EXECUTIVE SUMMARY

FUNDING A WATER-SECURE FUTURE

An Assessment of Global Public Spending

George Joseph, Yi Rong Hoo, Qiao Wang,
Aroha Bahuguna, and Luis Andres

WORLD BANK GROUP

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1818 H Street NW
Washington DC 20433
Telephone: 202-473-1000
Internet: www.worldbank.org

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Introduction

THE WATER CRISIS

Water is the basis of all life on our planet. Since ancient times, the prosperity, sustainability, and wellbeing of all living populations have been determined to a large extent by the availability of water. Today, water remains at the heart of social life and economic progress. It plays a central role in both the society and the economy—by facilitating economic growth and human capital development, and by creating new possibilities for individuals and groups, possibilities that have the power to reduce poverty for current and future generations and improve the quality of people's lives. There is therefore an urgent need to give clearer recognition to the role of water as a connector that spans essentially all economic activities—from energy generation, transport, and food production to education, sanitation, public health, and the reduction of the global burden of disease. In addition to Sustainable Development Goal (SDG) 6—the target that relates directly to water—the attainment of most of the other sixteen United Nations SDGs is also conditioned, directly or indirectly, on the availability of water.

Still not on track. Despite this, nine years into the SDG era, the world is still not on track to achieve its goals for water. Budgetary spending data on water supply and sanitation (WSS) from the BOOST database and several others, together with the data on spending requirements to achieve safe affordable drinking water for all (SDG target 6.1) and the eradication of open defecation and universal access to safely managed sanitation and hygiene (target 6.2) (Hutton and Varughese 2020), reveal that most countries are not spending enough to achieve these two vital targets by 2030. In fact, to achieve universal coverage for safely managed drinking water and sanitation by 2030, it would require at least a quadrupling of current rates of progress (WHO and UNICEF 2021, 2023).[1] Yet this task may be even harder now than in the past, for two reasons. First, substantial resource constraints, both natural and financial underlie the twin challenges of broadening access and of improving service quality that the water sector faces. Second, the goals the world set in 2021 at the UN Climate Change Conference COP26[2] in response to climate change require greater government investments to achieve the targeted levels of adaptation and mitigation in the water sector.

In addition, because investments in irrigation and other complementary agricultural support activities have not kept pace with population growth, achieving SDG 2 (Zero Hunger) is also proving difficult. Between 2014 and 2019, virtually no region in the world lowered its hunger and undernourishment rates (FAO et al. 2021; FSIN and Global Network Against Food Crises 2023). Rather, food availability per capita has declined, and vulnerability to food insecurity has increased in many developing

countries (FAO et al. 2021; FSIN and Global Network Against Food Crises 2023). Higher investments in irrigation along with complementary agricultural support measures will be needed to bridge these gaps.

Additional pressures on the spending gap. Yet just when there is a need for more money, there is less money available than ever. Ongoing recessionary tensions throughout the global economy, coupled with pandemic, conflicts and natural disasters, have placed additional pressure on governments' limited fiscal space (Augustin et al. 2022; Kose et al. 2021). These developments, taken together, make the challenge of bridging the water sector's financing and funding gap more pressing yet at the same time more difficult to achieve. In light of the ambitious goals set by governments and international agencies for the sector, the water sector's overarching policy imperative at the moment is to find a way to bridge this spending gap in the near to medium term.

An information deficit. A significant obstacle to achieving these goals, however, is the need to generate comprehensive, accurate, current, and detailed information on how much, and how well, financial resources are being spent in the sector at the national, regional, and global levels.

THE CURRENT STUDY

This study is a first-ever attempt to gain a 360° panoramic view of spending in the entire global water sector to better understand the financing and funding gaps in relation to sector goals, and consequently guide thinking on alternative ways to close them. It estimates total water expenditure at various levels of disaggregation, and at the global and regional scales, using several data sources, including budget data and national accounts data, and the updated versions of all available databases on infrastructure spending from various sources, including private and foreign funding.

The study thereby presents an integrated assessment of global and regional public spending in the water sector and its main subsectors. It presents findings that seek to answer questions about how public funds are spent in the sector, how well they are spent, and the financing and funding gaps[3] in the sector to help the government meet sector goals. The study is intended as a guide that governments and a range of other stakeholders can use to improve decision-making and thereby facilitate reforms to increase financing and funding in the water sector, enhance the utilization of already allocated funds, and raise the efficiency with which existing resources are employed to maximize development impact.

KEY FINDINGS

Spending gaps in WSS and irrigation. The study's findings demonstrate what many have long suspected but now have empirical evidence for—that two of the main subsectors, the water supply and sanitation subsector (WSS) and the irrigation subsector, face significant spending gaps to achieve their respective targets (part 2 chapter 2).

For instance, to achieve SDG targets 6.1 and 6.2 the WSS subsector faces an annual spending gap of between $131.4 billion and $140.8 billion in 2017 prices. The irrigation subsector has a spending gap of $3.5 billion a year even in a low-cost spending scenario that involves subsidizing irrigation infrastructure only and reducing agricultural demand.

The primacy of the public sector. Where will the needed financing come from? The public sector—the government and state-owned enterprises (SOEs)—remains the primary source of both financing and funding for the water sector. About 91.4 percent of total spending in the sector comes from the public sector (part 3 chapter 1). Over the last decade, private sector investments have been relatively marginal—only 1.7 percent of the total annual spending in the water sector (part 3 chapter 1). That apportioning of financing/funding responsibilities is not likely to change soon.

Poor budget execution rates. Given the fiscal challenges countries currently face, stepping up public financing will not be easy, but the other side of the matter is that water sectors in most countries, believe it or not, are not fully spending the budget allocations made to them at the start of the fiscal year. The sector's budget execution rates average about 72 percent during 2009-20, meaning that some 28 percent of allocated funds go unspent (part 3 chapter 2). Low budget execution rates point to systemic constraints on the sector's absorptive capacity, which in turn is anchored in a range of institutional, governance, project management, and political economy factors. Higher execution rates, by themselves, would narrow the water sector's enormous financing gap with lesser need for greater financial outlays.

Declining productivity and efficiency. Another avenue for bridging the sector's spending gap is to improve the productivity of public spending and reduce the inefficiencies of water service providers (part 3 chapter 3). Over the ten-year span- from 2009 to 2020—and indeed longer—water sector public spending has faced declining total factor productivity (5–6 percent) mainly because of efficiency losses. Only 35 percent of the utilities in the International Benchmarking Network (IBNET) database fully cover their operations and maintenance (O&M) costs of service provision and an even smaller share, 14 percent of all utilities, cover their total full financial cost—that is, O&M plus future capital costs. Moreover, based on data from 1557 water utilities from 67 countries, between 2004 and 2017, the average efficiency losses incurred by a typical water utility averaged approximately $21.4 million a year in 2015 prices, about 16 percent of the average total operating costs of these utilities. Improving productivity and efficiency in the water sector is an imperative which requires drastic changes across the spectrum, ranging from improving engineering designs to enhancing the motivation of the labor force.

The equity challenges. Finally, attracting more funds into the sector, as vital as this is, needs to be coupled with a commitment to spending those funds equitably (part 3 chapter 4). Water supply and sanitation and irrigation services are marked by significant subsidies from the government which need to be targeted smartly to benefit the disadvantaged communities, including those who live in difficult-to-reach areas such as dense urban districts and remote rural regions. Analysis of public spending

in the provision of WASH services in several countries clearly demonstrate a bias towards the non-poor segments and urban populations. This means that, given the presence of high levels of subsidies in the provision of WSS services, public money is targeted more towards the less deserving segments of the society. These biases in targeting needs to be carefully addressed as the countries move towards universal access to safe water supply and sanitation services.

WHAT IS UNIQUE ABOUT THE WATER SECTOR?

Water has certain unique public values and other attributes that give governments a dominant role in the sector. These include the fact that water is a merit good, there are spillover effects from its use, and the capital intensity needed to offer water services favors a monopoly structure. In addition to these, there are equity issues, affordability concerns, and the difficulty of defining property rights—three factors that discourage private sector participation. Additionally, as an exhaustible yet common-pool resource, water's long-term availability cannot be taken for granted. Indeed, in the absence of well-defined property rights, competing uses could lead to overexploitation, depletion, and/or pollution. Several of these attributes are briefly discussed below.

Services such as water supply and sanitation are merit goods; this means that the society values everyone having access to such services rather than not having them. For a well-functioning modern society, certain services and assets are considered prerequisites- public health, public transport, education, renewable energy, and open green spaces are so fantastic that as many people as possible should be consuming as much of them as possible. The government, which in principle, has an interest in creating socially desirable outcomes is the perfect candidate for producing and offering merit goods to the public.

Further, services such as water supply, sanitation, and irrigation tend to generate positive externalities meaning that when consumed they generate positive spillover effects that benefit the public generally, not just the individuals who pay for the service. For example, public health benefits of the provision of water supply and sanitation services have long been established. This makes it appropriate for government to subsidize the cost of water services because more people benefit than just the paying users. In fact, the price the actual consumers would be willing to pay for WSS services would reflect only the benefits they themselves are privately getting from it, while the rest of the public gets to enjoy the benefits of public health for free. Therefore, the private sector will be less willing to provide such services where the market price reflects the much lower private benefit and not the higher social benefit. A free-market economy would therefore underprice, undervalue, and hence under-produce and under-consume such services which generate positive externalities.

A capital-intensive sector with monopoly characteristics. Water sector infrastructure and services are highly capital-intensive, with high fixed capital costs and long payback periods. Once the infrastructure is set up, the marginal cost of providing service to an additional user is minimal. The high costs are all upfront. This impedes competition because it is economically unviable for a newly entering competitor to duplicate such infrastructure due to the high initial costs. And it is not desirable from a social welfare perspective to promote competition in such case due to the loss of economies of scale and scope.

Equity concerns. For the same reason, private service providers are reluctant, for fear of losses, to set water tariffs at less than the full cost-recovery price. Yet in practice, water tariffs are in fact often set well below cost recovery levels because otherwise many people cannot afford the services. In practice, then, especially in countries where broad inclusion has become a political goal, the government steps in and subsidizes the service provider to balance the business need for commercial viability and the sociopolitical need for inclusion.

Poorly defined property rights and common pool characteristics. Another complication that inhibits the engagement of service providers in the water sector involves the securing of property rights, a complicated process often linked to the nature of water that flows across space. In most countries, even the most advanced, WSS providers are typically state-owned, and water resources are held as national or common property or owned by public institutions. This means private firms entering the sector to build infrastructure or provide services must negotiate with state agencies over production volumes, tariff rates, service prices, and regulations—which compromises the business models most private firms would prefer to use. Further, the relative absence of clear property rights, coupled with the common-pool nature of water, makes it difficult to exclude others from using the available water. This has led to the phenomenon called "the tragedy of the commons"—the unchecked overuse of a finite, valuable, nonrenewable resource by consumers who have unimpeded access to it, each acting only in their own self-interest. An example of this is Western India's rapidly depleting groundwater tables (Ostrom [1969] 1999).

These varied circumstances, all linked to distinctly unique water sector attributes, all require government intervention not only to set the rules of the game but to take the leadership role in providing financing and funding. In short, free market conditions—the competitive determination of prices and the market-led allocation of resources through voluntary exchanges among numerous buyers and sellers—do not exist in this sector. This is both caused by, and leads to, government's central role in regulating, operating, and pricing water sector services.

The necessary involvement of government, however, also increases the sector's vulnerability to the characteristic shortcomings that public sector activities and arrangements have traditionally been fraught with, including institutional fragmentation, widespread inefficiencies and policy distortions of various types.

HOW MUCH IS SPENT ON WATER?

Institutional fragmentation. In many countries, the fragmentation of institutions has thwarted an integrated approach to water resource management. In most country settings, water resources are allocated, managed, and regulated by an entire phalanx of state entities that speak past each other, each with its own set of policies, priorities, perspectives, and budget, and with limited communication among them. The result: the absence of a clear and coherent investment roadmap for the sector.

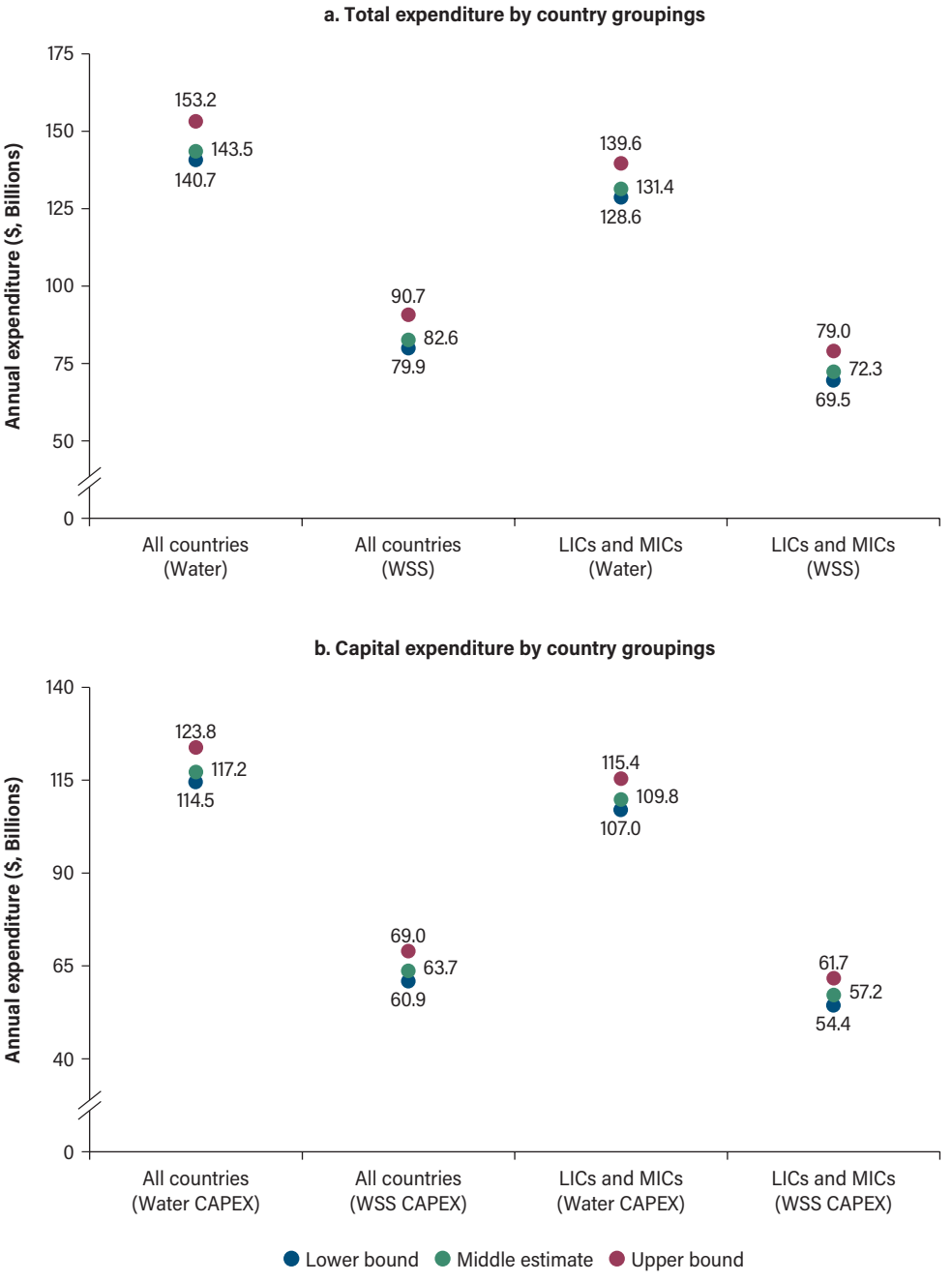
Developing an integrated comprehensive account of the actual levels of water sector spending is essential for policymakers to (i) prioritize spending needs, (ii) gain a holistic picture of the spending required to achieve sector-related SDG goals—and hence the spending shortfall—and (iii) explore potential synergies and tradeoffs among water subsectors. Previous spending estimations in the sector have offered an oversimplified account of the infrastructure spending shortfall.

Estimated annual total spending in the water sector. This study, for the first time, offers an accurate estimate of water sector public spending that encompasses four subsectors—WSS, irrigation, water transport, and hydropower. For the 130 countries included, total annual public spending in the water sector is estimated at $140.7 billion in 2017 prices. This corresponds to a lower bound (figure ES.1). If the private sector is included—a middle estimate—total spending is, then, $143.5 billion. Finally, if state-owned enterprises (SOEs) are also included—the upper bound—annual water sector spending becomes $153.2 billion in 2017 prices. These estimates correspond to approximately 0.45 percent, 0.46 percent, and 0.49 percent of overall GDP, respectively (figure ES.2). These figures cover domestic spending in the water sector and did not include official development assistance (ODA) to avoid potential double counting during the estimations. If ODA is added, annual total spending in the water sector would come to $164.6 (see sections below, figure ES.5). More than half of total water sector spending is in the WSS subsector, estimated to be between $79.9 billion (lower bound) and $90.7 billion (upper bound), or between 0.25 percent and 0.29 percent of overall GDP, with a middle estimate of roughly $82.6 billion, or 0.26 percent of GDP. Regionally, in both the water sector and WSS subsector, East Asia and Pacific (EAP) (including China) comes in as the highest spender, both as a share of its regional GDP and in absolute terms.

The capital-intensive nature of water sector spending. Spending in the water sector is, not surprisingly, capital-intensive. Annual capital expenditure (CAPEX) accounts for about two-third of the total expenditure, ranging between $114.5 billion (0.36 percent of the overall GDP) and $123.8 billion (0.39 percent of the overall GDP). Meanwhile, annual capital spending for WSS is estimated to be between $60.9 billion (0.19 percent) and $69.0 billion (0.22 percent).

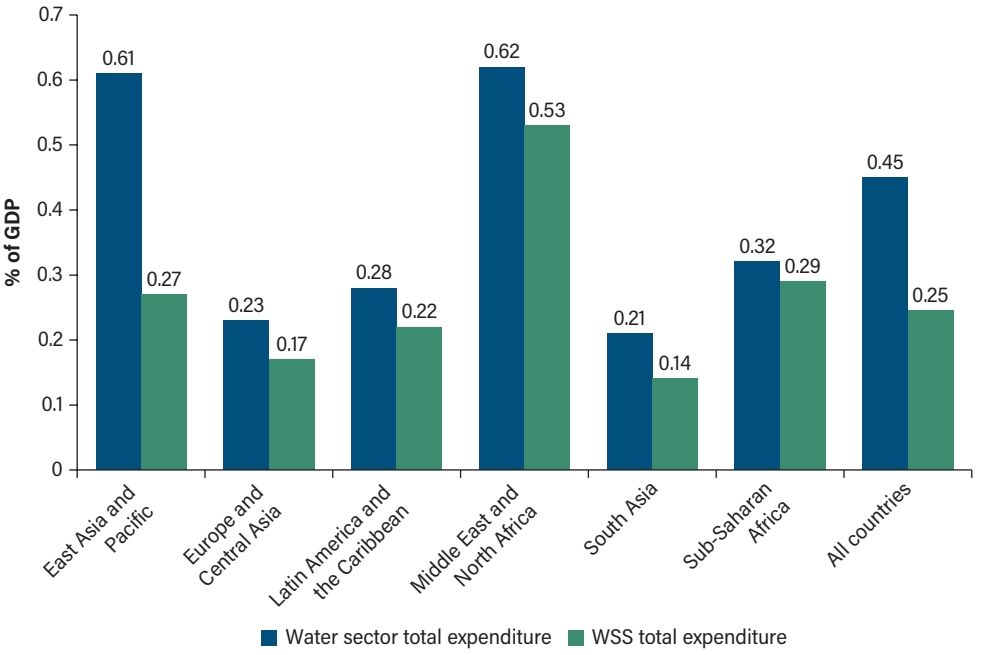
Low spending by FCV countries. On the other hand, fragile and conflict-affected countries (FCV) spend only between $2.8 billion (0.2 percent) and $3.9 billion (0.34 percent) annually on the water sector, of which $2.2 billion (0.19 percent) to $3.1 billion (0.27 percent) is capital expenditure (CAPEX). These estimates further underscore the distinct financing and funding challenges faced by FCVs in developing the infrastructure of their water sector.

FIGURE ES.1 Estimated Annual Expenditure in Water Sector and WSS (2017 constant prices)



Source: Authors' estimation using BOOST and other databases.
Note: Official development assistance is not included. 130 countries are included, of which, 115 are low-income countries (LICs) and middle-income countries (MICs). CAPEX = capital expenditure; WSS = water supply and sanitation.

FIGURE ES.2 Estimated Annual Spending in Water Sector and WSS as a Share of GDP (lower bound), by Region



Source: Authors' estimation using BOOST and other databases.
Note: Official development assistance is not included.

Government dominates spending. Public spending by government entities through the budget, amounting to $140.7 billion a year (lower bound), makes up most of the annual spending in the water sector.

Development outcomes beyond SDG 6. Finally, beyond SDG 6, water sector spending can significantly impact a range of other development outcomes. In particular, it can contribute to SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 3 (Good Health and Wellbeing), and SDG 5 (Gender Equality). Higher water sector per capita spending correlates with a lower prevalence of poverty and stunting among children and higher human development outcomes, even when country income categories are accounted for. By recognizing how water interconnects with other important development outcomes, policymakers can not only better justify water sector budget allocations but also pursue a more comprehensive approach to water resource management that yields far-ranging socioeconomic benefits.

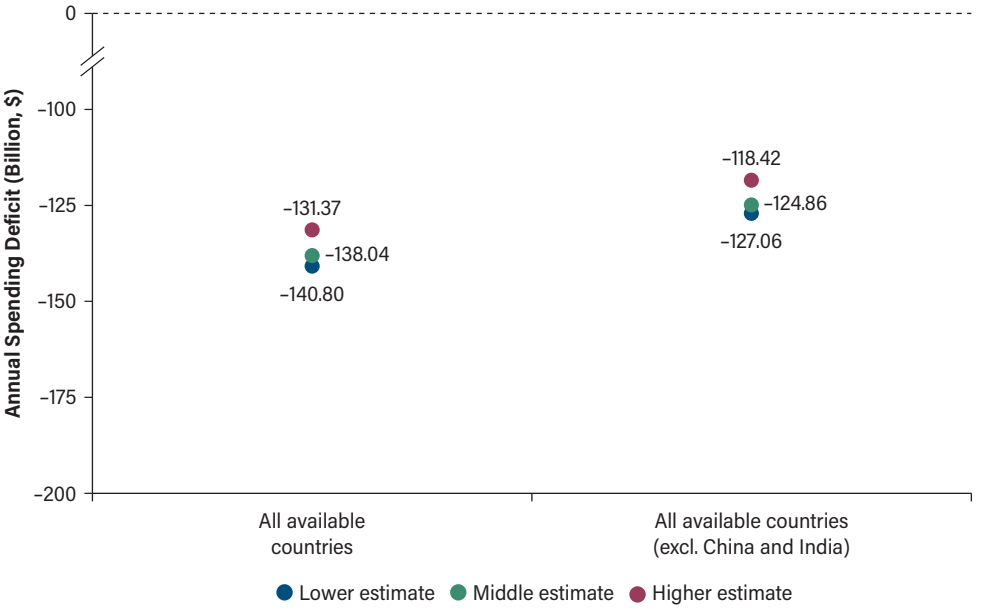
HOW BIG ARE THE WSS AND IRRIGATION SPENDING GAPS?

To the best of our knowledge, no previous studies have succeeded in producing reliable estimates of the spending gaps in WSS and irrigation because of the dearth of comprehensive national spending information from budgetary sources.

Spending gaps in WSS. Due to a shortfall in actual spending when compared to the required levels, many countries are falling short of achieving the SDG targets for universal access to safely managed water supply and sanitation by 2030. The estimated annual spending gap between 2017 and 2030 to achieve these targets ranges from $131.4 billion to $140.8 billion, with a middle estimate of $138.0 billion (figure ES.3). These figures represent between 0.45 percent and 0.48 percent of the 113 countries' overall GDP. On average, countries will need to increase annual spending to between 2.7 and 3.0 times the current level to bridge this spending gap to meet the SDG targets by 2030. Among the regions, SSA have the largest annual spending gap to achieve this target, followed by SA and MENA. The annual spending gap for SSA to meet SDGs 6.1 and 6.2 is estimated to be between $69.85 billion (4.35 percent) and $73.48 billion (4.58 percent) (figure ES.4). For SA, the corresponding estimates are $35.99 billion (1.08 percent) and $36.11 billion (1.08 percent). To bridge this gap, current annual spending would need to increase to between 9.5 and 17.0 times its current level for SSA, followed by SA, between 8.5 and 8.8 times.

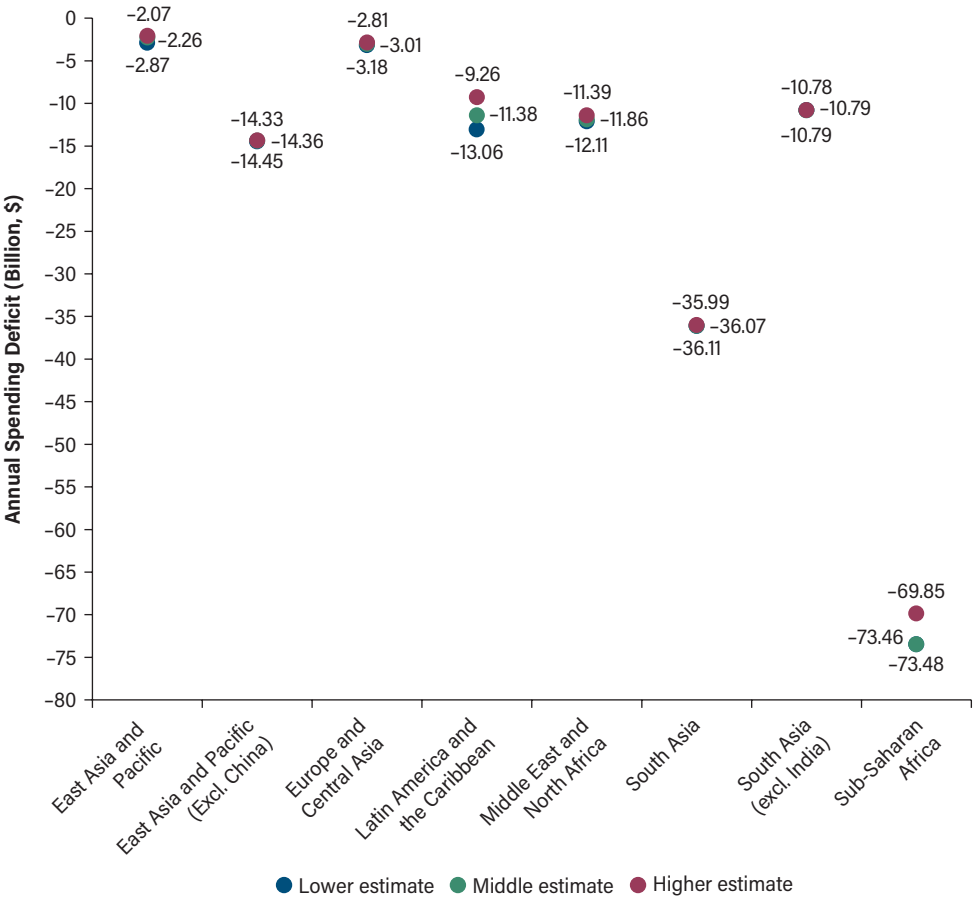
Larger spending gaps among FCVs and LICs. However, the challenge to meet the SDG targets for universal safely managed WASH services is even bigger for the FCVs and low-income countries (LICs). The annual spending gaps to achieve these targets are estimated to be between 4.71 and 4.80 percent of GDP for FCVs, and even

FIGURE ES.3 Average Annual Spending Gaps to Achieve SDG Targets 6.1 and 6.2, All Countries (2017 constant prices)



Source: Authors' estimation using data from Hutton and Varughese (2020) and the BOOST, and other databases
Note: Official development assistance is not included.

FIGURE ES.4 Average Annual Spending Gaps to Achieve SDG Targets 6.1 and 6.2, by Region (2017 prices)



Source: Authors' estimation using data from Hutton and Varughese (2020) and the BOOST, and other databases.
Note: Official development assistance is not included.

higher—between 9.16 percent and 9.34 percent of GDP—for LICs. To bridge these financing gaps, FCVs will need to increase their current annual spending to roughly 19.0 to 28.5 times their current levels, and LICs between 23.7 and 42.3 times. Those are clearly stratospheric goals.

Achieving universal access to basic WASH services is more realistic. Although the substantial spending gap to achieve SDG 6.1 and 6.2 by 2030 underscores an urgent need for action, current rates of progress suggest that many countries may not be anywhere close to attaining these targets by 2030. For many, a more realistic target would be achieving universal access to *basic* water, sanitation, and hygiene (WASH) services by 2030. Overall, most countries are spending enough on an annual basis

(between 2017 and 2030) to achieve universal access to basic WASH services by 2030. Indeed, it is estimated that, currently, the countries collectively have an annual surplus of between $12.9 billion (0.04 percent of total GDP) and $22.3 billion (0.08 percent of total GDP) in 2017 prices, with a middle estimate of about $15.6 billion, or 0.05 percent of the GDP. However, it must be noted that the averages often mask significant country level differences in spending needs.

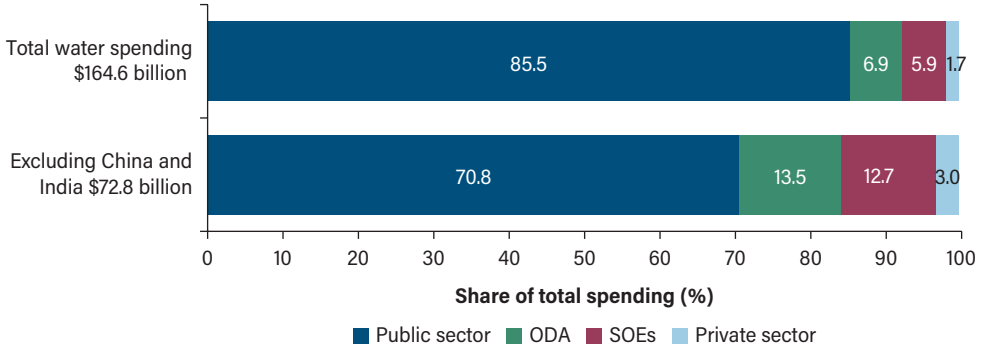
Spending gaps in irrigation. The irrigation subsector spending gap is less daunting but still grim. Our analysis of 41 countries indicates that, on average, they are not spending enough to achieve even the low-cost target by 2030 (Rozenberg and Fay 2019).[4] Together, they maintain an annual spending shortfall of $3.5 billion between 2015 and 2030—about 0.07 percent of their 2017 GDP.

Underestimations. Keep in mind that these spending gaps are likely to be underestimations. For one, climate change effects—including water stress, water scarcity, and infrastructure damage by floods and the like—are expected to aggravate the costs of providing sustainable levels of WASH and irrigation services. In the coming decades, as many as 33 countries, many of which currently have WSS spending shortfalls, could experience extremely high levels of water stress (Luo et al. 2015).

WHAT ARE THE SOURCES AND FEATURES OF WATER SECTOR SPENDING?

The four main sources of water sector spending are (i) government budgetary allocations, (ii) public spending through SOEs, (iii) ODA, and (iv) the private sector. Estimated total spending in 2017 was $164.6 billion.[5] As shown in figure ES.5, public sector spending (by public entities and SOEs) made up almost 91.4 percent of total spending (about $150.5 billion), followed by ODA[6]

FIGURE ES.5 Share of Water Sector Spending, by Source (2017 prices)



Source: Authors' estimation using BOOST and other databases.
Note: (1) Public spending and SOE spending are calculated based on part 2 chapter 1; (2) Private sector annual average spending from 2008 to 2017 was calculated from the SPI-PPI database; (3) ODA here includes other official flows (OOF). ODA in 2019 to all developing countries was about $192.2 billion (current $) and OOF was $68.8 billion.

(6.9 percent, $11.3 billion) and the private sector (1.7 percent, $2.8 billion).[7] Fiscal spending (by national, federal, and local governments) alone constituted 85.5 percent (about $140.7 billion).

Water sector spending as a share of government spending. In relative terms, governments really do not spend much on their water sectors. To put this in perspective, for the 68 countries for which data are available, average government spending in the water sector through the budget between 2009 and 2020 constituted only about 1.2 percent of total government spending. A large part of government spending was absorbed by the transport, energy, and human development sectors.[8] For example, the human development sector alone drew in more than 60 percent of government spending during the period.

Other notable features of water sector spending:

Capital intensive. Capital spending constituted almost two-thirds of total public spending in water (the remainder being recurrent spending). However, in the water sector, the share of capital spending fell from 71.6 percent in 2009 to about 56.8 percent by 2020. This may indicate declining infrastructure development in the sector, which would be disconcerting considering the large spending gaps to achieve the sector's SDG targets.

Low maintenance spending. It is equally troubling that maintenance spending in all the water subsectors—WSS, water transport, and irrigation—has been so modest. Regular maintenance is crucial to sustaining the functioning of physical infrastructure and can generate substantial savings by extending its life cycle (Rozenberg and Fay, 2019).

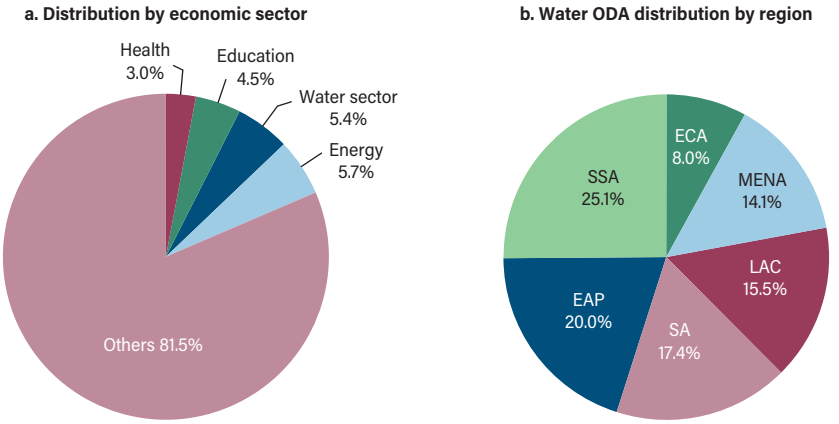
Low ODA inflows into the water sector. Between 2011 and 2019, the water sector attracts only 5.4 percent of ODA worldwide (figure ES.6), but ODA constitutes about 6.9 percent of water sector funding (figure ES.5). Sub-Saharan Africa (SSA) received the largest share of the total water sector ODA, at 25.1 percent. Meanwhile, the East Asia and Pacific (EAP) region also received a substantial proportion, accounting for 20.0 percent of the total water-related ODA during this period (figure ES.6).

The public sector and infrastructure investments in WSS. Patterns in project-level infrastructure investments, once again, affirm the public sector as the prime source of WSS infrastructure development investment. In 2017, 91 percent of investments ($18.4 billion) were from the public sector, just 9 percent ($1.8 billion) from the private sector. Within the public sector, almost 80 percent of WSS infrastructure investments came from the government, 11 percent from SOEs.

The limited role of the private sector in WSS. Data about infrastructure projects from the SPI-PPI database reinforce the above findings. Between 2009 and 2019, private sector investment projects made up only about 8 percent of the total number of infrastructure projects in WSS. In 2017, 9 percent ($1.8 billion) of all project-level infrastructure investments in WSS came from the private sector (figure ES.7). This is small compared to the 17 percent share of private sector investments in all

project-level infrastructure investments, which include those of other sectors like energy, transport, municipal solid waste and ICT. Given that substantial private funds are available, this emphasizes the need to rethink the strategy for attracting more private finance into the WSS sector.

FIGURE ES.6 Distribution of ODA by Sector and by Region



Source: Authors' elaboration using Credit Reporting System.
Note: ODA = official development assistance; CRS = Credit Reporting System; EAP = East Asia and Pacific; ECA = Europe and Central Asia; MENA = Middle East and North Africa; LAC = Latin America and the Caribbean; SA = South Asia; SSA = Sub-Saharan Africa.

FIGURE ES.7 Relative Shares of SOEs, Public Entities, and PPPs in WSS Infrastructure Development in 2017, by Region

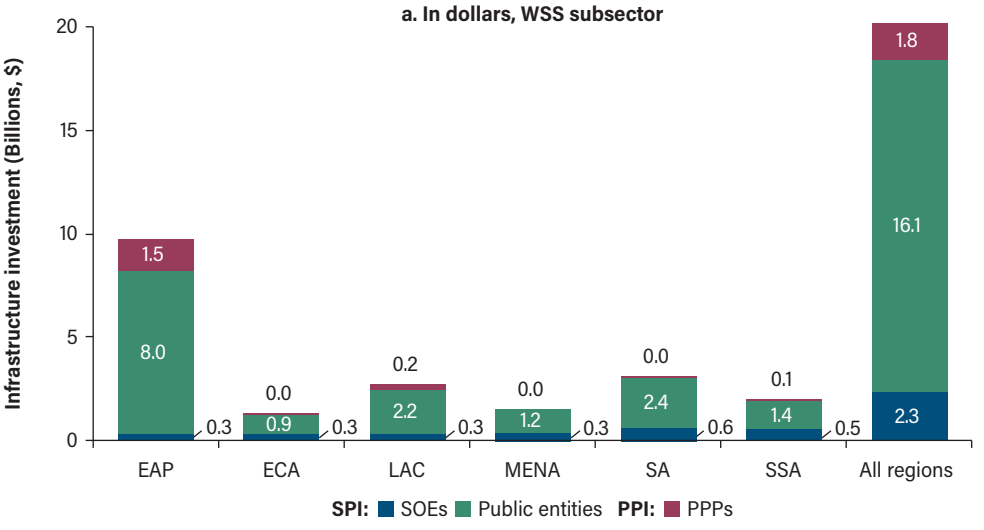


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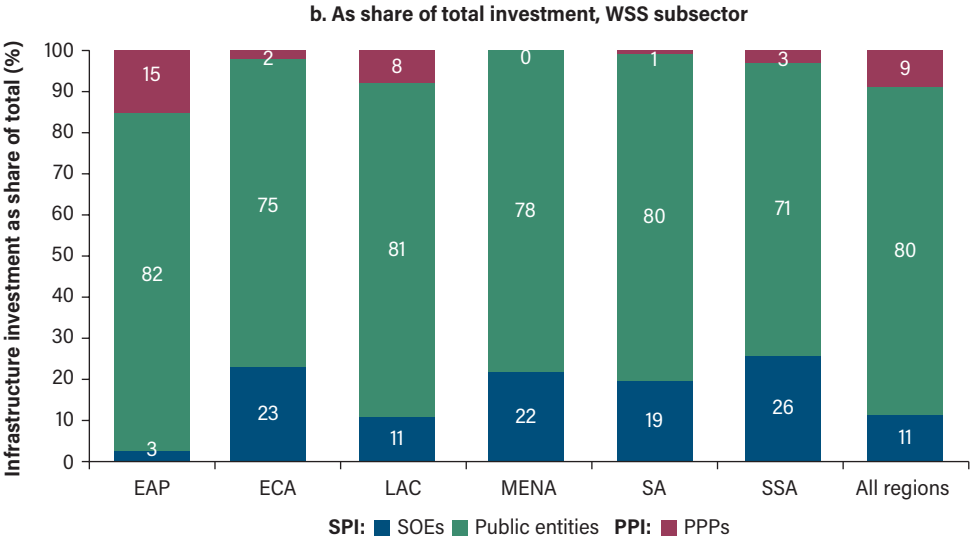
FIGURE ES.7 Relative Shares of SOEs, Public Entities, and PPPs in WSS Infrastructure Development in 2017, by Region (*Continued*)



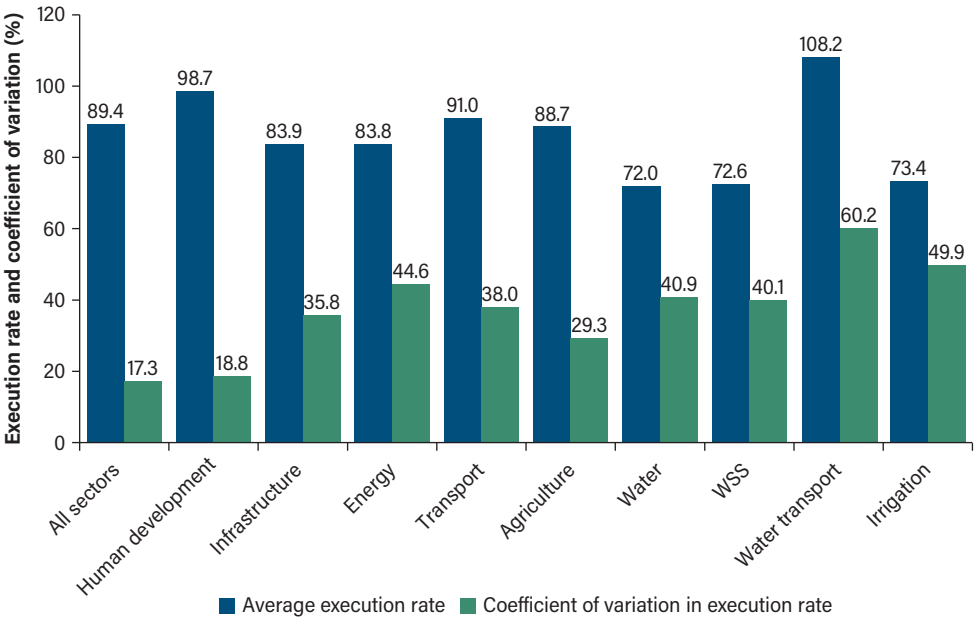
Source: Authors' estimation using PPI-SPI database; figures slightly different from SPI-PPI report due to correction of region misclassification.
Note: EAP = East Asia and Pacific; ECA = Europe and Central Asia; MENA = Middle East and North Africa; LAC = Latin America and the Caribbean; PPI = private participation in infrastructure; PPP = public–private partnership; SA = South Asia; SOE = state-owned enterprise; SPI = SOE and other public sector-funded infrastructure; SSA = Sub-Saharan Africa; WSS = water supply and sanitation.

IS THE SECTOR SPENDING ALL AVAILABLE FUNDS?

Large spending gaps, poor budget execution. Considering the financing gap, it is a paradox that the water sector does not spend all the funding allocated to it. It primarily reflects two things—poor financial management and low absorptive capacity. During 2009–20, countries' budget execution rate averaged 72 percent—albeit with a high degree of year-to-year and country-to-country variation—meaning that about 28 percent of all budgeted funds went unused (figure ES.8). In comparison, the human development sector consistently has an execution rate of 99 percent, with relatively low variation. For the transport sector it is 91 percent, and for agriculture 89 percent.

Low absorptive capacity. What explains the sector's low absorptive capacity? Infrastructure projects take 6–15 years to complete, of which 3–8 years are spent on preparation and 3-7 years on implementation (IMF 2020). Budget preparation complications and delays in the implementing ministries and agencies can reduce the time for planning and implementation and result in cost overruns. And in infrastructure sectors where capital spending is predominant, such as water, spending especially depends on the speed of project implementation.[9]

FIGURE ES.8 Average Sectoral Budget Execution Rates and Degree of Variation

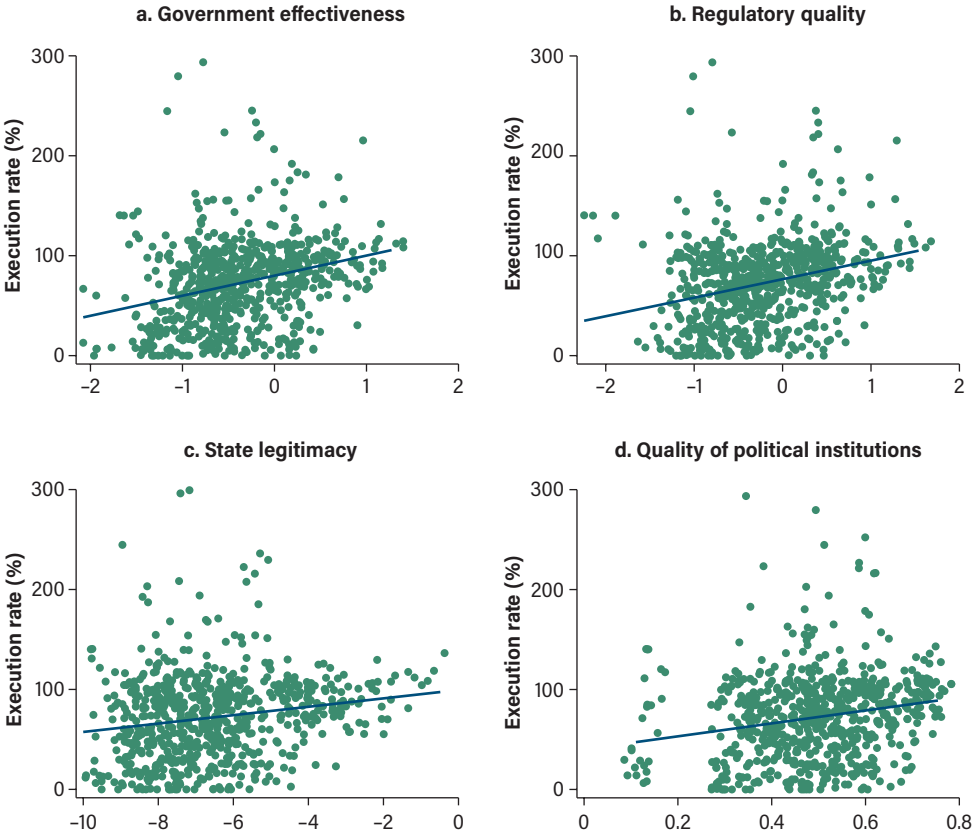


Source: Authors' elaboration using BOOST database.
Note: Average over years for each country provides assessment overall budget execution performance of countries. WSS = water supply and sanitation.

Improving budget execution rates can reduce spending gaps. A budget execution improvement corresponding to a reduction in the budget execution gap by 50 percent in the WSS subsector would raise the overall rate from an average of 73 percent to 87 percent, reflecting a 14-percentage point increase in budget utilization. This would translate into a significant reduction of the lower estimate of the annual global spending gap in WSS (to achieve SDG targets 6.1 and 6.2) from roughly $140.8 billion to $127.9 billion, corresponding to a $12.9 billion reduction in the spending gap for WSS.

Regulatory and institutional challenges. Low absorptive capacity also reflects systemic regulatory and institutional challenges that pervade the water sector. Political and institutional factors shape all aspects of planning and implementing infrastructure projects. Through econometric analyses, this study found that four indicators—governance effectiveness, regulatory quality, state legitimacy, and the performance of political institutions—are positively correlated with water sector budget execution rates (figure ES.9). Enhancing these measures of governance performance would help improve execution rates—as would addressing the fragmentation within water sector-related national agencies, having a coherent water policy, employing human capital effectively, ensuring accountability and transparency in the budgetary system, engaging in good project planning, and creating a sound institutional and political environment (Denizer et al. 2013; Isham and Kaufmann 1999). Countries with

FIGURE ES.9 Correlation between Water Sector Budget Execution Rates and Governance, Regulation, State Legitimacy, and Institutions



Source: Government effectiveness and regulatory quality data are from the Worldwide Governance Indicators (WBGI); State legitimacy data are from the Fragile State Index; performance quality of political institutions data are from Kuncic (2014)
Note: The x-axis in each plot represents standardized scores for governance indicators, which are coded in a positive direction.

better public investment management (PIM) and budget transparency usually have more success in implementing projects on time and on budget (IMF 2018).

DO INEFFICIENCIES GENERATE HIDDEN LOSSES IN THE SECTOR?

Thus far, the discussion about financing sources and budget execution has centered on how to raise the quantity (amount) of spending. By contrast, enhancements to total factor productivity (TFP) and efficiency improve the quality of how those funds are spent by broadening the population's access to good-quality, well managed water sector services. Both quantity and quality are crucial. With the world facing fiscal challenges from the pandemic, the Russia–Ukraine War, inflationary pressures, and the increasing incidence of natural disasters, getting a bigger "bang for the buck" from all available fiscal resources is a priority.

Using national-level budget data on spending in WSS service provisions, population access levels to WSS services from the WHO/UNICEF) Joint Monitoring Programme (JMP) for 130 countries, and IBNET data on 1,599 utilities from 67 countries over 14 years, the study raises and addresses several productivity- and efficiency-related questions: whether access levels are being attained efficiently—with the least possible cost—whether productivity can be improved within a given level of public spending in the provision of water supply and sanitation services, and whether there is room for water utilities to achieve efficiency improvements, especially as the world moves toward achieving the more ambitious (and more costly) targets envisioned under SDG 6.1 and 6.2.

Declining factor productivity. Between 2009 and 2020, the overall TFP of public spending on providing access to basic WASH services declined by about 6 percent, with significant country-to-country variation. What this means is that, for the same level of public spending as in 2009, output declined by 6 percent in 2020.

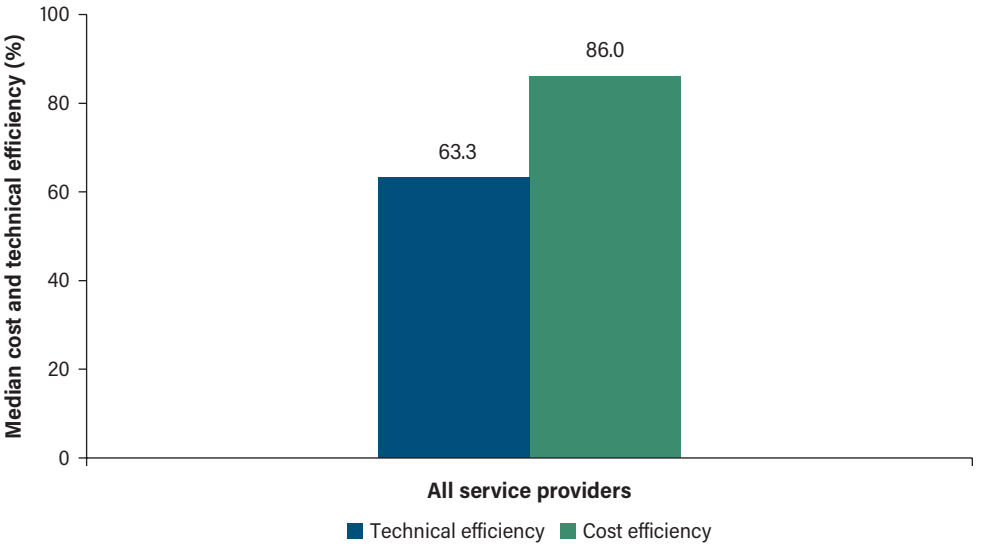
The TFP of public spending on the provision of access to higher-level WASH services (piped water, sewer connection) also declined overall, by about 5 percent. Average factor productivity decline was primarily driven by a decline in efficiency of 20 percent for basic WASH services as well as for higher-level, WASH services. Though technological change during the period, has the effect of raising TFP for both basic WASH services and higher-level WASH services, there is substantial room for efficiency improvements through better management and planning.

Inefficiencies among water utilities. From 2004 to 2017, the median cost efficiency of water utilities was 86 percent (Figure ES.10). This means that, compared to the best-performing water utility, the average water utility can cut its overall cost by 14 percent and provide the same level of service. Further, the median technical (or production) efficiency was only 63 percent, which means that, compared to the best-performing utility, the median utility could raise its output by 37 percent, given the same level of inputs. In short, from both the cost and the production perspectives, there is substantial room for efficiency improvements among water utilities.

Hidden losses due to inefficiencies. Finally, losses due to inefficiency can be thought of as hidden costs the water utilities are incurring. Globally, the value of the annual average efficiency loss per utility over the period of 2004–17 was $21.4 million in 2015 prices, which is an astounding 16 percent of the average annual total operating cost of all 1,557 utilities used for our analysis.

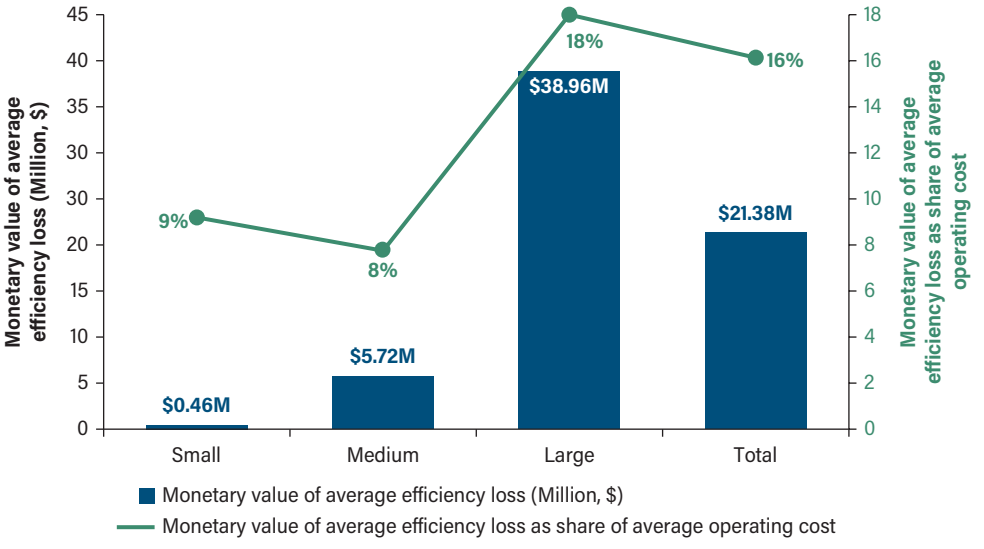
Figure ES.11 provides the monetary value of the average, cost-efficiency-related hidden loss (in $ million at 2015 prices) by utility size[10]. Small utilities had the lowest average efficiency loss, at $0.46 million in 2015 prices, but this constitutes a relatively smaller percentage of their average operating cost, at 9 percent. Medium-sized utilities had somewhat higher average efficiency losses—$5.72 million on average in 2015 prices—but this comprises a smaller proportion of their operating cost, at 8 percent. Large utilities, on the other hand, encountered the highest average efficiency loss—$38.96 billion on average in 2015 prices—corresponding to 18 percent of their average operating cost.

FIGURE ES.10 Median Cost Efficiency and Technical Efficiency, All Service Providers, 2004–17



Source: Authors' estimation using IBNET data.

FIGURE ES.11 Monetary Value of Average Efficiency Loss as Share of Average Operating Cost, by Utility Size (2015 constant prices)



Source: Authors' estimation using IBNET data.
Note: Instead of using deciles of population served, utilities are grouped into terciles—small, medium and large.

The efficiency of a water utility is also deeply influenced by its operational features and by the governance indicators and national demographic characteristics of its service area, such as population density. Regression results reveal that among country-level governance indicators, regulatory quality positively influences both cost and technical efficiencies. Additionally, regions with denser populations experience enhanced cost efficiency, likely because concentrated populations lead to lower per-capita water distribution costs. Understanding the relationships between a utility's operational features and broader national characteristics can guide targeted interventions to address specific ownership-based and size-based inefficiencies. Policymakers should prioritize sustainable water resource management to ensure cost-effective utility operations. Moreover, the pivotal role of design capacity on efficiency highlights the need for careful planning in determining investments in infrastructure development and technology upgrades.

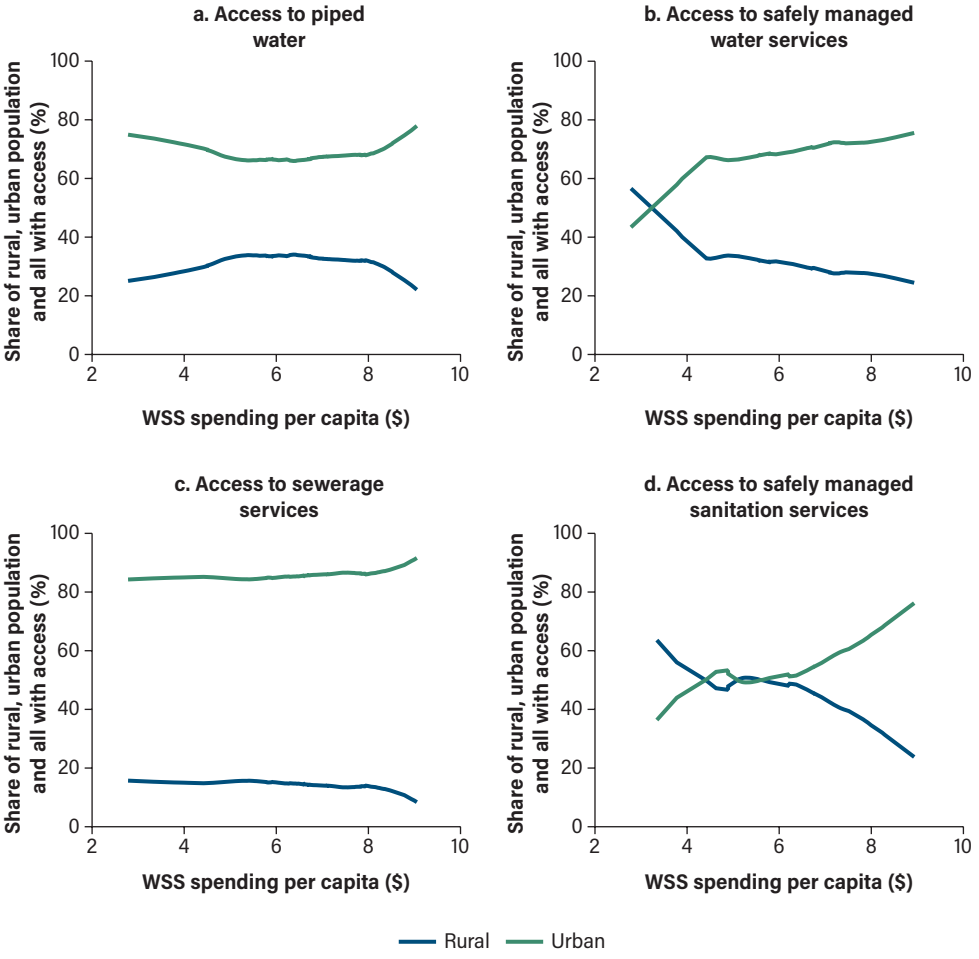
In summary, given the tight budgetary conditions, the potential for productivity and efficiency improvements is an area that the water sector should focus on. Such improvements achieved through systematic reform of water utilities can not only make additional resources available, but also can, catalyze the financial flows to the sector, particularly from the private sector.

WHO BENEFITS FROM WATER SECTOR SPENDING?

Equitable spending through targeted subsidies. The SDG targets emphasize economic as well as ethical importance of extending higher-level water sector services to underserved communities. Although attracting more funds into the sector is crucial, it is equally vital that this is coupled with a commitment to equitable spending. Poor access to WASH services, for example, compromises peoples' health, children's development, prospects, and safety, not to mention their privacy and dignity (WHO and UNICEF, 2021, 2023). Every year, a significant amount is being spent as consumption subsidies in the water sector, primarily, to address the affordability challenges faced by the poor. However, politically advantaged urban elites who could afford to pay fully for water services enjoy subsidies originally earmarked for the most vulnerable—creating errors of both inclusion and exclusion. It underscores the need to adopt smart targeting of water consumption subsidies as a way that addresses the disparities ingrained in the water sector, especially state capture by vested interests.

Errors of inclusion and exclusion. In the context of pervasive poverty and the exclusion of marginalized groups on ethnic, religious, and gender lines, market forces alone may not ensure equitable water services. Particularly for WASH services, inequities are widely observed across income groups and residential locations, with the data indicating that urban residents have greater access. Figure ES.12 shows that, at nearly all levels of per capita sector spending, more people in the urban areas enjoy greater access to water (piped water and safely managed water)

FIGURE ES.12 Correlation between WSS Spending per Capita and the Relative Access of Rural versus Urban Populations to WSS Services



Source: Authors' elaboration using per capita spending estimate in WSS in the report and WHO/UNICEF Joint Monitoring Program data https://washdata.org.
Note: WSS = water supply and sanitation.

and sanitation (sewerage and safely managed sanitation) services than their rural counterparts.

In principle, well-targeted subsidies could be designed to direct more spending to those who can least afford WSS services, especially higher-level services like piped water and networked sewerage. In practice, due to poor targeting of subsidies, errors of both inclusion and exclusion are rampant.[11] Benefit incidence analyses in 11 countries demonstrate that richer urban households receive comparatively more water subsidies than poorer rural households. Except in Viet Nam and the Dominican Republic, wealthier households in every country analyzed tended to receive more water subsidies. This regressivity is particularly pronounced in SSA.

Historical factors. It should be said, however, that in some cases the regressivity of water consumption subsidies may be a product of historical factors. For instance, the colonial history in Tanzania left the city of Dar es Salaam with a legacy of an inequitably distributed water and sewerage infrastructure that lingers on today. Piped water was provided only in those areas where the white colonial ruling class lived (World Bank 2017, 2018). Because infrastructure development is heavily capital-intensive, once it is undertaken, its spatial distribution in a city can determine for decades to come who benefits from connectivity and who does not, even when the original reasons for inclusion/exclusion have long since passed. Even today, many Dar es Salaam residents still rely on mobile tanker trucks and small carts to provide them with daily drinking water. It is, in a sense, an accident of history, but it has the persistence power of path dependency and illustrates how inclusion and exclusion patterns can be embedded in political-historical factors. These are factors that a BIA on its own is unlikely to capture unless it is situated in the context of that country's particular setting.

POLICY IMPLICATIONS AND THE WAY FORWARD

Against the backdrop of the goals set by governments and international agencies for the water sector and recognizing the predominant role of water in the economy, the sector's primary policy challenge is how to bridge the spending gap. Significantly increasing public financing is not likely to be feasible in the near term, but other options remain: (i) Increasing budget execution rates and the sector's absorptive capacity. (ii) Raising the productivity of public spending in the sector, by focusing on improving efficiency at various levels. (iii) Reducing the inefficiencies of water service providers, which contribute significantly to hidden losses in the sector. (iv) Minimizing errors of inclusion and exclusion, along with disparities in access to services, through better subsidy targeting. (v) Implementing targeted reforms to make the sector more attractive to the private sector and international capital.

In all this is the public sector's pivotal role in leading the effort to (i) improve the utilization and efficiency of public spending, (ii) catalyze additional long-term finance through reforms and targeted spending, and (iii) reform the water sector for more and better public spending.

Improving the utilization and efficiency of public spending

Reforms in public investment management (PIM) and public financial management (PFM) are critical starting points for making the utilization of public resources more efficient. First, PIM reform entails streamlining decision-making at all levels of the investment program, from strategic guidance and project selection to project implementation, evaluation, and audit. In spite of the daunting targets to be reached, the water sector is not able to use all the financial allocation that are available. A lot of money- more than one- fourth of the allocated public spending in the sector- is left on the table, untouched. This is primarily due to poor absorptive capacity of

the sector, which not only calls for more systematic planning but also for simplified implementation processes across the board.

Second, to address budget execution issues. PFM reform would facilitate the flow of public funds within and across the government machinery—from the finance ministry to the line ministries, departments, and implementing agencies. Anecdotal evidence suggests that the one of the reasons for the water sector's low execution rates is the lack of predictability of funding flows and continual delays (OECD 2009). Considering the long-term nature of water sector investments, medium- to longer-term budget planning, with a focus on multi-year programs, is also vital. Additionally, tracking funds at various programmatic and functional levels of the sector is important to understand how the funds are being used.

Finally, it is important to develop a realistic performance metric of government and SOE service provision that goes beyond strict efficiency considerations alone, because the public sector often needs to make efficiency–equity tradeoffs, which can include charging prices below cost, or extending service to commercially unprofitable areas (Vagliasindi 2012).

Catalyzing the flow of long-term finance

First, with credible regulatory systems that set tariffs and service standards independent of political expediency, risk-pooling arrangements could be designed, with government and private sector support, to enable smaller water utilities that have varying performance and risk levels to access long-term capital from the financial markets as a group. They could be aggregated, administratively or financially, to facilitate borrowing, with assistance provided by government or multilateral organization guarantees. Second, broadening coverage and enhancing the quality of water sector services call for substantially more capital investment in the sector. To that end, special-purpose national or subnational financial institutions could be developed with an exclusive focus on channeling long-term finance for water and other infrastructure investments. Third, in the context of well-developed, independent regulatory institutions, public and overseas donor funds could be used—regardless of the service provider's ownership structure—as guarantees to reduce the various types of risks associated with such investments.

Reforming the water sector for more and better public spending

The above reforms must be accompanied by sector-specific policy interventions in three areas: (i) cost recovery and demand management; (ii) developing state capacity and human capital; and (iii) improving data access, transparency, and communication. First, it is useful to examine the drivers of limited cost recovery in water sector investments, which often tend to be context-specific and path-dependent. This will help to develop a hierarchy of options including injection of public resources, efficiency improvement measures and tariff revision. Demand management measures should also be introduced through a combination of pricing schemes and behavior

change initiatives to reduce costs and manage scarcity. Second, consistent, long-term improvement in state capacity requires institutional and policy reforms and capacity-building initiatives to improve quality of water services. This is especially so to gather public support for initiatives, such as tariff reform, which typically encounter political challenges because of the legitimacy issues and push-back that many states and service providers face (Andrés et al. 2021). Third, to assess the credibility and effectiveness of spending flows at all levels in relation to planned, time-bound sector programs with measurable targets, the quality and completeness of water sector public spending data need to be improved. Transparent access to sector-level spending data and public expenditure tracking surveys (PETS) can improve accountability and service delivery in the water sector. All these should be coupled with a credible communication strategy to maximize popular support to reform efforts (Andrés et al. 2019).

CLOSING REMARKS

The water sector has a central role in driving economic growth, promoting human wellbeing, and sustaining the ecosystem. But as discussed in this study, a nexus of challenges related to the sector's financing and funding has cast uncertainty over the sector's current ability, and even its potential capacity, to realize its globally established targets within a desirable timeframe. With governments trying to navigate the complexities of balancing burgeoning social expenditures with limited fiscal resources, the goal of bridging the water sector's funding and financing gaps is an increasingly formidable challenge.

This real-world context makes it imperative that policymakers and other stakeholders adopt a new view of water, one that treats it as a global common good(Mazzucato et al. 2023), while recognizing its paramount significance in shaping the economy, ecosystem, and culture at the local level. This in turn necessitates a fundamental rethink of water's economics. Reshaping water markets will require policymakers to recognize water as a merit good that generates an extremely wide range of vital benefits and services for individuals, businesses, and communities, with positive-externality ripple effects that travel far. Second, adopting a global common-good lens requires acknowledging the interdependence of countries through the shared water cycle. Initiatives that embrace innovative public–private arrangements, property rights, and counter-rent-seeking mechanisms are crucial to supporting this interdependence.

As governments and international bodies strive to meet the sustainable development targets set for the sector, a multipronged strategy emerges as perhaps the only way forward. While the public sector remains, for the foreseeable future, the bedrock of funding, other players from the private sector and the international economy must be incentivized, through the creative use of risk-pooling arrangements, public sector guarantees, and the injection of catalytic capital, to invest

more, and more often, in the sector. Unlocking the water sector's true potential will also necessitate enhancing execution rates and addressing deep-rooted inefficiencies. As highlighted thoroughly in this study, the interconnectedness between budget execution, factor productivity, and efficiency underscores the comprehensive nature of the challenge to overcome the sector's financing gap. Offering equitable and universal access to safely managed water and sanitation services, even in the more remote regions, also highlights the importance of spending judiciously, which in turn points to the need to gain an accurate, comprehensive, data-driven, 360° view of sector expenditures.

If resources are successfully channeled toward both financial prudence and inclusive service provision, the water sector may be able to bridge its financing gap in a way that positions the world to achieve its development targets for the sector and beyond, especially when a multitude of formidable challenges lie just ahead of us.

ORGANIZATION OF THE REPORT

Part 1 of the study delves into the historical context and rationale behind government involvement in the water sector, emphasizing the prevailing role of the public sector in the management of this critical resource and in the various aspects of its service provision.

The first of the two chapters in part 2 adapts the methodology used by Fay et al. (2019) to estimate current aggregate spending in the water sector. The second chapter estimates the spending gaps to achieve the SDG targets for the WSS and irrigation subsectors.

Part 3, which examines spending patterns in the water sector, is organized into four chapters. The first presents not only trends but also the composition of spending, using World Bank, BOOST, SPI-PPI, and OECD Creditor Reporting System (CRS) databases. The next chapter analyzes the water sector's budget execution rates and its determinants for selected countries, comparing them with those of other infrastructure and human development sectors. The third chapter quantifies the total factor productivity of public spending in the WSS subsector, followed by an estimation of the hidden losses due to water utility cost inefficiencies. The fourth analyzes the inequities in the distribution of public spending, across spatial and income groups; and the targeting performance of WSS public spending to reach a holistic understanding of the sector's financial dynamics.

Part 4 lays out a handful of policy implications arising from this study's findings. It also offers some recommendations for improving sector financing that address both the magnitude of the investments needed, and how to enhance the execution, productivity, efficiency, and equity of public spending. In conclusion, this study should serve as a valuable resource for policymakers and practitioners involved in water sector infrastructure development or financing.

Notes

1. Between 2015 and 2020, global access to safely managed water services improved from 70 percent to 74 percent, and access to safely managed sanitation services from 47 percent to 54 percent. The average annual rate of progress was roughly 0.8 percentage points and 1.4 percentage points, respectively. Thus, to achieve universal (100 percent) access on both fronts by 2030, the world would need to quadruple its current rate of progress on both fronts.
2. COP (Conference of the Parties to the United Nations Framework Convention on Climate Change) is an annual climate change summit now in its 28th year. COP26 was held Glasgow, Scotland from October 31 to November 13, 2021. COP28 will be held in Dubai from November 30 to December 12, 2023.
3. Financing and funding don't mean the same thing. Financing is the process by which a bank or other financial institution loans capital to a government or company so that it can undertake, for example, an infrastructure project. Funding is the process by which the company or government that received the financing injects that capital into the project. Financing, in other words, precedes funding.
4. The low-cost target covers the cost to subsidize only irrigation infrastructure and to promote low-meat diets, which reduces agricultural demand from livestock farming because of the reduction of cropland required for feeding livestock.
5. Estimated total global spending covers spending in the subsectors for which information was available: WSS, irrigation, water transport, and hydropower. Public spending by government entities corresponds to about $140.8 billion (lower bound estimation from part 2 chapter 1).
6. In 2017, it is estimated that nearly 80.0 percent of ODA was channeled to the public sector, including central and local government recipients. It is uncertain to what extent these funds are reflected in the government budget recorded by the BOOST database. There is a possibility for double counting to some extent.
7. Although private sector investments have frequently been discussed as a means to address the water sector infrastructure investment gap, their participation thus far has been marginal.
8. The human development sector comprises education, health, and social protection.
9. In fact, in a study of some 16,000 major infrastructure projects, only an estimated 8.5 percent finished on budget and on time (Flyvbjerg and Gardner 2023).
10. The utilities are classified into three groups- small, medium and large, based on terciles of the population coverage. Small utilities cover a population less than 18650, medium utilities cover a population rage of 18650 and 146663 and large utilities cover a population above 146663.
11. Errors of exclusion capture the share of poor households who do not benefit from a subsidy, that is, who are excluded from it. Errors of inclusion capture the share of wealthier (non-poor) households who do benefit from the subsidy.

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