



A close-up photograph of a young child's face as they drink water from a metal tap. The child is wearing a pink cloth around their waist. The background is blurred, showing a natural outdoor setting.

## PART I

# A HANDBOOK ON WATER, SANITATION AND HYGIENE (WASH) FOR IMPACT INVESTORS

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EUROPEAN  
MICROFINANCE  
PLATFORM  
ADVANCING FINANCIAL INCLUSION



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## ABOUT THE HANDBOOK PART I

Billions of people across the world have gained access to basic drinking water and sanitation facilities since 2000, but these services do not necessarily provide safe drinking water and safely managed sanitation facilities. Even though 74% of the world's population used safely managed drinking water services in 2020, 2 billion people still lack access to these services. The need for urgent investments in the Water, Sanitation, and Hygiene (WASH) sector is inevitable to meet the 2030 goals of Sustainable Development Goal (SDG) 6, which focuses on safe drinking water, sanitation, and hygiene. Currently the three major sources of WASH financing (taxes, tariffs, and transfers) are not enough to meet the need for safe drinking water and sanitation services in developing countries. As governments and public finance cannot meet these funding requirements on their own there is a need to attract more private investments to the sector along with a similar increase in public finance.

This handbook was prepared in collaboration with the e-MFP WASH Action Group (AG). The AG was created in 2021 to answer to a need shared by some e-MFP members, particularly investors, to better understand the WASH sector and its relevance for low-income populations in developing countries, and to be able to identify investment opportunities in the sector. This is the first output of the AG activities and the result of thorough secondary research and stakeholder interviews. The handbook is divided in two Parts. Part I aims to improve awareness about the sector and its linkage with the SDGs. It contains valuable information not only for impact investors but for all financial inclusion stakeholders looking to improve their knowledge about the sector. Part II focuses on the WASH economy, drawing attention to the existing funding gap, identifying challenges and pre-conceived ideas about investing in WASH projects and advancing solutions to tackle the identified challenges, with the expectation of contributing to catalyse new investments in the sector in the short and medium term.

In Part I, the first chapter introduces the WASH sector on a broad level, explains WASH as part of the Sustainable Development Goals (SDGs), and makes a connection between WASH and other SDGs. The second chapter aims to explain the skeletal structure of the WASH ecosystem through depicting separate value chains for safe drinking water and sanitation, also touching upon the external drivers that are responsible for propelling the WASH ecosystem onwards. The third chapter sheds light on private enterprises currently operating in WASH value chains, the business models that are prominent in the sector and what potential investee companies look like. The document includes a glossary of the common terminology used in the sector (Annex I).

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## List of Abbreviations

<b>BOP</b>	Base of Pyramid
<b>CBO</b>	Community-Based Organizations
<b>CFI</b>	Corporate Finance Institute
<b>DFI</b>	Development Finance Institution
<b>EFL</b>	Entrepreneurial Finance Lab
<b>ESG</b>	Environmental, Social and Governance
<b>FSTP</b>	Faecal Sludge Treatment Plant
<b>GLAAS</b>	Global Analysis and Assessment of Sanitation and Drinking Water
<b>IDA</b>	International Development Association
<b>IFC</b>	International Finance Corporation
<b>ILO</b>	International Labour Organization
<b>IRC</b>	International Reference Center
<b>JMP</b>	Joint Monitoring Programme for Water Supply, Sanitation and Hygiene
<b>MDB</b>	Multilateral Development Bank
<b>MFI</b>	Micro Finance Institution
<b>MPWI</b>	Multi-Purpose Water Infrastructure
<b>MSME</b>	Micro, Small, and Medium Enterprises
<b>NGO</b>	Non-Governmental Organization
<b>NSDF</b>	National Slum Dweller's Federation
<b>OECD</b>	Organisation for Economic Co-Operation and Development
<b>PPP</b>	Public- Private Partnership
<b>PSL</b>	Priority Sector Lending
<b>RBF</b>	Results-Based Finance
<b>RBI</b>	Reserve Bank of India
<b>ROI</b>	Return On Investment
<b>SDG</b>	Sustainable Development Goal
<b>SIINC</b>	Social Impact Incentives
<b>SME</b>	Small and Medium Enterprises
<b>SPARC</b>	Society for the Promotion of Area Research Centers
<b>SSWM</b>	Sustainable Sanitation and Water Management
<b>STP</b>	Sewage Treatment Plant
<b>TIC</b>	Total Impact Capital
<b>UNDP</b>	United Nations Development Programme
<b>UNESCO</b>	United Nations Educational, Scientific, and Cultural Organization
<b>UNICEF</b>	United Nations Children's Fund
<b>WASH</b>	Water, Sanitation, and Hygiene
<b>WHO</b>	World Health Organization
<b>WSUP</b>	Water and Sanitation for the Urban Poor

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## Executive Summary

The private sector has a critical role to play in meeting the UN Sustainable Development Goals (SDGs) over the next ten years. WASH - one of the focus areas of the SDGs, presents a clear need of attention especially in the global south where lack of proper sanitation amenities and clean drinking water affect billions of lives. Not only is it expected that private investors will contribute to developing a robust WASH ecosystem in these regions, but also emerging evidence suggests that there is a business case for doing so, as investors build environmental, social and governance risk into their decision making, and seek to act in the interests of a broader range of stakeholders.

Although substantial progress has been made in the last decade, the WASH ecosystem still suffers from system blindness, i.e., it focuses on tangible infrastructure without paying the necessary attention to the supporting systems that make that infrastructure work. On a global scale, 2 billion people still lack access to safe drinking water services while 3.6 billion people lack access to safely managed sanitation services. Only 1.36% of total private finance mobilised from 2012-17 has been applied to the water and sanitation sector. The WASH sector needs considerable investment not only across the entire water and sanitation value chains, but also in external drivers like capacity development, policies, and technology.

To develop a good understanding of the water and sanitation ecosystem, it is necessary to understand the value chains associated with it. WASH value chains consist of broad-level stages, activities, and actors under these stages. Major stages of the safe drinking water value chain include source, extraction, treatment, transmission, market, consumers, and drainage. Whereas the major components of the sanitation value chain are point-of-use, containment, emptying, transportation, treatment, waste-to-value processing, and disposal. The major external drivers that influence the water and sanitation ecosystem are policies and regulations, capacity development, technology intervention and funding to the sector. Through the business models we studied during the research for this handbook, we concur that most private operators serve multiple stages of the value chains. So, investments in the WASH ecosystem should be mobilised across the value chains.

Historically considered an area catered for by the public sector, the current financing of WASH depends essentially on public funding, subsidies, or charity. However, it is proven that this will not be sufficient, and it will not bring the sustainability that is needed. Delivering universal access to safe services under SDG 6 could only be achieved if the sector attracts more private finance, which traditionally perceives this market as too risky. Private SMEs have proven to be important building blocks in the WASH ecosystem of emerging economies, providing products and services throughout the water and sanitation value chains (in many cases, cross cutting across different stages of the value chain). Adding to that, SMEs have often been torchbearers of innovations in the WASH sector and can present a sustainable business case for impact investors. Public sector WASH infrastructure often provides limited access, safety, and reliability to the bottom of the pyramid. SMEs may complement this infrastructure and bridge the gap in safe access to the last mile.

WASH has massive potential for private sector investors. Coupling the knowledge that most innovations in the sector come through private enterprises, with the fact that more than USD 1.25 trillion is required globally to meet SDG6 targets by 2030, funds must be mobilised by governments, philanthropic initiatives, and private sector alike to scale innovative solutions addressing a critical problem in the remotest parts of the world. Considering a 10% participation rate in the funding from the private sector, this means an investment opportunity of USD 125 billion for private investors.

The largest investment opportunity for private investors is present in China (USD 26.1 bn) followed by India (USD 19.2 bn). The South-East Asian region also provides a sizeable market (a total of USD 8.3 bn). For largest impact, African countries make a good case (combined opportunity of USD 10.3 bn) as access to WASH services is lowest in this region. There is also growing evidence against a traditional myth that public sector is the only actor in WASH ecosystem. Countries like Kenya (70% of the water market is private) and Brazil have been examples that private sector can contribute efficiently to WASH.

The 2019 UN Water Global Analysis and Assessment of Sanitation and Drinking Water (GLAAS) Report reveals that among 115 participating countries, the majority has a national plan ad-



dressing these needs (with estimated costs), but less than 20 countries reported having ensured sufficient funding to implement their plan. Despite all this and the WASH economy not being considered mature enough by many in the private sector owing to lesser profitability and historically sub-standard revenue models of private WASH busi-

nesses, the development of innovative financing structures and instruments has been adding significant value and building an investment case. These structures help private sector investors manage risk and return, while creating tangible social impact. Adding to these new perspectives brought by investment vehicles (as thematic impact funds in blended finance), circular economy approaches, integrated water resources management such as the water-energy-food-health nexus, and new technologies are unleashing new opportunities for small WASH businesses.

It is recognised that new technologies will contribute significantly to the realisation of the SDGs. Indeed, new technologies in the WASH sector facilitate and accelerate the deployment of successful solutions, as well as the monitoring of activities and their impact. Innovative solutions like alternative credit assessments, digital repayments, small-scale delegated management, and cross-subsidies have been helpful in mobilising more private finance by formalising the sector and balancing risks for private investors. Concomitantly, the WASH sector is moving into a more transversal approach to support entrepreneurs trying to create impact, with the emergence of regional business incubators, accelerators that help WASH enterprises become attractive and reach new and innovative sources of finance.

This handbook focuses on the safe drinking water and sanitation sectors. It has been designed to improve awareness of impact investors on WASH and its linkage with the Sustainable Development Goals (SDGs), on the value chains of safe drinking water and sanitation, and on the small and medium enterprises working in WASH and their business models. The knowledge sharing through the handbook is expected to catalyse new investments in this sector in the short and medium term.

## 1.1. Introduction to WASH

WASH (also known as Watsan and WaSH) stands for “water, sanitation and hygiene”. It is an umbrella term broadly used to address (in)adequacies in these areas in the international development context. The concept of WASH brings together water supply, sanitation, and hygiene, as the impacts on public health resulting from deficiencies in these overlap strongly.

Water is needed for all aspects of life. Humans and animals cannot survive without safe drinking water. Furthermore, adequate water resources are essential for food production and thus for proper nutrition. Sanitation refers to disposal, vector control, drainage and treatment of human excreta and urine; while hygiene is defined as practices perceived by people to be a way towards healthy living or good health. The interlinked nature and impact of these areas can be better understood by an example – lack of adequate sanitation contaminates water sources used for drinking-water, irrigation, bathing, and household purposes, leading to consumption of unsafe water, and resulting in impaired health through illnesses such as diarrhoea.

Half of the population in developing nations suffers from diseases associated with inadequate provision of water supply and proper sanitation facilities. More people in the world own cell phones than have access to a toilet; and as cities and slums grow at increasing rates, the situation worsens. Every day, lack of access to clean water and sanitation kills thousands, leaving others with reduced quality of life. In fact, safe water, sanitation, and hygiene are so crucial for human health and well-being that WASH was declared a human right in 2010 and a facilitator of access to other rights and development goals (ACTIAM, 2020).

## 1.2. WASH in SDGs (SDG 6)

Access to safe drinking water and sanitation has long been a major issue around the world, being mainly rooted in poverty, power, and inequality rather than physical availability (UNDP, 2010). Access to water and sanitation, water pollution prevention, and improved hygiene are essential in improving the living standards of the world’s population.

In 2000, eight Millennium Development Goals (MDGs) were developed at the Millennium Summit with a global action plan to lift people out of poverty by 2015. Reference to water in MDGs was in relation to access to safe drinking water, included as a target of goal 7 ‘Ensure environmental sustainability’. Sanitation was omitted from the initial version of the MDGs, with the target of improving access to basic sanitation only being added two years later. In December 2015, the 2030 agenda for Sustainable Development was launched as a result of meetings between world leaders in the same year. Following a broad consultation process that drew lessons learned from the MDGs, 17 Sustainable Development Goals (SDGs) and 169 targets were defined. Unlike the MDGs, water has been given greater importance within this new development agenda, being the focus of one of the 17 goals. Thus SDG 6 says “ensure availability and sustainable management of water and sanitation for all” (pS-Eau, 2016).

SDG 6 specifically focuses on water and sanitation and is broken down into eight targets (Table 1).

**TABLE 1: SDG Goal 6 and targets**

<b>Goal 6</b>	<b>Ensure availability and sustainable management of water and sanitation for all</b>
<b>Target 6.1</b>	By 2030, achieve universal and equitable access to safe and affordable drinking water for all
<b>Target 6.2</b>	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
<b>Target 6.3</b>	By 2030, improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
<b>Target 6.4</b>	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
<b>Target 6.5</b>	By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
<b>Target 6.6</b>	By 2030, protect and restore water related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
<b>Target 6.A</b>	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
<b>Target 6.B</b>	Support and strengthen the participation of local communities in improving water and sanitation management

Source: The United Nations website

The definitions of improved sanitation facilities and drinking water sources can vary widely within and among countries and regions. "Since the progress has to be measured at global level and across time, the Joint Monitoring Programme (JMP) has defined by categories explaining what improved and what unimproved water sources and sanitation facilities on the different levels mean. These categories also allow for enhanced monitoring of the targets" (WHO and UNICEF, 2017).

The JMP uses service ladders to benchmark and compare progress across countries, and these have been updated and expanded to facilitate enhanced monitoring. The monitoring has been done with particular focus on those that relate to the SDG global targets: Ending open defecation (SDG 6.2), achieving universal access to basic services (SDG 1.4) and progress towards access to safely managed services (SDGs 6.1 and 6.2).

**FIGURE 1: The JMP ladder for drinking water**

<b>Service level</b>	<b>Definition</b>
<b>Safely managed</b>	Drinking water from an improved water source that is located on premises, available when needed and free from faecal and priority chemical contamination
<b>Basic</b>	Drinking water from an improved source, provided collection time is not more than 30 minutes for a round trip, including queuing
<b>Limited</b>	Drinking water from an improved source for which collection time exceeds 30 minutes for a round trip, including queuing
<b>Unimproved</b>	Drinking water from an unprotected dug well or unprotected spring
<b>Surface water</b>	Drinking water directly from a river, dam, lake, pond, stream, canal or irrigation canal

**Note:** Improved sources include: piped water, boreholes or tubewells, protected dug wells, protected springs, and packaged or delivery water.

Source: WHO and UNICEF, 2017

Improved drinking water sources are those which by nature of their design and construction have the potential to deliver safe drinking water (WHO and UNICEF, 2017). A drinking water service can be said to be 'safely managed' only when it meets the following three criteria: 1) It should be accessible on premises, 2) Water should be available when needed and 3) The water should be free from contamination.

The major distinction of SDG 6 target 6.1 with that of MDG 7 is that for MDG 7, halving the number of people without access to basic drinking water services was the ultimate goal, while for SDG 6 the ultimate goal is that by 2030 all people have access to a much higher level of services, namely safely managed at their homes. This requires more attention to the safety of the water, the ca-

pacities of organisations to manage the services. Moreover, it assumes that the majority of people will have a connection to a water scheme. Another difference is that packaged and 'tanked' water can be included.

Improved sanitation facilities are those designed to hygienically separate excreta from human contact (WHO and UNICEF, 2017). Ideally, people should use improved sanitation facilities that are not shared with other households to say the facilities are safely managed. The excreta produced in these facilities should either be 1) treated and disposed of in situ, or 2) stored temporarily and then emptied, transported, and treated off-site, or 3) transported through a sewer with wastewater and then treated off-site.

**FIGURE 2: The JMP ladder for sanitation**

Service level	Definition
<b>Safely managed</b>	Use of improved facilities that are not shared with other households and where excreta are safely disposed of in situ or transported and treated offsite
<b>Basic</b>	Use of improved facilities that are not shared with other households
<b>Limited</b>	Use of improved facilities shared between two or more households
<b>Unimproved</b>	Use of pit latrines without a slab or platform, hanging latrines or bucket latrines
<b>Open defecation</b>	Disposal of human faeces in fields, forests, bushes, open bodies of water, beaches or other open spaces, or with solid waste

**Note:** Improved facilities included flush/pour flush to piped sewer systems, septic tanks or pit latrines; ventilated improved pit latrines, composting toilets or pit latrines with slabs.  
Source: WHO and UNICEF, 2017

## 1.3. Interlinkages between WASH and other SDGs

**FIGURE 3: Interlinkages of other SDGs to SDG 6**

Source: UN-ESCAP (n.d.)



Though there is a separate SDG for achieving the targets associated with WASH at household level, the scope of WASH is not limited to SDG 6 only. There is a dynamic interdependence between Goal 6 targets and every other Goal. To facilitate the implementation and achievement of these Goals along with their specified targets, an integrated approach must be implemented, combining the three dimensions of sustainable development - social, economic, and environmental. Some targets cannot be achieved alone since they reinforce each other. Achieving one target, in that case, eventually supports achieving other targets which align with the former. For example, to reduce the number of people living in poverty, it is a must to achieve access to water supply and sanitation for all (6.1, 6.2) first (UN WATER, 2016).

The interlinkages of other SDGs to SDG 6 could be either direct or indirect, depending upon the Goals and targets articulated within those SDGs (Figure 3). The direct and indirect linkages have

been determined by mapping out all the Goals and targets of each SDG across the Goals and targets of SDG 6 using the United Nations Economic & Social Commission for Asia & Pacific's 'visualisation map of interlinkages' (UN-ESCAP, n.d.). Each target of SDG 1 to SDG 17 was mapped out as either a direct/indirect linkage or irrelevant to the WASH sector. The qualitative analysis of individual targets of a particular SDG thus determined whether it has a direct or indirect linkage with SDG 6. These interlinkages in turn have connections to the social, economic, and environmental dimensions, which are detailed below.

### Interlinkages: Social Dimensions

There are substantial linkages between SDG 6 and the social dimensions of other SDGs. The Goals/targets which are directly linked to the social dimensions of SDG 6 are on poverty (1), hunger (2), good health (3), work (8), and community (11).

**TABLE 2: SDG 6 and its direct linkages to other SDGs: Social Dimension**

Goals	Targets associated with SDG 6
<b>Goal 1:</b> End poverty in all its forms everywhere	<b>1.1</b> Eradicate extreme poverty for all people everywhere <b>1.2</b> Reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions
<b>Goal 2:</b> End hunger, achieve food security and improved nutrition and promote sustainable agriculture	<b>2.1</b> End hunger and ensure access by all people, in nutritious and sufficient food all year round <b>2.2</b> End all forms of malnutrition <b>2.4</b> Ensure sustainable food production systems and implement resilient agricultural practices
<b>Goal 3:</b> Ensure healthy lives and promote well-being for all at all ages	<b>3.3</b> Combat water-related/water-borne diseases <b>3.9</b> Reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution
<b>Goal 8:</b> Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all	<b>8.4</b> Global resource efficiency in consumption and production
<b>Goal 11:</b> Make cities and human settlements inclusive, safe, resilient, and sustainable	<b>11.1</b> Ensure access to adequate/safe/affordable housing and basic services and upgraded slums <b>11.3</b> Enhance inclusive and sustainable urbanisation <b>11.5</b> Reduce the number of deaths related to water-related disasters

Source: The United Nations (<https://sdgs.un.org/goals>)

Quality education (4), gender equality (5), and reduced inequality (10) are targets that are indirectly linked to the social components of SDG 6. Lack of access to clean drinking water and safely managed sanitation services is considered as one of the major reasons for the higher number of girl-students dropping out of school. A 2015 report by the Indian NGO Dasra shows that “girls tend to miss school six days a month on an average due to the inability to manage their periods at school. This eventually leads to almost 23% of girls dropping out of school reaching puberty” (Verma, 2018). Such incidents not only hinder the chances of better education for girls, but also undermine the potential of students as future work-

ers. Addressing SDG 6 and its targets thus helps to improve sanitation services at schools, thereby ensuring quality education for all and reducing gender inequalities in a larger picture.

### Interlinkages: Economic Dimensions

SDG 6 has interlinkages with the economic dimensions of other SDGs, just as it does with the social dimensions. The Goals that are directly linked to the economic dimensions of water and sanitation are on poverty (2), work (8), infrastructure (9), and consumption and production (12). The targets associated with these goals are detailed below in Table 3.

**Table 3: SDG 6 and its direct linkages to other SDGs: Economic Dimension**

Goals	Targets associated with SDG 6
<b>Goal 2:</b> End hunger, achieve food security and improved nutrition and promote sustainable agriculture	<b>2.4</b> Ensure sustainable food production systems and implement resilient agricultural practices
<b>Goal 8:</b> Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all	<b>8.4</b> Global resource efficiency in consumption and production

<b>Goal 9:</b> Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation	<b>9.1</b> Develop quality, reliable, sustainable, and resilient infrastructure <b>9.4</b> Upgrade infrastructure to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies
<b>Goal 11:</b> Make cities and human settlements inclusive, safe, resilient, and sustainable	<b>11.1</b> Ensure access to adequate/safe/affordable housing and basic services and upgraded slums <b>11.3</b> Enhance inclusive and sustainable urbanisation
<b>Goal 12:</b> Ensure sustainable consumption and production patterns	<b>12.5</b> Substantially reduce waste generation through prevention, reduction, recycling, and reuse

Source: The United Nations (<https://sdgs.un.org/goals>)

The targets of certain Goals (SDG 2, 9, 12, 16) which are indirectly linked with the economic dimensions of SDG 6 are as follows:

- Increase investment in rural infrastructure, agricultural research and extension services, and plant and livestock gene banks in order to enhance agricultural productivity (2.a)
- Support domestic tech devices, research & innovation, ensure conductive policy environment for industrial diversification (9.b)
- Increase the access to small-scale industrial and other enterprises (9.3)
- Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Pattern (12.1)

- Encourage companies to adopt sustainable practices (12.6)
- Develop effective/accountable/transparent institutions of global governance (16.6)

### Interlinkages: Environment Dimensions

Although SDG 6 itself has environmental targets (6.3 - 6.6), it is also associated with the environmental dimensions of other Goals such as sustainable food production (2), community (11), sustainable consumption & production (12), life in water (14) and life on land (15). The interlinkages between SDG 6 and the environmental dimensions of other SDGs are briefly displayed in the following table (Table 4).

**Table 4: SDG 6 and its direct linkages to other SDGs: Environmental Dimension**

Goals	Targets associated with SDG 6
<b>Goal 2:</b> End hunger, achieve food security and improved nutrition and promote sustainable agriculture	<b>2.4</b> Ensure sustainable food production systems and implement resilient agricultural practices
<b>Goal 11:</b> Make cities and human settlements inclusive, safe, resilient, and sustainable	<b>11.6</b> Reduce adverse per capita environmental impact of cities, paying special attention to air quality, municipal and other waste management
<b>Goal 12:</b> Ensure sustainable consumption and production patterns	<b>12.2</b> Achieve sustainable management and efficient use of natural resources <b>12.4</b> Achieve environmentally sound management of chemicals and wastes throughout their lifecycle <b>12.5</b> Reduce waste generation through prevention, reduction, recycling, and reuse
<b>Goal 14:</b> Conserve and sustainably use the oceans, seas and marine resources for sustainable development	<b>14.1</b> Reduce marine pollution of all kinds from land-based activities <b>14.2</b> Sustainably manage and protect marine and coastal ecosystems to avoid adverse impacts

**Goal 15:** Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

**15.1** Ensure conservation and sustainable use of terrestrial and inland freshwater ecosystems

Source: The United Nations (<https://sdgs.un.org/goals>)

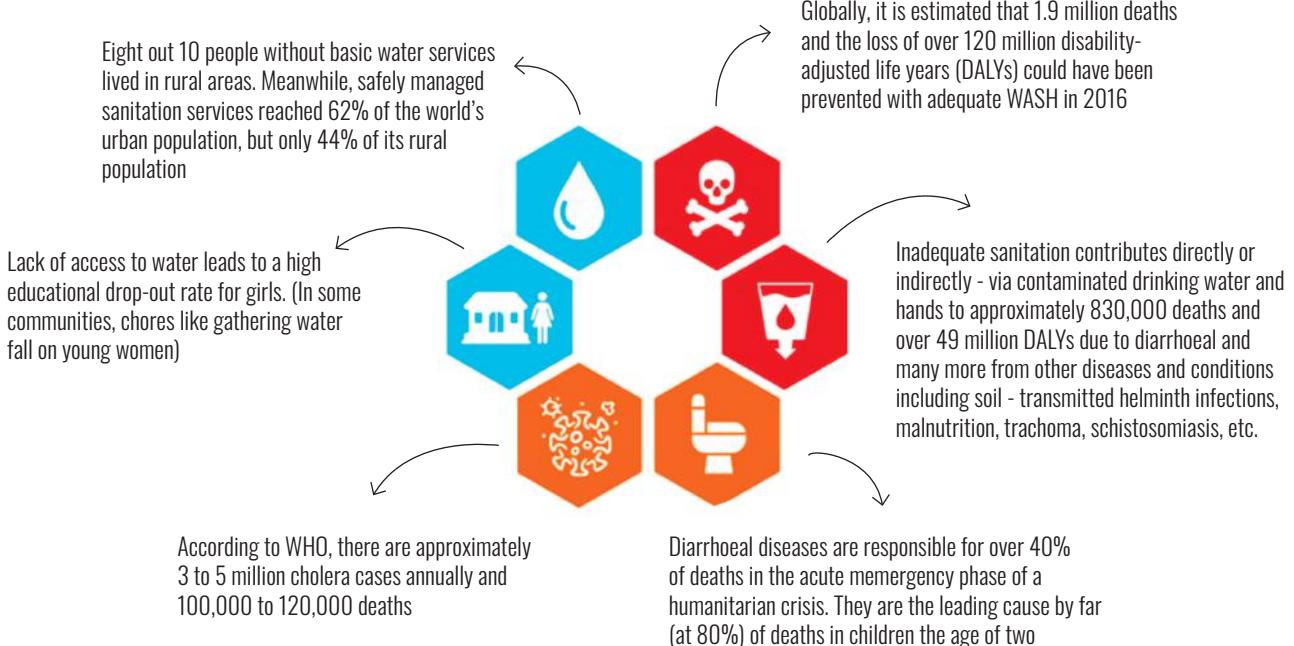
The targets of certain Goals (SDG 11, 12, 13, 15, 17) which are indirectly linked with the economic dimensions of SDG 6 are as follows:

- Support positive economic, social, and environmental links between urban/rural areas (11.a)
- Encourage companies to adopt sustainable practices (12.6)
- Integrate climate change measures into national policies, strategies, and planning (13.2)
- Integrate ecosystem and biodiversity values into national and local planning (15.9)
- Promote development, transfer, dissemination of environmentally sound technology (17.7)

## 1.4 Issues in WASH and their overall impact

On a global scale, having access to safe drinking water and safely managed sanitation facilities has significant socioeconomic implications. Billions of people across the world have gained access to basic drinking water and sanitation facilities since 2000, but these services do not necessarily provide safe drinking water and safely managed sanitation facilities. Even though 74% of the world's population used safely managed drinking water services in 2020, 2 billion people still lack access to these services.

**Figure 4: Facts and figures: water and sanitation**



Source: WHO, 2020; WHO and UNICEF (2020) and Centre for Disaster Philanthropy (n.d.)

According to the latest report of WHO, 3.6 billion people lack access to safely managed sanitation services and 2.3 billion people lack access to basic handwashing facilities at home in 2020 (WHO, 2020). The unsafe hygiene practices have compounding effects on the health of people including the devastating child mortality rates due to diarrhoea and other water borne diseases. As a matter of fact, dirty water causes more deaths every year than armed conflicts. Figure 4 highlights some critical facts and figures on the status of WASH services and the issues associated with them:

There was indeed some progress towards achieving universal access to safely managed WASH services (Table 5) but there is still a long way to go in order to achieve the SDG 6 and its targets by 2030. The report of the JMP - *Progress on household drinking water, sanitation, and hygiene 2000-2020*, makes clear that if current trends persist, billions of people will be left out without critical, life-saving WASH services by 2030 (WHO and UNICEF, 2021).

**Table 5: Percentage of global population with access to safely managed WASH services**

WASH component	2016 (%)	2020 (%)
Safely managed drinking water	70	74
Safely managed sanitation services	47	54
Handwashing facilities (with soap and water)	67	71

Source: WHO and UNICEF (2021)

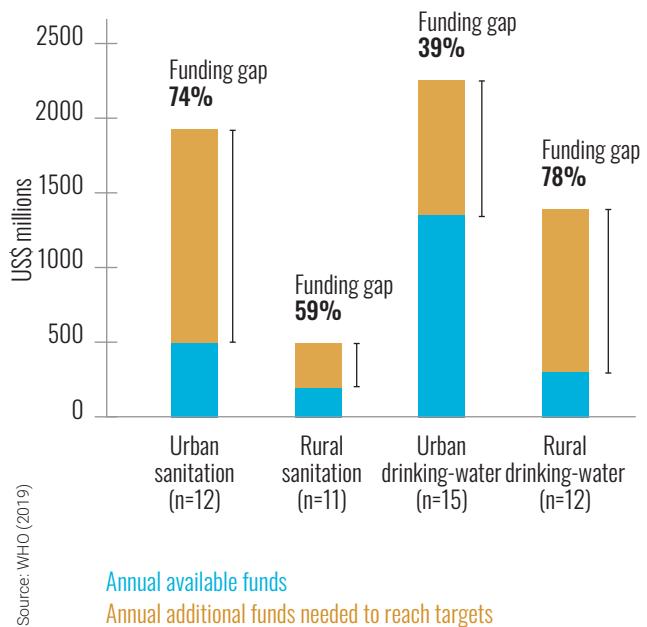
As per the report of the JMP, taking the current trends of access to safely managed WASH services, the following changes can be expected by 2030:

- Only 81% of the world's population will have access to safely managed drinking water at home (leaving 1.6 billion without)
- Only 67% will have safe sanitation services (leaving 2.8 billion without)
- Only 78% will have basic handwashing facilities (leaving 1.9 billion without)

The efforts towards achieving the SDG 6 goals by 2030 can only be catalysed through active investments in the different WASH components. Accelerating these investments will require prioritisation at the higher levels of decision making at both national and international levels including governments, international agencies, private sector, and civil society. A recent report by WaterAid states that just extending the basic sanitation services to the unserved will require an investment of USD 36 billion per year from 2017 to 2030. To achieve the SDG 6.2 alone it would require an investment of USD 105 billion per year. In order to achieve the SDG targets 6.1 and 6.2 in 2030, an investment of USD 114 billion would be required per year from 2017 to 2030 (WaterAid, 2021).

According to the UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) report, cost estimates from 20 countries reveal an overall funding gap of 61% between identified needs and available funding to reach national WASH targets. Figure 5 disaggregates this overall gap (WHO, 2019).

**Figure 5: Available vs needed funds to reach national WASH targets**



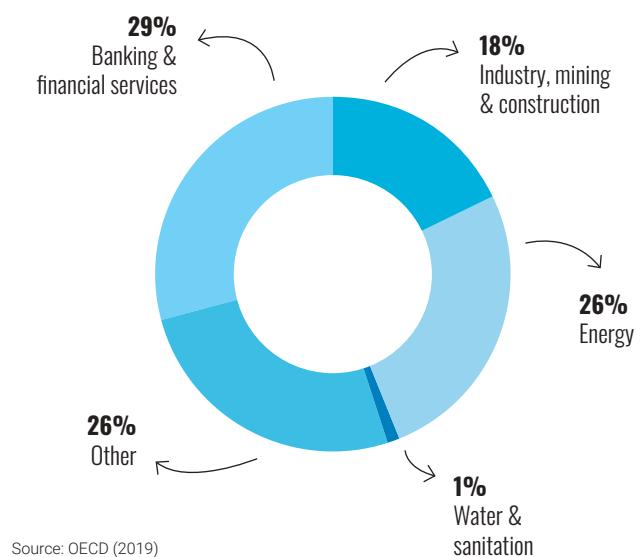
One of the major hindrances to investment in the WASH sector is the unavailability for most countries of disaggregated data on expenditure by the households and governments for drinking water, sanitation, and hygiene. While over 50 countries in 2018-19 provided aggregate expenditure data

for WASH, only half of those reporting provided it disaggregated by subsectors (WHO, 2019).

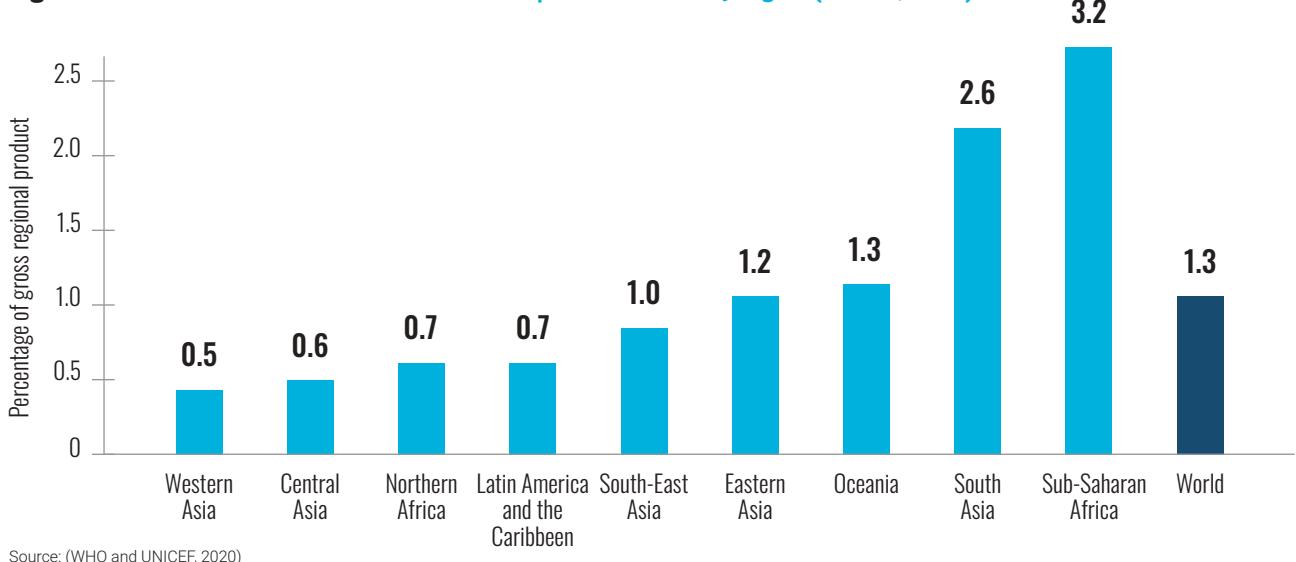
The economic consequences of not investing in water and sanitation in 135 low- and middle-income countries were evaluated in a 2012 WHO study which concluded that poor sanitation and inadequate water supply resulted in economic losses ranging from 0.5 to 3.2% of GDP in different countries as depicted in Figure 6 (WHO and UNICEF, 2021).

Figure 7 shows how only 1.36% (USD 2.14 billion) of total private finance mobilised from 2012-17 (USD 157.2 billion) has been mobilised in the water and sanitation sector (OECD, 2019). The SDG targets will require much more coordinated, collective, and innovative efforts to mobilise funding from all the sources including public and private investors. Only this will help nations to achieve their SDG targets. Increased investments in water and sanitation can have a significant impact on human health and development, as well as create jobs and ensure that no one is left behind.

**Figure 7: Commercial finance mobilised by development finance by sector (2012-17)**



**Figure 6: Economic losses associated with inadequate sanitation by region (% GDP, 2012)**



## 2

## VALUE CHAINS OF WASH

### 2.1 Components of value chain: Safe drinking water

Value chains correspond to the whole range of activities and services required to move a product or service from conception to sale in its final market (local/national/international/global). It includes producers, inputs, suppliers, operation, processors, retailers as well as buyers.

The safe drinking water value chain is made up of seven components: source, water extraction from sources, water treatment, water transmission, market components, consumers, and ultimately, drainage or recycling of used water. These seven components are part of a broad level drinking-water ecosystem originating from water source and leading to end of life. When these components are combined with their varied activities and actors at various levels of these activities, the whole value chain of safe drinking water is formed. Each component of the value chain is described briefly below:

#### 1 Source

The source is where the water is collected from, to be used in the value chain's subsequent processes. Sources include the rivers, lakes, rainwater, natural reservoirs, ground water etc. Water taken from the sources undergo different processes before it can be used for consumption.

#### 2 Extraction

Water extraction is the process of withdrawing freshwater from underground or surface sources and transporting it to a treatment facility. It denotes the total amount of water taken out over a period of time or on an occasional basis. Pumping and piping are two activities involved in the

withdrawal. Both activities do not confine to the water extraction phase since pumping and piping are required for all activities that occur after withdrawal. Thus, pumping and piping extend all the way to the consumer, cutting across different components in between them. The major actors involved in the extraction stage include the manufacturers of pumping and piping equipment, manufacturers of system monitoring equipment, enterprises involved in the installation and maintenance of this equipment, enterprises associated with quality checking and monitoring of the extracted water, etc.

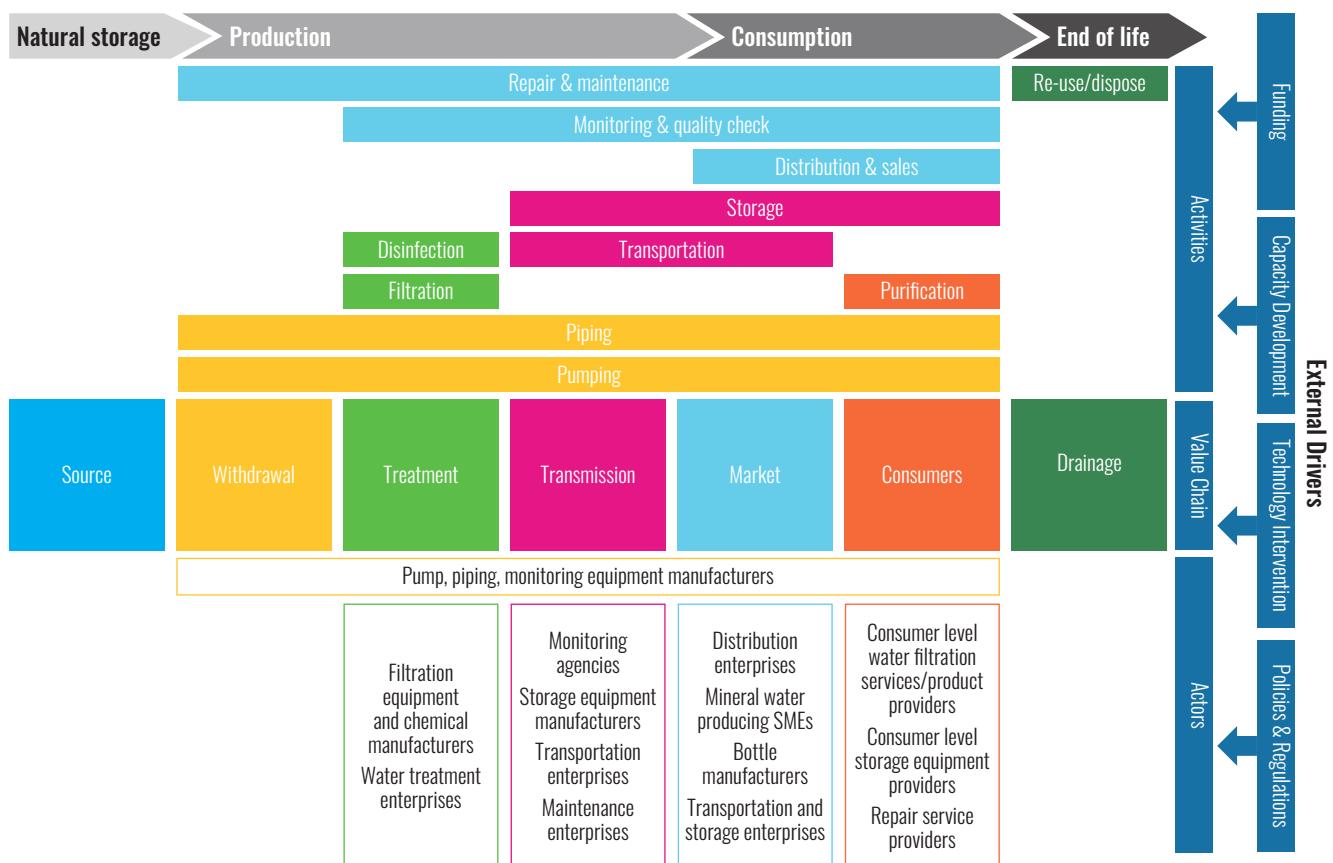
#### 3 Treatment

Water treatment is the process that improves the quality of water to make it fit for consumption. It involves various physical and chemical processes at different stages to eliminate all the contaminating agents present in the water. The two major activities involved in the treatment are removal of pathogens (disinfection) and removal of particles and minerals (filtration - both filtration of larger particles and filtration of micro particles using Reverse Osmosis technology) of the water collected from various sources. Pumping and piping are also used in various steps of treatment process. The actors associated with the treatment of water include the manufacturers of filtration/RO equipment and chemicals used for disinfection, water treatment enterprises, enterprises involved in the maintenance and repairing of the equipment etc.

#### 4 Transmission

In the process of transmission, the water from the treatment plant is carried out to distribution networks through transportation and transmission pipelines. The major activities in the transmission are storage and transportation other than pumping and piping. The treated water is stored at the treatment plant before being transported to the market for distribution. The manufacturers of water storage equipment, enterprises that transport treated water, monitoring agencies and the enterprises that provide maintenance services for all equipment, etc. are the major actors associated with the transmission stage of treated water. The key issues related to the transmission stage are quality of materials, prevention of illegal tapping, damage control (especially at road crossings) and land rights and permission to cross roads and railroads.

## Figure 8: Value chain: Safe drinking water



## 5 Market

The market is essentially where the distribution and sale of treated water takes place after the transmission stage. The activities associated with the market are distribution and sale of the transported water, monitoring, and quality checking at different levels of water treatment and transmission, and repair and maintenance of the equipment throughout the various stages of the value chain. Drinking water distribution enterprises, SMEs that produce and distribute packaged water, manufacturers of bottles for packaging, enterprises that provide transportation services, enterprises that manufacture storage equipment etc. are the major actors involved in the market component of the value chain of safe drinking water. The major issues associated with the market stage are price (and hence affordability for the low-income segments), quality, distribution, distance to vending points and risk of recontamination.

## 6 Consumers

Consumers are the end users of the treated water. Consumers could be households, industry and institutions, or even other business entities that buy purified water products/services from the market. The product can be either purified water (bottled/canned water) or household level purifiers or filters, which consumers can buy and use for small-scale use. The major activity involved at the consumer level is the purification of water using filtration and storage products available in the market. The major actors involved in this component of value chain are the manufacturers of consumer level water filtration services/products, enterprises that provide consumer level storage equipment, plumbers, enterprises that provide repair and maintenance services to the above-mentioned equipment, etc. The key issues associated with this stage of the value chain are affordability for low-income segments and access to credit.

## 7 Drainage

Drainage is the last component of the value chain of drinking water which marks the end of life of water after consumption. Broadly defined, wastewater is used water which has been affected by domestic, industrial, and commercial use. Here, the drainage refers to the water that is discharged after consumption by consumers. The water thus contains organic debris including faeces, which is essentially termed as sewage or grey or black water.

## 2.2 Components of value chain: Sanitation

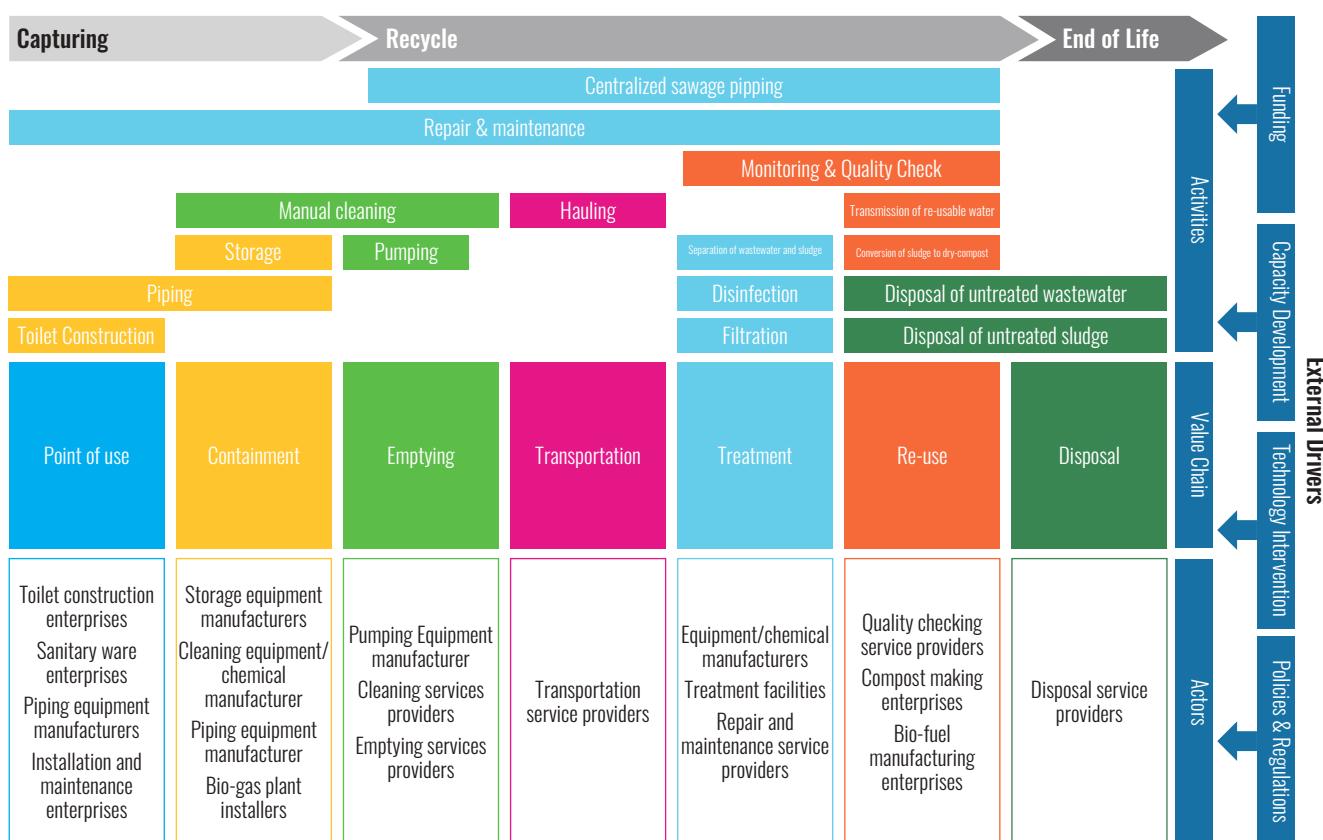
The sanitation value chain is made up of seven components: point of use (toilet), waste (excreta/urine) containment, waste emptying, waste transportation, waste treatment, use of treated waste, and effluent disposal after treatment. These seven elements are part of a larger sanitation ecosystem that begins with waste capturing, continues with waste transport, store, processing and recycling, and ends with waste disposal. The entire

sanitation value chain is formed when these components are integrated with their numerous activities and actors at various levels of these activities.

### 1 Point of use

The point of use in sanitation refers to the place where the excreta/urine is disposed safely. Safely managed toilets are considered the best practice in disposing the waste: both faecal and urine. Toilets can be designed in many ways taking into consideration the demand of the population using the toilet and what they can afford. As far as the value chain of sanitation is considered, toilets play a very crucial role as it is one of the key factors determining the economic progress of any country. The major activities associated with the point of use as the construction of toilets as per the needs of the users and plumbing works done for the collection of the sewage matter. The actors involved in this stage of the value chain are the toilet construction enterprises, enterprises that produce and distribute sanitary wares, manufacturers of plumbing equipment, enterprises who provide their service in the installation and maintenance of the sanitary ware etc.

**Figure 9: Value chain: Sanitation**



## 2 Containment

Human waste (faecal matter, urine) and the flushed water from toilets is contained in an on-site system referred to as the containment. The microbes present in the sewage digest the organic matter turning the slurry into a sludge or septage depending on the type of toilet used. The main activities involved in this stage of value chain are storage of the slurry within the containment zone and the piping; from the point of use to containment as well as to take the slurry further from the containment tank and also, the manual cleaning of the storage tanks in case of spillages. The manual cleaning involves the use of chemicals readily available in the market to stop the spillage and increase the drainage efficiency to the septic tanks. The major actors associated with the containment stage are the manufacturers of storage equipment, manufacturers of chemicals for the manual cleaning of storage tanks, manufacturers of piping equipment, enterprises that install bio-gas plants etc. Key issues in design of the containment pits or tanks are ease of access to the pit and prevention of contamination of nearby water sources.

## 3 Emptying

Containment is followed by the process of emptying the storage tanks either manually or by using a desludging truck. Specially designed vacuum pumps are used by the desludging trucks to empty the contents of the storage tanks. The activities associated with the emptying stage are pumping out the sludge from the storage tanks and/or the manual cleaning of the tanks. In a centralised system of sewage collection, which is used by most urban areas, the sewage piping extends from emptying to treatment plant directly. The major actors are manufacturers of pumping equipment, enterprises that provide septic tank cleaning services, enterprises that provide containment emptying services etc. The leading issue here is that emptying is rarely done in a planned way. An enterprise is just called when the pits are overflowing, which is harmful for the environment. Septic tanks are often not completely emptied, leaving a very solid mass at the bottom which reduces the storage efficiency. In some urban areas, the practice of pit-emptying is illegal, and is done at night (e.g., Kenya).

## 4 Transportation

Once the emptying is done, the sludge taken out is transported in a closed truck to the treatment plants. In the process of hauling, services from specialised transportation enterprises are used for the safe transit of the faecal sludge/septage. Transport needs to be done in a hygienic way. Local byelaws can be very strict with regards to the safe transport of sludge (e.g., Namibia). Illegal dumping of sludge is common practice and a threat to the environment.

## 5 Treatment

In the treatment phase, the sludge/septage undergo treatment either at a Faecal Sludge Treatment Plant (FSTP) or at a Sewage Treatment Plant (STP). In a STP, the faecal sludge is co-treated with waste/wastewater from other sources as well. The sludge can be treated in many ways that is best suited for the region where the treatment plant is located. The key factors which determine the treatment method are the cost of treatment and the possible uses of the treated sludge. The activities involved within the treatment phase are separation of wastewater and sludge in the treatment plant and further treatments of the solid and liquid waste separately. Biogas can be produced in the treatment stage which can be used to make the treatment energy neutral and can be sold externally or can be converted to electricity. The actors associated with the treatment stage are manufacturers of equipment, treatment plants (SMEs), enterprises that provide repair and maintenance services, etc. The location of such treatment plants is critical, both in accessibility for transport, environmental impact, and social acceptance. Treatment can also be done at the location of the toilet(s) without further transport, e.g., with composting toilets, biogas digesters and other biodigesters. Safe handling and drainage are concerns, and most of these systems will eventually require cleaning, emptying, and transportation.

## 6 Waste-to-value

After the treatment, mostly the solid sludge that contains essential nutrients (nitrogen and phosphorus) is converted into dry-compost or biochar (when pyrolyzed/heated) and is used as fertiliser in the agricultural fields. The treated water is mainly used for irrigation purposes in agriculture, particularly for non-food crops for health reasons and as industrial cooling water (Galkina

& Vasyutina, 2018). There are also innovative methods being used in terms of using the treated water effectively. For example, a Ghana-based enterprise – Biofilcom, redirects the entire treated water to specially designed vertical gardens, where it is filtered naturally and used to water the plants (Biofilcom, n.d.). Other waste-to-value products are bio briquettes (e.g., Sanivation and Sanergy), or Black Soldier Fly raising for protein products (e.g., Sanergy). Wastewater ponds can also be used for fish (e.g., TriMark in Ghana). The main activities in this stage are conversion of sludge to dry compost, transmission of usable water and monitoring and quality check of the treated water. The major actors involved at this stage are compost-making enterprises, bio-fuel manufacturing enterprises, SMEs that provide quality-checking services, etc.

## 7 Disposal

Even after the treatment, a part of the dry waste and water could be contaminated with toxic chemicals/microorganisms. Such waste products can neither be used as manure nor as industrial cooling water. Thus, they should be disposed safely, keeping environment safety in mind. Ultra-high temperature (plasma) burning is an alternative, an activity that can even be energy neutral. The activities associated with the disposal are wastewater and sludge disposal. The key actors at this stage are the enterprises which provide these disposal services.

## 2.3 Classification of differentiating factors in the sanitation value chain

Within the value chain of sanitation, there are certain categories based on some differentiating factors.

### 1 Source of wastewater

In the value chain of sanitation, the first level of distinction is the source of wastewater that is carried forward for treatment. The source can either be communal wastewater or domestic wastewater. Domestic wastewater is water from toilets as well as the wastewater generated from kitchens, baths, washing machine etc. which is commonly termed as greywater. Communal wastewater on the other hand is the wastewater generated by

a community. It could be a combination of solid and liquid waste carried from residences, education institutes, commercial buildings etc., along with any surface water and storm water which may have accidentally entered the sewage system. This wastewater consists of significant concentration of solids, numerous microorganisms, bio-degradable organic material, other organic material, certain amounts of nutrients such as nitrogen, phosphorus, etc. In this document, we are dealing with the wastewater generated at the household level only.

### 2 Geography

The next level of distinction is the geographical region where the water and sanitation services are being used. The geographical areas could be urban, peri/semi-urban and rural, based on the population and/or provision of infrastructure and services available in those regions. The national definitions of rural and urban differs from country to country, which makes it difficult to compare them across national borders. In order to facilitate the international comparisons, the UN Statistical Commission recommended the *Degree of Urbanization* in 2020 (World Bank, 2020), where a coalition of six international organisations a new global definition of cities, towns, semi- dense areas, and rural areas.

**Table 6: Degree of urbanisation by UN Statistical Commission**

Degree of urbanisation	Population density
<b>Cities/urban areas</b>	At least 50,000 inhabitants in contiguous dense grid cells (>1500 inhabitants per km <sup>2</sup> )
<b>Towns/semi-urban areas</b>	At least 5,000 inhabitants with a density of at least 300 inhabitants per km <sup>2</sup>
<b>Rural areas</b>	Low density with around 100 inhabitants per km <sup>2</sup>

Source: World Bank (2020)

### 3 Economic factor

The economy of the countries is the next major factor of distinction. The ecosystem of value chains varies significantly between developing

and developed countries depending on infrastructure and access to these facilities. The biggest issue in sanitation in developing countries is open defecation and the health problems associated with the same. Nigeria, the 6<sup>th</sup> most populous country in the world (United States Census Bureau, 2021), is an example for this. In Nigeria, less than a third of the population had access to basic sanitation in 2015. Moreover, access to sanitation has deteriorated over the last decade (WaterAid, 2019). At the same time, the basic sanitation access for urban people in the United States was estimated to be greater than 99%, while limited sanitation, unimproved sanitation, and open defecation were each less than 1%. Also, 99% of the urban people in the United States have access to safely managed drinking water into their home (WHO and UNICEF, 2020).

#### **4 Level of skilled people to operate sanitation system**

Another major factor of distinction is the level of skilled people to operate the sanitation system. The JMP ladder for sanitation is being used to measure the improvement of services at various levels of sanitation across countries. The JMP ladder has been mentioned already in the previous chapters along with its various stages from safely managed, basic, limited, unimproved sanitation services to no services/open defecation.

#### **5 Type of sewage system**

The type of sewage system is also a factor of distinction in the sanitation value chain. The sewage system can either be a centralised system or a decentralised system. In a centralised sewage system, the sewage is collected in a central location for treatment through a centralised piping system. Generally, the number of people/households connected to this system will be much larger than in the decentralised system. This is the most common method of sewage management used in medium to high-income urban areas. On the other hand, decentralised systems are for small, individual household facilities (with a maximum capacity of 20) to provide sewage/wastewater treatment services to residents. In this system the sewage can be treated onsite in septic tanks through aerobic or anaerobic techniques. The sewage can also be emptied periodically and transported to treatment plants by suction trucks (Obermann & Sattler, 2013). These systems can be used for example in compounds and condominiums in residential

areas. The majority of people in rural and low-income residential areas however depend on on-site systems, without any sewer at all. The advantage of such on-site systems is that they require much less or no flush water; saving a lot of purified water that is otherwise flushed along the drain.

#### **6 Level of self-reliance of consumers**

The sanitation system can either be self-managed by households or it can be a communal system. Self-managed sanitation systems are used and managed by individual households whereas the communal toilets are shared by a group of households in a community. This may be one toilet per household, or one toilet for a group of households. Communal toilets are often seen in low-income communities mainly in African and Asian cities. A best example of communal toilet model is SPARC, implemented in Pune and Mumbai cities of India as a collaboration of three Indian NGOs-SPARC, the National Slum Dwellers Federation (NSDF) and Mahila Milan. Under this model, communal toilets are constructed and managed by NGOs under contract from the government body and a moderate per-household monthly fee is collected (Water & Sanitation for the Urban Poor, 2011).

### **2.4 External drivers of the WASH ecosystem**

Apart from the major actors and activities associated with the value chains, a set of external players also influences the WASH ecosystem. These external drivers include policies and regulations, capacity development, technology intervention and funding to the sector (see Figure 10, page 23).

**Figure 10: External drivers influencing the WASH ecosystem**

#### **Policies & regulations**

A country's regulatory framework influences private sector operations, including safe drinking water and safely manages sanitation services, through laws, rules, tax regimes and standards, among other things.

#### **Capacity development**

In order to achieve the objectives around enhancing the access to safe drinking water and sanitation, capacity building at all levels including individual, organisation and societal is inevitable.

#### **Technology intervention**

Technology plays an important role in water & sanitation value chains as it provides resource-efficient solutions to certain challenges associated with WASH. The major areas of intervention include water extraction, desalination, efficient use, quality check & monitoring, treatment & recycling etc.

#### **Funding**

The UN goal of universal access to safe drinking and sanitation services cannot be accomplished without closing the financial gaps in the respective sectors. In order to achieve the same, capital spending for WASH would need to reach USD 114 billion annually by 2030.

both). OECD defines Small and Medium-sized Enterprises (SMEs) as non-subsidiary, independent firms which employ fewer than a given number of employees (the most frequently used upper limit is 250 employees), whereas IFC defines them more comprehensively:

*"An enterprise qualifies as a micro, small or medium enterprise if it meets two out of three criteria of the IFC MSME Definition (employees, assets and sales), OR if the loan to it falls within the relevant MSME loan size proxy"* (International Finance Corporation, 2021).

It is important to understand that there is no universally accepted definition of SMEs, and it varies from country to country. The most widely used upper limit for SMEs is 250 employees, however some countries set the limit at 200 employees.

### 3.1. Overview of SMEs

Small and Medium-sized Enterprises (SMEs) are the backbone of many emerging economies and play a very significant role in driving economic growth, social equity, and environmental conservation. SMEs have a variety of roles and functions in the WASH sector, focusing on products (such as design, development or supply of water or sanitation equipment) and services (such as water supply, sanitation installation, and desludging) (ISF-UTS, 2016a).

Small-scale businesses have been categorised differently all over the world in terms of their turnover or the number of people they employ (or

### 3.2. Types of SMEs in WASH

There are many types of small-scale enterprises providing products and services across water and sanitation value chains. These include private, government-owned/community-owned, as well as enterprises that are for-profit, not-for-profit or hybrids of these operating as forms of social enterprise (see Figure 11, page 25).

**Table 7: IFC MSME Definition**

Indicator	Employees	Total Assets US\$	Annual Sales US\$	Loan Size at origination
<b>Micro enterprise</b>	<10	<\$100,000	<\$100,000	<\$10,000
<b>Small enterprise</b>	10-49	\$100,000 - <\$3 million	\$100,000 - \$ 3 million	<\$100,000
<b>Medium enterprise</b>	50-300	\$3 million - \$15 million	\$3 million - \$15 million	<\$1 or \$2 million

Source: IFC

**Figure 11: Types of SMEs in WASH**

Not-for-profit	Hybrid	For profit
<p><b>Community owned, citizen-or member based</b></p> <ul style="list-style-type: none"> <li>- Formalised community-based organisations (CBOs) legalised as cooperatives or foundations</li> <li>- Membership-based formalised associations of CBOs operating rural water supply systems or community-scale sanitation systems</li> <li>- Membership-based formalised associations of sanitation entrepreneurs providing members with support services like training, networking, access to cheaper materials</li> </ul>	<p><b>Community owned, citizen-or member based</b></p> <ul style="list-style-type: none"> <li>- Membership-based formalised associations of CBOs that include a fee-for service revenue stream in addition to other forms of revenue (such as membership fee or support from local government)</li> </ul> <p><b>Privately owned</b></p> <ul style="list-style-type: none"> <li>- Local WASH NGOs engaged in business activities, including selling water supply or sanitation products, or providing contracting or consultancy services through a separately established private enterprise with the aim of supplementing its income</li> </ul>	<p><b>Privately owned</b></p> <ul style="list-style-type: none"> <li>- Small-scale sanitation enterprises and sole traders, informally or formally registered, providing sanitation products and services</li> </ul> <p>Small-scale private enterprises providing water supply services</p> <p><b>Government owned</b></p> <ul style="list-style-type: none"> <li>- Local or village government-owned enterprises providing water supply services</li> </ul>

The contribution of SMEs across the water and sanitation value chains is immense in developing countries where the public sector infrastructure has not caught up with the demand for safely managed WASH services.

We have already seen the activities across water and sanitation value chains. To understand the role of WASH SMEs in the value chains, they can be segmented based on the product and services they offer as in Figure 12 below (ISF-UTS, 2016b).

**Figure 12: Products and Services in WASH**

	Water	Sanitation
<b>Products</b>	<ul style="list-style-type: none"> <li>- Bottled water production</li> <li>- Water supply system spare parts</li> <li>- Water filter production</li> <li>- Pipes, plumbing equipment and pumps, including solar pumps</li> </ul>	<ul style="list-style-type: none"> <li>- Production and sales of sanitation products or related construction materials including toilet pans (of various types – cement, ceramic, plastic, etc.), concrete rings for latrine substructure, plastic septic tanks, etc.</li> </ul>
<b>Services</b>	<ul style="list-style-type: none"> <li>- Piped water supply service provision in rural areas</li> <li>- Other water sales (including from kiosks, carts, taps, wells, or rivers)</li> <li>- Distribution of household water treatment products</li> <li>- Consultancy or other short-term support to service providers such as taking on operations and maintenance (O&amp;M) functions for other outsourced roles</li> <li>- Retailing water spare parts in addition to other small household products</li> <li>- Water treatment plant operation</li> </ul>	<ul style="list-style-type: none"> <li>- Latrine installation services</li> <li>- Community-scale sanitation service delivery</li> <li>- Associations of sanitation entrepreneurs providing loans and technical support</li> <li>- Desludging services (including vacuum truck operation)</li> </ul>

### 3.3. Role of SMEs in water and sanitation value chains

Universal access to sanitation amenities and safe drinking water are long standing challenges despite decades of interventions by governments, funding agencies and civil society. SMEs working in WASH bridge the gap where public sector fails to serve low-income group communities. The contribution from SMEs in achieving SDG 6 will prove to be significant as they are often torch-bearers of innovative market-based solutions. The following are some of the ways SMEs contribute to water and sanitation value chains:

- They deliver water services and create sanitation infrastructure in developing countries either through their own funds or loans and some equity. These SMEs provide, in various innovative ways, safe water in cans or affordable water filtration systems; similarly, they provide household latrines with onsite waste treatment or transportation & treatment/recycling of the waste.
- SMEs are considered well-placed to drive private sector participation in providing water and sanitation services given the connection they can build to the local markets.
- Successful SMEs in WASH can provide proven and scalable business models which can be replicated in other developing countries.
- SMEs can contribute greatly to commercialisation of innovative low-cost sanitation technologies.
- Small-scale private solutions can help or inspire innovations in the public sector approach to WASH. In countries like Haiti where the public infrastructure is inadequate to provide potable drinking water, private sector enterprises have been filling that gap by providing safe and reliable drinking water at affordable prices.
- SME innovations can also have immense impact through PPP (Public-Private-Partnership) models, which are very popular in emerging economies like India and Brazil.

The role of private sector players including SMEs in delivering market driven WASH services has been well documented by research studies in Peru (Water and Sanitation Program (2011) and India (Toilet Board Coalition, 2017). The Toilet

Board Coalition's study estimated the size of Indian sanitation economy at USD 17 billion in 2017 (expected to double by 2021), while WSP's study in Peru showed conclusive evidence of private sector's role in transforming the vision of target groups from "beneficiaries" to "consumers", which is an important paradigm shift in WASH.

### 3.4. Business models in safe drinking water

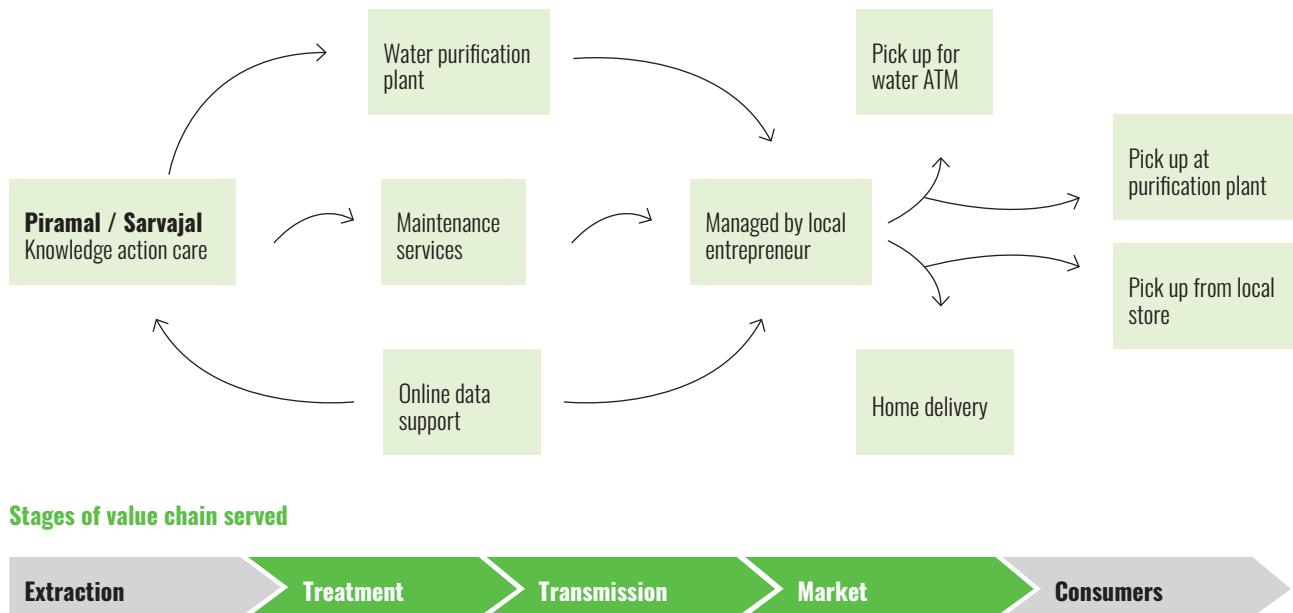
Since safe water has historically been seen as a public sector intervention for the most part, it becomes hard to imagine how this sector can attract private sector investors. While thinking of safe water, people often believe the end users to be "beneficiaries" rather than "consumers" who can (and are willing to) pay for the services they avail. This is not the truth – people are prepared to pay for access to safe WASH services if it means improving their quality of life and resilience to illnesses spread through contaminated water.

Our research shows that there are successful safe drinking water businesses in low- and middle-income countries that have proven to be sustainable through years of operations and impact on the ground. Most of these businesses are not start-ups, they have set operations, with a solid business case and revenue model, but they lack the capital to scale up despite being innovative and replicable. Private investors can help enterprises like these to scale up and serve a wider population. The examples below are indicative as there are other successful enterprises in the global south working in safe drinking water.

#### Piramal Sarvajal

Piramal Sarvajal is a for-profit enterprise that operates community water-filtration plants through local franchisees in underserved parts of rural India. In addition to filtration plants, they develop innovations across the value chain, including water system monitoring devices, customised ERP services for water enterprises, and solar water ATMs. They serve more than 725,000 people daily across 20 Indian states. They set up a community level purification plant for delivery of safe water, which is managed under a pay-per-use model by a local entrepreneur/community-based organisation. The water is first sourced from a

**Figure 13: Delivery Model Piramal Sarvajal**

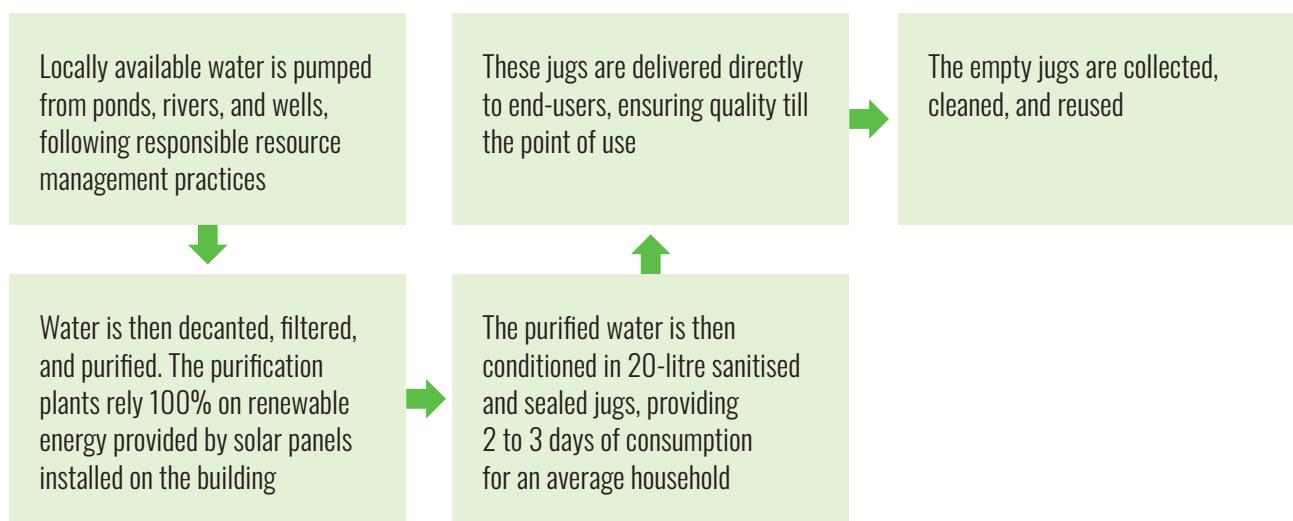


public pipeline and purified. Post purification, the water is either delivered directly to home, or through water ATMs that use smart cards to create price transparency and quality accountability to the last mile. Their operating models are scalable and customisable based on the needs of the community. They also provide after-sales services like water quality control (water quality meters, cleaning solutions) and equipment maintenance.

### 1001Fontaines

1001Fontaines was founded in 2004 as a French NGO. They started operations from Cambodia and have since scaled up to 4 countries in South-East Asia and Africa (Cambodia, Madagascar, Myanmar, and Vietnam). Their main innovation is a solar-powered water purification plant (which they call "the water kiosk"), but their delivery mod-

**Figure 14: Delivery Model 1001Fontaines**



el involves multiple stages of the drinking-water value chain. Purified water is provided to the end-users on a pay-per-use model by local entrepreneurs, and 20% of daily safe water production is supplied to local schools for free. The water quality is monitored every month and complies with the World Health Organization's standards.

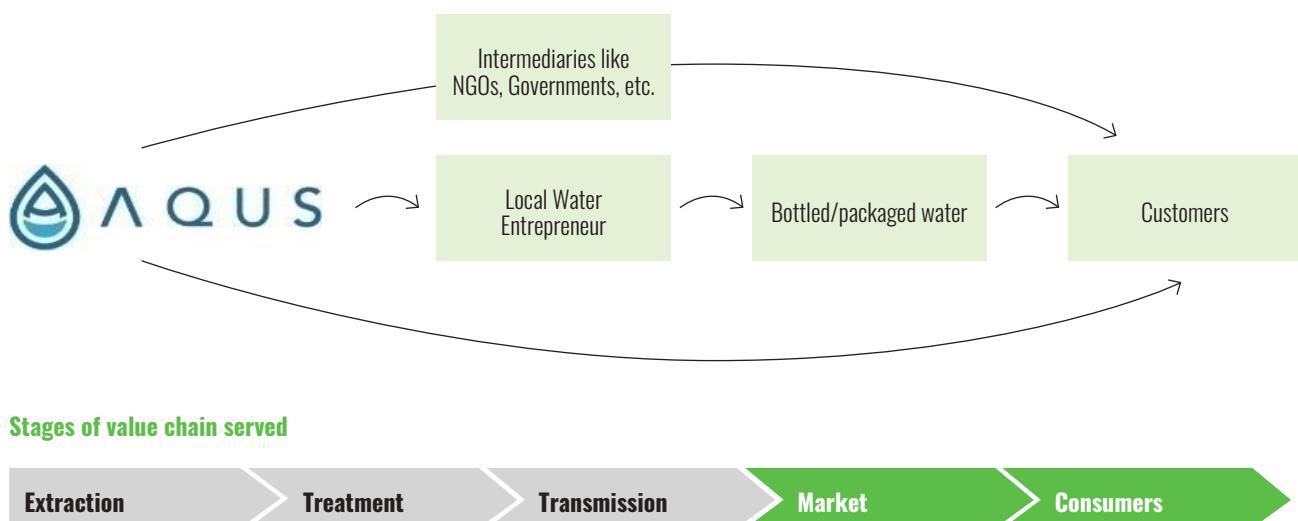
### Aqus

Aqus provides clean water solutions for households, businesses, governments, and NGOs around the globe. It is based in Uganda and the USA, and its main product is Aquafilter - a portable water filter that operates without electricity and can be used at a household level. These filters are accredited by EPA and filter out 99.9999% of bacterial pathogens (leaving 1 in a million). They are useful for communities and villages that do not have access to clean water, disaster relief areas, schools etc. These filters are point-of-use devices and can be attached either to running tap-water or to a bucket. Aquafilter sells them directly to consumers, or through intermediaries like local NGOs or governments. A good feature of their delivery model is that they also sell them to small-business owners (a local restaurant or grocery store, for example) who can use it to generate supplemental income by selling purified drinking water to local communities at very affordable prices.

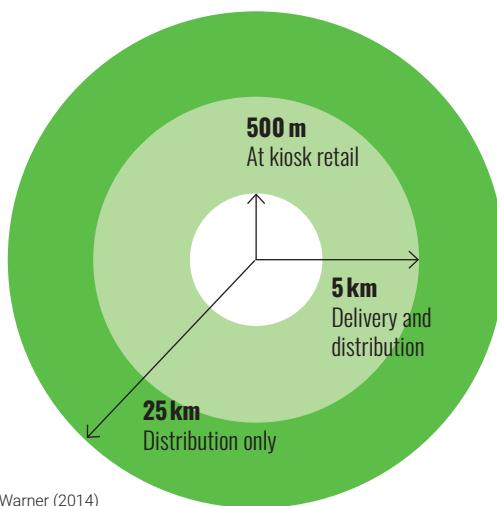
### DloHaiti

DloHaiti is a for-profit enterprise operating in Haiti. It offers a decentralised, local model of water treatment and distribution which is cheaper, more reliable, and safer than traditional local delivery models (which involve trucking water from distant treatment facilities). The traditional models offer high-priced water, variable water quality and limited availability outside major cities. DloHaiti improves this business model with decentralised water treatment kiosks, which customers in the immediate vicinity (up to 500 meters) can directly buy water from through pay-per-use delivery. To serve customers further away, DloHaiti empowers local entrepreneurs by providing them the opportunity to resell purified water or offer delivery and wholesale distribution services. With the Haitian government only providing non-potable water through the public infrastructure, and customers willing to pay for reliable and safe drinking water, the Haitian market provides a great opportunity for innovators like DloHaiti to sustainably solve local drinking water crisis.

**Figure 15: Delivery Model Aquafilter**



**Figure 16: Delivery Model DloHaiti**



Source: Sy & Warner (2014)

**Stages of value chain served**



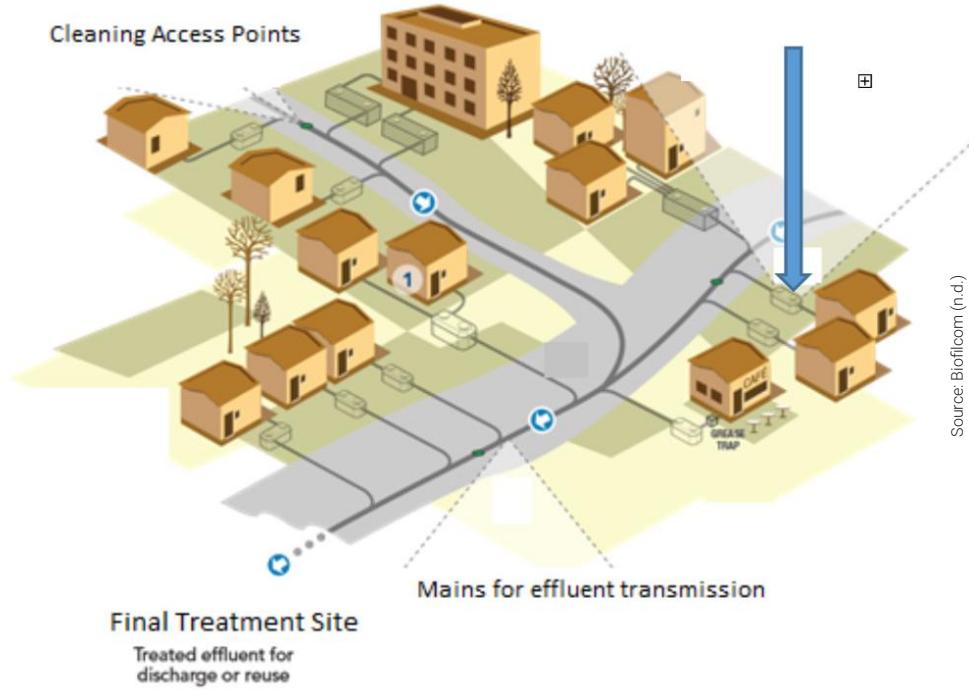
### 3.5. Business models in sanitation

Access to safe sanitation services, just like safe water is often thought to be addressed by the public sector. It is hard for people to imagine how money could be made from toilets. Again, this myth revolves around end-users being seen as beneficiaries rather than people willing to pay for safe sanitation services. With the establishment of end-users as consumers, there have been advancements in the private sanitation sector. Across all the stages of the sanitation value chain, private enterprises can be found – operating in low-income countries on charging-per-service models. A better understanding of the sanitation value chain can help private investors understand the vast potential the sector holds in terms of creation of private enterprises. Our study has identified a few businesses, which are leading examples in serving low-income communities, with a robust and replicable business model. With the right partners to provide scale-up capital, these businesses can create returns for the underserved communities as well as for the private investors.

#### Biofilcom

Biological Filters and Composters Limited is a Ghana-based enterprise established in 2005. It has a range of sanitation products designed to serve the bottom of the pyramid in underserved areas. Its Biofil Toilet System is a compact on-site sanitation facility that combines the benefits of a flush toilet system and composting toilets while eliminating odour using a fully aerobic digester. Its service delivery model comprises of three components – the user interface, the containment system, and the treatment and reuse system. The model is decentralised and is developed around the cluster of houses (ranging from 20-100 households). Each household makes a one-time personal investment in a user interface (commode with a super-structure). The generated effluent is treated collectively at a local treatment plant. Apart from this model, they also offer standalone sanitation solutions for individual households, where waste is treated onsite.

**Figure 17: Delivery Model Biofilcom**



#### Stages of value chain served



#### Loowatt

Loowatt is a sanitation enterprise currently operating in Madagascar, Philippines, and the UK. Its waste management system takes the entire process into consideration with sustainability at the core. Loowatt's primary product for emerging economies is the waterless home toilet with a manual flush, designed for use in locations where electricity is inaccessible. The toilet can function completely off-grid, and the delivery model is suitable for densely populated areas with limited space. Through this product, Loowatt targets bottom of the pyramid populations vulnerable to poor sanitation. The reasonably priced product is affordable to them and provides a private, secure, and properly managed sanitation facility. Loowatt also converts waste into biogas to generate electricity, cooking gas, and organic fertiliser.

#### Safisana

Safisana is a waste treatment enterprise based in Ghana. It offers waste treatment services to governments and industries to turn organic waste and fecal sludge into high value products like renewable energy, organic fertiliser, and irrigation water. Its model is based on the circular idea of waste as a resource. Each of their treatment plants can serve 50,000 underserved people. The Safisana team collects fecal and other organic waste from urban areas and transports it to the Safisana recycling plant. The waste is transformed through the process of fermentation into organic fertilisers and biogas; with the biogas subsequently used to produce electricity. Electricity is then sold to local energy companies and wastewater is turned into clean irrigation water for use in their own nursery. The organic fertiliser produced after waste treatment also provides year-round nutrient rich supplements to local farmers to increase vegetable yield.

**Figure 18: Delivery Model Loowatt**



**Figure 19: Delivery Model Safisana**

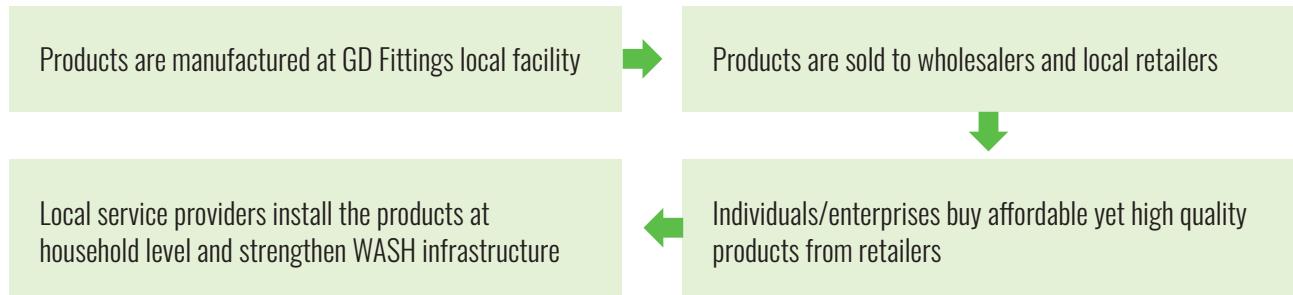


### GD Fittings

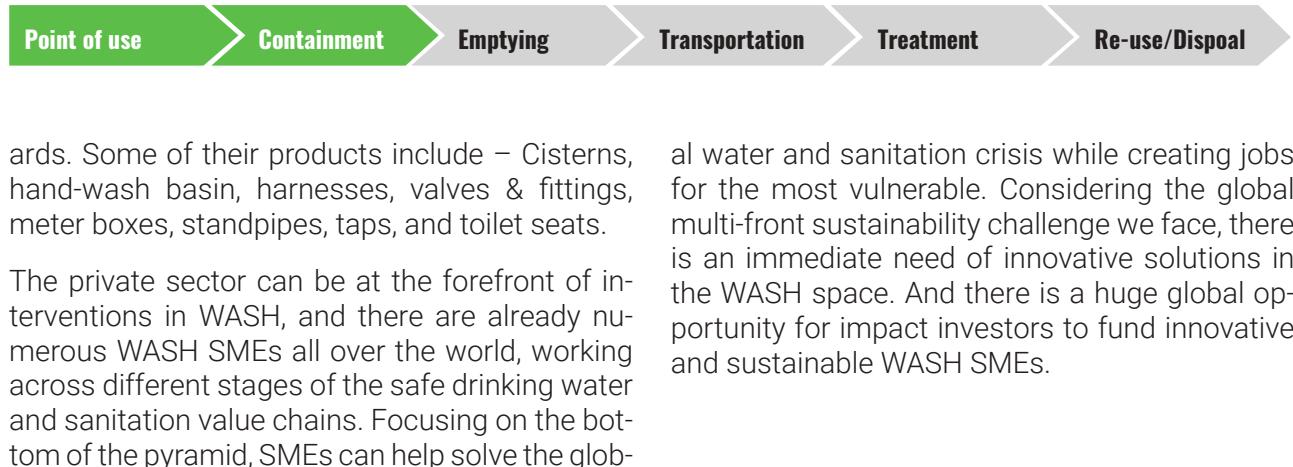
GD Fittings is a South African sanitary-ware and plumbing enterprise which innovates plastic based products. They are pioneers in water-saving technology and their products are manufactured using plastic injection molding, making them durable, safe, and cost-effective. They sup-

ply a wide range of taps, sanitary ware, cistern mechanisms and plumbing fittings to wholesalers and retailers in the plumbing and hardware industry. Their products are priced lower than traditional competitors, and are meant for the underserved, low-income population. GD Fitting's in-depth industrial knowledge allows them to produce products that conform to industry stand-

**Figure 20: Delivery Model GD Fittings**



**Stages of value chain served**



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## ANNEX I – Common Terminology in WASH

<b>Black Water</b>	Black Water is the flushed water from a toilet, combined with the excreta and other waste such as toilet paper.
<b>Blended Finance</b>	It is defined by the OECD and WEF as “the strategic use of development finance and philanthropic funds to mobilise private capital flows to emerging and frontier markets”.
<b>Circular Economy</b>	An economy in which waste and pollution do not exist by design, products and materials are kept in use, and natural systems are regenerated. This is considered a key component of several SDGs.
<b>Community</b>	A group of people who are interdependent and limited by geographical boundaries; share common natural resources; share a common culture; share a common goal; and experience similar problems.
<b>Community Mobilisation</b>	It is a strategy for involving communities in taking action to achieve a particular goal.
<b>Community-Based Management</b>	The service delivery model where communities are responsible to operate and manage water facilities.
<b>Customer</b>	A person, business or other operation supplied with WASH services by a WASH service provider.
<b>Development Cooperation Grants</b>	Funding of development projects and programmes by international organisations, NGOs, national and local governmental agencies, and development banks with the purpose of promoting economic cooperation with developing countries.
<b>Enabling Environment</b>	The set of interrelated conditions such as legal, governance and monitoring frameworks, political financing, institutions, and human capital that can promote the delivery of WASH services.
<b>Environmental Health</b>	A broad term that encompasses water and sanitation interventions as well as such issues as air and noise pollution.
<b>Excreta</b>	Excreta includes faeces, urine, and vomit. It drains from a toilet, often combined with other waste such as toilet paper.
<b>Hygiene</b>	In the SDG definition, hygiene is subsumed under sanitation with a dedicated indicator referring to use/availability of a handwashing facility on premises with soap and water. Hygiene, however, includes a wider set of behaviours and measures that can reduce the burden of infectious diseases in the community (such as related to menstrual health).
<b>Improved Sanitation</b>	Sanitation facilities designed to hygienically separate excreta from human contact.
<b>Informal Savings and Credit Groups</b>	Groups of individuals living close to one another who make regular savings contributions to a central pool that lends money to the members (includes Self Help Groups, ROSCAS, SACCOS, etc.)
<b>Market-Based Sanitation (MBS)</b>	A development approach to improve sanitation in a country by building the sanitation market of goods and services for which the customer makes a full or partial monetary contribution (with savings and/or cash equivalents) toward the purchase, construction, upgrade, and/or maintenance of their toilet from the private sector.
<b>Non-Sewered Sanitation</b>	A sanitation system in which excreta (referred to as faecal sludge) is collected and stored at the location where it is generated. It is then either treated and disposed of on-site or emptied and transported to another location for treatment and disposal.

<b>Pathogens</b>	Harmful sick-making micro-organisms that originate from the human body. They encompass protozoa, bacteria, and viruses, which are, among other things, distinguished by size.
<b>Safely Managed Sanitation</b>	Sanitation facilities should not be shared with other households, and the excreta produced should either be: treated and disposed in situ; stored temporarily and then emptied and transported to treatment offsite; or transported through a sewer with wastewater and then treated off-site.
<b>Sanitation</b>	It refers to the disposal of human excreta and urine, vector control, and drainage.
<b>Sanitation Coverage</b>	The share of the population that has access to sanitation as a percentage of the total population in a geographic area. Coverage is reported by limited, basic, or safely managed service levels defined by the WHO-UNICEF JMP
<b>Sanitation Enterprise</b>	The set of specific business activities that enable the sale of sanitation/toilet products and services by a sanitation entrepreneur (alternatively referred to as supplier) to their customers.
<b>Sanitation Entrepreneur</b>	An individual who owns and manages one or more sanitation enterprises.
<b>Sanitation Ladder</b>	The WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply, Sanitation and Hygiene defines five levels of service: open defecation; unimproved; limited; basic; and safely managed.
<b>Sanitation Market</b>	The interactions between the buyers (households) and sellers (sanitation enterprises) of toilet products and services.
<b>Sanitation Market System</b>	The totality of the sanitation market and the business environment and broader context within which the market operates.
<b>Service Delivery Model</b>	The legal and institutional setup for the provision of WASH services. A service delivery model includes all links in the value chain, the method of provision, the end use of services and the level of service delivered. Examples include a community water supply, a utility's sewerage service, and water kiosks managed by a small private provider.
<b>Service Level</b>	The quality or standard of service, measured by criteria set by national standards and/or the norms for Sustainable Development Goal 6. The criteria for water include quantity, quality, reliability, and accessibility; for sanitation, they are accessibility, use, reliability, and environmental protection.
<b>Service Provider</b>	The entity responsible for the day-to-day management of WASH services, including operation and maintenance.
<b>Sewage</b>	When black-water and grey-water (otherwise wastewater, with no or less pathogens) are drained into a sewer, it is called sewerage (or sewage).
<b>Sewered Sanitation</b>	A sanitation system in which waterborne excreta (referred to as wastewater or sewage) is collected and transported to treatment before disposal or use. This type of system relies on sewers and flush water for transport. It is often referred to as 'off-site' sanitation as waste is transported away from the location where it is generated for treatment.
<b>Sustainability</b>	Refers to the potential for lasting social, economic, and environmental improvements that a project offers.
<b>Sustainable Development Goals (SDGs)</b>	The Sustainable Development Goals (SDGs) or Global Goals are a collection of 17 interlinked global goals designed to be a blueprint to achieve a better and more sustainable future for all. The SDGs were set up in 2015 by the United Nations General Assembly and are intended to be achieved by the year 2030.

<b>Tariffs</b>	Money paid by users of WASH services and payment in kind (the value of labour and material investments made by households who manage their own water supply).
<b>Toilet</b>	A sanitation fixture used for capture and storage, or disposal of human urine and faeces. Throughout this document “toilet” is used in place of “latrine” for consistency and regional universality, even if “latrine” was used by the original source.
<b>Upgradeable Toilet</b>	A toilet design that allows the customer to add to existing components or replace them with superior or higher quality materials for increasing utility, convenience, or appeal in a way that caters to a wide range of income groups via flexibility for customisation (e.g., addition of tiles to a cement slab or replacement of a thatch roof with a tin roof).
<b>WASH</b>	WASH means ‘water, sanitation and hygiene’. It is an umbrella term broadly used to address adequacies in these areas in the international development context.
<b>WASH System</b>	All the social, technical, institutional, environmental, and financial factors, actors, motivations, and interactions that influence WASH service delivery in a given context.
<b>WASH Operator</b>	An entity that supplies the public with essential and safely managed water and sanitation facilities.
<b>Water Resource Management</b>	Refers to the coordination and control of how water is allocated to different sectors. A strong system includes methods or protocols for addressing conflicts and encouraging cooperation. Both the abstraction of freshwater and the disposal of used water should be controlled, managed, monitored, and enforced.
<b>Water Security</b>	The capacity of a population to safeguard sustainable access to an adequate quantity and acceptable quality of water to sustain livelihoods, human well-being, and socio-economic development; ensure protection from water borne pollution and water related diseases; and preserve ecosystems in a climate of peace and political stability.

## **About the European Microfinance Platform (e-MFP)**

The European Microfinance Platform (e-MFP) is the leading network of organisations and individuals active in the financial inclusion sector in developing countries. It numbers over 130 members from all geographic regions and specialisations of the microfinance community, including consultants & support service providers, investors, FSPs, multilateral & national development agencies, NGOs and researchers. Up to two billion people remain financially excluded. To address this, the Platform seeks to promote co-operation, dialogue and innovation among these diverse stakeholders working in developing countries. e-MFP fosters activities which increase global access to affordable, quality sustainable and inclusive financial services for the un(der)banked by driving knowledge-sharing, partnership development and innovation. The Platform achieves this through its numerous year-round expert Action Groups, the annual European Microfinance Week which attracts over 400 top stakeholders representing dozens of countries from the sector, the prestigious annual European Microfinance Award and its many and regular publications.

## **About Aqua for All**

Aqua for All is a foundation operating primarily in Africa and Asia. For over two decades, we have worked towards catalysing an innovative, sustainable and inclusive water and sanitation economy worldwide.

We believe that innovation, scalable solutions, and public and private capital are needed to bridge the service and financial gap to achieve SDG 6 – Water and sanitation for all.

We use grants to accelerate providing access to water and sanitation to low-income households and institutions. We do this by supporting innovations and scaling up enterprises until they are investment ready, without distorting the market. In addition, we use our funds to mobilise private and public capital to increase investments in water and sanitation. We are Making Water Count!

For more information, please visit: [aquaforall.org](http://aquaforall.org)

## **About the e-MFP WASH Action Group**

The e-MFP WASH Action Group was created in 2021 to answer to a need shared by some e-MFP members, particularly investors, to better understand the Water, Sanitation and Hygiene (WASH) sector and its relevance for low-income populations in developing countries, and to be able to identify investment opportunities in the sector.

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