Clean Water and Sanitation in San Luis Potosi

Global Summer Scholars Field Report

J. Esteban Marin Vaquero

September 30, 2019

Background

One of the most important issues in any city of the world is having enough water to sustain its population and needs. The United Nations Development Program has set the importance of Clean Water and Sanitation as Goal Number Six from the Seventeen Sustainable Development Goals (SDG) to "*protect the planet and ensure that all people enjoy peace and prosperity by 2030*" [1]. The urgency for not running out of water is a fundamental part for most local governments worldwide. Taking action by ourselves and not only expecting others to do what must be done is the reason I decided to apply for this in field research in my hometown, San Luis Potosi (SLP), Mexico.

For the purposes of this research I contacted the local authorities of SLP and worked in coordination with the water supply agency INTERAPAS[2]. Thanks to the support given by the WORLD Analysis Policy Center and the Hilton Foundation I diced to hire three research assistants (Mauricio Gonzalez, Pablo Narvaez, and Bernardo Villagomez) with the financial resources originally provided. Fortunately, I did not need the full scholarship for rent due to the fact that I own a small house in the city, so I decided to rent a small space and use it as an office. This freedom of choosing my team gave me the opportunity to work with full autonomy and focus the research in providing the INTERAPAS solutions to its problems without any political interference, which I'm totally grateful.

The case of San Luis Potosi

San Luis Potosi is a Mexican city located in the north center of the country and is the capital of the State of San Luis Potosi. Founded in the year 1592 A.C. and with plenty of silver, SLP was established as a mining town during the Viceroyalty of New Spain, nowadays SLP is an industrial city that provides half of the Gross Domestic Product (GDP) of the State due to the industrial activities. The metropolitan area of the of SLP is home of 1.19[3] million people and it's estimated that by the year 2030 the population will grow by 5.4% (being approximately 1.25 million people) [4].

Sociodemographic characteristics

According to the 2015 Intercensal Survey published by the the National Institute for Statistics and Geography (INEGI), there are 314 thousand households established in the city of SLP, where:

- 23.3% of the households have floor made from cement, 75.3% have a cement and wood firm floor, 1.1% have only soil as their floor, and the rest omitted an answer.
- 1.5% of the households have only one room, 6.6% have two rooms, 20.3% have three rooms, 30.4% have four rooms, 22.2% have five rooms, 10.4% have six rooms, and the rest have more than six rooms.
- 92.9% have tubing water inside the house, 4.7% have access to water outside the house, and 2.2% don't have access to tubing water.

[1] Retrieved from the United Nations Development Goals website: https://www.undp.org/content/undp/en/home/sustainable-development-goals.html.

[2] INTERAPAS states for intermunicipal metropolitan organism of potable water, sewerage, sanitation, and related services of the municipalities of Cerro de San Pedro, San Luis Potosi, and Soledad de Graciano Shanchez.

[3] Retrieved from the National Institute for Statistics and Geography, INEGI.

[4] Retrieved from the National Council for Population, CONAPO.

- 99.5% of the households have electricity and 0.5% don't have it.
- 45.4% of the households have internet connection and 54.4% don't have it, the rest omitted their answer.
- When partitioning the **quarterly income** for the households in SLP into quantiles [5] and **take the mean of each quartile**; in the first quantile (lowest income) a household gets \$3,149 MXN (\$205USD) [6], in the second quantile a household gets \$5,902 MXN (\$385$USD^{\S}$), in the third quantile a household gets \$8,936 MXN (\$583$USD^{\S}$), in the fourth quantile a household gets \$ 13,539 MXN (\$883$USD^{\S}$), and in the fifth quantile (highest income) a household gets \$29,847 MXN (\$1947$USD^{\S}$).

Supply and usage of water in SLP

The city has three main sources for getting sweet water are the Del Valle aquifer, the San Jose dam, and the Realito dam, where 92% of the water for public and domestic use is provided by the Del Valle aquifer [7]. The aquifer has been highly exploited since the 1960's because for every 2 cubic meters that are extracted every year, only one cubic meter refurbishes. This situation is a water stress scenario that endangers the inhabitants of SLP and jeopardizes the SDG.

Another important issue is that 70% of the surface of the San Jose dam has aquatic lilies. The lilies preclude the permeation of light causing oxygenation problems in the water, preventing that the organic matter cannot be degraded. This phenomenon affects the quality of the water in the dam, the growth or organic settlement in the bottom of the dam, and the growth and existence of marine fauna.

Both the overexploitation of the Del Valle aquifier and the aquatic lilies in the San Jose dam are mayor concerns for the supply of water in SLP, thus the INTERAPAS must carry out actions that can remedy both problems.

INTERAPAS

The INTERAPAS is a local organism that is in charge of providing potable water to the inhabitants of SLP. Founded in 1992, INTERAPAS has been having a financial deficit for more than 5 years, last year (2018) the organism reported a total deficit of \$308 million pesos (\$16.6 USD millions). The deficit has its roots in two mayor aspects: 1) a significant amount of pass due portfolio and 2) a tariff that does not cover the operational costs.

In addition to the Del Valle aquifer overexploited situation and the San Jose dam lilies, the INTERAPAS has old and bad quality infrastructure (half of the water it provides is lost by leakage), without overcoming the financial deficit it will be extremely difficult for the INTERAPAS solve those problems and invest in new infrastructure to avoid losing water. This reality will make it hard for the city of SLP to fulfill the SDG number six: Clean Water and Sanitation by the year 2030. That is why I decided to focus on analyzing and suggesting punctual solutions for redress the pass due portfolio and tariff issues.

Pass due portfolio

Sutuation

Last year the INTERAPAS reported that 113 thousand of users did not pay their water bill, this amount goes up to \$766 million MXN (\$15 million USD). In the year 2017 the Inter-American Development Bank (IDB) carried out a research for the INTERAPAS and reported that the commercial efficiency[8] of the organism was 60.9%, which means that for every 100 cubic meters invoiced only 60.9% where collected. This indicator means that the INTERAPAS must increase its commercial efficiency. Other Mexican cities report higher commercial efficiency[9]: Guadalajara, 83%; Monterrey, 97%; Queretaro, 74%.

[5] This means to divide the 100% of the households into 5 equally distributed groups (quantiles) representing 20% of the total households each.

[6] §Exchange rate in June 2015: \$1 USD = \$15.32 MXN

[7] Retrieved from the Mexican Official Journal of the Federation: Decree of rule of the Del Valle aquifer.

[8] This indicator measures the collection efficiency based on the water invoiced volume and the water collected volume: $CE = \frac{Invoiced_{volume}}{Collected_{volume}}$.

[9] Retrieved from the Mexican Water Technology Institute indicators.

Suggestion

The Mexican Water Technology Institute (IMTA) and the National Bank for Public Works and Services (Banobras) developed a program to improve the commercial efficiency of local water supply organisms in Mexico, the *Program for Modernization the Commercial Departments of Water Operator Organisms (PMCDW)*. The PMCDW has worked with 19 different local water organisms and has increased their amount of money collected by 20% on average, it also covers 100% of the cost of the diagnosis, action plan, executive project, supervision, and expert opinion and up to 40% of the total investments. The INTERAPAS satisfies the three requirements in order to be part of this program:

Requirement	INTERAPAS	Fulfills requirement
Organisms with at least 10 thousand users	Has 372 thousand users	Yes
Organisms with at less than $1 million MXN	In 2018 reported $0.87 millon MXN	Yes
More than 18 months for the next local election	The next local elections period in SLP is in 21 months	Yes

Tariff

Situation

Currently the income of the INTERAPAS does not satisfies the neither the financial nor the operational expenditures of the organism with the actual tariff. The water tariffs have not changed in SLP for the las 8 years even though the inflation and wages have risen, therefore is important to update the tariff. There are 4 principles that an efficient water tariff should have (Mann, 1987):

1. Cover all the expenses: the tariff must give an income higher than the expenditures.
2. Economic efficiency: the prices for potable water must assure the marginal cost of production for every cubic meter.
3. Equiality: all users must pay the consumed amounts of water and not be unfairly charged by a fixed rates.
4. Affordability: make sure that all households, including the ones in the lowest quantiles, will have access to the vital resource.

Does the INTERAPAS actual tariff fulfills the 4 important characteristics?

The list of tariffs charged by the INTERAPAS is presented in the following table:

Bimestral Consumption Range (cubic meters)	Tariff for each cubic meter of the total consumption, Mexican Pesos (MXN)
Minimum usage up to 25	$5.0
Up to 30	$7.5
Up to 40	$10.0
Up to 50	$12.5
Up to 60	$15.0
Up to 100	$17.5
Up to 160	$20.0
Up to 200	$22.5
Up to 250	$30.0
Up to 250 or more	$37.5

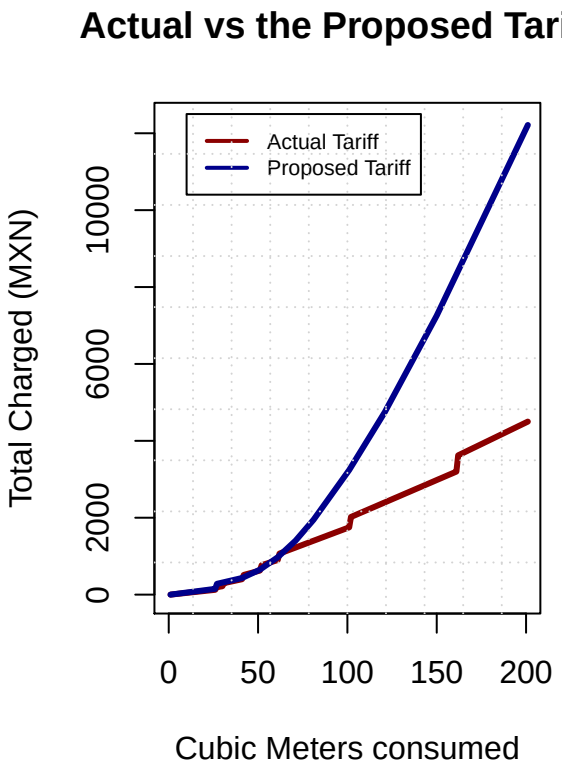
1. The actual tariff does not cover the total costs of the INTERAPAS, hence the first principle is not

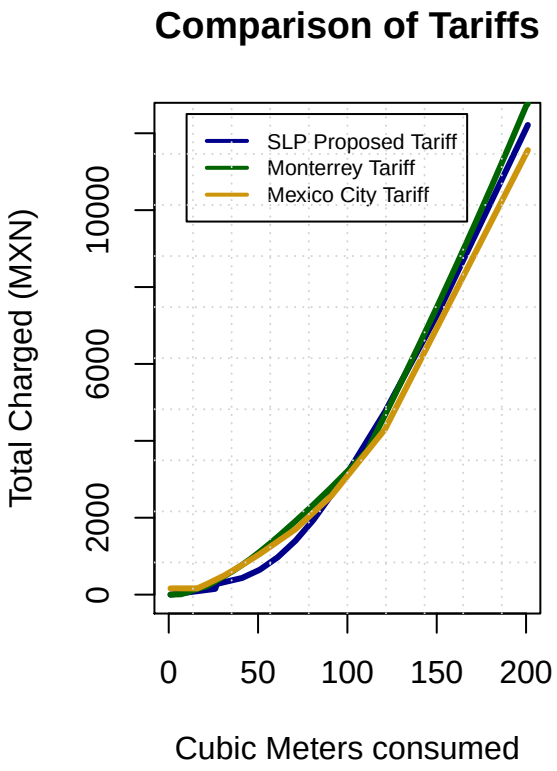
fulfilled (Cover all the expenses).
2. The price of cubic meter does not increase for every additional cubic meter consumed, thus the marginal costs are not charged, this fact discards the existence of the second principle (Economic Efficiency).
3. According to the IBD 35% of the users don't have a water meter and are charged by a fixed rate, this issue breaches the third principle (Equality).
4. In the city of SLP 97% of the population has access to potable water, this is a high percentage, which means that the INTERAPAS fulfills the fourth principle (Affordability).

Suggestion

In order to fulfill the four principles of an efficient water tariff we developed a proposal for the INTERAPAS that increases the cost for cubic meter in the range of 26 to 40 cubic meters by $0.8 MXN per cubic meter for the next 5 years.

Range cubic meter	Base Volume (cubic meters)	Base amount charged	Extra cubic meter
0 - 25	-	-	-
26 - 40	26	$280.8	$10.8
41 - 50	41	$453.6	$21.6
51 - 60	51	$680.4	$32.4
61 -70	61	$1,058.4	$43.2
71 -80	71	$1,458	$54
81 -100	81	$2,008.8	$64.8
101 -120	101	$3,315.6	$75.6
121 - 150	121	$4,752	$86.4
151 o more	151	$7,452	$97.2





This proposed tariff has three important characteristics: firstly, it fulfills the 4 principles of an efficient tariff; secondly, even though it may seem a huge increase from the perspective of the actual tariff, it goes in line with what inhabitants pay every month in Mexico City and Monterrey; and thirdly, the tariff does not punish the low or average consumers at all, for the median consumption relies between 30 and 40 cubic meters, on the other hand it desincentives the waste of water because, for households that consume more than 60 cubic meters will pay an increasing amount of money for every cubic meter they waste or over cosume. Thus, this was the proposal that we made to the INTERAPAS for the new tariff in order to satisfy the financial needs to overcome the deficit they have at the moment.

With the inclusion of the INTERAPAS on the PMCDW and the enforcement of the new tariff I'm confident that the organism will have positive utilities by 2022. This will let the INTERAPAS invest on infrastructure and have a clear path to achieve the 2030 United Nations Sustainable Development Goal Number Six: Clean Water and Sanitation.

Personal Reflexion

This experience has demanded the very best of my professional formation and my academic tools developed as a graduate economics student at UCLA. The case of my hometown requires an urgent improvement, I'm positive that the local Congress will take this research into account at the time its members will vote for the benevolent raise in the tariff in order to save the INTERAPAS from a possible bankruptcy and secure the future of water supply for the people of San Luis Potosi.