

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

WATER AND SANITATION SECTOR FRAMEWORK DOCUMENT

WATER AND SANITATION DIVISION

DECEMBER 2021

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ABBREVIATIONS

DIA	Development in the Americas
ECLAC	Economic Commission for Latin America and the Caribbean
ISWA	International Solid Waste Association
JMP	Joint Monitoring Programme
LPD	Liters per day
NRW	Nonrevenue water
OECD	Organisation for Economic Co-operation and Development
PPP	Public-private partnership
PSP	Private sector participation
RDI	Research, development, and innovation
SABESP	Companhia de Saneamento Básico do Estado de São Paulo [São Paulo State Basic Sanitation Company]
SFD	Sector Framework Document
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Fund
WASH	Water, sanitation, and hygiene
WHO	World Health Organization
WWTP	Wastewater treatment plant

EXECUTIVE SUMMARY

The Water and Sanitation Sector Framework Document highlights the importance of both access to and the quality of water and sanitation services for well-being and development, due to their positive impact on factors including health, education, and economic growth. Worldwide, 88% of communicable diseases in children are related to a lack of water and sanitation, while 61% of child mortality is related to diarrhea caused by intestinal parasites. Better health leads to better education, particularly for children, due to improvements in school attendance, learning ability, psychomotor development, and growth. It also boosts productivity, which in turn leads to better employment opportunities, higher incomes, and better quality of life, particularly for vulnerable populations in rural areas and disadvantaged informal settlements. Furthermore, the availability of these services creates opportunities to develop productive activities (e.g., increased tourism, improved competitiveness), as well as nonproductive ones (recreation). This is particularly the case for women and children, who are the hardest hit by the lack of these services. In terms of environmental impact, a lack of sanitation has adverse impacts on biodiversity and the safety of water sources for human, productive, and ecological use. Avoiding the overexploitation of water resources, preventing or mitigating pollution, and the proper management of solid waste are all intrinsic aspects of the concept of sustainable development.

The intensification in recent years of hydrometeorological events such as floods and droughts has been accentuated by the effects of climate change. This, together with pandemics such as cholera a few decades ago and dengue and COVID-19 more recently, represents a significant risk to the quality and sustainability of water and sanitation services, which in turn affects social and economic activities. As public goods subject to economies of scale (which create natural monopolies) and externalities, water and sanitation services require a governance framework in which the State plays a key role in defining policies, planning, and regulation. Given the high degree of decentralization in service delivery and the different ministries that are involved in key issues for the sector (environment, urban development, rural development, health, etc.), the governance framework for the sector must include mechanisms and tools for policy coordination and harmonization. These should ensure that interventions have the greatest possible impact; that positive externalities are captured and negative ones mitigated; that market failures leading to inefficiencies and inequities are corrected; and that benefits are maximized for all members of society.

This Sector Framework Document (SFD) is divided into five sections. Section I sets out the scope and subject matter of this SFD, as well as its alignment with the main policies of the IDB Group (“the Bank”). Section II describes the important challenges that remain—despite the region’s progress in recent years—in the areas of equity of access to water and sanitation (rural, indigenous, Afro-descendant, and periurban populations); gaps in sanitation services; service quality (potability, continuity, and pressure of water supply); the operational efficiency and financial sustainability of service providers; governance framework and cross-sector coordination; the management of vulnerabilities (e.g., climate and natural disaster risks); long-term planning; information availability; and the adoption of an innovation and digitalization agenda for all aspects of the sector.

Section III presents international and regional empirical evidence regarding the main policies and programs that have been successful, as well as good practices that can serve as a reference when designing sector interventions. The main issues examined in this

chapter are (i) increased access to and improved quality of services, incorporating user expectations regarding solutions and the value placed on services; (ii) financial sustainability, supported by a stable, sufficient flow of resources from rates (tailored to users' ability to pay) and public funding (with targeted subsidies), as well as the strengthening of sector governance and natural monopoly regulation; (iii) increased efficiency in the management of services, including partnering with the private sector where circumstances allow; (iv) consideration of environmental sustainability and disaster risk management issues (particularly those created by climate change); and (v) sector participation in an innovation agenda aimed at increasing efficiency, improving sector planning and governance, meeting user expectations, increasing risk resilience, and helping to reduce greenhouse gas production. To ensure the sustainability of interventions, any social considerations associated with these issues must be addressed. The section also highlights the gaps faced by the sector in terms of research, particularly with respect to sector governance and regulation.

Section IV presents lessons from the IDB Group's experience in the sector, based on loan and technical cooperation operations and knowledge products completed in recent years. This section also draws on experiences, lessons learned, and good practices from the countries, leveraged by specialists of the Water and Sanitation Division (INE/WSA) to prepare and execute operations.

Lastly, Section V describes the lines of action that will guide the Bank's operational and research activities. This SFD proposes that IDB Group activities in water and sanitation support the elimination of inequities, achieving the universalization of efficient, affordable, sustainable, and good quality services. The following five lines of action are prioritized: (i) promoting universal access to quality water and sanitation services; (ii) improving financing and governance frameworks; (iii) increasing the efficiency of service providers and promoting private sector participation, with a view to achieving sustainable services; (iv) incorporating disaster risk management and climate change considerations into the definition of sector policies and programs and promoting water security; and (v) driving innovation in the sector.

I. THE WATER AND SANITATION SECTOR FRAMEWORK DOCUMENT IN THE CONTEXT OF EXISTING REGULATIONS, THE INSTITUTIONAL STRATEGY, AND INTERNATIONAL AGREEMENTS

- 1.1 The Water and Sanitation Sector Framework Document (SFD) guides the IDB Group's work in the water and sanitation sector with the countries of Latin America and the Caribbean. The structure and content of this SFD observes the guidelines established in the document "Strategies, Policies, Sector Frameworks, and Guidelines at the IDB" (document GN-2670-5). This SFD supersedes the Water and Sanitation SFD (document GN-2781-8) approved in December 2017. It is consistent with the Update to the Institutional Strategy: Development Solutions that Reignite Growth and Improve Lives (document AB-3190-2) and Vision 2025 (document AB-3266), which acknowledge social exclusion and inequality, low levels of productivity, innovation, and regional integration, and the impact of climate change as structural challenges for development in the region.
- 1.2 For the purposes of this SFD, water and sanitation is understood as an economic sector that comprises the delivery of public drinking water services (catchment, conveyance, treatment, storage, and distribution, including integrated water resource management necessary for the delivery of the service and as a receiver of polluting waste) and public sanitation services to support adequate public health conditions by means of wastewater management (collection, treatment, and proper disposal) and comprehensive solid waste management (collection, transportation, transfer, recycling, recovery, and final disposal). This approach is based on a broad analysis of the sector, in which the availability of services contributes to urban and rural development and demands that water be conserved at both the source and the point of use. Notwithstanding this, a holistic approach to water as a resource is beyond the scope of this SFD.¹ It also implies a change in the traditional approach of treating infrastructure as an objective in its own right, instead incorporating issues of fulfilling service expectations and social needs, the policy and governance framework, efficiency of regulatory frameworks and financing, impacts and relationships with the environment and water resources, efficient management of services, and incorporation of new technologies (in infrastructure, services management, information management, and interaction with users).
- 1.3 The Water and Sanitation SFD is aligned with the IDB Infrastructure Strategy: Sustainable Infrastructure for Competitiveness and Inclusive Growth (document GN-2710-5) and the Integrated Strategy for Climate Change Adaptation and Mitigation, and Sustainable and Renewable Energy (document GN-2609-1), as it promotes universal access to water and sanitation, the development of innovative financing mechanisms, and private sector participation (**Box 1**). The document is also aligned with the goals and principles of the Public Utilities Policy (document GN-2716-6) in that it seeks to ensure efficient service delivery, continuous improvements in sector institutions and governance, and innovation to enhance aspects including efficiency, access, and sustainability; and with the

¹ This holistic view of water as a resource is not part of this SFD but is being addressed by a multidisciplinary group comprising specialists from the Water and Sanitation Division (INE/WSA); the Environment, Rural Development, and Risk Management Division (CSD/RND); the Energy Division (INE/ENE); and the Climate Change Division (CSD/CCS).

Environmental and Social Policy Framework (document GN-2965-23) as it seeks to promote equitable, inclusive access to services that are resilient to climate change and other disaster risks.

- 1.4 The Water and Sanitation SFD is closely linked to and complements the Bank's work established under other SFDs, in areas such as diseases associated with the lack of water and sanitation, behavioral changes in the population, the efficiency of resource management and use, urban planning, multisector approaches, tourism activities, gender and diversity approaches, integrated water resource management, climate change, and innovation and digital transformation. For issues relating to social exclusion, this SFD is related to the SFDs on (i) Health (document GN-2735-12), (ii) Housing and Urban Development (document GN-2732-11), (iii) Gender and Diversity (document GN-2800-8), and (iv) Social Protection and Poverty (document GN-2784-12). For issues relating to environmental sustainability and resilience, it is complemented by the SFDs on (i) Agriculture (document GN-2709-10), (ii) Climate Change (document GN-2835-8), (iii) Environment and Biodiversity (document GN-2827-8), and (iv) Tourism (document GN-2779-7). With respect to governance and financing, it is complemented by the SFDs on (i) Decentralization and Subnational Governments (document GN-2813-8), (ii) Housing and Urban Development (document GN-2732-11), (iii) Skills Development (document GN-3012-3), and (iv) Integration and Trade (document GN-3715-11). For issues of management and innovation, it is complemented by the SFDs on (i) Innovation, Science and Technology (document GN-2791-8) and (ii) Support to SMEs and Financial Access/Supervision (document GN-2768-7).
- 1.5 Many of the Sustainable Development Goals (SDGs) will not be achieved without access to quality water and sanitation services. The water and sanitation sector addresses SDG 6 (ensuring availability and sustainable management of water and sanitation for all), as well as SDG 11 (sustainable cities and communities through municipal waste management) and SDG 12 (responsible consumption and production, by increasing recycling rates). It also contributes directly to eight of the 16 SDGs (**Box 2**) and indirectly to a further six (**Box 3**).
- 1.6 This document is structured as follows: Section II describes the status of the water and sanitation sector in the region and identifies the main challenges. Section III reviews the international evidence and case studies of the effectiveness of policies and programs relating to the sector challenges identified in Section II. Section IV discusses lessons learned from the IDB Group's experience, while Section V proposes a set of strategic lines that will guide IDB Group operational, analytical, and dialogue activities aimed at tackling the challenges identified in Section II.

II. MAIN CHALLENGES FOR THE REGION IN THE WATER AND SANITATION SECTOR

- 2.1 Despite the region's progress on access to basic water and sanitation services, it still faces challenges in meeting the SDGs, relating to (i) low levels of access to quality water and sanitation services, with substantial inequalities between regions, socioeconomic groups, and ethnicities; (ii) low resource flows, which limit service expansion and improvement, and weak governance; (iii) inefficient management of services; (iv) weaknesses in the framework for environmental sustainability and resilience; and (v) a lack of innovation and digitalization

(Development in the Americas (DIA), 2020). Many of the problems in the sector—not just regionally but globally—are rooted in its status as a public good (particularly in the case of sanitation and solid waste services, where exclusion can have high social and/or environmental impacts), as well as its natural monopoly characteristics (asymmetrical information and high economies of scale that make it more efficient, per unit, to build for very long design periods, thus limiting the entry of competitors) and the presence of large externalities (particularly social and environmental). The dispersion and local nature of markets also pose a challenge: in contrast to other network-based services, such as telecommunications or energy, the opportunities for regional service delivery are limited by the high costs of transporting water from the source, within the city/community, and for wastewater removal, given the large infrastructure investments that would be required.

- 2.2 These characteristics, for example, create barriers to service delivery by specialized operators and the private sector, due to constraints on free market entry and exit, the need for sound regulatory frameworks, and high investment requirements. They also demand strong State participation (service delivery, planning, regulation, and control), yet governments do not always respond with the required efficiency, agility, and equity, encouraging opportunistic and inefficient behavior among users and limiting technological transformation and innovation. This contrasts with other public services, such as telecommunications or energy, where the opportunities for building regional or even international networks with lower unit costs (and hence higher profits) encourage providers to innovate. In light of the large number of factors influencing sector performance, this SFD proposes that the objective of universal access to quality, sustainable, and resilient water and sanitation services be complemented by the development of a suitable governance and management framework for services, and that the advantages offered by innovation be exploited to generate efficiencies and accelerate development of the sector.
- 2.3 **Achieving universal access to quality water and sanitation services is key for reducing inequalities and fostering economic and social development in the countries.** Given the Bank's conviction that the objective should not simply be to provide infrastructure, but also quality, equitable, and affordable services (DIA, 2020), it proposes to support a minimum service standard that includes the following: (i) in the case of water services, aspects such as continuity of service, potability, water pressure, and the location of facilities; (ii) in sanitation, the availability of a toilet in the home that is not shared with other households, with wastewater that does not endanger people's health; and (iii) in solid waste, the continuity of collection, final disposal of unrecoverable waste in sanitary landfills, and a steady increase in recycling and recovery. This minimum standard was established by the United Nations in the SDGs for 2030, in recognition of the impact of water and sanitation services on quality of life and well-being (health and environment), equity (gender, regional, socioeconomic, and ethnic), poverty reduction (education, productivity, employment, and income) and, consequently, economic development. Achieving these objectives represents a significant challenge for many countries in Latin America and the Caribbean: they will require not only prioritization efforts and the allocation of greater amounts of financial resources than in the past, but also political coordination and the generation of

information for evaluating gaps in access, identifying solutions, informing policies, and monitoring progress (Bain et al., 2018).

A. Low levels of access to quality services, with large inequalities

- 2.4 Low levels of access to quality water services.** Since the SDG standard for services was adopted in 2015, the level of access to safely managed water services in the region has remained unchanged. According to the Joint Monitoring Programme (JMP, 2020),² 75% of households in Latin America and the Caribbean have access to such services, meaning that more than 160 million people still lack them. Access to safe water implies that all households have a source of water on the premises (in or outside the home, within the plot) that is available when needed (sufficient water available at least 12 hours per day) and free of contamination (meeting standards for microbiological and priority chemical contamination). With the change in service standard established in the SDGs, coverage in the region fell from an average of 97% for basic access to drinking water (classified as an ability to secure water supplies by walking 30 minutes or less)³ to 75% on the measure of access to safe water. This is a consequence of poor water potability, and low continuity of service (60% of systems fail to offer continuous service, with rationing mainly affecting periurban and rural populations,⁴ which also have lower access to on premises, treated water).
- 2.5 Significant heterogeneity among countries.** Only 11 countries report access to safely managed water to the JMP (Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Nicaragua, Paraguay, Peru, and Suriname), with coverage of close to 100% in Chile and as low as 43% in Mexico. Coverage in Brazil and Costa Rica is above 80%, while in Paraguay, Colombia, and Ecuador, coverage is between 64% and 75%. In Nicaragua, Guatemala, Suriname, and Peru, access to safely managed water stands at between 50% and 55%. Data on service quality variables (continuity, potability, and the location of facilities) is not available in all countries,⁵ and improving it is a substantial challenge associated with the new standard on the quality of access. All 26 countries report on basic access to drinking water (**Figure 1. Access to drinking water**). A comparison of the statistics on basic access and safely managed access highlights the importance of measuring quality variables. In Mexico, for example, basic access is 100% while safe access is 43%. In Guatemala, the figures are 94% and 56%, respectively.

² The Joint Monitoring Programme for water supply and sanitation of the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) is the official United Nations mechanism that has been responsible for monitoring progress toward SDG 6 since 2016.

³ In basic access, water comes from an improved source, if the time devoted to collecting it is not more than 30 minutes. Improved sources include running water, protected dug wells, protected springs, rainwater, packaged water, or delivered water (tanker truck or cart with a small tank).

⁴ In Brazil, 40% of the population with a water connection experiences service interruptions. In Nicaragua, 37% of the population receives water for less than six hours each day, while in Peru, the average is 20 hours per day (Cathala and Nuñez, 2016). In rural areas, 53% of the population in Panama lacks 24-hour service; one in three rural inhabitants in Paraguay receives water for less than 24 hours each day (Cathala and Nuñez, 2016); and in Honduras, the average is 16 hours each day (IDB and Economic Commission for Latin America and the Caribbean (ECLAC), 2018).

⁵ In response, the Bank has been analyzing information from household surveys in each country and identifying improvements in data reporting for proper monitoring of the SDGs (see **Appendix 1**).

- 2.6 Three key inequalities in access to drinking water are: (i) urban/rural, (ii) socioeconomic, and (iii) indigenous and Afro-descendant populations.** Aggregate statistics conceal disparities in access between regions in the same country. In general, as access rises at the national level, gaps are concentrated in periurban and rural areas, which account for a large share of the population in the lowest socioeconomic stratum (Economic Commission for Latin America and the Caribbean, 2019; Queiroz et al., 2020). At the regional level, the difference between urban and rural areas in terms of access to safely managed water is almost 30 percentage points. Access to safely managed water is enjoyed by 81% of the urban population, while the proportion in rural areas is just 53%. In remote communities, coverage is even lower than in concentrated rural areas, and delivering drinking water is generally more costly (Care, 2015; Mejía et al., 2016; Smits, 2017; Hernández et al., 2018). Coverage in rural areas on the Peruvian coast, for example, is 20 percentage points higher than in rural forest areas, where rural communities are more remote (Pan American Health Organization, 2011). In urban areas, these figures hide the reality of informal urban settlements (paragraph 2.17).
- 2.7 Access among socioeconomic groups is also unequal in most countries.⁶** Haiti exhibits the greatest inequality in basic access to drinking water: coverage in the wealthiest quintile is 66 percentage points higher than in the poorest one (94% versus 28%). Nicaragua is second highest, with a difference of 47 percentage points, and in Colombia, Peru, Guatemala, Bolivia, and Guyana, the difference ranges from 18 to 23 percentage points (**Figure 2**). These gaps are also present by levels of education (illiteracy is associated with lower levels of access to improved services)⁷ and affect women to a greater degree (paragraph 2.10).
- 2.8 Indigenous and Afro-descendant peoples have lower access to water services than the general population, and this gap is deeper still in rural areas.⁸** According to the IDB (2014), the gap in access to water and sanitation between indigenous and nonindigenous communities exceeds 15 percentage points in Bolivia, Ecuador, Mexico, and Panama. In Paraguay, only 46% of the indigenous population has access to improved water sources, compared with 90% for the rest of the population (classified according to the language spoken by the head of household) (Multiple Indicator Cluster Survey, 2016). Where infrastructure is provided to these communities, it is often done in a culturally inappropriate way, potentially resulting in nonuse or abandonment.⁹ According to household survey data from several countries in the region, there is a marked gap in access to the water supply network between the Afro-descendant and general populations,

⁶ Of the 18 Latin American and Caribbean countries that report to the JMP, 11 have gaps of over 10 percentage points between the wealthiest and poorest quintiles. There are no measurements of inequalities and safe access.

⁷ In Panama in 2010, the gap in access to sanitation between the literate and illiterate populations was 44 percentage points, while in Ecuador it was 24 percentage points (Heller, 2019).

⁸ Exclusion increases once geographical factors are taken into account. The indigenous population in urban areas in Latin America and the Caribbean has 1.7 times more access to water services than that in rural areas (World Bank, 2015).

⁹ For the Kogi people in Colombia, water represents the blood of the earth and it is forbidden to manipulate it unnecessarily; the appropriate solution from their cultural standpoint is minimally invasive infrastructure (small tanks).

mainly in rural areas. In Colombia and Ecuador, access to water among rural households headed by Afro-descendants is between 10 and 20 percentage points less than for households headed by those of non-Afro-descendant or non-indigenous ethnicity. In Central America, the Garifuna population in Honduras also lacks access to basic water and sanitation services, due either to a lack of coverage of their remote rural communities or deficient infrastructure in the poorest urban neighborhoods where they have migrated.

- 2.9 **A lack of access to formal services forces households to spend more and disproportionately affects women and children.** A lack of safe access to drinking water mainly affects vulnerable groups, since they are forced to seek alternative sources such as tanker trucks, bottled water, or walking to draw water from a well or surface water. In urban areas, households without a connection pay between 10 and 20 times more for water supplies than high-income households connected to the network ([United Nations, 2019](#)). At the same time, when there is no water, or where access is limited, the burden of providing water for the household falls to women. Worldwide, women and children are estimated to be responsible for 72% of water collection for domestic use (WHO and UNICEF, 2015), devoting a total of 125 million hours per day to collecting water in containers weighing as much as 20 kg (water.org, 2015).
- 2.10 **Low access to sanitation.** There is a large gap between access to water services and access to sanitation, due primarily to (i) more extensive drinking water supply due to ease of construction and higher prioritization by the population, and (ii) a lack of technical capabilities among service providers (United Nations World Water Assessment Programme, 2017). In Latin America and the Caribbean, 67% of households have access to sewer services and 17% to a septic tank. Latrines are used by 9%, while 5% have unimproved access¹⁰ and 2% practice open-air defecation. Access to safe sanitation requires water and sanitation facilities that are not shared with another household, as well as treatment of excreta in situ or elsewhere that avoids endangering health. Coverage in the region rose from 28% in 2015 to 34% in 2020, leaving more than 430 million people still without access to this service, due mainly to low levels of wastewater treatment. Measuring safe access is complex due to scant information regarding the management of wastewater by households and wastewater treatment. Only 13 countries report to the JMP in this area. Chile has the highest level of coverage (79%), followed by Paraguay (60%) and Mexico (57%). Coverage in Brazil, Honduras, Argentina, Peru, Bolivia, and Ecuador is between 40% and 50%, while in Venezuela, Colombia, Suriname, and Costa Rica, it is below 30% (**Figure 3**). Based on the quality standard in place before the SDGs, which only considered the availability of basic solutions¹¹ (and not wastewater treatment), coverage in Latin America and the Caribbean was 86%. In Colombia, for example, basic sanitation coverage is 94%, while access to safe sanitation is 18%. Achieving the SDG does not require all wastewater to be treated by wastewater treatment plants (WWTPs); rather, nonconventional solutions can be an option when properly operated and

¹⁰ Simple pit latrines without a slab or platform, hanging latrines, and bucket latrines.

¹¹ Improved facilities that are not shared with other households, such as toilets connected to a sewer system, septic tank, or pit latrine, ventilated improved pit latrines, composting toilets; and simple pit latrines with slab. Improved access and basic access are reported by all 26 Bank member countries (Figure 3).

maintained; nonetheless, there is also a lack of information on the quality of the individual solutions, so figures for access such as those indicated for Paraguay could be lower. In the Caribbean, the wastewater treatment situation is critical due to its impact on beaches, yet only two countries estimate the treatment rate (Barbados at 3% and Jamaica at 8%), though they do not report it.

- 2.11 **Unequal sanitation services.** There are gaps in access between urban and rural areas. Although there is no data on access to safe sanitation in rural areas, the gap in basic access in Latin America and the Caribbean is 20 percentage points. Almost 10 million people still practice open-air defecation, of which 7.4 million are located in rural areas. Haiti, Peru, Bolivia, Colombia, Brazil, and Venezuela account for 79% of these households (**Figure 4**). There is a particular need to address access to sanitation in informal areas (paragraph 2.16). Socioeconomic inequalities are also even greater than in the case of drinking water. Bolivia exhibits the highest levels of inequality: basic coverage in the wealthiest quintile there is 72 percentage points higher than in the poorest quintile. In Guatemala, Panama, Nicaragua, Peru, the Dominican Republic, Paraguay, and Honduras, the difference ranges from 40 to 50 percentage points, while in Uruguay it is nine (**Figure 5**).
- 2.12 **Affordability and connections to sewer services.** One recurrent problem is the low level of user connections to sewer networks, particularly where families already have access to an individual solution. This is due to the cost of connections or the necessary works within the home (in Peru, for example, this cost was US\$1,200 for a population with monthly incomes of US\$285), the high costs of the service, and/or a lack of suitable workers. Connection rates of around 50% have been observed in numerous sanitation projects financed by the Bank and other donors (Sturzenegger et al., 2020).¹² With low numbers of connections, the expected benefits of investments in networks or wastewater treatment plants are not fully captured, limiting the impact of these programs on health.¹³ The main barriers to connections are (i) financial, relating to the price of the connection, as well as household ability to pay and financing opportunities; (ii) a lack of information and know-how; (iii) administrative; and (iv) the behavior and coordination of collective labor (Yarygina et al., 2020).
- 2.13 **Poor hygiene practices persist in households in the region.** The benefits of access to water and sanitation do not materialize unless interventions are undertaken to improve the population's hygiene-related habits and behavior. Although there is no aggregate data on access to basic hygiene¹⁴ in Latin America and the Caribbean, information from 13 countries (**Figure 6**) shows that it varies from 22% in Haiti to 91% in El Salvador ([JMP](#), 2020), with differences between households based on income. In the Dominican Republic, only 24% of the poorest households have access to handwashing infrastructure, compared with 83% of the

¹² An IDB analysis for Argentina, Ecuador, Paraguay, and Mexico found that only 23% of households had connected to sewer networks 12 months after these were built, rising to 33% after 48 months.

¹³ An evaluation of Colombia's home connection program (Departamento Nacional de Planeación, 2016) found that these interventions reduced the probability of diarrhea in children under five by 33%.

¹⁴ The SDGs establish three levels of service for hygiene: (i) a basic service level based on the availability of handwashing facilities in the home with soap and water; (ii) a limited level if handwashing facilities are present but there is no soap or water; and (iii) homes without handwashing facilities.

wealthiest households. Among rural populations in Latin America and the Caribbean, 41% lack access to hygiene facilities with water and soap (JMP, 2019), with high disparities between urban and rural areas. Of the aforementioned 13 countries, Colombia has the most significant disparities, with only 31% of rural households having handwashing infrastructure with water and soap, compared with 76% of urban households. Menstrual hygiene is also of primary importance for improving the health, well-being, and dignity of women (WHO and UNICEF, 2015), although evidence, norms, and standards in this area are much less developed than for handwashing (Mahon and Cavill, 2012).

- 2.14 **Uneven access to water and sanitation outside the home.** The WHO has identified inadequate sanitation in public institutions such as hospitals, health clinics, and schools as one of the main causes of diarrheal disease in Latin America and the Caribbean. In the region, 78% of schools have basic levels of sanitation and 61% have basic hygiene.¹⁵ Regional studies estimate drinking water coverage of rural schools in nine countries at 59%, representing a 35 percentage point difference with respect to urban schools (UNICEF and WHO, 2018). Despite limited data availability, it is clear that even where schools have access to water services, there is poor availability of hygiene and handwashing materials. The lack of school access to water, sanitation, and hygiene has meant that students have been unable to return to in-person classes during the COVID-19 pandemic (paragraph 2.22). No representative data is available on hygiene facilities in health clinics. The JMP estimates that only 15% of health clinics in Paraguay have handwashing facilities, compared with 26% in Honduras and 74% in Peru.
- 2.15 **Poor solid waste management constrains social development in the region.** There are persistent problems relating to the final disposal of solid waste in the region: 28% of all urban solid waste is inadequately disposed of (open air dumps, water bodies, burning), with a further 12% going to controlled dumping sites and 56% to sanitary landfills. The recovery rate is under 5%. Waste collection coverage in the region is 95% in urban areas and 74% in rural areas. However, there are marked differences in terms of quality and continuity between countries (**Table 1**) and inequalities based on area (informal settlements and rural areas), income, and ethnicity. In Suriname, for example, urban collection coverage is 70%, compared with 15% in rural areas. Urban coverage is above 99% in The Bahamas, Barbados, Ecuador, Chile, Guyana, Panama, Trinidad and Tobago, and Uruguay, while only The Bahamas achieves this level in rural areas. Haiti is the country with lowest levels of coverage in urban and rural areas, at 24% and 0.4%, respectively.
- 2.16 Poor solid waste management creates high risks for public health (Zibara et al., 2016) and hits the most vulnerable populations hardest. These risks stem from the pollution of surface and underground water sources, the ground, and the air (emissions of greenhouse gases, particles, and toxic gases). Vectors such as insects and rodents can transmit disease (e.g., cholera and dengue) (Goorah et al., 2009). Poor solid waste management is partly responsible for flooding and blockages to urban drainage systems; this is due to the practices of some of those generating waste (who dispose of it in water bodies or drains), as well as a lack of waste collection services and a failure to sweep roads and public areas. Likewise,

¹⁵ In Honduras, Mexico, and Peru, hygiene infrastructure is absent in 41%, 30%, and 22% of schools, respectively. In Brazil and Costa Rica, 61% and 70% of schools, respectively, have basic hygiene access.

the growing accumulation of plastic waste in water bodies and oceans is caused by the absence or poor delivery of solid waste management services (IDB, 2020a). Inadequate solid waste management also constrains growth in tourism (National Sustainable Tourism Master Plan for Belize 2030).

- 2.17 **Access to services in informal urban settlements represents a major challenge for Latin America and the Caribbean.** Urban areas are home to 80% of the region's population. Three features of the urbanization process have affected access to water and sanitation: (i) a failure to accompany population growth with the necessary infrastructure, partly due to expansion into unbuildable or unplanned areas (United Nations, 2014); (ii) a proliferation in the number of cities, which has grown sixfold in the last five decades, leading to a loss of economies of scale in water and sanitation; and (iii) growth in informal settlements,¹⁶ which are estimated to account for 21% of the urban population (with extreme cases such as Haiti, at 70%) (United Nations Human Settlement Programme, 2016).¹⁷ As a consequence, for example, it is estimated that in Argentina more than 98% of homes in informal neighborhoods lack sewer services, while almost 94% lack drinking water. High rates of informal land tenure aggravate this situation, given the restrictions (legal, administrative, or regulatory) faced by some providers in offering services to these areas. This forces the population to adopt alternative solutions that are more expensive or are associated with environmental problems (such as sanitation and solid waste). It is estimated that 29 million people in urban areas in Latin America and the Caribbean use latrines, while 67 million use septic tanks (UNICEF, 2017). These facilities are often shared and can represent a safety risk, primarily for children and women. Solid waste collection in these areas is deficient and can be a significant source of pollution.
- 2.18 **Rural areas have not been prioritized.** Gaps are due to (i) geographic isolation and low economies of scale; (ii) a failure to prioritize investment, particularly in remote areas; (iii) less formalization and capacity to deliver services and access financing; and (iv) the weakness or absence of institutions and scant information and technical assistance. There are additional challenges in the environmental and social spheres (Carrasco, 2011) that have consequences for sustainability (United States Agency for International Development, 2020). The use of conventional solutions (sewer networks with wastewater treatment) has shown low levels of sustainability even in population concentrations, as high operating and maintenance costs,¹⁸ together with the need for technical know-how that is not always present locally, have led to their rapid abandonment.¹⁹ At the other extreme,

¹⁶ The United Nations (2016) defines informal settlements as residential areas where inhabitants have no security of tenure over the land or dwellings they inhabit; neighborhoods usually lack basic services and urban infrastructure; and housing may not comply with current planning and building regulations and is usually situated in geographically and environmentally hazardous areas.

¹⁷ The Housing and Urban Development SFD considers informality to be one of the main challenges, related to social exclusion.

¹⁸ The marginal cost of infrastructure is significantly higher in remote communities. In the case of Honduras, the cost per connection is around US\$2,000 (including collection and treatment but not in-house connection), to which annual operating and maintenance costs of US\$250 must be added. In contrast, the cost of individual solutions is around US\$200.

¹⁹ In Chile, of 550 wastewater treatment systems built in recent years, 80% are either faulty or inoperative (Naveas and Ducci, 2014).

the generalized application of simple, individual sanitation solutions (such as latrines) has not always been successful due to a failure to take preferences and cultural issues into account. Solutions in Latin America and the Caribbean should therefore take into consideration the expectations of the population, its willingness and ability to pay,²⁰ and the use of innovative solutions that address cultural, gender, and sustainability issues.

- 2.19 **Water and sanitation and COVID-19.** The pandemic has highlighted the importance of access to water, sanitation, and hygiene (WASH) in combating COVID-19 (and other infectious diseases), as well as the challenges faced by Latin America and the Caribbean in ensuring service quality and continuity for the population ([American Water Works Association, 2020](#)). This is particularly the case for the most vulnerable groups ([WHO, 2020](#); [United States Environmental Protection Agency, 2020](#)) and for public locations such as schools and hospitals.²¹ This has been reflected in the measures taken by most governments to declare water and sanitation services essential, reducing or subsidizing rates, suspending or deferring bill payments, canceling service cuts, reconnecting homes free of charge, using tanker trucks to supply unserved populations, and ensuring continuity in solid waste collection services. These measures and the response to the emergency itself have led to declining revenue and increased operating costs, limiting service providers' financial capacity ([National Association of Clean Water Agencies, 2020](#)). These impacts will persist into the recovery stage of the pandemic.

B. Environmental sustainability and resilience: a sector facing vulnerabilities

- 2.20 The sector faces a number of challenges in terms of environmental sustainability: (i) the availability of water resources for the supply of drinking water, which in many cities is increasingly affected by competing demand from the agricultural and industrial sectors, as well as climate change; (ii) conserving and improving the quality of water bodies, particularly in urban areas; (iii) a lack of institutional capacity, planning, and coordination between stakeholders in the environment sector and those in other sectors demanding water resources; (iv) a failure to exploit the opportunities of the circular economy to reduce volumes of untreated wastewater and solid waste; and (v) the transition to a more climate resilient economy with zero greenhouse gas emissions.
- 2.21 **Climate change and disparities in water availability.** Although Latin America and the Caribbean account for one third of all water on the planet, the spatial and temporal distribution of that water makes it scarce in several regions²² and abundant in others where demand is low (the Amazon River accounts for 53% of surface runoff). The disparity between supply and demand is critical in the Caribbean (The Bahamas, Barbados, Haiti, Jamaica, and Trinidad and Tobago)

²⁰ Demand studies in Guatemala, Honduras, the Dominican Republic, and El Salvador suggest that the willingness to pay for these facilities is often lower than the cost, making this solution inefficient due to a failure to build appropriate awareness of the problem.

²¹ Many countries were unprepared to safely and separately manage the increased waste streams associated with health activities.

²² Primarily in the Caribbean islands (The Bahamas, Barbados, Haiti, the Dominican Republic, Trinidad and Tobago, and Jamaica) and in regions such as Northeast Brazil, northern Mexico, and Peru's Pacific Coast.

and regions such as Northeast Brazil, northern Mexico, Peru's coast, and northern Chile. In the ecosystems of the high Andes (Bolivia, Chile, and Peru), the risk to water resources (loss of glaciers, *páramos*, and *bofedales*) is significant. Even moderate scenarios project a loss of between 78% and 97% in glacier volume by the end of the century (Schoolmeester et al., 2018). According to the World Resource Institute, nearly 15% of the region's territory and 35% of its population are in areas subject to moderate to extremely high water stress (Hofste et al., 2019); this will be 43% by 2040, and could be 50% in Argentina, Chile, and Mexico. Climate change is altering rainfall patterns and intensity, generating extreme events (floods and droughts²³) that damage the infrastructure of water and sanitation providers and challenge their ability to meet demand, forcing them to turn to distant water sources with higher costs and risks for the hydrological cycle (MacDonald et al., 2016). In addition, they are impacted by changes in policies and regulations (taxes on emissions, conservation of conserve water resources, or use of clean energies) that limit the competitiveness of drinking water and wastewater treatment systems, or reduce access to financing (Simpson N. et al., 2020; Gros D. et al., 2016).

2.22 The region faces quality problems in bodies of water. The pollution of water sources has grown in most countries in the region and can limit their effective availability (United Nations Environment Programme (UNEP), 2016). It is estimated that nearly 25% of rivers²⁴ have been polluted²⁵ by domestic and industrial discharges, as well as often by mining, agricultural runoff, and inadequate solid waste disposal (including plastic) (Kresch et al., 2019; Thebo et al., 2017). This has led to excessive levels of fecal coliform bacteria, organic contaminants, phosphorus and nitrogen, and cyanobacteria.²⁶ Tourist areas—especially beaches—have been affected by solid waste pollution. Rural areas are much more sensitive to changes in the availability and quality of water as they depend on a single source. This degradation of available water sources depresses living conditions for the population considerably, reduces the ability to use water for human consumption and economic activity, and drives up the cost of water and sanitation services, while also affecting biodiversity and the opportunities for long-term climate resilience (Bates et al., 2008). Rising temperatures as a result of climate change may accelerate the degradation of water sources by increasing the presence of cyanobacteria (Aguilera A. et al., 2018).

2.23 Reducing emissions to mitigate the production of greenhouse gases. Final disposal sites for solid waste are the third largest anthropogenic source of methane emissions internationally, responsible for 14% and, thus, 5% of greenhouse gas

²³ For example, in the Caribbean in 2009-2010, Argentina in 2011, Mexico in 2011-2012, São Paulo in 2014-2016, La Paz in 2017, and Chile in 2019. Landslides in Peru and Colombia show the substantial impacts and damages caused by extreme climate events involving high levels of rainfall over very short periods.

²⁴ The Tietê River in São Paulo, Das Velhas River in Belo Horizonte, Bogota River in Bogota, Rimac River in Lima, and Reconquista and Matanza-Riachuelo rivers in Buenos Aires, among others.

²⁵ In Mexico, between 10% and 30% of monitored sites contain polluted water (Romero-Lankao et al., 2014), a situation that threatens availability of the resource, particularly in water-stressed areas.

²⁶ A significant fraction of aquifers in northern and central Brazil, Chile, northern Argentina, and Mexico are shallow, rendering them more susceptible to pollution from agricultural runoff or exchange with contaminated surface water sources.

emissions.²⁷ Water and sanitation providers are thought to contribute to climate change, with between 3% and 7% of total greenhouse gas emissions (International Water Association, 2015). Although these contributions are lower than in the case of other sectors (transportation and energy), the interdependencies that exist are of increasing importance. The relationship with the energy sector is particularly significant: water and sanitation services account for 4% of total electricity demand, while power generation demands 10% of available water resources (International Energy Agency, 2016). The potential to reduce emissions in the sector is not being exploited; only a small number of WWTPs and sanitary landfills capture and make use of biogas (methane). Despite the potential for sludge reuse and the energy potential of differences in altitude when transporting raw water, etc., few water and sanitation companies have increased the energy efficiency of their facilities and equipment or used cogeneration for power (Ferro and Lentini, 2015). Lastly, recycling and the control of nonrevenue water and excessive consumption of drinking water (in the process chain before arriving in the home, as well as drainage and wastewater treatment) all help to reduce energy consumption.

2.24 A failure to exploit the opportunities of the circular economy. Adoption of the principles of the circular economy entails replacing the current linear “take-make-consume-dispose” model with one that promotes the efficient use of materials, water, and energy, taking into account flows of materials and the extension of their useful life. More than 90% of solid waste in Latin America and the Caribbean ends up in final disposal sites, while in countries such as Belgium and Holland, the proportion is 5% ([World Bank](#)) (**Box 4**). Meanwhile, less than 5% of wastewater in the region is reused, compared with more than 80% and 40% in Israel and Spain, respectively. Wastewater can be used for irrigation, cleaning, or industrial purposes, and the investment costs associated with reuse are lower than for desalination (Broschek, Díaz, and Galleguillos, 2017). In addition, the region wastes almost one third of the food that it produces ([United Nations Food and Agriculture Organization, 2016 and 2019](#); UNEP, 2019), with households accounting for 61% of this. An IDB analysis has shown that 16 countries have national standards that regulate and/or promote the reuse of treated wastewater; 7 countries prohibit and/or regulate its reuse as fertilizer, soil conditioner, and/or by the agricultural sector; and 12 countries limit the recovery and marketing of biosolids and/or fecal sludge (Castro, 2021). Only Colombia has specific regulations to encourage energy recovery in the sector. In the social sphere, the circular economy means the creation of new jobs and opportunities to formalize the work of waste pickers. The potential exists to develop a market around sanitation that could represent additional revenue for operators through the sale of treated wastewater and energy and nutrient recovery from sludges (Toilet Board Coalition, 2016).

2.25 Resilience of companies in the sector. Climate events such as droughts and floods, natural disasters such as earthquakes, and health emergencies such as COVID-19 can affect the capacity of operators in the region to provide water and sanitation, in addition to the substantial economic damages inflicted. As has been the case during the current pandemic, most operators are unprepared to deal with

²⁷ This contribution could be close to 10% if the effects of other components generated by the uncontrolled burning of waste (e.g., soot) are quantified (Reyna et al., 2019).

these events, offering ad hoc responses and crisis management instead of risk management. Many lack risk management areas, early warning systems, and contingency plans for dealing with extreme events. This is the case with respect to water safety plans for water sources that help to increase the resilience of systems to the effects of climate change. Measures to streamline demand should first be presented to the public and applied when contingencies are triggered (e.g., incentives introduced by the São Paulo state water and sanitation company (SABESP) to reduce consumption through increased rates for excessive usage). In addition, there is little use in the region of green infrastructure solutions such as forests and artificial wetlands for regulating water quality, or solutions such as green roofs and other green spaces for regulating stormwater. To support the use of green infrastructure, there is a need to strengthen planning and structure projects that properly account for all benefits and costs (Development in the Americas, 2020).

C. Insufficient resource flows and weaknesses in governance

- 2.26 **A politically low-priority sector, reflected in public resource allocation.** A priority for the sector is to raise its profile within the national policy agenda. Investment in water and sanitation in Latin America and the Caribbean stood at 0.33% of GDP in 2012, falling to 0.31% in 2019,²⁸ with marked differences between countries ([InfraLatam, 2019](#)). Bank estimates indicate that at the current pace of investment, the SDGs will only be met in 2075. Universalizing access to water and sanitation by 2030 would require US\$27 billion per year,²⁹ representing a nearly fivefold increase in investment compared with 2019. The need for resources increases by a further US\$14 billion per year once the targets for solid waste are taken into account (Faleiro, 2020). The cost of these services (investments and operations and maintenance) is covered by government contributions (mainly subsidies) and rates. A first challenge will be to increase the availability and stability of government contributions over the long term, mainly for expanding access, even at a time in which the fiscal and macroeconomic situation in the countries has been deeply affected by the impact of COVID-19 ([IDB Macroeconomic Report, 2021](#)).
- 2.27 **A lack of targeting in subsidies.** Governments subsidize water and sanitation services to increase access for low-income households and/or ensure minimum consumption levels (Andres et al., 2019).³⁰ They provide a variety of subsidies for both demand (financing part of consumption) and supply (financing infrastructure or operating and maintenance costs—it is estimated that 22% of subsidies cover operating costs). Countries such as Chile, Colombia, and Peru subsidize demand for vulnerable population groups. With the exception of Chile, cross-subsidies are used predominantly in the region, and there is generally considerable room to

²⁸ The investment in water and sanitation fell from US\$10.737 billion in 2012 to US\$5.623 billion in 2019.

²⁹ IDB Infrastructure and Energy Sector, with coverage data from the JMP and average unit costs for the region. This data does not include infrastructure replacement costs.

³⁰ The maximum monthly consumption supported by subsidies is 15 m³ in Chile, 20 m³ in Colombia, and 10 m³ in Lima (SEDAPAL). In the case of SABESP, fixed charges allow for monthly consumption of 10 m³, while Aguas and Saneamientos Argentinos provides a similar entitlement in the Buenos Aires metropolitan area, but only for residential users with meters (Ferro and Lentini, 2013).

improve the design, targeting, and transparency of subsidies.³¹ Poor targeting is measured by errors of inclusion (households are included that should not be subsidized based on their income) and exclusion (households are not included that should receive subsidies). In Colombia, errors of inclusion and exclusion of 51% and 0.7%, respectively, were identified (Fundación para la Educación Superior y el Desarrollo, 2004). Subsidies in rural areas usually finance investments, and although rate levels are generally set with the aim of recovering operating and maintenance costs, they are usually insufficient to cover major repairs or expansions. With respect to solid waste, subsidies cover between 50% and 80% of total costs in most countries. This reflects municipal rates that are lower than the cost of service, low rates of revenue collection, and the high proportion of users exempt from payment (e.g., in Chile, where 80% of the population is exempt from paying waste management rates) (UNEP and ISWA, 2015). The challenge is to design efficient, equitable subsidy mechanisms supported by sufficient and stable long-term funding, based on rates that take total service costs into account.

- 2.28 **Service costs and rates.** The sustainability of services should be ensured by rates, but many companies lack sufficient resources even to cover their operations. Countries such as Chile, Colombia, Ecuador, and Peru have national rate models that cover the costs of investment, operation and maintenance, and subsidies to vulnerable populations (to support access and affordability). In other countries, the regulation of rates takes place at the state level (Brazil and Argentina) or local level. Rates generally send inadequate signals to users (who consume more due to low rates) and given their lack of predictability, service companies make insufficient investments. Although most large companies cover their costs, some of them—and the vast majority of medium-sized and smaller companies—do not update their rates. This affects their financial sustainability, reduces service quality and coverage, and/or increases the burden on the taxpayer (paragraph 2.22). Inefficiencies in service providers (paragraph 2.32) increase costs and, thus, rate levels. In addition, there are large gaps in the level of rate development in the different services, with water rates the most developed. Sanitation rates are generally insufficient to cover service costs, and are set as a percentage of water rates (usually less than 100%, even though the investment deficit means they should be higher). The quality of solid waste services is also affected by weak or absent arrangements for charging users (IDB, 2020) and by weak collections management (IDB, 2014c); as a result, only 50% of costs are recovered (operation and maintenance represented between 60% and 80% of the total cost (Faleiro, 2020)).
- 2.29 **Affordability.** Services are considered to be affordable where household expenditure does not exceed 5% of total income in the case of water and sanitation (Development in the Americas, 2020) and 1% in the case of solid waste management (UNEP and ISWA, 2015). The affordability of these services in Latin America and the Caribbean varies enormously depending on whether users are connected to a formal system. For those without a connection, a significant part of the affordability problem stems from the additional charges that must be paid for alternative sources of supply (paragraphs 2.9 and 2.12). For those connected to

³¹ An analysis of 10 countries across the world found that 56% of subsidies on average go to the wealthiest quintile, while the poorest quintile receives only 6% ([Andres et al., 2019](#)).

the system, affordability is determined by a number of factors: (i) the relationship between household consumption and expenditure, given that consumption may fall below the minimum necessary if rates are high, or may be excessive and inefficient, causing households to spend more than 5% of income on water and sanitation; and (ii) the poor quality of services (real or perceived), which leads to additional, self-supply costs that are often not taken into account. This is particularly evident in the use of bottled drinking water, or where water needs to be stored/pumped or wells used due to a lack of service continuity. There are knowledge gaps in the region due to a lack of information on the real level of rates, the efficiency and equity of subsidy systems, household consumption and the costs of self-supply, and the harmonization of methods to allow comparisons between cities or countries. Water rates in Bogotá, for example, can be higher than in Tegucigalpa—according to *Development in the Americas* (2020), as much as four times higher for monthly rates—but services in that city are continuous and of good quality. Users have no need to resort to alternative sources, and there is a subsidy scheme aimed at ensuring that low-income households can consume what they need at a price they can afford.

- 2.30 **Poor access to sources of financing.** In most countries, water and sanitation companies have very limited access to local credit resources, partly due to rate instability and partly to underdeveloped lending markets. One challenge is to strengthen partnerships to increase the flow of resources (leverage; either international cooperation/loans to the public and private sectors or capital investments), and also know-how that reinforces and multiplies the impact of interventions. Government financing for sector investment in the sector is drawn from multilateral or bilateral sources, with little use of local capital or credit markets. With the exception of the Bank's partnership with the Government of Spain—crystallized in the Spanish Cooperation Fund for Water and Sanitation in Latin America and the Caribbean (SFW)—the region has been passive in terms of seeking out international cooperation resources, climate funds, and other concessional resources. Notwithstanding this, the region has had successful experiences in terms of the design and execution of cofinanced investments, as well as more structured donor coordination.³² In the case of solid waste, there have been few examples of results-based financing or the implementation of economic tools to ensure extended producer responsibility. The lack of private investment has given rise to innovative financing mechanisms aimed at overcoming these hurdles; many involve climate financing, while other mechanisms include revolving funds, microfinancing, savings arrangements, and results-based financing (World Bank, 2020), as well as public-private partnerships.
- 2.31 **Institutional weakness.** Reform of the institutional framework began almost 30 years ago in Latin America and the Caribbean, and today there are countries that have consolidated sector entities (Chile, Colombia, and Peru); others in which the institutional framework has been created but is still undeveloped, fragile, and unstable; and others in which the degree of federalization has led to a diversity of

³² Successful examples include the Cooperation Group in Bolivia, Donor Roundtable in Haiti, Donor Roundtable in Honduras, and Rural Group in Peru.

conditions (Brazil and Argentina).³³ Policies have generally sought to ensure: (i) institutional separation between the functions of sector leadership (policy formulation and technical assistance), regulation, and delivery; (ii) decentralization of service delivery to subnational bodies; (iii) private sector participation; and (iv) regulatory frameworks to improve efficiency. In many cases, however, this process has not been completed due to a lack of legal frameworks and/or resource allocations (monetary and human), or due to a lack of coordination between the different agencies or levels of government. The diversity of arrangements adopted does not show any clear correlation between specific models and improved sector performance (Bertoméu and Serebrisky, 2018). The analysis of observed coincidence, divergence, and conflict therefore needs to continue with a view to improving the institutional framework for the sector. In the area of solid waste management, regulations in many Latin American and Caribbean countries are limited to the collection, transportation, and final disposal of waste, thus excluding treatment and recovery activities. This limits the implementation of these projects. There has been interest recently in incorporating the principles of the circular economy into the legislation, as well as bans on single-use plastics. With the exception of some specific waste streams in countries such as Argentina, Chile, Colombia, Brazil, and Uruguay, extended producer responsibility has not yet been adopted. In addition, most countries lack suitable bodies to monitor and inspect solid waste management systems.

2.32 Sector leadership. Leadership of the sector falls to a variety of institutions and is still an evolving area, despite the importance of having policies, technical assistance, and programs at the national level.³⁴ In many cases, it is the responsibility of low-level institutions with little political visibility. In some countries, such as El Salvador, Guatemala, Haiti, and the Dominican Republic, the lead agency is also usually the service provider, making it difficult to ensure neutrality in decision-making. One feature of the weakness in leadership is the lack of planning to target the most disadvantaged areas (e.g., periurban, rural, and indigenous areas) or eliminate gaps in access in sanitation and solid waste when compared with water. An IDB survey found that only half the countries have a formal national planning instrument for sanitation. With regard to solid waste, there is a marked tendency to demand the design of integrated municipal solid waste management plans, yet these are often not implemented or there are no national plans to guide the setting of local targets.

2.33 Sector regulation. In the absence of competitive markets, prices and the quality of services provided by water and sanitation companies must be regulated. For this reason, one focus of the reform process has been to create regulatory frameworks with independent entities,³⁵ some with national jurisdiction (Costa Rica, Honduras, Ecuador, Paraguay, Peru, and Uruguay) and others with authority

³³ In several countries, these reforms were embodied in specific sector laws for water and sanitation (either national or subnational), while in others, they were incorporated into health, environment, or water sector laws (Nicaragua, Ecuador, Uruguay, and several English-speaking Caribbean countries).

³⁴ Despite decentralization of the sector, the region lacks regional governments with sufficient capabilities and resources to support the municipios or service providers under their jurisdiction.

³⁵ The most successful cases of regulation have been in Chile, Colombia, and Peru, which between 1990 and 1992 created entities to regulate public and private enterprises, as well as to gather and publish information.

at the provincial level (Argentina and Brazil). Despite this, several countries—such as El Salvador, Guatemala, Mexico, and the Dominican Republic—have no regulatory authorities. Some frameworks have been supplemented by contracts or agreements between the regulator and service providers, incorporating monitoring mechanisms and targets (Argentina, Brazil, Paraguay, and Peru). When measured in terms of the region's progress on access and quality, the regulatory model has not performed efficiently. Despite advances in terms of setting rates, there is still a need to ensure that this process is insulated from political interference and that rates are based on criteria of economic rationale and efficiency, with a long-term horizon, incentives for efficient use of the resource, and subsidies that ensure access and affordability. One knowledge gap in the region is the lack of information among regulators regarding the cost of services and tools for harmonizing their calculation for the different companies.

- 2.34 **High decentralization of service delivery.** Motivated by the delegation of powers and resources to municipios, several countries have eliminated their national companies (Chile, Argentina, and Venezuela) or regional companies, replacing them with regional or municipal entities (Peru, Colombia). In countries with small populations, the national service provider is predominant (Nicaragua, Costa Rica, El Salvador, Barbados). Brazil and the Dominican Republic have provincial companies. Decentralization is most advanced in countries such as Bolivia, Colombia, Ecuador, and Honduras, and in solid waste management, where municipios are overwhelmingly responsible for services. However, there are some significant examples of the regionalization of final disposal among several municipios, optimizing transportation through the use of transfer stations.³⁶ All of these models coexist with other providers, such as cooperatives and small private operators, as well as a large number of community-based rural providers (cooperatives, sanitation boards, etc.). This process has created problems associated with the lack of capacities (technical, management, and/or financial) of most municipios to sustain services, as well as a loss of economies of scale and opportunities for transferring resources between communities with and without the ability to pay. It also complicates regulation and control, especially due to the costs involved.
- 2.35 **Transparency, accountability, and social control.** Forty percent of regulators in Latin America and the Caribbean are characterized by low levels of transparency, while accountability mechanisms for operators are weak (Andrés et al., 2013). Meanwhile, 29% of citizens participating in the Global Corruption Barometer survey have paid a bribe in return for a public service; of these, 14% did so to secure access to services, including water (Barreto-Dillon, 2019). Corruption is estimated to increase the cost of obtaining a connection to water and sanitation networks by as much as 30% in developing countries. Although there are no reliable estimates of costs, 10% of investments in the sector are lost to corruption according to the Water Integrity Network (2016), representing losses of more than US\$75 billion globally each year.

³⁶ In Colombia, for example, the waste from 86% of the country's municipios (969) is disposed of in 65 regional sanitary landfills, thereby exploiting economies of scale in this activity.

- 2.36 **Information availability.** The SDGs have highlighted the countries' weaknesses in terms of reporting disaggregated information on access or quality, which hinders the planning of efforts by area (periurban and rural) to eliminate gaps or improve quality. The reasons are as follows: (i) measurement and systematization are not always a priority in the countries; (ii) there is a lack of coordination between the agencies producing information (mainly between the different sectors); (iii) methods lack homogeneity and clarity; and (iv) climate information is not valued to help reduce uncertainty in climate change models. The region faces the challenge of improving and harmonizing reporting in each country, taking into account progress in systems to support the following: benchmarking, both regionally (Association of Water and Sanitation Regulators of the Americas) and internationally (International Water Association); change management and efficient, sustainable business transformation, such as AquaRating (IDB); and monitoring, such as the Rural Water and Sanitation Information System (SIASAR).³⁷ As regards solid waste, most Latin American and Caribbean countries lack information systems, official data, and indicators on solid waste management, and this limits the design and oversight of policies and regulations. There are some exceptions to this, including Brazil's National Solid Waste Management Information System (SINIR), Colombia's Single Public Services Information System (SUI), the National Waste Declaration System (SINADER) in Chile, and waste observatories in Ecuador, Argentina, and (soon) Uruguay.
- 2.37 **Coordination with other sectors.** Improving coordination between those responsible for policies and planning for issues such as health, education, energy, and gender and diversity in both urban and rural areas (paragraph 3.12) is a challenge in terms of improving interventions and managing services. Coordination with the authorities responsible for managing water resources is challenging, as these functions have been delegated to the upper levels of government, while water and sanitation functions have been decentralized. Governance of the sanitation sector is closely linked to urban management (including storm drainage), the management of water resources, and solid waste management. This creates coordination challenges between these sectors that often give rise to overlapping policies and objectives and/or inefficient arrangements that limit opportunities for expanding access to and improving the quality of sanitation services.
- D. The management of services can be improved to support progress toward universal access to quality water and sanitation.**
- 2.38 **Opportunities for efficiency gains on the part of operators.** Most services in the sector in Latin America and the Caribbean are provided by public administrations³⁸ (municipal, regional, or national) or by decentralized companies under regional governments. In large cities there are efficient companies (Lentini, 2015), but several need to improve their performance (Asociación de Entes Reguladores de Agua Potable and Saneamiento de las Américas, 2018) to avoid

³⁷ There is a lack of data disaggregated by sex, yet this is essential for assessing the scale of gaps in access, as well as conducting diagnostic assessments and proposing policies and projects with a gender perspective.

³⁸ In Brazil, for example, 75% of service provision is in the hands of state enterprises (Ferro et al., 2014). At the other extreme, only 5% of the urban market in Chile is served by a public entity.

limiting their financial sustainability.³⁹ The information for small companies shows a similar pattern. There are often high levels of nonrevenue water (NRW) of around 45% to 50%, mostly due to network leakage,⁴⁰ a lack of metering (averaging 79%),⁴¹ poor maintenance, and high operating costs (power can represent up to 40% due to deficient electromechanical equipment). Another outlier among the indicators is the number of employees per 1,000 drinking water connections, for which a reasonable maximum is three.⁴² This is aggravated by a lack of technical and financial planning, technology gaps, outdated cadastres, high turnover among management staff, insufficient numbers of qualified professional staff, low salaries, and poor training. Per capita consumption is another measure of efficiency. A reasonable average is 159 liters per day (LPD) with figures ranging from 317 LPD in Argentina and 362 LPD in Panama to 180 LPD and 113 LPD in Chile and Colombia, respectively. Although rates do influence consumption, a study found that higher levels of metering also reduce usage (in Argentina and Panama, average metering is 23% and 55%, respectively, compared with 98% and 86%, respectively, in Chile and Colombia (Lentini, 2015)). There are also cases of private and mixed ownership service models in Latin America and the Caribbean, and there are successful cases of each of them. Nonetheless, there is no evidence to show that any single model is associated with improved performance (IDB, 2018d). In the case of solid waste management, there are no tools for measuring operators' operational, administrative, and financial performance, and there are no reference standards or good practice guidelines.

2.39 Private sector participation. The role of the private sector in water and sanitation services is important for a number of sector policy objectives, such as improvements in efficiency and resource contributions. Private operators can be more effective in reducing water losses, improving revenue collection, and raising labor productivity.⁴³ In the 1990s, private sector participation (PSP) was seen as an opportunity to increase investment and improve service efficiency, but—with the exception of Chile—the distribution and management of risks in some cases undermined the attainment of expected results. Privatization processes were reversed in Argentina, Bolivia, and Uruguay, and PSP still meets with differing degrees of acceptance (Ballesteros et al., 2015), to the extent that four countries have introduced constitutional or legal provisions that specifically prohibit privatization of the service (Bolivia, Ecuador, Nicaragua, and Uruguay). According

³⁹ In 11 water and sanitation companies in the Caribbean, the EBITDA margin (earnings before interest, tax, depreciation, and amortization as a percentage of revenue) was found to range from -237% to 38%. Where this margin is insufficient, a company usually depends on subsidies to cover operational deficits (IDB, 2020).

⁴⁰ Ferro and Lentini (2013). An IDB analysis of companies in the Caribbean found that NRW ranged from 23% to 75%, with an average of 46% (IDB, 2021).

⁴¹ Although most operators have relatively high metering levels, there are wide variations, with a minimum of 19% and a maximum of 100%.

⁴² Lentini (2015) found that out of 63 regional operators, the number of employees per 1,000 connections averaged 3.3. The range, however, was between 1 and 7.4 (both figures from Brazil), and numbers were unrelated to the size of the operation. In the Caribbean countries, this figure can be as high as 12 employees per 1,000 connections.

⁴³ With improved service and more efficient operation, clients are more willing to pay their bills, and cash flow increases. With higher revenue and better credit ratings, service can be expanded (World Bank, 2009).

to Ferro (2017), the interventions were based on flawed information, unrealistic expectations, excessive investment needs not matched by ability or willingness to pay, a lack of consolidation of the regulations, and politicization of the issues, among other problems. Despite this, PSP is expanding in several countries, using different models. In Brazil, regulatory changes in the sector in 2020 have opened the door to greater private sector participation (currently 6% of the market and 20% of investment).⁴⁴ In Ecuador, the private sector covers 18% of the urban population (through a concession in Guayaquil). In Mexico, The Bahamas, Trinidad and Tobago, and Jamaica, PSP has involved specialized service contracts to control NRW, with very positive results. In addition, a number of large desalination projects have been developed in recent years under public-private partnership (PPP) agreements, and these have attracted considerable interest from international sponsors, commercial banks, and development banks.⁴⁵ Of total private infrastructure investment in the region, the water and sanitation sector accounts for 15% of the number of project and 6% of the amount invested (IDB, 2021a).

- 2.40 **Gaps in terms of human talent and informal employment.** Targets for universal access to safe water and sanitation require professionals who are able to lead and support the entire infrastructure provision cycle (planning, design, and construction), as well as service delivery. The sector faces three challenges in this respect, however: (i) an insufficient quantity of human resources; (ii) the quality and profile of those resources (professional, technical); and (iii) retaining the existing workforce and increasing its productivity. Internationally, most countries report an insufficient availability of human resources⁴⁶ to implement their water and sanitation plans. In Paraguay, for example, project planning and investment levels have increased significantly in recent years,⁴⁷ yet the supply of human resources has failed to keep pace with sector demand.⁴⁸ Plans and strategies need to be implemented to attract more professional and technical experts, and to improve the skills of existing ones in order to retain them. Around 1.8 million people are estimated to work as waste pickers in Latin America and the Caribbean (Avina, 2020), mostly in the informal sector, collecting between 25% and 50% of recyclable solid waste (UN-Habitat, 2010). This activity has gained the recognition of some governments in the last decade, and regulations have been developed to formalize waste pickers and integrate them into the solid waste management system. This has been the case in Argentina, Brazil, Uruguay, Ecuador, and Colombia, where more than 140,000 waste pickers have been formalized.

⁴⁴ More than 34 million people in Brazil lack drinking water, and US\$139 billion needs to be invested by 2033. BNamericas Intelligence Series. Opening the Floodgates to Private Investment in Brazil's Water Sector. January 2021.

⁴⁵ Chile and Peru are examples of these investments. There is a trend toward the use of PPPs to develop these works, enhance efficiency, and increase the use of underground water sources ([Cámara Chilena de la Construcción, 2018](#); [BNamericas, 2020](#)).

⁴⁶ Of all countries with national drinking water plans (95), only 14% have sufficient human resources to implement these, whereas in the case of urban sanitation (94), the proportion is 11% (Global Analysis and Assessment of Sanitation and Drinking-Water, 2019; United Nations Water, 2019).

⁴⁷ According to the National Water and Sanitation Plan, universalization of these services will require investments of US\$6 billion by 2030. Investments have doubled over the last two years to US\$648 million.

⁴⁸ In the engineering field, the numbers graduating each year are approximately 80% below those estimated necessary given the country's infrastructure needs.

- 2.41 **Management capabilities of rural operators.** Rural systems are generally community-managed (e.g., boards, committees, cooperatives). It is estimated that more than 145,000 community-based water and sanitation service organizations exist in Latin America and the Caribbean, serving more than 70 million inhabitants (around 55% of the rural population) (Zambrana, 2017). Most boards lack independent legal status and are therefore not recognized by the government or other entities (particularly banks), and this constrains their activities (Barakzai et al., 2014). Without training in how to operate, and with frequent turnover among committee members (who serve on a voluntary basis) and no government structures to provide support, service quality is low and users stop paying rates. The lack of revenue, low capability, and high management turnover lead to a lack of maintenance and poor use of water by the community. The main challenges, therefore, are to professionalize operators, create post-construction support mechanisms (Smits et al., 2012), implement adequate rates, and foster payment incentives. Although there is a lack of robust data at the regional level, between 30% and 40% of systems built in rural areas do not work properly (Álvarez, 2016).⁴⁹ To ensure sustainability, it is also important to work through indigenous governance structures when building community management schemes, and communication campaigns should be implemented at the community level in partnership with the indigenous authorities.
- 2.42 **Promoting the participation and capacities of women.** Project design and execution and service management do not always take the specific needs of women into account, and their participation, representation, and decision-making capabilities and rights are limited in issues relating to these processes. The same dynamic can be seen in the labor market, where women are underrepresented. Only 23% of management positions in water and sanitation companies are occupied by women. According to the Rural Water and Sanitation Information System, sustainability indicators are better for those rural systems with at least one woman on the management committee. It is estimated in the region that only 15% to 20% of management positions on water boards are occupied by women (Procoes, 2018; IDB, 2017; Monje et al., 2016). There is also low participation of women in solid waste management in the region, affecting positions with authority and decision-making powers and also informal recycling activities.⁵⁰
- 2.43 **Social participation.** The evidence points to inadequate performance, such as (i) weak ownership of water and sanitation systems, which discourages the adequate, sustainable use and maintenance of facilities; (ii) inadequate hygiene practices (Wood and Neal, 2016; Clasen et al., 2014); (iii) low connectivity in both drinking water systems and—in particular—sanitation systems (Buck et al., 2017); (iv) low levels of chlorination (disinfection) in systems;⁵¹ (v) low levels of rate payment; (vi)

⁴⁹ Saavedra, 2013. In Chile, only 20% of rural wastewater treatment plants are operating at a satisfactory level.

⁵⁰ The Latitud R initiative estimates that only 11% of waste pickers in the region are women (Avina, 2019).

⁵¹ This is because users may reject the smell or taste of chlorinated water, or because of a lack of information regarding the benefits of chlorination, among other things, with negative consequences for the health of the population.

irrational water use;⁵² and (vii) lack of reduction of the proper generation, separation, and disposal of solid waste. The inclusion of communities by governments in the planning, design, execution, and maintenance of water and sanitation systems remains a challenge for the region. This is of particular importance in rural areas, where a lack of participation by beneficiaries has meant that many systems are not used after they are built. The lack of participation is especially important in indigenous communities, where the involvement of leaders and consideration of the implications of their forms of social organization for water and sanitation services continues to be a challenge. Beneficiaries must participate from the outset in order to build awareness of the benefits of access to drinking water and of adequate, culturally appropriate sanitation, thereby creating demand for these services. In some cases, such as solid waste management, participation involves including the population working informally in the sector.

E. Innovation in the sector is nascent and its potential to improve access, governance, efficiency, and environmental sustainability has not been leveraged.

2.44 The water and sanitation sector is subject to regulation worldwide due to factors including the high impact of these services on society. Consequently, the sector has traditionally adopted a conservative approach to change compared to other sectors, and its preference for tradition and proven methods for achieving its objectives means that it is extremely slow to implement innovations (Minatta and Basani, 2020). In a context of high levels of regulation, service providers prioritize the protection of public health through compliance with regulatory requirements, followed by efforts to keeping services running and management of the usual financial constraints. Innovation thus ranks only fourth on the list of priorities.

2.45 **Innovation in water and sanitation is in the early stages.** Innovation initiatives in water and sanitation companies have been limited in the region, indicating a low level of innovation development (Minatta and Basani, 2020). Recent IDB studies show that innovation helps to increase and improve access to more efficient, quality services. Innovation in the water and sanitation sector is generally more incremental than disruptive, and innovation is observed to a greater extent in private providers than in public ones. The latter are traditionally more conservative (Kiparsky et al., 2016) and slower⁵³ to implement a culture of innovation. The innovative solutions with greatest impact in Latin America and the Caribbean have been the result of creative combinations of social and organizational solutions and technological innovations (Mastrangelo, 2018). There are numerous hurdles to accelerating the development and adoption of innovations in the region, and these fall into three categories: governance; research, development, and innovation; and service delivery.

2.46 **Governance challenges to innovation.** The governance of innovation in the sector faces the following constraints: (i) legal and institutional frameworks that are unsupportive of innovation; (ii) high fragmentation and geographical dispersion in the sector, creating diseconomies of scale and discouraging innovation; (iii)

⁵² In Bogota, Colombia, educational campaigns and rate increases led users to reduce their consumption of water. Datta et al. (2017) have documented similar results for Costa Rica. See also Allcott (2011) and Ferraro and Miranda (2013) for similar interventions in the energy and water sectors.

⁵³ Adoption of a technology in water can take more than 10 years (O'Callaghan et al., 2018).

regulatory frameworks that focus on social and technical aspects of the service, discouraging risk-taking and limiting innovation; (iv) low sector participation in global innovation policy; and (v) complexity of implementing sector regulations governing innovation.

- 2.47 **Research, development, and innovation challenges.** There are few academic studies and little research regarding innovation in water and sanitation (Wehn and Montalvo, 2017). For example, while the number of patent applications for clean energies has increased dramatically in the last decade (particularly in the European Union, Japan, and the United States), those relating to water and sanitation have remained relatively constant (Stanford Woods Institute of the Environment, 2014; Ribechini, 2018). The following challenges exist with respect to research, development, and innovation (RDI): (i) scarce RDI, concentrated in research bodies with low participation by service providers; (ii) a lack of common objectives and scant communication, limiting multidisciplinary collaboration for a relevant RDI agenda in the sector; (iii) weak information systems and a lack of open data; (iv) limited supply of technical assistance services and/or training in the management of sector-focused innovation; (v) low and fragmented demand for solutions and/or services that encourage RDI institutions and the creation of start-ups (partly due to the conservative nature and fragmentation of the sector); and (vi) a lack of financing tailored to the needs and characteristics of each step of the RDI process (short payment periods, high collateral requirements, and almost nonexistent grace periods for technology centers seeking to buy equipment).
- 2.48 **Challenges associated with the delivery of water and sanitation services.** The challenges faced by companies in innovating and adopting technology (digital) are generally related to issues of business culture, management, human capital, and financial capacity. These are reflected in (i) a lack of innovation culture, which translates into weak innovation activity and low rates of technology adoption;⁵⁴ (ii) a lack of internal incentives for promoting R&D activities (staff recognition); (iii) low emphasis on innovation as a business process; (iv) workforces with low levels of training in digital technology (Cespedes and Peleg, 2017); and (v) insufficient financing⁵⁵ and low budget allocations⁵⁶ for innovation activities.
- 2.49 **There is a trend in the region in favor of reducing market failures that inhibit the development and adoption of innovative solutions and practices.** This is particularly true on the supply side, with policy actions aimed at promoting coordination between stakeholders, generating regulations, and creating agencies to promote research (grants, patents etc.), development (e.g., finance for equipment and technology centers), entrepreneurship (technical assistance and training and support for science and technology competitions),⁵⁷ financing mechanisms (subsidies, seed capital, and investment funds), and the productive sector (implementation and scaling of pilot projects). Examples of such agencies

⁵⁴ Less than 40% of the international benchmark level for the sector (Cubillo et al., 2019).

⁵⁵ Internationally, investment in water innovation is lower than in the electricity sector (Ajami et al., 2014).

⁵⁶ Cubillo et al. (2019). Nine of the operators that stated their annual investment in innovation projects indicated budgets of US\$30,000 per year or less; four confirmed investment of US\$100,000 or more. (Cubillo et al., 2019).

⁵⁷ In Brazil, SABESP created the [PITCH SABESP](#) program, which involves public calls for proposals aimed at selecting innovative technologies that can help to solve the challenges faced by the company.

have been the National Research and Innovation Agency in Uruguay, the Chilean Production Development Corporation, and the Innóvate Peru program run by the Peruvian Ministry of Production (Minatta and Basani, 2020). On the demand side, interventions have been taking place through the innovation policies implemented in the region (Ospina et al., 2021). These tools have included the creation of regulation and standards, as well as tax benefits to stimulate private demand for innovation. Specifically, innovation has been fostered on the demand side through innovative public procurement (including the water and sanitation sector) that has had a greater impact in terms of accelerating innovation and technology adoption than on the supply side.

III. INTERNATIONAL EVIDENCE REGARDING THE EFFECTIVENESS OF WATER AND SANITATION SECTOR POLICIES AND PROGRAMS

- 3.1 **The development impact of water and sanitation services.** The availability of water and sanitation is essential for improving the population's quality of life, health, social and gender inclusion, productivity, environmental sustainability, and economic growth, particularly in the context of the COVID-19 pandemic (Howard et al., 2020). Socioeconomic returns on investments in water and sanitation are determined by these impacts (Agênor, 2013), and it is estimated that each dollar invested in water in Latin America and the Caribbean yields returns of US\$3 in urban areas and US\$8.2 in rural areas. In the case of sanitation, the figures are US\$3.3 for urban areas and US\$8.1 for rural ones (Hutton and Whittington, 2015).
- 3.2 **Water, sanitation, and health.** Both sanitation and water for drinking, food preparation, and hygiene are essential for life, and deficiencies in these services increase the transmission of diseases (Howard et al., 2020), particularly among children. It is estimated that 1.6 million deaths per year worldwide can be attributed to inadequate access to WASH (Prüss-Ustün et al., 2019).⁵⁸ Of these, 829,000 deaths are diarrhea-related, 297,000 of which are in children under five years of age (5.3% of deaths in this age group).⁵⁹ The lack of adequate water and sanitation accounts for 60% of episodes of diarrhea, 13% of acute respiratory infections, and 16% of child malnutrition (Prüss-Ustün et al., 2019). Globally, access to drinking water in the home reduces episodes of diarrhea by 75% (Wolf et al., 2018), while sanitation interventions with high coverage (above 75% of the community) reduce the risk of diarrhea by 45%. Network-based solutions have a greater impact than those at the household level (40% versus 16%). The positive impact on health is further enhanced by hygiene measures⁶⁰ and health education and communication (addressing handwashing and menstrual, personal, and food hygiene).

⁵⁸ In addition to infectious diarrhea, a lack of safe water is associated with a long list of diseases. Arnold and Colford (2007); Barreto et al. (2007); Galdo and Briceno (2005); Galiani et al. (2005); Rasella (2013); Waddington et al. (2009); World Bank (2013); Setty et al. (2017); Brown et al. (2013), and Gyorkos et al. (2013).

⁵⁹ Rocha and Soares (2015) found that access to water and sanitation helps to reduce child mortality.

⁶⁰ Studies show that handwashing using soap prevents between 30% and 47% of diarrhea in children (Curtis et al., 2009) and 23% of respiratory infections (Rabie and Curtis, 2006) and that hygiene promotion—including handwashing with soap—is the most cost-effective intervention (Jamieson, Bremen, and Measham, 2006). In Latin America and the Caribbean, Gyorkos et al. (2013) found that health and hygiene education interventions in primary schools in Peru reduced *Ascaris lumbricoides* infections by 58%.

Perceptions regarding the importance of handwashing have grown, given that this is one of the main measures for preventing COVID-19 infections, among other diseases (WHO and UNICEF, 2020). The impacts of access to water and sanitation on health also have long-term effects, impacting height, body weight, years of school, future earnings, and wealth accumulation.⁶¹ A lack of water and sanitation is correlated with mosquito-borne diseases, accounting for 80% of cases of malaria worldwide (Prüss-Ustün et al., 2019). The risk of contracting dengue is higher in the population without water and sanitation, due to water storage in the home (Overgaard et al., 2016) and open-air or stagnant wastewater.⁶²

- 3.3 Water, sanitation, and education.** The significant linkages in developing countries between access to water and sanitation and educational outcomes have been widely documented (Agenor, 2011; Duarte et al., 2011). Good health and nutrition are essential prerequisites for effective learning. High incidence of diarrhea in children hinders absorption of the nutrients that they need to grow, and this can lead over time to malnutrition and irreparable impacts on their physical and mental development (UNICEF, 2021). Researchers have also found that better access to water and sanitation in schools tends to increase attendance rates⁶³ (particularly among girls)⁶⁴ and the ability of children to learn.⁶⁵ In summary, healthier children perform better at school.⁶⁶
- 3.4 Water, sanitation, and labor productivity.** There is also a correlation between the availability of water and sanitation services and productivity and incomes. A lack of water and sanitation leads to lost labor productivity as a consequence of sickness-related absenteeism or a need to care for sick children. Time spent obtaining water from sources far from the home also affects the potential for income generation. In low-density and rural areas, the greatest economic benefit of water availability is the time saved carrying water, which can be used instead for productive activities that generate household income.⁶⁷
- 3.5 Economic and employment impacts.** Water and sanitation are essential for countries' economies, as they encourage productive activities that support income

⁶¹ Zhang and Xu (2016) found that young people in rural China with access to treated water in early childhood had higher levels of schooling than those who obtained access at later stages. Bhalotra and Venkataramani (2013) identified impacts on height and student performance in Mexico.

⁶² The incidence of dengue has grown by 700% worldwide over the last two decades. Latin America and the Caribbean is one of the hardest hit regions (Howard et al., 2020). AFD (2014), Pan American Health Organization (2012), and Magrin et al. (2014).

⁶³ In Egypt, water and sanitation interventions in schools reduced absenteeism due to illnesses similar to influenza, diarrhea, conjunctivitis, and influenza by 40%, 30%, 67%, and 50%, respectively (Talaat et al., 2011). Similar results have been found by Trinies et al. (2016) and Nicholson et al. (2014).

⁶⁴ In Kenya, WASH interventions in schools reduced the likelihood of absence among girls by 58% (Freeman et al., 2014).

⁶⁵ In Brazil, children from households connected to water and sanitation systems complete 0.7 and 0.8 more years of school, respectively, than those lacking the services (Ortiz Correa et al., 2016).

⁶⁶ Bleakley (2007) found that de-worming of children in South America had a positive impact on education outcomes. Bundy et al. (2006) found that health programs in schools can increase productivity in adult life, due not only to improved cognitive abilities but also due to their impact on school participation and years of education attained.

⁶⁷ Galiani et al. (2005) found that expansion of the "Aguas Argentinas" service led to a reduction in the distance traveled to bring water to the home, and, accordingly, increased productivity. Hutton and Haller (2004), Pickering et al. (2012), and Aiga and Umenai (2002) found similar results.

generation (and employment). In Latin America and the Caribbean, every US\$1 billion invested in infrastructure projects can generate, on average, 35,000 jobs directly associated with this investment (Pastor et al., 2020).⁶⁸ Despite this, few experiences, data, or tools are available to help understand and foster the local opportunities and economic benefits generated by investments in water and sanitation. In the case of solid waste management, there is a direct impact on employment as the activity is highly operational and intensive in employment demand. It also generates formalization and training opportunities (e.g., for informal recyclers).⁶⁹ Each ton of waste handled daily requires 4.2 employees (UNEP and ISWA, 2015).

- 3.6 **Water, sanitation, and gender.** WASH interventions are tools to reduce gender gaps. Women and girls suffer more from the absence of adequate WASH systems compared to men and boys.⁷⁰ This is the result of both biological factors, such as requiring a private bathroom with soap and water for menstrual hygiene purposes,⁷¹ and social factors, as in many cultures women are responsible for collecting water or cleaning and caring for sick family members. Ensuring access to water services therefore tends to benefit women to the greatest degree, reducing their poverty levels and addressing gender inequalities (water.org, 2015).

A. Service quality and access

- 3.7 **The international agenda in water and sanitation: universal access to quality services.** The critical importance of water for human development, the environment, and the economy is acknowledged in the SDGs, which establish the goal of universal coverage in water and sanitation by 2030 (United Nations Water, 2015). The United Nations has also declared access to water and sanitation to be a human right, including the dimensions of the effective availability of water, minimum consumption levels, quality, continuity, proximity and affordability, the need to incorporate marginal segments of the urban and rural populations, and the promotion of recycling and water reuse.⁷² In terms of solid waste management, the sector's crosscutting impact on economic and social development and the environment means that it is linked to 12 of the 17 SDGs (UNEP and ISWA, 2015), and this highlights the need to improve management of these services. At the same time, several of the goals of the Paris Agreement under the United Nations Framework Convention on Climate Change relate to the water and sanitation sector.

- 3.8 **Interventions in informal neighborhoods.** The absence of services in these areas is caused by economic, institutional, spatial, social, and political factors

⁶⁸ In the United States, it is estimated that each US\$1 million invested in water and sanitation services creates an additional 10 to 20 jobs, and for each local job in the companies, 3.7 indirect positions are created that contribute to the national economy.

⁶⁹ Recyclers' earnings increase by between 50% and 100% when they organize formally (Gunsilius, 2010).

⁷⁰ Women born in years of severe drought in rural areas of Africa suffer the effects for their entire lives, growing to a lower height, receiving less education, and accumulating less wealth (Damania et al., 2017). Demie et al. (2016) in Ethiopia showed that girls and women spent between 5.23 and 2.82 hours per day seeking water.

⁷¹ During menstruation, school attendance by girls tends to diminish where schools lack adequate water and sanitation facilities (Damania et al., 2017).

⁷² United Nations General Assembly, Resolution 64/292 of 28 July 2010.

(Sinharoy et al., 2019). International experience has shown that successful interventions in informal neighborhoods include (i) comprehensive neighborhood improvement strategies and the use of alternative technologies, with careful analysis of beneficiaries' payment capacity and the determination of subsidy arrangements (Satterthwaite et al., 2020); (ii) social cohesion components aimed at improving community coexistence, participation, and the strengthening of local community organizations (IDB, 2020b); and (iii) actions to support community education and hygiene (campaigns to improve housing, waste management, handwashing, etc.) and community organization for the self-management of services (Musoke et al., 2018), taking gender approaches into account (IDB, 2014; Getachew et al., 2016).

- 3.9 **Increased focus on rural areas.** One of the measures with greatest impact that has been promoted by countries with large gaps in access has been to prioritize the formulation of policies, plans, and programs serving rural populations (both concentrated and dispersed) (WHO, 2016). International experience indicates that the following features should be included: (i) users should be involved in selecting the most appropriate solution, and the use of a gender approach is critical; (ii) the solutions effectively demanded by the population, bearing in mind their payment capacity, are sustainable and effectively utilized (IDB, 2017);⁷³ (iii) intercultural approaches should be used, with information on the socioeconomic and cultural characteristics, knowledge, attitudes, and practices of the communities relating to planned solutions (UNICEF, 2012); and (iv) in the case of sanitation, creating demand, hygiene education, and promoting the local supply of solutions are all key (World Bank Water and Sanitation Program, 2016; ECOPSS, 2014). There are financing models that have proven successful in rural areas, such as the use of microlending for the construction of individual solutions (World Bank Water and Sanitation Program, 2016). Several studies have shown that even low-cost individual solutions (such as water filters) have been effective in reducing the prevalence of disease.⁷⁴
- 3.10 **The quality of service is as important as access.** Investing in a 5% improvement in the productivity, efficiency, and quality of infrastructure services compared to current standards could increase regional growth by 3.5% of GDP over the next 10 years (IDB, 2020). The most effective practices for improving quality include (i) establishing expected quality standards through regulations and regulatory frameworks, differentiating between urban, periurban, and rural contexts; (ii) using technical, legal, and administrative tools to ensure that operators comply with quality standards;⁷⁵ (iii) a transition away from a works-focused approach to one based on the delivery and quality of services (IDB, 2020); (iv) implementing information systems to monitor service quality indicators; (v) incorporating

⁷³ This is of particular importance where the beneficiaries are indigenous communities (Spanish Agency for International Development Cooperation, 2013; Reyna, 2011).

⁷⁴ Aiken et al. (2011) and Stauber et al. (2019) provide evidence of their effectiveness in the Dominican Republic; Clasen et al. (2016) in Colombia; and Clasen et al. (2005), Clasen et al. (2007), and Lindquist (2014) in Bolivia.

⁷⁵ Statistics from Chile, Peru, and Colombia show that quality indicators have improved significantly over time (annual reports from the Superintendency for Sanitary Services (SISS) in Chile, the Regulatory Commission for Water and Sanitation (CRA) in Colombia, and the National Superintendency for Sanitation Services (SUNASS) in Peru).

- innovative systems and technologies into investments and services; and (vi) developing risk mitigation plans and adopting a resilience approach to service delivery.
- 3.11 **Innovative incentives for connectivity.** A study of the determinants of connectivity to sanitation networks in Uruguay found marked differences in the socioeconomic characteristics of connected and nonconnected households, particularly in terms of household income, home ownership, and knowledge of the benefits of the service. Depending on the origin of disincentives for connectivity, behavioral change techniques were applied to improve the population's awareness of the importance of sanitation.⁷⁶ Where constraints are technical or financial, best practices include (i) providing technical assistance and financial facilities targeted to users in need of economic support, ideally using social assistance programs operated by government agencies, as in Bolivia (Bancalari et al., 2016); (ii) providing microloans to finance home connections, as in Peru (Álvarez and Paez, 2020); and (iii) 100% financing for home connections as part of a larger-scale program.⁷⁷ Another significant factor determining connection to the sanitation network is the participation of women in household decision-making (Bancalari et al., 2016).
- 3.12 **Sanitation as a business.** The major investments required in the region, particularly in informal settlements, provide an opportunity to create work and business opportunities for vulnerable populations (with a gender approach) in both the works and service delivery stages. In different cases, private entrepreneurship has contributed to all stages of the sanitation chain, for example through the creation of markets for fertilizer production, methane, or the cleaning of latrines (Mara et al., 2010). According to Rosenboom and Ban (2017), the decision by low-income households to obtain adequate sanitation depends to a large extent on supply—i.e., the design, cost, availability, and variety of alternatives offered in the market. In many cities, markets have emerged spontaneously for the collection and transportation of household fecal sludge generated by individual sanitation solutions. These require treatment facilities and regulation, standardization, training, and monitoring to ensure safe management of sludge (successful cases in [Bolivia](#), [Haiti](#) and [Nicaragua](#)).
- 3.13 **Improving access through changes in behavior.** Changes in user behavior—defined as the adoption of appropriate behaviors—is a critical component in improving WASH access and practices (Aunger and Curtis, 2016). Such strategies, involving areas such as reduced water consumption, handwashing, menstrual hygiene, increased connectivity, and the payment of rates, should ensure the participation of stakeholders as diverse as local governments, health and education authorities, local leaders, community organizations, and families. Sustainable changes in behavior occur when the authorities have sound strategies that use a variety of different communication channels, targeting specific groups. In Costa Rica, behavioral campaigns targeting specific groups led to a reduction

⁷⁶ In El Alto (Bolivia), a social marketing strategy was implemented to increase connectivity.

⁷⁷ The Colombian National Home Connection Program (2012-2017) was implemented in 20 municipios, providing 100% subsidies for water and sanitation facilities.

in water consumption of between 3.7% and 5.6% compared to a control group (Datta et al., 2015).

B. Environmental sustainability and resilience.

- 3.14 **The risks to future development.** Sustainable development involves the intertemporal reconciliation of economic and social development, on one hand, and environmental balance, on the other (Duran et al., 2015). Avoiding the overexploitation of water resources, preventing or mitigating pollution, and the proper management of solid waste are all intrinsic aspects thereof. Resilience involves having water to satisfy all uses and preserve its quality while also taking into account issues of climate change and risk management for natural disasters (e.g., floods and geophysical phenomena)⁷⁸ when planning infrastructure.
- 3.15 **Water availability and climate change.** Understanding the impact of climate change on the availability of water resources is of paramount importance for ensuring the sustainability and continuity of drinking water services, and for ensuring that projects achieve their operational, financial, and economic objectives (OECD, 2021). Successful practices in this area have converged upon the following: (i) integrated water resource management that takes into account all of the uses and users of water in a watershed; (ii) planning of infrastructure works resilient to climate change, including green infrastructure solutions to protect water sources (e.g., reforestation, the protection of forests, riverbanks, wetlands),⁷⁹ conserve water resources (International Union for Conservation of Nature and Natural Resources, 2007), and preserve ecosystems and biodiversity; (iii) the incorporation of adaptation plans into sector management and investment plans; (iv) implementing demand management strategies, building awareness in the population, promoting changes in behavior to reduce excessive consumption, exploring alternatives for reuse, and promoting low-consumption technologies; and (v) adequate price or rate levels and structures for water and sanitation services.
- 3.16 **Quality of water resources and sanitation management.** Pollution can endanger the health of the population and compromise the effective use of water resources (United Nations Water, 2021). With highly polluted rivers, downstream regions can experience reductions in economic growth (World Bank, 2019). The physicochemical and biological quality of water is affected by industrial, agricultural, and mining effluent, and also by climate change, in addition to domestic discharges. In this sense, the expansion of sewer coverage should be the first element in sanitation plans in order to reduce the risks to health, the environment, and economic development. Good practices in this respect include:⁸⁰ (i) prioritizing investment based on the impact on the health of the population and carrying out work in stages, given the long periods required to recover investments; (ii) defining comprehensive sanitation plans with an interagency coordination

⁷⁸ Water and sanitation services can be affected by disasters caused by geophysical phenomena (earthquakes, volcanic eruptions), and even their sustainability can be affected if services are designed and built without taking into account the possible impact of such events.

⁷⁹ In 81% of cities analyzed by The Nature Conservancy (2017), green infrastructure reduced sediment and nutrient pollution by at least 10% through the protection of forests, reforestation of grasslands, and good agricultural practices.

⁸⁰ IDB (2020d), Optimal Sanitation Initiative, Discussion Paper.

mechanism that involves all the agents; (iii) defining the financing arrangements,⁸¹ with rates linked to the cost of service; (iv) developing PPPs, with shared costs and risks; (v) improving institutional performance, with better policies, regulations, and capacity-building; and (vi) implementing innovative technical solutions, including nonconventional, nature-based solutions (IDB, 2020). An important issue is coordination with stormwater drainage and solid waste management services, given the impact of this on the proper functioning of sewer and wastewater treatment systems (Ocean Conservancy, 2019).

- 3.17 **The circular economy in water and sanitation.** The circular economy is increasingly present in public policy agendas in Latin America and Caribbean⁸² and in those of the multilateral institutions. Water and sanitation operators are also beginning to incorporate its principles, although this process is still at a very early stage. Internationally, there are experiences that demonstrate the viability of reusing treated wastewater in both agriculture (the case of Israel, United States Environmental Protection Agency, 2019) and industry (Mexico, South Africa, Brazil) (Rodriguez et al., 2020), and even as drinking water (Namibia). There are also experiences in recovering energy from wastewater treatment sludges (Chile, the United States, Sweden, Mexico,⁸³ and Japan) (National Science Foundation, 2015) and phosphorus for fertilizer (the United States, Netherlands, and Denmark) (International Water Association, 2016). There is potential for creating new markets and employment opportunities and resources in sanitation to support self-sufficiency of the sector (Toilet Board Coalition, 2016). In general, the transition to a circular economy requires (i) fostering the participation of the population, working to change habits and behavior, streamline consumption, improve payment cultures, and reduce, reuse, and deliver solid waste separated at the source; (ii) changing user perceptions of the reuse of water for production activities and of nature-based solutions for wastewater treatment; and (iii) strengthening regulatory frameworks (such as Chile's Circular Economy Roadmap (Ministry of the Environment of Chile, 2020)), institutions, and monitoring and control, and promoting new technologies.
- 3.18 **The impact of water and sanitation on climate change.** In the case of solid waste, there is clear potential to mitigate climate change by using low greenhouse gas emission technologies to collect waste, and through the active capture of biogas from sanitary landfills. Seven countries in the region have included circular economy actions in their updated NDCs (Platform for Accelerating the Circular Economy, 2021). One policy instrument used by cities to establish programs and targets to reduce emissions (including solid waste and wastewater management) is the Climate Action Plan. In the sector, countries need to take the following steps: (i) build institutional capacity to improve emissions reporting and monitoring; (ii) incorporate greenhouse gas mitigation measures into projects, consistent with local realities and capabilities (including green skills) and targets in the countries' NDCs; (iii) revise criteria, processes, and arrangements for executing and

⁸¹ There are successful models from countries both in the region and beyond. In Mexico, wastewater treatment coverage grew by 48% based on a significant injection of resources by the federal government. Similar arrangements were used in Brazil and developed nations in North America, Europe, and Asia.

⁸² Mulder and Albaladejo (2020).

⁸³ The WWTP in San Luis Potosí, Mexico, generates power for both internal consumption and sale, having generated savings of US\$18 million over a six-year period (World Bank, 2017).

- operating services; (iv) explore links between the sector and other sectors in terms of contributions; and (v) coordinate with bodies that are directly or indirectly involved in the sector and linked with climate change issues (environment, energy (International Energy Agency, 2018), agriculture, (United Nations Food and Agriculture Organization, 2011), solid waste, industry, tourism, mining, etc.).
- 3.19 **Climate change and disaster risk management.** Phenomena such as droughts, flooding, or even the COVID-19 pandemic affect the ability to provide services.⁸⁴ Although a risk-based approach is recommended to plan for these events (OECD, 2013), most operators still respond in an ad hoc manner, with little planning (Buurman et al., 2016). Lines of activity include: (i) developing tools to design projects that take climate change into account in hydrometeorological variables, improving data to forecast the risk, frequency, and intensity of extreme events (Hallegatte et al., 2017); (ii) using new approaches to planning infrastructure (e.g., robust design and dynamic routes for adaptation policies) (Roson and Sartori, 2012); (iii) better understanding the physical and economic impact of disaster and climate change risks and the adaptation and mitigation measures⁸⁵ by region and economic sector;⁸⁶ (iv) incorporating risk management into infrastructure standards, master plans, and design (OECD, 2013); (v) designing climate resilience indicators at the project level and extracting lessons learned from the measures implemented (Grunwaldt et al., 2021); and (iv) implementing nonstructural measures, such as early warning systems, contingency plans and disaster risk management (including for droughts), and institutional strengthening.⁸⁷

C. Sector financing and governance

- 3.20 **Strengthen long-term sector funding arrangements.** There is international consensus regarding the importance of increasing investment in water and sanitation, particularly with respect to sanitation (paragraphs 2.1-2.3). Obtaining the resources necessary to meet the [SDGs](#) depends on the effective channeling of funding from the government (budget resources, multilateral/bilateral or private financing, or grants) and users (rate payments). Notwithstanding the call to improve the stability and sufficiency of public subsidies—which would avoid incentives for direct political interference and undesirable behaviors and incentives on the part of the companies (Ducci and Krause, 2013)—it will be key to adopt rate policies that at least cover operating and maintenance costs. International evidence shows that the stability and sufficiency of government contributions depend on (i) prioritization of the sector in government policies; (ii) the macroeconomic situation; (iii) the capacity of service providers and lead agencies to effectively plan investments and develop programs and projects; (iv) the

⁸⁴ The drought experienced in São Paulo (Brazil) from 2013 to 2015 had a significant economic impact as did recent droughts in Australia and California. See Andrade (2016), Milano et al. (2018), and De Nys et al. (2017) for analysis of the Brazilian case; Lund et al. (2018) for California; and Buurman et al. (2016) for the management of droughts in 10 major cities around the world.

⁸⁵ The Water Resource Adaptation Plan in Chile and the National Climate Adaptation Plan in Colombia.

⁸⁶ See ECLAC studies (2009) in Chile, for example.

⁸⁷ In 2013, Mexico launched the National Program Against Droughts. The programs and actions to address the conditions of each watershed are agreed with the local authorities (Arreguín-Cortés et al., 2016).

capacity to effectively execute resources; and (v) the introduction of transparency measures governing the management of resources.

- 3.21 **Adequate rates.** International experience shows that the sustainability of services depends to a large extent on whether rates are gradually adjusted to meet the efficient long-term cost of service delivery, particularly in urban areas.⁸⁸ This process is feasible when rates are properly combined with targeted subsidies (Lentini, 2015). An analysis for Latin America and the Caribbean (Ducci and García, 2013) shows that the leading water and sanitation companies are those with rates that most closely reflect their costs. In the case of the most underdeveloped companies, the high reliance on direct, unstable government transfers to cover operating and maintenance costs is notable. The real opportunities to increase revenue from this source depend on factors such as (i) reducing political interference in the setting and enforcement of rates; (ii) a well-developed, effectively applied regulatory and control framework; (iii) the macroeconomic situation; and (iv) the existence of an effective, complementary system of subsidies. In the case of solid waste, and also for industrial users of wastewater, service charges should be based on the “polluter pays” principle, preferably as a function of the volumes generated. Successful experiences of charges for solid waste services have been seen in the United States and European Union (Morlock, 2017), as well as in Colombia (rate system that covers all costs, provides for the future closure of final disposal sites, and includes a recovery component that can be accessed by recyclers who are formalized as providers of this service). Direct fee mechanisms for solid waste can be directly administered by the provider while encouraging reductions in waste generation and improving waste separation by the population. They often also lead to budget savings in the public sector.
- 3.22 **Better targeting of subsidies.** Most subsidies are channeled to water, urban areas, and network-based services. A better balance between services (water and sanitation), geographic areas (urban and rural), and type of service would enhance the benefits of subsidies, while the use of technological innovation would help to improve targeting (Andres et al., 2019). Best practices in design suggest that⁸⁹ (i) subsidies should target families who encounter real difficulties in paying their bills (in indigenous communities, targeting by geographic area is recommended to avoid adverse impacts on the social fabric); (ii) targeting mechanisms should be transparent, objective, determined by stakeholders other than the operator, and updated regularly to minimize errors of inclusion and exclusion; (iii) determination of the subsidy should be simple and comprehensible to users; (iv) system costs must be efficient (e.g., use of databases and general use criteria for public policies); (v) funding should be stable and sufficient, flowing from users with higher payment capacity (cross subsidies) and/or government budgets (direct demand subsidies); and (vi) direct financing mechanisms for supply are desirable only where they can be regionally targeted (e.g., for rural or periurban areas) or used where externalities are present due to environmental or health problems (results-

⁸⁸ Water and sanitation operators belonging to subnational governments in Colombia exhibit worse performance when they are financed to a greater degree by transfers rather than own revenues (Development in the Americas, 2018).

⁸⁹ Subsidy systems with these types of characteristics have been used for more than 20 years in Colombia and Chile. See Lentini and Ferro (2014).

based financing programs have been shown to improve the impact of state investment ([Sanitation and Water for All, 2020](#)), such as the Municipal Incentives Program in Peru).

- 3.23 **Access to credit and capital markets.** Despite the constraints on access faced by many developing economies and on the capacity to absorb financing and prepare proposals considered bankable by many lenders, the region needs to improve the access of water and sanitation companies to credit and capital markets (Alaerts, 2019). Successful cases of companies that have accessed local and international capital markets include Chilean companies⁹⁰ and public enterprises in Brazil and Colombia (e.g., SABESP in São Paulo, which has been listed on the New York Stock Exchange since 2002, as well as Empresas Publicas de Medellin and Companhia de Saneamento de Minas Gerais in Belo Horizonte).⁹¹ As providers improve efficiency and adopt better corporate governance, transparency, and accountability practices, their eligibility to access these markets without sovereign guarantees will improve (Vargas and Cuellar, 2019). There is also a need to continue developing project finance structures that mitigate risk and attract investors from markets with appetite for long-term debt and stable returns. For investments that offer climate change adaptation and mitigation benefits, international climate funds (e.g., the Green Climate Fund, Adaptation Fund, World Environment Fund, and Climate Investment Funds) represent an opportunity to access concessional resources. There has been rapid, sustained growth in the appetite of institutional investors for climate financing, and in 2019 a record total of US\$259 billion in green bonds was issued,⁹² mainly in the United States, China, and France. The water and waste sectors received 9% and 3% of these resources, respectively (in the region, Aguas Andinas and ESVAL (Chile) issued green bonds in 2019).⁹³
- 3.24 **Improved sector governance.** Gaps in governance are one of the most common hurdles to the implementation of water and sanitation policies (Menard et al., 2018). In this respect, Bayu et al. (2020) found that while inequalities in access to sanitation in developing countries are influenced by the social and political dimensions of governance (e.g., government effectiveness), inequality in access to water is strongly affected by economic aspects of governance (such as the absorption of domestic funds or grant resources). This has led to the unequal prioritization of water and sanitation in developing nations. At the same time, the mechanisms established by societies and governments to manage solid waste have not developed at the same pace as those for water and sanitation (Nichols and Smith, 2019). One paradigm in the provision of public services is the separation of government functions and powers between different entities—with operators focusing on services and other entities responsible for formulating policies and standards and regulating services.⁹⁴ Experience indicates that this

⁹⁰ Following privatization, these companies tapped the stock markets and issued medium- and long-term bonds in local currency, financing more than 80% of their investments in this manner.

⁹¹ See Velez (2013) for the case of Empresas Públicas de Medellín and Cuéllar (2009) for that of SABESP.

⁹² The total cumulative amount since these issues began in 2007 is US\$754 billion.

⁹³ Aguas Andinas issued local-currency green bonds for the second consecutive year in 2019, in the amount of US\$83 million. The maturity was 25 years and the interest rate was 2%.

⁹⁴ This model has been successful, for example, in Chile, Colombia, Brazil, Peru, and Jamaica.

concept has not always been successful, and that each country should consider an ad hoc model of organization with certain basic features:⁹⁵ (i) strengthening the institutional framework through sector laws; (ii) securing permanent resources through high-level directives; (iii) ensuring training programs are available; and (iv) reducing interference by vested interests (unions, private sector associations, bureaucracies, politicians, contractors, etc.).

- 3.25 **Strengthening sector leadership and regulation.** Core government functions include establishing guidelines for sector development, setting policies and standards, planning at the national level, establishing information systems,⁹⁶ allocating resources, and determining approaches to service management. Successful countries⁹⁷ that are illustrative of good practices in the sector have entities governed by clear legal frameworks and mandates, substantial and regular budget resources, and qualified staff of high rank within the government structure. These features determine the sector's priority within the national agenda and the resources that are allocated to it. Support also needs to be continued for the creation and strengthening of regulatory bodies (to ensure that they have the autonomy and technical capacity necessary to apply regulations that ensure general service sustainability); the implementation of rigorous, technically sound rate regimes; preparation of optimal investment plans; improvement of information systems;⁹⁸ and the creation of communication and participation processes for citizens as direct beneficiaries of the service.⁹⁹ Given the poor performance of public operators and the prevalence of this problem in the region, support should be provided for a more clear definition of regulatory arrangements and their role in these cases. Another important issue, particularly in the rural sector, is the availability of systems for monitoring service access and quality levels, as undertaken in Chile, El Salvador, and Honduras (Smits et al., 2013).
- 3.26 **Economies of scale in services must be restored.** High levels of service decentralization, particularly at the municipal level, have in many cases highlighted weak performance and efficiency losses, increased transaction costs, and difficulties in control and regulation.¹⁰⁰ Some successful experiences have fostered the integration of municipios into leagues of municipal governments (Bolivia, Smits et al., 2012) or the regionalization of service delivery (Guajira, Colombia), the introduction of partnership arrangements (Brazil's Integrated Rural Sanitation

⁹⁵ See Hantke-Domas and Jouravlev (2011). See OECD (2011) for reforms in Eastern Europe and Central Asia.

⁹⁶ According to the OECD (2017), improving the quality of information available leads to improvements in labor efficiency.

⁹⁷ Peru and Colombia provide successful cases of sector leadership. In Chile, decisions are successfully channeled by the regulatory body or by the Empresa Concesionaria de Servicios Sanitarios, S.A. [Sanitary Services Concession Company].

⁹⁸ Andrés, Schwartz, and Guasch (2013).

⁹⁹ Civil society plays a key role in sector governance (e.g., the Development and Social Control Committees for Residential Public Services implemented in Colombia in the 1990s).

¹⁰⁰ Hantke-Domas and Jouravlev (2011), Ferro and Lentini (2010), and Mercadier et al. (2016) have performed empirical analysis of the issue of economies of scale in water and sanitation, which are present not only in works but also in operations and administration. Ferro (2017) presents a review of the literature and cases in the area from around the world.

System), or the creation of rural community boards or committees.¹⁰¹ In the United Kingdom, Netherlands, and Chile, regional companies have been created with positive results. The process of consolidation of regional companies in Brazil is incomplete, while Colombia has attempted to consolidate its highly fragmented sector on several occasions, with limited success. In Peru, the topic has been the subject of considerable debate, leading to the reintroduction of regional companies. The regionalization of waste management, in which two or more municipios share resources and facilities (a landfill serving several municipios), has been the most significant change in the United States, Japan, and the European Union in the last 30 years.¹⁰² Colombia, similarly, has improved final disposal and the control of operations as a result of the regionalization policy adopted in 2003.¹⁰³

- 3.27 **Transparency and corruption.** The international community has been examining the role that transparency plays in management of the sector.¹⁰⁴ One important lesson of the reforms in the region is the influence that information management, transparency, and governance practices have on the efficiency and quality of services (Adam et al., 2020). Corruption in water and sanitation can compromise government objectives in at least three ways: (i) distorting the structure of project expenditure and design; (ii) inflating costs; and (iii) delaying and lowering the quality of infrastructure and services: in extreme cases, preventing the completion of projects or requiring the same works to be contracted several times. An analysis of public procurement in water and sanitation in six Latin American and Caribbean countries between 2006 and 2018 (Adam et al., 2020) suggests: (i) improving the quality and scope of information on public procurement; (ii) introducing corruption risk analysis for micro-level decisions (e.g., audit) and at the sector policy level (e.g., for the supervision and control of services); (iii) introducing mechanisms for monitoring procurement costs; and (iv) investing in reforms to public procurement systems to effectively lower the cost of corruption.

D. Management of services and private participation

- 3.28 **Improving management in state-owned enterprises.** Water and sanitation services are generally provided by state-owned enterprises belonging to national, regional, or municipal governments. Through these companies, governments receive the economic, political, and social benefits generated by these activities, but also shouldering the costs of poor management or abuse (OECD, 2018). Numerous studies¹⁰⁵ show that effective management of a state-owned enterprise

¹⁰¹ Several countries have successfully used this model, such as Paraguay, with its associations of sanitation boards, and Ecuador, with the Network of Social Community and Community Water Management Organizations.

¹⁰² In the United States, the number of final disposal sites fell from more than 10,000 in 1980 to around 600 regional sites currently; this has led to an increase in the quality of operations and increased economies of scale.

¹⁰³ The number of sites in Colombia fell from 776 in 2005 to 308 in 2018 (Asociación Nacional de Empresas de Servicios Públicos and Comunicaciones de Colombia, 2021).

¹⁰⁴ In June 2015, the OECD Ministerial Council ratified the Principles on Water Governance (OECD, 2015).

¹⁰⁵ Cuellar (2019); OECD (2017); Andrés, Guash, and Azumendi (2011); Hankte-Domas and Jouravlev (2011); Velez (2013) compares the development of two public water companies in Colombia (EPM and EMCALI) in which performance has diverged significantly due in part to the degree of autonomy in decision-making.

- depends to a large extent on (i) management autonomy (including financial resources); (ii) clarity of objectives and appropriate corporate governance arrangements;¹⁰⁶ and (iii) adequate transparency and accountability (regulatory accounting, user participation, etc.).¹⁰⁷ These companies would also improve their productivity by transforming the gender aspects of processes, such as existing gender roles and norms and decision-making structures.¹⁰⁸
- 3.29 **Increasing the efficiency of service delivery.** International experience demonstrates that financial and management autonomy can be improved through projects focused on issues such as (i) reducing NRW¹⁰⁹ and improving metering and billing, with the use of results-based management contracts;¹¹⁰ (ii) improving commercial management in billing and collection processes;¹¹¹ (iii) using energy efficiently, particularly where systems are reliant on pumping drinking water and wastewater (this has a large impact on costs in the Caribbean region, where such systems can account for up to 50% of operating costs), as well as the implementation of energy efficiency measures, which can reduce energy costs by between 20% and 40% (Limaye and Welsien, 2019) and thus help to reduce greenhouse gas emissions; (iv) improving medium- and long-term technical and financial planning and fostering process automation; and (v) promoting asset management and preventive maintenance policies for infrastructure, aimed at maximizing useful life (United States Environmental Protection Agency, 2011; Asian Development Bank, 2013).
- 3.30 **Boosting labor productivity.** Labor productivity is a critical issue for operator performance, as staff costs are usually an important percentage of overall operating costs.¹¹² This relates to the need to implement programs to develop and consolidate employees' functional skills. One successful case is the Skills Accreditation Program developed in Colombia, which helped to professionalize staff in technical positions, as well as base-level staff. Developing digital technologies also requires water and sanitation operators to adapt and acquire new skills (reskilling and upskilling). In addition to recruiting new employees familiar with the technology, operators need to train existing employees to ensure that they can adapt to new knowledge requirements, maintain business continuity, and avoid service disruptions (Glenn et al., 2019).
- 3.31 **Private sector participation.** Boosting PSP in these services is crucial for increasing access and improving the quality and efficiency of services

¹⁰⁶ Andrés et al. (2018) found a positive correlation between corporate governance and performance in state-owned water and electricity enterprises in Latin America and the Caribbean.

¹⁰⁷ The quality of corporate governance and transparency in water and sanitation companies and regulatory and supervision entities is one of the determinants of their performance (Cuellar, 2019).

¹⁰⁸ See Hunt, Vivian et al. (2015); Ernst and Young (2016); Catalyst (2013); and Noland, Marcus et al. (2016).

¹⁰⁹ The difference between water produced and water billed to users.

¹¹⁰ Van den Berg (2014) analyzed the determinants of NRW in 68 countries. Wyatt et al. (2016 and 2018) analyzed the effectiveness of these contracts in New Providence, The Bahamas, finding that results-based management contracts are advantageous where losses are high, large reductions are needed, and water is expensive.

¹¹¹ Jourdain (2011) offers a tool for this purpose.

¹¹² Leading companies worldwide have around 1 employee per 1,000 connections and outsource a large number of activities. Between 2 and 3 employees per 1,000 connections is considered reasonable.

(incorporating new practices and technologies).¹¹³ Although PSP in water and sanitation in past decades failed to meet initial expectations for investment financing,¹¹⁴ it did help to improve efficiency and quality¹¹⁵ in water and sanitation services ([IDB, 2021a](#)). PPPs can be effective for implementing innovative technologies (e.g., NRW reduction). In the institutional sphere, the existence of a clear regulatory and policy framework and institutions with strong supervision capabilities are necessary conditions for the success of these processes ([IDB, 2021a](#)). Successful experiences indicate the need to take the following factors into account when structuring these types of projects (IDB, 2021a): (i) high demand for capital over short periods of time and the likelihood that this will be met by either the government or the private sector; (ii) political volatility due to the decentralized nature of these services; (iii) the population's social perceptions, economic capacities, and willingness to pay, particularly in the case of sanitation and wastewater treatment; (iv) the appropriate distribution of responsibilities and risks between public and private stakeholders; and (v) measurable service levels and performance indicators. Lastly, studies indicate that PSP increases when corruption is reduced, the rule of law applies, and good quality regulations are in place (Kogan and Bondorevsky, 2016). In addition to the institutional framework and proper structuring of contracts, the experience, reliability, and technical and financial capabilities of the private partner are key to meeting contractual obligations and performance standards.

- 3.32 **The role of the community in service delivery in rural systems.** Internationally, the most common management model in rural areas involves communities assuming responsibility for operating and maintaining systems.¹¹⁶ Case studies suggest the importance of the following features as part of the community operator model:¹¹⁷ (i) legal recognition, (ii) appropriate regulatory frameworks, (iii) post-construction support arrangements through municipal or other operators (Smits, 2014), (iv) performance monitoring, and (v) capacity building. Community involvement in planning interventions (such as the design of rate structures, selection of technologies, and location of infrastructure) is key for good management performance.¹¹⁸ There are mechanisms for social participation and oversight (e.g., public hearings or consultations) in special circumstances, such as the approval of work plans or rate increases, while there are also venues for the participation of local authorities where national, regional, or state operators are

¹¹³ Based on data from more than 1,200 water and electricity operators in 71 developing countries, Gassner et al. (2009) found that operators with PSP increased the number of residential water and sanitation connections by 12% and 19%, respectively, and raised daily service hours by 41%.

¹¹⁴ See Ducci (2007) for details of the performance of international operators in Latin America and their exit from the market.

¹¹⁵ Bonifaz and Itakura (2014) found that private water and sanitation companies achieve better results than state-owned ones. Barrera-Osorio et al. (2009) found positive effects of privatizations on consumer welfare in Colombia. Lambert (2019) studies privatization of water and sanitation in Guayaquil, Ecuador.

¹¹⁶ USAID (2020) provides a review of the literature on the management of rural water and sanitation systems.

¹¹⁷ For a comprehensive analysis with experiences in Latin American and Caribbean countries, see Mejía et al. (2016).

¹¹⁸ See Development in the Americas (2020) and IDB (2019) for the cases of Paraguay and Peru.

concerned, as well as nongovernmental organizations involved in consumer protection.¹¹⁹

E. Innovation

- 3.33 **Innovation governance in water and sanitation.** Policies have been implemented in different regions to promote innovation in the sector, either directly¹²⁰ or as part of national innovation strategy.¹²¹ Some countries have developed specific regulations to encourage innovative technologies to improve processes,¹²² and regulators have an excellent opportunity to establish rules, mechanisms, and tools that stimulate innovation (Sherman et al., 2020). Singapore, the Netherlands, the United Kingdom, and Israel are world leaders in sector technology and policy innovation, providing responses to local challenges that integrate both of these spheres.¹²³
- 3.34 **Research, development, and innovation.** A key success factor for reversing the lack of research and development in the sector is to provide incentives for linkages between stakeholders in the innovation ecosystem. In tandem with other reforms (institutional, regulatory, etc.), Israel has fostered the creation of an innovation triangle to facilitate interaction between entrepreneurs (who contribute new ideas and technology), the government (financing), and operators (testing and implementation) (Marin et al., 2017). The private sector can play a role in promoting innovation in service provision, as well as through modalities such as results-based contracts (e.g., NRW reduction in The Bahamas) (IDB, 2018).
- 3.35 **Innovation can help to reduce the access gap in rural and periurban areas.** Technical and social innovation can transform WASH provision and operations and maintenance, particularly in informal and rural areas where conditions are difficult and solutions are few. There are technologies, commercial models, and financial products on the market that can help to ensure that services are provided in a safe and affordable manner. Technical innovations are already being used in Latin America and the Caribbean, such as off-grid solutions that use solar energy to extract water from the air, which can be implemented in remote communities [in very dry areas](#). Innovative and effectively priced products designed for nonconventional contexts can make water and sanitation services affordable for the most vulnerable groups.¹²⁴ Innovative private sector approaches can also help

¹¹⁹ Several countries, such as Paraguay and Colombia, are strengthening public consultation processes before starting works, ensuring community participation and ownership of the infrastructure.

¹²⁰ In Europe, innovation associations have been created as high-level working groups that develop policy design recommendations for the European Commission and are aimed at determining RDI priorities, focusing efforts, and avoiding duplication. The European Innovation Partnership on Water is one of these groups.

¹²¹ Spain has designed a Country Science, Technology, and Innovation Strategy 2020, and the Ministry of Economy and Competitiveness has set strategic objectives for innovation in water.

¹²² The Pollution of Surface Waters Act in the Netherlands (European Commission, 2018a) and the proposed regulation in the European Parliament on water reuse are driving innovation in wastewater treatment (European Commission, 2018b). Europe has a plastics strategy that favors innovation in design, production, use, and recycling (European Commission, 2018c).

¹²³ See McKinsey (2019) for the case of Singapore, and the Israel Institute of Technology (2016) for the case of Israel.

¹²⁴ For example, SOIL provides the most economic form of safely managed sanitation to poor population groups in Haiti using a container-based system (Coates and Gray, 2020).

to alleviate water stress, particularly during emergencies and in special circumstances such as COVID-19.¹²⁵

- 3.36 **Modernization of infrastructure through digital technology.** Digital technology is a powerful agent of change for infrastructure. Examples are the adoption of remote sensors (satellites, drones), real-time monitoring of assets (Karmous-Edwards and Sarni, 2018), client loyalty (continuous access and close communication), predictive supply and demand analytics (Timón and Fontes, 2017), artificial intelligence (asset management), augmented and virtual reality (repair and training) and cybersecurity (access to information and distribution services) (Water Finance and Management, 2018). There have been successful examples of the use of these technologies in Spain and several European countries. In solid waste management, different alternatives are continuously being tested in logistics, monitoring, control, and technologies (Minatta and Basani, 2020) that could alter operating conditions and competition. These include dynamic routing, predictive and preventive maintenance, remote control automated systems using global positioning systems (GPS) or radio frequency identification (RFID) with the support of mobile apps, robotics for separation activities in recycling stations, and autonomous vehicles for reducing accident rates and maximizing collection efficiency.
- 3.37 **High-impact technologies for improving service management efficiency.** Digital technological transformation in both systems and processes can reduce operating expenditure by public service providers—including water and sanitation companies—by as much as 25% (McKinsey & Company, 2018). Internationally, digitalization in the sector has driven operating gains of up to 25%, lowering water supply failures by around 30%, reducing the time taken to repair broken pipes by 8%, and increasing the reliability of data to almost 99%, all thanks to precise, real-time readings provided by smart sensors (WaterWorld, 2020). New approaches are also being implemented in solid waste management (for collection, logistics, waste treatment plants, business models, and data tools) (Sarc et al., 2019). Systems with smart recycling are contributing to the development of new mechanisms for financing infrastructure and water management.¹²⁶ Other innovations are occurring in proven technologies that are already in use. Such is the case of desalination, where technological advances are expected that could lead to a significant decline in the cost of producing drinking water through reductions in power consumption (by 20% to 35%) and capital costs (by 20% to 30%), improving process reliability and flexibility (Glenn et al., 2019).

¹²⁵ In the case of Caye Caulker in Belize, the company Zero Mass Water installed hydropanels before COVID-19 that provide water in periods of scarcity; this solution—part of an IDB initiative with the Ministry of Tourism and Civil Aviation—to install 23 hydropanels produces up to 911 gallons of drinking water per month.

¹²⁶ Barcelona implemented an initiative prior to adapt environmental taxes in urban districts (levied through water bills) based on their recycling rates (Minatta and Basani, 2020).

- 3.38 **Smart management in water and sanitation.** Digital technologies can become catalysts for modernizing infrastructure and improving the service efficiency in water and sanitation (Glenn et al., 2019). The concept of the Internet of Water involves the open sharing of integrated sector data to facilitate decision-making processes (The Aspen Institute, 2017). Innovations in data science (Big Data) and augmented intelligence techniques¹²⁷ allow an understanding of the operational situation or monitoring of its quality, almost in real time. The combination of smart measurement and the Internet of Things is key for developing water management systems that serve consumers and help companies to improve sustainability and strengthen processes for detecting leaks, controlling consumption, monitoring river water quality in real time, or forecasting its availability under various climate change scenarios (O’Callaghan, 2020). In the case of solid waste collection and management services, the United Kingdom and Japan have internet-based systems that recognize who is recycling, the type of waste, and when bins are full. In Spain, Italy, and the Republic of Korea, there are smart bins that recognize the user by means of a radio frequency identification reader¹²⁸ on the lid (Minatta and Basani, 2020). The Republic of Korea has smart, solar-powered bins with automatic compacting that have reduced costs by as much as 80%. Waste recovery facilities in Finland are also using robots in plants to separate waste more efficiently (ISWA, 2019).
- 3.39 **The digital workforce.** The region needs to understand how the digital workforce will be integrated into water and sanitation companies (Abbatiello et al., 2017). Robots and artificial intelligence do not involve replacing workers; smart automation can increase labor productivity (Glenn et al., 2019). Tutoring, mentoring, and access to timely information on education and professional options tailored to age group can be of great value in helping to develop the skills that will be demanded by operators (IDB, 2020c). Intensive training workshops have been highlighted as a promising model to help overcome the challenges of refining and adapting digital skills in an efficient and cost-effective manner.
- 3.40 **Cybersecurity.** Public utilities have essential infrastructure that is critical for human development. Cybersecurity will therefore be an issue of high priority as these companies move toward digitalization of their operations, and will be important for mitigating risk perceptions regarding the use of cloud-based solutions. However, operations will need to be constantly strengthened with through new cybersecurity solutions (Clark et al., 2017).
- 3.41 **New technologies and changes in behavior.** Smart meters can encourage changes in behavior that conserve water by improving information and providing feedback on household consumption. Beal and Flynn (2014) show how in Australia the implementation of smart meters can lead to reductions of as much as 10% in water demand. Daminato et al. (2021) found that households in Tenerife (Spain) reduced water consumption by 2% as a result of a meter installation program using smart measurement technology that allows users to monitor their daily consumption and receive feedback in real time through an online portal.

¹²⁷ “Augmented intelligence” refers to the process of increasing human capabilities by combining them with technology.

¹²⁸ This allows remote meter reading so that operators can obtain information remotely, while clients can also see their usage online and receive alerts regarding any problems.

- 3.42 **Culture of innovation in service providers.** The shift in paradigm involves a holistic approach that includes regulations and administrative and cultural processes,¹²⁹ based on incentives and shared leadership. Given their RDI requirements, coordination by water and sanitation operators with providers of goods and services able to support their innovation efforts will be of central importance.¹³⁰

IV. LESSONS LEARNED FROM THE IDB GROUP'S EXPERIENCE IN THE WATER AND SANITATION SECTOR

- 4.1 The analysis of lessons learned is based on a review of 34 sovereign-guaranteed INE/WSA loan operations and 9 INE/WSA investment grants completed during the 2017-2020 period (**Table 2** and **Table 3**), as well as three IDB Invest operations (**Table 4**) and two IDB Lab operations (**Table 5**). It also includes a review of lessons learned from the design and execution of 19 technical cooperation agreements associated with various INE/WSA initiatives (**Table 6**). A lesson learned for the financing of sovereign-guaranteed operations is the importance of adopting a comprehensive approach that goes beyond the construction of infrastructure to include aspects of equity of access; governance; the management of services; financial, social, and environmental sustainability; and innovation, thereby improving sustainability. IDB Invest highlights the importance of coordinating and collaborating with the IDB and the Country Offices to provide support with non-sovereign guaranteed operations. These lessons highlight the value added that the IDB Group has been generating in the sector in such areas as the improvement of the governance framework and operator management, the availability of information for policy formulation and investment planning, the incorporation of approaches to climate change adaptation and mitigation into the sector policy agenda and project design, the promotion of innovation and digital transformation of the sector and its catalytic role for resources from other lenders and donors, and the factors that come with its presence on the ground in the countries, the allocation of technical cooperation resources and the development of tools and knowledge products that enable the countries to formulate policies and develop projects more effectively. The details of the lessons learned and the related operations can be found in **Table 7**.

A. Lessons aligned with service quality and access

- 4.2 **Progress in eliminating gaps requires increased investment in sanitation and the expansion of services beyond the residential sector.** To eliminate gaps in access, the Bank has promoted the development of infrastructure projects, particularly in the area of sanitation, where the region faces the greatest challenges. Access to sanitation—including wastewater treatment and adequate solid waste management—requires not only increased investment but also long-term planning and support. This, in turn, requires governments to continue prioritizing the sector over time, with a holistic approach to investment, institutional

¹²⁹ Three of the five primary internal factors that inhibit the adoption of innovation are directly related to culture (Speight, 2015).

¹³⁰ Water companies in France are members of “competitiveness clusters” (Dream: Eau & Milieux, Aqua-Valley, and Hidreos). Sydney Water is another example of managing innovation. Another example is Mekorot WaTech, an open innovation management platform belonging to Israel’s national provider.

- strengthening, and financial sustainability. The experience acquired has shown that the most effective interventions are those executed in phases, with a view to achieving expected objectives over the long term. In order to achieve universal access, it will also be essential to extend the scope of services beyond the residential sector, serving schools, health clinics, and other public facilities.
- 4.3 **Programs must include measures to improve the quality of services.** Most water and sanitation programs include interventions to improve the quality of services, and this should be achieved by rehabilitating systems together with actions to strengthen management. Potability is one of the key aspects of safe access to water services, particularly in rural programs, and it is therefore essential to include specific measures to support this.
- 4.4 **The socioeconomic and cultural characteristics of beneficiaries must be considered when attending to the most vulnerable population segments.** The Bank has focused its interventions on the most disadvantaged areas, both at the regional level (especially rural) and in socioeconomic terms. Tailoring programs to local contexts (cultural, social, economic, and political) allows better technologies and solutions to be selected, encouraging sustainability and ownership of the services. In programs that involve resettlement, these considerations are key for the success of these processes.
- 4.5 **Incentives for connectivity must be introduced.** Higher effective connectivity rates have been seen in projects that have included actions to encourage connectivity to sewer systems, especially for low-income populations. Economic, cultural, and social dimensions should be analyzed and should guide proposed arrangements. Financing is the most frequently used incentive for connection, but other incentives may be more appropriate depending on the context. Institutional issues should be clearly defined to maximize impact, ideally with programs directly led by service providers to ensure more efficient implementation, or with clearly established coordination mechanisms.
- 4.6 **Hygiene education and social awareness-building are key for ensuring that investment has a positive impact.** Traditional environmental education or awareness-building programs for users have evolved into behavioral change programs. These programs develop strategies to achieve appropriate user behavior in the long term, in terms of the use of facilities, rate payments, separation of waste at the source and its proper presentation for collection, handwashing, etc. The implementation of these actions in schools has had good results. Gender considerations in these campaigns are key to ensuring their success, enabling the understanding of problems and identifying specific priorities for each of the groups in the community and developing solutions tailored to their needs.
- B. Lessons aligned with environmental sustainability and resilience**
- 4.7 **The environmental sustainability of water and sanitation services requires an integrated water resource management approach to planning and investment.** It is essential that the hydroenvironmental dimension of watersheds be addressed as part of the planning and implementation of water and sanitation interventions, particularly through the introduction of measures to improve and conserve water resources. These measures may include improving planning; implementing one-off, low-cost measures; or carrying out sanitation infrastructure

works such as the rehabilitation of WWTPs and sewer systems to minimize the contamination of water bodies and ensure long-term sustainability.

- 4.8 **Investing in the resilience of services is increasingly critical.** Support for risk management by operators is key; this normally involves preparing emergency or contingency plans and training staff in technical issues that help to improve management during water insecurity events.
- 4.9 **There is a strong link between water and sanitation management and climate change.** Countries are increasingly developing lines of activity relating to climate change and adaptation in the water and sanitation sector. These actions should include drafting environmental protection laws that take climate change issues into account (such as in The Bahamas), the design of specific regulations to mitigate its impacts, and the inclusion of these issues in the design of works. In this area, the Bank has played a central role in supporting the countries both in the analysis of the impacts of climate changes and in the incorporation thereof into investment planning.

C. Lessons aligned with sector governance

- 4.10 **Solving water and sanitation problems requires long-term support and planning.** Political prioritization, together with long-term planning and financing, is key for ensuring the continuity of investments. Policy-based loans have been a satisfactory mechanism for bringing about regulatory and institutional changes that have strengthened the sector. Building community awareness of reform measures and validating them is key for achieving consensus among stakeholders and improving coordination between institutions. Likewise, phased programs facilitate long-term planning and allow institutional arrangements to mature. The design of framework plans allows general lines of activity to be developed, with interventions implemented in stages thereafter to facilitate more efficient execution. In contrast, a lack of strategic planning leads to the underutilization of infrastructure, accompanied by maintenance challenges.
- 4.11 **Support should be provided to strengthen sector institutions.** Strengthening institutional capacity at all levels is key for policy implementation, the successful structuring and execution of programs, and the sustainability of services. Support should include the strengthening of regulators, institutions to provide technical assistance, and providers. Experience indicates that weak capabilities—particularly at the municipal level—hinder the achievement of results. The Bank's value added has been reflected in including the issues of gender and diversity, climate change, and innovation on the policy reform agenda. Through the development of specific programs and policies in these areas, gender equity has been promoted and plans have been made on the basis of climate considerations.
- 4.12 **Information management and monitoring systems are important.** The Bank has supported the design and implementation of information systems, which are particularly important in rural areas where the lack of information is more evident. Another area with substantial information needs is solid waste. Maintaining a national-level data register for monitoring solid waste management also allows updated management and investment plans to be prepared.
- 4.13 **Integrity and transparency actions must be encouraged.** Transparency and accountability ensure the legitimacy of the processes and measures adopted. The

use of transparency tools is also key for disseminating sector strategies, targets, and achievements, and budget allocations and staff training are required for the more general development of these activities in Bank operations.

- 4.14 **Sector funding and financing should be a central issue in the design of interventions.** Many of the programs have supported studies to design rate and subsidy arrangements that contribute to the self-financing of services while ensuring that they are affordable for the most vulnerable population groups. In the case of solid waste management services, cost recovery alternatives need to be explored (e.g., fees) and support provided for their implementation. Meanwhile, the use of structured local-currency financial instruments under local law has proven effective in facilitating finance for operators.

D. Lessons aligned with service management

- 4.15 **Strengthening operators is key for improving efficiency.** The Bank has supported the strengthening of operators as a strategy for ensuring efficient, sustainable management, particularly in rural areas and small cities. In some cases, however, results have been limited. Some programs have supported collaboration with state-owned companies with more experience, and this has enhanced effectiveness. Weaker areas have included water quality monitoring, development of long-term strategies for NRW reduction, and energy efficiency plans. The adoption of good corporate governance practices yields significant benefits, as it can increase their access to financing options. With the development and implementation of AquaRating, the Bank has taken a major step forward on the agenda of strengthening operators' management and corporate governance, with its application in more than 100 companies over the last six years.
- 4.16 **Institutional support is required for management in rural areas and small municipios.** Technical and/or financial assistance for municipios is key for achieving the sustainability of systems, particularly in the case of small cities and rural areas. For example, the strengthening of arrangements for providing technical support to rural and departmental operators has yielded positive results in several countries. Likewise, the creation of a private investment fund has generated financing and technical assistance for water boards. In countries such as Honduras, Paraguay, and Peru, the Bank has encouraged water boards to form associations to generate economies of scale and strengthen the management capabilities of operators, which generally receive little training or technical support from the municipal governments. Training rural operators facilitates the efficient operation of water and sanitation systems, thus helping to reduce the vulnerability of communities to climate change, which is particularly significant in areas that receive low rainfall.
- 4.17 **Private sector participation offers high potential.** PSP has had a positive impact on the management and expansion of services, connectivity, development of sanitation pilot projects, incorporation of innovation, and protection of water sources (through water funds). PSP offers excellent potential in the area of solid waste management, but is at a very early stage of development in many countries. Boosting it will require that projects be properly structured and operated by technically and financially sound companies, and a long-term PSP strategy with a clear distribution of risks and benefits. Works for taxes mechanisms help to eliminate gaps in the sector; for these to be successful, it is essential to identify the

risks that the private party might face (physical, reputational, or regulatory). It is also important to develop partnerships to build trust between the public and private sectors (e.g., in Peru, a partnership was established with the private investment promotion agency, Proinversión, to facilitate dialogue and knowledge transfer to local and regional governments, as well as the central government). Lastly, there is a need to build awareness among private sector agents of the economic and social impacts of water and sanitation services in their area of influence.

E. Lessons aligned with innovation

- 4.18 **The use of technological innovations to manage services remains a challenge.** Although several programs have included innovation with the aim of universalizing access to water and sanitation, or have incorporated innovative technologies into their processes, the introduction of innovation remains a challenge in the sector. As in the other dimensions analyzed, continuous support and social awareness-building are important, as in some cases technology adoption requires ownership on the part of users to ensure proper operation and sustainability.

V. LINES OF ACTION FOR THE IDB GROUP'S WORK IN THE WATER AND SANITATION SECTOR

- 5.1 This SFD proposes that IDB Group activities in water and sanitation support the elimination of inequities, achieving the universalization of efficient, affordable, sustainable, and good quality services. Based on the diagnostic assessment presented in Section II, the review of evidence in Section III, and the lessons set out in Section IV, five lines of action are proposed as a guide for the IDB Group's work. These will need to be adapted to the reality of each country by means of policy dialogues, sector diagnostic assessments, programming discussions, technical assistance, and loan operations.
- A. Line of action 1: Promote universal access to quality water and sanitation services with equity, inclusion, and affordability.**
- 5.2 **Countries increase access and quality in the delivery of drinking water services through the use of comprehensive approaches.** Interventions should focus not only on expanding access but also on improving the quality and continuity of water and sanitation services to ensure that benefits are sustained over time. To ensure the effectiveness of policies and programs, the availability of information should be improved to allow monitoring of the quality of water and the number of daily hours of service received by households. Interventions should be promoted beyond the residential sector, in schools and health clinics. Comprehensive approaches are also required, addressing—in addition to infrastructure investment—the social aspects of these services and adopting broad multisector, productive, and skills approaches, among other things. Work will be done with young people and women as agents of change to make it possible to promote sustainability and equity in access to the services. As part of efforts to ensure rational consumption, a knowledge agenda will be promoted involving behavioral change strategies. Impact evaluations will help to determine which factors have greater impact on household decisions to use water rationally and pay the associated rates.

- 5.3 **The region expands access to safely managed sanitation, hygiene, and comprehensive solid waste management.** The Bank will promote a comprehensive approach at the national, regional, and local levels that addresses all determinants of sanitation problems, providing comprehensive solutions and prioritizing solutions in a graduated manner depending on risks to the health of the population. Projects should eliminate social inequalities, overcome barriers to access to sewer systems, and increase wastewater treatment by means of phased solutions. With behavioral change interventions and work in schools, the Bank, together with IDB Lab, will seek to increase the value placed on these services and the rational use of water, and promote good hygiene practices, analyzing interventions to evaluate their effectiveness. Lastly, projects will be supported that increase recovery rates and ensure the proper disposal of solid waste.
- 5.4 **Regional, socioeconomic, and ethnic gaps in access to services are reduced, particularly in the case of diverse and disabled populations.** Countries promote specific interventions to increase efficient, sustainable access in rural areas (including indigenous and Afro-descendant communities) and periurban zones. These areas require differentiated approaches in terms of both design and implementation, relating to issues such as the use of technologies, social participation with a gender and diversity approach, land-use planning, legalization of land tenure, management models, and the monitoring of services. In addition, targeting and prioritization arrangements should be designed that ensure support for low-income households and the most vulnerable population groups (indigenous populations, children, and the disabled), with a gender approach to improve the effectiveness thereof.
- B. Line of action 2: The design of policies and programs incorporates disaster and climate change risk management and promotes water security.**
- 5.5 **Latin America and the Caribbean should preserve water based on an approach that emphasizes risk management and improved quality.** The Bank will support the development of tools, methods, and models (quantitative or qualitative) for the assessment and simulation of water quality and availability (including aquifers) and the different uses of water, for use in the planning, design, and operation of water and sanitation infrastructure, including the sustainable management of rainwater drainage and solid waste. The region will also promote preservation of the quality of water resources, fostering innovative interventions that support green infrastructure (such as reforestation, forest conservation, promotion of sustainable agricultural practices, etc.) and solutions prioritized according to their impact on health risks to the population; that improve the quality of water bodies with a long-term perspective; and that incorporate circular economy principles addressing collection, handling, and wastewater treatment needs.
- 5.6 **Infrastructure that mitigates greenhouse gas emissions and is resilient to climate change.** Companies should adopt measures that reduce greenhouse gas emissions in collection, treatment, and disposal systems for wastewater and solid waste, as well climate change adaptation measures for these services. In terms of climate change adaptation, the measures needed to increase the resilience of services and infrastructure to risks of drought, floods, and rising sea levels must be included in project designs and masterplans in the region (as well as during

operation and maintenance),¹³¹ through the adoption of nature-based solutions, as well as other innovative mechanisms. The Bank will promote the development of early warning systems and contingency plans to protect against extreme events, as well as institutional strengthening actions in the following areas: (i) the management of hydrometeorological, water quality, and climate data that support integrated water resource management; (ii) identification and analysis of disaster and climate change risks; (iii) platforms for the dissemination of climate change management knowledge and coordination with other sectors; and (iv) the use of innovative methods to support decision-making and planning with respect to water resources. The implementation of these measures will also contribute to closing the knowledge gap with respect to the effects of climate change and the measures to address it.

- 5.7 **Circular economy.** The governments of Latin America and the Caribbean should transition towards a circular economy approach in the sector, viewing waste as a potentially exploitable resource. Programs will be promoted to foster the efficient use of water (e.g., the reduction of NRW and irrational consumption through the use of macro- and micrometering), reuse treated water and sludges, and use nature-based solutions to treat wastewater. In the case of solid waste, reductions in waste generation will be encouraged, together with gradual increases in recovery rates (recycling, materials recovery, and energy contained in solid waste) and the formalization of recyclers, the proper final disposal in sanitary landfills of waste that cannot be recovered, and the elimination of open-air dumps and other unsuitable practices.

C. Line of action 3: Improve the financing and governance frameworks

- 5.8 **The region must increase funding for the sector** through government contributions and user rate payments. Consolidating sufficient, stable government funding mechanisms will be key in the long term, including incentives for efficiency on the part of service providers and rational use on the part of the population. These should be adequately targeted to eliminate existing gaps and inequalities. Together with IDB Invest, the Bank should also promote the development of credit and capital markets that channel resources to investments in water and sanitation; joint and combined financing arrangements that enhance the impact of investments (funds, blended finance, and cofinancing); and the use of innovative tools and incentives that encourage resilience in investments (climate funds, water funds, nature-based solutions, results-based financing, thematic bonds, etc.). Knowledge should be deepened regarding the causes of the low priority placed on the sector and low levels of investment, and specific/crosscutting features between countries should be analyzed and investment needs quantified (including replacement costs).
- 5.9 **Governments must strengthen the sector leadership, planning, coordination, and information management functions.** Policy formulation, execution, and evaluation processes for water and sanitation must be strengthened, as well as the definition of plans and programs that differentiate and prioritize vulnerable areas (periurban and rural) and address deficiencies in

¹³¹ Activities under this line of action will be consistent with the Disaster Risk Management Policy (Operational Policy OP-704).

sanitation and solid waste as part of a long-term vision, with investments programmed in stages. Strengthening information systems should be a priority given that homogeneous, reliable, and timely information is essential for improving policy design, tailoring solutions to disadvantaged areas, and enhancing quality, regulation, and control. The Bank has been analyzing information from household surveys in each country and identifying improvements in data reporting for proper monitoring of the SDGs (see **Appendix 1**). Coordination needs to be improved between central and decentralized institutions and between agencies at each of these levels. There is also a need to undertake multisector initiatives (including the health, education, urban development, climate change, and gender sectors).

- 5.10 **Regulation and transparency frameworks in the sector must be strengthened to improve efficiency.** Standards, regulations, and policies should provide adequate incentives for accelerating service access, quality, and affordability for the poorest segments of the population, while also encouraging greater market concentration and increasing private sector participation in the water and sanitation sector. Regulations should reflect a long-term vision and should be stable in order to provide security for the different stakeholders (service providers, users, investors) and attract private sector participation efficiently. Knowledge must be improved regarding the effectiveness of the different institutional models, subsidy arrangements (targeting and beneficiaries), and rate and affordability methodologies (for both connected and nonconnected users), so that these can be adjusted to the specific needs of each country and to develop financial and commercial instruments while taking into account the ability to pay of users, especially women. Countries must improve their corporate governance frameworks, with regulators issuing the necessary regulations, including aspects relating to fighting corruption and increasing transparency.
- 5.11 **The region must strengthen employment in the sector.** Investments in water and sanitation boost the economy by creating jobs (largely for unskilled workers) and have the potential to foster gender-equitable employment (increased number of women in managerial positions) and local productive development (businesses providing infrastructure operation and maintenance, facilities maintenance, and plumbing and construction services for household connections, etc.). To accelerate technological transformation and adoption of the green economy agenda in the sector, workforce skills should be improved (using a gender and diversity approach) at both the national level (in sector lead agencies and regulatory and control bodies) and in water and sanitation service, construction, and consulting firms. Knowledge of the reasons for the lack of sufficient, adequate staff should be improved, with the involvement of academic institutions to improve education and training programs.
- D. Line of action 4: Improve management to ensure efficient, sustainable service delivery and promote private sector participation.**
- 5.12 **Service companies must become more efficient.** Investments in expansion should be accompanied by holistic management approaches that focus on efficiency, promoting a business mentality and a sense of corporate responsibility among service operators. High levels of performance depend on the control of NRW, the efficient use of energy, commercial management and customer service, technical (asset management) and financial planning for the medium and long

- terms, risk management, cybersecurity, labor productivity with a gender and diversity approach, transparency and integrity (with the support of digital tools), etc. The Bank will promote change management and efficient, sustainable business transformation, using tools such as AquaRating. Good corporate governance practices will be fostered that encompass transparency and accountability mechanisms in service providers and sector agencies, as well as mechanisms for citizen participation, communications and public opinion surveys regarding service quality, and coordination between the different sector entities.
- 5.13 **There is a need to strengthen investment planning and access to resources in service companies.** The quality of preinvestment (prefeasibility and feasibility studies and detailed designs) must be improved to ensure better investments. Adoption of a long-term perspective and effective prioritization of investments are critical, not only for improving efficiency but also for targeting investments to the poorest populations and improving risk management. Innovative **financial mechanisms** need to be developed (for both urban and rural areas) to ensure the sustainability of investments. Improving preinvestment is key for increasing access to funding and enhancing financing terms, while information availability is critical for the design, execution, and monitoring of sector investments.
- 5.14 **Water and sanitation service delivery must be improved in rural areas.** Community management structures in rural areas and smaller towns should be improved through the use of boards or associations, accompanied by technical and financial support mechanisms. Partnerships should also be promoted between service operators—particularly in the operating and maintenance phase—with the aim of creating self-sustaining systems. Together with IDB Lab, the Bank will promote the development of innovative mechanisms for service sustainability.
- 5.15 **Private sector participation can play an important role in the sector.** Alongside IDB Invest, support will be provided for different approaches that can be adapted to different contexts and circumstances. This is a tool for improving access, quality, and management efficiency in these services and for accelerating technological and digital transformation in service providers. It also represents a potential financing source.
- E. Line of action 5: Drive innovation in the sector**
- 5.16 **Innovation governance in the water and sanitation sector.** Promote public policies by coordinating with key stakeholders in the region, generating relevant information, and providing support for policy design. Support the development of regulations and tools that reduce aversion to the risks of innovation among public and private stakeholders in the water and sanitation sector, as well as specific regulatory initiatives for validating innovations, fostering gender equity, and stimulating innovation supply and demand in the sector.
- 5.17 **Research, development, and innovation.** Promote research with a multidimensional perspective, as well as grants and human talent exchange. Foster the design and implementation of pilot projects, prototypes, and emerging technologies seeking to narrow gaps and develop solutions for vulnerable populations. Encourage enterprise development through various support initiatives. Coordinate stakeholders in the innovation ecosystem as part of a public-private dialogue, in coordination with IDB Lab.

- 5.18 **Innovation to improve the efficiency of water and sanitation service delivery.** Promote the adoption of innovation in companies, collaborating with IDB Invest to secure private sector participation. Disseminate knowledge products relating to investment management and strengthen human talent capabilities, particularly at the corporate senior management level. Support the formation of providers' associations, facilitating open innovation.
- 5.19 **Crosscutting issues in the sector innovation ecosystem.** Foster an appropriate environment for catalyzing innovation by promoting a culture of innovation, coordinating between different sector stakeholders at the local and regional levels, and developing mechanisms to allocate resources for the implementation of innovation.

ANNEX I. BOXES, FIGURES, AND TABLES

Box 1. Alignment of the SFD with institutional strategies

IDB Infrastructure Strategy: Sustainable Infrastructure for Competitiveness and Inclusive Growth (document GN-2710-5)	This strategy establishes the principle of promoting efficient, sustainable basic service delivery and infrastructure that contributes to economic growth. In addition, based on the concept that infrastructure is a means of providing services of adequate quality, the document proposes a new vision in which infrastructure is planned, built, and maintained as part of an environmentally and socially sustainable framework, with improved governance and efficiency and the implementation of multisector programs. The SFD is aligned with this strategy as it promotes universal access to quality water and sanitation, sound governance and efficient management, the construction of sustainable and resilient infrastructure, development of innovative financing mechanisms, and private sector participation.
IDB Integrated Strategy for Climate Change Adaptation and Mitigation, and Sustainable and Renewable Energy (document GN-2609-1)	The SFD is aligned with this strategy as it promotes specific lines of action to determine sector policies and programs that address issues of disaster risk management, climate change, and water security.

Box 2. Direct contribution to the Sustainable Development Goals

Objective 1	<i>No Poverty</i>
Objective 3	<i>Good Health and Well-Being</i> , the objective of which is to eliminate water-related disease, particularly due to a lack of sanitation.
Objective 5	<i>Gender Equality</i> , through the equitable provision of basic services.
Objective 10	<i>Reduced Inequalities</i> , through the equitable provision of basic services.
Objective 11	<i>Sustainable Cities and Communities</i> , which aims to reduce deaths, affected populations, and economic losses from disasters, including water-related events. It also seeks to reduce the adverse environmental impact of cities, with particular emphasis on the management of solid waste (municipal and other types). This will be achieved through urban drainage interventions that incorporate climate change considerations and improve integrated water resource management.
Objective 12	<i>Responsible Consumption and Production</i> , which seeks to achieve the proper management of all waste and reduce its disposal in water. This is to be achieved by improving solid waste management and increasing wastewater treatment.
Objective 14	<i>Life Below Water</i> , which aims to prevent and reduce marine pollution from land-based activities. This will be achieved through the proper management of solid waste and wastewater.
Objective 15	<i>Life on Land</i> , which seeks to ensure the conservation, restoration, and sustainable use of ecosystems and associated services. This will be achieved through the promotion of green infrastructure as an innovative solution for water security.

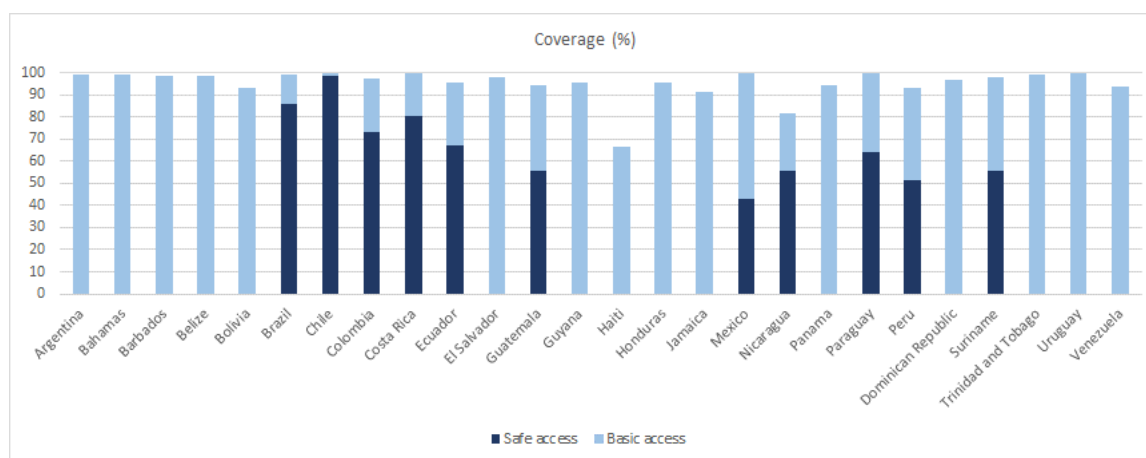
Box 3. Indirect contribution to the SDGs

Objective 2	<i>Zero Hunger</i> , through initiatives to avoid food waste as part of solid waste management.
Objective 4	<i>Quality Education</i> , helping to provide schools with water and sanitation infrastructure and reducing dropout rates through expanded access to water and sanitation.
Objective 8	<i>Decent Work and Economic Growth</i> , with expanded access to water leading to higher productivity.
Objective 9	<i>Industry, Innovation, and Infrastructure</i>
Objective 13	<i>Climate Action</i>
Objective 17	<i>Partnerships for the Goals</i>

Box 4. Solid waste

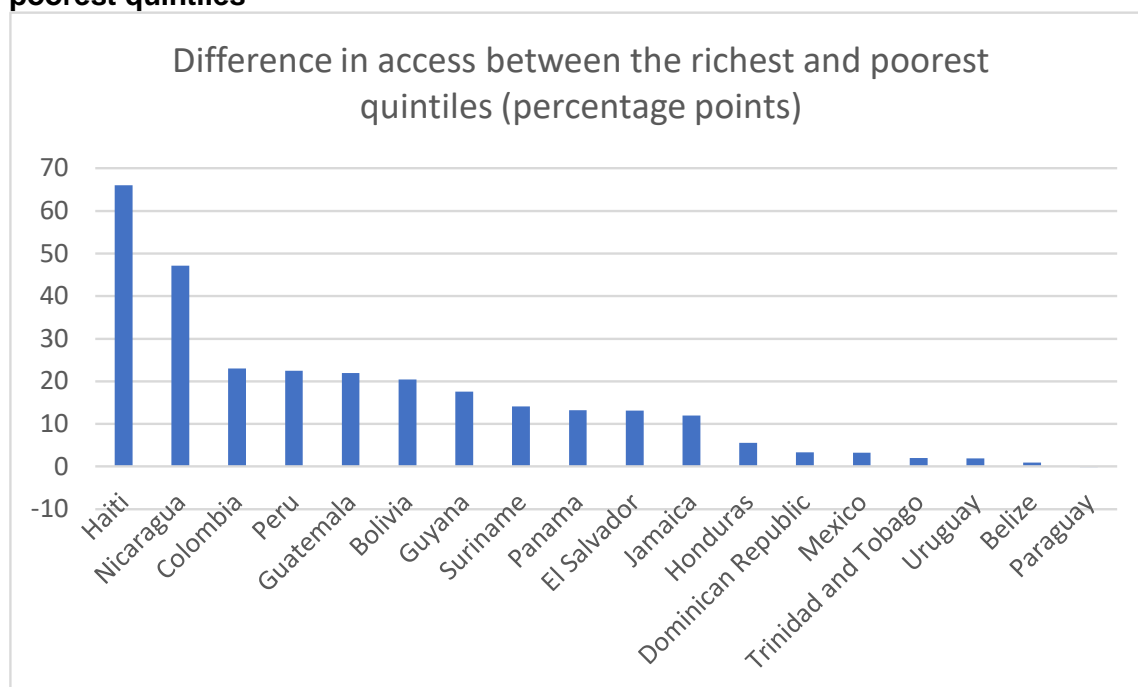
The differentiated handling and regulation of waste streams (e.g., clinical, hazardous, electrical and electronic (e-waste), demolition and construction waste, plastics, and oils) is infrequent, despite increasing production of such waste. The issue of plastics, in particular, has grown in importance due to its negative impact on the environment. In 2017, 8.3 billion tons of plastics were produced in the world, with single-use plastics accounting for 40% of the total (Geyer, R., Jambeck, J., & Law, K. (19 July 2017). Production use and fate of all plastics ever made. *Science Advances*, 3(7), e1700782). It is estimated that 3.7 million tons of plastic waste made its way into the oceans around Latin America and the Caribbean in 2020 (World Bank Group (2018). *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050*). In many countries in the region, regulation is limited to collection, transportation, and final disposal activities and excludes treatment and recovery activities. This creates legal uncertainty regarding the technical scope of these types of projects and the legal and financial instruments for their implementation. There has been marked interest recently in incorporating the principles of the circular economy into legislation, as well as bans on single-use plastics. In addition, with the exception of specific waste streams in some countries (Argentina, Chile, Colombia, Brazil, Uruguay), extended producer responsibility has not yet been incorporated, particularly in the case of packaging waste.

Figure 1. Access to drinking water



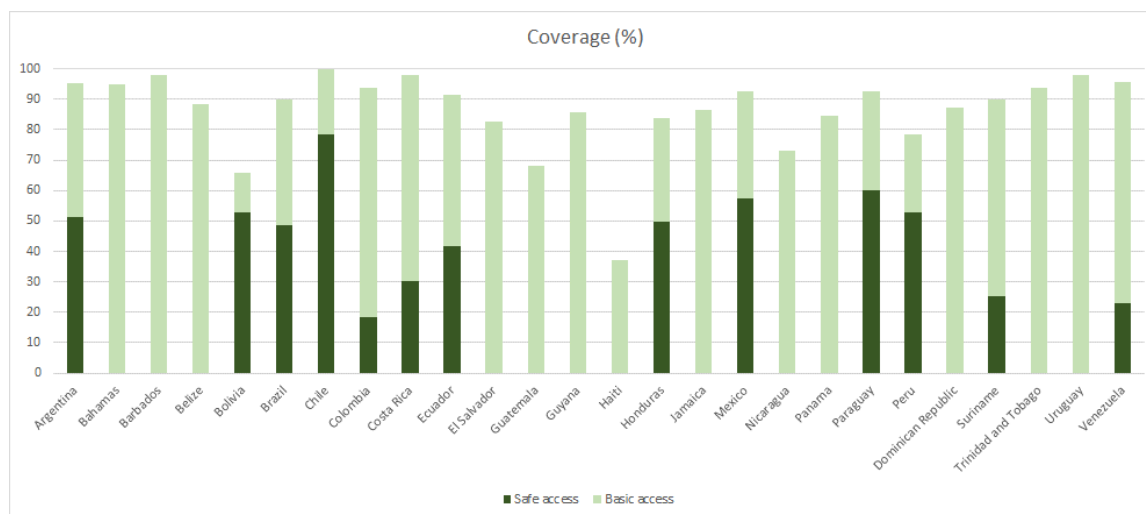
Source: JMP, 2020. Data for Argentina are from 2016 and for The Bahamas from 2019 (last reported data).

Figure 2. Difference in basic access to drinking water between the richest and poorest quintiles



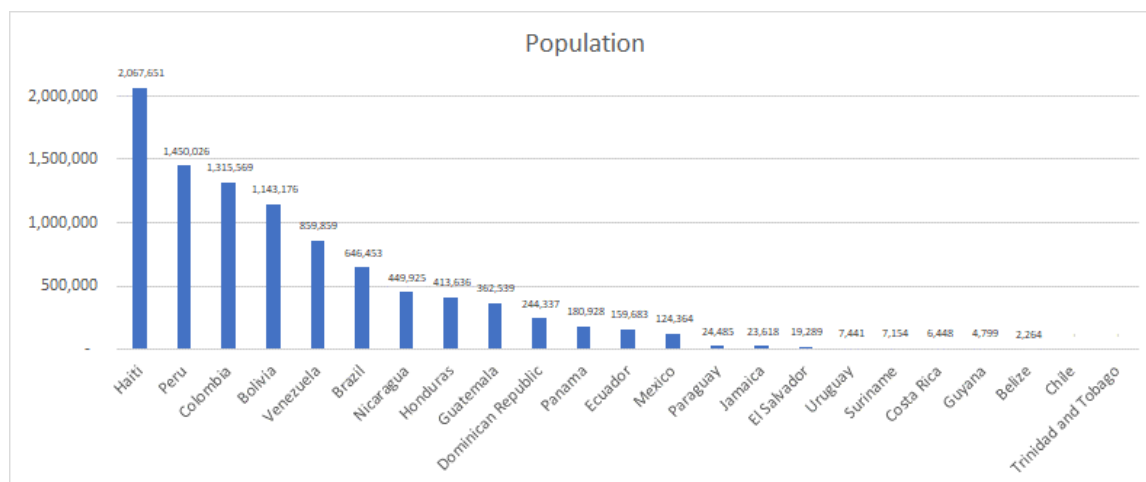
Source: JMP, 2017 (most recent data available).

Figure 3. Access to sanitation



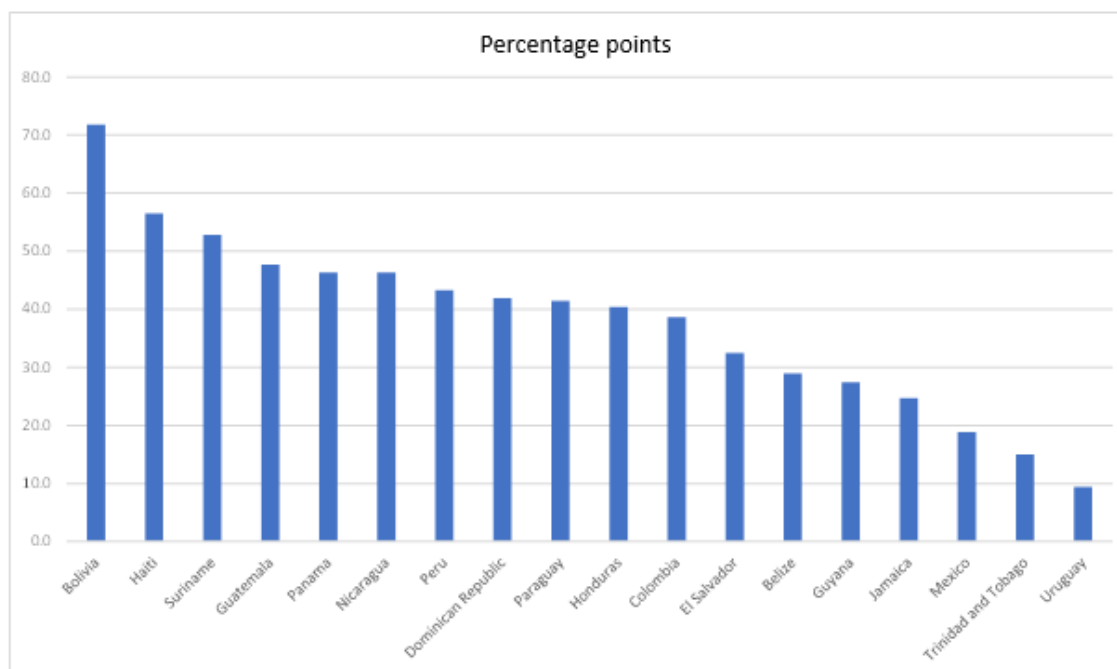
Source: JMP, 2020. Data for Argentina are from 2016 and for The Bahamas from 2019 (last reported data).

Figure 4. Population practicing open-air defecation in Latin America and the Caribbean



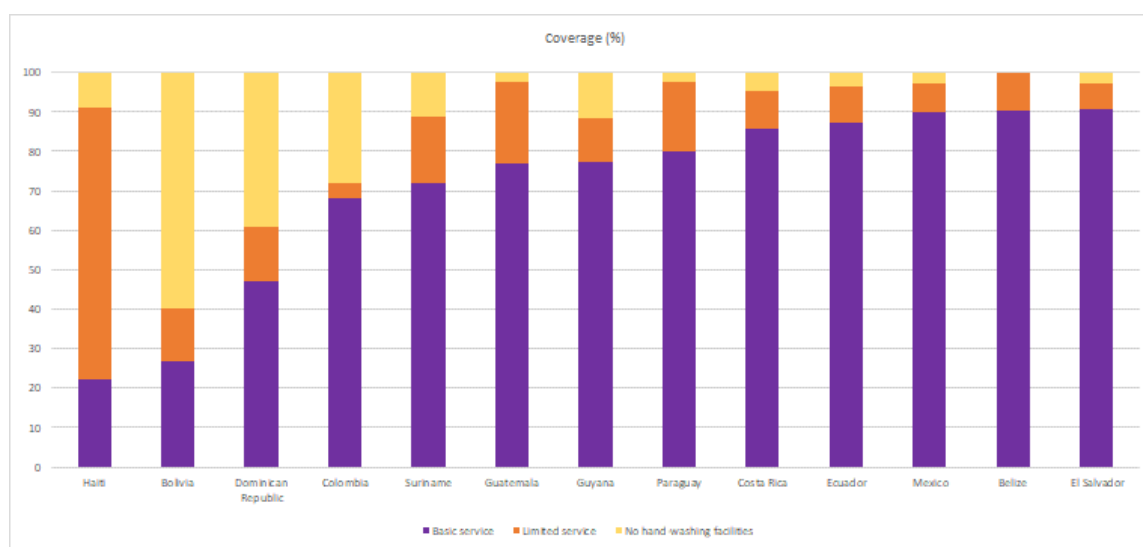
Source: JMP, 2020.

Figure 5. Difference in basic access to sanitation between the richest and poorest quintiles



Source: JMP, 2017 (most recent data available).

Figure 6. Access to hygiene services



Source: JMP, 2020. Data for Guatemala and Mexico are from 2019 and for El Salvador and Guyana from 2018 (most recent data available).

Table 1. Coverage and management of solid waste

Indicator	Municipal solid waste generated (kilograms/capita/day)	Municipal solid waste generated (millions of tons/year)	Urban coverage (%)	Rural coverage (%)	Recovery rate (%)	Sanitary landfill (%)	Controlled landfill (%)	Open dump (%)
Year	2018	2018	2020	2020	2018	2018	2018	2018
Argentina	1.11	18.04	95%	34%	6%	63%	9%	23%
Bahamas	1.89	0.28	99%	99%	5%	53%	15%	29%
Barbados	1.73	0.18	99%	86%	9%	90%	0%	1%
Belize	0.77	0.11	90%	80%	0%	34%	0%	66%
Bolivia	0.61	2.5	85%	6%	13%	32%	0%	56%
Brazil	1.07	82.26	98%	92%	2%	53%	22%	23%
Chile	1.18	7.86	99%	73%	1%	85%	0%	14%
Colombia	0.69	12.53	97%	24%	17%	79%	0%	4%
Costa Rica	0.8	1.46	96%	81%	4%	89%	0%	7%
Dominican Republic	1.1	4.37	87%	39%	8%	0%	0%	92%
Ecuador	0.91	5.59	99%	63%	13%	53%	0%	34%
El Salvador	0.82	1.92	80%	82%	0%	78%	0%	22%
Guatemala	0.49	3.1	92%	74%	0%	15%	10%	75%
Guyana	0.79	0.22	99%	85%	1%	44%	55%	0%
Haiti	0.63	2.55	24%	0%	0%	0%	10%	90%
Honduras	0.67	2.29	79%	46%	0%	11%	60%	29%
Jamaica	0.86	0.91	67%	28%	0%	0%	64%	36%
Mexico	0.94	45.59	95%	93%	5%	74%	0%	21%
Nicaragua	0.81	1.86	98%	87%	0%	0%	0%	100%
Panama	1.06	1.6	100%	54%	0%	42%	16%	42%
Paraguay	0.77	2.49	77%	12%	0%	36%	40%	23%
Peru	0.75	9	95%	38%	4%	24%	16%	56%
Suriname	0.42	0.09	70%	15%	0%	0%	0%	100%

Indicator	Municipal solid waste generated (kilograms/capita/day)	Municipal solid waste generated (millions of tons/year)	Urban coverage (%)	Rural coverage (%)	Recovery rate (%)	Sanitary landfill (%)	Controlled landfill (%)	Open dump (%)
Trinidad and Tobago	1.5	0.75	99%	89%	1%	0%	12%	87%
Uruguay	1.04	1.31	99%	78%	0%	59%	19%	22%
Venezuela	0.55	6.45	99%	99%	5%	53%	15%	29%
All countries	0.97	215.3	95%	74%	4%	56%	12%	28%

Source: Faleiro (2020).

Table 2. Sovereign guaranteed lending operations analyzed for lessons learned

Operation number	Name of operation
AR-L1025	Solid Waste Management in Tourist Municipios
AR-L1031	CCLIP: Water Supply and Sanitation Program for Smaller Communities
AR-L1122	Water and Sanitation Program for the Buenos Aires Metropolitan Area and Conurbation
BH-L1028	WSC Support Program - New Providence Water Supply and Sanitation Systems Upgrade
BO-L1028	Drainage in the Municipios of La Paz and El Alto
BO-L1034	Water and Sewerage Program in Periurban Areas, Phase I
BO-L1065	Water and Sanitation Program for Small Towns and Rural Communities in Bolivia
BO-L1200	Policy Reform Program for the Water, Sanitation, Solid Waste, and Water Resources Sectors in Bolivia
BR-L1006	Macambira-Anicuns Urban Environmental Program
BR-L1081	Integrated Socioenvironmental Program for Porto Alegre
BR-L1166	Tietê River Cleanup Program, Stage III
BR-L1216	Tietê Várzea Program
BR-L1314	Maués Integrated Sanitation Program - PROSAIMAUÉS
CO-L1028	Water and Sanitation Program for the Municipio of Pasto
CO-L1034	Medellin River Sanitation Program - Phase II
EC-L1081	Rural Sanitation and Water Infrastructure Program
ES-L1046	Rural Water and Sanitation Program
GY0055	Georgetown Solid Waste Management Program
GY-L1025	Georgetown Sanitation Improvement Program
HA-L1007	Rural Water and Sanitation Program
HA-L1039	Water and Sanitation for Intermediate Cities (II)
HA-L1044	Port-au-Prince Water and Sanitation Project
HO-L1207	Central District Water and Sanitation Services Reform Program

Operation number	Name of operation
ME-L1147	Program for the Sustainability of Water Supply and Sanitation Services in Rural Communities IV
NI-L1029	Water Supply Program for Managua
PE-L1060	Cajamarquilla, Nievería, and Cerro Camote Project – Expansion of Water and Sewerage Systems
PN-L1012	Multiphase Program for the Sustainable Development of Colón Province – Phase I
PN-L1053	Panama City and Bay Sanitation Project Supplemental Financing
PR-L1022	Water and Sanitation Program for Rural and Indigenous Communities (PAySRI)
SU-L1018	Water Supply Infrastructure Rehabilitation
UR-L1063	Montevideo Sanitation Program (PSU IV) Supplementary Financing
UR-L1069	City of Montevideo Drainage and Sanitation System Expansion and Improvement Project
UR-L1081	Integrated Sanitation Program for Ciudad de la Costa

Table 3. Investment grants analyzed for lessons learned

Operation number	Name of operation
CH-G1005	Meaningful Innovation: Water for All
HA-X1014	Rural Water and Sanitation Program (II)
HO-G1005	Intervention Models in Water and Sanitation for Rural Dispersed Area in Honduras
HO-X1017	Rural Water and Sanitation Program
ME-G1003	Intervention Model for Provision of Water and Sanitation in Rural Communities
PE-G1002	Pilot Project: Access to Water and Sanitation for Dispersed Rural Communities
PE-X1004	Program to Improve and Expand Water and Sanitation Services in Peru
RG-X1011	Testing a Prototype Caribbean Regional Fund for Wastewater Management GEF
RG-X1142	Regional Platform for Water Resource Management

Table 4. IDB Invest operations analyzed for lessons learned

Operation number	Name of operation
13069-01	Sabesp Green Capex Facility
BR-L1421	Aegea Corporate Loan
EC-L1129	Interagua Corporate Loan

Table 5. IDB Lab operations analyzed for lessons learned

Operation number	Name of operation
PE-T1378	PERU INVESTS IN WATER – An Investment Platform for Resilient Communities
ES-T1276/ES-Q0001	Capital Mobilization to Promote Resilience in Water Services

Table 6. Technical cooperation operations analyzed for lessons learned

Operation number	Name of operation
BR-T1295	ABES BID Technical Cooperation for Regulation of Water and Sanitation Sector in Brazil
RG-T2390	Decision Theater for Effective Water Resources Management in Latin America
PE-T1340	Implementation of Hydro-BID at the National Level
RG-T2642	Water and Sanitation as a Human Right: Practical Application in LAC, dissemination, and knowledge change
RG-T2704	Update of the Latin American and Caribbean Urban Solid Waste Sector Regional
RG-T2645	Development of Strategic Plans for the Stormwater Drainage Subsector
RG-T2050	Regional Initiative for the Economic and Social Inclusion of Recyclers
CO-T1396	Support for Reservoir Studies to Mitigate the Impact of Climate Change
RG-T2660	Development of Case Studies of the Water-Energy-Food Nexus in Latin America
RG-T2601	Development of Action Plans of Commercial Management and Corporate Governance
RG-T2883	Support for the Implementation of the AquaRating Program
ME-T1326	Wastewater Treatment and Management of Nonrevenue Water
BR-T1305	System to Reduce Drought Vulnerability and Enable Adaptation to Climate Change in Pernambuco
CO-T1417	Support for the Water and Sanitation Sector Through the Application of AquaRating in Colombia
RG-T2456	Support of the Start of Operations of the AquaRating Entity
CH-T1177	Water Scenarios 2030
RG-T2659	Development of Remote Sensing Data Sets and High-Resolution Modeling for Water Security and Climate Adaptation in Latin America and the Caribbean
RG-T2624	Supporting the Development and Implementation of Optimal Sanitation Solutions
RG-T2744	Transparency and Information Management in the Water and Sanitation Sector

Table 7. Specific lessons learned and associated operations

Pillar	Issue	Operation
Access and quality of services	More effective interventions are undertaken in phases (paragraph 4.2).	For example, UR-L1005/UR-L1063 for sewer networks and wastewater treatment and PR-L1092/PE-L1153 for final disposal of solid waste.
	It is essential to extend the scope of services beyond the home (paragraph 4.2).	Rural schools (UR-X1007) and inclusion of schools and health centers (HA-X1014, HO-X1017, and ES-L1046)
	Most programs in water and sanitation include interventions aimed at improving the service quality (paragraph 4.3).	Such as programs NI-L1029 and SU-L1018.
	Potability is one key consideration in safe access to water services (paragraph 4.3).	Program HO-X1017 successfully developed “chlorine banks,” which ensured the supply of this input.
	The Bank has focused its interventions on areas that lag behind both regionally (especially rural areas) and socioeconomically (paragraph 4.4).	PR-L1022/PR-X1003, HA-L1039/HA-X1013, HA-L1044/HA-X1021, PE-L1060, BR-L1314, etc.
	The adequacy of the programs for local characteristics enables a better selection of technologies and solutions, creating an incentive for ownership of the services and their sustainability (paragraph 4.4).	In the water and sanitation program in Pasto (CO-L1028), the interventions were not tailored to the rural context, which limited execution. Program PR-L1022/PR-X1003 took gender considerations into account on the sanitation boards and introduced methodologies tailored to the needs of indigenous communities.
	In programs with resettlement, these considerations are key for the success of the processes (paragraph 4.4).	Such as BR-L1006, BR-L1216, or UR-L1005/UR-L1063. For example, in the program in Porto Alegre (BR-L1081), two of the three phases of resettlement were canceled due to the lack of participation of those impacted in the process, and therefore, the lack of acceptance of the proposed solutions.
	Projects that have included sewer connection activities, especially for low-income populations, have higher effective connectivity rates. The economic, cultural, and social considerations should be analyzed and should guide the proposed mechanisms (paragraph 4.5).	UR-L1063.
	Financing tends to be the most commonly used incentive for connection, but other incentives may be more appropriate, depending on the context (paragraph 4.5).	AR-L1031 and BR-L1081. Like the communication strategy with social art in BO-L1034/BO-X1004.

Pillar	Issue	Operation
	Institutional considerations should be clearly defined in order to maximize the impact, ideally with programs directly led by service providers for more efficient implementation or use of clearly established coordination mechanisms (paragraph 4.5).	See BR-L1081, BR-L1166, and UR-L1081. In the case of PR-L1060, the definition of financial solutions for households and the work coordinated between institutions and social organizations achieved levels of connectivity of 98% in the periurban area of Lima.
	Hygiene educations and social awareness-building are key for achieving positive impacts with investments (paragraph 4.6).	Such as in BO-L1028, HA-L1039/HA-X1013, AR-L1025, and NI-L1029.
	One measure that has had good results is the implementation of these actions in schools for behavioral change (paragraph 4.6).	BR-L1081 and BR-L1216.
Environmental sustainability and resilience	In the planning and implementation of water and sanitation interventions, it is essential to consider the hydrological/environmental dimension of the watershed (paragraph 4.7)	For example, in BR-L1216 with the Tietê Várzeas Management Plan. In El Salvador, work was done with the Ministry of the Environment on the improvement of sources and conservation of soils.
	Completion of sanitation infrastructure works, such as the rehabilitation of wastewater treatment plans and sewer systems to minimize problems of pollution in bodies of water and to ensure long-term environmental sustainability (paragraph 4.7).	AR-L1122.
	Support for operators in risk management is key (paragraph 4.8).	As in Brazil (BR-L1314), where emergency plans were prepared and small operators were trained with the support of CAESB. In BO-L1200, support was provided for the development of strategic plans for the sustainability of the water sources for operators, and contingency plans were developed to contribute to water security. The Bank has also implemented technical cooperation operations to support sector institutions in water use planning, such as HydroBID (RG-T2828, RG-T3602), or for drought resilience in Brazil (BR-T1305).

Pillar	Issue	Operation
	Countries are increasingly developing lines of work on climate change and adaptation in the water and sanitation sector. These actions should include the drafting of environmental protection laws that consider aspects of climate change (like in The Bahamas), the design of specific regulations to mitigate its impacts, and the consideration of these aspects in the design of the works (paragraph 4.9).	<p>In Colombia (CO-T1396), the reservoir regulations were designed with the objective of reducing the impacts of climate change.</p> <p>In the case of Argentina (AR-L1025), the rehabilitation and construction of sites for the final disposal of solid waste considered aspects of climate change in the works, especially with respect to flood zones in the location of the facilities.</p>
Sector governance	Policy-based loans have been an adequate mechanism for introducing changes in regulations and institutions that strengthened the sector (paragraph 4.10).	Policy-based loan BO-L1200 prioritized the development of regulatory frameworks and the implementation of information systems.
	It is key to build support among society and validate the reform measures to achieve consensus among stakeholders and improve coordination among institutions (paragraph 4.10).	Policy-based loan PN-L1145/PN-L1159.
	Programs with successive phases enable long-term planning and the maturation of institutions (paragraph 4.10).	Like the program for the Tietê river cleanup in Brazil, the rural PROSSAPYS program in Mexico, or the rural programs in Paraguay.
	The definition of framework plans enables general lines to be drawn, and then interventions to be implemented in stages, facilitating more efficient execution (paragraph 4.10).	Such as BR-L1166 or PN-L1053.
	The lack of strategic planning results in the underuse of the infrastructure with challenges for its maintenance (paragraph 4.10).	As in the case of the wastewater treatment plant in Ciudad de la Costa (UR-L1081).
	The strengthening of sector institutions should be supported. The support should include the strengthening of regulators, technical assistance institutions, and providers (paragraph 4.11).	As in all the operations in Haiti (regulators). AR-L1122, BO-L1065/BO-G1002, EC-L1081, and PE-L1092 (providers).
	Experience shows that weaknesses in capacities, especially at the municipal level, impact the achievement of results (paragraph 4.11).	AR-L1025 in waste management, HA-X1014 in rural service management, or PN-L1012 at the regional/provincial level. In the case of the CreW program (RG-X1001), the lack of experience with revolving funds by the institutions limited the execution of the projects in certain countries.

Pillar	Issue	Operation
	Through the development of specific policies and programs on these issues, gender equity was promoted, and plans were made based on climate considerations (paragraph 4.11).	In Honduras, for example, through the design of the gender policy in the water provider being created for Tegucigalpa, the number of women in managerial positions being hired was increased.
	The Bank has supported the design and implementation of information systems, which are particularly necessary in rural areas, where the lack of information is evident (paragraph 4.12).	PE-X1004.
	Maintaining data records at the national level for monitoring solid waste management also allows for the development of updated management and investment plans (paragraph 4.12).	BR-T1392, PE-L1092.
	Transparency and accountability legitimize the processes and the measures undertaken (paragraph 4.13).	EC-L1081.
	The application of transparency instruments is also key in the dissemination of sector strategies, targets, and achievements (paragraph 4.13).	BR-L1006, BR-L1081, and BR-L1216.
	Many of the programs have supported studies for defining rate structures and subsidies that contribute to the self-financing of the services and, at the same time, ensure affordability for the most vulnerable population (paragraph 4.14).	PE-X1004 and HO-X1017 as success stories and PN-L1053 where there was no sense of ownership by the IDAAN since it had not been involved in the entire process.
	It is important to explore alternatives for cost recovery (rates, for example) for the solid waste management service, as well as to provide support for its implementation (paragraph 4.14).	AR-L1025 and BL-T1067.
	The use of structured financial instruments under local laws and using local currency has proven to facilitate financing for operators (paragraph 4.14).	SABESP (13069-01) and Brookfield/BRK Ambiental (12249-01) in Brazil, and Interagua (EC-L1159) in Ecuador.
Service management	The Bank has supported the strengthening of operators as a strategy to ensure efficient, sustainable management (paragraph 4.15).	BH-L1028, CO-L1081, CO-L1034, EC-L1081, HA-L1039/HA-X1013, HA-X1004, HA-L1007, HA-L1044/HA-X1021, PR-L1022/PR-X1003. BO-L1065/BO-G1002, HO-X1017, PE-G1002, HO-G1005, ME-G1003, PE-X1004, and HA-L1007 (with limited results).

Pillar	Issue	Operation
	Some programs have incorporated support for public enterprises with more experience, which has increased effectiveness (paragraph 4.15).	In BR-L1314, an agreement was entered into with CAESB.
	Some of the weakest areas are monitoring water quality, development of long-term strategies to reduce NRW, and energy efficiency plans (paragraph 4.15).	AR-L1122 and GY-L102 (water quality). BH-L1028 (NRW). NI-L1029 (energy efficiency plans).
	The adoption of good practices in corporate governance in operators entails major benefits, since it can increase their access to financing options (paragraph 4.15).	See the SABESP operation (13069-01) with IDB Invest.
	Development and implementation of AquaRating (paragraph 4.15).	RG-T2883, RG-T2456, and CO-T1417.
	Successful results have been obtained in the strengthening of technical support mechanisms for rural and departmental operators in several countries (paragraph 4.16).	EC-L1081 with support for the water management boards. Along the same line, program PE-X1004 successfully included training of the municipal management units. Nonetheless, the design and implementation of the support for operators was a challenge in the program in Port-au-Prince, Haiti (HA-L1044/HA-X1021). Where there is a context of informal operators that limits the orderly operation and sustainability of the system.
	Through the formation of a private investment fund, financing and technical assistance were provided for water boards (paragraph 4.16).	Azure: Blended finance for small scale operators. Young professionals perspective Interactive (worldwaterweek.org).
	In countries like Honduras, Paraguay, and Peru, the Bank has promoted association-building among water boards to create economies of scale and build the management capacity of rural operators, who generally lack training and receive little technical support from the municipal governments (paragraph 4.16).	HO-X1017, PR-L1022/PR-X1003, PE-X1004.
	PSP has had positive results in management and service expansion, improvement of connectivity, development of sanitation pilots, incorporating innovation, and protection of sources (via water funds) (paragraph 4.17).	HA-L1039/HA-X1013 (management and expansion). PE-L1060 (connectivity). RG-X1011 (innovation). RG-X1142 (protection of sources).
	The potential for PSP in solid waste management is large (paragraph 4.17).	HA-L1106.

Pillar	Issue	Operation
	A long-term PSP strategy is key, and projects need to be properly structured and operated by technically and financially sound companies with a clear distribution of risks and benefits (paragraph 4.17).	BRK Ambiental (12249-01) with IDB Invest.
	It is necessary to raise awareness in the private sector of the economic and social impacts of water and sanitation services in its area of influence (paragraph 4.17).	IDB Lab operation PE-T1378 (ATN/ME-16515-PE).
Innovation	Several programs have integrated innovation to achieve universal access to water or sanitation or have incorporated innovative technologies into their processes (paragraph 4.18).	<p>See BR-L1166 for innovative sanitation solutions. In Brazil (BR-L1314) and Honduras (HO-X1017), autonomous water supply systems were developed with solar batteries in rural areas and indigenous communities.</p> <p>In the wastewater treatment plant in Medellín (CO-L1034), innovative processes were implemented for the treatment of sludge and the reuse of methane for the plant's energy supply. In Brazil (SABESP -13069-01) a distributed solar generation program was undertaken in the wastewater treatment plants that produces 4.5% of the power consumed by the operator. The #SinDesperdicio platform promotes innovative solutions for the reduction of organic waste (RG-T3229).</p>
	The adoption of technology requires ownership by users for its proper operation and sustainability (paragraph 4.18).	CH-G1005 with the Plasma Water Sanitation System technology.

Appendix 1. IDB efforts to improve information availability

In 2019, the Water and Sanitation Division decided to harmonize the most recent national household surveys in the region with the objective of improving the availability of sector information. To do so, it joined the data initiative undertaken by the social sector divisions to harmonize household surveys undertaken by governments in the region. The decision was made to use these surveys because they are produced on a regular basis (either annually or biannually), data can be disaggregated by social or economic variable, and they are representative of each country.

Methodology

An analysis was performed of the 18 most recent available household surveys carried out by the census authorities in each country. As a first step, these were stratified based on the statistical methods used in each survey and validated through comparison with census data. Questions were then categorized by geographical area (urban and rural), household income, head of household gender, and (where available) ethnicity or culture.

Thereafter, the water and sanitation questions were categorized to create the following variables:

- a. Piped water to the home: This category comprises dwellings with water that is piped from a water utility, rural cooperative, or private company to a tap within the dwelling. Although this category is not measured internationally, it was found that a significant gap exists between the wealthiest and poorest households in the region. It was possible to measure this dimension in 16 out of 18 countries.
- b. Piped water to the plot: This category comprises dwellings with water that is piped from a water utility, rural cooperative, or private company to a tap that is outside the home but within the plot. In the case of this variable, it was found that many of the published international statistics did not correctly classify the water source, identifying only whether the connection was within the plot. All of the surveys analyzed allow this dimension to be measured.
- c. Nonpiped improved water sources: This category comprises water from a protected well or borehole, rainwater, or protected springs. In many cases, it was found that the surveys did not properly distinguish between protected and unprotected sources. Lastly, two data intervals were taken with a view to obtaining an interval estimate: one treating as improved water sources all categories that failed to specify whether the source was protected, and another treating these as unimproved. Only three surveys correctly classified all sources.
- d. Sewer: This category measures whether the household has a toilet connected to the drainage or sewer system. We cannot assess, however, whether the wastewater is properly treated once it leaves the individual's household. This variable can be measured using 17 of the surveys.
- e. Septic tank: This category measures whether the household has a toilet connected to a septic tank. This variable can be measured using 17 of the surveys. In 15 of these countries, however, no information is available as to whether the tank is covered or the waste is properly treated.
- f. Improved latrine: This estimates the proportion of households that do not have a toilet but do have a covered latrine with protected disposal or some type of treatment of excreta. This variable can be measured using only 5 of the surveys. For the other countries, an access interval was estimated by treating as either improved or unimproved all latrines for which coverage or the disposal of excreta was not specified.
- g. Shared toilets: This category measures whether sanitary facilities are shared by a number of households. This variable can be measured in only 12 countries.

- h. Open-air defecation: This category measures the number of households reporting that they lack sanitary facilities or access to same. This is a problem in certain rural areas in the region. This variable can be measured in 17 countries.
- i. Continuity of service: This measures whether the household receives water supply seven days per week. Seven countries provide data on this, while one measures whether water is available 24 hours per day without specifying the number of days.

Validation

Once all of these variables had been calculated, they were compared to official published data, international statistics, and other sources, with the aim of determining whether the calculated data was correct and could be validated. To ensure the quality of the data, this exercise was performed independently by two consultants.

Inequality statistics

Once these variables had been created, two social dimensions and one geographical dimension were created with the aim of better understanding gaps in access. Households were separated out based on household per capita income (five quintiles), the gender of the head of household, and by urban/rural location. This allowed a better understanding of each country's statistics based on their context.

The following data sources were used:

Country	Year	Survey	Agency	Household sample size	Representativeness
Argentina	2018	Permanent Household Survey	National Statistics and Census Institute (INDEC)	39,980	Urban
Bolivia	2018	Household Survey	National Statistics Institute (INE)	11,195	Urban-Rural-National
Brazil	2019	National Household Sample Survey	Brazilian Institute for Geography and Statistics (IBGE)	163,386	Urban-Rural-National
Chile	2017	National Socioeconomic Characterization Survey	Ministry of Social Development and Families	70,948	Urban-Rural-National
Colombia	2018	Comprehensive Integrated Household Survey	National Administrative Department of Statistics (DANE)	58,243	Urban-Rural-National
Costa Rica	2018	National Household Survey	National Statistics and Census Institute (INEC)	10,942	Urban-Rural-National
Dominican Republic	2018	National Continuous Labor Force Survey	Central Bank	6,539	Urban-Rural-National
Ecuador	2017	National Employment, Unemployment, and Underemployment Survey	National Statistics and Census Institute (INEC)	30,023	Urban-Rural-National
El Salvador	2018	Multipurpose Household Survey	Department for Statistics and Censuses (DIGESTYC)	20,840	Urban-Rural-National
Guatemala	2018	National Employment and Income Survey	National Statistics Institute (INE)	5,191	Urban-Rural
Honduras	2018	Permanent Multipurpose Household Survey	National Statistics Institute (INE)	6,151	Urban-Rural-National

Country	Year	Survey	Agency	Household sample size	Representativeness
Jamaica	2015	Survey of Living Conditions	Planning Institute of Jamaica (PIOJ) Statistical Institute of Jamaica (STATIN)	1,734	Urban-Rural-National
Mexico	2018	National Survey of Household Earnings and Expenditure	National Institute of Statistics and Geography (INEGI)	74,647	Urban-Rural-National
Nicaragua	2014	National Household Survey for the Measurement of Living Standards	National Development Information Institute (INIDE)	6,850	Urban-Rural-National
Panama	2018	Multipurpose Household Survey	National Statistics and Census Institute (INEC)	11,692	Urban-Rural-National
Paraguay	2017**	Permanent Household Survey	National Statistics Institute (INE)	9,594	Urban-Rural-National
Peru	2018	National Household Survey of Living Standards and Poverty	National Statistics and Census Institute (INEI)	37,462	Urban-Rural-National
Uruguay	2018	Continuous Household Survey	National Statistics Institute (INE)	42,282	Urban-Rural*-National

* In Uruguay, the survey treats areas with less than 5,000 inhabitants as rural (compared with 2,000 in the census).

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