



## OPEN ACCESS

## EDITED BY

Priscila Neves Silva,  
Oswaldo Cruz Foundation (Fiocruz), Brazil

## REVIEWED BY

Nelson Carriço,  
Instituto Politecnico de Setubal (IPS), Portugal  
Hajar Choukrani,  
Independent Researcher, Rabat, Morocco

## \*CORRESPONDENCE

Alejandro Jimenez  
✉ alejandro.jimenez@siwi.org

RECEIVED 24 March 2024

ACCEPTED 14 November 2024

PUBLISHED 27 November 2024

## CITATION

Alvarez L, Vargas L and Jimenez A (2024)  
Priorities for the rural water and sanitation  
services regulation in Latin America.  
*Front. Water* 6:1406301.  
doi: 10.3389/frwa.2024.1406301

## COPYRIGHT

© 2024 Alvarez, Vargas and Jimenez. This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

# Priorities for the rural water and sanitation services regulation in Latin America

Lourdes Alvarez<sup>ID</sup>, Laura Vargas<sup>ID</sup> and Alejandro Jimenez<sup>ID\*</sup>

Water and Sanitation Department Stockholm International Water Institute, Stockholm, Sweden

In 2022, 65.1% of people without access to at least basic water services and 44.6% of people without access to at least basic sanitation services in Latin America and the Caribbean (LAC) lived in rural areas. Addressing the disparity of access to drinking water, sanitation and hygiene (WASH) services requires appropriate and differentiate regulation for rural areas. This paper presents the results of a research and consultation process, with more than 80 experts in governance and WASH from 14 regulators and other WASH institutions in LAC on regulatory priorities for rural areas in the region. The 11 priorities identified are related to the development of rural services governance, support to rural service providers and users' role. These priority areas include the formalization and association of providers, the definition of specific service delivery standards for rural areas, the design of subsidies and non-economic incentives, training and technical assistance to providers, inter-institutional coordination and peer learning, information reporting, integrated management of water resources, and the promotion of user's participation and accountability, behavioral change programmes, gender equity and an intercultural approach. While promising experiences are presented in all areas, we propose that collective action is required to transform rural WASH regulation into a supportive, collaborative and integrative function that improves quality access to sustainable and resilient WASH services in the region.

## KEYWORDS

drinking water, sanitation, WASH, regulation, governance, rural areas, Latin America

## 1 Introduction

In 2022, 65.1% of people without access to at least basic water services and 44.6% of people without access to at least basic sanitation services in Latin America and the Caribbean (LAC) lived in rural areas ([UNICEF/WHO, 2023](https://www.unicef.org/water/report/unicef-who-water-sanitation-hygiene-2023)). These numbers represent 5.1 million people in rural areas relying on surface sources for drinking water and 5.8 million practicing open defecation. Gaps in access and quality of drinking water supply, sanitation and hygiene (WASH) services limit the benefits of universal access to WASH services, whether for health and life quality, environment, or economic development ([Shehu and Nazim, 2022](https://doi.org/10.1016/j.watres.2020.115888); [Queiroz et al., 2020](https://doi.org/10.1016/j.watres.2019.115888); [Gómez et al., 2019](https://doi.org/10.1016/j.watres.2019.115888)).

In rural areas, limitations to achieve universal access to WASH services are associated with a number of specific challenges, such as geographic characteristics, which condition the types of viable technology and the costs of services; limited presence of institutions at the local level with scarce human and economic resources; lack of specific regulations to ensure the service and its quality; high percentage of low-income population that cannot afford to pay fees to access the services; limited human and financial resources to provide services, commonly undertaken through voluntary community providers; limited human and financial resources

for the maintenance, repair, extension and replacement of the infrastructure, among others (De La Peña and Álvarez, 2018; Mejía et al., 2016; Dianderas, 2008).

Beyond access to infrastructure, ensuring sector governance, referring to the political, social, economic and administrative systems that influence water use and resource management, is considered fundamental for the achievement of universalization of WASH services (UNDP/SIWI, 2016). One of the least developed governance functions in the region, especially in rural areas, is the regulation of services (Moriarty et al., 2013), which comprises formal legal mechanisms, monitoring and enforcement processes to ensure that all stakeholders fulfill their mandates, and that rules, obligations and performance standards are met, as well as to ensure that the interests of each stakeholder are respected (Jiménez et al., 2020). Regulation has an essential role in ensuring the Human Rights to Water and Sanitation, allowing for a differentiated interpretation of affordability, and considering the specific needs of people living in vulnerable situations (Heller, 2017). Moriarty et al. (2013) point out that, while essential, regulatory functions in rural areas could be undertaken by entities other than a formal regulator, as service authorities or line ministers, ensuring compliance with regulations for the sector. Service provision in rural areas should be regulated, even if it's done with a 'light touch' system, applying appropriate performance criteria and not being overly punitive to incentive good practices and quality of service (Lockwood and Smits, 2011).

Some of the limitations to develop a robust regulatory framework of the WASH sector in rural areas are associated with the lack of political leadership, inadequate policies and legal frameworks, poor management structures and lack of clarity in the roles and responsibilities of key actors in regulation, shortage of financial resources to meet responsibilities, among others (SIWI/UNICEF, 2022; Moriarty et al., 2013; Akhmouch, 2012). Likewise, the institutions responsible for ensuring the provision and regulation of services in rural areas are generally centralized, focused on urban areas, and with limited human resources, technical capacities and financial resources in the regions (Mejía et al., 2016). Other aspects that limit the regulatory development of the sector in rural areas are the lack of availability and quality of information, key to decision-making; the weak coordination mechanisms between institutions; and the lack of information on the number and characteristics of service providers in rural areas, with high level of informality, heterogeneity and atomization (De La Peña and Álvarez, 2018; Trémolet, 2015). The few regulatory experiences in rural areas focus mainly on service quality standards, leaving aside key regulatory aspects such as economic aspects (tariff setting and investment planning) or environmental aspects (contingency plans and other adaptation and mitigation actions; Fernández et al., 2021; Fuster and Donoso, 2018; Carrasco, 2011).

In recent years, the importance of regulation and promotion of water governance, specifically in rural areas, has been reflected in several articles and conferences as a key aspect for the achievement of universal and sustainable access to quality WASH services (Jiménez et al., 2020; Pahl-Wostl et al., 2020; Tidar and Hyungjun, 2020; Gómez et al., 2019; Mejía et al., 2016). At the international level, conclusions of the Global Water Conference, led by the United Nations (UN) in 2023, highlighted the need to promote water governance, as well as the strengthening of various functions, such as financing or coordination among actors (UN, 2023a). The review of

the Sustainable Development Goals (SDG) conducted in 2023 (UN, 2023b) also emphasized the need to increase investment, capacity building, promotion of innovation, and coordination and cooperation, as essential strategies for achieving the clean water and sanitation SDG (SDG6). During the UN Water Conference, the Minister of Environment and Climate Action of Portugal presented the Global Coalition for Better Policies and Regulation of Water and Sanitation Services as a commitment, aiming to be an international cooperation action to promote the improvement of public policies and regulation of water and sanitation services in the world (UN, 2023c). At regional level, the VI Latin American Sanitation Conference (LatinoSan), held in 2022 in Bolivia, called for the strengthening of water governance, considering the specific conditions in rural areas, indigenous peoples and afro-descendant communities, to promote access to quality and sustainable sanitation services in the region (LatinoSan, 2022).

In order to make progress in the specific aspects of WASH regulation in rural areas, this paper presents a consultation process with regulators and WASH experts in LAC conducted during 2022 and 2023 on regulatory priorities in the region, particularly for rural areas. During this consultation process, complemented by a review of key literature, experiences of progress in priority areas were gathered and key actionable recommendations for the future are presented.

## 2 Methods

This report combines a desk review and a consultation process with more than 80 experts from 14 regulators members of the Association of Water and Sanitation Regulatory Bodies of the Americas (ADERASA) and other WASH experts in LAC to define the main challenges and opportunities for rural regulation in the region, as well as the compilation of relevant experiences in regulatory development in the WASH sector. While there is substantial literature about regulation, this is mostly focused on urban areas. Rural water services have limited differentiated regulation, and its application is not sufficiently documented. Hence the study approach was mainly focused on the consultation with regulators in the region to understand how they see the challenges and priorities for improving.

Experts in governance and WASH and WASH regulators in the region participated in the consultation. Criteria were based on staff from the regulators working in rural areas and combining different topics like tariffs, consumer protection or service quality. There was a core group of participants in all rounds of consultation. Additional participants from workshops, regional conferences and online discussions allowed for additional input from different countries and regulators in the region (Figure 1).

ADERASA brings together 14 regulators of WASH services in LAC, two associations of regulators (from Argentina and Brazil), one utility company (from Ecuador) and the Portuguese regulator as an honorary member. Its mission is to promote sound policies and effective regulations to ensure equitable access to quality WASH services. Among its objectives are the exchange of experiences in the regulatory processes between member countries; to promote the development, recognition and sustainability of the regulatory processes of WASH services; to make available to information on regulation; and to promote effectiveness and efficiency in the regulation processes (ADERASA, n.d.).

The consultation process (see methodology in Table 1) was developed within the framework of the preparation of the Ibero-American Regulatory Forum FIAR 2022 “Universal Regulation,” organized by ADERASA, and the opportunity to define guidelines to be shared during VI Latinosan Conference regarding the regulation of the WASH sector.

The literature review was conducted during the first half of 2022 (Preparatory phase). The review included grey and scientific literature focused on regulation of WASH services in rural areas. The review assessed experiences and case studies on rural regulation in LAC,

regulations in the water sector in several countries in LAC, and assessments on the governance of the WASH sector in rural areas. From there, the main challenges to develop regulatory actions for the WASH sector in rural areas were systematized. Based on the challenges defined, a process of face-to-face workshops (phase 1) and consultations (phase 2) was defined to outline the guidelines, to be validated (phase 3) during the VI Latinosan Conference and presented during the FIAR. A final consultation on the relevance of the priorities identified and the experiences related to them was carried out, and the result was presented in the annual meeting of ADERASA 2023 (phase 4).

Phase 1 consisted of three face-to-face workshops, coordinated by the Drinking Water and Basic Sanitation Authority (AAPS) in Bolivia, and facilitated by the Stockholm International Water Institute (SIWI). The first workshop, held in Lima, Peru, in June 2022, was attended by 22 representatives of the National Superintendency of Sanitation Services (SUNASS) and AAPS. During the hybrid meeting key aspects of regulation and experiences in rural areas in Bolivia and Peru were discussed. The second workshop was held in Bogotá, Colombia, in July 2022 and brought together 17 representatives of the Drinking Water and Basic Sanitation Regulatory Commission (CRA) and the Superintendency of Residential Public Utilities (SSPD), as well as AAPS, to discuss key aspects of economic regulation in rural areas. Finally, in August 2022, a workshop was held in La Paz (Bolivia) with 27 experts to discuss licensing and registration of rural providers, regulatory follow-up, environmental regulation and customer protection. These three meetings resulted in a first draft of priorities to develop WASH regulation in rural areas, which were discussed and complemented with the contributions of other regulatory entities during the consultation process. Colombia and Peru led the consultation process given their progress in recent years in rural regulation and their leadership in the ADERASA rural group.

This second phase, led by ADERASA, was conducted online with regional regulators reviewing and confirming the key priorities in rural regulation. From there, SIWI, AAPS and LisWATER drafted a first set of guidelines. This draft was discussed in a face-to-face workshop with



TABLE 1 Methods.

Phase	Method	Scope / Objective	Participants*	Period
Preparatory phase	Bibliographic review on rural regulation and case studies	Compilation of relevant experiences in rural regulation	SIWI, CapNet	February-June 2022
	Consultation with key stakeholders	Description of the conceptual framework	Representatives of AAPS, ADERASA, SIWI, IADB, Lis Water	June 2022
Phase 1	Regional face-to-face workshops in Bolivia, Colombia and Peru	Discuss key issues in the regulation of the WASH sector in rural areas and exchange of experiences	Representatives of AAPS, CRA, SSPD and SUNASS, SIWI	July–August 2022
Phase 2	On-line regional consultation	Validate key challenges and first conclusions of the regional workshops	ADERASA representatives	August–September 2022
Phase 3	Guidelines validation workshop in the VI Latin American Sanitation Conference LatinoSan	Validate the key issues in rural regulation and the final guidelines to be presented in the Tiquipaya Declaration	Representatives of 9 LAC regulatory agencies	October 2022
Phase 4	Consultation and socialization in the Annual Meeting of ADERASA 2023 in Lima, Peru	Presentation of identified rural regulation priorities and experiences	Representatives of ADERASA, SIWI, IADB, Lis Water, WHO	November 2023

Source: Prepared by the authors.

\*AAPS, Autoridad de Fiscalización y Control Social de Agua Potable y Saneamiento Básico (Bolivia); IADB, Inter-American Development Bank; CRA, Comisión de Regulación de Agua Potable y Saneamiento Básico (Colombia); SIWI, Stockholm International Water Institute; SSPD, Superintendencia de Servicios Públicos Domiciliarios (Colombia); SUNASS, Superintendencia Nacional de Servicios de Saneamiento (Peru).

21 representatives from 9 regulatory bodies in the region (Argentina, Bolivia, Brazil, Ecuador, Honduras, Nicaragua, Panama, Peru and Uruguay) in October 2022 (phase 3). The consultation concluded in the Tiquipaya Declaration (ADERASA, 2022) that was also part of the conclusions of the VI LatinoSan Conference.

Based on the working groups and consultation processes carried out in the previous phases, in phase 4, the authors identified 11 priorities for WASH regulation in the rural area. These priorities, classified into several topics, were subjected to a consultation process with representatives of ADERASA, IADB, Lis Water and WHO, to confirm their relevance and to compile successful related experiences that had not been identified previously. The consultation with the ADERASA regulators was carried out through a form with the description of the priorities and some cases already recognized as successful, to be validated, commented, or completed by the regulators in October 2023. The consultation was complemented with a presentation at the annual meeting of ADERASA regulators in November 2023, in Lima, Peru.

### 3 Results: policy priorities

As a result of the consultation process described, the authors identified 11 priorities to improve rural regulation in the WASH sector. These are associated with each of the main actors in the WASH accountability triangle (SIWI/UNICEF/WHO/IADB,

2021), with the regulator at the center as the ‘referee’ of the interactions within the public service delivery. The figure also includes some examples of key interconnected accountability relations between the main stakeholders (policy makers, service providers and users), who need to collaborate effectively to ensure the services are delivered successfully and sustained over the long term (Figure 2).

These priorities have different hierarchies depending on country-specific factors, although they are all interrelated and relevant to the development of rural sector. The level of implementation of these priorities in the rural WASH sector varies from country to country. However, there are successful experiences that can foster peer learning, as gathered from the consultations and the literature review and presented in Table 2.

### 3.1 Development of rural governance

The regulation has focused on the provision of WASH services in an urban context with conventional service delivery models, leaving behind the more complex scenarios, such as some rural areas, where circumstances limit this type of model. In this sense, key policy priorities to improve development of rural governance are related to adapting regulations, monitoring, inspection and control processes, as well as setting incentive mechanisms to ensure the sustainability and resilience of services (Fernández et al., 2021; Carrasco, 2011).

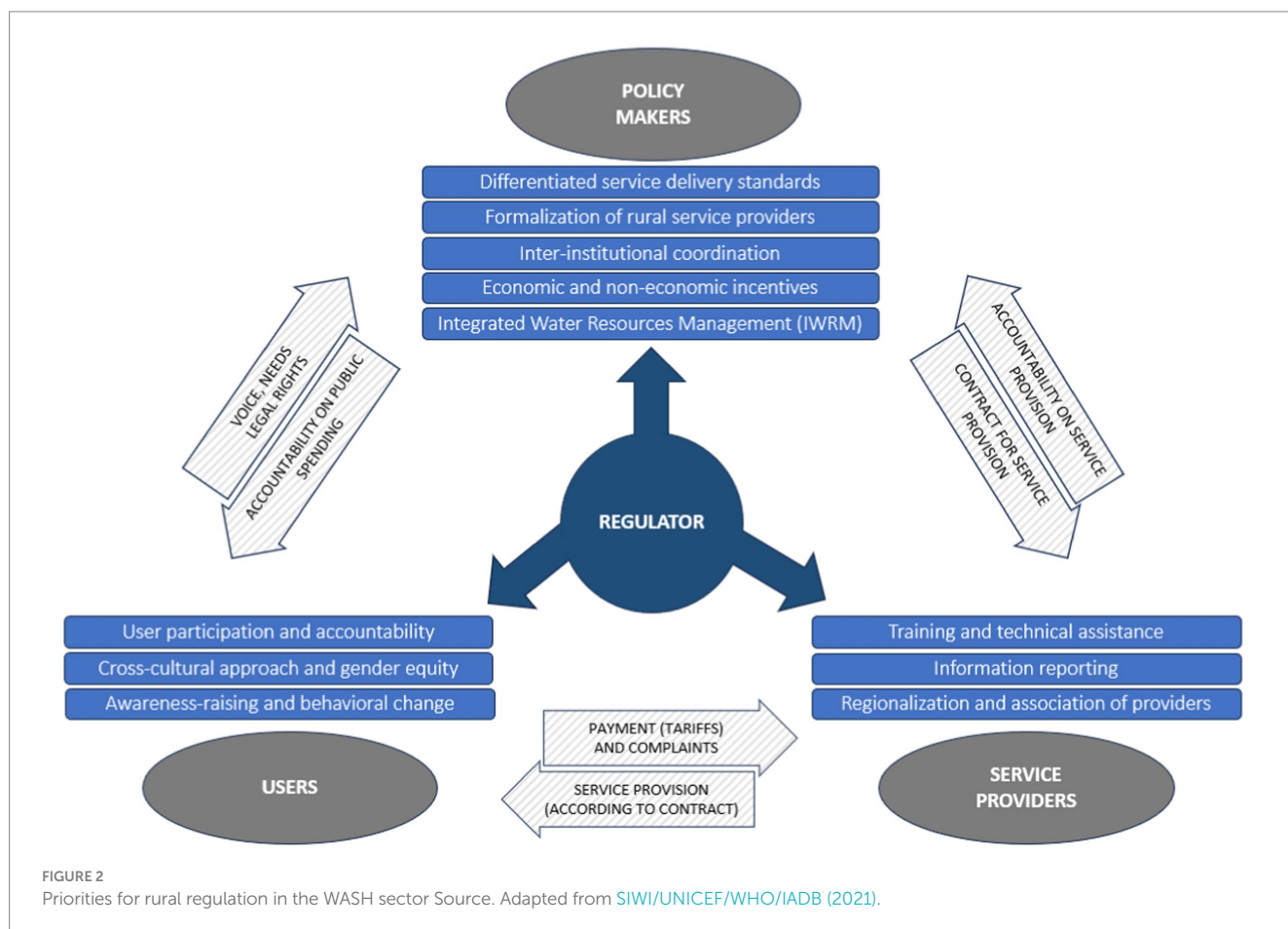


TABLE 2 Policy priorities and examples of implementation in LAC.

Topic	Policy priorities	Examples of progress
Development of rural governance	Differentiated service delivery standards	Colombia, Peru
	Formalization of service providers	Colombia, Costa Rica, Nicaragua, Peru
	Inter-institutional coordination	Colombia, Ecuador, Nicaragua
	Economic and non-economic incentives	Costa Rica, Dominican Republic, Peru
	Integrated water resources management (IWRM) and adaptation to climate change	Ecuador, Mexico
Support to rural service providers	Training and technical assistance	Colombia, El Salvador, Honduras, Nicaragua, Paraguay, Peru,
	Information reporting	Colombia, Peru
	Regionalization and association of providers	El Salvador, Honduras, Paraguay
Users' role	User participation and accountability	Costa Rica, Honduras, Peru
	Intercultural approach and gender equity	Mexico, Nicaragua, Paraguay, Peru
	Awareness-raising and behavioral change	Colombia

Source: Prepared by the authors.

Relevant examples were identified in relation to each policy priority area.

### 3.1.1 Differentiated service delivery standards

Service providers in urban and rural areas present different characteristics, both in the number of entities and in their organizational structure, management, human and technical capacities, availability of financial resources, etc. (Mejía et al., 2016); in addition, the rural areas have different challenges for service delivery, such as geographical dispersion, and lack of infrastructure. Standards developed for urban service providers are usually not appropriate for small-scale rural operators. For example, Colombia has developed strategies to differentiate service delivery standards of WASH services in rural areas. The Ministry of Housing, City and Territory, through the Law 1753 of 2015 and several subsequent decrees, allowed municipalities, districts, providers and administrators of alternative solutions to choose the most appropriate solution to ensure access to water and basic sanitation, according to the particular conditions of each area in terms of technical, operational and socioeconomic context (MinVivienda, 2015). In this new context, the Regulatory Agency defined differentiated quality standards of efficiency, coverage and quality adapted to rural conditions. In Peru, the Board Resolution No. 015-2020-SUNASS-CD approved the quality standards for the provision of sanitation services provided by community organizations in rural areas (SUNASS, 2020). This regulation addresses aspects related to access to services, quality of

services, collection of the family fees and closing and reopening of connections.

### 3.1.2 Formalization of service providers

In Peru, only 34% of the approximately more than 24,000 communal organizations monitored in 2019 had a registration certificate issued by the municipality (SUNASS, n.d.). In Paraguay, only 600 of the existing 2,000 drinking water management boards are registered with the National Environmental Sanitation Service (SENASA; Mejía et al., 2016). These figures are approximate since few countries in the region have robust data on the number of community providers operating in their territory, the percentage of formalization and the status and quality of the services they offer (Zambrana, 2017). In Colombia, by 2023, the SSPD had registered 2,410 rural providers out of the 33,425 villages in the country (SSPD, 2023). Some countries have taken steps to reverse this situation through regulatory measures. In Costa Rica, the Regulatory Authority of Public Services (ARESEP) endorsed the regulation of the Administrative Associations of Communal Aqueduct and Sewerage Systems (ASADAS), establishing a specific legal framework to regulate the operation of organizations for the community management of WASH services (Baldioceda et al., 2020). In Nicaragua, in 2010, Law 722 Special Law on Drinking Water and Sanitation Committees was issued to establish the provisions for the organization, constitution, legalization and operation of the Drinking Water and Sanitation Committees (CAPS) existing in the country and those that will be organized under this law (República de Nicaragua, 2010a; República de Nicaragua, 2010b). In Colombia, municipalities and districts are empowered to support the processes of legal constitution and community strengthening of organized communities that manage alternative solutions for WASH services in rural areas (MinVivienda, 2022).

### 3.1.3 Inter-institutional coordination

The implementation of a regulatory system for the WASH sector in rural areas requires coordinated efforts among operators, local, regional and national governments, associations and federations, watershed stakeholders, service beneficiaries, among others, to support legal, organizational and operational conditions (Camacho and Casados, 2017). Several studies point to the need for cooperation between regulatory entities, municipalities and rural operators, as well as coordination between regulatory policies and strategies, to ensure the quality of services (Hantke-Domas and Jouravlev, 2011). Some countries have made progress in this regard. At institutional level, Colombia developed the Departmental Water and Sanitation Plans for the Entrepreneurial Management of Water and Sanitation Services (PDA) as a strategy to accelerate the growth of access to WASH services and improve their quality by facilitating, among others, the effective interinstitutional coordination within each level and between different levels of government and to exercise better control and supervision over resources and compliance with regulations (Carrasco, 2011). In other countries, such as Ecuador or Nicaragua, coordination and alliances between institutions have facilitated the improvement of sector governance, better coordination between rural providers and public institutions, or the approval of projects with various sources of financing and various actors in their implementation (Vallecillo and López, 2021; Quezada et al., 2020).

### 3.1.4 Economic and non-economic incentives

The complexity of WASH services management in rural areas requires the creation of incentives to ensure the accessibility, affordability, quality and sustainability of services, particularly as the rural population has in average lower and more irregular income than urban. In Peru, the Incentive Program for the Improvement of Municipal Management was issued with the objective of simplifying procedures, generating favorable conditions for developing businesses and promoting local competitiveness, and improving the provision of local public services rendered by local governments (Cabrera and Coronel, 2020). In the Dominican Republic, the National Institute of Drinking Water and Sewerage (INAPA) subsidizes the cost of electricity for water pumping systems in rural areas. In addition, the National Energy Commission (CNE) has implemented investment projects in INAPA's water systems to reduce energy consumption associated with pumping, based on technological renovation processes, seeking savings in consumption of between 25 and 40% (FOCARD-APS, 2018). Finally, in Costa Rica the government recognized the situation of the ASADAS, with limited resources for the management of rural systems, and the Law of Exoneration of the ASADAS was issued, which exempts them from the payment of stamps and duties, sales tax, among other taxes (SCIJ, 2021).

### 3.1.5 Integrated water resources management and adaptation to climate change

Monitoring and controlling access to water resources and wastewater discharges from different sectors is essential to ensure the availability and quality of water for human consumption and environmental protection (World Bank, 2022). In certain circumstances, rural households may have additional water demands for non-residential uses, such as crop irrigation and animal husbandry for their own consumption. Impacts of climate change on rural populations are numerous and extend to issues of food insecurity and climate-induced migration (Romano et al., 2021); hence climate adaptation needs to be integrated within wider water resources management in rural areas. The regulation of the WASH sector in rural areas should consider IWRM and adaptation to climate change. While some progress has been made, further articulation is needed in most countries. In Ecuador, the Public Water Registry must include, among others, entities providing water-related public services, including community systems, authorizations for water use and development, and authorizations for discharges issued by the National Environmental Authority (Asamblea Nacional, 2014). In Mexico, the National Water Commission (CONAGUA) from the Ministry of the Environment and Natural Resources is responsible for issuing permits and redistributing the proceeds from tariffs in water resources management projects, although lack of incentives and effective verification mechanisms discourage further improvements in cost recovery, particularly in rural areas (World Bank, 2022).

## 3.2 Support to rural service providers

Regulatory actions generally do not prioritize technical assistance but focus on sanctions, without considering limited management and financial capacities of providers in rural areas (Gerlach, 2017;

Lockwood and Smits, 2011). On many occasions, providers do not have the financial capacity to respond to sanctions, and this may be a disincentive to their formalization under the national regulation (Carrasco, 2011). According to the consultative process, three regulatory priorities for rural service providers were identified.

### 3.2.1 Training and technical assistance

In rural areas, institutions offer insufficient technical assistance to service providers, who generally have limited financial, administrative and technical capacity. These limitations are associated with the large number of service providers in rural areas, their dispersion in the territory, the low institutional presence at the sub-regional and local levels, the understanding of cultural aspects within communities, among others, which suggests that technical assistance should be provided through regional schemes (Carrasco, 2011). There are few initiatives directly originating from the regulator to support providers through technical assistance or training. In Colombia, the SSPD offers technical assistance to community providers to understand the Rural Information System through training and awareness workshops at the regional level, in order to explain the new tools and encourage their understanding and use (CRA, 2022). In Peru, since 2018, SUNASS has been identifying and disseminating best practices, through regulatory benchmarking of community organizations as a performance assessment to support improvement of the quality of services (SUNASS, 2023).

In other cases, training is provided by national or subnational sectoral institutions. In Paraguay, SENASA provides training and technical, administrative and financial advice to the Sanitation Boards. This training included materials in Guarani and Spanish, adapted to the characteristics of the communities served (Perochena, 2020). In El Salvador, the National Administration of Aqueducts and Sewerage (ANDA) has created the Attention Management to Rural Systems and Communities Unit to provide training to strengthen the operation and maintenance capacity of non-state operators in the rural context (ANDA, 2018; Smits, 2012).

In Peru, the ASIR-SABA (Integral Rural Water and Sanitation) Project included the construction of Municipal Technical Assistance Offices (ATM), which play the role of articulation between the communities and the institutional framework and provide technical assistance to community providers to improve their operational and institutional performance, as well as their relationship with service users (Sánchez et al., 2023; Carrasco, 2016). In Nicaragua, a similar figure was created, called the Municipal Unit for Drinking Water and Sanitation (UMAS), which is responsible for technical assistance to the Drinking Water and Sanitation Committees (CAPS), providers of WASH services in rural areas (Vallecillo and López, 2021). In Honduras, the Water and Sanitation Management Boards (JASS) receive technical assistance from the municipalities, which are responsible for ensuring the conditions for the provision of water and sanitation services. A model called the Operation and Maintenance Technician (TOM) and the Water and Sanitation Technician (TAS) was implemented, which consists of a team of technicians from the National Autonomous Service of Aqueducts and Sewage Systems (SANAA) whose function is to support the community water boards in all aspects of the operation, administration and maintenance of the systems by providing informal training activities, advice and motivation (Smits et al., 2017).

### 3.2.2 Information reporting

Reporting information by rural providers to the regulator and other sectoral entities is essential to ensure monitoring of the quality of services and compliance with regulations and responsibilities to users. This information enables informed decision making, ensures better accountability among actors and greater transparency (Hantke-Domas and Jouravlev, 2011). There are several platforms created to strengthen the reporting of WASH sector information in rural areas. One of the most expanded in the region is the Rural Water and Sanitation Information System (SIASAR), a platform for monitoring the development and performance of the rural WASH sector through the collection of information in a systematic and reliable manner (SIASAR, n.d.). As of 2023, SIASAR has been implemented or is being implemented totally or partially in 11 countries in LAC (Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Honduras, Mexico, Nicaragua, Panama, Paraguay and Peru). Other countries have developed their own platforms, such as DATASS in Peru, a national information application that registers, processes and provides detailed data on WASH services in rural population centers (DATASS, n.d.). In Colombia, the SSPD has developed a Unique Rural Information System to collect information from community providers, with a series of forms adjusted to the reality of the information that can be provided by providers in rural areas, with a reduced number of indicators and help modules for an easy filling out of the requested information (SSPD, 2022).

### 3.2.3 Regionalization and association of providers

The promotion of regionalization and associativity of small providers has shown results in terms of improving efficiency and sustainability, creating economies of scale, strengthening the representation and coordination of the provider entities with sectoral institutions, offering solutions and technical assistance to collective operational challenges (supply of inputs, technical assistance, training, preservation of the aquifer recharge zone, etc.) and exchanging knowledge (Fundación Avina/CLOCSAS, 2017; Ballesteros et al., 2015). The Honduran Association of Water and Sanitation Management Boards (AHJASA), founded in the early 1990s and with more than 2,000 member boards, is the oldest in the LAC region and offers services for inputs purchase, training, technical assistance and certification of technicians (AHJASA, n.d.). The Salvadoran Association of Water Management Boards (ASSA) brings together 450 community organizations and provides assistance under the “itinerant technicians” methodology; it also organizes training sessions and offers the service of a chlorine bank that is regularly used by 25% of its members (ASSA, n.d.). There are also third-level associations, which bring together associations of providers, such as the case of the Paraguayan Federation of Associations of Sanitation Boards (FEPAJUS), with nine departmental associations and a supply center that offers products at a lower cost than the market, together with machinery and equipment available for members to rent (Fundación Avina/CLOCSAS, 2017; Mejía et al., 2016).

## 3.3 Users' role

There is a lack of sector-specific regulatory aspects that consider the role of the users in the provision of WASH services in rural areas. Generally, aspects related to participation or accountability are based

on general regulations that do not consider the specific limitations of rural areas, such as the low connection to networks, long distances to population centers with established institutions, or low representation in subnational institutions (Molinari, 2021). According to the consultative process, three main regulatory priorities linked with the users' role in the provision of WASH services in rural areas were defined.

### 3.3.1 User participation and accountability

The participation of the users of WASH services is essential, not only in the attendance to assemblies of provider community organizations, but also in the development of infrastructure projects, in the resolution of conflicts, complaints or sanctions, in the improvement of regulatory processes (participative definition and discussion of regulations), and the awareness and training in activities related to the provision of the service, among others (Carrasco, 2011; Marín, 2011). Countries in the region have been taking steps to reinforce user participation. In Peru, the approval of the methodology for defining the family fee for WASH services in rural areas must take place in the assembly, with the participation of the users of the services. In these assemblies, the role of the users is key to understanding how the fee is calculated, what consequences the calculated value has for the functioning of the system and the impact on their health, the environment and their economy (Resolution 207 of 2010). In Costa Rica, the manual “Transparency and Accountability in the ASADAS: Manual for the Administrative Associations of Sanitary Aqueduct and Sewerage Systems (ASADAS) of Costa Rica” was issued to provide greater clarity on accountability obligations of the ASADAS towards their users, its importance and its impact on democratic systems, considering that such mechanisms favor access to information, increase trust and facilitate conditions of participation and proximity of the citizenry (Monge et al., 2013). In Honduras, ERSAPS requests that all service provision's processes include wide citizen participation. In this context, ERSAPS has created two local bodies: the Municipal Commission for Water and Sanitation (COMAS), responsible for planning and co-ordination, and the Supervision and Local Control Unit (USCL), a citizen participation body in charge of service provision control and users' reclamations (Akhmouch, 2012; ERSAPS, 2006).

### 3.3.2 Intercultural approach and gender equity

Regarding gender and intercultural aspects, beyond some basic aspects of gender quotas in some bodies, there is no sufficient regulation on how to address properly these issues in rural areas. As an example, in Perú, the regulatory benchmarking of community organizations assessed women's participation, showing that 41.6% of workshop participants were women and 16.5% of community organization participants are led by women (SUNASS, 2023), but does not offer further information. However, there are initiatives promoted by various stakeholders which work towards greater inclusiveness and could inspire adequate and targeted regulation in these regards. In Paraguay, with an indigenous population of more than 115,000 people, the Paraguayan Indigenous Institute promotes policies and regulations for the effective design and implementation of plans, programs and projects for their good living in an articulated and participatory manner, in including access to WASH services in indigenous communities. In Nicaragua, initiatives such as PARAGUA have been developed, focused on comprehensively and systematically addressing

gender inequalities in rural water management, including the regulation of services and the development of the School for Women Leaders as a training experience for women on boards of directors (Murguialday, 2017). In Mexico, the Mexican Institute of Water Technology has developed a series of workshops in communities to promote gender analysis and women participation in integrated water management and policy. These workshops seek to contribute to the proposals for public policy advocacy, laws, regulations as well as participatory mechanisms to promote a greater role for women, as well as gender equity (Akhmouch, 2012).

### 3.3.3 Awareness-raising and behavioral change

The responsible behavior of WASH service users is essential for the conservation of water sources, as well as for the sustainable use of resources, maintenance of systems, payment of tariffs, appropriation of service management processes, among others (Vivanco et al., 2022). Some countries across the region are gradually raising awareness among provider organizations and users, as well as among local and national institutions. As an example, in Colombia, the SSPD organizes on-site meetings with community operators and users in rural municipalities, with the aim of promoting behavioral changes such as payment of tariffs, water consumption responsibility, or formalization of service providers (SSPD, n.d.). In addition, the CRA has online courses and guidance materials to raise awareness of the regulation and promote these changes in the population. However, these efforts are incipient and there are no mechanisms to evaluate the impact of these initiatives (CRA, n.d.).

## 4 Actionable recommendations

Although progress has been made in recent years in the regulation of WASH services in rural areas, more efforts are needed to ensure sustainable and universal access to quality and resilient WASH services, considering the specific characteristics of WASH service provision and service providers, as well as user needs.

Considering the 11 priorities to improve rural regulation in the WASH sector resulting from the research and consultation process, the authors identify some core actionable recommendations for implementing these policy priorities in the region:

- Development of incentives by national and subnational institutions for the formalization of service providers, to obtain information regarding their management and the quality of the services provided, and to control the provision of services by regulatory entities, which should trigger tailored technical assistance as required.
- Adaptation of standards and regulatory strategies by the sectoral regulatory body, including subsidies and non-economic incentives, considering the socio-economic and cultural characteristics of rural communities, as well as environmental constraints.
- Strengthen the associativity of organizations, ensuring that they meet the needs of their members and put in place structures to guarantee financial sustainability, taking advantage of opportunities to generate economies of scale in their area of influence.
- Strengthen active, free and meaningful user participation, either as individuals or organized, including all stakeholders, with transparency, and ensuring access to information

- Promote the inclusion of gender empowerment and the intercultural approach in the regulation of the WASH sector, to improve inclusivity and sustainability of services.
- Consider the different competing uses of water in rural areas, particularly in the face of climate change, to develop processes for integration between water resources management and WASH services, strengthen the presence of institutions at watershed and local level, and establish clear procedures for dispute resolution and integrated resource management.
- Continue the exchanges and learning from other regulators, rural providers and user associations, both in LAC and other regions, can enable the implementation of best practices, as well as documenting successes in achieving universal access to WASH services.

Some of these actions have been reflected in the latest Declarations made by the members of ADERASA (2019) and ADERASA (2016). The Declaration of Tiquipaya (ADERASA, 2022) suggested the strengthening of regulation in rural areas, requesting the competent authority to update the regulatory frameworks of WASH services to include specificities for rural areas; redesigning more efficient subsidy schemes for WASH services; and adopting alternative technical and financial solutions that respond to the particularities of rural communities and preserve the conditions of access, quality and continuity. Likewise, the Declaration highlighted some aspects that should be considered to advance in the regulation of WASH services in rural areas, such as the promotion and use of economies of scale, the promotion of risk management associated with water shortages as a consequence of climate change and the acceleration of population growth, or the incentive to incorporate technological developments and digitalization to improve the quality of service management.

## 5 Discussion

Developing specific rural regulation is essential to ensure quality, sustainable and resilient WASH services in rural areas, and to promote rural development in the LAC region, considering the specific characteristics of the context and rural communities, challenges and opportunities.

The set of priorities presented for regulation in rural areas require a different regulatory approach for rural areas in three key aspects:

### 5.1 A supportive regulation

The first challenge for the regulation of rural services is the formalization of rural service providers. It is therefore important to simplify these formalization processes and combine them with the creation of incentives, including access to subsidies, non-economic incentives, or technical assistance. This involves a change of mindset for regulators, who are initially set up for control purposes, but in rural areas need to be proactive and start by “convincing” the providers to join the regulatory system, especially when the presence of the regulator in the territory is a constraint. In this sense, the articulation and support of local governments can be valuable. While the change is underway, the progress is still insufficient. The number of community water and sanitation service organizations (OCSAS) is estimated at over 145,000,



providing access to more than 70 million inhabitants in the region, mainly in rural areas (Fundación Avina/CLOCSAS, 2017). OCSAS report low degree of formalization under the regulator across the region, either due to the complexity of administrative processes, lack of incentives, lack of confidence in the processes and possible sanctions for being under the regulator's control, lack of knowledge of legal obligations, or not understanding the benefits associated with regulation, among other obstacles (Fundación Avina/CLOCSAS, 2017; Smits et al., 2012; Carrasco, 2011). The low degree of formalization is then linked to the demands expected on the service providers registered. Defining differentiated service delivery standards for rural service providers is an important complementary step in this supportive approach. As this can be contradictory to the one of the main principles of regulation, the equal quality of service for all citizens, they should be defined as transitional and progressive. They need to be structured in a simple, and flexible way, with the development of tools and instruments that are easy to use, both at a technical and economic level, adapted to the capacities of the service providers and communities (Trémolet, 2015; Tidar and Hyungjun, 2020). The third pillar of this supportive regulation is the provision of economic and non-economic incentives for formalized rural providers, supporting the financial sustainability of services, and encouraging the reporting of information. In most cases, the incentives are economic, either for the provision of infrastructure works for construction, or to cover part of the costs of administration, operation and maintenance. Mechanisms for calculating simplified tariffs are also applied in the region. Non-economic incentives include the provision of training and education to improve the operation and maintenance of the services, strengthening the associativity of the providers, or facilitating the purchase of inputs and other administrative support. In any case, the incentives to be applied in rural areas need to be defined with clear and simple rules, to reach those that really need them. Recent examples from the COVID pandemic show that in occasions well intentioned subsidies failed to reach the most vulnerable service providers due to administrative complexity (UNICEF/SIWI, 2022; Giné-Garriga et al., 2021).

## 5.2 A collaborative regulation

In order to reach the largest number of rural service providers, generally scattered throughout the territory, the role of other actors at the subnational level, such as municipalities, is imperative to act as a link between the regulator, the service provider and the user (Moriarty et al., 2013; Jiménez and Pérez-Foguet, 2010). Developing partnerships with other levels of administration and the users to perform the regulatory functions is essential to ensure the fulfillment of regulatory mandates. In general, the regulation does not promote or establish specific training and technical assistance strategies for providers and suppliers in rural areas. Training and technical assistance at all institutional levels, need to include multiple perspectives such as management, technical, coordination, and accountability to users (SIWI, 2023). This strengthening must consider the existing characteristics and knowledge of providers, as well as their capacities, and incorporate tools and methodologies that allow reaching the maximum number of providers (face-to-face programs, use of radio, consideration of regional languages, among others). For this technical assistance to be provided, the contribution of other actors, such as technical units at the municipal level, or non-state actors, is essential,

as shown already by some examples in the region. These strategies could be combined with the regionalization and association of providers, with has long trajectory in some of the LAC countries. However, as the geographic isolation and dispersion of community providers or associations of providers in rural areas can hinder the consolidation and development of associativity (Fundación Avina/CLOCSAS, 2017), the role of technical support on the ground gains more importance. Another relevant aspect where the regulator cannot achieve results on its own is in the improvement of the quality of information reporting. Considering the characteristics of rural areas, it is necessary to implement innovative strategies to overcome the challenges of dispersion, as well as to allow the participation of the community in these processes (Fernández et al., 2021).

The network of partnerships needed in rural regulation expands to other areas of regulation and its practice. In general, regulatory frameworks do not include provisions on privacy, dignity and gender equity issues in the use of WASH services, linked with conditions of accessibility, acceptability or safety of services (Molinari, 2021). This omission is also evident in LAC water policies (Saravia et al., 2023). The regulations related to gender issues focus mainly on the presence of women on water boards. Most of the initiatives which go beyond gender quotas are originated by the civil society groups and are not institutionalized at country level. Hence, new type of partnerships between regulators and non-governmental organizations could offer opportunities to implement gender empowerment water related programs, as well as for a better implementation of an intercultural approach to services with indigenous populations considering the principles of dialogue, respect and trust, inclusion, flexibility and integration (Jiménez et al., 2014). These social aspects are linked to wider awareness-raising and behavioral change, including water use, the perception about water tariffs, and the transformation of social norms. Considering the limited capacity to enforce regulations in rural areas, these elements of behavioral change are of critical importance. Some regulators have already started working on this direction, but in general, there are not sufficient human and technical resources to include different types of actions and communication strategies directed to changing behavior, and for collaborating with other actors present in the territory.

## 5.3 An integrative regulation

The impact of climate change on the availability and quality of water resources implies a shift in their governance. The limited institutional presence in rural areas in LAC, especially in the most dispersed areas, calls for a greater inter-institutional coordination between the institutions that ensure the quality of basic services and the environment in the communities (e.g., health centers, water boards, watershed commissions) in order to articulate actions, disseminate and monitor regulations, and enhance communication (De La Peña and Álvarez, 2018; Akhmouch, 2012). While regulation has in general not fostered this type of collaboration across entities, it is essential to promote integrated rural development. In this context and linked to the previous aspects of developing a supportive and collaborative regulation, regulation must break the silos between public health, economic and environmental regulation, considering the different water uses and the different needs and challenges of users throughout the basin. Water planning at large is not sufficient

considering climate changes effects, which aggravate challenges of resource pressure, and is certainly not sufficient if articulated only at the local level. The institutional framework of water resources management in LAC needs further development, particularly in Central America; when existing river basin authorities face problems with stakeholder communication (particularly with rural, indigenous, and afro descendant populations), limited powers to enforce river basin plans, and lack of financial autonomy. The lack of adequate mechanisms to solve disputes in the rural areas over water uses can also lead to social conflicts (Kuzdas et al., 2015). For these reasons, strengthening user participation and accountability is essential in the improvement of regulatory processes and resolution of conflicts, such as the those related to the competition among different uses of water, the protection and conservation of water resources, or the procedures for water allocation under water scarcity. Ensuring community engagement and participation promotes transparency and accountability, leading to more equitable and effective water governance (Akhmouch, 2012).

These three paradigm shifts require that the regulators go beyond the traditional way of interpreting their mandate; they will need the political, technical and economic support of central governments, the willingness to cooperate from other stakeholders such as municipalities and NGOs, and a collective effort to convert regulation in a supportive, collaborative and integrative function in rural areas.

## Author contributions

LA: Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. LV: Conceptualization, Investigation, Supervision, Validation, Writing – review & editing. AJ: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing.

## References

- ADERASA (2016). Salta Declaration. Asociación de Entes Reguladores de Agua Potable y Saneamiento de las Américas (ADERASA). Available at: [adepasa.org](http://adepasa.org)
- ADERASA (2019). Declaration of Cartagena. Association of Drinking Water and Sanitation Regulators of the Americas (ADERASA). Available at: [adepasa.org](http://adepasa.org)
- ADERASA (2022). Declaration of Tiquipaya "regulation of sanitation services in rural areas". Association of Drinking Water and Sanitation Regulators of the Americas (ADERASA). Available at: [adepasa.org](http://adepasa.org)
- ADERASA (n.d.). Association of Water and Sanitation Regulatory Bodies of the Americas. Available at: [adepasa.org](http://adepasa.org) (Accessed October 2023).
- AHJASA (n.d.) Honduran association of water and sanitation management boards. Available at: [ahjasa.org](http://ahjasa.org)
- Akhmouch, A. (2012). Water governance in Latin America and the Caribbean: a multi-level approach". OECD regional development working papers, 2012/04. Paris: Organization for Economic Co-operation and Development (OECD).
- ANDA (2018). Informe a Sistemas y Comunidades Rurales. Informe de octubre a diciembre 2018. Dirección de Atención a Sistemas y Comunidades Rurales. San Salvador: Administración Nacional de Acueductos y Alcantarillado (ANDA). Available at: [transparencia.gob.sv](http://transparencia.gob.sv)
- Asamblea Nacional (2014). Ley Orgánica de Recursos Hídricos, Usos y Aprovechamiento del Agua. República del Ecuador. Available at: [regulacionagua.gob.ec](http://regulacionagua.gob.ec)
- ASSA (n.d.). Salvadoran association of water management boards. Available at: [elsalvadorassa.com](http://elsalvadorassa.com)
- Baldiodeda, A., Guillén, A., Rojas, J., Suárez, A., Golcher, C., and Gómez, W. (2020). Systematization of experiences in capacity building of community aqueducts (ASADAS

## Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. Funding for the Stockholm International Water Institute authors was provided by the Swedish International Development Cooperation Agency through the GoWATER Programme.

## Acknowledgments

The authors would like to extend sincere thanks to all participants in the different rounds of consultations. Special thanks go to contributions from CRA, AAPS and SUNASS, and the rest of ADERASA regulators, Cap-Net and Lis-Water for their inputs into the document. The authors would also like to thank the reviewers for all their comments.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

in Santa Cruz, Abangares, La Cruz, and Nicoya, Costa Rica. *Rev. Univ. Diálogo* 10, 11–33. doi: 10.15359/udre.10-2.1

Ballesteros, M., Mejía-Betancourt, A., Arroyo, V., and Real, C. (2015). The future of water and sanitation services in Latin America. Caracas: development Bank of Latin America (CAF) and Washington DC: Inter-American Development Bank (IDB). Available at: [iadb.org](http://iadb.org).

Cabrera, V., and Coronel, E. (2020). La experiencia de Perú en el desarrollo de políticas para asegurar el acceso a agua potable en el ámbito rural. *Rev. Ingeniería* 1, 18–27. doi: 10.16924/revinge.49.4

Camacho, H., and Casados, J. (2017). Regulation of drinking water and sanitation services in Mexico. Jiutepec: Mexican Institute of Water Technology (IMTA). Available at: [imta.org](http://imta.org).

Carrasco, W. (2011). Public policies for the provision of drinking water and sanitation services in rural areas. Santiago, Chile: Economic Commission for Latin America and the Caribbean (ECLAC). Available at: [cepal.org](http://cepal.org)

Carrasco, W. (2016). Análisis de la Influencia del Proyecto SABA en las políticas de Agua y Saneamiento Rural. Lima: Agencia Suiza para el Desarrollo y la Cooperación (COSUDE). Available at: [ccafs.cgiar.org](http://ccafs.cgiar.org)

CRA (2022). Bases del nuevo marco tarifario de acueducto y alcantarillado para pequeños prestadores. Bogotá: Comisión de Regulación de Agua Potable y Saneamiento Básico (CRA). Available at: [cra.gov.co](http://cra.gov.co)

CRA (n.d.). CRAColombia. Available at: [youtube.com/@cra.colombia/videos](https://youtube.com/@cra.colombia/videos)

DATASS (n.d.). Diagnostic system on rural water supply and sanitation Ministry of Housing, Construction and Sanitation. Available at: [vivienda.gob.pe](http://vivienda.gob.pe)

- De La Peña, M. E., and Álvarez, L. (2018). Implementing water and sanitation projects in the rural sector: challenges in Latin America and the Caribbean. Washington DC: Inter-American Development Bank (IDB).
- Dianderas, E. (2008). Small-scale local operators in Latin America. Their participation in the provision of water and sanitation services. Drinking water and sanitation program. Washington DC: World Bank. Available at: [worldbank.org](http://worldbank.org)
- ERSAPS (2006). Reglamento de Juntas Administradoras de Agua. Tegucigalpa: Ente Regulador de los Servicios de Agua Potable y Saneamiento (ERSAPS). Available at: [republica.de Honduras](http://republica.de Honduras)
- Fernández, D., Saravia, S., and Gil, M. (2021). Regulatory and tariff policies in the drinking water and sanitation sector in Latin America and the Caribbean. Serie Recursos Naturales y Desarrollo 205. Santiago, Chile: Economic Commission for Latin America and the Caribbean (ECLAC). Available at: [cepal.org](http://cepal.org)
- FOCARD-APS (2018). Fortalecimiento a los Modelos de Gestión Comunitaria en Agua Potable y Saneamiento en la Región. La Libertad: Foro Centroamericano y República Dominicana de Agua Potable y Saneamiento (FOCARD-APS). Available at: [sica.int](http://sica.int)
- Fundación Avina/CLOCSAS (2017). La Asociatividad entre Organizaciones Comunitarias de Servicios de Agua y Saneamiento (OCSAS) en Latinoamérica. Panama: Fundación Avina. Available at: [scribd.com](http://scribd.com).
- Fuster, R., and Donoso, G. (2018). Rural water management. Global issues in water policy book series (GLOB, volume 21).
- Gerlach, E. (2017). Regulating rural supply services. A comparative review of existing and emerging approaches with a focus on GIZ partner countries. Eschborn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). Available at: [rural-water-supply.net](http://rural-water-supply.net).
- Giné-Garriga, R., Delepiere, A., Ward, R., Alvarez-Sala, J., Alvarez-Murillo, I., Mariezcurrena, V., et al. (2021). COVID-19 water, sanitation, and hygiene response: review of measures and initiatives adopted by governments, regulators, utilities, and other stakeholders in 84 countries. *Sci. Total Environ.* 795:148789. doi: 10.1016/j.scitotenv.2021.148789
- Gómez, M., Perdiguero, J., and Sanz, A. (2019). Socioeconomic factors affecting water access in rural areas of low and middle income countries. *Water* 11:202. doi: 10.3390/w11020202
- Hantke-Domas, M., and Jouravlev, A. (2011). Public policy guidelines for the water and sanitation sector. Santiago, Chile: Economic Commission for Latin America and the Caribbean (ECLAC). Available at: [cepal.org](http://cepal.org)
- Heller, L. (2017). Report of the special rapporteur on the human rights to safe drinking water and sanitation. A/HRC/36/45. New York: United Nations. Available at: [un.org](http://un.org).
- Jiménez, A., Cortobius, M., and Kjellén, M. (2014). Working with indigenous peoples in rural water and sanitation. Recommendations for an intercultural approach. Stockholm: Stockholm International Water Institute (SIWI). Available at: [siwi.org](http://siwi.org).
- Jiménez, A., and Pérez-Foguet, A. (2010). Building the role of local government authorities towards the achievement of the human right to water in rural Tanzania. *Nat. Resour. Forum* 34, 93–105. doi: 10.1111/j.1477-8947.2010.01296.x
- Jiménez, A., Saikia, P., Giné, R., Avello, P., Leten, J., Liss Lymer, B., et al. (2020). Unpacking water governance: a framework for practitioners. Stockholm: Stockholm International Water Institute (SIWI). *Water* 12:827. doi: 10.3390/w12030827
- Kuzdas, C., Warner, B., Wiek, A., Yglesias, M., Vignola, R., and Ramírez-Cover, A. (2015). Identifying the potential of governance regimes to aggravate or mitigate local water conflicts in regions threatened by climate change. *Local Environ.* 21, 1387–1408. doi: 10.1080/13549839.2015.1129604
- LatinoSan (2022). Tiquipaya Declaration. VI Latin American sanitation conference (LatinoSan). October 12–13, 2022, Tiquipaya (Santa Cruz, Bolivia). Available at: [olasdata.org](http://olasdata.org)
- Lockwood, H., and Smits, S. (2011). Supporting rural water supply: moving towards a service delivery approach. International water and sanitation Centre (IRC). ISSN 9781853397295. Available at: [ircwash.org](http://ircwash.org)
- Marín, R. (2011). The optimal community aqueduct. Conditions for the effective management of water services. The case of Costa Rica. San José: Fundación Avina. Available at: [avina.net](http://avina.net)
- Mejía, A., Castillo, O., Vera, R., and Arroyo, V. (2016). Drinking water and sanitation in the new rurality of Latin America. Santiago de Chile: Development Bank of Latin America (CAF). Available at: [caf.com](http://caf.com).
- MinVivienda (2015). Ley 1753 de 2015 por la cual se expide el Plan Nacional de Desarrollo 2014–2018 “Todos por un nuevo país”. Available at: [funcionpublica.gov.co](http://funcionpublica.gov.co)
- MinVivienda (2022). Formalización de operadores. Esquemas diferenciales. Bogotá: Ministerio de Vivienda, Ciudad y Territorio. Available at: [minvivienda.gov.co](http://minvivienda.gov.co)
- Molinari, A. (2021). Regulators and the implementation of the human rights to water and sanitation in Latin America and the Caribbean. Water and sanitation division. Discussion paper IDB-DP-00874. Washington DC: Inter-American Development Bank (IDB). Available at: [iadb.org](http://iadb.org)
- Monge, E., Paz, L., and Ovares, C. (2013). Transparencia y rendición de cuentas en las ASADAS. Manual para las Asociaciones Administradoras de Sistemas de Acueductos y Alcantarillados Sanitarios (ASADAS) de Costa Rica. San Jose: PNUD/AyA. Available at: [aya.go.cr](http://aya.go.cr)
- Moriarty, P., Smits, S., Butterworth, J., and Franceys, R. (2013). Trends in rural water supply: towards a service delivery approach. *Water Alternat.* 6, 329–349.
- Murguialday, C. (2017). Avanzando en equidad de género en la gestión comunitaria del agua. sistematización de experiencias y lecciones aprendidas. ONGAWA. Available at: [ongawa.org](http://ongawa.org)
- Pahl-Wostl, C., Knieper, C., Lukat, E., Meergans, F., Schoderer, M., Schütze, N., et al. (2020). Enhancing the capacity of water governance to deal with complex management challenges: a framework of analysis. *Environ. Sci. Pol.* 107, 23–35. doi: 10.1016/j.envsci.2020.02.011
- Perochena, G. (2020). Paraguay: Revisión del Gasto Público en Agua y Saneamiento en el Ámbito Rural. Análisis y recomendaciones de política. Ficha técnica. New York: UNICEF. Available at: [unicef.org](http://unicef.org)
- Queiroz, V. C., Carvalho, R. C., and Heller, L. (2020). New approaches to monitor inequalities in access to water and sanitation: the SDGs in Latin America and the Caribbean. *Water* 12:931. doi: 10.3390/w12040931
- Quezada, J., Perez, A., Fargas, M., and Hinojosa, L. (2020). Recopilación de buenas prácticas de gestión comunitaria del agua en la Amazonia Norte de Ecuador. Barcelona: Associació Catalana d'Enginyeria Sense Fronteres. Available at: [esf-cat.org](http://esf-cat.org)
- República de Nicaragua (2010a). Ley Especial de Comités de Agua Potable y Saneamiento. La Gaceta, Diario Oficial 111 del 14 de junio de 2010. Available at: [legislacion.asamblea.gob.ni](http://legislacion.asamblea.gob.ni)
- República de Nicaragua (2010b). Reglamento de la Ley Especial de los Comités de Agua Potable y Saneamiento (CAPS). Decreto Ejecutivo 50-2010 de 11 de agosto de 2010. La Gaceta, Diario Oficial 172 de 8 de septiembre de 2010. Available at: [legislacion.asamblea.gob.ni](http://legislacion.asamblea.gob.ni)
- Romano, S., Nelson-Núñez, J., and LaVanchy, T. (2021). Rural water provision at the state-society interface in Latin America. *Water Int.* 46, 802–820. doi: 10.1080/02508060.2021.1928973
- Sánchez, J., Ospino, A., and García, T. (2023). Áreas de Asistencia Técnica Municipal en agua y saneamiento Guía para la formulación y puesta en marcha. ASIR-SABA Colombia. Available at: [asirsaba.com.co](http://asirsaba.com.co)
- Saravia, S., Montañez, A., Fernández, D., and Sarmanto, N. (2023). Diagnóstico de la prestación de los servicios de agua potable y saneamiento en El Salvador, México y Panamá. Serie Recursos Naturales y Desarrollo 217. Santiago, Chile: Economic Commission for Latin America and the Caribbean (ECLAC). Available at: [cepal.org](http://cepal.org)
- SCIJ (2021). Exoneración a las Asociaciones Administradoras de Sistemas de Acueductos y Alcantarillados Comunes (ASADAS). Ley 8776 de 2009 reformada por la Ley 10075 de 2021. La Gaceta N° 212, 2 de noviembre de 2009. Available at: [pgrweb.go.cr](http://pgrweb.go.cr)
- Shehu, B., and Nazim, F. (2022). Clean water and sanitation for all: study on SDG 6.1 and 6.2 targets with state policies and interventions in Nigeria. *Environ. Sci. Proc.* 15:71. doi: 10.3390/envirosci.2022015071
- SIASAR (n.d.). Rural water and sanitation information system. Available at: [globalsiasar.org](http://globalsiasar.org)
- SIWI (2023). Capacity development for water. The improved governance of water is critical to water security because of its crucial role in economic growth, social inclusion and environmental sustainability. Available at: [siwi.org](http://siwi.org)
- SIWI/UNICEF (2022). Good practices in the development and implementation of public policies for the fulfillment of SDG 6 in Latin America and the Caribbean. Stockholm: Stockholm International Water Institute (SIWI) and New York: United Nations Children's Fund (UNICEF). Available at: [siwi.org](http://siwi.org)
- SIWI/UNICEF/WHO/IADB (2021). The WASHREG Approach: An Overview. Stockholm International Water Institute (SIWI) and New York: United Nations Children's Fund (UNICEF). Available at: [www.siw.org](http://www.siw.org)
- Smits, S. (2012). Hacia un Sistema de monitoreo para agua potable y saneamiento en zonas rurales de El Salvador. San Salvador: IRC. Available at: [ircwash.org](http://ircwash.org)
- Smits, S., Rodríguez, M., and Serrano, A. (2017). Financiamiento público municipal para apoyo directo a la prestación de servicios de agua y saneamiento rural en Honduras. Tegucigalpa: IRC. Available at: [ircwash.org](http://ircwash.org)
- Smits, S., Tamayo, S., Ibarra, V., Rojas, J., Benavidez, A., and Bey, V. (2012). Governance and sustainability of rural water supply and sanitation systems in Colombia. Washington DC: Inter-American Development Bank (IDB). Available at: [iadb.org](http://iadb.org)
- SSPD (2022). Proyecto de Inversión Rural. Vigilancia diferencial de prestadores rurales. Institutional presentation. Bogotá: SSPD. Available at: [superservicios.gov.co](http://superservicios.gov.co)
- SSPD (2023). Single information system for household public services. Database. Bogotá: Superintendencia de Servicios Públicos Domiciliarios (SSPD). Available at: [sspd.gov.co](http://sspd.gov.co)
- SSPD (n.d.). Pequeños prestadores AAA. Superintendencia de Servicios Públicos Domiciliarios. Available at: [superservicios.gov.co/Empresas-vigiladas/Acueducto-alcantarillado-y-aseo/Pequeños-prestadores](http://superservicios.gov.co/Empresas-vigiladas/Acueducto-alcantarillado-y-aseo/Pequeños-prestadores)
- SUNASS (2020). Reglamento de calidad de la prestación de los servicios de saneamiento brindados por organizaciones comunales en el ámbito rural. Resolución

- de Consejo Directivo N° 015-2020-SUNASS-CD. Lima: SUNASS. Available at: [sunass.gob.pe](http://sunass.gob.pe)
- SUNASS (2023). Benchmarking Regulatorio de Organizaciones Comunes 2023. Enfoque: adecuada desinfección del agua. INFORME N°0033-2023-SUNASS-DF. Available at: [sunass.gob.pe](http://sunass.gob.pe)
- SUNASS (n.d.). Organizaciones Comunes. Lima: Superintendencia Nacional de Servicios de Saneamiento (SUNASS). Available at: [sunass.gob.pe](http://sunass.gob.pe)
- Tidar, B., and Hyungjun, K. (2020). Water governance contribution to water and sanitation access equality in developing countries. *Water Resour. Res.* 56:25330. doi: 10.1029/2019WR025330
- Trémolet, S. (2015). Regulation in rural areas. Briefing note. Building blocks for sustainability series. The Hague: IRC. Available at [ircwash.org](http://ircwash.org)
- UN (2023a). Summary of proceedings by the president of the general assembly. United Nations conference on the midterm comprehensive review of the implementation of the objectives of the international decade for action "water for sustainable development" 2018–2028. New York: Office of the President of the General Assembly. Available at: [un.org](http://un.org)
- UN (2023b). Sustainable development goals report. Special edition. Department of Economic and Social Affairs. New York: United Nations. Available at: [un.org](http://un.org)
- UN (2023c). Global Coalition for Better Policies and Regulation of water and sanitation services. SDGActions 50292. Ministry of Environment and climate action of Portugal. New York: United Nations. Available at: [un.org](http://un.org)
- UNDP/SIWI (2016). Water governance. Issue sheet. Water governance facility. Stockholm: Stockholm International Water Institute (SIWI). Available at: [siwi.org](http://siwi.org)
- UNICEF/SIWI (2022). Diálogo multi-actor del sector agua, saneamiento e higiene en Colombia. Del análisis de la respuesta hacia aprendizajes para la resiliencia del sector. New York: United Nations Children's Fund (UNICEF) and Stockholm: Stockholm International Water Institute (SIWI). Available at: [siwi.org](http://siwi.org)
- UNICEF/WHO (2023). Progress on household drinking water, sanitation and hygiene 2000–2022: special focus on gender. New York: United Nations Children's Fund (UNICEF) and World Health Organization (WHO). Available at [washdata.org](http://washdata.org)
- Vallecillo, R., and López, L. (2021). Proyecto Tecnología para la gestión sostenible del recurso hídrico. Buenas prácticas en la lucha comunitaria por el agua. Managua: Servicio de Información Mesoamericano sobre Agricultura Sostenible (SIMAS). Available at: [caps-nicaragua.org](http://caps-nicaragua.org)
- Vivanco, C., Soto, M., and Mancilla, G. (2022). Community-based water and sanitation service organizations (CWSOs) in Latin America and the Caribbean: Rural water management from a technical-social perspective. Paris: United Nations Educational, Scientific and Cultural Organization (UNESCO). Available at: [unesco.org](http://unesco.org)
- World Bank (2022). Water matters: Resilient, inclusive and green growth through water security in Latin America. Washington, DC: World Bank. Available at: [worldbank.org](http://worldbank.org)
- Zambrana, T. (2017). La Confederación Latinoamericana de Organizaciones Comunitarias de Servicios de Agua y Saneamiento: antecedentes, evolución y potencialidades". Panama: Spanish Agency for International Development Cooperation (AECID). Available at: [cloccas.org](http://cloccas.org)