, workplace, and public transport closures.

However, the most notable recommendation was the need for comprehensive WASH practices, which requires communities to have safe, accessible, and sustainable water resources.

While access to WASH is tangible for most developed countries, developing countries across the Asia-Pacific region experience significant challenges. At present, the East Asia and Pacific region has 369 million people without access to basic sanitation services and 165 million people lacking access to basic drinking water (UNICEF, 2020). In South Asia, over 134 million people still lack access to improved drinking water and between 68 to 84 percent of water sources are contaminated (UNICEF, 2015). This reality continues to make implementing and scaling WASH measures to curb COVID-19 transmission extremely difficult.

COVID-19 has impacted almost every aspect of human life—from health, to livelihoods, food security, human rights, gender equality, and mortality. This crisis calls for collaboration and solidarity on the development of improved prevention strategies and strengthened resilience in the face of global health shocks. Namely, it is important to understand the role SDG 6 played in the management of the COVID-19 outbreak, how progress has been impacted, and what actions are required to accelerate SDG 6 progress in a COVID-19 context.
II. SDG 6

SDG 6 Description

Sustainable Development Goal 6 (SDG 6) aims to ‘ensure availability and sustainable management of water and sanitation for all’. The goal encompasses 6 targets and 2 sub-targets, with a total of 9 indicators and 2 sub-indicators (See Figure 1).

SDG 6 in the Asia-Pacific

While there has been significant progress against SDG 6 targets in the past 20 years, the Asia-Pacific region is not on track to meet any of the targets for clean water and sanitation.

> The Asia-Pacific region is home to only 36 percent of the world’s water resources with the lowest per capita water availability globally.

> More than 80 percent of the wastewater generated in the region’s developing countries is not treated, with wastewater remaining an under-tapped resource and a contaminant of clean water resources.

> Around half of the rural population in the Asia-Pacific has no access to improved sanitation, while the region’s growing urban population, expected to reach 3.5 billion by 2050, is driving massive demand for water and wastewater treatment systems.

> The region is one of the most disaster-prone globally, and its major economic sectors, such as agriculture and energy, are primarily dependent upon a reliable supply of fresh water.

> Persistent organic pollutants (POPs) and other hazardous chemicals from the agricultural and industrial sectors are found to be increasingly polluting ground and surface water resources and water-related ecosystems.

> Due to rapid population growth, urbanization, and increased industrialization, water competition among sectors has become more severe—threatening agricultural production and food security.

SDG 6 and Human Health (SDG 3)

SDG 6 and SDG 3 are intrinsically connected as WASH is recognized as a primary method of disease prevention (Hall et al., 2020). However, WASH is reliant on clean, safe, and accessible water resources. Furthermore, water ecosystem and biodiversity health are also inherently linked to human health as anthropogenic impacts on biodiversity increases the risk of infectious diseases (OECD, 2020).

While WASH has received prominence during the COVID-19 outbreak, it cannot be considered separately from the health of water resources and its ecosystems. From Source-to-Sea and from Source-to-Tap, the entire water system contributes to WASH and health outcomes and therefore must be more actively considered when planning for health interventions.

Water scarcity, poor water quality, inadequate sanitation, and damaged ecosystems affect the health of people, societies, and their economies. The COVID-19 outbreak has forced governments in the region to consider the importance of managing and investing in sustainable water resource management.
### FIGURE 1: SDG 6 TARGETS AND INDICATORS

**Target 6.1:** By 2030, achieve universal and equitable access to safe and affordable drinking water for all

- **Indicator 6.1.1:** Proportion of population using safely managed drinking water services

**Target 6.2:** By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

- **Indicator 6.2.1:** Proportion of population using safely managed sanitation services, including a handwashing facility with soap and water

**Target 6.3:** By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

- **Indicator 6.3.1:** Proportion of wastewater safely treated
- **Indicator 6.3.2:** Proportion of bodies of water with good ambient water quality

**Target 6.4:** By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

- **Indicator 6.4.1:** Change in water-use efficiency over time
- **Indicator 6.4.2:** Level of water stress: freshwater withdrawal as a proportion of available freshwater resources

**Target 6.5:** By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

- **Indicator 6.5.1:** Degree of integrated water resources management implementation (0-100)
- **Indicator 6.5.2:** Proportion of transboundary basin area with an operational arrangement for water cooperation

**Target 6.6:** By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

- **Indicator 6.6.1:** Change in the extent of water-related ecosystems over time

**Target 6.a:** By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

- **Indicator 6.a.1:** Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan

**Target 6.b:** Support and strengthen the participation of local communities in improving water and sanitation management

- **Indicator 6.b.1:** Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management

III. SDG 6 and COVID-19

A. Target 6.1: Universal and equitable access to safe and affordable drinking water for all

Status in the Asia-Pacific Region

Asia has made considerable strides in access to safe and affordable drinking water over the past decade. An estimated 92 percent of the population now have access to basic drinking water and only 1 percent of the population’s drinking water is sourced from surface water (UNESCAP, 2020).

However, regional access to safe and affordable drinking water is still a challenge in rural areas where eight out of ten people live without access to a freshwater resource (UN-Water, 2019). It is projected that by 2030 there will be a 40 percent supply-demand deficit in water resources. This shortage is largely driven by growing populations and increasing food demand. Agriculture is the leading consumer of water resources, especially in countries that are highly dependent on irrigation, such as Pakistan, where irrigated agriculture consumes more than 70 percent of annual average water resource availability (Young et al., 2019).

Target 6.1 and COVID-19

During the COVID-19 pandemic, the WHO stressed the need to practice WASH measures such as handwashing. However, this recommendation largely assumed water availability. Millions in the Asia-Pacific region still lack access to safe and affordable drinking water. In East Asia and the Pacific, 165 million people lack access to basic drinking water (UNICEF, 2020). In South Asia, over 134 million people do not have access to improved drinking water and between 68 to 84 percent of water sources are contaminated (UNICEF, 2015). Populations across the Asia-Pacific region still lack access to robust water infrastructure necessary to access safe and affordable drinking water.

While the direct impact of COVID-19 on safe drinking water has been minimal, impacts on water utilities have been significant. With the slowing of the global economy and industrial operations, many water-intensive sectors have downscaled or reduced activities resulting in the decline of demand (IFC, 2020). Additionally, in many countries’ partial suspension of water billing for low-income users and moratoriums on water service cut-offs have been common responses to assist vulnerable populations through the economic hardship imposed by COVID-19 lockdown measures (IFC, 2020).

While these measures have been necessary, significant reductions in water utility revenue pose concerns for long-term operational sustainability, especially in poorly governed economies. It is expected that water utilities could see revenue collections drop 15 percent on average as a result of the COVID-19 pandemic (IFC, 2020). This phenomenon could pose a challenge to sustainable water infrastructure, especially regarding maintenance and investment in updating aging assets, and hamper progress made to achieve equitable
access to safe and affordable drinking water in developing countries.

B. Target 6.2: Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation

Status in the Asia-Pacific Region

Between 2000 and 2015, the proportion of people across the Asia-Pacific region without access to sanitation services declined from 48 percent to 35 percent benefitting approximately 580 million people (UNESCAP, 2016). Among sub-regions, the Pacific performs best where 80 percent of the population have access to basic WASH services, in contrast to South and Southwest Asia with only about 40 percent (WHO, 2019; UNESCAP 2020).

Despite this progress, 1.5 billion people in the Asia-Pacific region still lack basic access to improved sanitation facilities (UNESCAP, 2016). Furthermore, one-quarter of health care facilities still lack basic water services, and 43 percent of schools lack basic access to soap and water for handwashing (WHO, 2019).

Target 6.2 and COVID-19

WASH played a critical role in the prevention of disease spread during the COVID-19 pandemic. The WHO developed recommendations for Member States to promote hand hygiene practices to help prevent the transmission of COVID-19 (WHO, 2020). However, due to national deficits in WASH infrastructure and services, communities struggled to contain the virus. While this was most notable in rural areas, large cities also faced significant risks due to high population density and informal settlements.

Crammed living conditions and inadequate public services, particularly in waste management and sanitation, act as a significant source of risk for contagions in large developing cities (IFC, 2020). For example, underdeveloped water and waste management systems was one of the contributing factors to the spread of Ebola during the 2013-2016 outbreak in West Africa and was identified as an underlying factor to thousands of deaths during the outbreak (Keulertz et al., 2020). However, during the COVID-19 pandemic make-shift handwashing facilities were set up in areas where access to WASH services were scarce (See Case Study 1).

A surprising positive externality of WASH measures during the COVID-19 outbreak has been the reduction in cases of other communicable diseases. For example, Singapore has seen a drop in cases of influenza, the common cold, diarrhea, conjunctivitis, and hand, foot and mouth disease. In Taiwan, similar observations have been made where influenza and Invasive Pneumococcal Disease (IPD) cases declined to a 6-year low, with rates during the spring months reaching approximately 10 percent of the 10-year average (Galvin et al., 2020).

According to the Organisation for Economic Co-operation and Development (OECD), WASH investment in poor communities has significant returns. Cost-benefit ratios (return (US$) per $1 invested in [urban/rural] water supply) in the Asia-Pacific Sub-Regions are as follows: Caucasus and Central Asia – 3.1 / 9.6; South Asia – 2.2 / 4.5; South-East Asia – 2.6 / 9.3; East Asia – 5.4 / 15.9; Oceania – 2.3 / 6.6. Investing in basic water services is one of the most cost-effective measures to increase pandemic preparedness (Cooper, 2020).

The COVID-19 pandemic also brought attention to the vulnerability of frontline WASH and healthcare workers. Few financial or PPE provision protections were initially allocated to frontline workers during
COVID-19, signaling the need to improve health disaster preparedness and response strategies for frontline worker welfare. However, the Ministry of Housing and Urban Affairs in India responded to this need by establishing new measures for WASH workers such as:

**CASE STUDY 1: TACKLING COVID-19 WITH HANDWASHING IN BANGLADESH**

Funded by the United States Agency for International Development (USAID) and implemented by Abt Associates, the Feed the Future Bangladesh Nutrition Activity installed 55 temporary handwashing stations in 27 markets in Faridpur, Khulna, and Patuakhali districts of Bangladesh in response to the lack of WASH access during the COVID-19 outbreak. The initiative targeted vendors, customers, and suppliers with the objective to raise awareness of handwashing in the market and at home. Handwashing stations were in easily accessible locations with posters illustrating handwashing procedures and social distancing markings on the ground. At the end of this pilot, surveys showed that an average 1,000 people wash their hands at each station on market days and 650 people on non-market days. Additionally, users have demanded that permanent handwashing stations be installed. The Activity was successful in raising awareness about proper handwashing practices and has highlighted the need for this intervention to be upgraded (i.e., permanent handwashing stations be connected to water system infrastructure) and scaled up.

*Source: Abt Associates (2020)*
C. Target 6.3: Improve water quality by reducing pollution

Status in the Asia-Pacific Region

Since the 1990s, water pollution has worsened in most rivers in the region. Severe pathogens and other hazardous chemicals affect river stretches in Asia, and the number of rural inhabitants whose health is at risk by encountering polluted surface waters ranges up to 134 million (UNESCAP, 2016). Among the most vulnerable groups are women and children (UNESCAP, 2016; UNEP, 2016). It is projected that 70 to 80 percent of untreated urban wastewater is discharged into freshwater reservoirs and oceans each year, leaving our water systems open to organic pollutants and other hazardous chemicals (UNESCAP, 2016).

Localized solutions towards wastewater treatment, such as decentralized wastewater treatment systems, are emerging at the technical and policy levels across the region, most notably in South and Southeast Asia where it is needed most. This is alongside advancements in Integrated Water Resource Management (IWRM) which contribute to a decrease in water pollution, through the holistic management of water systems. (UNESCAP, 2016).

Target 6.3 and COVID-19

Water quality is a pre-requisite for safe and accessible drinking water and essential WASH services. Furthermore, quality water is a result of appropriately managed wastewater and pollution.

COVID-19 has had both positive and negative impacts on water quality. Due to reduced economic activity during COVID-19 lockdown periods, water quality momentarily improved across the Asia-Pacific region. Furthermore, some ecosystems regenerated due to industrial inactivity, namely major rivers that experience high volumes of industrial pollution (Yunus et al., 2020). While this is not a direct actionable finding for COVID-19 prevention, it is worth noting as water quality is a prerequisite for healthy ecosystems and access to clean drinking water and WASH services.

A study on Vembanad Lake (the longest freshwater lake in India) revealed that the decrease in industrial and tourism activities during COVID-19 lockdowns resulted in an estimated 16 percent decrease in suspended particulate matter (SPM) concentration, an astounding improvement of lake water quality (Yunus et al., 2020).

However, despite water quality gains, COVID-19 has increased the use of single-use plastics which threaten our oceans with more pollution than ever before. COVID-19 triggered an estimated global use of 129 billion face masks and 65 billion gloves every month (Ford, 2020). A recent study found that by 2030, river basins are predicting a twofold increase in the number of plastic debris—including micro and nano-sized plastics (Silva et al., 2020). However, with the excessive use and consumption of single-use plastics (including PPE) during the COVID-19 pandemic, these predictions are likely to be extremely cautious (Silva et al., 2020). For example, in early 2020, Manila [Philippines] produced approximately 280 metric tons of additional medical waste per day as compared to their usual baseline; that is 16,800 tons over a 60-day outbreak period (ADB, 2020). A drastic increase in medical waste was also reported in Hubei Province, China, with an increment of 370 percent (Klemes et al. 2020). Plastic waste will be a major issue that will need to be addressed and highlights how human systems and products need to consider environmental impacts more carefully.
Additionally, considering that a high percent of untreated wastewater is discharged into freshwater systems, it is important to realize the additional health risks of wastewater dumping due to COVID-19. Studies have detected COVID-19 found in untreated wastewater, highlighting the importance of reducing the discharge of untreated wastewater into freshwater systems and the need to invest in and develop wastewater treatment capacity in areas with poor sanitation (See Case Study 2).

CASE STUDY 2: COVID-19 TRANSMISSION RISK FOR FECALLY CONTAMINATED RIVER WATER

While transmission of COVID-19 are mainly airborne, recent studies have documented the detection of COVID-19 in fecal matter and its ability to survive in untreated wastewater (Ahmed et al., 2020; Kitajima et al., 2020; Guerrero-Latorre et al., 2020). This is not a concern in high-income and developed countries with sufficient wastewater treatment capacity to neutralize viral loads found in wastewater, however, it is relevant and concerning in regions where treatment centers are insufficient or nonexistent.

COVID-19 has been detected in river water in countries with poor sanitation, where untreated sewage is discharged directly into water system—posing a high risk to downstream communities that rely on poorly managed surface water as their main water source. Sewage in areas where infection rates are high also show much higher COVID-19 viral loads in untreated wastewater (Shutler et al., 2021; Zaneti et al., 2020). As sewage can enter natural water systems due to sewage overflow events, failure of water treatment systems or a complete lack of infrastructure, this can potentially enable virus transmission to people or animals via water consumption, aerosol generation, or filtering of water during feeding. Additionally, under certain conditions, COVID-19 has been shown to remain stable in solutions up to 25 days (Shutler et al., 2021). With natural water systems able to act as transmission route for COVID-19, it is important to reduce spills and pollution in water systems.
D. Target 6.4: Substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals

Status in the Asia-Pacific Region

Most countries in the Asia-Pacific region withdraw unsustainable proportions of their freshwater supply, sometimes exceeding half of the total water availability. Seven of the world’s fifteen biggest groundwater abstractors are in the Asia-Pacific region and groundwater use is expected to increase by 30 percent by 2050 (UNESCAP, 2016).

The increase in demand for irrigation has led to severe groundwater stress in some areas, especially in two of Asia’s major food baskets – the North China Plain and North-West India (UNESCAP, 2016). This phenomenon is pushing irrigators and water experts to find solutions to save water at the field level, and more importantly, at the river basin level to achieve ‘real water savings’¹. However, efforts to curb water scarcity are often derailed by long held myths about water productivity and water efficient technologies that increase water consumption as opposed to decrease water consumption, the effect often referred to as ‘Jevons Paradox’ (See Box 1) (Sears, 2018; Opstal at al., 2020).

Scientific interest in water savings is growing rapidly and along with it, the quantity of journal articles, expert reports and conferences addressing water savings. A recent review observed that the number of case studies on the performance of water conservation technologies beyond the field scale has increased significantly in recent years: out of 224 applied case studies on this topic over a period of 42 years (1976-2017), some 91 studies (40.6 percent) were published in the last nine years (2010-2018) (Perez-Balnco et al., 2020; Opstal at al., 2020). However, much work still needs to be done to translate these findings into policy.

Target 6.4 and COVID-19

Water is key to food security as crops and livestock need water to grow. Agriculture requires large quantities of water for irrigation and good water quality for various production processes.

During the COVID-19 crisis several analysts and decision makers warned of problems with food supply and spiking food prices, creating a sense of urgency among governments to ensure food supply (Reinhart & Subbaraman, 2020). Many countries across the Asia-Pacific are net food importers (i.e., Republic of Korea, Hong Kong, Taiwan, Singapore, Malaysia, Bangladesh and Nepal), due to a number of reasons including, but not limited to, a lack of sufficient water resources. The panic in agricultural markets pushed water scarce countries to invest more heavily in domestic agriculture to prepare for food shortages and economic shocks. It is predicted that if not properly managed and accounted for, this could be significantly damaging to national sustainable water resources (Reinhart & Subbaraman, 2020).

During the COVID-19 pandemic, as traditional markets closed in many areas of Asia, farmers who owned land responded to food shortages by diversifying previous land-use to enable self-sufficient food production—often replacing their previous livelihoods (FAO, 2020). Recent observations in Thailand, Lao PDR, and Myanmar...

¹ The term ‘real water savings’ is used to emphasize that the perspective of only looking at a field should be broadened to entire basin; in other words, we define a real water saving as an intervention that releases an identified quantity of water to an alternative use. Water Saved is the amount of water resulting from a reduction in consumption and/or in the non-recoverable fraction of the return flows, and that can be made available for alternative uses. (Opstal et al, 2020).
have shown that many households that cultivate rice have started adding other crops to their field, planting vegetables and fruit trees (e.g., Paw paw) to become food self-sufficient (FAO, 2020). While showing clear advantages for community food security in the short to medium term, these land-use changes have triggered a sudden increase in groundwater extraction and consumption, even in areas where groundwater levels were already under pressure. Consequently, local water levels are at risk of declining in many areas, which will adversely affect long-term food security (FAO, 2020).

**CASE STUDY 3: AGRICULTURAL WATER USE EFFICIENCY AND REBOUND EFFECT IN CHINA**

Due to increasing agricultural driven water scarcity, many innovations in the agricultural sector have been developed to ensure water systems are more efficient, one of the most notable being efficient irrigation systems. Efficient irrigation systems (i.e., drip irrigation systems) are typically introduced as ‘water saving’ technologies with the belief that if water is delivered more efficiently to crops, the same quantity of crop can be produced with less water, therefore, water will be saved. However, this theory assumes that water use is reduced when the intervention is introduced, which is not necessarily the case (i.e., Jevon’s Paradox/rebound effect: increases in efficiency of using a natural resource does not necessarily lead to less consumption of that resource) in contexts where enforceable water allocation systems are not in place. As a result, efficient irrigation systems in poorly governed water markets often increase consumption. This is because, efficient irrigation systems increase crop productivity per hectare, and often result in increased yield. With increased yield, comes increased profits, and ultimately incentive for the farmer to increase production and water use (Opstal et al., 2020).

A study in China observed agricultural water use data from 30 provinces/cities from 2000 to 2017. Results show that 1) agricultural water use efficiency has a significant negative effect on water use, but average water rebound effect is roughly 89 percent; 2) effect of water use efficiency varies depending on climate (i.e., humidity) and the scale of the grain-producing area (i.e., major grain-producing areas vs. minor grain-producing areas); and 3) water use efficiency affects water use through planting area and structure, as increased efficiency expands planting area which in turn increases water use. The implication from this study suggests that to improve agricultural water use efficiency, irrigation agricultural scale must be controlled to avoid this efficiency rebound effect (Xu et al., 2021).

![Diagram](image)

Source: Opstal et al. (2020)
E. Target 6.5: Implement integrated water resources management (IWRM) at all levels

Status in the Asia-Pacific Region

Since 2000, most countries across the Asia-Pacific region have formulated and implemented comprehensive national water resources strategies utilizing IWRM principles (GWP, 2012), with the exception of the Pacific, where IWRM is particularly challenging due to the unique geographical context. However, despite progressive actions towards IWRM, governance and cross sectoral collaboration required to effectively implement IWRM strategies is still a persistent challenge in developing contexts (GWP, 2012). The Global Water Partnership (GWP) has noted that the most serious threat to water security is ineffective water management, stressing concern for the gap between policy objectives and field level outcomes (GWP, 2012).

Target 6.5 and COVID-19

IWRM is a process that promotes the coordinated development and management of water, land and related resources to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (See Figure 3).

In the context of COVID-19, water managers and public authorities have a newfound responsibility to consider water resource management in the context of pandemic prevention and management. This has the potential to generate new discussions around the importance of balancing water use against public health priorities.

Additionally, IWRM can be used as a tool for Prevention and Smart Monitoring of COVID-19 (GWP, 2016). For instance, sewage water has been monitored to identify possible pandemic hotspots (UNESCO, 2020). Considering the ability to help track the virus in early stages (even among asymptomatic individuals) with innovative procedures—as just mentioned—local governments in India have introduced city-wide sewage surveillance systems in Bangalore (See Case Study 4).

The COVID-19 pandemic has reinforced the necessity to utilize scientific approaches to tackle health risks at various levels. It is necessary for IWRM to carefully consider public health management and monitoring in planning processes.

![FIGURE 3: IWRM PLANNING STAGES](source: UN Water, 2000)
CASE STUDY 4: TRACKING COVID-19 THROUGH WASTEWATER IN BANGALORE

It is well known that municipal wastewater harbors a great variety of pathogenic viruses and enveloped viruses (i.e., coronaviruses) have also been found in wastewater (Farkas, 2020). Using this information, the Government of Karnataka with the aid from USAID and the Skoll Foundation-supported COVID Action Collab (CAC), introduced the Precision Health Platform in Bangalore. This program will test sewage from both sewer and non-sewer wastewater to identify new clusters of infection and cover over 75 percent of Bangalore’s population of 9 million people.

This innovative and important tool will provide early detection of clusters can help guide a COVID-response and provide policy makers with the data needed to efficiently allocate limited pandemic resources.

Advantages of sewage testing for viral monitoring include but are not limited to (Larsen, 2020):

- **Efficiency**: monitoring for traces of a pathogen enables quick and effective surveillance of entire communities.
- **Accurate surveillance**: a sensitive signal of whether a pathogen is present in the population and whether transmission is increasing or declining.
- **Early intervention**: successful in revealing infection dynamics earlier than diagnostic testing, it could provide public-health officials with near-real-time information on disease prevalence.
- **Cost effective**: It is cost-effective way to survey transmission dynamics of entire communities.
- **Non-biased**: Avoids the biases of other epidemiological indicators.
- **Inclusion**: Collects data from people who lack access to healthcare.
- **Rapid results**: Hospitalizations lag infections by weeks and do not report on people with mild or asymptomatic disease. Further, medical diagnostic testing capacity may be insufficient.

*Source: ArcGIS StoryMaps (2021)*
F. Target 6.6: Protect and restore water-related ecosystems

Status in the Asia-Pacific Region

The health of water-related ecosystems is dependent on water quality and availability. Water scarcity and deteriorating water quality is a growing threat across the Asia-Pacific region, and by virtue threatens the destruction of water-related ecosystems (and land ecosystems as they are also reliant on water availability). As water-related ecosystem services (fish production, water supply, etc.) are fundamental to human life, this is particularly concerning for developing countries where large populations still rely on subsistence farming and ecosystem services for food security and livelihoods (Grizzetti et al., 2016; Vorosmarty et al., 2010).

At present, around 80 percent of Southeast Asian wetlands are threatened by conversion to agricultural land or development by drainage, and up to 45 percent of intertidal wetlands have already been lost (WWF, 2014). Furthermore, ecosystem damage is expected to be compounded by climate change (See Figure 4). The most significant contributions to the sustainable management of freshwater resources and ecosystems in the past 20 years has been the advancements in IWRM and innovative, integrated, inter- and transdisciplinary science (i.e., eco-hydrology) (UNESCAP, 2016)

Target 6.6 and COVID-19

Anthropogenic impacts on biodiversity and its habitats increases the risk of infectious disease (Gibb et al., 2020). Agricultural expansion, logging, infrastructure development is the most common driver of infectious disease emergence, accounting for approximately one-third of all emerging disease events (OECD, 2020). Zoonoses – diseases transmitted from animal species to humans (such as COVID-19) – account for approximately 60 percent of all infectious diseases and 75 percent of emerging infectious diseases in humans (Gibb et al., 2020). Other zoonotic diseases include Ebola, avian influenza, sudden acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS) and Human Immunodeficiency Virus (HIV) (OECD, 2020).

![Figure 4: Causes of Ecosystem Change in Streams and Rivers](source: Malmqvist & Rundle, 2012)
(Gibb et al., 2020). With current development trends, environmental degradation, and the compounding impact of climate change, the prevalence of zoonotic diseases is likely to increase without adequate protections.

In order to better manage ecosystem health in conjunction to human health a number of approaches can be used to address the health of humans, animals and the environment in an interlinked manner—including One Health, Planetary Health and Eco-Health. Each of these approaches “promote the underlying assumption of humans and other animals sharing the same planet and the same environmental challenges, infections and infectious agents as well as other aspects of physical—and possibly mental—health”. These approaches advocate for the strengthening of cross sector collaboration from a range of different sectors, such as public health, animal health, plant health and the environment to effectively detect, respond to, and prevent outbreaks of zoonoses using epidemiological data and laboratory information shared across sectors (WHO, 2017). Additionally, more policy and legislative commitments are required to adequately protect the environment and conserve ecosystems.

Figure 5: Catchment Ecosystem Service Degradation Level

Tree cover loss was applied as a proxy to represent catchment ecosystem services degradation since forests play an important role in terms of water regulation, supply, and pollution control. The forest cover data is based on Hansen et al.’s global Landsat data at a 30-meter spatial resolution to characterize forest cover and change. The authors defined trees as vegetation taller than 5 meters in height, and forest

![Figure 5: Catchment Ecosystem Service Degradation Level](image-url)
cover loss as a stand-replacement disturbance, or a change from a forest to non-forest state, during the period 2000 – 2019.

### G. Target 6.a: Expand international cooperation and capacity building

#### Status in the Asia-Pacific Region

Cooperation among Asia-Pacific countries for capacity building and knowledge sharing is typically strong. Dialogue and cooperation are embedded in regional governing bodies including but not limited to UN Agencies, UN Commissions, and Intergovernmental Organizations. Furthermore, these organizations assist national governments to mobilize overseas development assistance (ODA) in the region to address key development challenges.

**Target 6.a and COVID-19**

2020 has seen a significant increase in international cooperation and increased ODA. This is largely due to mobilizing resources to respond to overseas COVID-19 health risks.

Within the context of SDG 6, it will be vital to monitor how increased investments are targeted, ensuring that they are contributing to sustainable long-standing initiatives that will assist in the long-term progress against SDG 6 targets (Development Initiatives, 2020). However, while ODA investments initially increased, they are expected to slow as national donor agencies suffer budget cuts due to national economic crises (See Figure 6).

**FIGURE 6: TOTAL WATER AND SANITATION COMMITMENTS REPORTED TO THE INTERNATIONAL AID TRANSPARENCY INITIATIVE (IATI) BY BILATERAL AND MULTILATERAL DONORS IN THE FIRST FIVE MONTHS OF 2019 AND 2020**

Source: Development Initiatives,
H. Target 6.b: Support and strengthen the participation of local communities in improving water and sanitation management

Status in the Asia-Pacific Region

It is well known that the water sector is highly fragmented. As water is involved in almost every aspect of the economy and human life, managing water holistically, whether in developing or developed contexts, is significantly challenging (OECD, 2015).

Due to the highly segmented nature of water, this also presents challenges in consulting stakeholders with effective coordination. However, despite these challenges, community engagement with water and sanitation management is on the rise in Asia (OECD, 2015). Further, the region has seen an abundance of community led initiatives arise to address WASH shortages, for example, Community-Led Total Sanitation (CLTS) which originated in Bangladesh.

Target 6.b and COVID-19

Engaging citizens was especially important during the COVID-19 pandemic. Responding to an unprecedented threat to national health, governments needed to rapidly adapt to changing circumstances, effectively disseminate public information and directly engage specific communities with respect to their immediate needs (World Bank, 2020). However, due to social distancing and lock down measures, face-to-face engagement was limited.

Governments across the world have faced extraordinary decision-making challenges balancing trade-offs between the health, safety, and well-being of citizens and impacts to national economies and livelihood (World Bank, 2020). Despite these challenges, development organizations and governments across the Asia-Pacific have been able to reach local communities and key stakeholders to improve service provisions for COVID-19 responses. An example of this can be seen in Indonesia (See Case Study 5).
CASE STUDY 5: EMPOWERING COMMUNITIES AND LOCAL-LEVEL INSTITUTIONS TO DEVELOP SOLUTIONS THAT BEST MEET THEIR WASH NEEDS

Indonesia’s Community Based Drinking Water Supply and Sanitation program (PAMSIMAS) is a project addressing the country’s rural problem of open defecation and poor handwashing practices. Focusing on empowering communities and local-level institutions to develop solutions to meet their specific needs, the program has been able to eliminate poor sanitation and adopt better hygiene practices. To date, an estimated 1.9 million people (36 percent who are female) have been trained to improve hygiene behavior and sanitation practices, while 72 percent of target communities have adopted handwashing practices.

The PAMSIMAS project also supports initiatives in local communities to help villagers better adapt to the current COVID-19 pandemic. For instance, program facilitators have coordinated with stakeholders to build 15 handwashing facilities with adequate water supply and soap in Samustida Village. Additionally, in Kedungmundu Village, the local community used funding from the PAMSIMAS program to proactively disinfect mosques and distribute face masks (World Bank, 2020: 2).

Source: World Bank (2020: 3)
IV. COVID-19 and Water Related SDGs

A. SDG 1 Poverty

Status in the Asia-Pacific Region

Of the world’s 1.3 billion multidimensional poor people, nearly half live in the Asia-Pacific. However, the extent of poverty differs significantly across the region – from less than 1 percent (Armenia, Thailand, Kazakhstan, Maldives, Turkmenistan) to 40 percent (Afghanistan, Bangladesh, Timor-Leste) (UNESCAP, 2020). The East and Northeast Asia subregion has achieved significant progress towards eradicating extreme poverty, with less than 1 percent of the population living on an income below the international poverty line ($1.90 per day in 2011 PPP dollars). About 5 percent of the population in Southeast Asia lives on an income less than the international poverty line but is on track to eradicate extreme poverty in the subregion by 2030 if progress continues in its current pace. In the South and Southwest Asia subregion, poverty remains an issue with 10 percent of the population below the international poverty line, whereas in North and Central Asia has less than 5 percent. In the Pacific subregion, while many countries have reduced extreme poverty to low levels, countries such as Papua New Guinea and the Solomon Islands still have a significant proportion of its population living under the international poverty line, 38 and 25 percent, respectively.

SDG 1 and COVID-19

Global extreme poverty is expected to rise in 2021 for the first time in over 20 years as the disruption of the COVID-19 pandemic compounds the forces of conflict and climate change (World Bank, 2020). The COVID-19 pandemic is estimated to push an additional 89 to 115 million people into extreme poverty this year, with the total rising as much as 150 million by this year, depending on the severity of the economic contraction (World Bank, 2020).

With respect to SDG 6, people living in informal settlements—the poorest and most marginalized populations—could be particularly vulnerable as they often rely on communal water points and toilets, private vendors, and water tankers. High water costs and limited access could prohibit generous use of water for handwashing, whilst needing to leave home to access and queue for communal facilities makes self-isolation and social distancing difficult (Cooper, 2020). These conditions make lockdowns impractical and limited household budgets may also mean that purchasing soap or hand sanitizer is not a household priority.

Vulnerable populations or individuals with no access to clean water are likely to have other vulnerabilities such as a lack of education, housing or are considered low income (UNESCAP, 2016). These risk factors all increase COVID-19 vulnerability. Additionally, longer-term changes in climate and water scarcity, alongside rapid urbanization and ongoing conflicts in
fragile areas will increase social instability and internal/external displacement. Collective action is required to ensure years of progress in poverty reduction are not erased due to COVID-19, thus, efforts must be made to confront this issue (World Bank, 2020).

### B. SDG 5 Gender Equality

#### Status in the Asia-Pacific Region

Statistically across the Asia-Pacific region, women bear the burden of unpaid domestic and care work across countries, regardless of the level of development (UNESCAP, 2016: 3). Such work includes cooking, cleaning, and taking care of children and the elderly (UNESCAP, 2016: 3).

Data on unpaid domestic and care work is available for 19 Asia Pacific countries between 2000 and 2015. During this time women spent between 2.4 and 6 hours per day on unpaid work, while men spent only between 18 minutes and 2.3 hours per day (UNESCAP, 2016: 3). This disparity is evident not just in the low-income countries but also in the upper middle- and high-income countries (UNESCAP, 2016: 3).

#### SDG 5 and COVID-19

Due to the disparity in unpaid domestic work between men and women, labour division in the WASH and health sector is also highly gendered. An estimated 70 percent of global health and social care workers are women, and 80 percent of household water collection in developing countries falls on women (WHO, 2019; WHO & UNICEF, 2017).

The burden of water collection falls on women in all contexts, as a result this affects women in a multitude of ways. For example, in poorer urban communities with higher population density, women are forced to collect water at crowded community pumps, increasing the threat of COVID-19 transmission. This also holds true in rural contexts, where women are generally responsible for gathering water and firewood. Additionally, as the COVID-19 pandemic continues to unfold in developing countries and large populations of workers in the informal sector continue to migrate out of cities (seen as epicentres for COVID-19) due to a lack of employment opportunities and slowing economic activity, women's unpaid care and domestic work burden has intensified (Crawford, 2020).

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**FIGURE 7: WASH AND WOMEN**

Access to safe water, sanitation and hygiene is critical for protecting human health and reducing women’s unpaid work.

- Women and girls are responsible for collecting water in 80% of households lacking on-site drinking water, increasing their exposure to the virus.
- Globally, 4 billion people are deprived of safely managed sanitation and 3 billion people lack access to clean water and soap at home.

Source: Azcona et al. 2020, UN Women
In areas where WASH and water services are difficult to access, women’s unpaid workload have increased, especially in situations where they have had to care for family members who fell sick. More alarmingly, according to UN Women, the confinement of COVID-19 lockdowns left women more vulnerable than ever to gender-based violence (GBV), with some countries recording a 50 percent increase in GBV helpline calls (UN Women, 2020). The nature of women’s work puts them at an increased risk of contracting COVID-19. Therefore, policies must recognize and address gender inequalities and barriers to WASH access during times of crises.

As part of WaterAid’s COVID-19 response, in partnership with JEETA, tribal women in Odisha, India were trained with skills to repair and maintain drinking water sources.

Source: WaterAid (2021)

C. SDG 13 Climate Change

Status in the Asia-Pacific Region

Higher temperatures, sea level rise, and extreme weather events are just a few of the impacts expected in the Asia-Pacific region due to climate change. These impacts are already having a major impact—harming economies, destroying natural and physical assets, and compounding developmental challenges such as poverty, food and energy security, and public health (UNESCAP, 2016: 5).

ESCAP’s latest report highlights the region’s total greenhouse gas emissions doubling since 2000, emitting half the world’s total greenhouse gases (UNESCAP, 2020). The region’s share of renewable energy in its total energy consumption has dropped from 23 percent to 16 percent from 2000 to 2016. In 2018, at least 24 million lives in the region were negatively impacted by natural disasters. To achieve
its 2030 targets, the region will need to significantly accelerate progress or reverse current trends.

**SDG 13 and COVID-19**

Increased anthropogenic activities and climate change are leading to less predictability in water availability. Increased incidences of water-related disasters threaten to destroy water points and sanitation facilities, contaminate water sources, and exacerbate water scarcity—negatively impacting human health and productivity.

Growing evidence suggests that climate change may lead to more frequent viral outbreaks and epidemics. This is due to themes explored under SDG Target 6.6. Climate change may increase the number of zoonotic disease spill-over events from hosts to humans by increasing the landscape suitability for the host and human-host contact (Redding et al., 2016; Cooper, 2020). Due to its altering effect on the global water cycle, climate change is also expected to increase flood occurrence, leading to failed sanitation and unsafe water which contribute to conditions for disease spread (Cooper, 2020).

For WASH, efforts to establish climate resilient water management is needed to ensure that supply and storage solutions, institutions and decision-makers are prepared to adapt to a shifting climate and uncertain water cycle (Cooper, 2020). It is clear that climate change will have an inevitable impact on all sectors of human life that rely on the water cycle, from ecosystem services to economic activities. Countries need to consider adaptation and mitigation measures to contain climate-related risks more seriously.
V. COVID-19 and Cross Cutting Issues

Key drivers for accelerating SDG 6 are set out in UN-Water’s SDG 6 Acceleration Framework. This framework outlines a set of guiding principles that espouse prioritizing the vulnerable, inclusivity, conflict sensitivity, unleashing female and youth potential, planning for resilience, and designing and implementing transformations based on scientific evidence. The framework uses three action pillars, (1) **Engage**: Engaging closer with UN agencies, governments, and civil society; (2) **Align**: Improving ways of working and coordination with key stakeholders; and (3) **Accelerate**: Key drivers that are understood to improve and support country progress.

The five accelerators as defined by the framework are as follows:

- **Financing**: Optimized financing is essential to get resources behind country plans.
- **Data and information**: Data and information targets resources and measures progress.
- **Capacity development**: A better-skilled workforce improves service levels and increases job creation and retention in the water sector.
- **Innovation**: New, smart practices and technologies will improve water and sanitation resources management and service delivery.
- **Governance**: Collaboration across boundaries and sectors will make SDG 6 everyone’s business.

This framework can be applied to SDG 6 in the context of COVID-19 to better understand COVID-19 impacts and impending challenges to accelerating SDG progress as a result of the outbreak.

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**FIGURE 9: SDG ACCELERATION FRAMEWORK**

Source: UN-Water
Finance

Due to COVID-19, the global economy slowed substantially with a global real GDP contraction of 3.4 percent in 2020 (OECD). Unfortunately, this contraction occurred during a time when governments faced additional and increased public costs to manage the impacts of COVID-19. Public costs incurred during the COVID-19 outbreak include additional public service spending, support for households (i.e., welfare, income support schemes, job retention schemes) and support for businesses (i.e., business rates relief, loans and guarantees, grants). Public revenue is also expected to decrease compared to pre-COVID-19 predictions, as corporation taxes, capital taxes, fuel duty taxes, and business rates are expected to be substantively reduced due to the decrease in economic activities (Institute for Government, 2021).

Aside from financial impacts on the economy, COVID-19 revealed significant gaps in public service spending in developing countries, namely with respect to WASH funding. Prior to COVID-19, financing in the WASH sector already lacked in multiple countries in the Asia-Pacific (Figure 10). With the impact COVID-19 has had on financial markets, public spending and public revenue, it is likely that other costs to revive the economy will take precedence over WASH funding in the near future. Within this context it will be important to engage with the private sector and develop public-private sector partnerships to build resilience in financial support in the WASH sector.

Partnerships and Governance

Prior to the COVID-19 outbreak 26 countries (52 percent) in the Asia-Pacific had a national public health emergency response plan in place outlining a response for multiple communicable diseases with epidemic or pandemic potential (GHS Index, 2019). However, a number of countries (24) lacked robust plans for responding to potential pandemics. This was reflected by the ad-hoc governance style, and delayed planning of measures to manage COVID-19 outbreaks.

**FIGURE 10: SUFFICIENCY OF FINANCIAL RESOURCES ALLOCATED TO SANITATION TO MEET NATIONAL TARGETS**

Source: WHO (2019)
In the Asia-Pacific region, ASEAN demonstrated leadership and facilitated cooperation to contain the pandemic. Due to previous experience with SARS and H1N1, some countries demonstrated success in managing COVID-19 containment, however, this was not consistent amongst all ASEAN countries. While a number of factors determined why certain countries in the region did better than others, the most critical were strong leadership, centralized and/or better national coordination, clear public messaging, and strict enforcement (Brookings Institution, 2021).

In many contexts throughout the region, COVID-19 highlighted clear gaps between national efforts to control the COVID-19 outbreak and local efforts to provide critical supplies to lower socio-economic communities. Many local led initiatives demonstrated effectiveness in addressing critical shortages in supplies and spreading information, further, there initiatives would have prospered with support from national efforts. With better coordination and partnership between the national and local leadership, future outbreaks will be better managed and contained.

Data and Information

Reliable data and information were key inputs for national responses to COVID-19. For example, a Joint Intra-Action Review of the Public Health Response to COVID-19 in Thailand carried out by the Government of Thailand’s Ministry of Public Health World Health Organization stated that ‘an advanced integrated digital data system will be required to ensure efficiency in managing the situation’.

The COVID-19 response required timely and accurate data to enable effective decision making. However, data on medical, public health, and WASH access in many countries across the Asia-Pacific is dated and fragmented, presenting significant challenges and sometimes impairing countries to respond effectively to COVID-19 outbreaks. Thailand noted in their review of the COVID-19 response that the data required to make effective decisions was either not available, not accessible, or not properly formatted to allow for analysis and communication, and often not linked to other databases to allow for effective cross sectoral planning.

COVID-19 has elevated the importance of investing in robust data collection and organization, however, there are also some fears that data privacy may become an issue. To respond to the growing health crisis, governments across the region enacted unprecedented measures in data collection to track, trace and contain COVID-19. However, some approaches have been considered controversial in terms violating privacy and other fundamental rights of citizens (OECD, 2020).

Capacity Development

In 2019, prior to the COVID-19 outbreak, a study was carried out by the Global WASH Cluster and Groupe URD, a think-tank for humanitarian action, which assessed the capacity of the WASH sector. The study concluded that ‘unless there is adequate provision of safe drinking water and good sanitation, populations affected by conflict or disaster will suffer significantly.’ The study also demonstrated that the WASH sector is still falling short of providing clean water and sanitation in contexts of mass displacement or when people do not have access to WASH services, and the sector as a whole was not in a position to meet many challenges ahead including urbanization, epidemics, climate change, accelerated demographic pressure, and technological risk.

One of the key recommendations of the study indicated the need to improve capacity development in the WASH sector and to develop technical
capacities to respond to new and emerging challenges through improved skills and delivery mechanisms for WASH programming which include but not limited to: fecal sludge mechanisms, work in urban areas, solid waste management, emerging global environmental disease threats, risks of highly toxic pollution resulting from disasters or conflicts in industrial settings.

The regional response to the outbreak of COVID-19 demonstrated the shortcomings outlined in the 2019 study. Specifically, national efforts were forced to accelerate progress on these shortcomings by delivering emergency WASH services to communities without access to WASH, protecting WASH workers, building WASH worker capacity to respond during a health crisis, and developing COVID-19 safe WASH practices. In the future, it will be important to ensure that these emergency efforts are harnessed and developed into longer term strategies to secure WASH facilities and invest in WASH workers’ capacity to respond to the array of emerging challenges due to climate change and population growth.

Innovation

Like all major upheavals, COVID-19 has been a catalyst for human innovation as people and organizations are forced to live and work in different ways. The accelerated uptake of established technologies alongside emerging innovations has significant implications for the water sector and SDG 6. In many cases this change has been positive, increased digitization and the availability of ‘big data’ has allowed WASH professionals to coordinate their responses and resources at a greater scale and efficacy than ever before. Emerging technologies like the creation of ‘digital twins’ for water infrastructure, artificial intelligence, and drone monitoring to reduce non-revenue water losses, alongside simpler measures such as real-time smart water meters, all present an opportunity to create responsive and efficient water systems that can maximize service availability.

However, the range of epidemiological contexts and levels of digital readiness has exposed a stark ‘digital divide’ across the Asia-Pacific. Inequitable access to water among citizens, and variable technical capacity and resources among service providers and policy makers highlights the need for a greater focus on inclusive and low-cost solutions.

Similarly, where advanced technologies may be applicable for large-scale urban systems, it remains important to consider rural communities and informal settlements (in which the high population density of urban settings is combined with low resource availability and compounding social vulnerabilities). In these settings it is often not technological innovation that will have the most impact but structural and financial changes that are required to improve accessibility.

COVID-19 has highlighted the intrinsic links between public health and local, national, and international economies. WASH investments are among the most cost-effective measures, not only to control COVID-19 but also to promote wider development. Therefore, maintaining the current focus on WASH and innovation promises a dual benefit of enhanced disease control and prosperous communities. As such WASH and pandemic resilience needs to be more widely considered within long-term recovery strategies at all levels.

The democratization of knowledge through social media has allowed local communities to take their own measures to enhance pandemic preparedness such as educating low-income communities on soap production. In low-tech environments, the scaling of new community-led initiatives to building strong local networks is vital to establish pandemic
resilience. At a national scale, digital platforms are increasingly important for effective public health messaging especially regarding handwashing and sanitation.

Overall, COVID-19 has instigated irreversible changes to the way national and local governments think about WASH and digitization and has stimulated innovation across the water sector. What is needed now is to ensure the positive gains made in behavioral change, service provision, and human rights to water are supported and sustained to accelerate achievement of SDG 6.
VI. The Path Forward and Policy Recommendations

The COVID-19 pandemic has had mixed impacts on SDG 6 progress. COVID-19 has led to an increase in vulnerability for poor and marginalized populations, it has slowed the economy, and threatened the sustainability of water infrastructure and essential WASH services. Additionally, plastic waste has increased globally as a result of additional medical waste and PPE, and groundwater abstraction has increased in some areas to compensate for food shortages and economic shocks to the agricultural industry.

However, COVID-19 has also highlighted the role ecosystems have in protecting and conserving human health. Due to lockdowns and the slowing of the economy, air quality and water quality improved momentarily in some areas, providing scientists the opportunity to conclusively prove how economic activities impact water ecosystems. Furthermore, the outbreak highlighted the importance of cooperation and knowledge sharing at the regional and national level with stakeholders and civil society. Lastly, COVID-19 demonstrated the value of investing in IWRM, monitoring, and data collection.

With this understanding, the following recommendations for accelerating SDG 6 in the Asia Pacific Region in the context of COVID-19 have been developed:

- Increase investment in water utilities and infrastructure to trigger transformational change in countries where access is still limited. Policy makers should harness the momentum achieved through emergency COVID-19 responses and follow with long-term commitments to strengthening water security.

- Support policies that defer payment for sanitation and sewage (Keulertz, 2020). However, simultaneously support policy measures that ensure water utilities recover economic losses to secure water utility sustainability. For example, financial support to allow utilities to absorb temporary revenue losses or payment deferrals from customers, including informal water service providers where necessary.

- Water resource challenges experienced by the extreme poor should be addressed first in national recovery action plans.

- Implement financial support policies (cash transfers or subsidies) for improving water supply to at-risk communities.

With recognizing the lack of water resources available to millions of people across the Asia-Pacific region—particularly vulnerable populations—and losses experienced by water utilities, recommendations for Target 6.1 are as follows:

With recognizing the lack of WASH facilities and services available to rural populations and
the stress COVID-19 posed to health workers and WASH frontline staff, recommendations for Target 6.2 are as follows:

> Improve access to handwashing facilities, including the construction of new facilities particularly in schools, markets, health clinics, and detention centers.

> WASH hygiene kits should be adapted to include provisions for highly communicable diseases in case of future health shocks to ensure communities are prepared.

> Implement policies and regulations to protect WASH and healthcare workers for future health shocks. Policies could include but are not limited to mandatory supply of personal protective equipment, sanitary working conditions, health insurance, and income security. Additionally, potential risks experienced by frontline workers, such as violence and harassment, should be acknowledged and mitigated.

> COVID-19 measures to treat wastewater as a biohazard and kept safely contained for treatment should be followed by long-term commitments to treating wastewater.

> Support local community organizations and civil society groups in provision of WASH and COVID-19 preventative measures.

> Response and recovery of COVID-19 must pay special attention the risks and burdens borne by essential health workers, the majority of whom are women.

> Disease-related health vulnerabilities faced by women as a result of their role as primary care givers must also be recognized and addressed as a matter of priority.

> Economic support packages for vulnerable women and measures to confront women’s time spent doing ‘free work’ and increasing income poverty should be implemented. This includes efforts to recognize, reduce and redistribute the increased burden of unpaid care and domestic work.

> Improve gender disaggregated data collection and expand research on the gendered impacts of COVID-19, particularly on those most marginalized.

With recognizing the water pollution threat of increased plastic use as a result of COVID-19 medical waste and PPE, as well as the positive impact reduced economic activity has on water quality, recommendations for Target 6.3 are as follows:

> Implement more efficient waste management systems for plastic waste recovery; accompanied by regulation for production, and consumption of single-use and medical plastic products (including incentives for recycling and redesigning) (Patricio, 2021).

> Implement policies and regulation that internalize the cost of waste management (recycling and disposal) for plastic product producers to ease the burden of economic costs associated with plastic waste management.

With recognizing agriculture driven water scarcity and land use changes during COVID-19 as a response to agricultural industry shocks, recommendations for Target 6.4 are as follows:

> Improve collection of water data including monitoring, accounting, and allocation to ensure water withdrawals stay within sustainable limits.

> Build national capacity in water accounting and
allocation practices to strengthen sustainable water management.

With recognizing innovations in IWMR to track and monitor COVID-19 outbreaks using wastewater, and the high reliance on water resources for health prevention coupled with the growing climate risks, recommendations for Target 6.5 are as follows:

> Advocate for synergies with climate goals when accelerating the uptake of investment in water resources to ensure mutually beneficial outcomes, as climate, water, and health are intrinsically linked.

> Support and invest in innovative IWRM methods for monitoring health outbreaks through water and sewage systems.

> Advocate for the inclusion of human health markers in IWRM policy design.

> Strengthen IWRM at local and national levels to facilitate stronger national coordination for water priorities.

With recognizing the key role ecosystems play in protecting human health by preventing transmission of disease from animals to humans, recommendations for Target 6.6 are as follows:

> Increase protection measures for land and water ecosystems.

> Strengthen cross sector collaboration from a range of different sectors, such as public health, animal health, plant health and the environment to effectively detect, respond to, and prevent outbreaks of zoonoses using epidemiological data and laboratory information shared across sectors approaches to prevent future outbreaks of zoonotic diseases.

> Ensure that post-COVID-19 economic recovery activities do not compromise ecosystems and biodiversity health.

> Scale up investment in biodiversity conservation, sustainable use and restoration, including spending targets for COVID-19 stimulus measures and recovery plans.

> Collect data and learn from environmental studies carried out during COVID-19 lockdowns to find pathways for land and water ecological recovery.

With recognizing the economic impacts of COVID-19 and the likely slump in public investment in overseas development aid, recommendations for Target 6.a are as follows:

> Increase the profile of the business case for WASH and water investments.

> Increase private sector finance and public-private-partnerships investment for WASH and water infrastructure.

With recognizing the importance of community engagement during national health crises, and the lack of connectivity for vulnerable populations, recommendations for Target 6.b are as follows:

> Public awareness and communication with stakeholders played a key role in the success and/or failures of the spread of COVID-19. Lessons from developing digital solutions to reach key demographics during the COVID-19 crisis should be scaled across the water sector.

> Harnessing progress in digital communication platforms due to COVID-19 efforts should be injected into innovations to increase population wide connectivity.
VII. Conclusion

Despite progress during the past two decades, the region still has much work to do if it is to meet its SDG 6 targets by 2030. Many still lack access to WASH services, water pollution has worsened in most rivers, countries continue to withdraw unsustainable amounts of water, and wetlands remain threatened by land conversion. Recognizing the connection between SDG 6 and other SDGs further emphasizes the need to enable and accelerate progress. To meet this end, it is imperative to improve data collection, implement effective policies and regulations to protect and improve water resources, increase investments, and improve water governance. While adverse impacts to our water resources can be managed through the practices mentioned in this brief, adverse human health impacts—such as contagious viruses—can also be managed with progress towards SDG 6.
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