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EDITED BY
Ana Paula Fracalanza,
University of São Paulo, Brazil

REVIEWED BY
Loritta Chan,
The University of Hong Kong, Hong Kong SAR, China
Lorenzo De Vidovich,
University of Trieste, Italy

*CORRESPONDENCE
Alex Ricardo Caldera Ortega
✉ arcaldera@ugto.mx
Daniel Tagle Zamora
✉ datagle@ugto.mx

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Balance on social inclusion and environmental justice at the end of the 30 years of the drinking water service concession in the city of Aguascalientes, Mexico

Alex Ricardo Caldera Ortega[1]* and Daniel Tagle Zamora[2]*

[1]Public Management and Development Department of University of Guanajuato, Guanajuato, Mexico, [2]Social Studies Departament of University of Guanajuato, Guanajuato, Mexico

After three decades since the concession for drinking water and sewerage services was granted to a private company, which eventually became part of the Veolia group in the city of Aguascalientes, Mexico, it is necessary to assess the situation. The local government chose not to renew the contract and, furthermore, opted to remunicipalize the system and its management. This document provides an evaluation from the perspective of political ecology, which focuses on two dimensions: social inclusion and environmental justice. The primary outcomes are within the framework of water commodification, where the service operation primarily views users as customers who must pay their fees promptly, while the city's growth is seen as a business opportunity. The logic of market environmentalism also restricts the exploration of options to secure water resources for the region's future. Currently, there is a failure to address the substantial overexploitation of groundwater sources that the drinking water service relies upon, which jeopardizes both the population's fundamental right to water and the city's sustainability. The case of Aguascalientes, Mexico, is significant because it represents not only the initial foray into private company involvement in providing drinking water services in this country but also stands as the first instance where the contractual term concluded. Consequently, local authorities opted for remunicipalizing the service to be administered by a public organization.

KEYWORDS

privatization, urban water management, water commodification, government regulation, remunicipalization

Introduction

The objective of this article is to assess the situation as the concession contract for drinking water and sewerage services in the city of Aguascalientes, Mexico, approaches its conclusion. This contract, initially awarded to a private consortium and eventually headed by the French corporation Veolia, was initially granted in 1993 and is set to expire in 2023. The decision made by the municipal government of Aguascalientes was to discontinue the private participation scheme and instead remunicipalize the service.

To begin, the article initiates a theoretical reflection on privatization and the current ongoing situation. Despite the unsatisfactory outcomes of private involvement in this sector, particularly

in terms of ensuring equitable access to water for the population and achieving environmental balance for environmental justice, there persists a reluctance to depart from the market environmentalism paradigm, even as water management returns to public control (Bakker, 2003).

Subsequently, the article provides a concise overview of how private participation in the water sector has been promoted in Mexico over the past three decades. It then delves into the case of Aguascalientes, which was a pioneering example in the early 90s as the first city in the entire country to adopt this approach.

The comprehensive analysis of the Aguascalientes case is conducted through an examination of data pertaining to the management of drinking water and sewerage services, which are sourced from official outlets. This analysis sheds light on the dimensions that the paradigm of market environmentalism, as discussed by Bakker (2003), compels us to consider social inclusion and environmental justice.

Privatization, market environmentalism and water management in the city

Globalized cities have become arenas of contention for scarce resources such as land and water. Although urban governance structures have undergone transformations aimed at becoming platforms for territorial decision-making and the inclusion of local actors, the opening to diverse social stakeholders has remained limited. Consequently, the outcomes of public policies often fall short of addressing social inequalities and environmental injustices.

In Latin America, urban governance institutions have been structured since the 1980s to perpetuate patterns of capital accumulation. Local governments have assumed the role of "facilitators" for private entities seeking to exploit the land market's potential and attract investments from the globalized economy. These governments make public services necessary for urban growth available to the market. They act as intermediaries in the interaction between private actors and embrace a business-centric view of the city. Consequently, policy decisions, rather than resulting in benefits for the territory and its population, tend to replicate the investment priorities of dominant actors, perpetuating urban inequalities (Harvey, 1989).

Breaking away from the market-enviromental paradigm in water management has proven challenging. Neoliberal reforms have managed to adapt and coexist with the routines and structural conditions they aimed to eradicate, including political clientelism, selective public investment benefits, and the influence of influential economic and political groups at the local level (Castro, 2009; Bakker, 2010).

From this perspective, water is perceived as a highly productive factor for capital. However, due to its scarcity, the market is considered the most efficient allocation mechanism (with the primary goal of maximizing the surplus value water can generate). Environmental sustainability, while acknowledged, is often postponed, or addressed incrementally, particularly in regions with limited water resource availability.

The preferred public policies in water management within this context involve increasing supply through large-scale transfer projects from neighboring basins. These projects require public investments in infrastructure that can be delegated to private entities for construction and operation, allowing them to benefit from tariff collection. Unfortunately, the costs are often passed on to users, who are primarily viewed as customers rather than citizens.

Water governance structures, in particular, limit user participation. They include only social sectors that "represent" the most influential groups in the city or those deemed knowledgeable about the technical aspects of water management. The ability of social actors to influence public decision-making is restricted primarily in the early stages of the policy cycle (during the formulation of general city development plans) rather than in their implementation, monitoring, or evaluation. Moreover, information on indicators of water availability, quality, and distribution is not always publicly available, and accountability mechanisms often operate inadequately (Caldera-Ortega, 2012).

This structural issue explains why models of private management or even remunicipalized drinking water and sanitation systems in Latin America, where privatization was previously implemented, struggle to break free from the prevailing commercialization scheme of the commercial-environmental paradigm and to restore public control over water management (Pigeon et al., 2013).

Literature reviews that emphasize the dimensions of social inclusion and environmental justice tend to report similar findings. The private sector frequently passes the costs of planned and unforeseen investments directly to users, either through tariffs or indirectly through government-funded investments. Access to water quality and continuity is unequal in the city, with social sectors possessing greater economic resources experiencing more positive indicators. Conversely, poor sectors often pay more for water as their primary access is through informal sources (such as water tankers, pipes, or common sources). In environmental terms, the private sector or corporatized organizations display limited commitment to environmental education related to water conservation. Investments in recovering lost water volumes during transmission within the city are inadequate, as is commitment to wastewater treatment and reuse. In areas with physical water scarcity, strategies favor increasing supply through long-distance transfer from other basins (Bakker, 2010; de Gouvello and Scott, 2012; Castro, 2015).

The suboptimal performance in the provision of drinking water and sanitation services is primarily attributed to the absence of effective governance institutions, particularly the trio of transparency, social participation, and accountability mechanisms (Tortajada, 2010, p. 301). In Latin America, over the last three decades, numerous medium-sized cities have aimed to facilitate private sector involvement in the delivery of drinking water services. However, these efforts often lacked the design of institutions, rules, and mechanisms necessary for user control and supervision. There was a misconception that technocratic management and market incentives alone would suffice to ensure the satisfactory provision of these services, disregarding other social and environmental dimensions.

Analytical model and methods for observing experience

Evaluating private participation experiences or various forms of delivering public services in their corporatized formats in the region

necessitates examining not only traditional operational indicators but also those shedding light on the outcomes related to social inequality and environmental injustices.

In terms of equity, attention should be given to multiple dimensions, including effective and high-quality access to drinking water and sanitation services, as well as the costs borne by users. This extends beyond tariff values to encompass other expenses associated with accessing water within or outside the home. Such analysis requires a focus on the impacts that affect different segments of the population, with particular emphasis on the most disadvantaged groups.

Regarding the dimension of environmental justice, it is imperative to assess the condition of water supply sources in terms of their sustainability and balance for the future. This involves examining the direction of infrastructure investments to optimize resource utilization and the commitment to implementing strategies that align with adjusting the demand for water resources within the city (Figure 1).

This article undertakes an analysis encompassing two critical dimensions: social inclusion and environmental justice. It reviews the outcomes within the city of Aguascalientes, Mexico, which has operated under a management model based on the concession of drinking water and sewerage services for the past 30 years. The contract, held between Veolia and the city, is set to expire in October 2023. The examination of data draws upon publicly available sources, including databases and official documents containing recent city diagnoses. These diagnoses have played a pivotal role in shaping the city's planning over the past 2 years and have served as the foundation for determining the future operating model post-concession contract expiry.

Brief overview of the privatization of drinking water services in Mexico

The establishment of a suitable institutional framework for privatization in Mexico commenced with the reform of the Law of Rights and the Water Law in 1985. This reform marked the end of a "long period, which began in 1929, during which the federal government largely refrained from charging for the use of the nation's water" (Aboites Aguilar, 2009, p. 88). Starting from the subsequent year, the collection of fees for water usage became a critical component

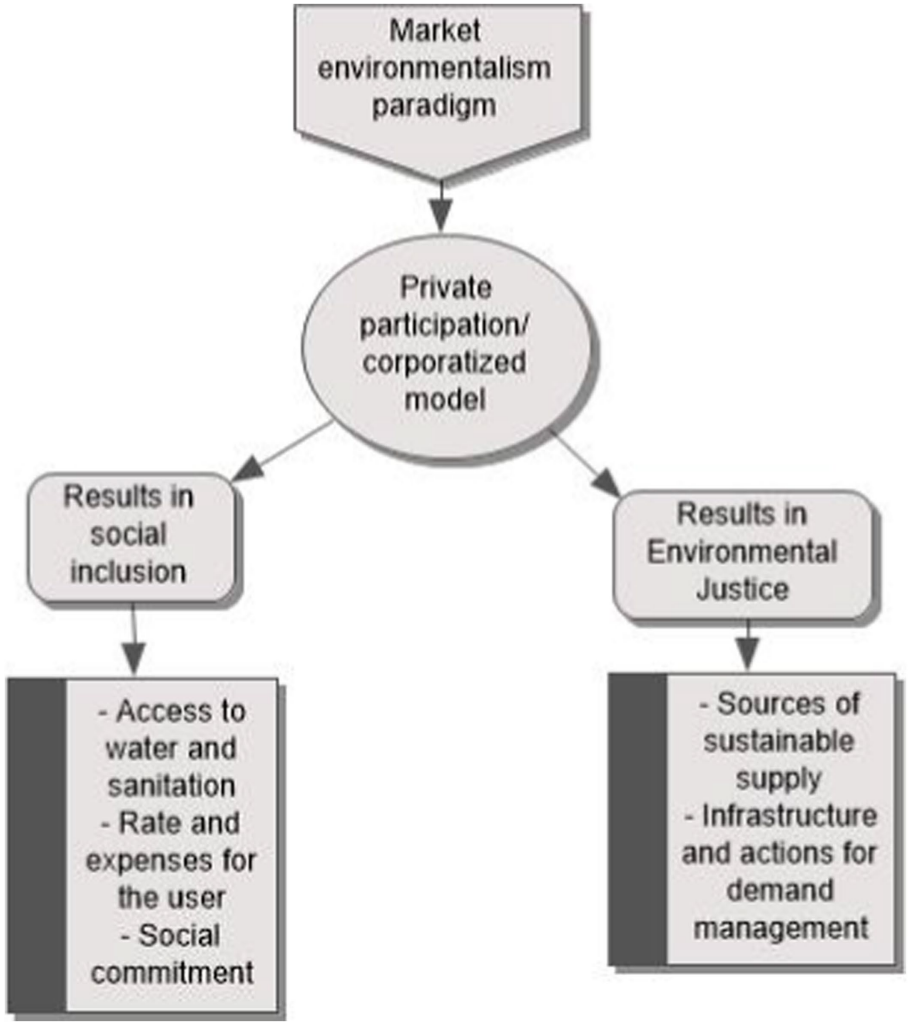


FIGURE 1
Analytical model. Source: Authors.

for implementing the overarching direction of water policy. This policy was later institutionalized through the National Water Commission (Conagua), a government agency responsible for water management since 1989.

Conagua has consistently advocated for the adoption of market mechanisms to encourage private investment and the efficient utilization of water resources in the drinking water, sewerage, and sanitation sectors. From its inception, Conagua published guidelines aimed at 'modernizing' this subsector, emphasizing principles such as decentralization, autonomy, and the involvement of private initiatives in service provision (Pineda Pablos, 2002). Perceiving that the agencies responsible for delivering these services at the state and municipal levels often operated with limited technical capacity and low levels of administrative efficiency and revenue collection, Conagua initiated efforts to promote necessary legal and institutional transformations in states across the country.

To facilitate these institutional transformations in states and municipalities, Conagua relied on the National Program for Drinking Water, Sewerage, and Sanitation in Urban Areas (APAZU). This program involved the development of master plans and infrastructure projects, as well as the reorganization of operational agencies. Conagua actively promoted the involvement of private initiatives in various schemes, particularly through TOC (construction, operation, and transfer) arrangements for hydraulic infrastructure. This primarily included aqueducts for long-distance drinking water transfer and wastewater treatment plants.

The city of Aguascalientes, located in the state of the same name in the Mexican federation, was the pioneering case in the country. In 1993, it signed a contract for the provision of comprehensive services, encompassing extraction, conveyance, and collection. This approach was followed by Cancun in 1994, Navojoa in 1996 (which was later remunicipalized in 2004), and finally, Saltillo, Coahuila, in 2001, adopting a mixed company model where 51% of the financial capital is public and the remaining 49% is private. Subsequently, Puebla and Quintana Roo progressed with full concessions for their drinking water systems. The former included five municipalities in 2014, while the latter, in addition to the previously mentioned concession in Cancun, expanded to several surrounding municipalities in the same year. Among the examples featuring the management and leasing model (commonly known as M&L), notable cases include Mexico City and Veracruz. Querétaro also joined this trend, starting in 2021, with a unique model where real estate sector companies obtained concessions for neighborhoods and newly developed areas within the capital city (Map 1).[1]

It is indeed true that many cities in Mexico continue to adhere to the model of public management for drinking water services. However, the pressure to expand private participation in the sector persists, particularly through partial contracts that involve specific areas of cities or various aspects of service management. These aspects may include tariff collection, infrastructure maintenance, or even the construction of new facilities, with subsequent operations entrusted to private companies. This trend has continued despite the 2012 reform of the Mexican Constitution, which enshrined the human right to water.

The challenge lies in the development of derived laws, primarily a General Water Law, that could translate this constitutional principle into a tangible reality. Unfortunately, reaching a consensus among the different political parties within the Congress of the Union (National Legislative Power) regarding the specific regulatory and financial mechanisms required for effective implementation has proven to be a complex task. As a result, the full realization of the human right to water remains a goal yet to be fully achieved in practice.

The following table displays investments made by various levels of government in Mexico, along with those from the private sector (categorized under "other" in the table) over the last two decades. By a significant margin, federal, state, and local governments have been the primary contributors to investments in the expansion of water distribution networks in cities, water transfer projects, and the maintenance of water infrastructure (Conagua, 2022). Specialists attribute this trend to unfavorable conditions for private investment in Mexico, primarily driven by economic instability and legal uncertainties. However, the prevailing view among key stakeholders in the public and private sectors of the water industry is that greater private investment should be encouraged. Investment levels across all sectors have been relatively low, and experts suggest that over the next decade, investments need to be two or three times higher than they have been thus far in Mexico to meet the United Nations' sustainable development objectives (Badillo, 2023) (Graph 1).

The case of the city of Aguascalientes

Aguascalientes is a city located in west-central Mexico with a rich historical background. It was founded in 1575 by Spanish settlers in the vicinity of the Kingdom of New Galicia. The city was strategically positioned on the "Camino Real de Tierra Adentro," a vital route connecting the silver mines in the north, including Santa Fe (now in New Mexico, United States), and Zacatecas with the capital of the New Spain territory, which is present-day Mexico City (González, 1881).

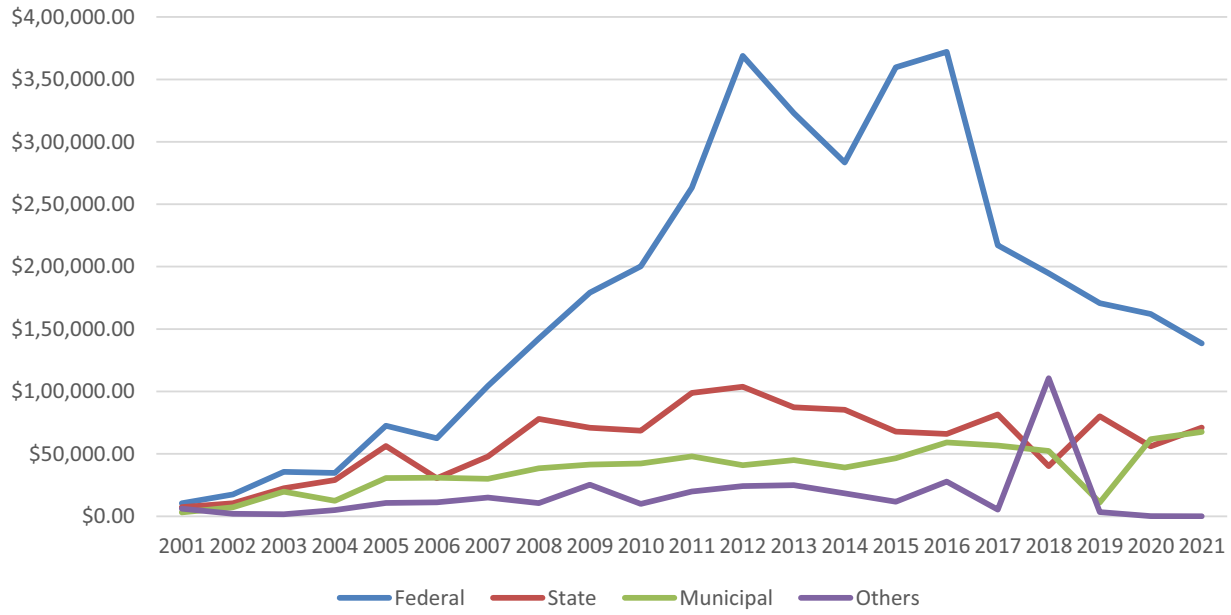
Originally named Villa de Nuestra Señora de la Asunción de las Aguas Calientes, the city was established to provide a resting place and protection for convoys transporting silver. This area was frequently besieged and attacked by indigenous Chichimeca groups. The region was characterized by a fertile valley nourished by hot springs, primarily from the "Ojocaliente" spring (*Ibid.*). These hot springs played a significant role in irrigating the abundant orchards in the city and contributed to its agricultural focus during that era. However, due to increased demand and the establishment of the National Railway Workshops during the Porfirista period (1876–1911), the natural springs began to show signs of depletion, leading to the drilling of the first deep groundwater wells in the early 20th century (Gómez Serrano and Delgado Aguilar, 2011).

Concerns about water scarcity and the need for an efficient water service prompted residents to organize in the first half of the 20th century. Their demands included the federalization of the water service system in 1936 and the exploration of new water sources for the working-class neighborhoods near the railway workshops in 1941 (Delgado Aguilar, 2019).

As of 2020, the sociodemographic profile of the municipality and city of Aguascalientes includes a population of 948,990 inhabitants,

1 The latter is a phenomenon of the main cities of Mexico, where Aguascalientes is not the exception as will be seen later.

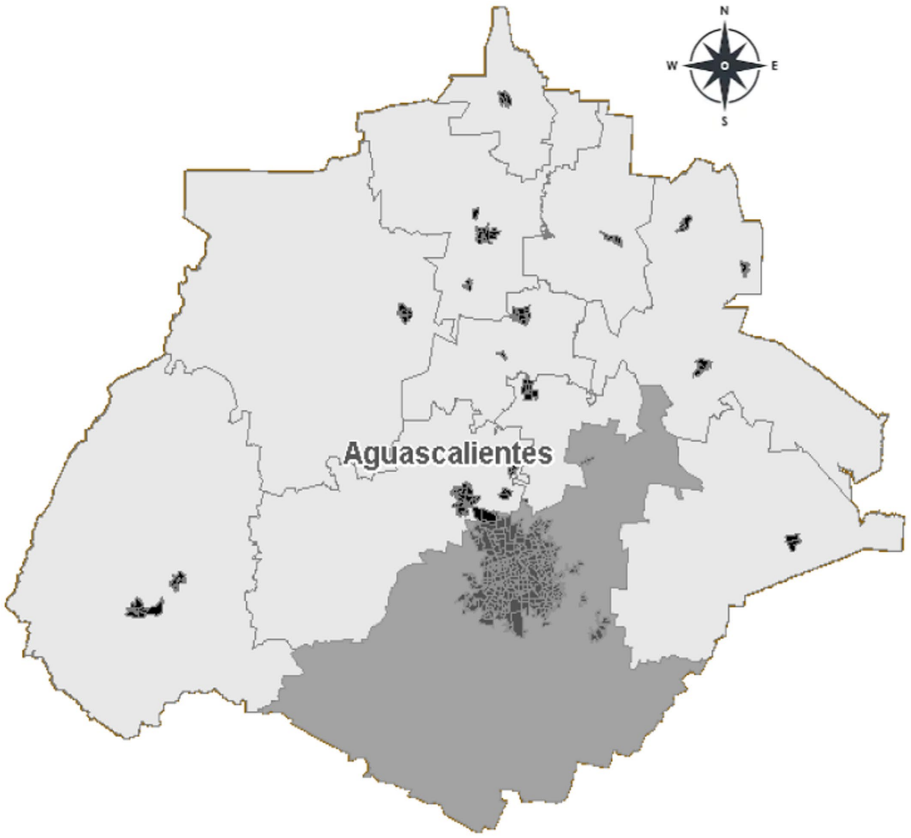
MAP 1
Cases of private participation in the water sector in Mexico. Source: Author's construction.



GRAPH 1
Investment in water and sanitation in Mexico, by origin of the resource. Prices in US dollars base value of 2018. Source: Author's construction based on Conagua (2022).

constituting 75% of the total population of the state. Gender distribution is relatively balanced, with 51.3% being women and 48.7% men (INEGI, 2020). The municipality covers an area of 1,178 km^2, with a population density of 806 persons per km^2. The provided map delineates the boundaries of the capital municipality of Aguascalientes and its urban area, which, according to INEGI (Mexico's national statistics and geographic institute), comprises areas with more than 2,500 inhabitants (Map 2).

In terms of the economically active population, Aguascalientes has a significant workforce, with 65% of the total population participating in economic activities. This workforce is distributed across various sectors, with 47.9% engaged in the service sector, 48%



MAP 2
Municipality of Aguascalientes and its urban area. Source: Author's construction based on INEGI (2022).

in the manufacturing and industrial sectors, and 4.1% in the agricultural sector. The manufacturing sector, particularly the production of cars, vehicles, and auto parts, plays a prominent role and has attracted substantial international investment. Notable brands such as Nissan-Renault, Daimler Infinity, and Mercedes-Benz, as well as electronic component companies such as Sensata, Flex, or Marelli, have a significant presence in the region (INEGI, 2018).

When referring to social wellbeing, as measured by the National Council for the Evaluation of Social Policies of Mexico (CONEVAL), Aguascalientes is classified as having a "very low lag" status. This classification indicates that the state experiences relatively few deficiencies in key areas, including education, access to health services, basic housing services, housing quality and spaces, and household assets. Among the nearly 2,469 municipalities and territorial demarcations in Mexico's 31 states and Mexico City, Aguascalientes stands out as one of the 70 municipalities with the fewest deficiencies according to the social lag index calculated by CONEVAL (2020).[2]

For a more detailed understanding, the table below presents data for the four municipalities in Aguascalientes with the highest social lag and the four municipalities with the least social lag, out of a total of 11 municipalities in this Mexican entity. This information underscores Aguascalientes' relatively favorable socio-economic conditions, especially when compared to less fortunate regions in Mexico (Table 1).

Aguascalientes, despite its strong economic performance and its ranking as the seventh "most livable" city in Mexico according to the Peace Index of the Institute for Economics and Peace (IPC) in 2021, has experienced growth and economic development over the last four decades that heavily relied on the intensive use of its limited natural resources, particularly water (Herrera-Nuño, 2022).

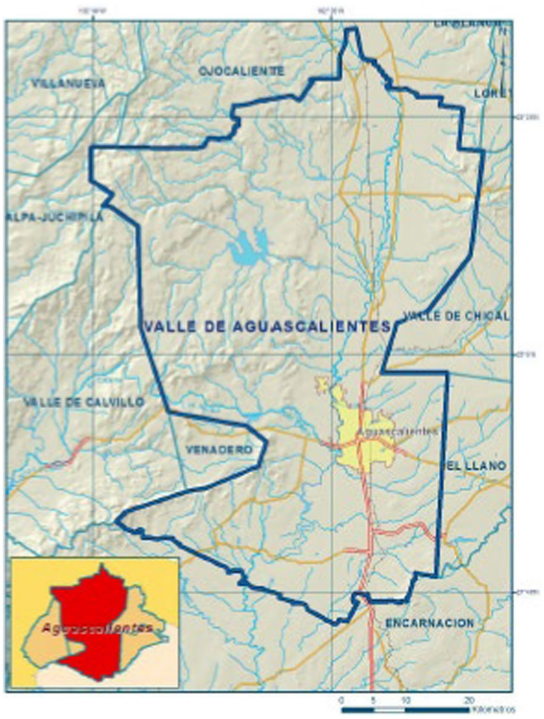
The city of Aguascalientes relies on the extraction of water from the Aguascalientes Valley aquifer, which provides approximately 99% of the water used for human consumption, specifically for the capital municipality of the state. Since 1963, the aquifer has been subject to legal restrictions, as it was recognized that "free extraction" was not sustainable. The primary use of the water is for agriculture, accounting for 75% of the concessions granted by Conagua. This is followed by urban public use at 16%, industrial use at 8%, and the remaining 2% allocated to other purposes such as livestock. The total volume of extractions from the entire aquifer is reported as 347,626,050 cubic meters per year, according to the Public Registry of Water Rights (REPDA). Calculations by the relevant authority indicate a natural recharge of 249.6 cubic hectometers per year (hm^3/year), with an additional 2.4 hm^3/year attributed to committed natural recharge. These figures result in an estimated overexploitation of the aquifer at −100.426050 hm^3/year

2 The specific data from the table are not provided in your text, but it would typically include metrics related to education, healthcare, housing, and other social wellbeing indicators for these municipalities.

TABLE 1 Comparison of municipalities with the highest and lowest degree of social backwardness in Aguascalientes at 2015 (percentage).

Indicator	Municipality							
	Greater degree of social backwardness				Lower degree of social backwardness			
	El Llano	Asientos	Tepezalá	Calvillo	Aguascalientes	Pabellón de Artega	Jesús María	San Francisco de los Romo
Degree of social backwardness	Low	Low	Low	Low	Very low	Very low	Very low	Very low
Place in the national context	1835	1950	2050	2077	2397	2293	2286	2277

Source: CONEVAL (2020) based on INEGI Intercensal Survey at 2015.



MAP 3
Aguascalientes Valley Aquifer. Source: Conagua (2020, p. 3).

(Conagua, 2020, p. 37). This situation highlights the significant challenges related to water resource management and sustainability in Aguascalientes, where economic development has placed a heavy demand on its already strained water resources (Map 3).

The water crisis in Aguascalientes, characterized by physical scarcity, prompted political and social actors to seek alternative water management models. During the 1980s, and particularly toward the end of that decade, a potential solution began to emerge. Dominant political and economic figures saw private sector participation to access additional capital, which could then be invested in exploring alternative water sources. It was believed that market-based instruments, such as tariffs, could influence the behavior of stakeholders and promote more rational consumption patterns. These arguments formed the basis for the decision in the early 1990s to grant concessions for the provision of drinking water and sewerage services in the city of Aguascalientes (Granados-Roldán, 2006, 2015).

Below, we will briefly outline the key moments and actions that contributed to shaping the rules and the environment within which the concession of water services took place in this central-western Mexican city.

Institutional development of the concession of drinking water and sanitation services in the city of Aguascalientes (1993–2023)

As previously mentioned, the case of Aguascalientes marked the first case of private sector participation in the drinking water sector in Mexico in January 1993. This concession, originally set for 20 years, was awarded to a partnership consisting of the ICA group (Ingenieros Civiles Asociados), Banamex (Banco Nacional de México), and the Compagnie Générale des Eaux (which later became part of Veolia-PROACTIVA, with total ownership since 1996). The concessionaire adopted the name Concesionaria de Agua de Aguascalientes (CAASA), and the local government entrusted the Aguascalientes Municipality Drinking Water Commission (CAPAMA), which had been the public operating body since 1984, with the role of regulatory authority.

From the outset, this privatization experience was met with significant controversy. Municipal, state, and federal authorities, all aligned with the Institutional Revolutionary Party (PRI), supported the concession model. They argued that this approach would address the issue of overexploitation of the Aguascalientes aquifer by introducing incentives to alter consumption patterns through the introduction of a economic value for water, which had previously been undervalued. Additionally, they believed it would inject resources to settle existing liabilities, invest in new infrastructure, replace aging networks, and explore new sources of supply. The underlying premise was that local public administration, represented by the municipality of the capital, should focus on core governance responsibilities, and collaborate with private initiatives to enhance service coverage, quality, and timeliness.

The challenging climate, coupled with the economic crisis of 1994 and the complex national political landscape, led to a political shift at the local level in 1995. The main opposition party at the time, the National Action Party (PAN), took control of the municipal government. Once in

power, the new municipal government attempted a "service rescue" in March 1996. However, this move resulted in the intervention of higher levels of government (state and federal, which were still under the control of the hegemonic PRI party at the time).

Through negotiation, the parties (the company and the municipal government) reached a revised concession agreement. This renegotiation included several key terms:

1. Modification of rate-setting mechanisms.
2. Extension of the concession period from 20 to 30 years.
3. Creation of a Social Support Fund aimed at benefiting users with fewer resources. Funding for this fund would be generated from a small percentage included in the user tariff.
4. Commitment from all three levels of government (municipal, state, and federal) to cooperate with the concessionaire company in settling its debts.
5. Transformation of the supervisory body, which would henceforth be known as the Citizen Water Commission for Drinking Water and Sewerage of the Municipality of Aguascalientes (CCAPAMA).

However, it is important to note that the renegotiation of the 1996 concession title (contract between local government and company) diminished the regulatory and sanctioning powers of CCAPAMA itself in cases of non-compliance by the private company. This reduction in authority was particularly evident in the removal of sanctions and the grounds for various types of breaches that the concessionaire could incur, which had been present in the 1993 version of the concession title. The following list refers to all potential instances of non-compliance by the concessionaire company, which were previously subject to government sanctions if they occurred, but were not included or had the sanctions removed during the renegotiation of the 1996 contract (ITESM/CCAPAMA, 2012):

- User register "not updated";
- Billing not delivered to users on time in 10% of the total register;
- Delivery of receipt to users that varies toward the discharge in 25% of their consumption, they are before performing physical inspection;
- Unattended user complaints;
- Failure to comply with housing connection deadlines when the user has paid;
- Measurement of "air" in pipes;
- Failure to meet deadlines for replacing meters that fail in homes;
- For not repairing leaks on public roads within a period greater than 48 h from the report;
- For not meeting the request for tank cars in rural areas;
- Due to loss of water pressure in pipes.

In an analysis of the balance of investment and operational responsibilities between CCAPAMA and CAAASA/Veolia, as well as an assessment of collection and profits, the terms of the concession agreement placed the municipal government at a significant disadvantage compared to the company. The table below summarizes the processes of the water management model in which the municipal government, through CCAPAMA, retains the responsibility for investment, including joint operations with the private company responsible for the service. This analysis was conducted in 2012 by a team of auditors led by researchers from the Instituto Tecnológico de Estudios Superiores de Monterrey (ITESM), as requested by the regulatory body (Table 2).

According to the new 1996 agreement, subsequent changes to the regulatory framework and the thresholds of service quality indicators could only be reviewed every 4 years. The supervision by CCAMPAMA toward CAASA/Veolia only materialized in several audits: the first in 1998, which was solely financial; then in 2005, 2008, 2012, 2016, and 2022, which encompassed additional components such as the technical, management, and administrative dimensions.

Almost all audits have been preceded by a political climate of pressure from partisan actors and local social groups toward the municipal government so that it would increase its capacity for control and surveillance of the concessionaire company. Even with these changes in supervision by the local government, the institutional framework for regulation has been characterized as limited and insufficient to adequately monitor the provision of the service by the private company. Several analysts agree on the idea that regulatory capabilities should be strengthened since there was room for political discretion, especially on the part of the local government, and a weak framework of information obligations on the part of the company (Caldera-Ortega, 2004; Castro et al., 2004).

Since the economic crisis of 1995, the concessionaire company could not maintain investment commitments, and even both the state and federal governments have contributed to these liabilities. Of the $107 millons of Mexican pesos of debt that CAASA had acquired with the Santander Mexicano bank at the beginning of the concession, in 1995, they became $158 millons of pesos (approximately 12 millons of US dollars at 2000 prices). This amount was assumed by the Banking Fund for Savings Protection (Fobaproa) of the federal government in 1996. The following year, $70 millons of pesos were also recognized in debt with Conagua for payment of rights, which added up to a total of

TABLE 2 Comparison of liabilities and gains between grantor and concessionaire, after the renegotiation of the 1996 concession title.

Process	CCAPAMA	CAASA/Veolia
Supply and purification	Investment/Operation	Operation
Distribution	Investment	Operation
Feasibility studies for the growth of water infrastructure in the city	Investment/Operation	Not applicable
Customer service and marketing	Investment/Operation	Investment/Operation
Gathering	Investment	Operation
Sanitation	Investment/Operation	Operation
Reuse	Investment/Operation	Not applicable
Project management and investment scheduling	Investment/Operation	Investment/Operation
Support units	Investment/Operation	Investment/Operation
Fees and subsidies	Operation	Operation
Percentage of responsibilities	89%	65%
Percentage of profit from fee collection	1.70%	98.30%

Source: ITESM/CCAPAMA (2012, p. 168).

$230 millons of pesos, which by 1999 had already become $290 millons of pesos (a little more than 30 millons of dollars US dollars at 2000 prices).

Since the negotiations in 1996, it had been agreed to pay part of the debt; however, it was not until 2001 that this matter was settled when the concessionaire company assumed a payment of $110 millons of pesos (12 millons of dollars US dollars). The support from Conagua is also complemented by the start of the PRODDER program, as it forgives all debts for water rights to the operating organizations in the country, which benefited CAASA/Veolia with $90 million pesos (11 miollons of dollars) and the rest was assumed by the Institute for the Protection of Bank Savings of the federal government (Pineda Pablos, 1999).

The 2000 agreement also agreed that the three levels of government should make investments in drinking water and sewage infrastructure in the city of Aguascalientes for an amount of $284.20 millons of pesos in the period 2001–2005 (approximately 30 million US dollars), and the concessionaire company $25.8 millons of pesos annually (26,000 US dollars annually) until the end of the concession (Proactiva Medio Ambiente CAASA, 2006).

Since then, the three levels of government have continued to invest year after year in hydraulic infrastructure for the city of Aguascalientes. Although the data presented in the following table refer to the aggregate amounts of investment in urban areas in the state of Aguascalientes, a range that goes from 80 to 85% of these corresponds to the Aguascalientes municipality, so it is possible to express that the investment of $25 millons of pesos per year on average (26,000 US dollars) agreed to be disbursed from 2001 by the concessionaire company (amount considered in the fourth column called 'other') is significantly lower than what other essentially public sources of financing contribute (Table 3).

It is significant that the investment of "private" comes from the money of public funds that are channeled through the National Commission for the Promotion of Housing (CONAFOVI) and that finally is assumed almost 100% by the buyer of the house. The results of which the proponents of the private participation model concentrate on the technical dimension. The truth is that these results are a reflection of the millionaire investments coming not only from the concessionaire but also from public resources that both Conagua, the state government and the municipality itself, have applied through federal programs such as credits with public banks, the World Bank, or the Inter-American Development Bank.

After the demand for the remunicipalization of the service, the most heard demand among parties and leaders of social organizations attentive to this issue is to reform local legislation to prohibit service cuts to users with debts on their drinking water accounts. The main argument used by the actors who are against the service cuts is that this measure violates Article 121 of the General Health Law.

TABLE 3 Amounts of investment in hydraulic infrastructure in urban areas for the state of Aguascaliententes in period 2000-2021 (US dollars, base prices in 2018).

Year	Federal	State	Municipal[A]	Others[B]	Total
2000	$82,000	$86,000	$44,000	n/a	$212,000
2001	$264,000	$100,000	$196,000	$1,050,000	$1,610,000
2002	$452,000	$122,000	$398,000	$676,000	$1,648,000
2003	$606,000	$212,000	$430,000	$902,000	$2,150,000
2004	n/a	n/a	n/a	n/a	$0
2005	$1,100,000	$992,000	$378,000	$1,126,000	$3,596,000
2006	$600,000	$270,000	$406,000	$790,000	$2,066,000
2007	$1,210,000	$722,000	$492,000	$606,000	$3,030,000
2008	$3,076,000	$2,724,000	$444,000	$552,000	$6,796,000
2009	$1,978,000	$808,000	$648,000	$1,192,000	$4,626,000
2010	$978,000	$126,000	$566,000	$1,000,000	$2,670,000
2011	$3,686,000	$680,000	$1,326,000	$1,066,000	$6,758,000
2012	$5,410,000	$934,000	$2,960,000	$1,120,000	$10,424,000
2013	$5,076,000	$1,210,000	$912,000	$864,000	$8,062,000
2014	$3,946,000	$1,154,000	$532,000	$1,036,000	$6,668,000
2015	$5,728,000	$1,664,000	$838,000	$844,000	$9,074,000
2016	$5,980,000	$1,686,000	$1,020,000	$642,000	$9,328,000
2017	$0	n/a	n/a	n/a	$0
2018	$2,530,000	$2,840,000	$218,000	$20,000	$5,608,000
2019	$778,000	$0	$532,000	$1,444,000	$2,754,000
2020	$1,492,000	$1,474,000	$144,000	$0	$3,110,000
2021	$1,734,000	$1,772,000	$154,000	$0	$3,660,000

Source: Author's construction with data in Conagua, Situation of the Drinking Water, Sewerage and Sanitation Subsector, SEMARNAT, editions from 2001 to 2022. [A]Includes direct investment and PRODDER. [B]It refers to investments by state commissions, housing developments, credits, and contributions from private initiatives.

On 4 July 2002, the local legislative branch approved reforms to the Water Law of the State of Aguascalientes (LAEA) aimed at eliminating the possibility of cuts to debtor users. The proposal also raised the possibility that Congress would be the one to determine the amounts of the rate and manage the operation of the Social Support Fund (El Heraldo de Aguascalientes, 24 January 2003). For its part, the executive branch decided to veto these reforms. In reality, it was a "pocket veto," that is, the executive simply did not publish the reform to the law in the official gazette to make it valid, an issue that was made possible given the lack of clarity of the local constitution on this matter.

Issues such as remunicipalization or modifying the LAEA to avoid cuts to users with debts on their accounts due to the service are counterbalanced not only by municipal authorities or political actors linked to the government but also by social actors. For example, the set of local business and professional chambers, including civil organizations, on various occasions have asked for restraint and responsibility to make the best decisions that ensure the sustainability of the resource, regardless of whether the service is provided by a private company or the municipal government, also defending the possibility of service cuts.

The only effective modifications to the LAEA in the years that the concession has lasted have been secondary elements that apparently address issues that had temporarily generated controversy in the public debate. Particularly, technical-operational issues such as fee collection to public educational institutions; 'encapsulation' of water meters in homes and tadeo (interruption by areas of the city of the continuity of the flow of drinking water during the day or different days of the week), as well as negotiation of debts with users who owe their accounts. The reforms address complementary issues for the efficiency of the service within the private participation model, not approving any reform that could conflict with the model.

The conflict in the matter has been reduced over all these years, but the issue is always present. In electoral times, particularly local, the heated debate is resumed, and it was always threatened to take away the concession from CAASA/Veolia, even from 2018, to make society believe that things had changed, and the company leaves that name and openly assumes that of Veolia. It was handled as a company replacement, but Veolia had full control of the Aguascalientes concessionaire for at least 15 years.

During the 2021 electoral process to renew the state executive and municipal presidency of Aguascalientes, all candidates, including those who were winners of the National Action Party, stated that the concession for Veolia would not be renewed at the end of the 30 years of this to be completed in October 2023. After some attempts to make it seem that the decision would be made by reviewing all options, with the support of specialists and citizens, the decision in March 2023 was to remunicipalize the service in the figure of a decentralized public body, called the Aguascalientes Integral Water Model (MIAA, by the acronym in Spanish), with its stand out main feature being the formation of a "citizenized" Board of Directors, having broad decision-making capacities and budgetary autonomy. Veolia on its own has tried to enforce one of the alternatives that the concession title itself considers, which is the extension of the contract for 2 more years in case the municipal government cannot take charge directly due to technical and financial incapacity, but so far, the decision seems to be firm to return the service to the government apparatus in the figure of MIAA.

Several of the arguments of the current municipal authorities are based on the suboptimal results achieved in several of the standards that the concession title itself defined in the technical and financial aspects. Then, in addition to presenting some of these results, we reflect on them in terms of the dimensions of social inclusion and environmental justice, supported by housing data on access to water and sanitation in Aguascalientes.

Results of management under the private participation model

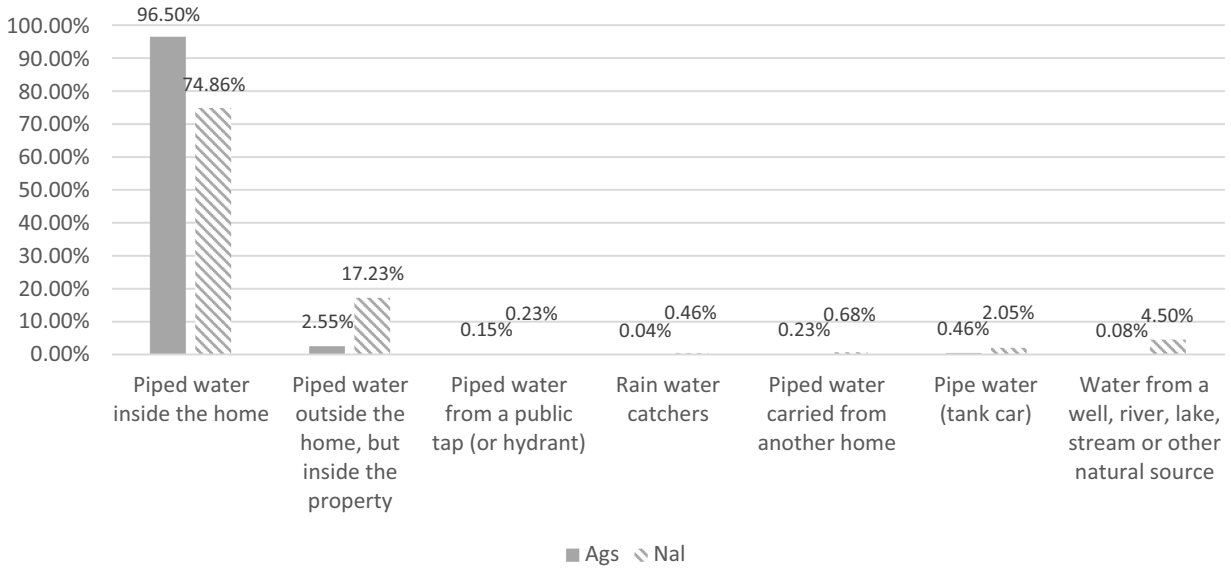
The data presented below seek to reflect not only the performance of recent years of water management in the city of Aguascalientes but also to take stock of how the service is toward the end of the 30-year concession period in the dimensions of social inclusion and justice.

Social inclusion dimension

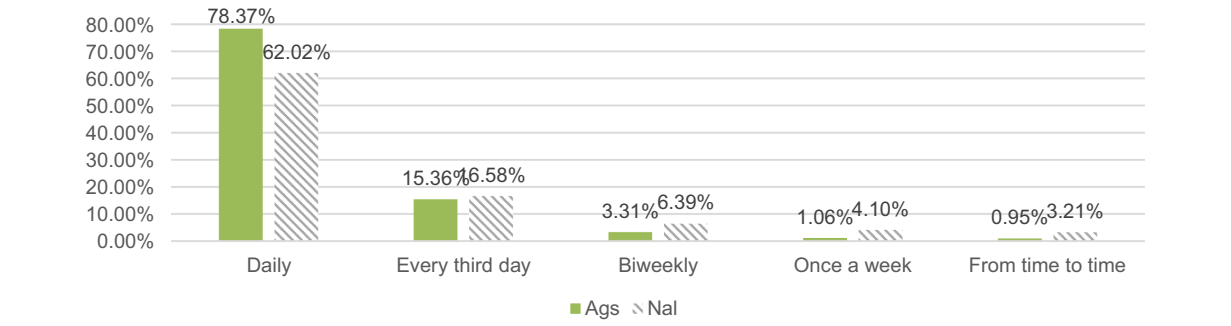
When discussing access to drinking water and sewerage services for the population, the most recent official data indicate that 98.6% of the population has access to the former in city of Aguascalientes. Within this population, only 92.99% have piped water inside their homes, while 6% have access to piped water within their own property but outside their homes. However, there is a 1% segment that must collect water from nearby sources (INEGI, 2020). Contrasting this data with the most recent information from the National Household Income and Expenditure Survey (ENIGH) by INEGI in 2022, it is reported that in Aguascalientes, 96.5% have access to water inside their homes, compared to the national average of 75%. The figures for Aguascalientes and the national average for those with water on their own property but outside their homes are 2.55% and 17.2%, respectively. The data also include marginal sources of access, such as public sources, rainwater harvesting, water delivery through tank trucks or pipes, water hauling, and water from neighboring properties or directly from natural bodies (Graph 2).

When examining the provision of drinking water in households and the frequency of service continuity, according to the ENIGH data from INEGI in 2022, it is reported that in Aguascalientes, 78% of households receive daily drinking water, compared to 62% in the national average. In Aguascalientes, 15.4% of households receive drinking water every 3rd day, while the national average is 16.6%. Additionally, 3.3% of surveyed households in Aguascalientes receive drinking water twice a week, while the national average is 6.4% (INEGI, 2022; Graph 3).

The sewerage access indicator for the entire municipality is 98% (Conagua, 2022). However, it is worth noting that the 2020 Population and Housing Census data from INEGI were collected during a pandemic, which posed logistical challenges. As a result, the INEGI National Statistical Yearbook adjusts this figure to 97% using data from 2018. When we break down this data further, we find that only 96% of the population has sanitation service through the public network, 2.19% use septic tanks or bio-digesters, 0.21% rely on ravines or crevices, 0.18% dispose of waste directly into rivers or lakes, and 0.97% reportedly do not have access to any type of sanitation. In absolute numbers, this means that 46,000 Inhabitants in Aguascalientes do not have access to sanitation from the public network (INEGI, 2022).



GRAPH 2
Access to water. Source: Author's construction with data on INEGI (2022).



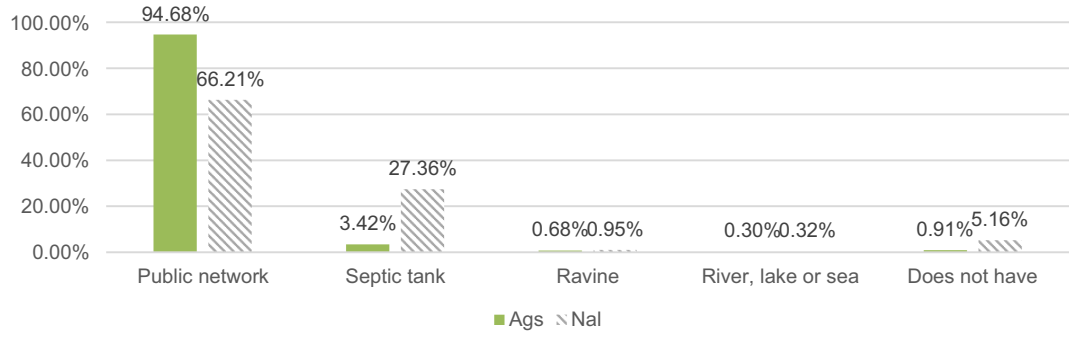
GRAPH 3
Water endowment. Source: Author's construction based on INEGI (2022).

The sewer or drainage connection data from INEGI (2022) indicates that 94.5% of homes in Aguascalientes are connected to the public network, whereas the national average is 66.2%. In Aguascalientes, only 3.4% of households dispose of their wastewater at home using a septic tank, whereas the national average is 27.4% (Graph 4).

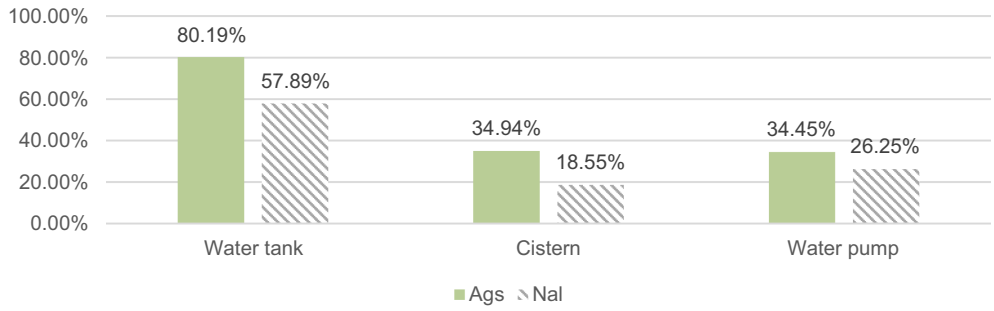
Regarding the tools or technologies used within households to address interruptions or availability issues with drinking water attributed to the concessionaire company, data from Aguascalientes indicate that 80.2% of households have a water tank for water storage, while the national average is 58%. Additionally, 35% of households have a system or cistern, compared to 18.5% nationally. Water pumps are devices used to pressurize water from cisterns to rooftop water tanks, and in this regard, 34.4% of households have this technology, compared to 26.2% nationally (INEGI, 2022). This aspect is significant as it reflects an additional investment made by users in their homes to ensure service continuity (Graph 5).

The main management indicators of the Veolia company in Aguascalientes as of 2018 indicate that the quality standard is generally met in the total water delivered, but on the other hand, sanitation is only applied to 5% of the water used in the pipes. In the city, 48% of the water is lost in distribution networks, there is only 80% commercial efficiency and only $8 of every $9 dollarse invested invested are collected (Instituto del Agua del Estado de Aguascalientes, 2022, p. 85).

Regarding the analysis of the costs paid by users to access drinking water and sanitation services in the municipality of Aguascalientes, it should be mentioned that the regulatory framework of the tariff structure includes the Water Law of the State of Aguascalientes, the Law of Drinking Water, Sewage and Sanitation Systems, and the Municipal Regulation of the Decentralized Public Body of the Municipal Administration of Aguascalientes (CCAPAMA), as well as the Concession Title of 1993 and modified in 1996. Although these instruments define the general guidelines for establishing the rate, the types of rates considered (domestic, commercial, and industrial), and even their indexation (annual increase due to inflation and the change in production costs for each cubic meter of water), what is not in these legal documents is how cross-subsidies are granted or its existence in the domestic sphere of differentiated costs according to the location



GRAPH 4
Drainage or sewerage. Source: Author's construction based on INEGI (2022).



GRAPH 5
Household implements to ensure availability and continuity of drinking water. Source: Author's construction based on INEGI (2022).

of the dwelling or home in domestic use (located in areas classified according to criteria used in the urban development policy that typifies the zones according to their socioeconomic level, identified as zones A, B, C, and D), which was specifically defined by guidelines signed in agreements between CCAPAMA and CAASA/Veolia itself (ITESM/CCAPAMA, 2012, p. 55). The cost of the rate for each of these classifications in the "domestic" type of users is shown in the following table. The data are shown in values current in 2018, presented in US dollars (Table 4).

The commercial and industrial rates, on average, represent twice the domestic rate type A for the first ($1 dollars, the minimum base amount) and twice the domestic rate C for the second ($18 dollars the minimum base amount), respectively. However, the registration for these two types of users does not exceed 5% of the total. There is another single rate for government offices, schools, public markets, and facilities of charitable institutions, which is $1 dollars per cubic meter consumed, but this type of user does not exceed 4% of the total registration. Finally, there are the "rural" type users, who represent 4% of the registration and start from the base amount of $6 for a block of 10 m3 and $1 for the cost of an additional m3. The user registration estimates are as follows: 63% are type A domestic users, 20% are type B, and 4% are type C (ITESM/CCAPAMA, 2012, p. 57) (Graph 6).

Although the intention seems correct in terms of implementing cross-subsidies in the drinking water service rates to benefit households in economically disadvantaged areas, the reality is that its design is deficient in ensuring that higher-income users bear the cost of subsidizing those with fewer economic means. This issue arises because the cross-subsidy in Aguascalientes is calculated by dividing all the costs (monthly or annually) by the total cubic meters of water delivered (billed), thereby obtaining the average cost per cubic meter of water. This means that some users are charged above this cost—mainly users in the middle-income category, who constitute the largest group within the total user base (i.e., type B users). On the other hand, some users are charged below this cost, especially those in the higher income category (domestic rate C and commercial and industrial rates). However, even though these higher-income users pay more, they may not necessarily be the ones subsidizing the lower costs for those in the lowest-income category. This discrepancy occurs due to the simple consideration of economies of scale (ITESM/CCAPAMA, 2012, p. 55).

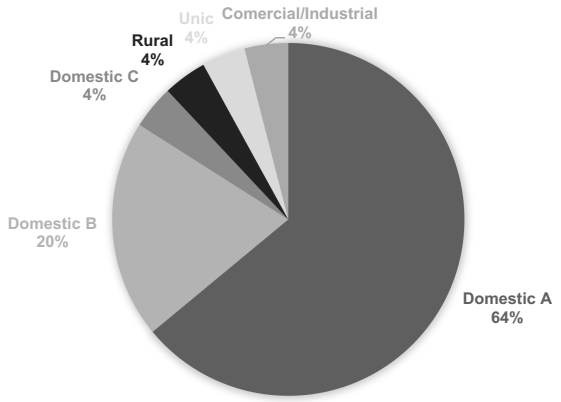
The 2017 INEGI Household and Environment Module (MOHOMA) survey asked respondents about the amount they paid on their water bills in the last month before the questionnaire was administered. The sample size for Aguascalientes was 423 observations, and the result was a statistical average of $10 dollars as the cost of the water bill (INEGI, 2018). To compare the level of the bill with other cases in Mexico where the private sector is involved in the operation of the water service, we present the data reported by each of the selected operating organizations. These data allow us to observe how their behavior has evolved over a time series spanning from 2011 to 2021 (Conagua, 2022; Graph 7).

The cost of the rate is presented in US dollars per year and is grouped, considering all types of rates within each drinking water and sewage service system in the main cities of the country. In this

TABLE 4 Rates in domestic users in Aguascalientes (2018 prices in US dollars).

Rank	Annual base volume	Base amount A	Additional M3	Base amount B	Additional M3	Base amount C	Additional M3
0–10	10	$6.49	$0.00	$8.22	$0.00	$12.54	$0.00
11–20	10	$6.49	$0.43	$8.22	$0.38	$12.54	$0.38
21–30	20	$10.76	$0.81	$11.89	$1.19	$16.16	$1.19
31–50	30	$18.70	$1.78	$23.89	$2.11	$28.22	$2.11
51–75	50	$54.70	$4.81	$65.89	$6.32	$70.22	$7.51
76–100	75	$174.76	$7.51	$223.46	$7.51	$257.78	$9.03
101-onwards	100	$362.32	$3.62	$411.03	$4.11	$482.86	$4.86

Source: ITESM/CCAPAMA (2012).



GRAPH 6
Distribution of register of users of drinking water services in Aguascalientes. Source: Author's construction based on ITESM/CCAPAMA (2012).

document, we present the values standardized to 2018 prices. As seen in Graphs 2, 7, the rate in the city of Aguascalientes is the highest among the selected cases, all of which involve private sector participation in the management of their systems, including Mexico City, Saltillo, and Cancún. Additionally, a line representing the average cost of the drinking water rate in the cities presented in the Conagua publication (2022) is included. Data from both public and private systems are extracted from this publication (Graph 7).

The final piece of information required to calculate the costs users incur to access water is identifying how much they consume or if they pay extra for bottled water for drinking purposes, instead of using the water provided through the public network. We collected this data from the previously mentioned MOHOMA survey by INEGI (2018), which indicates that a significant majority of Aguascalientes users purchase jugs or bottles of water for drinking, accounting for 74.4% of users, as opposed to the 19.4% who consume water directly from the municipal drinking water system that reaches their homes or residences (Graph 8).

Water, as a human right, encompasses five dimensions: quantity, quality, accessibility, acceptability, and affordability (Rojas Rueda, 2021). The 2012 reforms in Mexico, which recognize the human right to water in the Constitution, have challenged the private participation model, particularly in one of its management tools: the complete cutoff of supply to users with overdue payments, which is deemed unconstitutional. Mechanisms are necessary to ensure the human right to water. This does not imply that water should be provided for free, as users already pay for the service in their water bills. However, the local government, regardless of its management model, must guarantee this fundamental right. In line with international conventions, governments should ensure a minimum consumption of 50 to 100 liters per day per inhabitant (United Nations-Water, 2011).

On the other hand, the private company in Aguascalientes failed to ensure continuity of service, an essential aspect of service quality. They transferred the costs of their inefficiencies to users and did not invest adequately, or at least as committed, in maintaining urban infrastructure. Users, in one way or another, ended up bearing the brunt of these investments through their water bills and expenses on household equipment to store water, as well as the purchase of bottled water.

Due to the storage devices citizens were required to have in their homes (water tanks, cisterns, and water pumps), the quality of water was compromised, as it depended on users, and the company neglected its responsibility once the water entered users' homes and was stored by them.

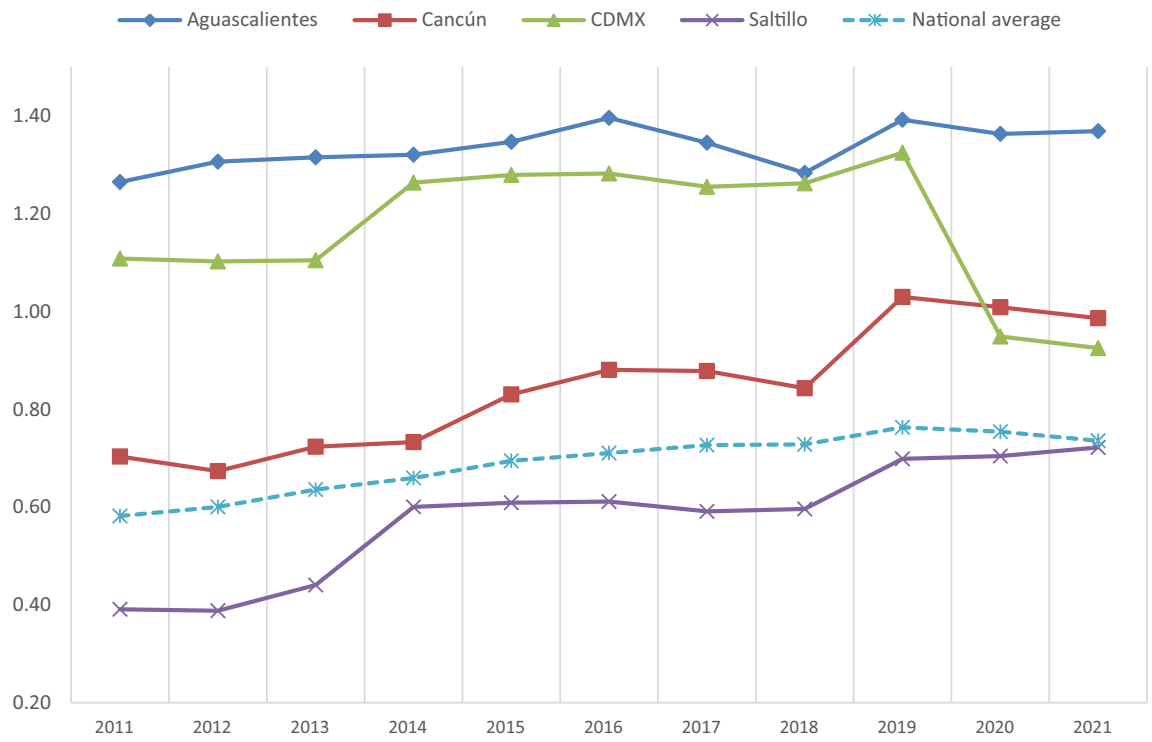
The high costs of the water rate affected accessibility, making it one of the highest rates in the country, even when compared to other cases of privatized drinking water services in Mexico.

There was no mechanism in place to hold the company accountable for its inefficiencies or to impose sanctions for rectifying its shortcomings. The regulatory mechanisms were ineffective, and the decision-making process lacked transparency. The link among users, regulators, and the company was broken.

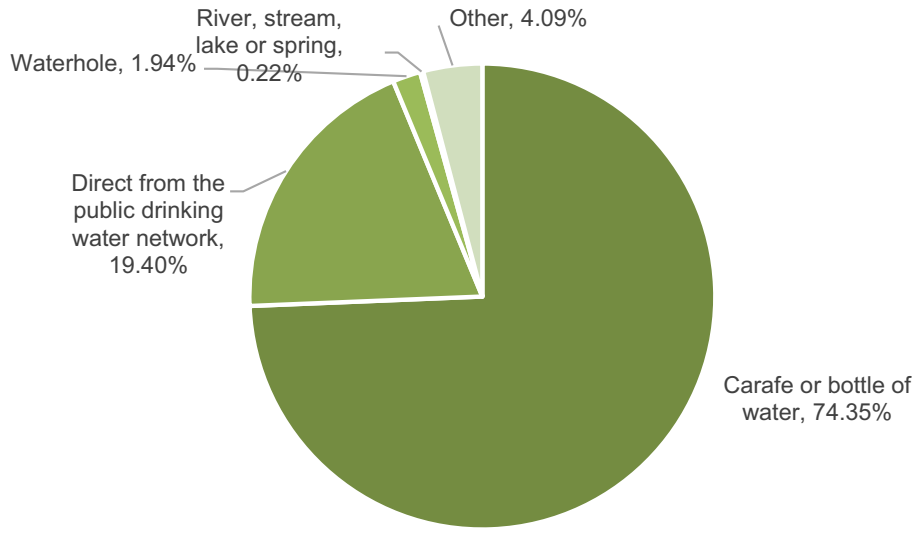
Environmental justice dimension

As mentioned at the beginning, the city of Aguascalientes depends on human consumption or public-urban use of 99% of the water that comes from the subsoil (that is, from the aquifer of the Aguascalientes valley). The aquifer has an annual pressure of 140.24%, so there is overexploitation of this natural source of water (Instituto del Agua del Estado de Aguascalientes, 2022).

The availability of water from the Aguascalientes Valley aquifer is virtually non-existent, as its annual consumption stands at 427.4 Mm^3 (millions of cubic meters), which is more than double the average annual recharge rate of 235 Mm^3. In essence, the aquifer is operating



GRAPH 7
Comparison of the rate of Aguascalientes and other cities in Mexico. Values in per cubic meter in US dollars, prices as of August 2018. Source: Author's construction based on Conagua (2022).



GRAPH 8
Water to drink by users in Aguascalientes. Source: Author's construction based on INEGI (2018).

with a deficit of 192.4 Mm3 per year. The primary user of the aquifer is the agricultural sector, accounting for 68% of the total volume, followed by the public-urban sector at 28%, while the remaining 4% is allocated to various other uses, primarily industrial (Rodríguez-Sosa, 2015, p. 10). In response to the ongoing issue of overexploitation, a ban was implemented in 1963, which remains in effect indefinitely throughout the state of Aguascalientes. This restriction permits only limited extractions from existing wells, and no new concessions are granted for any purpose.

The city of Aguascalientes relies on 264 wells for its water supply, with an extraction rate of approximately 82.6 Mm^3 per year. Although this represents only 20% of the total extractions

from the aquifer within the urban area, these wells have the highest extraction flows, ranging from 250 m^3/h to 436 m^3/h, and the greatest well depths, reaching depths of 400–600 m (Rodríguez-Sosa, 2015, p. 13).

The deepest drawdown cones in the aquifer area are found in the city of Aguascalientes itself, as well as in the north in the municipalities of Rincón de Romos, Pabellón, and San Francisco de los Romo. Average drawdown rates are −1.92 m/year, reaching rates of −3.52 m/year in areas where the water table is reducing more rapidly (The Nature Conservancy, 2017, p. 6). It is estimated that since 1970 and until 2017, the mining of the entity's aquifers accounts for around 34% of the groundwater reserves. This has impacted the extra cost of producing each cubic meter of water for all uses by approximately 200%, mainly attributed to the amount of electrical energy needed for subsoil water extraction (Instituto del Agua del Estado de Aguascalientes, 2022, p. 46).

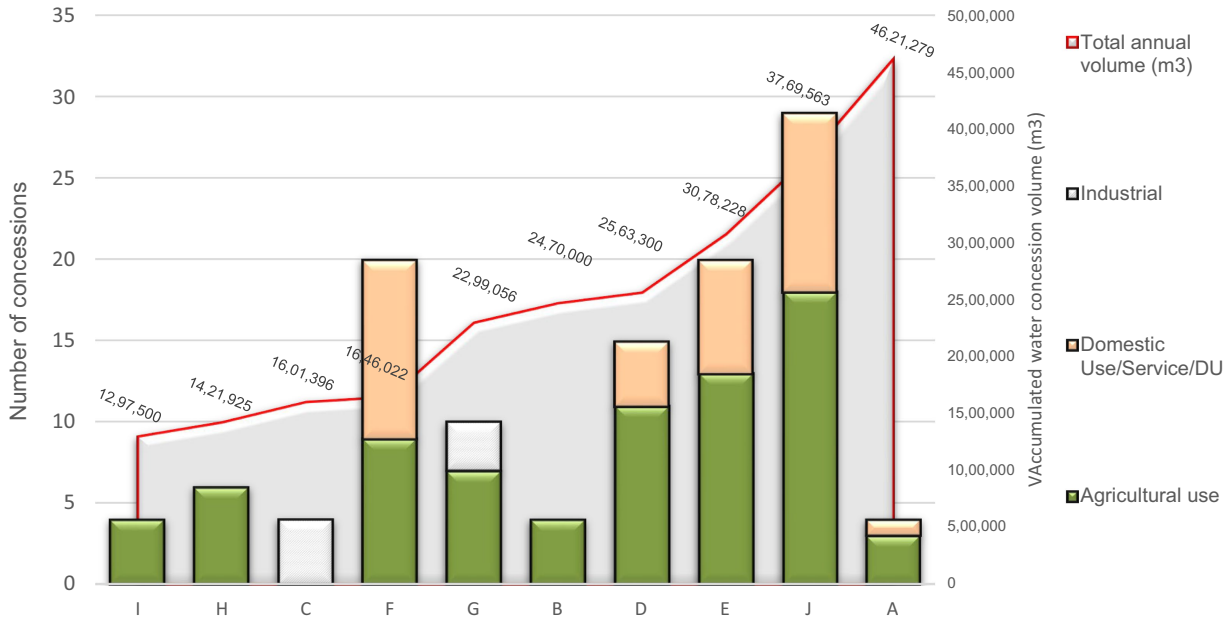
The intensity of agricultural activity and the demand for water in the area that leads to the depletion of the water tables mentioned, especially in the northern area of the aquifer of the Aguascalientes Valley, cannot be mitigated even with the modernization project of the irrigation district 001 of Pabellón de Arteaga that has access to surface water from the Plutarco Elias Calles Dam which as a declared objective has been defined to reduce the overexploitation of aquifers in the area of influence in the municipality of Pabellón de Artega (The Nature Conservancy, 2017, p. 14).

Climate change data recorded by various authorities indicate that in the last 20 years, there is an average increase of 0.32°C in the average annual temperature compared to the cycle periods on timelines that go from 1971 to 2002 and from 1980 to 2004 (The Nature Conservancy, 2017, p. 22). Drought periods are more recurrent and are reflected in the storage levels of dams in the state, which are 100% allocated to agricultural use but have historically remained at levels of 65–70% of their maximum storage capacity. From these reservoirs, farmers resort to alternative extractions from their groundwater concessions (Instituto del Agua del Estado de Aguascalientes, 2022).

If we add the projected population growth in the region, which is expected to increase at a rate of 9.9% per year by 2025 and 14.9% by 2030 (reaching a total of 1,507,807 inhabitants in the entire state of Aguascalientes), according to CONAPO data, the pressure on water resources will be even greater. Evidence shows that, although in recent years the population has reduced its water consumption due to a greater awareness of water conservation, during droughts and periods of high temperatures, extractions can increase by up to 30% (The Nature Conservancy, 2017, p. 23).

Special attention should be given to the phenomenon of the "concentration of groundwater extraction concessions" in the hands of a few entities. The following graph presents 10 cases highlighted in a journalistic investigation published by the internet portal of the association called "Mexicanos Against Corruption," conducted by Jennifer González, Mónica Cerbón, and other journalists, titled "The Water Exploiters" (González et al., 2020). This publication provides information for all 32 entities in the country, which is presented in an interactive graphic compiled from official data from REPDA of Conagua. It allows users to explore entities and individuals who not only hold multiple concessions but also extract significant volumes of water. The 10 cases that stand out in Aguascalientes are specifically related to the aquifer of the valley under consideration. The graph below illustrates each case with columns representing the number of concessions by type of use (agricultural, industrial, and domestic/services), identified by the numbers on the left vertical axis, and the volume of officially licensed water in cubic meters on the right vertical axis. All users are business entities, whether in the agricultural, industrial, or residential construction sectors, which we have identified with letters from "A" to "J" (González et al., 2020; Graph 9).

A parallel phenomenon to the aforementioned is the expansion of the city of Aguascalientes, giving rise to the



GRAPH 9
Users hoarders of water in Aguascalientes. Source: Author's construction based on González et al. (2020).

conurbation of middle-class suburbs on its outskirts where a 'silent and fragmented' privatization of water for public use or human consumption is taking place (González et al., 2020). The ambiguity of the National Water Law, which permits the 'purchase of water concessions/rights' across different uses, combined with limited regulatory control by the national authority, Conagua, has led to an increasing number of rights being transferred from agricultural use to public-urban or registered services. However, there are still water rights classified as agricultural, which, by their nature, benefit from a special 'zero cost' rate for water extraction. These rights are being used illegally to supply water in these suburban neighborhoods, with the drinking water services provided by the owners of these water concessions. This results in higher costs for users and a lack of mechanisms to regulate them or enforce the human right to water (González et al., 2020).

The specific issue of the concentration of water rights in the hands of a few entities, particularly construction companies operating in these suburban subdivisions to provide drinking water services, is a recent but gradually growing phenomenon. The local government has not shown any intention to undertake regulatory actions or establish a clear roadmap with concrete steps to bring these small systems, which are currently 'privatized' and 'fragmented' on the city's outskirts, under government control in the short or medium term.

In terms of environmental justice, a critical element to consider is the compromised state of the sole water supply source in terms of sustainability: the Aguascalientes Valley aquifer, which is suffering from overexploitation. Approximately three-quarters of the water is consumed by agricultural activities, which are not necessarily focused on ensuring local food security but rather on exporting agricultural products to both the national and international markets. The water used for these agricultural products is not the most efficient choice for sustainable aquifer use.

The second environmental concern relates to industrial use. While it accounts for only 4% of total extractions, it contributes significantly to the environmental crisis due to pollution. Although approximately 90% of the water used for urban and industrial purposes undergoes treatment, only 15% of that treated water finds a second use. Moreover, the hoarding of concession titles for agricultural and industrial use exacerbates the problem. Additionally, clandestine water extractions, which can represent up to 13% of the legal concession titles granted by Conagua, further contribute to the issue (Bolaños et al., 2020, p. 35).

Environmental injustice lies in how compromised the future water supply for human use has become. There are no alternative or nearby sources that can ensure the population does not face a 'day zero' scenario. Environmental injustice affects the entire population, as they bear the responsibility of raising awareness about water conservation, enduring the real costs of infrastructure inefficiencies, while agricultural, industrial, and water hoarding entities are not held to the same standards.

Efforts to protect the ecosystem remain limited as if the limits of Aguascalientes' development have not been exceeded due to the finite nature of its natural resources, primarily water. Urban water management maintains a fragmented or sectoral policy vision. Integrated water management is lacking, as the prevailing paradigm is one of market environmentalism, where water is primarily seen as a commodity.

On the one hand, water continues to be prioritized for productive uses, such as agricultural exports and industrial activities. There is no clear plan to ensure water for human consumption in the medium term through demand management and consumption adjustments based on the region's water availability. On the other hand, public discourse has been primarily centered on the city's water management model, without fundamentally shifting away from the market environmentalism paradigm and designing a comprehensive, sustainable water management policy.

Without a commitment to securing water for human consumption as a fundamental human right and for environmental conservation, the prospects for sustainability are bleak, and environmental injustice prevails over the region's population.

Conclusion

Discussing the privatization of the water sector in Aguascalientes, and more broadly for the Mexican case, necessitates a comprehensive reflection on the balance between physical and commercial efficiency, which has thus far dominated as the primary indicators for evaluating the outcomes of private sector involvement in water management in Mexico. Social participation, as a mechanism to guide water governance that aligns with environmental interests, encompassing the conservation of water sources and discharge management, remains an unresolved issue. This persists due to the inherent nature of the private sector, which prioritizes capital accumulation, often overlooking the management of one of the most crucial public services for social wellbeing, namely, drinking water and sewage.

The economic interests of transnational companies involved in this sector clash with the defense of collective interests for universal access to affordable and equitable drinking water, which also encompasses the preservation of water sources. These conflicting interests form the focal points of the ongoing debate regarding the desired water management model for the future in the capital city of Aguascalientes.

After 30 years of Veolia group management in the city of Aguascalientes, as the first privatization project in the Mexican water sector following the onset of the neoliberal model, it is now possible to objectively analyze the results achieved by the corporate-led model. The data presented reveal suboptimal performance in both technical and financial aspects. Furthermore, an examination of housing data related to access to water and sanitation in Aguascalientes indicates that the management of the Veolia group has compromised social inclusion and environmental justice in favor of maximizing profits derived from tariff payments made by households connected to the network.

According to the ENIGH, 3.5% of the Inhabitants in Aguascalientes city lacks access to drinking water, which translates to 33,214 inhabitants who do not have this essential public service. Additionally, a significant portion of the connected population faces irregularities in their water supply, affecting over 146,000 individuals.

In terms of tariff rates, the privatization model promoted by Veolia aligns with the characteristics of market environmentalism. Aguascalientes stands out for having the highest water rates compared to private counterparts in other Mexican cities, thereby undermining social inclusion by straying from affordability standards. This issue is compounded by the additional costs borne by users to ensure access

to drinking water for human consumption, leading to a high demand for bottled water.

In the environmental part, Veolia has not made progress with respect to the care of its main source of supply, the aquifer of the Aguascalientes Valley, which continues to show indicators of high depletion that puts at risk the viability of the human right to water and not to mention the sustainability of the liquid. This lack of attention at the source intersects with the physical efficiency of Veolia and its relationship with the problem of water waste, identifying clearly that it maintains the challenge of environmental dissociation since it presents a physical efficiency of 52% in their water distribution networks throughout the city, which demonstrates the low commitment of the corporate in a city with an aquifer that presents strong water stress to raise the efficiency in the use of the resource that shows guidelines for environmental responsibility by the corporate.

The primary justification for granting the concession and advocating for private sector participation in the full control of the drinking water and sewage system in the early 1990s was the belief that the financial investment from these private entities would facilitate the discovery of new water sources. Additionally, market mechanisms such as setting appropriate pricing through tariffs were expected to encourage rational consumption behaviors, fostering a sense of responsibility toward water conservation and the preservation of water sources, notably the Aguascalientes Valley aquifer. However, after 30 years of private sector involvement, neither of these anticipated outcomes materialized.

In practice, it has been government actors at the federal, state, and municipal levels who have primarily sustained investments in the sector, and there have been no substantial efforts to address the significant overexploitation of the aquifer.

The lackluster outcomes in the drinking water and sanitation subsector, prevalent not only in Aguascalientes but across the nation, can be attributed to a configuration that perpetuates power concentration, inadequate institutional structures that fail to promote engagement from most users, and a propensity to prioritize patterns of influence and negotiation among the elite. This approach tends to sideline meaningful discourse committed to the human right to water and democratic collaboration among stakeholders.

Worldwide best practices in water governance have demonstrated that the most effective institutional frameworks are those in which the population not only has guaranteed access to water for both human and productive use in adequate quantities but primarily because all interests are adequately represented in the decision-making process. This approach fosters a sense of equity, encourages innovation, and facilitates learning for both service providers and users.

To ensure universal access to drinking water and sanitation services, or at the very least, to introduce criteria that promote greater equity in public action, the government should manage its policies with a strong focus on redistribution. This involves mechanisms such as implementing cross-subsidies, guaranteeing a minimum level of access through municipal networks and infrastructure, or establishing support transfer programs for those in greatest need. These measures should be implemented regardless of whether the drinking water and sanitation systems are managed by public or private entities. While private sector investments are necessary and should yield fair returns, it is unrealistic to expect the subsector to rely solely on market criteria for the distribution and provision of services in an equitable manner.

Water scarcity is not just a technical problem; it is fundamentally a political and social issue that must be addressed to ensure both social inclusion and the conservation of natural water sources for environmental justice.

Author contributions

AC: main investigation, preparation of interviews, documentary review, and final writing. DT: data collection in official documents and newspaper sources, complementary writing, and support in preparing interviews. All authors contributed to the article and approved the submitted version.

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

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