

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

WATER AND SANITATION SECTOR FRAMEWORK DOCUMENT

WATER AND SANITATION DIVISION

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ABBREVIATIONS AND ACRONYMS

ADERASA	Association of Water and Sanitation Regulatory Entities of the Americas
CAESB	<i>Companhia de Saneamento Ambiental do Distrito Federal</i>
CAF	Development Bank of Latin America
COPASA	<i>Companhia de Saneamento Ambiental de Minas Gerais</i>
CSD/CCS	Climate Change Division
CSD/RND	Environment, Rural Development and Disaster Risk Management Division
DEM	Development Effectiveness Matrix
ECLAC	Economic Commission for Latin America and the Caribbean
EMAAP	<i>Empresa Metropolitana de Agua Potable y Alcantarillado</i> (Metropolitan Company for Potable Water and Sewage)
EMS	Environmental Management Systems
EPM	<i>Empresas Públicas de Medellín</i> (Public Companies of Medellín)
EPMAPS	<i>Empresa Pública Metropolitana de Agua Potable y Saneamiento</i> (Metropolitan Public Company of Potable Water and Sanitation)
ESCI	Emerging and Sustainable Cities Initiative
ESG	Environmental and Social Safeguards Unit
ETD	Neglected Tropical Diseases
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
IDB	Inter-American Development Bank
IPCC	Intergovernmental Panel on Climate Change
INE/ENE	Energy Division
INE/WSA	Water and Sanitation Division
IWA	International Water Association
IWRM	Integrated Water Resource Management
JMP	Joint Monitoring Programme
LAC	Latin America and the Caribbean
MDG	Millennium Development Goals
NDC	Nationally Determined Contributions
NTD	Mosquito-Borne Diseases
NRW	Non-Revenue Water
O&M	Operation and Maintenance
OECD	Organization for Economic Cooperation and Development
OVE	Office of Evaluation and Oversight
PPP	Public-Private Partnerships
SABESP	<i>Companhia de Saneamento Básico do Estado de São Paulo S.A</i> (Basic Sanitation Company of the State of São Paulo S.A)
SCL/SPH	Social Protection and Health Division
SEDAPAL	<i>Servicio de Agua Potable y Alcantarillado de Lima</i>

SDG	Sustainable Development Goals
SENASA	<i>Servicio Nacional de Saneamiento Ambiental</i> (Environmental Sanitation National Service)
SFD	Sector Framework Document
SFW	Spanish Cooperation Fund for Water and Sanitation in Latin America and the Caribbean
SIASAR	<i>Sistema de Información de Agua y Saneamiento Rural</i> (Water and Rural Sanitation Information System)
SISAR	<i>Sistema Integrado de Saneamiento Rural</i> (Rural Sanitation Integrated System)
SISS	<i>Superintendencia de Servicios Sanitarios</i> (Sanitary Services Superintendency)
SWIT	Smart Water Infrastructure Technologies
TC	Technical Cooperation
TNC	The Nature Conservancy
UNICEF	United Nations Children's Fund
UNDP	United Nations Development Programme
WB	World Bank
WHO	World Health Organization
WSA	Water and Sanitation
WSI	Water and Sanitation Initiative
WSC	Water and Sewerage Corporation of The Bahamas

EXECUTIVE SUMMARY

The update of the Water and Sanitation Sector Framework Document responds to the mandate provided in document "Strategies, Policies, Sector Frameworks and Guidelines at the IDB" (GN-2670-1), paragraph 1.20, which states that all Sector Framework Documents (SFDs) shall be updated every three years. This update reflects the main challenges in the region and highlights those challenges that gained key prominence in recent years. Also, this update includes the sector's new tendencies, supported by progress in research and practice, in the design of policies and projects in the sector. This document supersedes the Water and Sanitation SFD approved in November 2014 (GN-2781-3).

This SFD highlights the importance of the access and quality that the Water and Sanitation (WSA) services have, because of its positive impacts on health, education and economic growth. At a global level, 88% of infant infectious diseases are related to the lack of WSA, and 61% of infant mortality corresponds to diarrhea episodes caused by intestinal parasites. Better health directly results in better education, especially in children (because of the reduction of absences and increase in the learning capacity, psychomotor development and growth), and productivity, which in turn affects access to better employment opportunities, more income and better quality of life. Also, having access to these services create development opportunities for productive (e.g. increase in tourism, more competitive) and non-productive (recreation) activities –specially for women and children, whom most affected by the lack of services. From an environmental point of view, the lack of sanitation generates negative impacts on the biodiversity and security of water sources for human, productive and ecological use.

The upsurge of hydrometeorological events, such as floods and droughts, heightened by the effects of climate change, represent an important risk because of its effects on the quality and sustainability of the WSA services, and on the social and economic activities that depend on the water resource. The presence of economies of scale in the provision of these services in urban areas, which generate a situation of natural monopoly, and the impacts in the sector in the context mentioned in the previous paragraph, require the intervention of the State to ensure that positive externalities are captured, and negative externalities are mitigated, thus correcting market failures that can lead to inefficiencies and inequalities, and ensuring that the benefits are maximized for society.

This document is structured in five sections. The first section defines the subject matter and the scope of this SFD, as well as its alignment with the Bank's policies. The second section presents international and regional empirical evidence about the key policies and programs that have been successful, and the best practices to take into account when designing interventions in the sector. The key issues that are highlighted and developed in this chapter are: (i) the improvement of the access and quality of services; (ii) the strengthening of the sector governance and regulation of the natural monopoly; (iii) the financial sustainability and increase in the efficiency in management of services, including, when conditions make it possible, partnerships with the private sector; and (iv) the consideration of water security issues and disaster risk management (particularly in those generated by climate change). In each one of these issues the social considerations associated must be addressed to consider the sustainability in the interventions. Also, the gaps faced by the sector in research issues are highlighted, particularly in sector governance and regulation issues.

Section III presents the principal challenges of the sector in Latin America and the Caribbean (LAC), following the same issues addressed in Section II. Despite the region's progress in recent years, there are still some major challenges relating to equity and access to WSA (for rural, indigenous, and peri-urban peoples), the sewerage service gap, the quality of water service (potability, continuity, and pressure of water provided), the wastewater treatment, administrative and operational efficiency of utilities, financial sustainability, the governance framework and inter-sector coordination, disaster risk management, long-term planning to address the challenges of climate change and consideration of environmental, water resource management, as well as social and gender aspects.

Section IV presents the lessons learned from the Bank's experience in the sector, based on loan operations, technical cooperation and knowledge products developed in recent years. This section is also fed from the contribution of experiences, lessons learned, and good practices of countries harnessed by the specialists of the Water and Sanitation Division (INE/WSA) in the preparation and execution of operations. This section also presents the projects implemented by INE/WSA to improve the design of the operations based on the Development Effectiveness Matrix. The comparative advantages of the Bank in the region are highlighted and the principal knowledge products that the Bank has generated in recent years are described.

Lastly, Section V describes the goals, principles, dimensions of success and lines of action that will guide the Bank's operational and research activities of the Bank. The goal proposed by this SFD for the Bank is to support the countries in achieving universal access to sustainable, high-quality WSA services and to prioritize the following principles which shall govern the Bank's actions: (i) achieve universal access to the services, improving opportunities for the low-income and most vulnerable population (women, indigenous and afro-descendant people), and increasing the quality of the services; (ii) promote comprehensive solutions, where in addition to providing infrastructure, actions for the institutional strengthening actions are implemented for the utilities and a sector governance framework, and promote financing schemes for the proper operation and maintenance of the services; (iii) promote multisector interventions, deepening the articulation with other sectors seeking more social and economic impacts; and (iv) reinforce the concept of water security in the WSA sector, to have resources of adequate quality and quantity for all uses and reduce the risk of disasters, taking into consideration climate change effects. The four defined Dimensions of Success, as well as the lines of action, are framed in these principles.

I. THE SECTOR FRAMEWORK DOCUMENT IN THE CONTEXT OF CURRENT REGULATIONS AND THE INSTITUTIONAL STRATEGY 2010-2020

A. The Water and Sanitation Sector Framework Document as part of existing regulations

- 1.1 This document supersedes the Water and Sanitation Sector Framework Document (GN-2781-3) approved by the Operations Policy Committee in 2014, in accordance with the provisions set forth in paragraph 1.20 of the document "Strategies, Policies, Sector Frameworks and Guidelines at the IDB" (GN-2670-1), which provides that Sector Framework Documents (SFD) shall be updated every three years.
- 1.2 This document is a part of the 20 SFDs prepared within the scope of document GN-2670-1, which together provide a comprehensive vision of the development challenges in the region. For the purpose of this SFD, water and sanitation are understood as an economic sector comprising water services for human consumption (catchment, treatment, storage and distribution, including integrated water resource management), sewerage (collection, treatment, disposal of wastewater and storm water, and reuse), and solid waste (collection, handling, and final disposal).¹ This SFD is complemented by the Health and Nutrition SFD, Urban Development and Housing SFD, Agriculture and Natural Resources Management SFD, Gender and Diversity SFD, Tourism SFD, Climate Change SFD, Environment and Biodiversity SFD, and the Environment and Biodiversity SFD, in aspects including water-related diseases, behavioral changes, land management, multisectoral approach, tourism activities, a gender approach, and integrated water resource management, climate change and the importance of ecosystem services in water resources.
- 1.3 The Water and Sanitation SFD is aligned within the Strategy for Sustainable Infrastructure for Competitiveness and Inclusive Growth (GN-2710-5), which provides as a principle to promote the provision of basic efficient and sustainable services and the development of infrastructure that contributes to economic growth through the universal access of Water and Sanitation (WSA), developing innovative financing mechanisms and promoting the involvement of the private sector. In addition, by treating infrastructure as a means to provide services of adequate quality, it proposes a new vision in which infrastructure is planned, built, and maintained within an environmentally and socially sustainable framework, with better governance, greater efficiency, and a promoting multisector program. The Water and Sanitation SFD is also aligned with the Integrated Strategy for Climate Change Adaptation and Mitigation, and Sustainable and Renewable Energy (GN-2609-1), as it seeks to contribute to the institutional priority of protecting the environment, adapting to climate change and promoting food security. The document is also aligned with the goals and principles of the Public Utilities Policy (GN-2716-6) in that it promotes access to the service for the entire population, seeks to provide the service in conditions of efficiency, promotes continuous

¹ The scope of this SFD does not include a comprehensive approach to water as a resource, but it is being analyzed by a multidisciplinary team composed by specialists from the Water and Sanitation Division (INE/WSA), Environment, Rural Development and Disaster Risk Management Division (CSD/RND), Energy Division (INE/ENE), and Climate Change Division (CSD/CCS).

improvements in the sector's governance and promotes innovation to encourage the efficiency, access and financial environmental sustainability, among others.

B. The Water and Sanitation Sector Framework Document and the Institutional Strategy

- 1.4 The Water and Sanitation SFD is consistent with the Update to the Institutional Strategy 2010-2020 (AB-3008), which recognizes social inclusion and equality, productivity and innovation, and the impacts of the effects on climate change, as challenges for structural and emerging developments in the region. The Institutional Strategy also raises three crosscutting development issues that the interventions and WSA can potentially address: gender equality and diversity, climate change and environmental sustainability, and lastly, institutional capacity and rule of law.

II. INTERNATIONAL EVIDENCE ON THE EFFECTIVENESS OF POLICIES AND PROGRAMS IN THE SECTOR AND IMPLICATIONS FOR THE BANK'S WORK

- 2.1 **Impact of Water and Sanitation Services.** The costs avoided in health, the improvement in academic performance, the increase in work productivity and the growth of industries that depend on water (agriculture, livestock, recreational, fishing, tourism, etc.) determine the socio-economic profitability of investments in WSA.² According to a study from the World Health Organization (WHO),³ at a global level, the benefits could represent up to 1.5% of the Gross Domestic Product (GDP) and it is estimated for the LAC region that for each dollar invested in water, the profitability would be US\$2.40, while this cost-benefit relation in the sanitation service would increase to US\$7.30.
- 2.2 The sector's impacts in social development (in education, health) and economic (productive and non-productive activities) and the strong economies of scale related to the investments in WSA, that generate conditions of natural monopoly, require the comprehensive intervention of the State in the following issues: (i) improvement of the access and quality of the services; (ii) strengthening of sector governance and regulation of the natural monopoly; (iii) financial sustainability and increase of efficiency, to improve the performance of the service operators, including, when the institutional framework is adequate, the participation of the private sector as an instrument to achieve this goal; and (iv) the consideration of water security aspects and risk management of disasters caused by climate (including the effects on climate change). In each one of these issues the social considerations associated must be addressed to consider the sustainability in the interventions.

A. Access to and quality of service

- 2.3 **Water, Sanitation and Health.** According to the United Nations Children's Fund (UNICEF) (2006), the lack of WSA is the main cause for diseases in the world,⁴

² Agênor (2013).

³ Hutton (2012).

⁴ In addition to the infectious diarrhea, the lack of safe water is related to a long list of diseases, such as chronic intoxication with arsenic, selenium and other metals, viral Hepatitis A and E, leptospirosis, typhoid fever and a variety of intestinal parasites. Arnold and Colford (2007), Barreto et al. (2007), Brennenman and Kerf (2002), Galdo and Briceno (2004), Galiani et al. (2005), Moraes (2003), Waddington et al. (2009), WB (2013) and the summaries by Brennenman and Kerf (2002). For example, one out of every three hospitals in developing countries does not have running water (Chawla et al., 2016).

especially in children.⁵ Our studies⁶ document that the access to WSA helps to improve the health. According to recent estimations,⁷ access to WSA could prevent, per year, 361,000 deaths due to diarrhea in children less than five-years-old, which represents 58% of the deaths due to diarrhea; up to 73% of these could be reduced with the continuous supply of piped water and the elimination of excretes through the sewage system for homes and community environments.⁸ According to estimations at a global level,⁹ if the access to WSA were universal, the number of diarrhea episodes would be reduced in 17%. If the disinfection of water is added at the place of consumption, the reduction of these episodes could reach 53%. Lastly, by providing access to continuous water supply, connections of the home to the sewage and partial wastewater network, would allow to obtain a reduction of diarrhea episodes in 69%.

2.4 The lack of access to WSA related to the increase in the incidences of Mosquito-borne Diseases (MBD). Studies show that the risk of getting dengue is greater in populations without access to WSA, because of water storage in the home (without protection) and wastewater in open space¹⁰ or standing water.¹¹ Between 50 and 100 million cases of dengue occur every year in the world, being Latin America and the Caribbean (LAC) the most affected region.¹² Additionally, the lack of WSA is an important risk factor for infectious diseases, such as neglected infectious diseases, which affect more than 1.5 million people worldwide and cause about 170,000 deaths every year. In LAC, these mostly affect people located in tropical and subtropical zones and, disproportionately, to the poorest population.¹³

2.5 **Water, Sanitation and Education.** On the other hand, a large number of investigations have documented the existence of significant links between access to infrastructure and the results in education in developing countries.¹⁴ Researchers found that better access¹⁵ to WSA in schools tends to increase the attendance rates (specially of girls) and the child's learning skills.¹⁶ Good health and nutrition are key pre-conditions for effective learning.¹⁷ The high incidence of diarrhea is related to high levels of malnutrition, which can result in high levels of anemia, low levels of early cognitive development, psychomotor development and

⁵ Formal studies by Behrman and Wolfe (1982), Lavy et al. (1996), Lee et al. (1997), Shi (2000), Newman et al. (2002), Leipziger et al. (2003), Wagstaff and Claeson (2004), and Gamber-Rabintran et al. (2010) found that the access to clean water and the sanitation infrastructure helps to reduce infant mortality.

⁶ For example, the summaries by Brenneman and Kerf (2002).

⁷ WHO (2015), Black et al. (2003).

⁸ Pruss-Ustun et al. (2014).

⁹ Hutton and Haller (2004).

¹⁰ Schmidt et al. (2011), Cordeiro et al. (2011).

¹¹ Cecchini et al. (2012), AFD (2014), PAHO (2012), Githeko and Woodward (2003), Magrin et al. (2014).

¹² Between 2000 and 2006, the region evidenced 68% of the cases at a global level (Cafferata et al., 2013).

¹³ OPS (2016).

¹⁴ As documented by Brenneman and Kerf (2002), and more recently by Agenor (2008, 2011). For LAC, the relation between access to WSA in schools and the academic results is presented in Duarte et al. (2011).

¹⁵ In terms of increase in the access and improvement of the service (continuity and quality).

¹⁶ In Bangladesh, the attendance rates of girls in schools increased up to 15% after improvement in the access to WSA. In Morocco, a sharp increase in the record of girls was due in part because of the improvements in these services in schools. This effect can operate in part by improving health in children.

¹⁷ WB (2008a).

growth in children,¹⁸ thus affecting their learning abilities. In conclusion, the healthiest children perform better at school.¹⁹

- 2.6 **Water, Sanitation and Labor Productivity.** There is also a relationship between the availability of WSA, productivity and income. The lack of WSA involves a loss of productivity of employment origin because of absenteeism due to sickness or the need to take care of sick children. Also, a lower potential in the generation of income should be considered due to the time or income allocated in obtaining water from some source that is distant from the home. In low density and rural areas, the greatest economic benefit of the availability of water is in the savings in time of carrying that can be allocated to productive activities capable of generating income for the family.²⁰ Likewise, in urban and peri-urban zones, because of the lack of WSA, the population incurs in more expenses by using an alternative way (water wells and pumping, water tankers, bottled water, septic chambers or wells, hiring of vacuum trucks,²¹ etc.).²²
- 2.7 **New international agenda for Water and Sanitation: universal access to quality services.** The Sustainable Development Goals (SDG) for the WSA sector, whose purpose is to improve the quality of life²³ by reaching by the year 2030 universal coverage,²⁴ recognizes the impact in the availability of WSA services because of its impact in health, education, equality (gender, regional and ethnic) and in the economic and social development of countries. Likewise, the declaration of the United Nations for the access to WSA as a human right is oriented towards incorporating elements of effective availability of water, minimum levels of consumption, quality, continuity, closeness and access, the need to incorporate segments of the urban and rural marginal population, and the promotion of recycling and reuse of water.²⁵ Also, several of the goals of the Paris Agreement of the United Nations Framework Convention on Climate Change are related to the WSA sector. Almost all LAC countries have prepared their Nationally Determined Contributions (NDC) to establish their mitigation and adaptation actions directed towards meeting said goals. To accomplish these quality and equality goals, and incorporate the requirements of the climate change goals, imposes a great challenge for the region that strengthens social requirements²⁶ and the call to institutions²⁷ and scholars²⁸ to increase public and private spending in WSA.

¹⁸ Humphrey (2009), Fewtrell et al. (2005).

¹⁹ Bleakley (2007) found that de-worming in South American children had positive effects in academic results. Bundy et al. (2006), the increase in health programs at schools (which includes the treatment of intestinal parasites), emphasized that these programs can increase productivity during the adult life not only because of better cognitive skills, but also because of its effect in the academic participation and academic years reached.

²⁰ Hutton and Haller (2004), Pickering et al. (2012).

²¹ Vacuum trucks are those which have cylindrical, tanks, equipped for the collection and transport of waterwaste from homes with septic tanks.

²² Lentini (2006).

²³ Howard et al. (2013), WB (2013).

²⁴ Universal access means that 100% of the population has access to WSA services.

²⁵ United Nations Assembly, Resolution 64/292 of July 28, 2010.

²⁶ See, for example, the electoral campaigns in Peru, Argentina, Bolivia.

²⁷ The World Bank (2005) notes that the low coverage and poor quality of the sanitation service has effects in the health, nutrition and possibly in the infant development, education, the environment and activities, such as tourism; and also increases the probability that girls abandon school or are victims of aggressions when they seek privacy. With respect to the lack of access to water, it notes that this causes the death of 4,000 children and loss of up to 7% of the GDB every year.

²⁸ Sachs (2005 and 2008), Agênor (2013).

2.8 Policies to close the gap of coverage of Water and Sanitation services.

Over the course of the 19th century, the countries in the region have made great efforts to increase the WSA coverages (¶3.2), in the context of the Millenium Development Goals (MDG). The experience in the LAC region and at a global level indicate that those countries that have significantly increased the coverages in WSA have adopted policies such as: ²⁹ (i) giving priority to long term investments in the sector; ³⁰

(ii) formulating special programs to serve vulnerable and less accessible population segments, such as those in rural and periurban areas,³¹ women (see box),³² ethnic groups, among others; (iii) providing sanitation solutions in projects that involve water connections; (iv) paying special attention to these segments to ensure their connection to the systems as service users (for example in Medellín or Greater Buenos Aires), including in-house connections;³³ (v) including WSA connection aspects in programs for neighborhood improvement or regularization of settlements (e.g. Montevideo); and (vi) revision of technical regulations governing service design and standards for periurban areas, small towns, and rural communities (Chile, Haiti, Colombia).

WSA services for women and girls

Women are the main responsible for the collection, carrying and management of water in the home. At a global level, it is calculated that women and girls are responsible for 72% of the collection of water for domestic use (WHO and UNICEF, 2015) and that women spend a total of 125 million hours per day in collecting water in containers that can weigh up to 20 kg (water.org, 2015). Closing the access gaps to WSA has important impacts in the life of women and girls because it frees the time they spend in these tasks to do other activities, such as activities that generate income (OECD, 2011) or going to school (Nauges and Strand, 2013).

2.9 More focus in rural areas, the most lagged.

Some of the measures with the greatest impact promoted on various continents by countries facing major coverage challenges has been to give priority to formulating policies, plans, and programs aimed at serving the rural population both in small towns and remote areas. Nevertheless, as the provision of services progress, the areas to which access must be given get farther, which causes additional challenges at a technical, financial, environmental, institutional and social level.³⁴ In particular, the

²⁹ Analogue elements arise from the experience in Africa, particularly rural, although they have conditions of service much more precarious than in LAC (see Ghosh and Morella (2011), chapter 9). The experience of several regions in Asia, highlights similar practices to those indicated in this document (see the case of Souteast Asia and the Pacific in Willetss et al. (2008), and for Asia in general see Asian Development Bank (2013)). For challenges and practices faced in Eastern European and Central Asian countries, referred to equality in access, see UN-WHO (2012), and with respect to obsolete and oversized infrastructure see OECD (2011).

³⁰ For example, countries like Brazil, Chile, Colombia and Peru, among others.

³¹ In the discussion about the goals in the Development Agenda post-2015, these quality issues of the services have been very relevant. The issue of reducing inequality in the provision of the services has also been relevant. See WSSSC (2014) and WHO-UNICEF (2014).

³² Demie et al. (2016) carried out a study in Ethiopia that demonstrated that about $5,23 \pm 2,82$ h per day were spent by girls and women looking for water. The little access to drinking water, together with illiteracy (73.1%) and the prevalence of diseases transmitted by water, influenced greatly the participation of girls and women in education, agricultural production and other development activities in the area of the study.

³³ See AySA (2014) for the case of Buenos Aires, and see United Nations (2012) for examples in Bangladesh, Angola, Manila, Dakar and some cities in India.

³⁴ Carrasco (2011); CAF (2016).

approach to be used in rural sanitation is a question that is currently under study,³⁵ however, based on international experience, it should involve the following main considerations: (i) the type of solution to be proposed is generally an individual one (not in a piped system), in which the user/beneficiary has a strong say in deciding on the most appropriate solution from the range of available technical solutions; (ii) only solutions actually demanded by the population, including payment capacity considerations, can be sustainable over time and effectively used by the population;³⁶ and (iii) creating demand, providing education in hygiene, and promoting the local supply of solutions appear to be decisive elements of the proposed actions.³⁷

- 2.10 **The quality in the service is as important as the access.** Beyond the access goal,³⁸ the international community is increasingly concerned with the quality of services, partly because of the social pressure of demanded for the provision of such services,³⁹ and also because of the definition of the SDG, which incorporates other variables in addition to access. In the sector, it is common to find problems with the potability, continuity, volume per capita, and pressure of the water delivered, as well as with an effective functioning of the sewerage system and wastewater treatment plants, and with inappropriate disposal of solid waste in water bodies, sewers, or onto the ground. These problems limit the impacts in the access to the services. An issue that generally is not incorporated by the service providers and that greatly determines their quality is the planning with respect to the risks and adoption of resilience in the provision of the services. Some of the most effective practices in this regard include: (i) establishing a clear definition in regulations and regulatory frameworks, of the expected quality standards, distinguishing as far as possible between urban, peri-urban, and rural areas (including small towns and remote areas, see the case of Vietnam);⁴⁰ (ii) have technical, legal and administrative tools to ensure that operators meet the quality standards;⁴¹ (iii) move from an approach directed towards investments in works, to one of provision and quality of the services (as has been done in Ethiopia, Nepal, Zimbabwe, Bolivia, India, Colombia, Thailand and South Africa);⁴² (iv) introduction

³⁵ ECOPSIS (2014).

³⁶ This is particularly relevant when the beneficiaries are indigenous communities.

³⁷ Kar and Chambers (2008).

³⁸ See Superintendencia de Servicios Sanitarios (SISS) (2012), it is not enough just to have access, but a continuous service is required (24 hours, seven days a week), and with potability and adequate pressure.

³⁹ International standards for the quality in the service include: water potability (absence of microorganisms and pathogens who cause diseases) and the presence of residual chlorine that reduces the risk of contamination of the distributed water; pressure that allows for the delivery of the service at superior levels of the house; continuity, which implies availability of the service every day of the week during 24 hours per day; and provision, which implies availability in the minimum volume of 60 liters per inhabitant per day.

⁴⁰ In the urban area, the quality standards are defined in the region. In the rural area, there are practices in other parts of the world that propose a service scaling concept, as a gradual strategy to improve them. This consist in giving some type of access to persons without service, even if they do not comply with the required standards, but improving the lack of the service. Once there is access, one goes up the ladder at superior service levels to ensure minimum quantities, water quality, safe source of water that is not more than 30 minutes in walking distance. Then, the next ladder is a level with better provision (40 l/h/d), and lastly, access to quality is provided with a minimum access of 60 l/h/d. WashCost (2010). In Vietnam, they chose a differentiated regulation system for alternative providers (Tremolet and Halpern, 2006).

⁴¹ The statistics available of the regulatory bodies in Chile, Peru and Colombia show that effectively the quality indicators have been improving notably with time (see Annual Reports of the SISS in Chile, Water Regulatory Commission in Colombia, and SUNASS in Peru).

⁴² Van Koppen et al. (2009) show these case studies of multipurpose water services.

of information and monitoring systems for quality in service indicators (as in the cases of South Africa and Malaysia);⁴³ (v) incorporate innovative systems and technologies for investment and management of the services; and (vi) develop risk mitigation plans by the service providers.

- 2.11 **Proper management and wastewater treatment.** The lack of adequate treatment and/or disposal of urban wastewater, before being discharged into rivers, lakes, or the sea, deteriorates the quality of the resource, limits its sustainable use, impacts biodiversity and puts a risk in the health of the people that have contact with these. The increase in the air temperature, together with water rich in nutrients, could increase the possibility of the appearance of cyanobacteria, causing direct impacts to the health, and therefore, economic impacts to the population close to these water bodies.⁴⁴ The main causes for the lagging in this issue are: (i) fast expansion of urban populations; (ii) poor planning in territorial development; (iii) lack of financing for infrastructure; (iv) lack of technical capacity of the service providers; and (v) improper or poor design and operation of these facilities. Untreated wastewater is one of the main threats for the public health by contamination of the water bodies used for recreation, water supply or production of food, because they transmit diseases such as cholera, gastroenteritis and hepatitis.⁴⁵ Untreated wastewater also poses a threat to "ecosystem services" from natural capital, with strong potential impacts in the industry, agriculture and tourism.⁴⁶ Likewise, water pollution affects coral reefs and mangroves, thus reducing the ability to protect coastal zones from impacts related to extreme events, which are exacerbated by climate change.⁴⁷
- 2.12 **Circular economy in sanitation.** The lack of water resources in some places or during sometimes of the year, as well as the SDGs that set forth, in addition to the coverage goals, the need to increase recycling and safe water reuse, change the paradigm of traditional sanitation for circular economy, in which wastes are seen as a resource with potential for use, not only of treated wastewater, but also of the mud and solid waste as source of energy and nutrients. In dealing with these challenges, in the world there are experiences that have demonstrated the viability for the reuse of treated wastewater for agricultural purposes (Israel), for industrial use (Brazil) and even there is experience for potable reuse (Namibia).⁴⁸ Also, there are experiences in the recovery of energy from sludge that comes from treatment processes (Sweden, Mexico⁴⁹ and Japan⁵⁰), and recently the possibility of recovering nutrients has been proven (Holland and Denmark).⁵¹ Thus, a great potential for the generation of new markets around sanitation is identified, which

⁴³ In Paraguay, El Salvador and Honduras, a Rural Water and Sanitation Information System (SIASAR) is being implemented as a comprehensive monitoring system of the rural systems and as an instrument to define policies and interventions (Smits et al., 2013). International cases (South Africa and Malaysia) are documented in Muller et al. (2008).

⁴⁴ Delpla et al. (2009).

⁴⁵ OECD (2013).

⁴⁶ Hutton et al. (2008) estimated for four South East Asian countries (Cambodia, Indonesia, Philippines and Vietnam) that poor conditions in sanitation cause loss in the tourism sector between 5% and 10%. The Tourism SFD (GN-2779-9) highlights the importance of basic services for the sector's development.

⁴⁷ Vergara et al. (2009), IPCC Fourth Assessment Report: Climate Change (2007), Lapointe, B. et al. (2010).

⁴⁸ Jimenez et al. (2008).

⁴⁹ The Wastewater Treatment Plant in San Luis Potosi, Mexico, generates energy for internal consumption and for sale, generating savings of US\$18 million in a period of six years (WB, 2017).

⁵⁰ WERF, Status Report: Energy and Resource Recovery.

⁵¹ IWA (2016).

can reduce the frequent elevated costs of the service and contribute to its self-sufficiency in generating resources.⁵²

B. Sector Governance⁵³

- 2.13 **Separation of functions.** A paradigm in the provision of public utility services refers to the need to clearly identify, assign and separate the different entities the functions and powers of the State, in different entities, which should have certain independence and autonomy among them. It is considered essential that such operators concentrate in delivering services, and that other entities should be responsible for supervising the sector, formulate policies, issue standards and regulating the services. This model has been successful in Chile, Colombia, Brazil, Peru and Jamaica, for example, and its origins can be traced back to the reforms of the 1980s in England, which have also been applied successfully within the region in the energy and telecommunications sectors.⁵⁴ Experience also indicates that this concept has not necessarily been successful in all countries of the region that have attempted to apply it, and in general each country must develop a tailor-made model of organization, with certain basic principles. Although these topics are still matters of ongoing debate, the following elements can be cited as essential for the success of the model:⁵⁵ (i) the success of sector reforms will depend on the specific context, in terms of the quality of State institutions, including the legislative and judicial branches; (ii) a country's macroeconomic stability; (iii) a political will to separate power among State institutions; (iv) the quality of the institutional environment in terms of formulating public policies and the effectiveness with which countries carry them out;⁵⁶ (v) the degree of a country's real commitment to the new institutional framework; and (vi) the degree of interference in institutions, of private interests (labor unions, bureaucracies, politicians, private contracting firms, degree of transparency etc.).
- 2.14 **Strengthening governance in oversight.** Among the central functions of the State in WSA are establishing guidelines for the development of the sector, setting policies and standards, overall planning, information systems,⁵⁷ allocating resources for financing investments, and decision-making on the management modality for the services. Countries that have succeeded in this area⁵⁸ and have followed good practices in the sector, have institutions that operate under a clear legal framework and mandate, with significant and periodic budgetary resources, qualified personnel, and a high senior ranking within the structure of the State—elements which determine the sector's priority on the countries' public agenda and in the allocation of resources.

⁵² Toilet Board Coalition (2016).

⁵³ In this document, the term "governance" refers to the elements related to the definition and application of public policies, roles of the institutions and regulatory and legal frameworks. Krause (2009).

⁵⁴ From the 1990s, several countries developed reforms based on State subsidy principles, incorporation of private operators, the creation of regulatory frameworks and the separation of roles.

⁵⁵ Ver Hantke-Domas and Jouravlev (2011). For the case of reforms in countries in Eastern Europe and Central Asia see OECD (2011).

⁵⁶ It is important to consider the level of capacity and maturity of the service providers when designing sector reforms, given that they are a necessary part of the institutional arrangement.

⁵⁷ According to OECD (2017), improving the quality of available information improves labor efficiency.

⁵⁸ Successful cases of proper sector steering are Colombia and Peru, and more recently, Argentina. In the case of Chile, the decisions are channeled with success by the regulatory body (as minority stakeholder in several companies), or the Empresa Concesionaria de Servicios Sanitarios, S.A. (as controlling company of the agreement for the transfer of exploitation rights).

- 2.15 **Strengthening governance in regulation.** An important factor for good performance of regulators is to strengthen transparency frameworks, accountability and corporate governance of regulatory bodies, as well as ensuring the coordination between the different entities responsible for the sector's governance, supervision and audit⁵⁹ which promotes and guarantees communication processes and citizen participation as direct beneficiaries of the service. Also, the experience in public policies indicates that governments should impose regulations both to public providers, as well as to private and mixed providers based on principles of just and reasonable profitability, good faith, due diligence, efficiency requirements and transfer of efficiency earnings to consumers.⁶⁰ The lessons of international experience have raised questions about the design of the frameworks and institutions for regulating public utility companies, which often have multiple and conflicting objectives that are quite different from commercial goals.
- 2.16 **Political economy of the sector.** The State plays a fundamental role in these services, as already explained, and it is important to ensure that public policies are aimed at maximizing the "common good", and that they have a long-term vision, i.e. with sustained priority that extends beyond the time limits of individual government mandates, and that they are properly planned within an adequate institutional framework.⁶¹ Using the analysis approach known as "actor-centered institutionalism,"⁶² it is proposed that the policy-making process implemented in a country or sector be the result of the interaction of stakeholders (president, ministers, managers, congress, users, etc.) who have different capacities (resources, legal authority, etc.) aligned primarily by the institutional context that sets the ground rules, and guidelines, incentives, and perceptions. Stakeholders interact in areas where policy decisions are resolved and the nature and quality of the same are determined. The analysis formalizes modeling of decision-making under the prism of game theory. This approach is strongly centered on characterizing the way in which public policies are defined, such as their stability, adaptability, coherence and coordination, quality of implementation, capacity and will, and incentives to enforce them (enforcement), public orientation, and efficiency.⁶³ It also identifies characteristics such as legitimacy, transparency, accountability, citizen participation, inclusion, equity, integration, capacities, and adaptability.⁶⁴ This methodological framework for analysis has been widely applied in macroeconomic policy, fiscal budgeting, and other fields and has led to a series of work.⁶⁵ Despite its importance, these issues are not very well developed in the sector's literature, particularly in the region, and therefore, they are key elements in the INE/WSA's knowledge agenda. The complexity of the subject and the difficulty in making empirical studies, capable of controlling the various factors and stakeholders that affect the sector, require a gradual and systematic approach, such as that proposed in Section V of this document.

⁵⁹ Andrés, Schwartz and Guasch (2013).

⁶⁰ Hankte-Domas and Jouravlev (2011).

⁶¹ A political economy is understood as the analytical approach that proposes to use specific elements of the neoclassical theory of human and corporate behavior, on how to be the theory of games, to model the actions of stakeholders in the political and institutional fields related to this. Ver Persson and Tabellini (2000).

⁶² Scharpf (1997), IDB (2006).

⁶³ Stein et al. (2005).

⁶⁴ OECD (2012), chap. 3.

⁶⁵ Stein and Tomassi (2008), Hallerberg et al. (2009).

- 2.17 **The scale of services.** The high decentralization of services, especially in the municipal level, has generated another point for analysis, relating to the difficulties encountered by these entities, and the loss of economies of scale in their management. Fragmentation seems to induce effectiveness and efficiency losses, increasing transaction costs and hinders control and regulation.⁶⁶ Some successful experiences have promoted the integration of municipalities in municipal associations or organizations at a departmental/state level, to take advantage of economies of scale. In England, the Netherlands and Chile regional companies were created⁶⁷ and not at a municipal level for the delivery of the services. In Colombia, the Departmental Plans for Water and Sanitation were created, which gave at a departmental level the interagency coordination, planning, formulation and execution of investment, the local institutional strengthening, the allocation of resources and supervision and control, looking to take advantage of economies of scale, especially in the administration and management of the services, and harmonizing decentralization at a municipal level.⁶⁸
- 2.18 **Integrated Water Resource Management (IWRM).** A river basin or watershed is a complex system where multiple stakeholder interact, on occasions with conflicting interests. Thus, water security of a river basin or watershed requires joint collaboration between the public and private sector and the civil society, with an organization that can overcome market failures caused by water users that do not internalize negative externalities that generate the consumption or contamination of water resources.⁶⁹ The current paradigm in water resource governance is to take a comprehensive approach to managing the resource, meaning that all stakeholders living within a river basin or watershed should be involved in the decisions that affect them and should develop consensus-based plans that are environmentally and socially sustainable. Nevertheless, successful cases are limited.⁷⁰ Several entities⁷¹ have proposed tools and guidelines for IWRM, developing the application of good practices such as: (i) long-term planning of which the planning follows an evolving, gradual and participative process, within a framework of land management of the urban and rural territory; (ii) recognition of change drives and the need to adapt to the changes in the river basin and watersheds; (iii) incorporation of all relevant, internal and external, stakeholders with adequate information and communication systems; (iv) create river basin and watershed organizations as institutional mechanisms to plan, regulate and control interventions for recovery and conservation of water resources; and (v) improve

⁶⁶ Hankte-Domas and Jouravlev (2011). Ferro and Lentini (2010) empirically examine the subject of economies of scales in WSA. These are related to the decreasing tendency of medium costs in long term costs as production grows. These economies are present in works and in the operation and administration. Also, there are economies of scale in the planning of the expansion sharing resources, in the maintenance avoiding double work and in the coordination of the use of water resources.

⁶⁷ An interesting modality is also the one in Brazil that since the beginning of the 1970s was municipal title services, but large state companies mainly provide these under a SABESP concession agreement (2011).

⁶⁸ Rozo (2011), did an evaluation of the Water and Sanitation Departmental Plans and identified that in effect, they are tools that help to articulate and coordinate different agencies, overcome the institutional weakness of small municipalities, allocate more resources to generate more impact and improve transparency. Nevertheless, the comprehensive application of this policy was limited to the difference of objectives at the different levels of government involved.

⁶⁹ In paragraph 2.33 Water Funds are highlighted, as mechanisms that arise from society and promote the participation of the public and private sector.

⁷⁰ UNEP (2009) presents successful cases in 11 countries of the world, including the Rio Negro in Argentina.

⁷¹ Ver Akhmouch (2012), UNESCO (2011), ECLAC (2011), among others.

information and accountability systems by the water managers, among other aspects.

- 2.19 **Risks and climate change planning.** The long-term planning of services should consider land management and the management of river basins and watersheds to mitigate the impact that geological, water and climate change risks can generate. It is essential to have knowledge of the availability of water, its potential uses (human supply, agriculture, industry, tourism, agriculture, power generation and for the balance and functionality of the ecosystems that provide key services to society,⁷² and other effects such as more saline intrusion in aquifers due to the increase of sea levels. The sustainable use of groundwater is crucial for the capacity to adapt to droughts and climate change, by providing a sustainable regulatory reserve during periods of low availability of groundwater. One of the most common policy and planning instruments (and in general adopted by countries in LAC) are adaptation plans with specific focus in the water sector, which analyze how projected temperature and precipitation changes would alter the water cycle, the availability of water, natural ecosystems and economic activities. Also, programs are developed to respond to these problems, including measures of adaptation specific to the level of the watershed and sub-watershed.⁷³ Another of the policy instruments used more frequently at the city level is the Climate Action Plan,⁷⁴ which sets forth programs and goals of reduction of emissions derived from different economic activities and infrastructure (including solid waste and wastewater management), as well as actions of adaptation to reduce the vulnerability when facing extreme climate events.⁷⁵
- 2.20 **Multi-sector approach to achieve a comprehensive management of urban services.** The complexity of public services and goods in large and medium-sized cities⁷⁶ has led to the need to design better approaches to planning and management of the same. Of particular note, mainly, are the well-known

⁷² According to UN Water (2015), since 1992, floods, droughts and storms have affected 4.2 billion people and have caused economic damages for US\$1.3 trillion.

⁷³ Examples of the Water Resources Adaptation Plan in Chile (in analysis of vulnerability and creation of capacity phases), and the National Adaptation Plan to Climate Change in Colombia, within the framework of the National System of Climate Change, with a water resource management area.

⁷⁴ Mexico was the first developing country to present its Climate Action Plan to the United Nations Framework Convention on Climate Change in 2015, within the context of the Paris Agreement. Also, more than 30 municipalities have Municipal Climate Action Plans. Then, countries such as Panama, Chile, Bahamas or El Salvador presented their Climate Action Plan. Additionally, Quito has a Quito strategy for climate change (2009), which, in its adaptation and mitigation item, considers programs such as the promotion of recycling and integral management of solid waste and the comprehensive management of water resources. Likewise, Buenos Aires in its Action Plan by 2030, sets forth goals for the reduction of Greenhouse Gas (GHG) emissions in the waste sector. In Colombia, in 2016 the National Policy for Climate Change, which contains (for the WSA sector) lines of action and specific mitigation actions, which are embodied in the Sector Action Plan of Mitigation of the Housing, City and Territorial Ministry. The policy contains a sector diagnosis of GHG emissions and estimations of the potential mitigation of the sector.

⁷⁵ Currently, the Bank is supporting the Government of Paraguay through the Technical Cooperation "Study of Water Resources and Climate Vulnerability of the Patiño Aquifer" (PR-T1207), with the purpose of evaluating its climate vulnerability and susceptibility of contamination with respect to different climate change scenarios, leading to the design of a comprehensive management plan and the definition of an institutional scheme for its implementation that enables the Government to make effective decisions for its protection and proper management.

⁷⁶ Within the framework of this document, the definition of principal, medium or minor cities does not have a specific population size connotation, but one related to each country that differentiates the population in the capitals and larger cities, from regional or departmental capitals and populations of similar size, and the municipalities or intendencias of lesser population size.

interactions between programs and projects that simultaneously address issues such as protection against floods, sanitary and storm sewerage networks (when combined), and solid waste management. At the same time, there are interventions that address other aspects related to the activities in the city (substandard neighborhoods, management of the urban environment and water bodies, natural disaster risks, etc., and their interaction with WSA services). Examples of this are the use of park strips⁷⁷ for managing the rise during floods,⁷⁸ the extension of the access to services in peri-urban zones and the recovery of urban zones through decontamination of water bodies.⁷⁹ Accordingly, comprehensive planning and management of these elements within a territory, with a view to overcoming weaknesses in terms of standards, allocation of responsibilities and resources, regulation and supervision, would seem a fundamental condition for the success of interventions in urban areas. Examples of successful comprehensive planning are mainly in Brazil, in cities such as Manaus, Belem, Curitiba and Porto Alegre.⁸⁰

- 2.21 **Civil society participation.** Civil society plays an essential role in sector governance, as occurs in watershed boards for the water sources used by WSA utilities for supply, the development and social oversight committees of household utilities—as implemented in Colombia in the 1990s—or in the opening up to national and international markets, as in the case of SABESP in Brazil, (great exposure process because of the requirements private investors have with respect to transparency). Different participative tools have been developed in several countries to improve transparency, integrity and accountability.⁸¹

C. Utilities management and private participation

- 2.22 **Improving the management of State utilities.** The common model of delivering WSA services is through state owned utilities, at a national, regional or municipal level. These entities have multiple goals, usually opposing, and principles that address the accomplishment of an efficient delivery of the service, serve marginal neighborhoods for social purposes, be a source of employment, sustain financial equilibrium, or rent-seeking for special-interest groups.⁸² Given their predominance, there is a growing concern for understanding the characteristics of public utilities more thoroughly, their incentives, restrictions, capacities, orientation, and means for achieving greater service quality and efficiency.

⁷⁷ The linear parks are recreational areas, generally urban, to recover river basin or stream areas and to provide green spaces such as natural public spaces, fulfilling a comprehensive ecological, urban and social role.

⁷⁸ See Mayorga (2013).

⁷⁹ Some cities in Latin America have applied these protection measures, environmental recovery and water sustainability, such as in Bogotá (Costa Posada, 2015) and Quito (Vidal, 2015).

⁸⁰ See Tucci (2007) and Mayorga (2013).

⁸¹ In Indonesia, a study was conducted in slums of Makassar, Yogyakarta and Jakarta, using participative techniques for assessment of corruption to explore how this affects the urban poor in Indonesia. It found that the main costs of corruption are financial, human capital, moral decline and loss of social capital. In Kerala, India, more than 300,000 beneficiaries of the WSA services participated in the evaluation of the water points within the framework of the restructuring of the service in favor of transparency in decision-making by the municipality (Gonzalez de Asis et al., 2009). This generated more appropriation of the infrastructure and more recovery of costs.

⁸² The lack of transparency and corruption is an important element in the functioning of the companies, and it is estimated that between 20% and 70% of the resources of the sector could be saved, if transparency is increased and corruption is reduced. IDB (2007a), taken from a study of the International Water and Sanitation Center (IRC). See also Transparency International (2008).

Studies⁸³ show that good management of a public company (its efficiency)⁸⁴ depends greatly on: (i) its management autonomy (including financial resources); (ii) clarity in the goals they establish (through proper corporate governance mechanisms); and (iii) an adequate transparency and accountability (regulatory accounting, user participation, etc.).

- 2.23 **Making service delivery more efficient.** Without overlooking the global improvement of the management of operating utilities, it would seem important and feasible to focus efforts on improving certain critical indicators. International experience shows that significant financial improvements can be achieved through projects targeted at issues such as: (i) reduce unaccounted-for water (ANC), measured as the difference between water produced and water billed to customers, arising from physical shortcomings of the system or from inefficient business management in measuring and invoicing, through instruments such as results management contracts;⁸⁵ (ii) improving the commercial management, invoicing and collections processes, as these affect the operating cash flow;⁸⁶ (iii) boosting labor productivity, recognizing that personnel costs often represent a significant percentage (around 35%)⁸⁷ of the utilities' operating costs;⁸⁸ (iv) efficient energy use, particularly in systems that involve significant pumping of water (drinking water and wastewater) or water production and treatment, aspects that have a major impact on costs in the Caribbean region (representing on average 30% to 40% of operating costs)⁸⁹, which in turn brings a reduction of Greenhouse Gas (GHG) effect emissions; (v) encouraging policies for preventive maintenance of infrastructure, in order to maximize its useful life;⁹⁰ and (vi) implementing development programs and consolidation of functional competencies for the correct functioning and operation of the infrastructure.⁹¹

⁸³ Andrés, Guash and Azumendi (2011); Hankte-Domas and Jouravlev (2011); Irwin and Yamamoto (2004); Lobina and Hall (2008); Sjodin (2006) analyzes the evolution of EMOS in Santiago de Chile between 1977 and 1999; Baietti, Kingdom and Van Ginneken (2006); Halpern et al. (2008); Kingdom et al. (2006); Muller et al. (2008); Van Ginneken and Kingdom (2008); Velez (2013) compares the evolution of two public water companies in Colombia (EPM and EMCALI), with very different performances due to autonomy in the decisions.

⁸⁴ Hankte-Domas and Jouravlev (2011). Efficiency is understood as a minimum cost service (two employees per a thousand water connections, ANC of 20%), adequate potability of water, continuity, pressure greater than 10 meters of water column, commercial management (collection above 95% and macro-measurement of 100%) and claims, environmental sustainability (including efficient use of energy and protection of water bodies) and coverage goals with certain self-financing goals. These levels of efficiency apply to public, private and mixed operators, given that, in the region, private participation is limited in the sector and services are mainly provided by the public sector. It is important that structural conditions, including the current legal frameworks, are sufficiently adequate so that public operators meet efficiency goals.

⁸⁵ These types of programs have been developed in Asia and are entering the region (for example, in Bahamas, where the Bank supported a program for the reduction of unaccounted-for water, reducing this indicator in 60%). World Bank (2008b).

⁸⁶ See a tool for this purpose in Jourdan (2011).

⁸⁷ World Bank (2002).

⁸⁸ Leading companies in the world employ about 1 employee per 1,000 connections, outsourcing a great number of activities. It is considered that between two and three employees/1,000 connections are reasonable.

⁸⁹ IDB (2011a). Many companies accomplish energy savings between 10% and 40%. In water plants, savings of between 5% and 15% in power consumption are expected with the installation of speed regulators and high-efficiency motors, while savings of 10% to 20% are possible in treatment plants through modification of equipment.

⁹⁰ The concept of asset management is widely used in developed countries. See for example Jolicoeur and Barret (2004).

⁹¹ See Accreditation of Competencies Program developed in Colombia, and that helped to professionalize technical and base operational positions.

- 2.24 **Incorporation of technological innovation.** The adoption of new technologies by the utilities has the potential of significantly contributing to the improvement of efficiency, increase in productivity and the quality of the service (Israel is one of the most successful cases in this subject),⁹² and to reduce costs of investment and Operation and Maintenance (O&M). One of the most developed areas in terms of new technologies is Smart Water Infrastructure Technologies (SWIT). SWITs can contribute to the reduction and loss of water, streamlining O&M and the improvement in the management of data and assets, allowing making decisions based on information.⁹³ The most developed products are, among others: (i) smart water meters;⁹⁴ (ii) network sectorization;⁹⁵ (iii) pressure management; (iv) active detection of losses; (v) information management systems; (vi) customer management systems; (vii) geographic information systems; (viii) supervisory control and data acquisition (SCADA); and (ix) hydraulic modeling. Costs of incorporating these technologies will be lower as its development advances. Nevertheless, the value of SWIT for the utilities depends greatly on the business model and the goals of each operator.⁹⁶ LAC has already started to implement these technologies as is described in ¶3.29.
- 2.25 **Transparency and accountability.** The international community has been examining the growing key role that transparency plays in the sector's management.⁹⁷ It is estimated that in developing countries, corruption⁹⁸ can increase the cost of obtaining a connection to the potable water and sewage network in 30%.⁹⁹ One of the most relevant reforms implemented in the sector, in the region in the last 20 years, is the importance of information management, transparency and governance practices as crucial for efficiency, effectiveness and quality of the service. The quality of corporate governance and transparency of companies that deliver WSA and the regulatory and supervision agencies is one of the crucial elements of their performance.¹⁰⁰ In addition to improving the

⁹² More information about the Israel's case can be found at <https://medium.com/the-startup-nation/how-can-israel-and-the-netherlands-capitalize-the-smart-water-tech-revolution-1e8dba6190eb> For the incorporation of new technologies it is a good practice to consider the transfer of knowledge, and thus, guarantee the correct use by the operators, as well as considering that technologies are in line with the needs and realities of these areas.

⁹³ Arniella (2017).

⁹⁴ Smart measurement is a component of the smart network that allows a service company to obtain measurement readings at will (daily, every hour, or more frequently, without the need of manual readers to transmit information).

⁹⁵ Sectorization allows having, within a large network, different subnetworks of lower dimensions that enable a more detailed control of the amount and pressure of the water that enters to ensure the correct delivery to all the beneficiaries supplied by this network. Also, sectorization would allow to have entry water data available in real time, and to store this data to be able to analyze on a daily basis the entry flows and to immediately detect possible leaks, improving the system's efficiency.

⁹⁶ Beal and Flynn (2014) present case studies in Australia to implement smart meters. They concluded that costs could vary between US\$5,000 and US\$15 million, depending on the project's scope and the status of existing meters. Among the benefits found, savings through the reduction of water demand is highlighted (of 10%), which allowed the company to postpone the extension of the infrastructure by four years, resulting in savings of about US\$20 million.

⁹⁷ The principal sign in this sense comes from the Ministerial Council of the Organization for Economic Cooperation and Development (OECD), which in June 2015 ratified a series of Water Governance Principles (OECD, 2015).

⁹⁸ Corruption is the abuse of power for one's own benefit. Corruption can be classified into large-scale, minor and political corruption, depending on the amount of funds lost and the sector in which it occurs (Transparency International).

⁹⁹ Transparency International (2008).

¹⁰⁰ Cuellar (2010).

efficiency of the service suppliers, transparency and good corporate governance improves the integrity of the procurement and investment processes, resulting in progress in quality and access to services.¹⁰¹ In turn, these aspects contribute to the increase of reliability levels among users, risk graders, financing suppliers and authorities, thus reaching more citizen participation in the control of the services. Also, studies indicate that private participation increases when corruption is reduced, and the rule of law and the quality of the regulations is maintained.¹⁰²

- 2.26 **Asset-management-oriented operation and maintenance.** The sustainability of investments depends largely on O&M and rehabilitation practices done by utilities. The sizable capital investments that create economies of scale in such services demand efficient asset management. Best practices in this field are determined by elements such as the following: (i) more than an expanding investment approach, utilities must adopt an asset management approach in which maintenance and rehabilitation prevail; (ii) infrastructure maintenance must follow a preventive, rather than a remedial approach; and (iii) asset management must be ongoing, with adequate trained personnel, technology training of the workforce and financial resources.¹⁰³
- 2.27 **Private sector participation.** The private sector could play a significant role in improving managing WSA services and in sector's innovation. Despite that in the last two decades' private participation in WSA, in most cases, did not meet the initial expectation of attracting the expected capital contributions for the financing of investments, its participation did show, and in some cases continues, positive effects for improvements in efficiency and quality of the service.^{104,105} Although, through the sale of assets and concession agreements in different forms –Build Operate and Transfer (BOT) and Public Private Partnerships (PPP)– private managers can contribute to redirect the activities of the WSA providers by increasing their efficient management capacity –and at the same time contribute with resources for the financing of investments for the expansion and improvement of the services,¹⁰⁶ the lessons learned show that the risks associated are too big and that the distribution of them requires solid studies. Successful experiences in the region show that private sector participation arrangements must consider aspects such as the following: (i) heavy capital demand over short periods of time and the actual likelihood that they will be contributed,¹⁰⁷ either by the state or by the private sector; (ii) the monopolistic nature of these services; (iii) the volatile political stability, given the decentralized nature of these services; (iv) the social perception, and people's economic capacity and willingness to pay for these services, especially for sewage and wastewater treatment; and (v) the adequate distribution of responsibilities and risks between the public and private stakeholders.¹⁰⁸

¹⁰¹ Andrés, Schwartz and Guasch (2013).

¹⁰² Kogan and Bondorevsky (2016).

¹⁰³ Examples regarding the certification of operators that train and technology training of the workforce in Colombia and Jamaica.

¹⁰⁴ For cases in LAC, see Saltiel and Maywah (2007). For cases in Africa, see World Bank (2014).

¹⁰⁵ Andres et al. (2013) found, as key factors of success, the existence of a regulatory framework and of clear policies and instructions with high capacity of supervision.

¹⁰⁶ See lessons learned in PPP in Africa (World Bank, 2014).

¹⁰⁷ Credit quality of states or municipalities to honor payments for availability or guarantees of minimum income.

¹⁰⁸ See details about the actions and exit of international operators in Latin America in Ducci (2007).

2.28 The role of the community in the provision of the services in rural systems.

The most common management model –internationally– in rural areas is that of the community as responsible for O&M services. Only in relatively small sized countries is it possible to think of centralized or external to the community management ways. In several countries, it was proven that those rural systems that had post-construction support were more efficient and sustainable than those that only received technical assistance during the construction of the system.¹⁰⁹

Case studies suggest that it is important that the community based model have, among other factors: (i) legal recognition; (ii) a proper regulatory framework; (iii) post-construction support schemes,¹¹⁰ through local utilities or others; (iv) performance monitoring; (v) support programs to local governments that are responsible for delivering the service; and (vi) generation of operation and management capacities of the systems. The participation of the community in the pre-construction planning of the systems (for example, in the design of tariff systems, the selection of the technology and location of the infrastructure) is key for a good management performance.¹¹¹

D. Financial sustainability

2.29 Strengthening the sector's long-term financing. The real possibility of covering substantial resources that are needed to reach the goals set in the [SDGs](#), that is, ensuring universal WSA services and improving its quality, will require the effective channeling of contributions from users (through the payment of tariffs), the State (providing its own resources or financing from multilateral and bilateral sources) and from donors. International experience shows that the financial sustainability is feasible by adequately combining tariff policies and targeted subsidies.¹¹² Given the volatility of such contributions, which could also induce to unwanted behaviors and incentives in corporate decisions, and to direct political interference,¹¹³ the coexistence to accomplish tariff policies that seek to cover the long-term total cost for the delivery of the service should be reiterated.

2.30 Designing targeted subsidy schemes. Best practices in the design of subsidy schemes suggest that:¹¹⁴ (i) they should be targeted to families that would find it hard to pay their service bills; (ii) the targeting mechanisms must be transparent, objective, and defined by players other than the operator; (iii) the method for calculating the subsidy must be simple and understandable to the users; (iv) the system's costs must be efficient (for example, by basing it on information and criteria of general use for public policies); (v) financing must be sufficient and stable, and may come from users with a higher capacity to pay (cross-subsidies) or from the government budget (direct demand-side subsidy); and (vi) the mechanisms for financing directly the supply are only desirable if they can be territorially targeted (for example at rural or peri-urban areas), or in cases where there are externalities because of environmental or health problems.

¹⁰⁹ Smits et al. (2012).

¹¹⁰ Whittington et al. (2009) show evidence for Bolivia, Peru and Ghana.

¹¹¹ Bakalian and Wakeman (2009) for cases in Peru, Bolivia and Ghana. See Carrasco (2011) for cases in Colombia and Paraguay.

¹¹² See cases in Chile, Brazil and Colombia in Lentini (2015).

¹¹³ See Ducci and Krause (2013).

¹¹⁴ Subsidy systems with characteristics such as those that have been used for more than 20 years in Colombia and Chile. See Lentini and Ferro (2014) and Foster (2003).

- 2.31 **Potential access to credit and capital markets.** Heavy investments that the sector requires call for redoubling efforts to give better access to WSA utilities to loans and the capital market. Several cases in more developed countries, and in developing countries, show that having stable and appropriate tariff regulatory frameworks and stable in the long-term (as well as a governance environment that guarantees that continuity) is a condition for gaining such access with interest rates, currencies and maturities more aligned with the financial profile of the business.¹¹⁵ This has been the evident case of companies in Chile, after their privatization, which have access to the securities market and issued medium and long-term bonds in local currency, thus financing more than 80% of their investments.¹¹⁶ It is also the case for several utilities in Brazil and Colombia that have had access to local and international capital markets (such as the case of SABESP from São Paulo that is traded in the New York Stock Exchange).¹¹⁷ As WSA service providers shift from an engineering vision to a corporate service and customer service vision, demand for better corporate governance, transparency, accountability and efficiency in the service delivery increase, making them more prone to capital markets and non-sovereign guaranteed financing from multilateral organizations.¹¹⁸ Another source of financing are contributions from the private sector for investments for O&M, and which repayment may come from the recovery of tariffs or State contributions.
- 2.32 **Water resources and storm drainage.** With respect to the financing of costs associated to IWRM,¹¹⁹ good practices are related with the identification of mechanisms to charge users through rates or tariffs associated with extractions or discharges, as well as with the incorporation of the value of the hydro-ecosystemic services in the mechanisms for assigning and charging for the rights to use and/or discharge. For the financing of urban drainage there are different mechanisms, but the one most commonly used is the public budget.¹²⁰ The scarcity of this source of funding and the relatively low priority of these activities, make such financing subject to many fluctuations that impede long-term planning,¹²¹ even for preventive O&M (for example, cleaning of channels, conduits, networks, etc.). At the international level, several municipalities in the State of Florida and elsewhere in the United States that have developed an institutional framework for delivering "storm water management" through specialized private firms,¹²² through concession agreements, with outcome indicators and tariffs based on actual runoff volumes.¹²³ Additionally, there are examples in the United States where

¹¹⁵ Haarmeyer and Mody (1997).

¹¹⁶ See Ducci and Medel (2007).

¹¹⁷ Details from the cases of Empresas Publicas de Medellín (EPM) and SABESP are found in Cuéllar (2009).

¹¹⁸ See Ducci and García (2013).

¹¹⁹ See details in OECD (2012c).

¹²⁰ See Soluciones Integrales S.A. (2003).

¹²¹ In some countries (e.g. Brazil and Colombia) cost recovery mechanisms are based on the increase in property values (surcharge for improvements), which has the advantage of focusing the burden on the beneficiaries of the projects. It is also common for financing of works to come from general municipal funds or from property and other taxes, with the limitations inherent to such resources.

¹²² See APWA (1999). There is interest in the region for these schemes. In fact, in Chile a law to such ends progressed some way through Congress before it was suspended. The public utilities regulator in Colombia has expressed interest in the topic, and has conducted some specific workshops with support from the Bank.

¹²³ APWA (1999). Runoff is the current of water that is discharged when exceeding its deposit or natural or artificial flows. It is formed when rainfall exceeds the capacity of the surface's infiltration.

developers are required to build infrastructure to mitigate the impacts of output flows of the urbanization.

- 2.33 Innovative financing schemes for the conservation of ecosystems and water resources.** With the objective of protecting and conserving water resources in priority watersheds, innovative financing and training schemes have been implemented, addressing specific actions for adapting to climate change. These schemes are oriented mainly at urban and peri-urban watersheds with strong development pressures and a threat to water security, and they contemplate two key issues that have been ignored in the past: the active participation of the private sector in their financing and the economic-financial sustainability of long-term programs. One innovative example led by the Bank are the Water Funds,¹²⁴ a financial, governance and management mechanism that integrates all relevant stakeholders of a watershed to promote water security in a metropolitan area through conservation actions (nature-based solutions or green infrastructure). Water Funds are a flexible and independent financial mechanism that allows obtaining public and private funds.¹²⁵ Currently 20 funds are in operation in the urban watersheds of Colombia, Mexico, Ecuador,¹²⁶ Brazil, Peru, Dominican Republic and Costa Rica.¹²⁷ Another example, although smaller in scope, is the program for the management of water resources in the basins of the rivers Chillon, Rimac and Lurin in Peru. The program establishes a collaboration model between private companies, the National Water Authority and other relevant stakeholders for the implementation of training programs in the area of adaptation, including the installation of a water resources observatory for monitoring supply basins.¹²⁸ Another innovative mechanism for obtaining resources at a basin level is the markets *cap & trade* of discharge rights (industrial and agriculture), currently under study and experimental development in some pioneering countries.
- 2.34 Access to concessional climate financing.** For those interventions that offer benefits with respect to the adaptation and mitigation of climate change, the international climate funds such as the Green Fund for Climate, the Adaptation Fund, the Global Environment Facility (GEF) or the Climate Investment Funds, represent an opportunity to have access to concessional resources that are able to cover the additional costs and risks that these measures represent. These funds seek to support countries for the fulfillment of both NDCs and SDGs.

¹²⁴ These Funds are promoted and supported through the Latin American Alliance of Water Funds, an initiative led by IDB, TNC, FEMSA Foundation, and GEF.

¹²⁵ The Latin American Alliance of Water Funds started with a contribution from the partners of US\$15 million and has leveraged resources for more than US\$130 millions for natural infrastructure. The main achievements are: (i) implementation of conservation activities in more than 130,000 hectares; (ii) more than 200 public and private organizations involved; and (iii) more than 65 million persons benefited in cities that are supplied by the concerned watersheds. The Alliance has been able to generate changes in public policies to increase investments in conservation (in Lima it was established that the Potable Water and Sewage Service of Lima –SEDAPAL invest 1% of its charges collected in natural infrastructure and 3.5% in mitigation and adaptation to climate change, which translates in investments for the next five years in US\$25 and US\$92 millions, respectively).

¹²⁶ The Water Fund of Quito was the first and was created in 2000 to guarantee water of a quality and quantity in more than 2.5 million inhabitants of the Metropolitan District of Quito. The Public Metropolitan Utility of Potable Water and Sanitation is the partner that contributes the most (currently, 2% of tariff charges collected which feed the fund, representing 98% of the Trust).

¹²⁷ See <http://waterfunds.org/en>

¹²⁸ See <https://www.giz.de/en/worldwide/31204.html>

E. Social considerations

- 2.35 Behavioral change as an innovative force of social transformation in the Water and Sanitation sector.** The benefits of the access to WSA do not depend only on the delivery of technology and services, but also in its adequate use.¹²⁹ Behavioral change of the users, understood as the adoption of proper behavior, is a crucial component to improve the access and the practices related to water, sanitation and hygiene, as well as being able to guarantee impacts in the health at home and in the community at a larger scale.¹³⁰ International experience relates improper behaviors in issues such as: (i) low appropriation of WSA systems, which discourages their use, and proper and sustainable maintenance of the facilities; (ii) proper hygiene practices;¹³¹ (iii) low connectivity to potable water systems and, above all, to sanitation systems; (iv) low level of chlorination (disinfection) of the systems;¹³² (v) low levels of payment of the tariffs; and (vi) irrational use of water.¹³³ The behavior of users is complex and is influenced by a set of defining factors, such as motivations, values, beliefs and prior experiences of the people within their social systems and financial incentives (prices, awards, fines, among others).¹³⁴ The information itself does not change the behaviors, and a cognitive learning process is necessary beyond the traditional community communication activities (meetings with the community, fliers, workshops, etc.).¹³⁵ Also, financial mechanisms can be promoted through activities of change in behavior to improve the access to loans and accelerate the access to WSA services in communities, both through the development of financial products adapted to the sector and the training of small and medium companies to improve the products and through the services they offer.¹³⁶ Communication based in formal and behavioral investigation is key to address the targeted public considering determinant factors that drive changes in behavior. Some of the determinant factors are the priorities in individual motivations, local cultural norms, collective identity, factors related to the economy, the social context, etc.¹³⁷
- 2.36 A new focus on rural sanitation.** This subsector is the most lagging in quantitative terms for achieving SDGs at a global level. The traditional approach of building conventional sewerage systems has been found unfeasible because of its high unit costs and operational problems. Existing studies¹³⁸ have shown that a key factor for increasing sustainable access to these services for rural communities is to boost demand (through awareness raising and promotion of services, taking

¹²⁹ Epidemiological studies show that washing the hands with soap prevents between 30% and 47% of infant diarrhea (Curtis and Cairncross, 2003) and 23% of respiratory infections (Rabie and Curtis, 2006). A recent review of different interventions classified the promotion of hygiene, including washing the hands with soap, as the intervention with the most cost-benefit (Jamieson, Bremen and Measham, 2006).

¹³⁰ Barot et al. (2016), Biran et al. (2014), Dreibelbis et al. (2016), Neal et al. (2015), Neal et al. (2016), Torres et al. (2002), World Bank (2013), Waddington et al. (2009), Dreibelbis et al. (2013).

¹³¹ Washing the hands is far from being a customary practice with percentages between 5% and 15 % (Scott, Curtis and Rabie, 2003) in key moments such as after going to the bathroom or cleaning a child. The importance of washing the hands is evidenced in Curtis et al. (2009), Cairncross et al. (2010), Luby et al. (2004), Quick (2003).

¹³² This occurs due to the rejection of smells or the taste of water after the chlorination process, lack of information about the benefits of chlorination, among others, with negative impacts in the population's health.

¹³³ In Bogota, Colombia, through education campaigns and tariff increases, users reduced water consumption.

¹³⁴ WSP (2013).

¹³⁵ Marteau et al., (2012), World Bank (2015), Neal et al., (2016).

¹³⁶ Buck et al. (2017), USAID (2012).

¹³⁷ WSP (2013).

¹³⁸ See WSP (2012), and ECOPSS (2014).

into account local preferences and conditions), complemented with sanitation markets (innovative business models from the community to deliver individual services, which include the active participation of the private sector in the supply of inputs through the input manufacturers for sanitation and construction, service providers, microfinancing institutions, microbusinesses and community entrepreneurs, among others, as well as stimulating the demand). Additionally, there are financing models that have proven to be successful in the rural sector such as the use of microcredits for the construction of individual sanitation solutions. In India, through a revolving fund that provides microcredits, they have managed to take the sanitation coverage to 100% in 19 communities.¹³⁹ In Kenya, they implemented a model where the rural community paid 20% of the infrastructure through equity and the remaining 80% was financed through loans. Loans granted a grace period during the construction of the works. This allowed to significantly increase the coverage of water (in more than 20 percentage points).¹⁴⁰ On the other hand, promoting innovative campaigns in education and behavioral change to improve hygiene patterns is more cost-effective for the reduction of the risk of diseases related to water than those interventions only in infrastructure.¹⁴¹

- 2.37 **Social participation in the project's cycle.** International experience indicates that to promote the effectiveness and efficiency of the interventions in rural and peri-urban areas, the participation of the community is necessary in the entire project's cycle, including location and selection of technological alternatives, professionalization of water community utilities, education campaigns and change of behavior for the payment of tariffs and subsequent O&M of the systems, among others.¹⁴² For example, in drought areas, the participation of the people affected in the decision-making process has reduced the conflicts and mitigated the negative impacts of resulting resettlements.¹⁴³ Likewise, policies for IWRM highlight the need to incorporate the users and inhabitants of the watersheds in the decision-making process through effective communication strategies to reach an agreement,¹⁴⁴ considering gender, ethnic and social inclusion aspects. This involves supporting structures at a local level, at a watershed level, created to share responsibilities with the State entities. In the case of waste management, the participation of informal recyclers in programs improves the management of waste, increasing recycling, as well as the quality of life of the workers through their formalization and training.¹⁴⁵
- 2.38 **Gender and vulnerable communities approach.** International experience has shown that women¹⁴⁶ play a key role in the sector because of their involvement in the use of water in the home and the supervision and promotion of hygienic practices¹⁴⁷. Some studies have shown that WSA projects that are designed and

¹³⁹ WSP (1999).

¹⁴⁰ WSP (2011).

¹⁴¹ WSP (2012).

¹⁴² IRC (2012).

¹⁴³ Van Herk (2014).

¹⁴⁴ Project Management Institute (2013).

¹⁴⁵ Formal organized recyclers increased their income between 50% to 100% and thus improved their labor conditions (Gunsilius, 2010), as well as accomplish more interference in the generation of public policies. The fact of organizing legally allows them to establish agreements and contracts with public and private organizations that facilitate their formal integration under the existence of inclusive public policies, which strengthens their activity, autonomy and increases their sales volumes (ILO, 2013).

¹⁴⁶ United Nations (2012), pg. 25, IDB (2014).

¹⁴⁷ Getachew et al. (2016).

operated with the active participation of women are often more sustainable and effective than those in which women do not participate.¹⁴⁸ The inclusion of a gender approach in projects has also been instrumental in ensuring adequate and hygienic maintenance of sanitary units. This approach has also encouraged the division of responsibilities linked to the conservation of the hygiene in the home and the education of children in sanitation.¹⁴⁹ Likewise, different studies show that the equal participation of women in community management organizations of WSA services is positively correlated with improvements in efficiency and sustainability of the service (more transparency and better governance).¹⁵⁰ On the other hand, when improvements in sanitation and hygiene are not a priority for families, women and girls suffer the most because their privacy and security is determined by the degree of access to sanitary units.¹⁵¹ Another relevant aspect from the international experience is to implement a specific approach to vulnerable communities, especially indigenous or native people, to adequately internalize cultural aspects, take into account specific needs (access and security of facilities),¹⁵² reduce discrimination¹⁵³ and guarantee the sustainability and the use of the solutions provided to them.

- 2.39 **In-household connections.** Even if companies expand their potable water and sewage networks, generally users are responsible for the connection costs to the networks and any in-house improvements (laundry, showers, etc.) necessary to use the WSA services in their homes. These improvements and connections require a high capital investment, which is difficult to cover by the poorest families. In this situation, the benefits anticipated from investments in WSA networks are not being fully captured because of persistent low rates of connection to such networks. Likewise, low connectivity limits the impact in health as it limits the use of WSA services.¹⁵⁴

F. Water security, climate change and resilience to natural disasters.

- 2.40 In this document, water security is understood as the existence of an acceptable level of water with an acceptable level of risk that allows to satisfy various uses, the conservation of quality, and the consideration of climate change issues in the planning of infrastructure, flow management and risk management for natural disasters (such as droughts and geophysical disasters).¹⁵⁵ At a global level, it is calculated that the total cost of water insecurity for the global economy is US\$500 billion per year.¹⁵⁶ In general, climate change has been evidenced in several ways, such as in the acceleration of the detriment of Andean glaciers, the rise of the sea level in coastal zones, variations in occurrence, intensity and localization of rainfall,

¹⁴⁸ See Narayan, Deepa (1995), UNWater (2006), and Van Wijk-Sijbesma (1998).

¹⁴⁹ Van Wijk-Sijbesma (1998).

¹⁵⁰ Leino (2008) uses experimental evaluation to measure the impact generated by community management in Kenya.

¹⁵¹ When in schools the hygiene conditions are not adequate, there is a greater desertion rate. World Bank (2010).

¹⁵² White et al. (2016) present a qualitative study about access barriers to water, sanitation and hygiene services for persons with disabilities in Malawi.

¹⁵³ Perafán et. al. (2005).

¹⁵⁴ DNP (2016)

¹⁵⁵ Geophysical disasters could also affect the delivery of WSA services, for example, earthquakes, volcanic eruptions (the ashes can cause damage to WSA systems), etc. There is a risk of interruption of the service and this could even affect their sustainability if the WSA systems are designed and built without taking into account the possible effects for natural events.

¹⁵⁶ Sadoff and others, 2015.

as well as temperature increase.¹⁵⁷ Understanding the effects of these impacts in the availability of the water resources is extremely important to ensure not only the sustainability and continuity of the potable water distribution services, but also to guarantee that the related infrastructure projects meet their operational, financial and economic goals. In this sense, it becomes very important to study and better understand the future scenarios of water stress in the region, especially in areas that today experience severe conditions of water scarcity (Northeastern Brazil, El Chaco, Pacific coast of Peru, Northern Mexico, Haiti and other island nations in the Caribbean, or the Central American dry corridor). The main socio-economic sectors (urban supply, industry, energy and agriculture) compete for this resource and many areas in the region are in water stress. Therefore, a better understanding of the Water-Energy-Food Nexus (see ¶4.54) and the trade-offs among these sectors, related with the water use, is key for an efficient planning and management of such resource and to guarantee conditions of water security.

- 2.41 **Water demand and availability.** It is estimated that the global demand of water will increase in 55% by 2050¹⁵⁸ because of the increase in the demand of the manufacturing industry, thermal electricity generation and domestic use.¹⁵⁹ This increase could have a more significant effect on the availability of water resources than the effect originated from climate change,¹⁶⁰ thus making it necessary to include both effects combined.¹⁶¹ By the year 2050,¹⁶² the combined effect of the intensification in the demand and climate change will increase the tensions about the availability of fresh water; it is expected that a greater number of people (2,3 billion additional people, plus more than 40% of the global population) will live in severe water stress zones, especially in Northern and Southern Africa and Southern and Central Asia. Another report predicts that the world could face a global water deficit of 40% by the year 2030, in a business-as-usual¹⁶³ scenario. On the other hand, the Fifth Assessment made by the Intergovernmental Panel on Climate Change (IPCC) states that, for each centigrade degree that the global temperature increases, approximately 7% of the global population would be exposed to a decrease in renewable water resources in at least 20%. This would place a large part of the global population at risk of water scarcity, which is very relevant for the

Some factors of irrational use of the resource

There is a relation between consumptions per inhabitant and medium tariffs; the lower the tariffs, the more medium consumption. Similarly, in cities with more micro-measurement coverage, lower consumption levels can be seen. The problem with irrational consumption of the water resource is also related with improper behaviors (for example, not closing the water faucet while brushing the teeth, leave water running while not in use, over irrigate the lawn) and does not necessarily respond to financial incentives. In relation to management issues, innovation plays an important role because of its effect in efficiency improvements and efficient use of water.

¹⁵⁷ Vuille (2015), IDB (2010), IDB (2014a), World Bank (2006).

¹⁵⁸ OECD (2012a).

¹⁵⁹ In LAC, 73% of the water extraction is used for agriculture purposes, 18% for domestic use and the remaining 9% for industrial use. In comparison with the global media, 71% is destined for agriculture use, 9% for domestic use and 20% for industrial use (Water Center, 2013).

¹⁶⁰ Magrin et al., (2014), Vergara et al., (2013), Vergara and Scholz (2011).

¹⁶¹ IDB (2014a), IDB (2015a), IDB (2015b), IDB (2015c).

¹⁶² OECD (2012a).

¹⁶³ WWAP (2016).

sustainability and expansion of WSA services.

- 2.42 Successful practices in this subject are emerging in the region and the world, although they generally converge towards:¹⁶⁴ (i) a paradigm of IWRM; (ii) planning of infrastructure works that are resilient to climate change, including green infrastructure investments (for example, reforestation, protection of forests, river basins and wetlands);¹⁶⁵ (iii) raise of awareness and promote behavioral change of the population to reduce excessive consumption, explore reuse alternatives and promote low consumption technologies; (iv) incorporation of water bodies in the urban environment; (v) proper solid waste management, given that beyond their impact in the health and the environment, many times compromises the functioning of storm and sanitary drainage; (vi) levels and structure of adequate prices and tariffs for WSA services, in addition to water as a resource; (vii) use of mandates and incentives for the conservation of water (for example, payments for environmental services, conditioned transfers, especially for change and recovery of agricultural practices, among others); sources of water; water property rights regimes; expansion and restriction for the exchange of water among users within a watershed or between watersheds; and (viii) allocation of water rights in cross border watersheds.¹⁶⁶ These are areas that require more research and analytical work.
- 2.43 **Quality of the resource.** The physical, chemical, biological and hydro-morphological quality of water is also affected by climate change. According to the Fourth Assessment Report of the IPCC, the impacts of climate change will worsen the contamination of water. Likewise, the quality of water is affected, and its use is compromised by the increase of the discharge of liquid and solid effluents in urban watersheds, and nutrients and pesticides in rural watersheds. Even though a reduction of organic discharges in landfills with wastewater treatment plants has been verified, it is not an easy task to detect the corresponding improvements in the quality of the water bodies.¹⁶⁷ The expansion of the sanitary sewage coverage and the wastewater treatment is necessary to reduce the contamination of water resources.
- 2.44 **Natural disaster and climate change risk management.** An issue related to water security is the threat that climate change represents with respect to negative effects because of natural disasters, such as hurricanes and droughts,¹⁶⁸ as well as slow evolving events, such as droughts, that could tend to be more frequent and strong in dry and semi-dry areas. Floods are one of the most common natural disasters, whether because of torrential rains, strong flows or because of the combined effects of both, and, sometimes, they have devastating effects, causing death and high losses in infrastructure, agriculture production, private property and economic activities. In turn, LAC is the most vulnerable region to natural

¹⁶⁴ For the experience in Asia regarding this subject, see ADB (2013).

¹⁶⁵ The investment in green infrastructure in the sector has increased in recent years, nevertheless, it is still emerging. A survey conducted to 34 utilities in the region concluded that investment in green infrastructure is less than 5% of their annual budget. 28 initiatives for green infrastructure were analyzed, of which 14 correspond to water funds (<http://fundosdeagua.org/sites/default/files/infraestructura-verde-en-el-sector-de-agua-potable-en-america-latina-y-el-caribe-espanol.pdf>).

¹⁶⁶ Olmstead (2013).

¹⁶⁷ OECD (2012).

¹⁶⁸ WB (2011).

disasters¹⁶⁹ and the poorest population is the most affected by them.^{170,171} Fast and unplanned urbanization in risk areas, the environmental degradation and the lack of adequate governing are factors related to the increase of the impacts of natural disasters.¹⁷² The relocation of people that build their homes in risk areas, generally of inadequate quality, is key to mitigate impacts from floods that in addition to the economic impact includes the loss of human lives. Part of the problem with the risk of floods is explained by the fact that urban drainage is one of the less served aspects in the region.¹⁷³

- 2.45 The most advanced issues in the definition of policies to ensure that investments in the WSA sector contribute to reduce at a short and long term the vulnerability of the population when facing threats and risks associated to climate change include: (i) that the parameters and methodological tools for the design of infrastructure take into account risk analysis, of probability preference, that consider the deltas of expected changes in the hydro-meteorological variables due to climate change, improving the availability of information and models that enable to forecast the distribution of risks, frequency and intensity of extreme events;¹⁷⁴ (ii) the use of new approaches to plan investments in infrastructure (e.g. strong design methodology to view and analyze information in the decision-making process with high uncertainty);¹⁷⁵ (iii) the development of studies that improve the comprehension of the specific physical and economic impact of disaster risks and climate change in the region, at a territorial level and at the economic activities sector level;¹⁷⁶ (iv) the incorporation in master plans and design rules of WSA infrastructures of the risk management and climate change issues;¹⁷⁷ (v) the elaboration of studies to identify proper adaptation and mitigation measures with clear development co-benefits; (vi) proper coordination with the plans and instruments of land use and land planning; and (vii) the design and implementation of non-structural measures such as early warning systems, contingency plans, and handling and management of disaster risks (including droughts), institutional strengthening to build adaptive capacity, among others.¹⁷⁸ Likewise, the coordination with wastewater management is key to mitigate problems related to inadequate disposal of garbage in the drainage system and urban streams. The impact of floods is magnified when superficial runoffs in urban areas transport contaminants such as heavy metals, organic loads, suspended solids, oils and grease.¹⁷⁹

- 2.46 **Green infrastructure and ecosystemic services.** A better understanding, correct assessment and the incorporation of ecosystemic services in the planning

¹⁶⁹ (IDB, 2013). When presenting the highest in the world medium for economic damages by disaster: 0.18% of the GDP per event (EM-DAT, s/f).

¹⁷⁰ Due to the overexposure to natural disaster threats, more vulnerability, permanent impacts about its education and health, and risk effects in its savings and investor behavior. WB (2017), IDB-CEPAL (2000), WB (2003).

¹⁷¹ An epidemiological review conducted by Ahern and others (2005) concluded that floods with the highest impacts in mortality have occurred where infrastructure is poor and the population in a risk situation have scarce economic resources.

¹⁷² IDB (2013).

¹⁷³ Dourojeanni and Jouravlev (1999).

¹⁷⁴ Hallegatte et al. (2017).

¹⁷⁵ Roson and Sartori (2012).

¹⁷⁶ See, for example, studies from ECLAC (2009) in Chile.

¹⁷⁷ OECD (2013).

¹⁷⁸ Rogers and Tsirkunov (2011).

¹⁷⁹ For an extensive review of cases and integral address of water in Latin America, see Guilar-Barajas, Ismael, et al. (2015).

- and design of sectorial infrastructure projects, are key to ensure an adequate management and use of the resource and a resilient and sustainable infrastructure. This principal is based on the concept of green infrastructure (*“green & smart infrastructure”*), which seeks to favor the ecosystem based adaptation approach to climate change (Ecosystem Based Adaptation –EBA).¹⁸⁰ One example is the incorporation of adaptation plans within the sectorial management and investments plans, which favor the conservation and efficient use of water resources¹⁸¹ and the conservation of the ecosystems and the biodiversity; improving the resilience of WSA services and the most benefited populations when faced to growing impacts from climate change and extreme events (droughts, floods, coastal erosion, increase of sea level,¹⁸² glacier detriment, among others).
- 2.47 Some of the relevant lines of action for the sector are: (i) flood management through the promotion of sustainable urban drainage systems based on recovering and the respect of the natural water cycle of the urban watersheds, taking advantage of and favoring the natural mechanisms of retention and infiltration for the reduction of flows¹⁸³ and speeds of water currents (for example, use of permeable pavements, urban parks and green areas like in Curitiba or in the use of wetlands),¹⁸⁴ and incorporate them in investment plans, such as Drainage Master Plans;¹⁸⁵ (ii) the protection of water sources, to guarantee water security in urban areas by adopting protection measures for forests, minimize erosion and reducing contaminants and deposits in the water currents (examples such as Hong Kong, Katmandu, Lima, Panama City and Kingston).¹⁸⁶ According to The Nature Conservancy –TNC (2017), in 81% of the analyzed cities, green infrastructure reduced deposits and contamination by nutrients in at least 10% through the protection of forests, reforestation of pastures and good agriculture practices. In six of the largest cities in Colombia, it was found that the protection of water resources could increase the potential of the flow of currents up to 11%. Additionally, benefits resulted in the reduction of GHG emissions and the capture of carbon through the conservation of forests, as well as an increase in biodiversity; and (iii) with respect to the foregoing, the utilization of natural treatment systems, incorporating innovative technology and alternative investment programs for wastewater sanitation based on the use of wetlands and other natural systems as a part of wastewater treatment systems. It is also important to integrate the design of treatment systems within the framework of watershed management plans to better use the treatment capacity of the water bodies and to ensure the effective treatment within the framework of the natural eco-hydrological cycle of the watersheds, while at the same time reducing investments and O&M costs. The implementation and sustainability of these measures occurs due to the establishment of effective mechanisms of compensation for environmental

¹⁸⁰ Conservation International, 2015 (a) (b) (note of CC).

¹⁸¹ IUCN, 2017, a (note of CC).

¹⁸² IUCN, 2017, b (note of CC).

¹⁸³ The goal of green infrastructure is to improve nature's capacity to generate ecosystemic goods and services (e.g. flow, regulation and quality of water) and include activities such as reforestation, protection of forests, river basins, wetlands, among others.

¹⁸⁴ Sorensen et al. (1998).

¹⁸⁵ For example, Brazil, Bolivia, Trinidad and Tobago, Argentina, and Bahamas. Recently, Chile adopted an Urban Drainage Manual that specifies these "non-conventional" solutions. See <http://www.doh.gob.cl/manualdrenajeurbano/Paginas/default.aspx>

¹⁸⁶ Sorensen et al (1998).

services, establishment of ecological currents and the implementation of methodologies for the economic assessment of ecosystemic services.

- 2.48 **Environmental management in utility companies.** Public pressure for a better quality of life, especially in metropolitan areas, and the heavy demand for available water resources are transforming the management model of WSA utilities to include environmental and social issues in decision-making processes. The impacts of climate change in some regions are driving utilities to adopt Environmental Management Systems (EMS) to counter-effect the low availability of water resources, the contamination of water currents and the need for efficiency.¹⁸⁷ The implementation of EMSs and the development of instruments for defining ecological flow, payments for environmental services, and users' willingness to pay for environmental and social benefits are necessary to guarantee the sustainability of WSA utilities. International experience shows that it is important to allocate resources, in the preparation of projects, for the implementation of EMSs in accordance with their business development level. At a project level, it is important to consider issues related to the conservation of water sources (payments for environmental services) and the conservation of downstream water ecosystems (ecological flow).

III. PRINCIPAL CHALLENGES IN THE REGION

- 3.1 Despite the region's progress in recent years, especially with respect to the access to potable water, there are still some major challenges related to equity and access to WSA (for rural, indigenous, and peri-urban peoples), the sewage service gap, the quality of water service (potability, continuity, and pressure of water provided), low level of wastewater treatment, administrative and operational efficiency, financial sustainability, the governance framework and inter-sector coordination, (land planning, energy, health and agriculture) disaster risk management, long-term planning to address the challenges of climate change and consideration of environmental, water resource management, as well as social and gender.

A. Accessibility and quality of services

- 3.2 **Water and Sanitation Coverage.** The most complete and updated information about the levels of access to WSA services, available for all the countries in the region, corresponds to that reported by the WHO and UNICEF (2015),¹⁸⁸ in a follow-up to the accomplishments of SDGs. Based on these, LAC showed in 2015 a level of access to safe water¹⁸⁹ of 94.6%¹⁹⁰ and improved sanitation of 83.1%¹⁹¹ (see Figure 1). These coverage ratios mean that there are still 34 million people in the region without access to safe sources of water. To achieve universal coverage by the year 2030, which is the year agreed by the UN countries to reach this goal, would require incorporating nearly 124 million people to water services and

¹⁸⁷ In 2014, the city of São Paulo, Brazil, experienced a long drought that required the WSA utility SABESP to adopt measures to control water springs and the efficient use of existing dams.

¹⁸⁸ WHO and UNICEF (2015).

¹⁸⁹ According to the WHO, safe water is that whose microbial, chemical and physical characteristics comply with the WHO's guidelines or national guidelines on the quality of potable water.

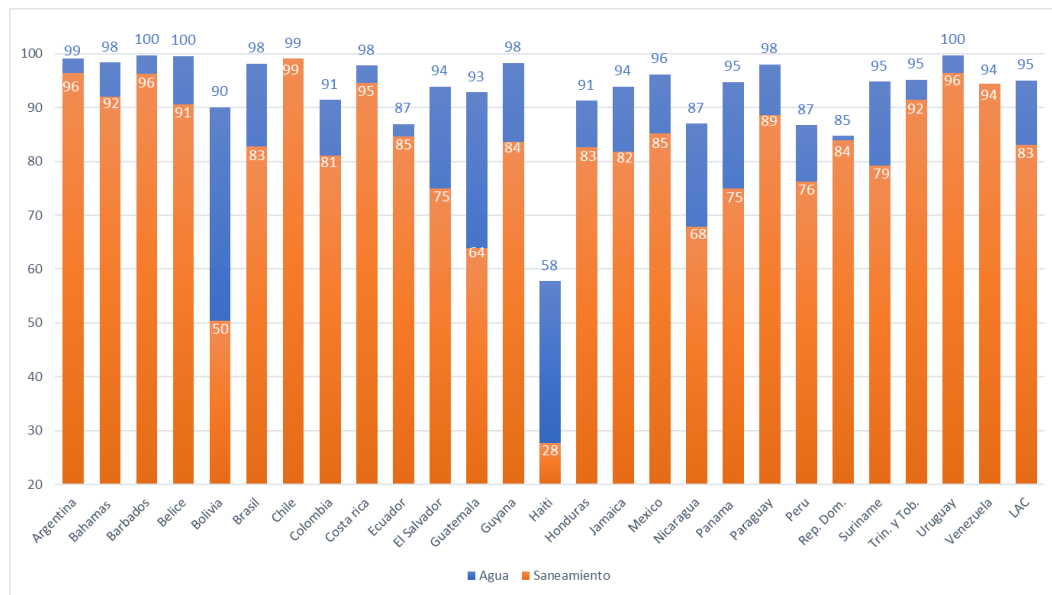
¹⁹⁰ The differences between countries are significant. Countries that did not make it: Haiti (58%), Dominican Republic (85%), Ecuador (87%), Nicaragua (87%), Peru (87%), Bolivia (90%), Colombia (91%), and Honduras (91%).

¹⁹¹ In developed regions, the coverage of safe water is 99% and sanitation is 96%. JMP (2014).

196 million people to sanitation, requiring an investment of approximately US\$170 billion.¹⁹²

- 3.3 **Access to sanitation, a big challenge to solve.** Despite the relative progress of the region with respect to the global situation, as mentioned, the lack of access to sanitation¹⁹³ is one of the main sectoral challenges, taking into account that 18.5 million people, mainly in rural areas, continue to practice open defecation.¹⁹⁴ Additionally, in numerous sewage network projects of the Bank and other donors, a connection rate of only 50% to 70% has been observed, which shows that the challenge of expanding the access to the services will involve considering the situation of disposal of wastewater inside the home. Experience shows that to solve this problem it is necessary to:¹⁹⁵ (i) provide support with the financing of the costs of changes and improvements of hydro-sanitary installations in the homes of the poorest families; (ii) ensure the existence of policies, laws and regulations to promote the connection, to not limit the intervention of WSA utilities in those areas and to adjust the quality standards of the services; and (iii) raising the population's awareness about the social and environmental benefits of connecting to the service.

Figure 1. Water and Sanitation Coverage (%)



Source: (JMP, 2015)

¹⁹² This information does not include the needs for investment to improve the quality of the service (continuity, potability, pressure). Garzón and Sturzenegger (2016).

¹⁹³ According to the WHO, basic sanitation is the lowest cost technology that allows to adequately eliminate excretes and wastewaters and having a clean and healthy environment in the home and their surroundings. The access to basic sanitation includes security and privacy in the use of these services.

¹⁹⁴ Lentini (2015).

¹⁹⁵ Plan Nacional de Agua Potable y Saneamiento de Argentina (National Plan of Potable Water and Sanitation of Argentina) (2016): "The effective access to reach the sanitary goals is also related to the willingness and capacity of users to face the cost of conditioning the internal installations that enable them to connect the home to the service, in particular, considering that the deficit is mostly located in areas with lower economic income. Additionally, see the Plan Nacional de Desarrollo de Paraguay 2030 (National Development Plan of Paraguay 2030) (2013).

3.4 Expanding access while reducing regional and socioeconomic inequality.

The coverage figures conceal disparities of access between countries, between urban, peri-urban and rural areas, and by level of income.¹⁹⁶ It is estimated that around 70% of the families in LAC that lack water service, and 85% of those that have no sanitation, belong to the first two income quintiles of the distribution of income¹⁹⁷. Likewise, the coverage of urban services is greater than the one recorded for rural areas. According to estimates from the WHO and UNICEF, in urban areas the water coverage reaches 97% of the population and 88% of sanitation, while in rural areas the coverage is 84% and 64%, respectively.¹⁹⁸ Nevertheless, in rural areas, it should be noted that these numbers do not reveal the reality of informal urban settlements, which is estimated to house 27% of the population. Closing these gaps requires a significant effort considering that in the region it can be observed, every five-years, a decline¹⁹⁹ of the coverage increases for water and sanitation.²⁰⁰

WSA Status at subnational level

The disparity between countries and regions of a same country are large and inequitable. Some examples:

- In Guyana, while in the capital there is 98% coverage of potable water (76% by pipes) and 88% of sanitation, in inner cities the coverage is 57% and 65%, respectively.
 - In Mexico, the states of Chiapas, Guerrero and Oaxaca have WSA coverage close to 74%, while at a national level they are close to 95%.
 - In Jamaica, while the coverage of water is 97% (90% by pipe) in urban areas, in rural areas the coverage is up to 89% (49% by pipe).
 - In Panama, the urban area reaches coverage close to 98% and 56% for WSA respectively, while in indigenous populations the coverage only reaches levels of 44% and 37%.
-

3.5 New focus on sanitation solutions in rural communities.

Evidence shows the drawbacks of using conventional solutions (sewage networks with treatment plants) for serving rural communities, even when the population is somewhat concentrated. These solutions bring with them problems of sustainability, especially when they include wastewater treatment plants, because they entail high costs for their service and maintenance,²⁰¹ and technical know-how not always available in local institutions that may cause them to be promptly

¹⁹⁶ There are differences between countries and within each country (85% of those people that do not have sanitation belong to the two quintiles of lower income; rural 63% of access to sanitation improving vs. 87% urban).

¹⁹⁷ IDB (2007a).

¹⁹⁸ Lentini (2015).

¹⁹⁹ This could be due to: (i) higher costs for connection for the investment in rural areas increasingly more isolated and/or dispersed, in the outskirts of large cities, in informal settlements or other places with difficult access; and (ii) decrease in the priority given by the governments with respect to the perception of the accomplishment of the SDG.

²⁰⁰ Garzón and Sturzenegger (2016) show that, in the case of water, this rate was reduced from 2.3% per year in the 1990-1995 five-year period to 1.4% for the 2005-2015 period. In the case of sanitation, the rate went from 2.9% to 1.7%.

²⁰¹ For Honduras, the costs of investments per connection reach approximately US\$2,000 (including collection and treatment, but not in-home connection), to which O&M costs of about US\$250 per year should be added. In contrast, the costs of individual solutions are about US\$200.

abandoned.²⁰² On the other end, experience has also shown that the widespread applications of simple individual sanitary solutions, such as latrines, have not been successful. The lack of acceptance of the population because of solutions offered that do not adapt to their needs and their lack of willingness to pay,²⁰³ leads to their disuse. The use of unconventional solutions (individual, semi-concentrated or centralized) has shown to be an adequate instrument²⁰⁴ to extend the services at a reasonable cost and greater ownership for the community, given the social work that entails the full project's cycle.

- 3.6 **Improving the quality of Water and Sanitation services.** The quality of the service incorporates variables such as potability (absence of fecal matter and chemical contaminants), pressure so that the water can reach higher floors in the home (up to three in urban areas), continuity (available when needed), and accessibility (within a premise or a source that does not involve spending more than 30 minutes per day obtaining it). Even though there are few statistics because of the weakness of the sector's information system, the lack of potable water that is consumed is a notable problem in the region²⁰⁵, even though the existing laws in most countries require the disinfection of captured surface waters. In the case of groundwater, while chlorination may not be so important, there may well be elements such as nitrates, arsenic, or boron present.²⁰⁶ The Caribbean islands face potential saline intrusion due to overexploitation of aquifers, which can make them unusable because of the high levels of chlorides and other ions or salts. A further aspect of importance is the lack of service continuity. Around 60% of the water systems in LAC do not offer 24-hour service seven days a week,²⁰⁷

Goal 6 of the Development Agenda Post-2015 of the UN establishes as a goal for 2030 "To guarantee the availability of water, sustainable management and sanitation for all." When incorporating quality variables in the definition of access, this generates a very strict compromise for the sector. The targets are: (i) universal and equitable access (targets 6.1 and 6.2); (ii) improve quality, reduce contamination and increase wastewater treatment and reuse (target 6.3); (iii) increase the efficient use of water resources ensuring the sustainability in all uses (targets 6.4 and 6.5); and (iv) protect and restore water systems (target 6.6). It also contemplates the expansion of international cooperation to improve the capacity of the countries (target 6a) and to strengthen the community's participation (target 6b).

²⁰² In Chile, it has been documented that, of 550 wastewater treatment systems built in the last years, 80% have problems and do not work (Naveas and Ducci, 2014). Only in Uruguay, where Sanitation Works of the State operate the rural sanitation systems, has it been possible its proper functioning; this is a very unique case in the region, because usually the community is responsible for managing the systems.

²⁰³ Demand studies in Guatemala, Honduras, Dominican Republic and El Salvador, suggest that in many cases, the willingness to pay for these installations is less than its cost, which makes this solution inefficient as a result of a lack of proper socialization of the problem.

²⁰⁴ In dispersed communities of Honduras, where local conditions make it difficult to apply traditional methods for its delivery and disinfection, innovative solutions for fast implementation, individual or collective, low cost and of easy operation and maintenance have been required (OPS, 2003).

²⁰⁵ It is important to take into account the difference between safe water as defined by the UN and potable water, which means that the water is disinfected by some physical-chemical process, such as chlorination.

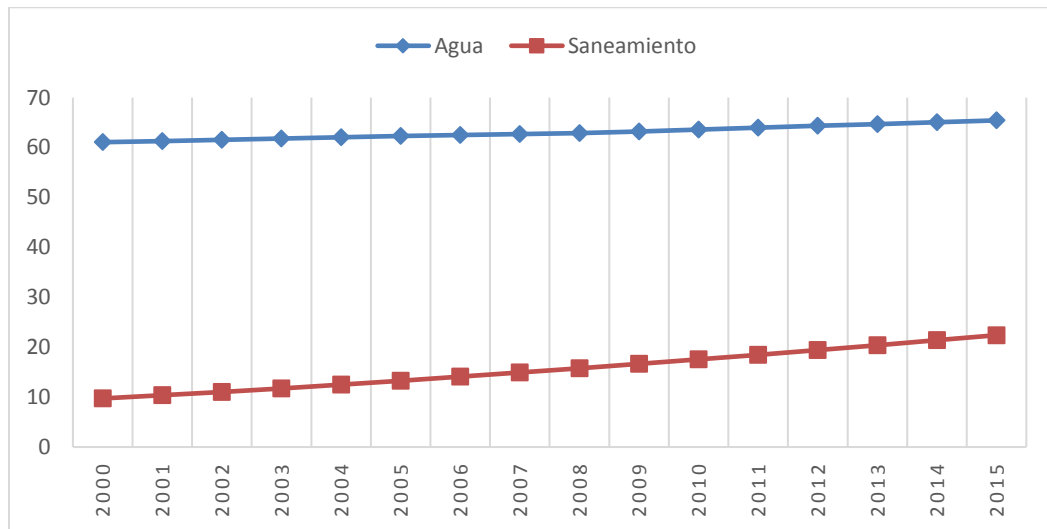
²⁰⁶ There are documented cases of the presence of these elements in Chile and Argentina. Galindo et al. (2005).

²⁰⁷ In Brazil, 40% of the population with water connection suffers cuts. In Nicaragua, 37% of the population receives water less than 6 hours per day; in Peru, the average is 20 hours per day. Cathala and Nuñez (2016).

rationing²⁰⁸ that mainly affects peri-urban and rural populations.²⁰⁹ This problem also has consequences for the level of unaccounted-for water, as the seepage of air into the systems boosts the pressure and causes breaks in the pipes, increasing the probability of leakage and the consequent introduction of pathogenic organisms into the water supply.

- 3.7 When incorporating these quality variables of the service to the calculation of the coverage of water and sanitation services, the situation becomes very critical for the region. The goal intended by the new definitions in the SDGs is safely managed universal access to water and sanitation. Access to safely managed water means access to an improved source of potable water that is located within the premise, available when needed, and free of fecal contamination and other priority chemical contaminants. On the other hand, access to safely managed sanitation means that the enhanced installations are not shared with other homes and where excrete is safely disposed of on site or is transported and treated outside the home. With these definitions, the coverage in the region is 65.4% for safely managed water and 22.4%²¹⁰ for safely managed sanitation (see Figure 2).

Figure 2. SDGs - Access to safely managed WSA services (%)



Source: JMP, 2015.

- 3.8 **Increase the management, disposal, treatment and reuse of wastewater.** A big challenge, considering SDGs, for the next decades will be to increase the percentage of treated wastewater. Even though there are no full statistics in this regard, in most parts of the region there are important delays in this subject, although in several countries significant progresses have been registered (for example, in the cases of Chile, Brazil and Uruguay and, more recently, in Argentina, Mexico and Peru).²¹¹ Currently, the JMP estimates that at a regional level, 22% of households have their wastewater treated, with a high variation

²⁰⁸ Jouravlev (2004).

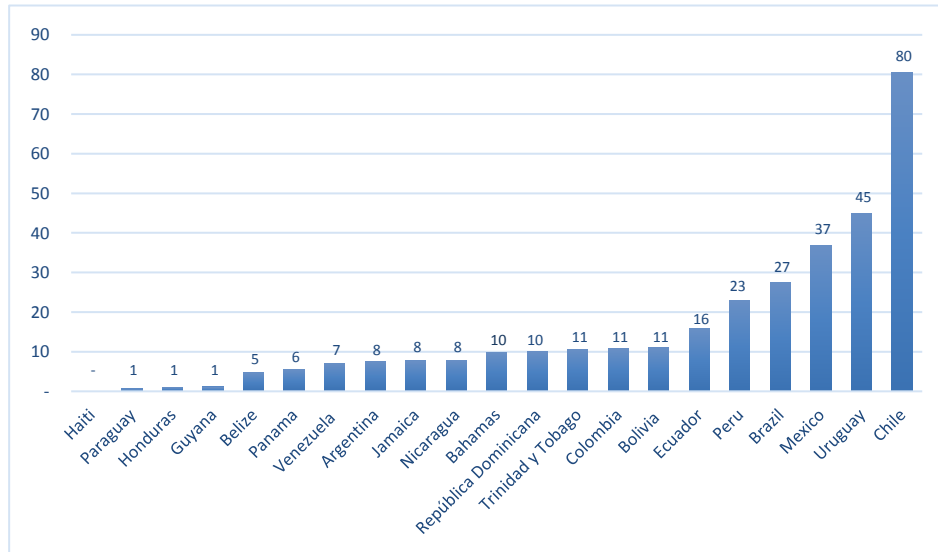
²⁰⁹ In Panama, 52.9% of the rural population does not have service 24-hours per day; in Paraguay, one of every three inhabitants in rural areas (33.3%) does not have 24-hour water service. Cathala and Nuñez (2016).

²¹⁰ Although there is no statistical information available for all the countries in the region, the values provided by the JMP correspond to a representative sample of countries that adequately shows the situation in the region.

²¹¹ Lentini (2015).

between countries (Chile, which exceeds 80%, followed by Uruguay with 45%, Mexico with 37%, then Brazil with 27%, Peru with 23% and in countries like Ecuador, Bolivia, Colombia and Trinidad and Tobago these values vary between 10% and 20%), as shown in the following Figure 3.

Figure 3. Coverage of homes that treat wastewater (%)



Source: JMP (2015)

- 3.9 Good practices in this subject consist, firstly, in scheduling investments by phases and prioritize them, given the longer periods of time necessary for its implementation.²¹² Associated to this is the financing matter, with the following reference models: (i) in Mexico, the coverage of treatment grew to 48%,²¹³ with a significant direct injection of resources from the federal state (similar scheme has been used in Brazil²¹⁴ and in developing countries in North America, Europe and Asia); (ii) financing of investments with tariffs (scheme used in Colombia and Chile, the latter also incorporates the private sector as a key stakeholder, where an urban universal coverage in treatment has been reached); and (iii) different formulas of public-private partnership, with costs and risks shared between the State and the private sector (Mexico, Colombia and Brazil).²¹⁵ Additionally, the reuse of treated wastewater is presented as isolated cases in some countries of the region.²¹⁶ Alongside the low coverage of treatment is the challenge related to inadequate behaviors, low connectivity to the sewage systems (§2.39), which reduces the effectiveness and impact of the interventions, especially in health and environment. A relevant issue because of its impact on the proper functioning of the sewage, including storm drainage, and the quality of water bodies, is the

²¹² In Chile, urban coverage went from 12% in 1994 to 100% in 1998. In Montevideo, a successful program for sanitation of the Bay since the mid-80s has been developed in several stages.

²¹³ See De la Pena et al. (2013).

²¹⁴ See, especially, the Programa de Aceleração do Crescimento (PAC), <http://www.pac.gov.br/>

²¹⁵ One analysis of international cases of public-private management models for the delivery of water services (including the treatment of wastewater) may be consulted in Marín (2009).

²¹⁶ In Mexico and Brazil with specific projects, and in Colombia with the development of a regulatory framework. USEPA (2012).

wastewater management. Even though in the last decade significant progress has been made in the solid waste collection (with an urban coverage of 93%),²¹⁷ street cleaning, and that the population that has access to adequate landfills has doubled, there are still many challenges for their comprehensive management.

- 3.10 **Considering the effect of the urbanization process in LAC.** According to the United Nations Development Program (UNDP),²¹⁸ today, 80% of the population in LAC lives in cities, which makes it the most urbanized region in the world, and it is expected that for the year 2050 this percentage will be 87% of the population. In the last fifty years, the number of cities with more than 500,000 inhabitants have increased from 28 to 131, where more than half of the urban population lives (55%).²¹⁹ The population in urban centers of more than 300,000 inhabitants represents 60% of the urban population, and equals to 48.7% of the region's total population. For the year 2030, it is estimated that urban centers with more than 300,000 inhabitants will concentrate 51.1% of the region's population.
- 3.11 The accelerated and disorderly growth of the cities in LAC in the last decades, which has been characterized by an expansion of the occupation of land more than an urban densification and a proliferation of precarious settlements,²²⁰ presents a challenge to reach the globalization of WSA services and improve the quality of its delivery. The population of the region's cities, in addition to facing a growing unsatisfying demand, especially for water, also faces a growing population living in areas with high levels of marginality and poverty, in many cases in high-risk areas and in areas that are usually affected by the lack of coverage or by quality problems when some type of service is available.²²¹ On average, one inhabitant for every four lives in precarious settlements in the region.²²² These areas are frequently not considered in the urban development plans and, to be able to serve them properly, they demand a very complex job that covers legal, technical, social, commercial and financial issues,²²³ and thus delaying their incorporation into the WSA delivery systems. Therefore, because of the lack of safe water and adequate sanitation, populations in these areas suffer consequences in their health and their income because they drink or use unsafe water and because in many cases, they do not have sufficient amounts to satisfy their basic needs.
- 3.12 **Improving coordination with other sectors.** The effects that WSA interventions have in health and the environment have already been mentioned ²²⁴

²¹⁷ BID-OPS/OMS-AIDIS, 2010.

²¹⁸ <http://www.un.org/sustainabledevelopment/es/2016/10/america-latina-debe-impulsar-un-modelo-de-crecimiento-urbano-que-genere-riqueza-sugiere-el-pnud/>

²¹⁹ Rojas (2014).

²²⁰ Precarious settlements have different names that vary in each country, such as slums, ranches, villas, favelas or misery belts. According to the United Nations Program for Human Settlements (UN-Habitat), the definition requires a group of individuals that live under the same roof in an urban area, with risk of eviction, with lack of lasting materials for the home and lack of sufficient space and access to improved WSA sources.

²²¹ Lentini (2016).

²²² United Nations Program for Human Settlements, 2012.

²²³ According to Lentini (2016), an example of WSA actions and programs implemented in marginal areas, it should be noted those carried out by the Sanitary Sewage and Potable Water Service in the city of Santa Cruz de la Sierra, Bolivia; EPM in Medellin, Colombia; Interagua in Guayaquil, Ecuador; SEDAPAL in Peru (see Balcazar, 2008); and AySA in Buenos Aires, Argentina, through *Agua+Trabajo* and *Cloaca+Trabajo* plans.

²²⁴ The WHO identifies inadequate sanitation of public entities, such as hospitals, health centers and schools, as one of the main causes of diseases related to diarrhea in LAC. In Guyana, for example, it is estimated that only 48% of the hospitals have a safe source of water. In Dominican Republic, the estimated percentage of hospitals that have a reliable source of water is 75%.

(¶2.1-¶2.8). Another area of great impact is that of urban planning and the contribution to the growth and competitiveness of cities and the countryside. An estimated 24% of the urban population in LAC lives in precarious settlements, in areas unsuited for urbanization.²²⁵ Many of the constraints for expanding access in peri-urban areas flow from the high costs per connection due to the relative difficulty in accessing dwellings, their location in vulnerable areas, and the high rates of unplanned growth in cities. In rural areas, the constraints have to do with the relatively low density of dwellings, topographical limitations to access, low socioeconomic levels, the scarce use of nonconventional technologies, and problems in offering technical assistance and training in utilities.²²⁶ These aspects pose the need to improve the mechanisms for coordination with other sectors to enhance the impact of multisector interventions and to compile and analyze information on investment costs (including those associated to (O&M) and the use of appropriate, low-cost technologies that will reduce the required investments.²²⁷

- 3.13 **Limited access to services for indigenous people.** Indigenous people, as a group, have less access to infrastructure services than non-indigenous groups. According to the Inter-American Development Bank –IDB (2014), it can be noted that, with respect to access to potable water, the gaps between both groups exceed 15 percentile points in Bolivia, Ecuador, Mexico and Panama. Simple calculations to estimate the lagging in time of the access of indigenous people to potable water (how long ago did countries reach coverage rates for non-indigenous homes equal to current coverage rates in indigenous homes) showed that indigenous homes now have rates that were similar to the rest of the homes 10 to 26-years ago. Two factors are related to this gap: (i) geographic isolation; and (ii) the inequality in public investment between rich regions and the poorest regions. The dispersion of indigenous settlements increases significantly the marginal costs of investments in infrastructure in remote communities. Even in cases where these communities are equipped with infrastructure, there is a lack of cultural relevancy, which could result in the non-use or abandonment of such infrastructure.²²⁸ The intercultural approach requires information about the socio-economic characteristics of the communities where and with which you are working. In addition, it is necessary to identify the knowledge, attitudes and practices with respect to the elements to be introduced. That is, one must analyze at minimum, the concept and relationship with the water, environment, hygiene; type and form of water supply, among other issues.²²⁹

B. Sector Governance

- 3.14 **Priority Policy.** A priority for adequate governance in WSA is giving it greater political visibility, increasing its existence in the national policy discussions and

²²⁵ UN-Habitat (2012).

²²⁶ Carrasco (2011).

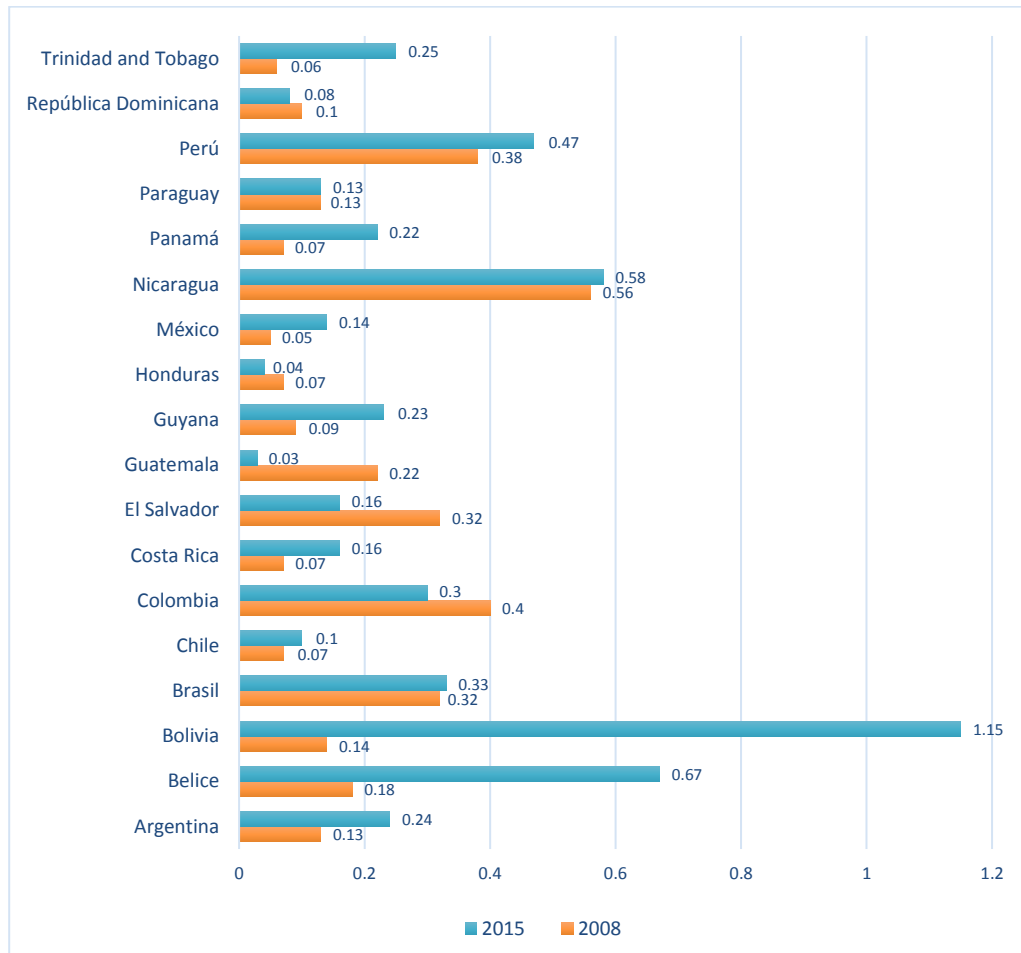
²²⁷ In countries in the Caribbean it is necessary to analyze the impact on transportation costs of inputs and goods, as well as the rocky conditions of the surface. In countries like Panama, Uruguay and in least developed countries, a reduction in the offer from contractors is given for demands in other infrastructure sectors. In other countries, macroeconomic conditions related to the exchange rate, generate also revaluation of costs, with great impact in the level of investments.

²²⁸ With respect to the supply of water, for example, for the Kogi people in Colombia, water is the blood of the each and it is forbidden to control it or manipulated it unnecessarily. Given that the Kogi have abundant water resources, the adequate solution from a cultural point of view, would be to build a minimally invasive infrastructure (for example, small tanks) and ask for permission to the water spirit to use the water resources in this way.

²²⁹ UNICEF (2012). For more information, see the Gender and Diversity Sector Framework Document.

decision levels. There is consensus at an international level on the importance of increasing investment of water and sanitation (¶2.1-¶2.3); countries with low income per capita with improved access to safe water and sanitation have an average GDP annual growth of 3.7%, while countries with similar income (with the same per capita income) but without improved access have growth of only 0.1%.²³⁰ In LAC, it is estimated that the investment in infrastructure in WSA in 2012 reached 0.33% of the GDP²³¹ and without any variation for the year 2015,²³² but with marked differences between the countries of the region (see Figure 4). Additionally, the compliance of the SDG requires that states take measures to advance in structural reforms to reach these goals, without putting at risk the financial sustainability of the utilities.

Figure 4. Evolution of Investment in WSA per country as GDP percentage



Source: [InfraLATAM](#), 2017.

3.15 Institutional and Legal Framework. The institutional framework of the sector in the region is diverse, with countries that have consolidated sectorial entities for more than 20 years (such as Chile, Colombia and Peru), and others in which

²³⁰ World Health Organization, http://www.who.int/water_sanitation_health/watandmacr5.pdf.

²³¹ CEPAL (2014), <http://www.cepal.org/es/infografias/la-inversion-en-infraestructura-en-america-latina-y-el-caribe>

²³² Estimated from data from InfraLatam 2017. Information available for some countries.

institutionality is still incipient, fragile and unstable.²³³ Despite some differences in the content of sectorial reforms and in their speed, the current tendency of public policy in the sector in the LAC countries is relatively uniform and, at the same time, completely opposed to those from the past.²³⁴ Among the common tendencies or elements from reforms carried out in the region, the following stand out: (i) reforms that aim at institutional separation between the functions of the definition of policies and planning, of economic regulation and of system management; (ii) the consolidation of decentralization process in the delivery of the service to subnational entities; (iii) a renewed interest in the participation of the private sector in the delivery and/or management of the services; and (iv) the creation and/or strengthening of the regulatory frameworks, both as a necessary condition to make the private sector participation possible, as well as a mean to improve efficiency of public delivery of the utilities, ensuring sustainability and at the same time safeguarding access for low income groups.

- 3.16 Several countries of the region have specific sectorial laws in terms of drinking water and sanitation, whether at national level (Bolivia, Chile, Peru, Paraguay, Costa Rica, Honduras, etc.) or subnational (Argentina), while others integrate guidelines contained in sectorial health or environmental laws, or derived from water laws (Nicaragua, Ecuador, Uruguay and several English-speaking countries in the Caribbean). More recently countries such as Brazil, Colombia and Peru have tried to insert the problematic of the sector in the context of a coordinated view with the topic of urban and housing development. Overall, countries with the greatest coverage of utilities usually do not have specific sectorial plans, probably due to the high coverage reached²³⁵ (Barbados, Chile, Costa Rica, Uruguay, and Trinidad and Tobago) or due to its federal nature (Brazil or Mexico). On the other hand, countries with the greatest delays have developed national sectorial plans that most of the time have not been complied, mostly because they set very ambitious goals, which aim at quickly reducing existing gaps, but that become unfeasible.²³⁶ The updating of these Sector Development Plans is a task to be promoted by the Bank and can led to the prioritization of the sector in the definition of public policies.
- 3.17 **Sectorial Planning.** Sectorial planning for WSA services in LAC countries falls on different institutions and it is an institutional topic still in evolution. In the region, there is still the need to consolidate models that promote administrative efficiency and that facilitate an effective cross coordination of other dependencies that are connected to the use of water resource in areas of energy, agriculture, environment, among others. Similarly, reflecting the urban character of the region, in recent years Brazil, Colombia and Peru have tried to insert the problematic of drinkable water with the topic of urban and housing development. To do this, they have transferred the responsibilities of stewardship and drinkable water and sanitation policy to the ministries of housing and water. In other cases, the sector governance is at nonhierarchical levels of the health or infrastructure sector. The need to recognize the special requirements of the rural and peri-urban sectors is

²³³ Rojas (2014).

²³⁴ Jouravlev (2004).

²³⁵ Rojas (2014).

²³⁶ Idem.

especially important, thus the specific stewardship entities to these areas are necessary,²³⁷ and its creation nor strengthening must be promoted by the Bank.

- 3.18 In some countries of a minor geographical scale, such as El Salvador, Guatemala, Haiti and Dominican Republic, the principal entity is also usually the utility (with an operator of national scope). Current public administration tends more towards the separation of roles to guarantee neutrality and more transparency in decision making. Even more complex, to serve the functions of information, planning, and assignment of rights or authorizations for water use, Brazil and Peru created specialized agencies for regulation of hydric resources. In the case of Mexico, the National Water Commission (CONAGUA), attached to the Secretary of Environment, exercises functions as the ones indicated for the regulatory agencies, but it also operates the infrastructure for regulation in the hydrographic watersheds and it finances investments. There is a different case in Argentina, although there is a Sub-Secretary of Hydric Resources at federal level, water administration is a provincial right of constitutional hierarchy.

- 3.19 **Sectorial regulation.** In terms of regulation of utilities, both public and private companies dedicated to delivering WSA services, need a regulation with respect to price and quality of service, when the market is not competitive.²³⁸ A significant axis of the reforms in the 90's in LAC was to create entities of economic regulation of utilities that were both autonomous and independent of public control,²³⁹ nevertheless, the search for a clearer definition of the role of regulation of urban delivery of services by public companies or municipal utilities must be supported.

Successful cases of regulation in LAC

The most successful cases in terms of creation of a framework and solid institutions in terms of economic regulation of WSA utilities are Chile, Colombia and Peru. Between 1990 and 1992, these countries created the Superintendence of Sanitation Utilities, The Commission of Drinkable Water and Basic Sanitation, and the National Superintendence of Sanitation Utilities, respectively. These entities assumed regulatory responsibilities in fixing fees, they regulate both public and private companies, define criteria of quality of the service and they unite and broadcast sectorial information. Its ongoing work during these 25 years has fostered development and sustainability of WSA services avoiding abuse of dominant position, guaranteeing the delivery of quality utilities with reasonable fees, and expanding coverage and improving efficiency in utility management by the providers. Source: CAF 2014.

- 3.20 This concept has been adopted in a generalized way in LAC.²⁴⁰ Many countries of the region have specific regulatory frameworks for the sector. Some frameworks have national scope, such as those of Chile, Colombia, Costa Rica, Honduras, Paraguay, Peru and Uruguay, and others are of provincial or state level jurisdiction

²³⁷ In Chile, more than 90% of rural drinkable water systems, built since the mid 60's, are still working because of the constant support of policies of the State defined by the Ministry of Public Works. In Paraguay, from its creation in 1972, the National Environmental Sanitation (SENASA) supports conformation of Sanitation Boards in rural areas and towns of less than 10,000 inhabitants, and it has contributed to the creation of more than 3,500 Sanitation Boards, most of which are still working. Paraguay was the country with the greatest increase in coverage of waters in rural areas in the frame of MDG, which is greatly attributed to SENASA's work.

²³⁸ This concept became stronger in the discussion of public policies in LAC when a debate on participation of the private sector in WSA utilities in the region was inaugurated, in the end of the 80's and beginning of the 90's.

²³⁹ These instances have been successful, especially in the definition of fee structures in countries such as Colombia, Peru and Chile.

²⁴⁰ CAF (2014).

such as Argentina and Brazil. Still, other countries such as El Salvador, Guatemala, Haiti, Mexico and Dominican Republic do not have regulatory entities. Also, there are regulatory entities that combine control and surveillance with some technical assistance services to utilities –possibly because the market that they regulate is essentially the responsibility of public companies– or those that aside from the regulation of public services are responsible for –because of the lack of a water authority– what corresponds to the water resource. There are also instances that simultaneously regulate different utilities, such as the case of the Power and Water Utilities Regulatory Unit (URSEA) in Uruguay and the Agencia Reguladora de Saneamiento e Energia do Estados de Sao Paulo (ARSESP) in Brazil, although usually with limited scope regarding the one that specific sectorial regulatory entities have.

- 3.21 In some cases, these frameworks of rights and obligations between the regulatory entity and the operators have been supplemented through contracts or agreements (concession, administration, management and results) that establish goals to comply and its monitoring mechanisms; they also set the responsibility of the authority regarding fees and other aspects of its competence related to delivery. Although these contracts are common in the participation with private operators, currently, its implementation to participate with public companies (for example in Argentina, Brazil, Paraguay, Peru and Uruguay) is also growing. It is necessary to continue to support the creation and strengthening of regulatory entities with the purpose of ensuring overall sustainability of utilities,²⁴¹ to instill technically and thoroughly sustained tariff regimes, preparation of optimal investment plans, improvement of information systems and the necessary monitoring and control. The participation of the Bank in the financing of programs and projects is an effective mechanism to promote this type of reforms.
- 3.22 **Delivery of service.** A common element in the WSA sector in LAC since the 1990's has been extensive decentralization of utilities. In several countries, national companies were eliminated to create regional entities,²⁴² or they were directly assigned to the towns.²⁴³ In countries of small geographical scale, overall, urban providers predominate (or even national), as in the cases of Nicaragua, Costa Rica, Panama, El Salvador, Uruguay, Jamaica, Barbados, Trinidad and Tobago, centered on the delivery of the service in capital cities. Companies of provincial, state or administrative region scale exist in Chile (through private companies), Argentina, Brazil, Dominican Republic and Venezuela, although in some of these cases there are municipal, coops and small private companies that co-exist, while municipal and inter-municipal utilities are typical of countries in which municipal decentralization processes were not developed. Nevertheless, in the municipality realm, there are other management models as cooperatives that predominate in the eastern region of Bolivia and in several provinces of Argentina (Chubut, Santa Fe, Cordoba, Entre Rios, La Pampa, among others), sanitation boards in peri-urban areas in cities of Paraguay, or Peruvian companies that are incorporated as limited liability companies of public capital and with inter-municipal scope in most cases. On the other hand, in the rural realm, models of community

²⁴¹ Ducci and Garcia (2013) indicate that there are countries in which almost all the analyzed companies show coverage indexes of operational costs above 125% of the mean (for example Brazil and Chile), while there are others in which the majority of the analyzed companies do not cover their operational costs with operational income (for example companies analyzed in Venezuela and Trinidad and Tobago).

²⁴² For example, in Chile, Argentina and Venezuela.

²⁴³ Colombia, Peru and others.

base prevail in most of the LAC countries with different names (coops, sanitation boards, water boards, etc.), but as community organizational structures of private nature.

- 3.23 This decentralization process, especially in the case of municipalities assuming utilities, did not occur without problems, for example: most of the municipalities of the region do not have the technical, management or even financial capacity to sustain utilities; atomization of utilities does not facilitate achieving economies of scale,²⁴⁴ nor transference of resources between communities with payment capacity to those that do not have it; and the property of utilities in the hands of the municipalities makes the intervention of the central or regional state in local decisions difficult. On the other hand, atomization makes regulation and control difficult, especially because of the costs it implies. In countries such as Colombia and Peru, this topic has been extensively debated, and, in the case of Peru, even regional or departmental companies have been created.²⁴⁵
- 3.24 Taking advantage of economies of scale in WSA utilities and management of solid waste demands strengthening the coordination and decision-making mechanisms between municipal entities, water management boards and other local entities. Usage of the concept of commonwealths (Bolivia)²⁴⁶ or the creation of forms of association (Integrated Rural Sanitation System–SISAR in Brazil, or the Community Office of Water in the commune of Hurtado River in Chile)²⁴⁷ or the Intercity System for Waste Management of the South East (Mexico),²⁴⁸ are examples to face these challenges. Similarly, management of water resources, organization and strengthening of users, and the coordination of State entities is indispensable to move forward in a safe, efficient and equitable use of the resource.
- 3.25 **Transparency, accountability and social control.** In a parallel way to the institutional arrangements to improve governance in the sector, the priority of implementing actions that promote mechanisms of transparency and accountability arises, both from utilities operators as well as from regulatory agencies to create sustainable progress in efficiency, quality and sustainability of the utilities and, at the same time, to increase levels of trust between users and authorities, enabling greater citizen participation in the control of utilities. In this sense, it is necessary to improve transparency and corporate governance frameworks of the regulatory entities (40% of regulatory entities of the region show low levels of transparency and weak accountability mechanisms)²⁴⁹ and of utilities; information management systems on service standards and performance of the utilities; mechanisms of assistance and communication with the public, including claim and complaint management systems; accountability and corporate governance systems; and, the coordination between the different entities responsible for the governance, supervision and inspection of the sector.

²⁴⁴ Ferro, and Lentini (2010).

²⁴⁵ Brazil is a different and interesting case, in which, during the 70's, state level companies and towns were pressured to enter into "concession coventants" so that these companies would develop and operate utilities. Even today, 70% of municipal utilities in Brazil, are operated by state level companies.

²⁴⁶ Smits et al. (2012).

²⁴⁷ Rocha (2014).

²⁴⁸ Intercity System of Waste Management (2013).

²⁴⁹ Andrés et al. (2013).

- 3.26 **Coordination and information:** To improve planning and policy coordination instances, plans and programs in rural areas in topics such as health, education, and gender focus, and agriculture, among others, (¶3.2) is a critical challenge to improve infrastructure interventions, and to manage delivery of service. Another challenge is the need to foster mechanisms of coordination to be efficient and effective in applying aid of donors from the sector. Excessive fragmentation of aid at a global, national or sectorial scale reduces its efficacy, thus the “Paris Declaration on Aid Effectiveness” sets forth as one of its principles “To eliminate duplication of efforts and to rationalize activities of donors to reach the maximum possible efficiency.” There are examples of coordination in Nicaragua, Peru, Bolivia and Ecuador where the governments have created the so-called “water tables” to rationalize and focus financing and donations of donors and bilateral and multilateral agencies. An indispensable tool in sectorial governance, design of public policy and control of management of utilities is the timely and reliable availability of information that enables all agents to make adequate decisions. Similarly, it constitutes a necessary condition to ensure transparency, accountability and to facilitate social control.²⁵⁰ The region faces the challenge of harmonizing criteria from the information sources within each country, considering the progress that has been made in regional *benchmarking* systems (Association of Water and Sanitation Regulatory Entities of the Americas –ADERASA) and international (International Water Association–IWA, IBNET); of knowledge in company management as AquaRating (IDB); and monitoring such as SIASAR (Water and Rural Sanitation Information System).²⁵¹
- 3.27 **Integrated water resources management.** The main challenges to handle environmental topics related to Integrated Water Resources Management (IWRM) are caused by inefficient governance and management.²⁵² Water crises are mainly “governance” crises.²⁵³ At exacerbating the existing problem and leading to other challenges, climate change demands greater coordination between institutions, better knowledge of availability and quality of resources, planning of infrastructure, considering future changes in availability of the resource, innovation in the technological, finance and management fields, better mechanisms of preservation and management of the resource, better knowledge of the impacts of climate change on water resources and ecosystems producers of water and more contact with users. An institutional mapping shows great heterogeneity among ministries and levels of government. Some tendencies are: (i) functions such as delivery of WSA services has been decentralized in several countries and the responsibility of IWRM remains at top government levels; (ii) many countries have established organizations of watersheds²⁵⁴ where its capacity to contribute to IWRM depends on their regulation, planning and financing powers; (iii) there are super-positions and gaps of functions;²⁵⁵ (iv) there is a lack of water-meteorological data which is necessary for planning of water resources; (v) lack of inter-sectorial coordination and between the different decision making levels; (vi) lack of effective incorporation

²⁵⁰ Experiences of data of providers from Brazil, Chile and Peru are outstanding.

²⁵¹ Lack of data from the sector desegregated by sex that enable dimensioning the gaps in access to water, sanitation and hygiene between men and women is indispensable to be able to carry out diagnoses of gender, propose public policy and projects with gender perspective, and to analyze if resources and benefits of said projects are getting to women.

²⁵² OECD (2012b).

²⁵³ OECD (2015b).

²⁵⁴ OECD (2012b).

²⁵⁵ World Bank (2011), Andrés et al. (2011).

of the social and environmental dimensions in management plans; and (vii) user organizations and civil society are very weak. An appropriate legal framework and an institutional multi-level government approach and with civil participation, are necessary to make progress in IWRM and to guarantee water security.²⁵⁶

C. Utilities Management and Private Participation

3.28 Opportunities of profit in efficiency of utilities. In LAC, the model of management by State utilities²⁵⁷ through public administration (municipal, regional or national) or decentralized companies of the territorial entity in charge predominates.²⁵⁸ In a utilities diagnosis²⁵⁹ it was found that there are companies with high management ability and good indicators in the largest cities of the region, but there are still relevant companies with poor performance.²⁶⁰ Information in the case of companies of small and medium size is more limited, but it responds to similar patterns. In many of these cases there are high levels of unaccounted water (around 40% mostly losses in net),²⁶¹ lack of measurement of the service (average measurement is around 79%),²⁶² lack of maintenance of existing infrastructure and its deterioration due to the lack of prompt replacements, excess of expenses in some items and insufficiency of equipment for adequate utilities management. Another usual indicator of efficiency is the number of employees per 1,000 connections of drinkable water, with an adequate level of maximum three, for which there is noticeable excess in some utilities.²⁶³ Added to this, is a high rotation of managerial personnel and a low quantity of qualified professionals, low salaries, low levels of training and no motivation. Another additional indicator that shows the level of overall efficiency in the delivery of WSA services is water consumption per user or inhabitant. Average inhabitant consumption is of approximately 159 liters per day,²⁶⁴ with consumptions of 317 liters per inhabitant per day and 362 liters per inhabitant per day, in Argentina and in Panama, respectively, followed by Honduras with consumption per inhabitant of 244 liters per day. Although the

²⁵⁶ Akhmouch (2012).

²⁵⁷ In Brazil, for example, 75% of the delivery of service is in the hands of state companies, Ferro et al. (2014). On the opposite, only 5% of the urban market in Chile is in hands of a public entity.

²⁵⁸ There are few cases with medium participation of the private sector, such as in Colombia, Brazil and Mexico, and others isolated cases such as in Argentina, Ecuador, Honduras and Peru.

²⁵⁹ Ver Lentini (2015). In this report, indicators to assess management of operators were calculated, mainly using the data base that is prepared and published by ADERASA. Similarly, data consulted on this source were complemented with those obtained from the information systems of Chile and Brazil. Thus, a sample of 66 operators was conformed, that together form a population of 183,000,000 inhabitants, which represent 62.5% of the total population of urban clusters of more than 300,000 inhabitants in LAC.

²⁶⁰ Indicators of delivery of the services for a broad set, although not representative, of companies is found in ADERASA (Association of Water and Sanitation Regulatory Entities of the Americas) (2007). The numbers that are indicated correspond to those observed in big companies (that serve over 500,000 inhabitants), with a strong bias towards Chilean and Colombian companies, considered, overall, very good or good.

²⁶¹ Ferro and Lentini (2013).

²⁶² Although micro-measurement percentage is relatively high in most of the operators, there are wide dispersions in the degree in which the users are measured, with values of minimum 19.0% and maximum 100%. Argentina, for example, has average micro-measurement of 31.2%; Panama (54.7%) and Peru (58.1%) operators are found in the middle level. Mexico reports 100% of micro-measurement.

²⁶³ Lentini (2015) found that, from 63 analyzed operators of the region, an average of 3.3 employees per 1,000 connections, with range between an employee per 1,000 connections and a maximum of 7.4 (both values correspond to Brazil), and that it is repeated in other countries of the region, regardless if the utilities are delivered in big cities or in metropolitan areas or provided in a much lesser scale (Argentina, Chile, Colombia and Peru). There are many entities in the region that operate with lower productivities. In the Caribbean countries, this number may come to 12 employees per 1,000 connections.

²⁶⁴ Estimated based on a sample of 60 operators (see Lentini, 2015).

incidence of tariff values must be considered in the volume consumed by users, a recent study for cities in LAC of more than 300,000 inhabitants found that when the levels of micro-measuring are high, consumption per inhabitant decreases.

3.29 Innovation with new technologies and management models in the sector.

The adoption of SWIT is an example of innovation in the sector. Recognizing its potential, countries like Bahamas, Barbados and Jamaica have financed implementation of such technologies through loans to utilities obtaining ANC reductions, increase of water supply and reductions in costs which have improved the financial position of the companies. It is important to continue supporting the adoption of these technologies in the region, facilitating the understanding of costs and benefits and defining strategies to overcome barriers and limitations in implementing these technologies (cost, institutional resistance to change, inadequate professional capacities, obsolete existing infrastructure, among others). An aspect that is outstanding is the precariousness of preventive maintenance of infrastructure, on which the region must make progress of the concept of investment in replacement towards asset management, adopting management schemes, monitoring practices and systems to obtain adequate and timely maintenance of the infrastructure. From the lessons learned, comes the need of adequate corporate governance practices in companies, fostering the constitution of autonomous business schemes, whether there are public, private or mixed.

3.30 Management capacity of rural operators. Rural systems are in many cases managed by organized communities (boards, committees, cooperatives, among others), in charge of the administrative management and of O&M.²⁶⁵ Nevertheless, most of these boards lack legal status and, thus, recognition from the State and from other entities, especially banking institutions, making their management difficult, and increasing the risks of loss of resources (source of social problems in case of not transparent enough management).²⁶⁶ Without training to operate, with frequent rotation of members of the committee and without state structure to support them, low quality of service is provided and there is a lack of maintenance and misuse of water in the community, with anticipated tear and wear of infrastructure. The main challenge in this matter is thus related to perfecting, sustaining and professionalizing actions of operating entities, as well as generating post construction schemes of support to the communities.²⁶⁷ In the same line, another challenge to help close the gender gaps, is the lack of knowledge of the different stakeholders of the sector on gender problems and how these are closely related to the effectiveness of WSA projects. This lack of knowledge may limit the effectiveness of activities.

3.31 Promote the participation and skills of women among the different sectors linked to the projects. In rural areas, most of the systems are managed by

²⁶⁵ It is the case of the Sanitation Boards in Paraguay, the Water Commissions in Mexico, the Water and Sewerage Administrative Boards in Ecuador, the Water Administration Committees in Guatemala, or the Water Boards in Honduras.

²⁶⁶ Barakzai et al. (2014).

²⁶⁷ There is ample recognition in literature on the importance that post-construction support has to rural providers (community) to increase sustainability of water resources in these areas (Smits et al., 2012; Alvarez, L., 2016, Lookwood, 2002; RWSN, 2010; Harvey et al., 2006) In El Salvador, The Salvadorian Association for Water Services, a utilities providers' net of Community base contracts services of 6 *circuit riders* that service 170 communities. Through technical assistance, in topics of accounting, management and maintenance, they have reached better levels of service with greater sustainability (Smits et al., 2012).

community boards in which women, being the responsible ones for carrying water, are usually sub-represented both in the preparation of the projects, as well as in their implementation. For example, in accordance to the disclosure of data made in Paraguay in 2014 that analyzes participation of women in 44 sanitation boards,²⁶⁸ it was found that only 18% of the members of the boards are women (conformed by seven persons) and that they only occupy 14% of leadership positions. The main challenge in this matter is thus related to fostering active participation of women on boards, mainly focusing on their participation in leadership positions.

- 3.32 **Participation of the private sector.** The role of the private sector in WSA continues to be relevant as a tool for several objectives of sectorial policy, as improvement of efficiency and, although in a lesser scale, support of resources. Recent estimates²⁶⁹ foresee growing participation of the private sector (of more than US\$15 billion in 2013 to US\$25 billion for 2020) due, in part, to the insufficiency of sovereign guaranteed loans because of the fiscal constraints of the countries of the region. In accordance to the World Bank (WB) (2017), 80% of WSA utilities in LAC will have difficulties mobilizing non-sovereign guaranteed financial resources, unless they implement significant reforms in governance, tariffs, among others. In the 1990s, private participation was interpreted as a possibility to increase investments and improve efficiency and the quality of services. The results under the privatization model adopted in the region were not those expected,²⁷⁰ except for Chile. Several privatization processes were reverted in Argentina, Bolivia and Uruguay, and the model still generates different levels of rejection,²⁷¹ to such point, that constitutional or legal clauses have been incorporated that specifically prohibit privatization of utilities (Bolivia, Ecuador, Nicaragua and Uruguay). Nevertheless, in several countries of the region, participation of private utilities is on the rise under different models.²⁷² In Brazil, the private sector covers 15% of the urban population; in Colombia private participation covers 50% of the population under a scheme of joint ventures; in Ecuador, it is 18% (mainly the concession in Guayaquil). In the case of countries like Mexico, Bahamas, Trinidad and Tobago and Jamaica, participation of private operators has been targeted to specialized services contracts for micro meters and ANC control.
- 3.33 This evidences that it is possible to promote different PPP schemes in the region adequated to the needs, expectations and conditions of each market, such as management contracts,²⁷³ commercial and operational management (Mexico, Bogota), technical assistance to public operators (Haiti, Guatemala),²⁷⁴ or specific

²⁶⁸ Revealing of data was made carried out by SENASA to the Sanitation Board with which it was working at the time. There are not desegregated data by gender before 2014.

²⁶⁹ CAF (2014), GWI (2015).

²⁷⁰ According to Ferro (2017), interventions were made with a deficient informative base, unreal expectations, excessive needs of investment for the capacities or reduced payment provisions, scarce consolidation of the regulation (although this is more diffused that, in other regions in way of development and in continental countries of Europe) and politicization of the environment, among other problems.

²⁷¹ According to analyses made by Ducci (2007) and Ballesteros, Arroyo and Mejía (2015).

²⁷² CAF (2014).

²⁷³ Examples are found in Bogota, where at the beginning of the 90's operational and commercial management of five zones in which the city was divided was given to specialized operators, to improve efficiency of systems, general service standards and of investments, introducing in remuneration of the managers a variable portion associated to success indicators ([Aloas](#)).

²⁷⁴ See Haiti's case in Brochard (2013).

services provision with arrangement to contracts based on results (as for ANC,²⁷⁵ Bahamas²⁷⁶ and Jamaica), total investment in works (Brazil),²⁷⁷ among others. An instrument that has resulted effective for the development of sustainable PPP schemes is granting finance guarantees without sovereign guarantee to private partners of these schemes.²⁷⁸ Lessons learned in topics such as more availability of information (rules of the game, and contracting process, among others), plurality of bidders,²⁷⁹ risk distribution, design of contracts and tariff system, impact on minor income users, definition of agile mechanisms for conflict resolution, information and support studies, regulation schemes, political support,²⁸⁰ assurance of finance for rehabilitation and expansion works, among others must be considered,²⁸¹ and where the Bank's support plays a relevant role.

D. Financial sustainability

3.34 Availability of Public Resources. In LAC, there is an enormous need for investment resources. It is estimated that a total of US\$170 billion is needed to reach WSA universal coverage in 2030, equivalent to US\$11.5 billion per year, constituting a solid increase of the investment level in recent years, which was equivalent to nearly 0.34% of the GDP.²⁸² If the requirements of solid waste management, wastewater treatment and urban drainage are added to this, the needs would double, even without considering investments for quality improvement. A first challenge is related to increasing the availability of budget resources from the State, mainly as a contribution to investment in rehabilitation of systems and its expansion. The actual possibility of increasing these financing sources is given by factors such as: (i) priority of the sector in government policies; (ii) macro-economic situation of the countries; (iii) capacity of entities in charge of utilities to efficiently plan investments and to develop programs and projects; (iv) capacity of effective execution of resources; and (v) inclusion of measures of transparency in management of resources. Another challenge is to strengthen alliances that help contribute not only additional flows of resources (leverage), but also knowledge that may reinforce and multiply the impact of operations in the sector. In this sense, there have been numerous successful experiences in the region of design of co-financing operations from two or more stakeholders. At its

²⁷⁵ PPIAF (2016) doc documents lessons learned in design of programs of unaccounted water reduction and structuring of contracts based on performance.

²⁷⁶ A successful example is the contract that State company Bahamas Water (Water and Sewerage Corporation of The Bahamas, WSC) signed with a private company in 2012 to reduce ANC. Contracts as this, with elements of APP contracts and of contracts based on long term performance, have advantages compared to conventional projects, given that the reduce risk of noncompliance of goals and risk of performance is passed on to the private contractor. The contract included 30% of setoff based on results, and for 2015 WSC had saved 2.5 billion gallons of water (WSC, 2017).

²⁷⁷ Total investment of the Sao Lourenzo Producer System is carried out by private partner and its construction is expected to be finished at the end of 2017, benefiting two million inhabitants of Great Sao Paulo.

²⁷⁸ See guarantee granted to WSA Company of Tlalnepantla de Baz in Mexico (Standard&Poor's, 2003), Sewer Water Treatment Company of Puerto Vallarta (World Bank, 2007), and in Peru, the projects of the Wastewater Treatment (TAR) of Taboada and La Chira in which the private one finances the work and through a trust fund grants a collateral guarantee to pay service of the debt in case of insufficiency in collection

²⁷⁹ Recent experience of IDB Invest in sewer systems shows that the dimentioning or the Project finance structure submitted by the contracting authority may not correspond to the market's expectations, resulting in bidding processes without bidders or with a single one that imposes unacceptable commercial conditions for the state.

²⁸⁰ In the Caribbean region, lack of support from governments and lack of political will has been a cause that has prevented investments of the private sector in the sector (World Bank, FOMIN, Caribbean Development Bank, IDB, PPIAF, 2017).

²⁸¹ OECD (2007).

²⁸² Garzón and Sturzenegger (2016). For infrastructure investment data see: <http://www.infralatam.info/>

turn, institutional and technical coordination between financing organisms and donors enables to collaborate more effectively with national governments and establish spaces of discussion that allow harmonization and complementarity in the design and execution of effective solutions.²⁸³

- 3.35 **Access to external sources of finance, especially in capital markets.** In LAC, there are examples of WSA providers that have obtained a degree of corporate development that allows them to access both local as well as international capital markets, as the case of SABESP²⁸⁴ in São Paulo, EMP Medellín, and COPASA in Belo Horizonte.²⁸⁵ To the extent that WSA utilities evolve from companies with an engineering view to companies with a corporate vision of service and client service, the demands regarding corporate governance, transparency in accountability, efficiency in the delivery of the service increase as these are necessary conditions for the utilities to be able to access on their own to capital markets and finance without sovereign guarantees by multilateral organisms. It is worth noticing that, in most of LAC, finances have been made under corporate debt structures. Nevertheless, structures of Project Finance must continue to be developed which adequately mitigate construction risk and at the same time attract investors of capital markets with an appetite for long-term debt and stable returns. A necessary development is the reduction of the perception of risk of infrastructure projects (better designs, corporate governance in companies, and efficiency in the delivery of the services).
- 3.36 **Tariffs and cost recovery.** Despite that in the last decades progress has been made regarding the regulation of methodologies and mechanisms to regulate sustainable²⁸⁶ and efficient tariffs, it is still necessary to foster mechanisms to ensure that tariffs and tariff schedules are fixed with criteria of economic rationality and efficiency, foster rational use of the water resource, without political interference that is frequently transferred to providers, social policy responsibilities, and with a long term view, and with mechanisms of subsidies that guarantee access and affordability to all inhabitants. This kind of tariff systems or regimes in the region is dissimilar; nevertheless, schemes of growing blocks, differentiated by categories of users, are common between medium or large utilities. Except for Chile, usage of crossed subsidies is predominant in all other countries. Determination of subsidized minimum survival consumption is also generalized.²⁸⁷

²⁸³ Successful examples of this kind are: (i) Cooperation Group in WSA from Bolivia, formed by the German, Japanese, US, Canadian, Swedish, Spanish, Dutch, EU, IDB, WB, UN-HABITAT and UNICEF cooperation; (ii) financial support from IDB, BCIE and KFW to prepare the National Investment Plan in Sanitation in Costa Rica; (iii) support from IDB, WB, AECID, KFW and AFD, to prepare the National WSA Strategy in Ecuador; (iv) conformation of the Donors Table of Haiti, between IDB, AECID, AFD, UE, WB, UNICEF, COSUDE and PNUD; (v) WSA Donors Table in Honduras, WB, IDB, BCIE, JICA, EU, COSUDE, AECID; (vi) Rural WSA Group of Peru, formed by WB, OPS, CAF, AFD, USAID, GIZ, COSUDE, SECO, JICA, AECID, IDB, CIDA Canada and the national Sanitation Directorate from the Ministry of Housing, Construction and Sanitation; and (vii) Donors WSA Table from Dominican Republic of which IDB, AECID, WB, AFD and EU are part of.

²⁸⁴ SABESP, the largest public company in the world, is listed in NYSEG and BOVESPA.

²⁸⁵ Details of the cases of EOM and SABESP are found in Cuellar (2009).

²⁸⁶ Whether it is decided to cover operational and maintenance costs, plus costs of rehabilitation and renewal of nets, plus investment costs.

²⁸⁷ In Chile, for example, the cap of consumption that may be subsidized is 15 m³. In Colombia, basic subsidized consumption is 20 m³ per month. In the case of Lima (SEDAPAL), subsidy corresponds to the first block of up to 10 m³ per month. In the case of *Companhia de Saneamento Básico do Estado de São Paulo* (SABESP), and payment of fixed charge gives right to a monthly consumption of up to 10m³, and similar criteria is applied in AySA (Buenos Aires's Metropolitan Area), but only for the residential category with measure (Ferro and Lentini, 2013).

- 3.37 Countries such as Chile,²⁸⁸ Colombia and Peru have tariff frameworks and structures in which utilities cover the costs of the delivery of the services with income generated by tariffs and their legal frameworks contemplate subsidies' schemes to vulnerable populations to ensure access. In other countries, some operators cover their costs with income generated by tariffs as the case in Brazil (SABESP, CAESB, COMPASA) and Ecuador (INTERGUA, EPMASPS). On the other hand, there are cases in which procedures or methodologies for tariff revision and updating that affect financial sustainability of the utilities have not been regulated or are not applied. An analysis of the WSA companies in LAC²⁸⁹ shows that leading companies are those that have fees that are adequate to their costs, while in the more lagged countries, high significance of direct, unstable, transference from central or subnational governments to cover even O&M costs is noticeable. Similarly, incorporation of tariffs of aspects linked to environmental protection and water resource must continue to be supported, through the application of environmental rates that are charged in the utility invoice (for example, in Colombia, Costa Rica and Peru).²⁹⁰
- 3.38 Insufficiency of resources derives in great limitations to operate the service that is delivered to the users efficiently.²⁹¹ Lack of resources to finance investments implies the incapacity of the entity to expand services, usually where families of low income reside, or to improve installations for the sake of optimizing the quality of the service, reduce leaks and timely replace material assets (including wastewater treatment). Regarding income generations, there is a market to be developed around sanitation that aside from contributing to health and to environmental conservation, it may represent additional income for utilities through the sale of treated wastewater, recovery of energy and nutrients coming from mud.²⁹²
- 3.39 **Financing of water and sanitation for rural areas.** Servicing rural areas has usually been related to social programs of governments through which investments are financed through nonrefundable funding. Although in most countries mechanisms for the recovery of ordinary O&M costs are created through tariffs that users pay and that in the case of the rural sector the communities themselves collect them, experience has shown that these collections are usually insufficient, and have not generated resources for major repairs or expansion of the services.²⁹³ The challenge in terms of financing consists in designing mechanisms for financing that are sufficient and stable in the long term, that consider the total cost of the service during the life cycle of the project.²⁹⁴

²⁸⁸ Chile, fee estimation is based on the "model company" (efficient costs) is a case of regulation particularly complete and theoretically grounded (Ferro 2017).

²⁸⁹ Ducci and García (2013).

²⁹⁰ Lentini (2015).

²⁹¹ The most severe limitations imply situations in which there is not even minimum resources to acquire chemical products, pay electricity bills, have the materials and tools of frequent use, etc., all of which extensively affects the quality of the service that is delivered to clients, in the quality of served drinkable water, in the quality of effluents and treated ones that are discharged, in prompt response to claims, in repairs and search for leaks, in lack of preventive maintenance of infrastructure and others.

²⁹² Toilet Board Coalition (2016).

²⁹³ Lockwood, 2002.

²⁹⁴ AVINA (2011) compiles 22 experiences on finance mechanisms in Bolivia, Colombia, Costa Rica, Ecuador, Guatemala, El Salvador, Honduras, Nicaragua, Peru, Mexico, Paraguay and Brazil.

- 3.40 **How to finance management of water resources continues to be a central topic.**²⁹⁵ Overall, State entities that are responsible for management lack enough and stable resources to develop their work, being also limited by rules inherent to their action in the public sector. At a local level, there are no resources to finance associations of users, or for society to participate in processes of planning of watersheds. This happens despite that it has been implemented in several countries, with more or less degree charges to users for water extractions, or for effluent discharge. These resources are usually precarious and insufficient to cover the demands of management. On the other side, charges to users are not always linked to the value of water, considering the different uses, or they are not used as means to rationalize the use of the resource. Effective incorporation of the public sector in mechanisms to finance for the management of the resource continues to be a challenge. There is also no adequate estimate of the value of the water resource or its cost of opportunity.

E. Social Aspects

- 3.41 **Need for a gender and differentiated approach for indigenous peoples, afro-descendants, and other minorities.** Despite the key role that women play in the collection, carrying and handling of water at the home, they are usually absent in the decision-making process on design, execution, monitoring and operation of WSA projects. Their absence in these decision-making processes results in infrastructure and services that do not necessarily meet their needs. Consequently, services are not so effective neither sustainable in time. Additionally, female labor participation in the sector is low. In accordance with data from the Labor Market and Social Security Information System from IDB, women represent 19.7% of the total of employees of the “water, electricity and gas” sector. In other words, women are sub-represented in the sector, mainly from technical and management jobs, both in rural and urban areas. This represents a challenge because not only does it limit the economic opportunities for women, but it also affects sectorial performance by losing the knowledge, skills, and perspective that women may contribute. Also, because of their role as main managers of the water in the home, they have a preferential position to understand the needs of users, which could strengthen and improve the effectiveness of the projects. In accordance with IDB (2011), disparities between men and women have been found in terms of access, control over benefits of resources, opportunities and services. In recycling projects, promotion of gender equality may have great impact. Similarly, the need to include a differential approach for indigenous people and afro-descendants is also a challenge.
- 3.42 **Incorporate more innovative actions in hygiene, hand washing and menstrual hygiene on interventions of the sector.** Access to a secure source of water without intervention in behaviors and habits does not necessarily materialize all benefits of access to water, and where relevant increase of coverage of sanitation has not been accompanied with measurable results²⁹⁶ in terms of health improvement, advocate for a comprehensive approach with the systematic incorporation of hygiene in the programs of delivery of WSA. In the cases of the handling of menstrual hygiene, the scientific body associated to health is much less developed.²⁹⁷ An adequate management of menstrual hygiene is a

²⁹⁵ See details in OECD (2012c).

²⁹⁶ Clasen et al. (2014).

²⁹⁷ Mahon and Cavill (2012).

fundamental factor to improve the health, wellbeing and dignity of women,²⁹⁸ but the rules and standards associated to these practices are much less developed than in the case of hand-washing. Financing of the sector is extensively addressed for the construction of infrastructures and not to ensure that there is an effective demand for them or that they are properly used. Strategies aimed at behavioral change in aspects such as hand washing and menstrual hygiene must work with stakeholders as diverse as: local governments, health and education authorities, local leaders, base organizations or families. Sustainable changes in behavior through time are produced when authorities have sound strategies using different communication channels and not only based on sporadic campaigns.

- 3.43 **Social participation.** Inclusion of the community in the planning, design, execution and maintenance by government and in executing agencies continues to be a challenge for the region. This is especially relevant in rural areas in which due to the lack of participation of the beneficiaries, many of the systems are not used after being built. Beneficiaries must participate from the beginning of the projects to generate awareness of the benefits of accessing drinkable water and having adequate sanitation, with the purpose of creating demand for these services. Communities must be consulted during the different stages of the design on preferences, capacity and availability of payment, among other criteria. There are mechanisms of social participation such as public hearings or public consultation for special circumstances as the approval of work plans or tariff increase; there are also instances of participation by local authorities when it is related to national, regional or state level/provincial utility companies, as well as user and consumer defense NGOs.²⁹⁹ In some cases, as in the management of solid waste, participation includes population that informally works in the sector during the implementation of the project (see box). Additionally, the need to train communities for its O&M is seen, as well as to create a culture of payment of tariffs and foster the rational use of water. Similarly, in indigenous communities, the countries do not have a differential approach in policies, programs and projects, thus solutions that are implemented are not sustainable if their cultural, social and economic characteristics are not considered.

Participative management in urban solid waste

Recent urbanization growth of the region has increased the presence of low-income individuals who collect and classify urban solid waste on streets, opencast landfills or other points, looking for materials with potential resale value. Some cities, such as Lavras and Itauna –in the Brazilian State of Minas Gerais– Bogota, Bridgetown or Buenos Aires, have developed social programs to formalize these informal recyclers, to optimize management of recycling materials and to strengthen their management capacity and business strategy. Capacities in national and local governments are built to structure inclusive public policy interaction strategies with the industry are set to improve the commercial conditions of recyclables.

²⁹⁸ Assuming that half of the 946 million people in the world who do not have Access to water and defecate outdoors are women, it may be estimated that at least 500 million women and girls do not have Access to basic services to practice adequate, safe and worthy menstrual hygiene. WHO and UNICEF (2015).

²⁹⁹ Some countries, such as Paraguay and Colombia, are strengthening the processes of public consultation before implementing projects, ensuring participation of the community and appropriation of infrastructure to be built. Consultation includes technical, social and financial aspects (definition of fees).

F. Water security, climate change and resilience to extreme events

- 3.44 Demand and availability.** Although LAC is considered a region with abundance of water resources³⁰⁰ there are cities in which its availability is very low.³⁰¹ The diversification of economic activity and pressure for food generates externalities that compromise the environment and water resources in particular. The UN Food and Agriculture Organization (FAO) estimates that 72% of the water in LAC is used in agriculture; 11% in industry, and 17% in domestic and municipal uses³⁰². Climate impact is manifested particularly in some regions and countries,³⁰³ and it generates serious variations and instability in the supply and availability of water for current and future consumption, aside from causing serious damage to the infrastructure.³⁰⁴
- 3.45** Recent droughts³⁰⁵ have called attention upon the resource and the need to make rational and efficient use of it. In some cases, prolonged droughts produced drastic reactions in the levels of the sources, which obliged providers to implement emergency and rationalization of demand (in the case of SABESP, the operator chose to create incentives for consumption reduction through tariff increases for excessive consumption).³⁰⁶ In the most extreme cases, sources of water supply disappeared.³⁰⁷ Nevertheless, in some countries the idea of expanding sources of water for human consumption above its efficiency level persists. As it was mentioned, several WSA utilities from LAC report losses greater than 50% of their produced volume,³⁰⁸ and in many countries, there is excessive consumption; although there are several countries in which consumption per capita has been decreasing³⁰⁹ because of a combination of consumption measuring policies, fee increases and awareness campaigns.³¹⁰ Collecting rainfall³¹¹ as a measure of protection against droughts has gained a lot of drive in the region, especially in arid

³⁰⁰ On average, the availability of fresh water per capital reaches some 63,000 m³/year, very well above the minimum defined by United Nations as water stress. See FAO AQUASTAT DATABASE.

³⁰¹ Mainly in the islands of the Caribbean (Bahamas, Barbados, Haiti, Dominican Republic, Trinidad and Tobago, and Jamaica) as well as in regions such as Northeast Brazil, North of Mexico, and the Pacific Coast in Peru and North of Chile, among others.

³⁰² UN Food and Agriculture Organization (2015).

³⁰³ Examples of this are: increase of rainfall in southeast Brazil, east central Argentina, Uruguay and Paraguay, parts of Bolivia, and northwest Peru and Ecuador; noticeable reduction of rainfall in central south Chile, northeast Brazil, south of Peru and part of Central America and Mexico. Recent landslides in Peru and Colombia evidence important impact and damage caused by extreme climate events, with high rainfall in short periods.

³⁰⁴ Graciela (2015).

³⁰⁵ For example, in the Caribbean in 2009-2010, Argentina in 2011, Mexico in 2011-2012, Sao Paulo in 2014-2016 and, La Paz in 2017.

³⁰⁶ De Nys et al. (2016).

³⁰⁷ This has been the case of several townships in central-north Chile in recent years, where they have experienced about five years of drought.

³⁰⁸ IAM (2007).

³⁰⁹ Utilities in the capita cities of Chile, Colombia and Peru have registered, in the last 20 years, a drop-in water consumption per capita of 30% to 40%, respectively (Lentini, 2015), and in Medellin, Colombia, average consumption decreased 25% in the last 10 years (SIU, 2016).

³¹⁰ Effects related to climate change, when being prolonged drought events (Albiol and Agullo, 2014), optimization of home artifacts that use water (Albiol and Agullo, 2014), awareness on the need to preserve water resources (Escudero and Lerda, 1996; Willis et al., 2011), improvement of unaccounted water indexes (Aquaterra, 2008), evolution of fees (Salazar and Pineda 2010 aim at being some of the causes for which tendency to low has been measured, in water consumption per capita. In European countries, the reduction of water consumption per capita has been significant (Albiol and Agulloa, 2014; Aquaterra, 2008; Brussels Environment, 2015).

³¹¹ Collection of rainfall consists of exploiting rainfall through damming runoffs from reservoirs, ponds or other forms of storage.

regions. Although these measures are mainly addressed to protect and take advantage of scarce resources in agriculture activities, it has also been used for human consumption in rural areas, showing the importance of reservoirs as a measure of adaptation in building climate resilience.³¹² In high-Andean ecosystems, the potential impact of climate change on water resource availability and quality (for example loss of tropical glaciers and degradation of high-Andean wetlands) are important.³¹³ The handling and creation of water reserves, as well as the protection of the ecosystems that regulate hydrological cycles to cover these seasonal deficits, are critical.

- 3.46 The excess of water due to climate change is also another problem that is more important in some countries, that may be due because of greater precipitations, tidal waves or due to sea level increases. Excess of water may have serious problems for WSA systems, such as siltation of dams and networks or, in extreme cases, structural damage to said systems (for example in Belize City, Kingston and Peru). Nevertheless, exposure of WSA systems to other kind of extreme events such as earthquakes, volcanic eruptions and tsunamis in coastal areas, may put the sustainability and quality of utilities at risk.
- 3.47 **Quality of the resource.** The real availability of the resources is affected mainly by the quality of the water. Most urban rivers^{314,315} that serve as source of water are contaminated by domestic and industrial drains, and some of them also because of mining and agriculture runoff, which in many cases limits its use. Rural areas are more sensible to changes in the availability and quality of the source, and thus variations in the flow have a strong impact on the supply. Water contamination processes³¹⁶ in watersheds and rivers (deposits, nutrients, dissolved organic carbon, pathogens and pesticides) generates a significant deterioration of the population's conditions and significantly reduces the capacity of use of the superficial waters for human consumption and economic activity, thus limiting the climate resilience conditions in the long-term and also impacting biodiversity.³¹⁷
- 3.48 **Mitigation of Greenhouse Gas emissions in sanitary infrastructure.** GHG emissions generated by solid waste and wastewater represent, at global level, a small portion of total emissions (approximately 5%). Landfills and sewage plants contribute with 18% of the total of anthropogenic methane emissions (from these, approximately 60% come from dumps and landfills, and 40% from sewerage discharges). These emissions tend to increase given the rise in population and the increase of coverage of sewage networks and treatment plants, and because of more regulatory demanding about the disposal and treatment of wastes. Additionally, emissions for energy consumption in pumping systems (of water and wastewater) are on the rise to the extent that energetic requirements of operation

³¹² Tortajada, ed. (2016).

³¹³ Francou et al. (2003); Ramirez et al. (2001).

³¹⁴ Tietê River in São Paulo, River das Velhas in Belo Horizonte, Bogotá River in Bogotá, Rimac River in Lima, Reconquista and Matanza-Riachuelo Rivers in Buenos Aires, and others.

³¹⁵ Bates et al., 2008.

³¹⁶ The severity of the contamination problem has been documented at country and basin level, under a standpoint of climate resilience and water security. In Mexico, between 10% and 30% of the monitored places in a broad study of water quality at national level contains contaminated water (Romero-Lankao et al., 2014), a situation that, if it does not improve, would seriously threaten availability of the resource, especially in water stress areas.

³¹⁷ Bates et al., 2008

of plants and nets increase. Currently, the potential of the reduction of emissions in the sector is unexploited. They are reduced to plants that integrate technological solutions and capturing methods and biogas exploitation (methane). Reuse of wastewater coming from depurated plants, rise of efficiency of installations and equipment and co-generation as sources of energy³¹⁸ has been scarcely used by WSA companies, despite the potential that the exploitation of muds and potential energy caused by difference in altitudes in transporting raw water, among others, may have for energy generation. Finally, recycling indirectly contributes to the reduction of energy consumption and the mitigation of climate change.

3.49 Environmental and social management in Water and Sanitation utilities.

Environmental and social management in WSA utilities of the region is found at different development levels with great variations between countries and within the same country. Companies of larger sizes, usually tend to develop SGA for several reasons (pressure from environmental control organisms, own initiative to improve management systems of the company, and to be on the lead of the sector, among others). Companies of smaller sizes are focused on the delivery and expansion of WSA services and cover environmental and social topics when there is a dynamic environmental organism or when they get finance from international organisms. Regarding the design of projects, mainly rural or in small towns to implement environmental and social safeguards, it is important to consider that these may have some environmental problems that must be considered in project design and management. In drinkable water projects, it is necessary to consider the mitigation or correct handling of rainwater.³¹⁹ In sanitation systems, there is the need to consider the correct handling and disposal of muds that, in the case of individual solutions, are accumulated in septic tanks or in latrines. There are countries in the region in which the technical or environmental rules demand that these systems comply with quality standards of the effluent that lead to building conventional solutions of sewerage and treatment networks. Thus, it would be convenient to review the relevant regulation and adapt it to the characteristics of these small systems. Brazilian companies such as SABESP, from the State of Sao Paulo, CAESB from the Federal District, COPASA from the State of Minas Gerais, as well as Empresas Públicas de Medellín (EPM), in Colombia and EPMAPS from the City of Quito, among others, have implemented preliminary versions of an SGA and have started actions towards ISO 14001 certification. Nevertheless, most of the companies of the region still do not have adequate systems to deal with environmental and social issues associated to the expansion and maintenance of WSA services.³²⁰ An interesting agenda to be developed in the companies of the sector is related to designing mitigation plans that must contemplate: (i) a baseline of the carbon print of the company; (ii) energy, fuel consumption reduction goals, among others, to reduce emissions; and (iii) the incorporation of infrastructure with efficient energy use or energy co-generation in the water transport, wastewater, mud and solid waste treatment processes.

³¹⁸ Ferro and Lentini (2015). Eficiencia energética y regulación en los servicios de AP y alcantarillado. CEPAL.

³¹⁹ Grey water refers to Waters that are used in the kitchen, personal hygiene and alike, and that are not contaminated with feces.

³²⁰ Results of the workshops carried out in Brazil, Argentina, Colombia, Mexico and Barbados, to prepare the Sector Framework Document of 2014.

IV. LESSONS LEARNED FROM THE BANK'S EXPERIENCE IN THE SECTOR

- 4.1 Historically, the IDB has been closely related with the development of the WSA sector in LAC. With the purpose of contributing to achieve the SDGs in 2007 the Bank launched the Water and Sanitation Initiative (IAPS), which revitalized WSA loan portfolio representing 12% of total loans, opposed to 5% of the previous period (1996-2006). The initiative prioritized key topics for the sector, as increase of coverage in the poorest population of the region and service to rural and peri-urban population, aligning intervention proposals to the social-political reality, priorities, institutional capacity and degree of development of the sector in each country.
- 4.2 The analysis of the 2007-2016 loan portfolio shows a focalization in the WSA subsector (90% of the approved reimbursable amount), as opposed to water resources, solid waste management and urban drainage. Nevertheless, in the last years there is a greater activity in solid waste projects (for example, representing 13% of the loan portfolio in 2014) and urban drainage (for example, representing 12% for 2013 and 2016, respectively).

A. Lessons learned from Project Completion Reports (PCR)

- 4.3 With the purpose of extracting the lessons learned from the execution of projects financed by the Bank in the sector, with support from the Knowledge and Learning Sector, an analysis of 34 loan operations³²¹ completed during the 2014-2016 period was carried out, through the analysis of the Project Completion Reports (PCR).³²² Lessons learned from the technical cooperation portfolio for this same analysis period were also included, based on the AquaFund annual reports. Finally, input from specialists of the country was received through their respective portfolio loans that allowed completion of reviewed documental information.

³²¹ This section is based on lessons learned from the Bank's loan operations completed during the 2014-2016 period (see [List](#) of 34 loan operations)

³²² A total of 21 final documents of PCR were analyzed. For documents which PCR was not available yet, final assessments or documents with relevant information for this section were reviewed.

1. Access and quality of the services

- 4.4 **Service to rural areas under a demand based approach.** To obtain universalization of WSA utilities and the achievement of SDGs, is key to assist the rural and the dispersed rural sectors, characterized by a population of low economic income, heterogeneous, with low population density and limited institutional presence. For the operations supported by the Bank in these areas, it will be verified that the technological, financial, institutional and socio-environmental aspects, both in the design and execution of the projects to ensure post-construction sustainability.
- 4.5 Additionally, the experience indicates that an approach based on demand must be attempted. The diagnosis to set the baseline of the project must contemplate the analysis of the socio-economic conditions of the population, provision and payment capacity, as well as a preliminary mapping of expectations of actors/stakeholders of influence. Similarly, equitable access must be guaranteed to all communities through dissemination activities and appropriate promotion of the programs.
- 4.6 **Access to sanitation.** Universal access to sanitation, including wastewater treatment, requires not only large increase in investments, but adopting a long-term planning approach, which implies that the governments prioritize the sector in a sustained manner, under a comprehensive approach that considers in an integral way the infrastructure investments, institutional strengthening and financial sustainability. The experience acquired by the Bank in this field has shown that the most effective interventions are those carried out in phases in order to achieve the long-term expected objectives, given the financial and capacity constraints.
- 4.7 **Comprehensive solutions.** Projects must provide comprehensive solutions that simultaneously contemplates issues beyond access, to the WSA services, such as

Infrastructure, behavioral change and access to credit through social art

The initiative “*Lazos de Agua*” promotes improved access to WSA systems using social art to foster behavioral changes (hand washing, fee payment, connectivity). Similarly, it fosters affordable access to capital, developing micro-finance schemes to improve connectivity at homes, community financing models and specific innovative products for homes, utilities, financing entities and water boards, among other actions, with an approach based on the marked and demand driven. Several programs in the region (Paraguay, Mexico, Guatemala, Nicaragua, Colombia) are developing programs under this initiative together with the public institutions that are responsible for management and operation of the sector in the countries, with the objective of aligning the goals and methodologies, and to complete the social work that is already being done in the countries.

Montevideo Urban Sanitation Plan

Since 1981, the Bank has been supporting the Montevideo Urban Sanitation Plan. At the end of stage V (approved in 2016) all wastewaters will have adequate treatment. Improvement of urban sanitation and drainage utilities management developed during successive stages has allowed that, in the last 5 years, utilities are financially self-sustainable.

quality sanitary education (hand washing, menstrual hygiene), and environmental and social characteristics. This becomes evident in projects of recovery of quality of water bodies or flood prevention and control programs, which should include comprehensive actions with regard to the sewerage, rainwater drainage and solid waste management. Additionally, the preparation and execution of this type of interventions, which requires the participation and coordination between multiple stakeholders to adequately incorporate its expectations and interests', usually is a mayor challenge to achieve the objectives.

- 4.8 **Multi-sector solutions.** To obtain a larger impact in the quality of life and in the health of the population, multi-sector work between the Water and Sanitation Division and other sectors within the Bank (natural resources, climate change, urban development, health, education, among others) is important. There are successful cases of joint work between the Water and Sanitation Division and the health sector. For example, in a case in Guyana a comprehensive intervention to improve sanitation included a massive administration of medication, given that the sewerage and solid waste disposal systems were deficient and allowed the reproduction of mosquitos. In Haiti, WSA interventions were implemented to reduce risk factors of lymphatic phyllaries and helminthes, such as stagnant water where mosquitos are reproduced, and drinkable water contaminated with human waste. In El Salvador, health levels improved through a program that combines interventions of improvement in neighborhoods, local risk mitigation, investment in structural solutions for water handling and access to social services. With the housing and urban sector, several multi-sector programs have been supported, with the objective of expanding the coverage and quality of infrastructure and urban services, improvement of neighborhoods and housing, and strengthening of the governance of local institutions. This are the cases of the Environmental Sanitation Program of the Reconquista Basin in Argentina, Brazil, and the Environmental and Social Program for the Igarapes de Manaus in Brazil, among others.

- 4.9 **Innovative incentives to connectivity.** One of the most recurring problems in the region is the low connection of users to WSA services, especially to sewerage networks. Several projects financed by the Bank did not include intra-household connections in its design and therefore the expected benefits did not fully materialize. From these experiences different tools have been used to solve this problem: (i) behavioral change strategies using mass media for users to recognize the problem and understand the importance of connecting (especially for health benefits); and (ii) provide technical and financial assistance to users for their connection to the sewerage system (some programs focused support on families that really needed financial assistance using
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- Microfinances to increase connectivity**
- In Peru, in a joint project with MIF, a pilot project was implemented which developed a micro-credit model for in-household sanitary improvement through three components: (i) promotion of demand in alliance with some micro-finance entities to offer micro-credit products for these improvements; (ii) strengthening of the technical supply through training of individuals in the neighbourhoods of construction of improvements; and (iii) systematization and dissemination to report about the project. With this pilot project, 17,000 loans were granted benefiting 50,000 people, US\$8 million in investment for sanitation improvement, more than 1,300 individuals trained in plumbing and default rates of less than 1%.
-

eligibility criteria applied by social assistance programs operated by government agencies, while Pilots were made to grant microcredit to finance intra-household.

- 4.10 **Adaptation of solutions.** There is no ideal solution for all cases. The projects must offer adequate solutions considering the socio-economic and cultural characteristics of the beneficiaries within the national regulatory framework of quality of service. Contemplating and selecting among strategic intervention options that maximize efficacy, efficiency and sustainability of these solutions is especially relevant in sanitation projects. This is critical in rural areas, but also in urban or peri-urban projects, where alternative solutions have been successfully implemented, such as the use of condominium sanitation network systems. Adaptation of solutions is not only about infrastructure issues, but also on issues of access to micro-credit or consideration of the finance context.

2. Governance

- 4.11 **Long-term planning.** The support of the Bank to countries in solving their WSA problems has shown that long-term accompaniment and strong political support is required.³²³ It is important to consider the inter-institutional links of a reform

Institutional strengthening in Costa Rica, Peru, and Bolivia

The development of the National Sanitation Policy in Costa Rica involved more than six institutions. This exercise was also an example of multisectoriality (environment, health and water), harmonization of support among donors and promotion of the financial sustainability of the operators through the reduction of costs and increase of income. In Peru, the IDB supported the drafting of the Framework Law on the Management and Provision of Sanitation services, the creation of the Safe Water Investment Fund (FIAS), and the General Law on Solid Waste and Efficiency of Materials. In Bolivia, the reform program of the AyS and water resources sectors allowed a greater articulation among the different sectors, better planning and prioritization of investments, supporting local and community participation.

process, and the need to include all relevant institutions, seeking its sustainability. Policy Based Loans (PBL) have proven to be an adequate mechanism to induce regulatory and institutional changes to strengthen the sector and to generate appropriate conditions for the development of investment projects and programs. In many cases, this alternative has resulted more effective than including, in multiple-stage projects (investment projects), conditions of regulatory or institutional reforms to trigger subsequent stages, given that the executing agencies of these operations do not control the adoption of these measures and they take time to design, consensus, approval and implementation that exceed the cycle of execution of an investment project. For its part, multiple-stage projects have shown to be very efficient in the accompaniment to executors of investment projects, which although they do not contemplate reforms in policy, they do require continuity in long periods of time (with several governments or administrations in between) to ensure maintenance of a long-term view (examples of this long-term drive are common in the sanitation of urban watershed programs).

- 4.12 **Support to territorial entities.** In projects that serve several localities, many times it is necessary to strengthen the institutional capacity of governments and entities of their corresponding level (e.g. strengthening the municipality to which several

³²³ EPMAS, EPM and SABESP are outstanding.

rural localities belong), to ensure the sustainability of the programs. The support should be promoted from early stages, identifying functions and responsibilities at the different institutional levels, defining support needs (institutional, financial, technical) and generating coordination mechanisms with all stakeholders, in order to improve their capacities and fulfill the programs objectives.

4.13 Information and monitoring management.

The current measurements about access and quality of the WSA services are not aligned with the monitoring needs of SDGs. For this, the water projects need to include indicators that enable the monitoring of water quality, accessibility, pressure and continuity of the service. In sanitation, this implies including to the definition of the access indicator, information about the management, treatment and disposal of wastewater. Governments are faced with the challenge of defining base lines, collection and accessible monitoring of good quality

information. An important lesson learnt from Bank's projects is the lack of reliable information systems to survey this type of information. Therefore, in the design of the projects, the strengthening of the capacities of the relevant organizations in matters of information collection and processing should be considered.

SIASAR and the turn-key methodology for rural aqueducts in Honduras

The Rural Aqueduct Program in Honduras has been a successful intervention in terms of the results reached, their support to the consolidation of the sector's institutions and the strengthening of the Information System of SIASAR, obtaining 2,000 records for rural systems (close to one fourth of the national total). Likewise, the program was a lab to experiment new ways of executing investment projects, working with private companies through the design-construction modality (turn-key), which generated substantial savings in time and resources in the execution of works, expanding the personal management and operative training defined by the municipality.

4.14 Transparency. Actions that promote transparency and accountability mechanisms improve the efficiency and quality of the services. Studies such as the one promoted by the IDB's Transparency Fund in coordination with INE/WSA, applied in four countries of the region, enabled the establishment of a knowledge base to support utilities in the improvement of their accountability and access to the information. Transparency is also a key factor to gain the trust of the users and to attain awareness of their contribution, that is, the prompt payment of the tariffs is key for the adequate delivery of the service in the short, medium and long term. Using internet, it is possible to inform the public about the administrative, financial, operative and technical situation of the services, for example, publishing financial statements or management indicators, such as the case of utilities in Brazil, Chile and Peru. For this, the Bank has developed tools such as AquaRating, Corporate Governance and Improvement of the Commercial Management (§4.55), and is financing cross-support programs for transparency and for the corporate governance framework, such as in Ecuador and Trinidad and Tobago.

4.15 Likewise, it is important that the bidding processes for works, equipment and services, especially in state-owned companies, are perceived as transparent. The Bank supports the realization of transparent processes in the contracting of works, goods and services for the sector, with special emphasis on the verification that these processes define with precision the scope of the products to be hired; that

the mandatory requirements for the qualification of the bidders are reasonable with respect to the magnitude and type of works to be executed; and that the mandatory requirements that the works, goods and services to be delivered, must meet international laws and good practices of engineering applicable to the subject-matter, with the purpose of not unnecessarily limiting the competition both with respect to the bidders as well as with respect to the products or services to be provided. It is also a good practice to prepare comprehensive reports of the evaluation of offers that widely explain the processes for the selection of offers.

3. Financial sustainability

- 4.16 **Cost recovery/payment for the service.** In several countries of the region the micro-metering is low, the tariff charges are based on criteria associated with the characteristics of the property or geographical area of the user, there are high volumes of free consumption, and there is room to improve tariff regimes but, above all, there are no explicit subsidy mechanisms for low-income families. An important lesson learned is that when the operator's commitment to the quality of the services provided is clear, the possibilities for users to accept higher rates increase substantially. On the other hand, although rate adjustments are a necessary condition to get out of the so-called vicious circle in which many companies find themselves, the moment in which these are made is critical. A scheme that has been successful in several countries is the gradual adjustment of tariffs, linked to a comprehensive commercial and information policy directed to explaining the benefits of the investment programs and other actions, but ensuring that the tariff system has the measures to subsidize families with payment capacity problems. Successful cases show that the political support of these measures has been very important.

4. Utilities management and private participation

- 4.17 **Support to utilities.** An issue that is considered valuable for utilities has been to incorporate in projects not only infrastructure components but also include a quality, asset management and efficiency approach to the delivery of the services. This approach has led to the incorporation of rehabilitation, expansion and upgrade of technology components, as well as to the provision of equipment and tools, inclusion of good practices for business corporate governance, personnel training and institutional strengthening for the utilities. A recurring problem in the region, especially important in the Caribbean and in smaller sized cities, is the high costs of energy. The Bank has implemented several projects for energy efficiency, which have had a high financial profitability. The savings in energy expenditures allowed for the recovery of the investment in a maximum period of up to three years. On the other hand, progress was found in the skills of the personnel that enable improvements in the labor efficiency of the systems, which leads to savings in operational costs. Finally, it was also observed that a dedicated

Success cases in management improvement in utilities in the Caribbean

In Guyana (GY-L1025), the operational performance of Guyana Water Incorporated was improved, reaching annual savings of 24% in energy (US\$314,000), with a recovery of the investment in 3 months. In the case of Bahamas (BH-L1028), the volume of unaccounted-for water was reduced from seven MIGD to three MIGD in three years with SWIT technologies.

professional group is required in asset handling and management issues that ensures the infrastructure's sustainability

- 4.18 **Weaknesses in the management of small utilities.** The Bank has financed several reinforcement programs for utilities in small-size urban areas, especially in those that have limited technological and personnel resources to efficiently manage the services, due to the lack of financial resources, lack of scale, high political interference, inadequate management schemes and absence of adequate comprehensive and regulatory policies. Nevertheless, the general conclusion has been that these programs have had limited or temporary impact because of the high rotation of the personnel, among other factors.

- 4.19 **Management of services in rural communities.** In rural projects, it has been demonstrated that in the populations where a pro-active social promotion work was developed as well as a greater promotion, training and organization of the population, a better sustainability of the services was achieved. For this, experience indicates that the organizations involved or with potential involvement in the decision-making process and the weaknesses that must be corrected must be identified; strengthen and / or train on types of community-based organizations for the provision of

Water and sanitation program for rural and indigenous communities in Paraguay

This is one of the most successful projects of the Bank in rural areas, which has had a positive effect in the sustained increase of the coverage, from a community management perspective. Through a methodology that consults the beneficiaries during the preparation and execution phases in each location, SENASA conducts training and formalization activities in the sanitation boards, as well as the promotion of the sustainable use of the services, taking into consideration the social, economic and cultural conditions of the community.

services; provide training on legal aspects; train on mechanisms of accountability, provision of information to users, and compliance with legal frameworks for access to information that existed in the country. On the other hand, the projects must include the design of post-construction support mechanisms in aspects of O & M, monitoring, among others. Even in cases where the project does not involve the community administration of the service, experience shows that it is fundamental to involve community leaders as a link between the institutions involved in the project and the beneficiary community, in order to achieve preparation and execution of the most effective program.

4.20 **Public-Private Partnerships.**

Several lessons can be drawn from the Bank's support for this type of scheme. On the first hand, it is clear that without strong incentives neither the private sector nor the public will make their best efforts. Aligning incentives and control with the expected results is essential in any PPP contract. Active and effective consultation with the people who will be affected by the contract, and especially the utility's employees. Although this type of consultation may delay the implementation of the contract, the cost of the delay may be less than the cost of the contract not achieving its objectives.

Operational Technical Assistance in Haiti

The water and sanitation project of Port-au-Prince II (HA-L1075) includes a participation of the private sector through an operative technical assistance agreement. This modality allowed for the reorganization of the Port-au-Prince utility, as well as increasing the company's income in 50% between 2011 and 2017, increase the number of active clients in 56%, and improve the quality of the service, among other improvements.

5. Social considerations

4.21 **Community participation.** The Bank's experience in rural WSA projects is very

extensive, which has made it possible to extract many lessons learned regarding the importance of good management of the social aspects of this type of project. The participation of communities and families who are benefited is key for the adoption of the results and for the adaptation of the solutions to their needs, and challenges as a community due to: (i) allows to know the perceptions of the families and thus preventing possible social conflicts; (ii) contributes to the sustainability of the works or services; (iii) allows to transmit the knowledge generated during the execution of the operation of the community and their representatives; (iv) could be constituted in audit, social control, and monitoring of results; and (v) increases the effectiveness in the execution of the works.

The community as a pillar for sustainability

In Bolivia, the Bank prepared the Social Regulation for Community Development of the WSA Sector for better formulation of projects, taking into consideration the community since the design phase. In Peru, the community has been a key actor also in the execution of works, through the execution specific projects of the PROCOES (see box in paragraph 4.28). In Paraguay, the social work with the indigenous communities of El Chaco has been key for the increase of the access and the sustainability of the systems. including the cultural and cosmological vision of the water.

4.22 **Resettlement.** The works that involve the resettlement of the population require a careful definition of the action area and enough time to define adequate solutions, with good physical and socio-environmental diagnosis with the participation of the stakeholders involved. Experience shows that the most complex projects that involve human resettlement need more time to prepare to avoid delays and over costs during their execution. A successful case of resettlement and environmental management is the case of PROSAMIM in the Igarapes of Manaus, which included comprehensive resettlement interventions, sanitation infrastructure, urban development and institution building.

- 4.23 **Gender focus.** The Bank's experience has also shown that promoting women's participation is well-received and has a positive effect, both on its positioning within the community and on the outcomes of projects. Thanks to the gender focus included in programs, women have more input into decision-making at higher-levels when forming part of organizational structures, such as when it comes to the construction of water and sanitation systems; also, their influence in the impact of the programs is fundamental because women are generally key in the family's hygiene habits and its health.

Gender in Water and Sanitation operations

On average, a 40% of the approved WSA loans between 2014 and 2016 include gender activities thanks to: (i) the priority of the issue from the preparation of the projects; (ii) the identification of issues and the gender gap linked to WSA in the project's intervention areas during its preparation and design; (iii) the inclusion of specific gender activities and indicators that seek to close the gaps between men and women and monitor the results of these activities; and (iv) the support of execution agencies in the implementation of said activities.

6. Environmental and climate change issues

- 4.24 **Climate change.** Incorporating climate change considerations is key in the design of WSA infrastructure projects. In recent years, the Bank's experience has shown that these aspects are critical in, for example, the construction of water reservoirs and other regulatory elements to serve the accelerated melting of tropical glaciers, the supply of water as an answer to increasing drought conditions, the adaptation of urban river systems to changes in precipitation patterns, the regulation of dams for the prevention of floods, the construction of embankments for the protection of surges and the sustainable exploitation of underground water wells to avoid their salination. The development and application of management tools, such as the one developed by the Bank with HydroBID, makes it possible to evaluate the amount of water, the infrastructure needs and the identification of adaptation strategies and projects as an answer to climate scenarios (climate, land use, population).
- 4.25 **Environmental sustainability.** Projects must include aspects related to the protection and sustainability of water sources, and environmental and health education and training. Specifically, mechanisms must be incorporated to ensure the efficient and sustainable use of water and implement training programs and technical assistance to users on good water use practices. In this sense, an important lesson learned is that creating awareness among users about the importance of monitoring water consumption can achieve a more responsible use of the resource, both economically and environmentally.
- 4.26 **Environmental safeguards.** According to Bank's experience, the preparation of an environmental evaluation as part of the process of formulation of infrastructure projects could prevent the need for subsequent changes in the designs and reduce the quantity of mitigation measures to implement, improving the project's effectiveness and efficiency. It is important to ensure that institutions have adequate process for environmental monitoring, both during the execution as well as during the post-project phase. Additionally, the consultation processes with the benefited communities of the projects have resulted in an efficient mechanism for achieving the results.

7. Cross-cutting lessons

- 4.27 **Executing agencies.** A success factor identified is having executing agencies with prior experience in implementing projects from international agencies is key for the successful development of the projects. Another key issue is the integration of the executing agencies within the sector institutions, which facilitates the learning processes, avoids the loss of knowledge, limits the conflicts related to the differentiated compensation of the personnel, and promotes the appropriation of execution systems and results of the program.³²⁴ Additionally, the reduction of the number of executing agencies of a same program optimizes logistic resources, reduces the bureaucratic processes, and facilitates the coordination and execution of the program's activities. Finally, an important lesson learned is that the analysis of the capacity of the executing agencies that is carried out as part of the preparation of the projects must be carried out in a more comprehensive manner and consider the realities of the country and the sector.
- 4.28 **Training.** Bank's experience has shown that training of personnel, both sectoral entities and operators and of the executing units, does not always assume institutional strengthening, especially due to continuous changes in the formation of technical teams. In parallel with the personnel's training, it is important to institutionalize and systematize the processes that promote the long-term strengthening of the institutional structures. Also, to sustain the institutional strengthening, in each operation there should be an analysis and distinction between actions directed towards the execution of the specific program and those directed towards strengthening the executing entity in a more global way and in the long-term.
- 4.29 **Knowledge.** Knowledge is the basis for the formulation of new operations and innovation to improve the results and their sustainability. The exchange of knowledge into the WSA Division, with other divisions of the IDB and other external stakeholders (multilaterals governments, development institutions, the academia, the civil society, among others) is key for the development of new intervention strategies and for the improvement of the impact of the operations.
- 4.30 **Execution, follow-up and monitoring scheme of the operations.** For a smooth execution, an adequate design and conceptualization of the operation is needed. Several experiences have shown that the design of clear contracting schemes is

PROCOES: Executing Groups

Within the framework of the Program for Improving and Expanding Water and Sanitation Services in Peru (PROCOES) the execution through Executing Groups was implemented, a modality according to which the executor has the legal capacity to hire and intervene in all the necessary aspects for the execution of the projects. Local funds that are a part of the program subscribed with the government are transferred to the beneficiaries themselves who are organized through executing groups, who hire and execute all of the project's components.

³²⁴ In Ecuador, within the framework of loan 1802/OC-EC, Environmental Sanitation Program for the Metropolitan District of Quito II, was formed as an Executing Unit that depends directly on the General Management of the water utility, with autonomy in the decision-making process, with highly trained personnel and with a Management that is dedicated to the Audit and Supervision of the works that guarantee the technical control, cost optimization and time for best execution. The consolidation of the EU has avoided political interference and has allowed for the efficiency in the program's implementation.

important, with realistic timings and a solid definition of execution roles and structures. In many cases, delays during the execution are due to the need to complete, review and/or modify the design differences (incomplete technical files, up scaling of the works, baseline information, etc.) or the redefinition of execution schemes considering the strengths of the participating stakeholders. It is important the designs of adequate indicators and the definition of monitoring and evaluation schemes that enable reliable mechanisms for the follow-up of the results.

- 4.31 **Added value of the technical cooperation.** Technical cooperation could add value both in the preparation of loan operations, with environmental or prefeasibility studies, as in contributing with lessons learned of innovative operations with a diversity of stakeholders in complex social, economic and environmental contexts. Technical cooperation is a lab to support countries both operationally and in innovative aspects, such as climate change, green infrastructure or circular economy for the sanitation sector, and as a source of research and dissemination of knowledge for the Bank and the rest of the sector. Also, they could strengthen and consolidate the coordination and the work between government agencies and other stakeholders.

B. Results of the Development Effectiveness Matrix (DEM)

- 4.32 The Development Effectiveness Matrix (DEM) is an instrument that has been designed to ensure the effectiveness of operations, not only at the level of intervention logic (Logical section of the program) and the existing evidence (Ex ante economic analysis), but also at the level of its evaluability (Monitoring and Evaluation).
- 4.33 During the period of analysis, high levels of operational evaluability have been maintained as a consequence of good results in the logic of the programs and the economic evaluations. In recent years, INE/WSA has been able to strengthen the systematization of diagnostic studies (including sector notes in the new structure of country strategies), the bibliographical compilation on the effectiveness of interventions, the development of tools to analyze the vertical logic of the projects, as well as the definition of a list of indicators intended for results matrix, among other strategies. In addition, these instruments were widely disseminated among the specialists of the Division through seminars, meetings and online material. This strengthening not only improves the evaluability of the interventions, but also allows for the generation of lessons and knowledge for future sector operations.
- 4.34 As for economic evaluation, the high levels reported on the DEM during recent years respond to the human resource capacity of the Division to conduct or guide in-house economic evaluations. As a general rule, a rigorous cost-benefit analysis is performed for all operations, as reflected in the values of the DEM.
- 4.35 INE/WSA is conducting four impact evaluations in two countries (Bolivia and Paraguay). In rural areas of these two countries, the effect of WSA interventions on health variables (for children under 5) and time use, among other welfare variables, is being measured using an experimental design.³²⁵ In peri-urban areas of Bolivia, the impact of education and awareness campaigns, and economic incentives (subsidies/loans) concerning sewerage connectivity is being measured

³²⁵ For methodological details and baseline information about the experimental evaluation in rural areas of Bolivia, see Gertner et al (2016). This publication provides input for the design of an impact assessment of water and sanitation in rural areas.

using an experimental design; and, using a quasi-experimental design, the effect of sewerage on health variables is being measured. The lesson learned from the implementation of these evaluations are the following: (i) focusing the evaluations made to supplementary interventions of infrastructure, such as the availability of information (training/communication campaigns, etc.), economic incentives, among other things; (ii) identifying intermediate results associated with the functioning of the services as variables of interest (quantity, quality, functionality, proper usage, etc.); (iii) maximizing the use of secondary/administrative information versus primary information and, in the event of using primary information, budgeting and overseeing fieldwork; and (iv) evaluating interventions that may be executed within a short period of time in order to minimize the risk of contamination of the treatment and control groups.

C. Reports of the Office of Evaluation and Oversight (OVE)

- 4.36 In recent years, the Office of Evaluation and Oversight (OVE) has produced evaluations covering various aspects of WSA. The evaluation “The Challenge of Integrated Watershed Management: Analysis of the IDB’s Action in Watershed Management Programs 1989-2010,” from October 2012, identified the Bank’s structural difficulties in implementing the mandates of the strategy and highlighted the absence of a clear definition of the concept of “integrated watershed management” in the development of operations. In this sense, INE/WSA has developed projects with a more comprehensive vision by considering water resources management concerning watersheds and incorporating other sectors. Such is the case of the Environmental Sanitation Program of the Ipojuca River Basin in Brazil and the Lake Tititaca Program in Bolivia. In addition, in recent years, HydroBID was consolidated and implemented in Trinidad and Tobago, Honduras, Peru, Brazil and Ecuador.
- 4.37 The evaluation “Building Resilience and Reducing Emissions,” from 2014, was the first to assess the Bank’s actions (2004-2014) about climate change mitigation and adaptation. The evaluation focused on the agricultural sector and natural resources, energy, disaster risk management and transportation. The evaluation showed that, although the Bank had managed to make some progress in the achievement of the objectives of the Climate Change Strategy, climate change integration was not fully mirrored on the sector and country strategies or on the loan programs. Given this situation, INE/WSA has included mitigation actions, such as energy efficiency in potable water companies, as well as actions for climate change adaptation through the Water Resources and Climate Change Adaptation Strategy made for 2010. INE/WSA has a catalogue of case studies dealing with the major challenges associated with climate change (extreme events, floods, droughts, rising sea levels, melting of glaciers, degradation of ecosystem services, etc.) throughout the region. Collaboration and coordination with the Climate Change Division (CSD/CCS) have also been improved, as well as the incorporation of aspects associated with climate change into WSA projects.
- 4.38 In 2014, the OVE published an Evaluation of Special Programs Financed by the Bank’s Ordinary Capital highlighting the AquaFund case. The evaluation underlines the fact that 95% of AquaFund’s technical cooperation operations were administered by INE/WSA based on the amount of approvals for 2012-2013. In addition, INE/WSA has conducted specific evaluations on AquaFund to review the results and the impact it has had on lending operations and initiatives, which are described in the lessons learned section.

- 4.39 In 2016, the Emerging and Sustainable Cities Initiative (ESCI) was published, which concluded that, although the ESCI was successful in coordinating efforts of different divisions for the preparation of action plans, such coordination was based on informal mechanisms between divisions. With the creation of the Climate Change and Sustainable Development Sector (CSD), a new opportunity for collaboration arises, considering that the cities usually prioritize issues associated with water, drainage, solid waste, among others.
- 4.40 In 2016, OVE conducted a specific evaluation on a rural WSA project in Paraguay (PR0118). Among other things, the results highlighted the functionality of the systems and the technical and economic capacity of the Water Boards to solve system failures. However, challenges were observed to guarantee long-term sustainability due to limited resources for system expansion, considering water use for agricultural purposes and the increase of connections.

D. The Bank's comparative advantages in the region. Knowledge Generation.

- 4.41 **Technical Experience.** The Bank is seen as an entity with significant experience in the region. In recent years, it has been renewing and decentralizing its specialist staff in order to meet countries' demands more effectively, and the executing agencies value the support provided by those specialists in the development and execution of the projects. In many cases the executing agencies consider that the Bank should reinforce its role as a collaborator with other entities (donors, government agencies) and with the executing agencies themselves in the development of projects
- 4.42 Implementation of the WSI positioned the Bank as a lead entity in the sector, by proposing a series of strategic guidelines and a set of special targets and financial and nonfinancial products to support solutions tailored to the needs of each country. For the 2014-2016 period, the Bank's program in the sector still represent the largest proportion of investment made in the region with 43% (24 projects). On the other hand, the World Bank provides 32% (17 projects),³²⁶ and CAF provides 25% (24 projects).³²⁷
- 4.43 **Source of Cooperation.** As a strategic part of the WSI, the Bank launched the AquaFund in 2008, a multidonor fund for non-reimbursable technical cooperation designed to finance the preparation of projects, institutional strengthening activities and innovative pilot projects (water in schools, recycling with the participation of recyclers, low-density rural areas, etc.). To date 169 technical cooperation projects have been approved for a total of US\$87.4 million, benefiting 25 countries of the region. The AquaFund has been key to positioning the Bank as the sector's main partner in LAC, generating benefits in terms of: (i) developing an active knowledge and public policy agenda; (ii) increasing the loan portfolio; (iii) improving portfolio performance and disbursements, and reducing the risk of cost increases by having projects that are ready from a technical standpoint; (v) strengthening sector institutions; (vi) supporting knowledge sharing; and (vii) developing innovative intervention models. In addition, the AquaFund has leveraged significant public and private capital (over US\$50 million in co-financing, and more than US\$30 million to finance technical cooperation from other donors).

³²⁶ www.worldbank.org

³²⁷ Information provided by the CAF.

- 4.44 Given the AquaFund's impact in the region, it will continue to play an essential role in implementing this SFD. It is the main WSA Division tool available for incorporating considerations on gender, ethnic minorities, and climate change, as well as for supporting the generation of knowledge, public policies, and the preparation and execution of loans on priority topics such as access for peri-urban and rural populations, wastewater treatment, solid waste management, risk management, urban drainage, business management of the operators, sector governance, and financial sustainability.
- 4.45 **Catalyst of resources from multiple donors to increase impact.** For the Bank, collaborating with other regional stakeholders has been part of its strategy, both for complementary investment and for the development of initiatives to generate knowledge and promote the sector in the international agenda on water.
- 4.46 In addition to the successful experience of SWF with LAIF and AquaFund, the Bank has had a very important role in incorporating non-reimbursable complementary resources into those deriving from the ordinary capital. Collaboration with the European Union allows for the development of TC in two areas: climate change adaptation and integrated water resources management. On the other hand, the GEF supported the development of initiatives such as the [CReW](#) and [Waterfunds](#).
- 4.47 On the other hand, the Bank is working jointly with the European Investment Bank to co-finance programs in Argentina, Nicaragua and Panama; with the Central American Bank for Economic Integration in Nicaragua and Panama; with the World Bank in Peru and Colombia; with the French Development Agency in Argentina, Ecuador and Haiti; with the German Bank in Peru; and with the European Union in Guyana.
- 4.48 The IDB works with the donors to collaborate with governments in establishing spaces for discussion that allows action harmonization and complementarity in the sector. Examples of this are the donor tables in Bolivia, Ecuador, Dominican Republic and Haiti, where support is provided to the governments to define national policies. In Costa Rica, the National Plan for Sanitation Investment was developed jointly with other donors and, in Honduras the Sector Policy 2013 was implemented.
- 4.49 **Regional leader of the international agenda for the sector.** The Bank is providing support to the governments of the region in the generation of proposals for the international agenda for the sector. Such is the case of the new goals approved in 2015 for the 2030 agenda and its SDGs. The Bank works jointly with key stakeholders to provide Governments and sector entities with tools; an example of this is the collaboration with the International Water and Sanitation

Spanish Cooperation Fund for Water and Sanitation in Latin America and the Caribbean (SFW)

One of the cases where there has been an important complementarity of actions, with regards to investment and leadership in the policy dialogue with the countries, is the Bank's collaboration with FECASALC. The collaboration between the IDB, Spain and the countries of the region has generated 19 operations (18 investment operations and one TC) for an amount exceeding US\$1,1 billion. The US\$580 million corresponding to the donations of the Government of Spain have allowed leveraging an additional US\$556 million (US\$329 million in IDB loans and US\$227 million in local contribution).

Center (IRC) to learn about the state of the art of WSA service levels in rural areas. Availability of information is key to design strategies and action plans aimed at achieving SDGs in LAC.

- 4.50 The Bank has been a key stakeholder in international processes and events associated with the sector. From 2015 to 2017, has led SIWI's regional agenda in LAC, bringing to the table topics that are strategic for the region, as well as the need to leverage resources to achieve the coverage goals set out in the SDGs. In addition, the Bank has participated in events such as Latinosan to promote the discussion of sanitation in the region, and CLOCSAS and FESAN in Chile, to strengthen community organization around rural WSA services. Recently, the Bank has been appointed Coordinator of the Americas for the 2018 World Water Forum in Brazil, allowing the region to be included in the international agenda, and as co-organizer of the IWA Water and Development Congress held in Argentina in November 2017.
- 4.51 **Promoter of global initiatives in the region.** The Bank's collaboration has been instrumental in developing regional initiatives such as the Water Operators Partnership in Latin America and the Caribbean (WOP-LAC). WOP-LAC is carried out in collaboration with the United Nations Human Settlements Programme (UN-HABITAT), ALOAS (Spanish acronym for Latin American Association of Water and Sanitation Operators), among other organizations, to facilitate the exchange of experiences between water and sanitation operators to improve efficiency in the provision of services. In the case of the CReW, demonstrative experiences were generated around sanitation through collaborative efforts with the GEF (financing entity) and the UNEP (co-executor).
- 4.52 Regarding solid waste, the Regional Evaluation on Urban Solid Waste (EVAL, by its Spanish acronym) is being updated in collaboration with the Inter-American Sanitary and Environmental Engineering Association (AIDIS) and the Pan American Health Organization (PAHO). In addition, the Initiative for Inclusive Recycling (IRR), in which stakeholders such as Pepsi, Coca Cola, Avina and the Multilateral Investment Fund (FOMIN) has been established as the first platform for technical assistance in MSW with the public-private participation. This initiative has generated experiences regarding the incorporation of recyclers into solid waste management, which has subsequently been linked to the Bank's operations.
- 4.53 **Generator of Partnerships with the Private Sector.** The Latin American Water Funds Partnership is an initiative of the IDB with FEMSA Foundation, TNC and GEF, has incorporated stakeholders from the public and private sector, as well as members of civil society, to promote changes in public policies in order to increase investment for the watershed conservation. On the other hand, the initiative Lazos de Aguas is being supported by the Bank together with FEMSA Foundation, Coca Cola and One Drop to promote behavioral change through social art as a mechanism for ensuring project sustainability. In addition, the Water Center is created in collaboration with FEMSA Foundation, the Monterrey Institute of Technology to promote research and development of the capabilities of the WSA sector from a regional perspective. This collaboration has led to the recent creation of the Strategic Decision Core (NED), whose goal is to provide decision makers with a scenario-simulation tool in order to take more informed decisions concerning policy options.

- 4.54 **Knowledge Generator.** In addition to the initiatives that the Bank has been promoted with other stakeholders, there are those that the Bank has generated to support the countries of the region by promoting innovation in the sector. Such is the case of Aquaranting, a tool for the analysis of the quality of management of water operators that has begun to be used successfully in the region. On the other hand, HydroBID has positioned itself as a tool to provide support to the region in managing and planning water resources. Recently, the HydroBID Support Center was created with the support of PepsiCo Foundation to ensure sustainability and strengthen the technical capabilities in the region, by offering training programs to the agencies that are responsible for water management, to increase their management capabilities and improve decision-making by using state-of-the-art tools. Finally, the tools of Corporate Governance and Commercial Management allow for the preparation of actions plans to improve both aspects in the WSA utilities, and support the design of the institutional strengthening component of operations. On the other hand, the Water-Energy-Food Nexus developed with the Energy Division (INE/ENE) and the Environment, Rural Development and Disaster Risk Management Division (CSD/RND) generates knowledge on intersectoral interaction, promoting integrated planning.
- 4.55 **Originator of Sector Innovation.** The IDB-FEMSA awards recognize the effort, innovation and replicability of WSA projects. The SWIT initiative aims at exploring the barriers for the implementation of smart technologies in the sector. Likewise, through the Optimal Sanitation initiative, it seeks to support countries in complying with the SDGs, by diversifying technological solutions, promoting the circular economy of sanitation, and encouraging lower cost solutions to multiply the impact of interventions. The Transparency initiative carried out jointly with the Institutional Capacity of State Division (ICS) seeks to promote good practices for information management and governance in order to improve the efficiency, effectiveness and quality of services. The Lazos de Agua initiative promotes community work and behavioral change through social art, complementing the social actions of service providers. Finally, the Sustainable Urban Drainage initiative seeks to promote the use of green infrastructure as a complement to conventional drainage systems to prevent flooding.
- 4.56 In response to the Zika emergency that has hit LAC since 2015, the Social Protection and Health Division (SCL/SPH), with the support of INE/WSA, launched the “Smart Crowdfunding for Zika” project that explores innovative options to prevent and solve MBDs. One of the topics addressed by this project was vector control from the perspective of waste and stagnant water management (through the use of drones, cell phones, recyclable products, etc.).
- 4.57 All these initiatives have generated knowledge. However, it is important to transfer this knowledge to governments, utilities and other stakeholders of the sectors, and reflect it on loan operations through the use of research platforms, tools and products. It is also important to systematize project documentation to collect lessons learned and standardize processes/documentation, which would contribute to preparing more solid loan operations, thus, reducing execution times.

V. GOALS, PRINCIPLES, DIMENSIONS OF SUCCESS AND LINES OF ACTIONS THAT WILL GUIDE THE BANK'S OPERATIONAL AND RESEARCH ACTIVITIES

A. Goal and principles of the Bank's work in Water and Sanitation

- 5.1 The Sector Framework's goal for the Bank is to support countries to achieve universal access to sustainable and good-quality of water and sanitation services. Given the heterogeneity of the issues associated with these services in different countries, the technical sector notes developed within the framework of national strategies shall define the necessary steps to meet the particular conditions and needs of each country for each service. The following principles shall govern the actions of the Bank, guiding its work towards generation of knowledge, dialogue with the countries and design and implementation of operations with sovereign guarantees (loans, donation and technical cooperation):
- a. Achieving universal access to WSA services, particularly sanitation, given its greater relative underdevelopment, including wastewater treatment and proper management of solid waste, improving the opportunities for low-income and more vulnerable populations, as well as improving the quality and efficiency in the provision of these services.
 - b. Promoting solutions that are technically comprehensive and promote sustainability from an engineering, economic, environmental, social, institutional and financial point of view. In addition to the provision of infrastructure, this requires defining actions aimed at the institutional strengthening of public providers and linking private operators to management, governance, adopting gender dimensions, vulnerable population, indigenous or Afro-descendant communities, and promoting financing schemes for proper O&M of services.
 - c. Promoting multisector interventions, deepening articulation with other sectors (health, disaster risk management, climate change, urban development, agriculture, education, energy, etc.), seeking greater social and economic impact.
 - d. Reinforcing the concept of water security in the water and sanitation sector in order to have good quality resources in the right quantity, reduce the risk of disasters (such as the effects of floods and droughts and geophysical threats) by considering the impact of climate change in hydro climatic threats.

B. Dimensions of Success and Lines of Action

- 5.2 In order to support countries in achieving universal WSA coverage in a sustainable manner (including resilience considerations) and guarantee its quality, particularly concerning sanitation due to its underdevelopment, the main challenges of the sector mentioned in section III should be considered: (i) unequal access and low quality of services, especially in sanitation; (ii) limited sector governance; (iii) inefficient management of services, low participation of the private sector and financial instability; and (iv) threats to water security and impact of climate change. Based on these challenges and on the provisions of the Public Utilities Policy (OP-708), four dimensions of success are established that seek to achieve the proposed goal. As a priority, access and quality of services are increased, especially in sanitation because of its impacts in the quality of life of the people, with a focus on vulnerable populations (lower incomes, rural and peri-urban,

ethnic minorities), considering gender aspects. Secondly, sector governance is strengthened, and the States prioritize investments in water and sanitation, an adequate institutional strategy with clear roles and responsibilities is defined to provide specific guidelines to all agents. Thirdly, utilities are strengthened to increase management efficiency, aiming at financial sustainability and increasing involvement of the private sector. Lastly, the programs and services that are promoted take into account climate change and risks of natural disasters considerations, and promote water security.

- 5.3 Each of these dimensions of success includes lines of action that set out operational and knowledge activities to which the Bank must give priority while this water and sanitation SFD is in effect. The lines of action were defined taking into account country needs, international evidence, and the good practices identified, together with lessons learned from Bank projects in recent years.
- 5.4 To accomplish these lines of action, operational and analytic activities were set out and were defined with the governments and principal stakeholders in the region; the Bank will give priority to these while this SFD is in effect. These activities aim to strengthen country dialogue, design and execute better projects, and propose a knowledge agenda that provides innovative tools to the region. The Bank will also set forth an agenda for evaluations, in order to increase the lessons learned and identify key factors of project success.
- 5.5 The dimensions of success, lines of action and activities set forth in this chapter contribute to the achievement of the SDGs, especially Goal 6, which aims to “ensure availability and sustainable management of water and sanitation for all,” since this SFD promotes achieving universal access to water and sanitation in an equitable manner –by bridging geographical and socio-economic gaps– increasing wastewater treatment and reuse, improving IWRM to ensure its availability in the required quantity and quality, working in a coordinated manner with other donors to generate bigger impact, as well as using innovative methods to strengthen community participation. In addition, this SFD contributes to achieving Goal 1 “End poverty” and Goal 5 “Gender equality” through the equitable provision of basic services, and Goal 3 “good health and well-being,” which aims to eradicate water-related diseases, especially for the lack of access. Likewise, it contributes to Goal 11 “sustainable cities and human settlements,” since it aims to reduce the number of deaths and people affected and economic losses caused by disasters, including water-related disasters. This will be achieved through urban drainage interventions, by incorporating climate change considerations and improving IWRM. Similarly, this SFD contributes to Goal 12, related to sustainable consumption and production, which aims to achieve adequate management of all wastes and reduce their release into water, air and soil. This will be achieved by improving solid waste management and increasing wastewater treatment. Finally, this SFD contributes to Goal 15 “terrestrial ecosystems,” which aims to ensure the conservation, restoration and sustainable use of ecosystems. This will be achieved by promoting green infrastructure as an innovative solution to ensure water security.

1. Dimension of Success 1. Countries achieve universal access to water and sanitation while improving service quality

- 5.6 The Bank will support countries in the quest for universal access to water and sanitation, particularly sanitation given its greater underdevelopment in the region,

and in their efforts to improve service quality, including wastewater treatment, reuse and proper management of solid waste, reducing unequal access by focusing efforts on those areas (rural and peri-urban) that are lagging furthest behind, and on vulnerable population (lower income households, ethnical minorities), taking into account gender considerations, to ensure the long-term sustainability of investments. The Bank will take a proactive role in the consideration of projects associated with participation, gender, and indigenous communities, and ethnical minorities.

5.7 **Lines of Action.** The following lines of action are proposed for achieving this dimension of success:

- a. Promote specific approaches in rural and peri-urban areas that increase the population's access to water and sanitation services, narrowing socioeconomic, geographic, ethnical and gender-related gaps, incorporating innovative aspects such as the use of non-conventional solutions to maximize the impact of available resources, incorporating technologies for the reuse of wastewaters and adequate sludge management, with a long-term vision and a schedule of solutions to be completed in stages.
- b. Increase comprehensive interventions that, in addition to investments on infrastructure, take into account the aforementioned innovative aspects concerning behavioral change social issues associated with hygiene education, connectivity, conservation and rational use of water, as well as payment for the service, etc.
- c. Improve quality of service, especially access to water, by incorporating good practices of asset management, rehabilitation, infrastructure expansion, focus on customer service and use of adequate technologies into interventions.

5.8 **Operational activities.** To accomplish the aforementioned lines of action, the Bank would give priority to the following operational activities while this SFD is in effect:

- a. Investments to increase WSA coverage, particularly sanitation, and implement low-cost technologies to have a greater impact on the low-income population. The inclusion of alternative technologies would allow countries to increase the number of beneficiaries served, with the same resources available. This would help reduce the relative gap in the sanitation service.
- b. Investments that increase wastewater collection and treatment, and improve the quality of bodies of water, promoting the reuse of treated wastewaters and the recovery of energy and nutrients.
- c. Urban drainage, solid waste, and water resource programs that promote a multisector approach to interventions, taking into account climate change, gender, and ethnicity considerations.
- d. Projects that finance system rehabilitation and maintenance and enhance quality in terms of continuity, potability, volume, and pressure, or improve efficiency (by reducing costs and increasing revenues).

5.9 **Analytical activities.** The proposed analytic activities that will complement the operational activities are:

- a. Updating of Sector Strategic Plans that identifies existing gaps associated with access and quality and covers the sub-sectors covered by this SFD, such as urban drainage systems, solid waste and water security.
- b. Support for innovative pilot projects to increase knowledge on the design, construction, and operation of appropriate, low-cost technologies and the development of tools to help countries in formulating and executing comprehensive sanitation strategies (Optimal Sanitation).
- c. Implementation of more efficient and effective mechanisms to serve fringe populations in peri-urban and rural areas (small municipalities and remote areas) resulting from good practices and lessons learned from the Bank's interventions.
- d. Development and implementation of comprehensive and innovative tools to promote behavioral change in individuals to achieve rational use of water and adequate service management, increase system connectivity, particularly sewage systems, payment of utilities and proper hygiene practices. The effectiveness of these tools will be analyzed through the collection of socio-economic information and the analysis of public opinion data.

2. Dimension of Success 2. Sector governance is strengthened, and States give priority to Water and Sanitation actions

5.10 The Bank will support countries to consolidate and strengthen a sector structure that will make it possible to prioritize the sector, to define roles and responsibilities in institutions, and to promote the development and application of public policies and standards that meet local needs and conditions; this will bring about stability in investments, attract private resources to the sector, and boost transparency.

5.11 **Lines of action.** The following lines of action are proposed for achieving this dimension of success:

- a. Develop mechanisms so that governments give priority to the sector and strengthen their institutions (sector structure, public policies, institutions, resources), especially in sanitation.
- b. Support the implementation of actions to promote transparency and accountability mechanisms in service operators and sector agencies. Promote reliable information systems in the countries for designing public policy, regulation, and control.

5.12 **Operational activities.** The proposed operational activities associated with these lines of action are:

- a. Develop policy, normative, regulatory, planning and financing frameworks to differentiate rural and peri-urban conditions, including differences among services to reduce the relative lack of access to sanitation.
- b. Technical assistance to support and promote policies that encourage interaction among entities for developing multisectoral, comprehensive initiatives (through programs undertaken with the following sectors: health, education, urban development, climate change, energy, agriculture, gender, etc.).
- c. Technical assistance to develop and implement transparency and corporate governance frameworks within regulating entities and service providers,

management systems, mechanisms aimed at customer service and communication with the public, accountability systems and coordination between different entities of the sector.³²⁸

- d. Public policy reforms that enable governments to appropriately manage urban drainage and solid waste services, water security, risk management and climate change.

5.13 **Analytical Activities.** The proposed analytic activities while this SFD is in effect are:

- a. Develop theoretical models to generate assumptions and identify opportunities to conduct experimental and empirical studies:
 - i. Increasing transparency in the efficiency of the provision of WSA services.
 - ii. Role and effectiveness of regulating public utilities.
 - iii. Water and Sanitation provision models in rural areas to increase their sustainability.³²⁹
- b. Identify the factors of satisfaction in the provision of water and sanitation services, connectivity, mainly in sanitation, and users' willingness to pay, as well as their relationship with political responsibility, from the perspective of electoral conduct.

3. Dimension of Success 3. Utilities management is efficient, innovative and sustainable and private sector participation increases

5.14 The Bank will strengthen water and sanitation operators in order to improve operational efficiency, coverage and quality of service, and will promote public-private partnerships for management and investment.

5.15 **Lines of action.** The following lines of action are proposed for this dimension:

- a. Promote the establishment and strengthening of autonomous and efficient utilities (public, private or mixed, regional and rural community-based).
- b. Develop innovative financial arrangements in urban and rural areas that ensure the long-term sustainability of investments.
- c. Improve the efficiency of utility management by incorporating innovative solutions (state-of-the-art technology, SWIT in aspects such as NRW and energy efficiency, etc.) that contribute to reducing the operational costs and increasing the revenues of service providers.

5.16 **Operational Activities.** To accomplish the afore-mentioned lines of action, the following operational activities are proposed.

- a. Technical assistance for developing mechanisms and incentives that increase private sector involvement in managing utilities and in financing investments.

³²⁸ The Bank currently has a governance benchmarking initiative for the Caribbean, which we will continue to support and strengthen in the upcoming years.

³²⁹ Work will be carried out in coordination with other sectors, including ENE, to seek good practices and lessons learned from multisectoral arrangements for the provision of water and energy services in rural areas.

- b. Design actions plans for utilities to improve their operational, business, technical, and financial management³³⁰, and provide technical assistance for their implementation, so they can be more autonomous and efficient, through corporate governance and commercial management tools, and the use of innovative technologies (SWIT).
- c. Design and support the gradual application of financing arrangements that enable utilities to recover operation and maintenance costs and efficiently expand services (including wastewater treatment, reuse and desalination).
- d. Design mechanisms that encourage the development of innovative solutions to promote wastewater reuse, green infrastructure, co-generation of energy, use of rainwater, state-of-the-art technology (SWIT, bio-engineering, membrane technology, etc.), among other things.
- e. Strengthen arrangements for community-based water and sanitation management for rural systems and small towns, through boards or associations, by developing and implementing technical and financial support, particularly in the post-construction phase, that guarantee the operation and maintenance of the water and sanitation solutions implemented.

5.17 Analytical activities. The proposed activities that should be given priority are:

- a. Analysis of the effectiveness of interventions (SWIT technologies, constructive methods, materials) to boost efficiency, reduce operational costs,³³¹ and improve the quality of urban utilities in the region.
- b. Assess the level of demand and use of SWIT technologies through the collection of data from a representative sample of service providers in one or more countries in the region.
- c. Assess the efficiency and role of the physical and institutional context³³² (e.g. levels of local development, climate and geographical conditions) through the collection of data from a representative sample of service providers in one or more countries in the region.
- d. Case studies, good practices, and tools to facilitate operators' access to capital markets, as well as to involve the private sector in the management and investment of services.
- e. Support the development and implementation of improvement plans in the management of the utilities in the sector, through the application of AquaRating and other complementary tools, or the regionalization of services.

³³⁰ In aspects such as non-revenue water control, increased collection, energy efficiency, increased labor productivity, customer service, information systems, and access to credit and capital markets.

³³¹ Work will be carried out in coordination with ENE for the promotion of high energy efficiency systems, optimization of the capacity of electricity supply infrastructure, use of rates for large users, control and automation systems, etc.

³³² The methodology proposed in Simar and Wilson (2007) and in Renzetti and Dupont (2009) will be followed.

4. Dimension of Success 4. The preparation and execution of sector projects involves disaster risk management, climate change and promotes water security.

5.18 The Bank will be proactive in developing instruments for the diagnosis, simulation, planning and implementation of models and guides to incorporate the effects of extreme events (including the effects of climate change on the design, planning and operation of Water and Sanitation infrastructure, including rain drainage).

5.19 **Lines of action.** The following lines of action are proposed for achieving this dimension of success:

- a. Achieve water security in the region to ensure adequate management of the availability and use of water resources and preserve their quality, promoting innovative green infrastructure interventions.
- b. Incorporate into the management of water and sanitation services measures for the mitigation of GHG emissions and adaptation to disaster risks and climate change, including risk management for droughts, floods and sea level rise.

5.20 **Operational activities.** In the period covered by this SFD, the Bank will give priority to the following activities in the sector:

- a. Investments and technical assistance for promoting integrated water resource management,³³³ disaster risk management, including flood control,³³⁴ and consideration of climate change aspects in service provision (from the design of infrastructure to operation and maintenance), to increase water security and strengthen utilities' environmental management, promoting the use of green infrastructure in the projects.
- b. Early warning systems and contingency plans to reduce the impacts of extreme events such as droughts, floods and sea level rise.
- c. Projects that finance the installation of hydro-meteorological and water quality data collection and monitoring systems to support integrated water resources management and decision-making.
- d. Climate change mitigation measures such as calculating the carbon footprint of WSA utilities, use of efficient energy, co-generation, thermosetting of sludge and adequate management of solid waste, in addition to innovation measures such as renewable energy-powered desalination systems (which contribute to handling the effects of climate change without increasing GHG emissions).
- e. Technical assistance to design and implement incentives for reducing the generation of solid waste, increasing recycling, and formalizing recyclers.

5.21 **Analytical activities.** The proposed analytic activities that should be given priority are:

³³³ Activities under this line of action involving agriculture will be carried out in compliance with the Agriculture and Natural Resources Management SFD (GN-2709-5) and with the Environment and Biodiversity SFD.

³³⁴ Activities under this line of action will be carried out in compliance with the Disaster Risk Management Policy (OP-704).

- a. Adjustment and implementation of HydroBID, including flood, water quality and hydro-economic models, creation of Water Funds that promote the implementation of green infrastructure in supplying basins.
 - b. Incorporate analytical tools to study the Water-Energy-Food Nexus to increase the understanding of the interactions between these sectors in terms of competition for the use of resources at the national, subnational, or basin level to incorporate this integrated vision by using frameworks that support decision-making in the planning of public policies and the design of water infrastructure.
 - c. Incorporate analytical tools and methodologies to support the countries assisted by the Bank in the adequate evaluation of water ecosystem services and ecological flows, especially in circumstances of lack information, to incorporate them into basin management plans and infrastructure design.
 - d. Design tools for defining the foreseeable impacts of climate change at the local level, and identifying, planning and designing more effective and efficient measures for adaptation (including the analysis of wastewater reuse). Some of these approaches include, for example, the use of solid methods (based on probabilistic methods to calculate risks associated with different natural threats) to support decision-making in highly uncertain situations.
 - e. Generate working documents on the provision of solid waste services and studies on the feasibility of new technologies and practices associated with the Integrated Solid Waste Management (ISWM).
- 5.22 In addition, INE/WSA will work in a crosscutting manner to develop effective tools for disseminating its knowledge products to sector clients and authorities.

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