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## PRESENTATION

*Tradiciones de Guatemala* is a journal of the *Centro de Estudios de las Culturas en Guatemala (CECEG)* of the Universidad de San Carlos de Guatemala. It is published annually and disseminates the results of multidisciplinary research on the different manifestations of cultures in Guatemala. *Ceceg* studies the current cultural dynamics from a holistic, dynamic and constantly under construction vision as the basis for the development of Guatemalan society, in a contemporary context characterized by the global interactions of the different cultural manifestations.

This issue presents research conducted in 2019 by the team of professionals, which have focused on the detailed study of the different cultural manifestations of the township of Mixco, which belongs to the metropolitan region of Guatemala. The reasons for having taken this township as the object-subject of study are due to its strategic and current importance in terms of culture

and development of the región under its influence. During the pre-Columbian, Hispanic, Independence and contemporary periods, the town of Mixco has had an interesting social, economic, and cultural dynamic, both in its relationship with the then capital city of Antigua and the *Almolonga* Valley, as well as with the current city of Guatemala. It has also had social and cultural interactions with other towns in the Mesoamerican region, which have been relatively little studied with these approaches.

In order to have a perspective of approach from various approaches to sociocultural analysis, the research conducted is presented, starting with the study of “Heritage architecture and identity of Mixco, Guatemala” by Aníbal Chajón Flores, who in this study describes the most important facts related to the architectural heritage of the township, its evolution, related styles and remarks on its management and its current state.

“Process of introduction of drinking water to the town of Mixco 1774-1803 and some contemporary data related to the liquid”, is the title of the second study, by Abraham Israel Solórzano Vega, who comprehensively addresses from a historical perspective the problem of water in the township, the details and characteristics of the system established at the time and the problems and solutions raised by locals and the authorities related to water supply, today recognized by the United Nations system as a Human Right.

Despite transculturation and various social phenomena typical of a town located near one of the largest metropolises in Central America, the production of different types of handicrafts also represents an important aspect of the cultural dynamics of Mixco. For this reason, Aracely Esquivel Vásquez’s study, “The Current Handicrafts in the City of Mixco,” addresses the complexity of the processes surrounding this productive and economic activity and its importance to many local producers even today.

“Traditional Mixqueña clothing” is the title of the study carried out by

Deyvid Molina, in which he describes the characteristics of the traditional indigenous clothing of this community, its changes throughout history and its current manifestations, since, like any society in permanent multicultural interaction, this clothing has many changes, meanings and importance.

The contributions of the community’s search for solutions to the ongoing problem of health care in the community were also analyzed from an integrative approach. For this purpose, a study called “Traditional medicine, survival and medicinal plants: the case of Mixco” was prepared by Byron Fernando García Astorga.

In regard to the search for contemporary manifestations of Mixco culture, gastronomy could not be overlooked, so the study “Popular sweets and traditional chocolate in the city of Mixco” by Ericka Sagastume García was carried out, which deals with the historical and cultural development of this productive and culinary tradition, which is very well known at the regional level, not only because of the importance that cocoa derivatives represented during the pre-Columbian, colonial and presents times, but also because it continues to be an important productive and

Socio-cultural process for the locals of the metropolitan region.

Erick Fernando García Alvarado conducted the analysis of “Some Pedagogical Techniques Using the Oral Tradition to Encourage Reading and Writing in Students in high school of the Township of Mixco”, in which a review was conducted in the

Educational center of a practice that has been implemented by some teachers to preserve the oral tradition of the localities.

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# WATER INTRODUCTION PROCESS IN THE TOWN OF MIXCO (1774-1803) AND SOME CONTEMPORARY DATA RELATING TO LIQUID

*Abraham Israel Solórzano Vega*

## Abstract

**T**he process of introducing water to the town of Mixco in 1774, began with a series of requests in which local authorities used as a main argument the offenses to God, which were generated around the rivers due to the lack of liquid in the center of the reduction. When referring to the offenses to God, the manuscripts refer to violations of women that were carried out in the mountains. It was detected, that at that time the Church had great interference in the decisions of the local government and coupled with it, the work itself caused social and economic problems to the indigenous inhabitants. The infrastructure work that lasted two years, without a doubt, was of great importance for the neighbors. However, the intentions of the Spanish government were not only to prevent harm to women, but to prevent the

escape of indigenous people and to have control of the population in an enclosed space. In addition, with the construction of the pipes, forced labor of indigenous people was used, and they were also forced to lend their beasts of burden without remuneration. Within the text, information is provided regarding the way in which water purity was determined, the management and control of it in the colonial period. In addition, some contemporary data on Mixco's situation regarding the collection and distribution of the liquid are disclosed.

For the elaboration of this work the historical method was used, which essentially includes investigation of archives and bibliographical sources.

**Keywords:** introduction of water 1774, Mixco, contemporary water problem, indigenous.

## **Introduction**

The purpose of this work is to demonstrate the water introduction process to Mixco between 1774 and 1776, including both economic expanses and the entire framework from conception to conclusion. Undoubtedly, this undertaking significantly impacted the daily lives and cultural practices of the indigenous population. Forced labor was implemented simultaneously resulting in the forsaking of the crops, thereby necessitating an increase in labor efforts.

A moral dilemma arose due to the lack of access to water. As a solution, the authorities suggested introducing water and constructing public washing facilities. However, the government's plan went beyond moral considerations and aimed to gain control over the indigenous population to prevent potential issues. Unfortunately, when the inhabitants of Mixco fled, it resulted in the loss of their labor force and tribute as well as other consequences. In other words, the sources of economic prosperity within the colonial system had been depleted. However, the 18<sup>th</sup> century witnessed significant advancements in determining the safety of drinking water, as well as its management and regulation.

As an important part of the part of the work, sufficient data was gathered to provide a broad overview of the current water issue in the municipality. The historical method was used for the preparation of this research, which essentially includes research in archives and bibliographic sources.

## **Mixco in the present day**

The municipality of Mixco is situated in the extreme western part, just 16 kilometers away from the capital city. It is situated in the main mountain range of the Andes , with borders to the east with *Chinautla* and Guatemala, to the south with *Villa Nueva*, and to the west with *San Lucas Sacatepéquez* and *Santiago Sacatepéquez*. The municipal capital is positioned at an altitude of 1,730 meters above the sea level with an estimated annual rainfall of about 1,000 millimeters. The municipality experiences temperate climate marked by an average temperature of 20 degrees Celsius and 55 % humidity. Covering a total area of 132 square kilometers, the region is comprised of urban land, slopes, ravines, rivers and streams (Muñoz, 2019).



The municipality occupies an area that features the *Sierra de Mixco*, which comprises 12 hills, ravines and gorges. Additionally, the municipality has an abundance of water resources, including *San Lucas*, *Salayá*, *Panzalík*, *Mariscal*, and *El Zapote* rivers. The *San Jerónimo* and *El Manzanillo* springs further supply water to the municipal capital. Water tributaries include the *El Tempiscal* stream, and *El Aguacate* and *Los Gavilanes* creeks. Currently, the city's greenery has flourished with the extensive wooden area in the territory, serving as a vital lung (Muñoz, 2019).

Currently, it can be argued that the allocation and construction of housing in this region aligns with the expansion of the capital city rather than the demographic growth of Mixco. (Muñoz, 2019). Refer to Figure 1 for visual aid.

### **Some important concepts**

#### ***Water***

As is known, water is a fundamental necessity for human beings similar to oxygen. It can be described as a transparent, odorless, and tasteless liquid in its pure state, composed of one oxygen atom and two hydrogen atoms (H<sub>2</sub>O) (Nájera 1991, p. 9).

#### ***Drinking water***

In addition to the aforementioned components, water must exhibit specified quality characteristics to be consumable by humans (Fajardo, 2011). According to Nájera (1991, p. 9), fundamental characteristics include the following.

Water should be free of harmful organisms, and should not contain more than 100 colonies of bacteria per cubic centimeter of water. The presence of coliform germs or E. Coli could indicate contamination, and thus should not be present. In 100 cubic centimeter of water coliforms should only be present in 5 % of the total analysis conducted in a year.

#### ***Water quality***

Regarding water quality, Fajardo (2011, p. 52) considers the following:

Set of physical, chemical, and biological characteristics comprise water quality. These attributes correspond to the source of the water, such as its origins, from a well, spring, rain, or any other source. Alternatively, the quality may change along the way as the water passes through different places before utilization. Alterations can occur due to contamination or self-purification processes at these intermediate points.

### ***Water contamination***

Regarding water contamination Nájera (1991, p. 9-10), says:

When water comes into contact with soil, it alters its composition and may have negative effects on health. Contamination can take biological form, mainly from human or animal waste, which contains viruses, bacteria, parasites, and other pathogenic microorganisms, contaminating water supply sources, storage ponds, or water distribution networks.

Alternatively, chemical contamination is also possible via industrial waste disposal and the application of substances like fertilizers or chemical fertilizers in agriculture (Nájera, 1991).

In the same sense Fajardo (2011, p. 53) indicates:

Water contamination occurs due to the action and effect of the introduction of various materials or forms of energy, or induce conditions directly and indirectly in the water, which results in the detrimental alteration in the quality of the same, affecting its function within an ecosystem.

### ***Some remarks at a general level***

As indicated above, water is essential

for human survival, and thus, in the Hispanic period, when constructing towns or reductions, a nearby river was necessary component. Technical term abbreviations like reductions should be explained upon their first use. Colonial laws deemed this fundamental and mandatory (Ramírez, 2006). According to the same author, the primary purpose of the water supply was to meet the biological needs of the inhabitants, with any excess used for crop irrigation. The town of Mixco benefited from the presence of four surrounding rivers: these rivers provided the local population with a reliable water source. Mixco, Pancochá, Panzalic, and Concepción.

In contrast, the colonial period saw an unequal distribution of water resources, with public and government buildings as well as religious structures receiving priority (Ramírez, 2006). This policy was also applied in Mixco, since the liquid reached the interior of the church of Santo Domingo and the house of Juan Hagedorn, who served as both judge and commissioner of the area. Regarding the community, the main fountain was constructed in the plaza, along with public washing areas and basins dispersed throughout various

parts of the town (Hagedorn, 1774, Hagedorn, 1776).

### **Background information**

Before 1774, an effort was made to bring water to center of Mixco Town as per the data found in the General Archive of Central America (Hagedorn, 1774, f. 4-4v.). However, the water was not drinkable since it was contaminated by cattle, horses, and pigs during transport. As a result, the water was no longer clear or healthy upon arrival.

In consideration of improving the community's overall health and well-being, it has been proposed to introduce high-quality, clean water to the *Yga* patio. Manzanillo is the birthplace of the water source, and the water has traditionally been brought to this town to an old, now-dilapidated basin that is currently unhygienic. To achieve this, it has been suggested to bring the water from Manzanillo, a league away, via culvert.

According to testimonies of some locals of Mixco, before 1774, there existed a kind of canal though which the liquid flowed, which was used to irrigate the fields of the priest of the church and somehow also reached a basin. According to witnesses, the canal was exposed to outdoor elements and thus, the conveyed

liquid was impure and odorous, rendering it unsuitable for use in drinking, cooking, or washing clothes (Hagedorn, 1776).

As can be seen, for various reasons, the water was unsuitable for laundry and women had to go to the river for that purpose. Drinking and cooking were the main reasons to use water from that source, albeit with less frequency. Regrettably, the manuscripts only reference the existence of a water transportation system to a basin prior 1774, lacking details on the work and duration of the system.

According to the 1776 manuscripts, the population experienced hardships due to the distance between the tributaries. Despite the challenges, this was the only viable option available at the time. *El Molino* and *Panzalic* rivers were the only water sources accessible, but crossing the vegetation-filled and unsafe ravines posed significant risks, especially to women. Undoubtedly, transporting water in containers to the houses while walking through the mountains and rocky terrain presented a challenging journey (Hagedorn, 1774).

The recorded stories emphasize the offenses committed against God near the rivers. It is essential to note that access to drinking water and food preparation necessitated the usage of these rivers by the population. Moreover, women used the rivers to wash their clothes (Hagedorn, 1774). It should be clarified that the documents do not explicitly state that offenses against God refer to the rape of women, but such actions are considered offenses against God according to Catholic principles.

To carry out such an important construction project, the authorities needed to consider specific factors to ensure the functionality and durability of the work. Therefore, they verified the availability of necessary materials such as wood, lime, and stone for the kiln before initiating construction. Fortunately, Mixco had an abundance of these materials in the surrounding area, making them readily available for use (López, 1773). It is relevant to clarify the meaning of culvert in the documents, as per Juan Ramírez (2006, p. 14), who describes them as “brick boxes used to cover and protect pipes. These boxes can be situated on the surface or underground. *Atarjea* and *ataujía* are also common names for this type of protection”.

In addition, before starting the work, an inspection of the terrain had to be made and it had to be observed of the water source was in an elevated place so that the water would circulate by gravity. According to Juan Ramírez (2006), this was the approach utilized during the colonial period to transport water to the center of any given community. The goal was to utilize the hills’ natural slopes to channel the liquid as directed, with distribution boxes built along the path to reduce the flows’ impact.

#### ***How the process was carried out***

The process of the introduction of water to the town of Mixco commenced in 1774, under the guidance of the judge commissioner of the area, Juan José Hagedorn. Hagedorn coordinated the work from preliminary studies until completion (Hagedorn, 1774).

In the 18<sup>th</sup> century, the town of Mixco faced a water scarcity which led to a great interest among the population to obtain water sources closer to their homes, as documented in the General Archive of Central America (Hagedorn, 1776). It should be noted that the individuals who composed the documents were affiliated with the government and this it cannot be determined whether

this interest was shared by the settlers. According to the documents, the population growth of the town after the 1773 earthquake was one of the main reasons for considering the introduction of water. This growth led to the migration of people from other areas in search of food, which complicated the issue alongside the existing population (Hagedorn, 1774). Cortés y Larraz (1958) provided data on the number of inhabitants in the 1760s, revealing insights into the formation of society during that time. According to the author, there were 300 households comprising 1,440 indigenous individuals, 83 households of ladino people whose ethnic origins are unclear. In total, there were 393 households and 1,759 individuals.

The civil and ecclesiastical authorities identified a fundamental problem near the *Panzaglique* River, where women fetched water, many evils and offenses against God were committed. These offenses involved rape of women at the site, causing a moral problem. It is possible that the term “many evils” in this context includes murders, robberies and other crimes, as the pluvial tributary is located a quarter of a league away from the population, hidden by thick mountains (Hagedorn, 1774). During his visit to the parish of *Escuintla*,

Cortés y Larraz (1958) also mentioned instances of impropriety and offenses to God in the rivers, where large groups of people, including men, women, boys and girls, bathed together without modesty. It can be inferred that individuals dressed scantily and residing in distant areas from the city were more susceptible to experiencing infidelity of those who were married, and sexual assault.

Apparently, similar occurrences of abusive and deceitful acts towards women, in close proximity to rivers, were not exclusive to that specific town. The request of authorization to access water from the *Pinula* River, made by the authorities in 1735 for the town of *La Ermita*, due to the same issue, confirms that this was a frequent problem in Guatemala during the Hispanic period (Chután, 2015).

Thus, in 1774, authorities declared the installation of a water pipeline in Mixco an emergency measure not only to prevent risks to human life, but also to provide the population with safe drinking water and water for washing and basins, which could be distributed to different parts of the locality (Hagedorn, 1774, f.1).

For the construction of the primary basin, which provides clean drinking water and washing areas for clothes and other items, this eliminates the need for residents and locals to travel to the rough and difficult-to-navigate *Panzaglique* River. According to extrajudicial information I have received, this river is associated with a lot of wickedness.

The main idea was to transport water via pipes from *El Manzanillo* to Mixco's center to prevent contamination along the entire route. José Ramírez led the project and oversaw planning, material evaluation, labor requirements, and cost analysis. Initially the project was valued at 3,600 pesos, which covered the cost of buying or elaborating pipes, lime, and bricks. Additionally, it included the construction of a main basin with its sinks and three small basins (without sinks) distributed throughout the town. The plan also aimed to bring water to the churchyard, with the likely assumption that the fountain situated within the parish's land mentioned in the documents of the General Archive of Central America (Hagedorn, 1774) was the aforementioned fountain. By the 1770s, there was sufficient experience in using *taujías* to pipe

water as plumbers had executed similar works employing gravity and canals for conduction (Chután, 2015).

As for construction labor, Hagedorn maintained that the indigenous people were expected to provide their labor without compensation. He proposed a system in which workers were grouped and had to rotate their duties on a weekly basis. Settlers were also required to lend their pack animals to transport construction materials like stones and lime. According to the same author, the indigenous people consented to these terms (Hagedorn, 1774).

At the time, the authorities aimed to minimize costs, and thus, instructed official teachers to teach indigenous people how to craft pipes and bricks, while the ladinos provided material transport free of charge. Additionally, four bricklayers from the town of *Jocotenango* and four bricklayers from *San Sebastián El Tejar* were ordered to assist (Hagedorn, 1774).

The research conducted by skilled plumbers on water conduction demonstrated the feasibility of the project. After informing Martín de Mayorga, the president of the *Real Audiencia*, he authorized the construction on August 18, 1774.

under the supervision of Hagedorn (Hagedorn, 1776), the project was completed in 1776, having achieved the objectives outlined two years earlier as stated in the manuscript. The abundance of water reaching the basins eliminated the settlers' need to collect the liquid from the river. This was beneficial for both indigenous people and ladinos. According to the author, the intellectual's plans were executed precisely. At its core, the project involved piping water from *El Manzanillo* to the center of Mixco. In the town plaza, the main fountain, consisting of a large basin with a bowl, was constructed for both utilitarian and aesthetic purposes. Two additional fountains, each with their own sinks were built; one for the convent and another for the commissioner judge in charge of the project, Juan Hagedorn. A tank containing 18 washing spaces and three small basins was constructed on the street adjacent to the plaza for the convenience of the public (Hagedorn, 1776). Refer to Figures 2, 3, and 4 for further information.

To verify if the construction was completed and met the needs of the settlers, Martín de Mayorga dispatched Francisco Geraldino to gather testimonies from the beneficiaries and verify the accuracy of the information.

### *Some data regarding the water pipeline*

The cost of the infrastructure project to bring water from *El Manzanillo* to the town of Mixco was around 4,777 pesos and 7 *Reales*. The distance between the starting point and endpoint was one league, equivalent to approximately 4.5 kilometers. The real cost cannot be determined due to the concurrent works carried out in various parts of the town, including repairs and constructions. The given amount includes all the works. Among the repairs needed, the following are mentioned: the church roof, cemetery constructions, the chapel of souls, and the plaza and streets of the town.

The labor required for the work performed by master mason José Ramirez, his assistant, and indigenous laborers for routine tasks. The latter worked as unpaid laborers providing a service known as public works (Hagedorn, 1776).

The construction materials utilized included bricks, tiles, wood, lime, and clay. The artisans enlisted for project encompassed a master builder, mason, assistant, carpenter, bricklayers, roof-layers, carver of the fountain bowl (central plaza), master, and assistants for pipe elaboration. Additionally, the expenses for renting



mule carts for transportation were accounted for. It has been ascertained that the clay utilized for pipe production was imported from *Chinautla*.

***Testimony of three priests in relation to the completed work***

One of the ways to ensure the completion of a project was to have respected individuals validate the construction and fundamental elements. In this instance, Hagedorn summoned priests Cristóbal de Loayza, José Mencos, and Pedro de Castilla to certify the work and its benefits to the community (Hagedorn, 1776, f. 6.v.).

Finally, it can be said that the water-related works aforementioned are indispensable for the residents of the town. They hold great significance in both the physical and spiritual sense, so much so that they have no excuse for going to the ravines to get the water they need, and consequently they are more insulting to God Our Lord.

Among the noted benefits for the community, the water could irrigate land used for vegetable crops both inside and outside of the town. It is probable that what they wanted to avoid by introducing water to the center of the town was no specifically to avoid violence against women.

Rather, it may have sought to prevent tribute-paying indigenous people from scaping the reduction, which could result in the loss of both labor and tribute. The original community could flee from the settlement through the rivers and seek refuge in areas beyond Spanish authority. Alternatively, the commissary judge overseeing the work may have aimed to gain economic benefits by inflating its value.

***Lifetime of the water piping***

Unfortunately, the *taujiás* water transfer system was short-lived. In 1803, some settlers reported that the pipe was destroyed and no longer functional. Consequently, a request was made for a new project to be carried out as repairing it was impossible (Lara, 1803).

***Second study for the introduction of water to Mixco***

As previously noted, the project undertaken by José Ramírez to transport water to the center of Mixco failed. Therefore, on July 14, 1803, the locals, both indigenous and ladinos, united to petition the authorities to undertake a new survey and implementation of the project. This was prompted by the previous pipeline's malfunction, and the inhabitants deemed it impractical to



repair the pipes due to their evident damage. Therefore, the request was directed to carry out the work taking into account that the piping should not be done in the same trenches where the damage pipes were located. Additionally, the use of higher quality materials than the previous ones has been stressed (Lara, 1803).

As is commonly understood, authorities during the colonial period often used the excuse of lacking funds to avoid financing public works. As a result, the neighbors proposed various methods to collect economic resources to cover the cost after making the aforementioned request. One suggestion was for the justices to evaluate the residents' economic abilities and ask for cash contributions accordingly. Another proposal to raise fund was to fine clandestine *chicha* sellers three pesos (approximately 30 establishments), in this way they would achieve two objectives: first to avoid the consumption of the drink and the other was that the money collected would be used to execute the construction of the pipes. Still in relation to fines, it seemed pertinent to them that all drunks found in the street should be fined one peso, to be used for the same purpose (Lara, 1803). The proposals were not

accepted. However, there was the possibility of decreeing obligatory work for ladinos and indigenous people one day a week (Lara, 1803, Figure 4).

The town's residents, including both indigenous and ladinos individuals, should participate in the labor for no compensation. The alternative supervisory board should assign them tasks so that they only work for one day each week. Additionally, both groups' mayors can serve alternately for a short period of time, if necessary.

Another proposal that is consigned in the documents (Lara, 1803) was to withdraw funds from the community fund, with the condition that the ladinos would contribute an amount equal to the amount spent by the indigenous community. Consequently, on October 18 of the same year, the prosecutor of the Reales requested a breakdown of the indigenous and ladino populations in the town, as well as the monetary value of the community fund at that time.

The process continued and in 1804, José María Ávila, a master mason, was hired to evaluate, create a plan, and calculate the cost of the project. He estimated the work to cost

2,700 pesos. The spring of *El Manzanillo* was deemed the suitable location for the water supply. The following shows the way in which the points were marked on the map created by Ávila (Lara, 1803, Figure 5).

- A. The intake and source of the water
- B. The direction of the water
- C. The boxes and the drain
- D. The fountain in the plaza
- E. The road to Guatemala and the road to Santiago
- F. River of *El Molino*

Andrés Saavedra, the Mayor of Antigua Guatemala, retained the map and assessment prepared by José María Ávila to submit it at a later date to the *Real Audiencia*, allowing the authority to decide on the best course of action (Lara, 1803). Regrettably, no further information is available regarding the execution of the project. Yet, it is evident that it was planned and financed by the community. On the other hand, one of the confraternity's books revealed that water had reached Mixco's main basin from the valley of *La Cienega*, a location near *Manzanillo*, in 1838. It may be concluded that Ávila's planned work had been executed and was still active in the stated year (Book No. 4, 1838, Figure 6).

We walk along the Reales road, which leads from the capital city to the old city of Guatemala. After ascending the slope, we pass the marsh, the source of water for the town climbing the first hill on the left-hand side of the road towards Antigua.

Further important data revealed by the maps of Mixco is related to the natural resources that the area of the town had, as it shows the abundance and variety of trees, forests that at the same time housed the fauna of the place, which today has been gradually lost.

It should be mentioned that in 1773, studies were conducted before the city of Santiago de Guatemala was relocated to *Nueva Guatemala de la Asunción*. These studies encompassed the examination of Mixco's area to determine its available natural resources. One of the primary objectives was to assess if the area had sufficient water supply to sustain the new metropolis. To clarify, the objective of the research was to determine if there were rivers with sufficient flow to supply a large number of inhabitants that would grow over time (López, 1773). Additionally, there was a necessity to evaluate the availability of

construction materials in the vicinity of Mixco, including stone, wood, flagstones, lime, and other resources. It should be noted that the goal of the project was to construct the largest city in the dominion, thus necessitating sufficient raw materials. It can be inferred that Mixco possessed ample resources for the new city (Arroyo, Conde, & Sarazúa, 2016).

As a result of these studies, Bernardo Ramírez prepared reports and devised plans to illustrate how to take advantage of the currents and accumulate the water in the Belén Dam to transfer it to the metropolis. The provided map not only verifies that the water source was situated in *La Ciénega* area which is located in the upper region of Mixco, but also provides insight into the hydrography of the region during 1774. Meanwhile, the presentation describes the points indicated on the map and how the liquid catchment was planned for the growing city (López, 1773, Figure 7).

The text quoted below is written as it appears in the document in the General Archive of Central America (López, 1773, f. 130) and describes the rivers that were consigned in the previous map. It depicts how the project was executed to collect and transport the water to the Belén Dam.

This water source was utilized to provide the residents of *Nueva Guatemala de la Asunción* with enough water.

### ***Mixco's work and rivers***

#### ***Description:***

Plan displaying the course of the neighboring Mixco farms' rivers and the water springs at Mister Salvador Herrarte's hacienda, denoted by the following numbers.

1. The first source of the Mixco River is located at *las Cruces*.
2. The *Pancochá* River originates from *Ciénega Grande*.
3. The rivers converge at the mill.
4. The springs of water from which the two rivers are formed.
5. The spring known as *Panzalique*.
6. The Belén River, originates from one of the creeks of Mister Luis Borrallo's farm.
7. The Concepción River, originates from one of the ravines of Juan Antonio Mansilla's farm.
8. Meeting of two rivers.
9. The springs from which the two rivers are formed.

10. Where to start the pipelines for the introduction of the rivers.
11. Main box up to where the water will arrive by *taujiá*.
12. Sand depository boxes.
13. Four boxes that will allow for the crossing of two ravines.
14. Church of Mixco
15. The houses of the Mill
16. Houses of the Concepción farm.
17. Plain of Belén
18. Houses of the hacienda of Mister Salvador Herrarte.
19. The lagoon of said hacienda.
20. The springs that emerge from the small rocky hills situated behind the houses.

***Instruments for water weight measurement***

Within the information found in the documents of the General Archive of Central America (López, 1773, f. 362), Bernardo Ramírez conducted studies to measure the weight of water according to the plumber's report.

The same box that was used for a previous similar operation to measure the amount of water in the *Vacas* River was employed again. This time, a table featuring four

readings of water volume on various dates, as measured by the city, was also consulted.

Similarly, Ramírez mentions a device used to measure the height of rivers and the weight of water (López, 1773, f. 362-363) *to measure the height of the river and the weight of water. I utilized the wind level, a widely recognized instrument among authors, as explained by Father Tosca.*

***Water prophylaxis***

One of the most important aspects regarding water was its cleanliness, rendering it fit for drinking and useful for any use. It is worth noting that one of the reasons for piping water to the center of Mixco back in 1774 was that the water supply then was cloudy and malodorous (Hagedorn, 1776).

According to information obtained in the same manuscripts, in order to assess the purity of *El Manzanillo* water, the researchers examined the tributary under normal conditions, ensuring it was free from any odor and color. To preserve the water's purity, a plan was proposed to channel the water through closed pipes, preventing exposure to the air, soil, or wildlife (Hagedorn, 1776). This approach was implemented during the introduction of water to Mixco.

Continuing the discussion on water purification, we discovered a file concerning the preliminary research conducted before the relocation of Santiago city to the valley of the *Ermita* (also referred to as the Virgin valley). A fundamental aspect of the research in 1773 involved examining the sources of the tributaries that were tapped for the water transfer, which included four rives from Mixco (Mixco, *Pancochá*, *Concepción*, and *Belén*).

It should be noticed that before moving the city to the valley of the *Ermita*, it was imperative to ensure the availability of sufficient drinking water in the surrounding area. Consequently, the designated rivers underwent customary aseptic tests for human consumption suitability at that time (López, 1773).

The methods used to test water purity were primarily based on observation. These observations included examining the behavior and health of individuals who consumed the water and studying the surrounding natural environment, including the tributaries, air, river banks, sun, distance from the water source, and whether people washed clothes in the streams. Additionally, experiments were conducted using appropriate instruments according to

the scientific knowledge of the time.

The physicians were entrusted with the task of analyzing and determining the water's safety (Guzmán, 1988). They conducted tests on site or collected samples of the liquid for later analysis. As evidence by the documents, the doctors had to drink the water and determine the taste, odor, color, sediments and, after testing and analyzing, then reached conclusions and submitted a report to determine if it was safe for human consumption (López, 1773).

The observations that are discussed included observing the inhabitants of the nearby areas that consumed the water and assess the residents robustness (or health) while doctors conducted interviews to determine whether they were afflicted by gastrointestinal or other illnesses. The observations under discussion pertain to the health of individuals near the *Chaqueda*, *Pinula*, and *Las Vacas* rivers, whose drinking water was consumed and examined for its purity. One of the manuscripts authored by Manuel Molina, a medicine graduate assigned to study the rivers' purity (López, 1773, f. 146).

Among the many samples that have been presented for examination, only the one from *Chaqueda* and the one from the *Pinula* spring can be chosen, as they enjoy more or less of the necessary conditions for this choice than clarity and lightness, being free of odor, color and taste, and although due to the scarcity of simple in the only apothecary that is presently available, it is enough for me to know the inhabitants of these places have remained healthy and robust with the use of them, as this is the most effective proof of the cleanliness of the water.

Another significant analysis involved observing the solid heterogeneity of water, as well as analyzing evaporation and calcination. These experiments required a metal sheet to be used for pouring the liquid, and the artifact was placed in a stove to evaporate the liquid. Sediments were left behind in certain cases but no in others. The type of sedimentation was then analyzed to determine its potential for harmful effects on health. If, after the evaporation tests, no mineral deposits remained, the physicians ascertained that it was drinkable.

Another physician, Manuel Rodríguez, who was given the task of analyzing the water of the rivers of Mixco, reported that despite the lack of necessary experimentation

instruments, the tributaries were deemed to be safe. His criteria was based on personal observation and experience of individuals who drank water. Based on his findings, it was observed that there were no diseases caused by contamination. The expert stated that the direct penetration of the sun into the streams, along with the presence of clean air, earth, and stones, were vital factors for the natural purification process (López, 1773).

Manuel Sanz, a member of the research team, identified certain elements that needed to be examined to determine the drinkability of the substance. Sanz stated that the substance should be devoid of any taste, color, and odor to be classified as pure. Moreover, Sanz highlighted several factors that could contaminate the substance, such as pungent taste, whitish color, sediments with dark spots, mucilaginous matter, sea salt content, karst materials, soil, lime, and sulfur. An important observation he adds is the study of vegetation on the tributary banks. He referred to the process as maceration and noted that the crushing of the bushes indicated impurity. Additionally, washing clothes in the river was also considered proof of impurity (López, 1773).

When specialists were unable to personally inspect the river water, they would request for a sample to be collected in a glass container for later analysis (López, 1773). However, the problem was that these tests proved to be unreliable due to the prolonged storage of the sample in the container.

In the specific case of the Mixco, *Pancochá*, *Concepción*, and *Belén* rivers, Manuel Sanz, Manuel Molina, Mariano Rodríguez, and Marcero Salomón evaluated the purity of the water. They visited the Mixco River to verify its health. As a first step, they interviewed locals to gather data on whether they consumed water from the tributaries and in they had any health issues. The interviewees indicated that they did drink from these sources and did not experience any illnesses. Another aspect of the study involved the doctors drinking water from the streams in Mixco, which they found to be devoid of taste, odor, and color. As part of the experiment, 33 liters of water were evaporated, resulting in a residue that was both salty and oily. However, this residue did not demonstrate a high degree of purity (López, 1773).

From previous experiments, it can be concluded that the Mixco water contains some alkaline elements and *Concepción* water has nitrate

components, but it is noteworthy that these elements are present in corrected concentrations and do not affect the quality of the waters.

### *Water management and control in the colonial period*

According to a Royal Decree from 1641 found in the General Archive of Central America (Tellez, 1641), the Town hall was responsible for water distribution and conduction, and the King at the time ratified the aforementioned entity should continue with this role.

In 1782, the Town hall oversaw the construction of the water pipelines in New Guatemala, according to Guillermo Guzmán (1988). The same year saw the introduction of primary regulations for water sector management, with the initial aim of providing the population access to water through public basins. The author also notes that the first urban water management ordinances in New Guatemala were enacted during the same period. Years later, the objective became to bring water into buildings and homes.

To carry out the task of water control, the *Real Junta de Distribuciones* was established in 1796, which was responsible for



overseeing all activities related to introducing water to New Guatemala. Notable members of the commission included José Domas y Valle (president), Ambrosio Cerdán (regent), Miguel de Bataller (prosecutor), Ambrosio Llano (prebendary of the Church), Cristóbal de Gálvez (ordinary mayor of first vote), among others. In 1798, the *Noble Ayuntamiento* also held the position of Water Judge and it was officially agreed upon that the indicated institution should gain control of the water from four rivers in Mixco (*Pancochá*, Mixco, *Concepción*, and *Belén*) and transfer it to the newly established city (López, 1773). Supporting this, another manuscript from the General Archive of Central America (Nájera, 1792) confirms that the Town hall received water-related financial reports.

As can be seen, the authorities had several objectives in carrying out the work of piping water to the New Guatemala: first, to provide water to the population; second, to recover the investment in the infrastructure and to obtain some economic benefit from the sale of the service. All this taking into account that in the new city was considered that the water supply should reach the interior of a certain number of houses and buildings.

Regarding the fee for the water service, Guzmán (1988) confirms that the Syndic of the *Noble Ayuntamiento* was in charge of making the study to establish the price for the provision of this service, and in the end, value was established at ten pesos for each straw.

However, in the case of Mixco, there is no evidence to confirm whether the population was ever charged for water. It is assumed that the inhabitants were not charged for five reasons: the settlers worked on the pipelines without pay; the economic conditions of the indigenous people were deplorable, the social conditions of subjugation to the Spanish and Creoles meant that they had no means of obtaining money to pay; they had to pay tribute; and in addition, the water did not reach the interior of the houses, but was supplied through public basins or flagon filler.

### ***Some contemporary data on the Pansalic and Pancochá rivers***

Currently, the micro-watersheds of the *Pansalic* and *Pancochá* rivers correspond to the subtropical low montane rainforest and are classified as protected areas. These conditions give life to the trees found in their surroundings, among which are oaks (*Quercus conspera*, *Quercus tristis*, *Quercus brachistachys*) *Bocconia arborea* (*Sangre de Chuchó*) and some



species of pine tree (*Pinus pseudostrobus*, *Pinus maximinoi*), broadleaf species and conifers (Fajardo, 2011). It should be noted that, in a way, this area becomes a lung of the city.

In addition to the above, the region's timber resources can be used for firewood, lumber, charcoal, ornamental plants, natural dyes and traditional medicine.

As for the fauna, studies report that 53 species of birds live in the area, of which 40 are resident and 12 are migratory, in addition, invertebrates, mammals, reptiles and butterflies are found in this habitat.

Water from the *Pansalic* and *Pancochá* rivers is used by the surrounding communities (*El manzanillo*, *Los Celajes*, *La Maravilla*, *Pacul*, *San Ignacio* and *El Roconal*) for water supply, daily domestic use and crop irrigation (Fajardo, 2011). Among the problems identified in the area by Fajardo (2011) are: deforestation, surface water scarcity and contamination, soil erosion, biodiversity loss and forest fires.

Of the problems mentioned above, the most serious are Surface water contamination in the surrounding areas. In other words, by throwing garbage in places near the

rivers, they are contaminated and the community is aware that the liquid is polluted, but they use it in a normal way. This is due to the fact that the tributaries do not have a cloudy color and there are no studies that indicate the degree of contamination, in addition, deforestation, which is also caused by the inhabitants, makes the soil more susceptible to erosion (Fajardo, 2011).

### ***Water quality of the Pansalic and Pancochá rivers in the 2010s***

The physical and bacteriological studies carried out by Fajardo (2011, p. 107) indicated that the water of the rivers aforementioned is not suitable for human consumption, mainly because of the bacteria content, which causes gastrointestinal diseases that can lead to the death of people who ingest it. However, if the liquid is treated with chlorine or other purifying agents, it can be used for human consumption the problem at the moment is that people do not use any treatment even though they know that the tributaries are contaminated.

### ***Contemporary water data for the urban area of Mixco***

Currently, it can be said that most of the houses in the urban area of Mixco have drinking water. According to the data provided by the Water Department of the Municipality, this entity supplies 48,787 users (Guerra, 2019). The liquid, according to Dimas Coromac (2019), comes from the place called *El Manzanillo*, which is piped and distributed to the community. Although there are no exact dates for the construction of the infrastructure currently used for distribution, a document was found in the archives of the confraternity of *Santo Domingo de Guzmán*, which states that in 1948 this association asked Mayor Vicente Tablas to issue a new title for a straw, since the first one had been lost (Soto, 1948). It can conclude that at the time the municipality distributed water through pipes.

Water irrigation in the urban area is facilitated by mechanical and artesian wells, which the Municipality primary controls and manages. The Municipality delivers services to some sectors of the following zones: 1, 2, 3, 4, 5, 6, 7, 9, 10, and 11. However, not all areas within these zones have access to municipal services, as some private colonies have their own wells (Guerra, 2019).

In the same way, to facilitate the treatment and distribution of drinking water, the Municipality operates seven plants in various locations, including *Molino de Las Flores* in zone 2, *Paraíso* in zone 7, *Alamedas de Yumur* in zone 6, *Montserrat de Mixco* in zone 4, *Jardines de Minerva* in zone 11, *Lo de Fuentes*, and *Planes de Minerva* in zone 11 (Guerra, 2019).

Despite the currents infrastructure in place by the municipality to supply the community, unaddressed issues still persist. Service irregularities stem from reduced flow rates, while deteriorating distribution networks present another obstacle. As a result, the service is suboptimal (Guerra, 2019).

As previously noted, the Water Department in the municipality of Mixco has identified service deficiencies and proposes immediate solutions, including sectorizing services and implementing schedules for different sectors. Additionally, future plans involve drilling mechanical wells, creating a new network, and implementing mechanisms to recover the water table (Guerra, 2019).

### ***Water and basins***

Water has various meanings and religious conceptions in which it is linked to natural elements, as explained by Larios (1999). These associations include its connection to beginning and endings, an its portrayal as masculine, feminine, and bisexual. Christian beliefs associate water with life, baptism, and forgiveness of sins. In the view of the author, the installation of pipes in Mixco during the Hispanic period served a utilitarian purpose of primary importance by distributing water through public basins or flagon fillers. The function has persisted over time, even until present day.

### ***Current use of the basins***

As previously mentioned, the construction of basins began in 1774 following the introduction of piped water to Mixco municipality. Additional basins were likely built in 19<sup>th</sup> and 20<sup>th</sup> centuries, as evidenced by documents from the General Archive of Central America (Hagedorn, 1774; Hegedorn, 1776) describing the production of three basins. In present day, ten basins have been identified in zone 1 of Mixco based on field research and studies conducted by Rubén Larios (199). According to the author, the basins have different dates,

with some dating back to the 19<sup>th</sup> century and others to the 20<sup>th</sup> century. In 1774, it appears that only three basins were constructed around the town (in addition to the church fountain and one by the plaza for washing clothes), while the rest were built later due to the population growth that occurred in the following centuries, creating a greater demand for water supply.

According to data provided by Herber Guerra (2019), head of the Water Department for the Municipality of Mixco, currently, there exist five public basins in the urban area of Mixco that distribute water to a portion of the community. Based on field research conducted, a central water source was identified in Zone 1 of the municipality. This source consists of 14 sinks, a flagon filler with only a base to hold containers, and five water jets with small tanks but no sinks, all located in zone 1. Refer to Figure 8, Figure 9, Figure 10, Figure 11, Figure 12, and Figure 13.

During Otto Pérez Leal's term as mayor, the basins were shut off and only turned back on after people protested. Mayor Neto Bran (2016-2020) has since maintained this distribution system, with a plumber now tasked with opening and closing

the faucets. Water is typically supplied to the community after 5 PM (Coromac, 2019).

According to Dimas Coromac (2019), basins are primarily used due to population growth. These basins are located in areas with houses for renting rooms, known as lofts, where multiple families live. The water provided by the municipality to these residences is insufficient, leading people to utilize the public and free service. During the field research, it was discovered that the basins are located in areas where multiple families inhabit the houses. These families are the ones who utilize this service.

### ***Implementation of drinking water in Lo de Coy***

Although Mixco is surrounded by several rivers, there has been a persistent problem with water shortage. According to an article in the May 6, 1980 edition of *La Hora* newspaper (Redactor, 1980), the residents of *Lo de Coy* did not have access to drinking water until that day. It was only through the inauguration of liquid distribution by Mayor Pedro Ottoniel Rivera Gómez that the situation was finally addressed. This amount covered the building of a mechanical well that supplied water to

the piping system as well as a large and small tank for water storage. Additionally, seven hundred home installations with half a water straw were installed. The cost of the project was 84,500 Quetzals. To meet the inhabitants' needs, a drainage system was constructed.

The shortage of water has brought about numerous difficulties, far beyond exclusively the lack of supply. Neighbors are experiencing health problems due to the impurities in the water obtained from nearby tributaries, which can even result in the death of many people. Thus, it is essential to provide drinking water, rather than just meeting basic needs.

### ***Mixco's current water management and control***

Currently, the Municipality of Mixco governs the distribution, maintenance, and fees related to water services in the municipality. Nonetheless, there is currently no legislation in place to regulate matters related to the management of water in Mixco (Guerra, 2019). Due to the fact that private neighborhoods have their own wells and the responsibility for managing water service lies with private companies, the municipality is unable to oversee the provision of water in these areas.

The delegation of responsibility for water supply to housing developers by the Municipality has resulted in problems that have affected the neighborhoods' residents. The issue was reported in the January 5, 1979 edition of the *Prensa Libre* newspaper (Redactor, 1979). According to the report, residents of *San Francisco* colony (Zone 6 of Mixco) voiced concerns over the insufficient water supply. The article also revealed that the construction company drilled a well to provide for a specific number of homes, but due to the construction of additional houses, the water supply was unable to meet the increased demand. It was discovered that this was not the first occurrence of the issue, but rather that it had persisted unnoticed until it worsened and became apparent at that moment.

***Issues due to the lack of legal regulations in groundwater exploitation***

As stated previously, Mixco lacks water regulations and bylaws as of 2019 (Guerra, 2019). In the municipality, the drilling of wells started in 1963 to obtain groundwater from *La Brigada*, *El Molino*, and *El Naranjo* plants. However, the issue arose because private companies

started drilling wells without any restrictions, and due to the fact that there was no entity in charge of the control and management of the exploitation of the liquid (Baeza, 2006, p. 6).

In the municipality of Mixco, the water issue is critical. Many private companies supply the water demand for the urban areas by exploiting the aquifer from the Guatemala City valley. These companies are inadequate, in terms of both water quantity and quality.

The challenge lies in private suppliers monopolizing water supply for exclusive residential areas, resulting in inadequate water access for the majority of Mixco's population. Any company seeking to drill a well in the designated location may proceed after satisfying the Municipality's requirements, including an environmental impact assessment, a plan for the well site, a water and drainage design, proof of real estate ownership, payment of *IUSI* taxes, and ornamental payment, and a request submitted to the mayor (Baeza, 2006).

The same author states that, until 2006, the municipality possessed 75 wells that were inadequate to meet the population's requirements. In the same year, there were 270 private wells that were beyond the municipality's

regulation. Hence, it is believed that the lack of regulations regarding the exploitation of groundwater results in severe issues concerning Mixco's water scarcity.

### **Remarks**

To explain the introduction of water in Mixco, in 1774, the authorities addressed the water issue along with physical and moral challenges. Their aim was to solve water shortages in the town and mitigate the damage caused in the surrounding river areas. The authorities believed that resolving the water shortage would also resolve the associated issues. It is possible that the Reales intended to prevent indigenous people from traveling to areas outside of Spanish control to avoid any leakage, rather than merely supplying water to the community of Mixco. This could be why the water piping works were considered an emergency.

The main reason for the construction and piping of the water was the emphasis given by the authorities to offenses against God, particularly the abuse of women near rivers (not limited to Mixco). However, even after the finalization of the project, women continued to use the rivers for washing clothes, a practice that continued until the middle of the 20<sup>th</sup> century.

According to the documents, the work was evaluated at a certain amount but ended up costing more due to a lack of honesty on the part of those in charge, and substandard materials were used which ultimately led to the collapse of the work 25 years after being finalized.

It is important to note that just as the water was being introduced to Mixco, a study was being conducted to relocate the city of *Santiago de Guatemala* to the valley of *La Ermita*. This implied the purification of the rivers from which the water for the new community would be taken. In this sense, it is important that women no longer wash their clothes in the rivers to avoid contaminating the liquid. In this case, it is not a coincidence that the introduction of water from the source of *El Manzanillo* was carried out to purify the four rivers of Mixco (*Mixco*, *Pancochá*, *Belén* and *Concepción*), which was one of the main water streams that was transferred to the new city.

On the other hand, it is known that the Spaniards were always interested in building European-style cities to control the indigenous population and keep them from leaving.

For the indigenous people, the introduction of water to Mixco meant a problem because the public works were done with indigenous labor without economic compensation, which meant more work, along with other demands from the Spanish. In other words, the fact that they had to work in the introduction of water changed their daily lives in some way, because they had other obligations without getting paid.

The General Archive of Central America documents, created by Spanish authorities, demonstrate the introduction of water to Mixco as a solution to physical and moral challenges caused by water scarcity. Nonetheless, the Spanish authorities merely made these decisions, resulting in economic coercion and forced labor of the subordinates. By being forced to work in public works, the indigenous people neglected their primary work in agriculture. It is important to note that this location served as a source for obtaining food products and making tribute payments. Additionally, it is possible that the alteration of their customs and roots due to the influence of the river might have severed certain cultural connections.

Although, it has been proven that the *Pansalic* and *Pancochá* rivers are contaminated, the locals continue to

use their water without any type of treatment. It is worth noting that residents have contributed to the pollution of the tributaries by disposing of garbage and waste in them. Furthermore, neighbors have deforested the surrounding areas, which adversely affects the water's purity and consequently the health of the inhabitants.

The water issue in Mixco persists as it remains unresolved. The Municipality authorities state that the service is inconsistent. To provide water to residents, private contractors have drilled wells in some areas of the community.

Another unresolved issue in the Municipality is the lack of water regulation bylaw. Due to the absence of a statute, private residential areas have control and management, and they continue to drill wells irrespective of the damage they may cause in the present or future.



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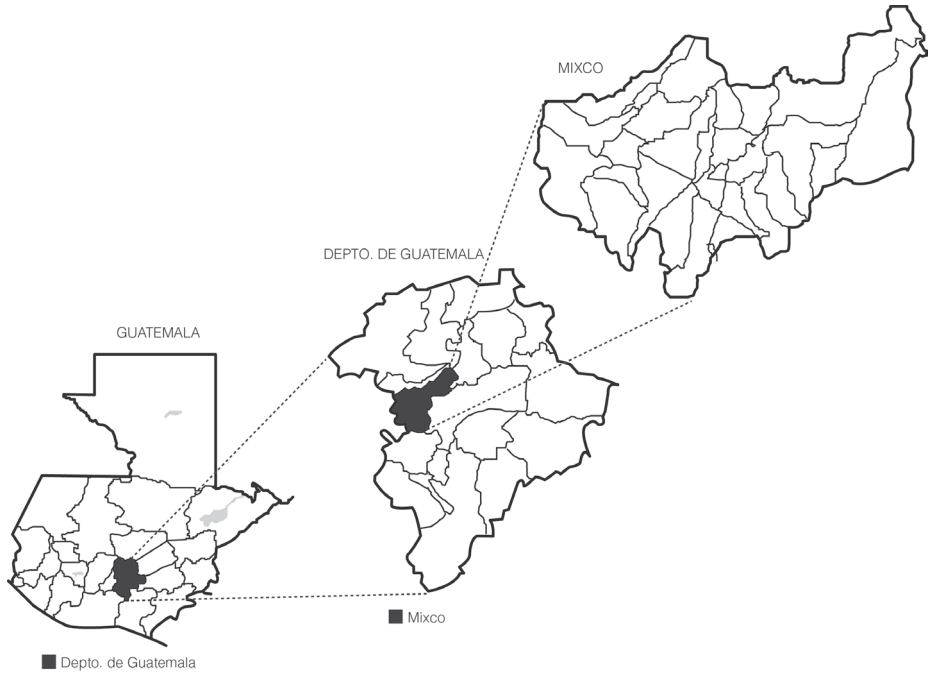


Image 1  
Map of the Municipality of Mixco.



Image 2  
Colonial fountain bowl, located in the park of Mixco. (Solórzano).



Image 3  
Public basin located next to the fire station,  
zone 1 of Mixco. (Solórzano).



Image 4  
Basin located within the enclosure of the  
parish of *Santo Domingo de Guzmán*.  
(Solórzano).



Image 5  
Map drafted by José María Ávila for the second study of the water  
piping from *El Manzanillo* to the town of Mixco in 1803. Retrieved  
from the General Archive of Central America, Signature A1, File  
2951, Docket 27827, Page 12. (Solórzano).



Image 6

Mapo f the Municipality of Mixco in 1838. Book  
of the confraternity of *Santo Domingo de Guzmán*.  
No. 4, page 15.v. (Solórzano).



Image 7

Map depicting the location of the rivers that irrigate the Municipality of Mixco. Retrieved from the General Archive of Central America, signature A1, E. 16501, L. 2274, f. 130. (Solórzano).



Image 8  
Flagon filler located on 11<sup>th</sup> Avenue, "C" and 7<sup>th</sup> Street, Zona 1.  
(Solórzano).



Image 9  
Basin located at the corner of 9<sup>th</sup> Avenue and 7<sup>th</sup> Street, Zona 1. (Solórzano).





Image 10

Basin located on 11<sup>th</sup> Street and 9<sup>th</sup> Avenue, zone 1. (Solórzano).



Image 11

Basin located in the recreational park that is located on 13<sup>th</sup> and junction, 4<sup>th</sup> Avenue, and 5<sup>th</sup> Avenue, zone 1. (Solórzano).





Image 12

Basin located in the recreational park on 13<sup>th</sup> Avenue and junction, 4<sup>th</sup> Avenue and 5<sup>th</sup> Avenue, zone 1. (Solórzano).



Image 13

Basin located on 12<sup>th</sup> Avenue and 5<sup>th</sup> Street, zone 1. (Solórzano).