

# The Environmental Problematic of Xochimilco Lake, Located in Mexico City

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**Abstract:** This article presents the geographical location of Lake Xochimilco, some economic and social characteristics of the mayoralty of Xochimilco are mentioned; the inhabitants living in poverty. Subsequently, the serious pollution of this lake and its impact on the health of the inhabitants living near the lake is. Finally, it puts forward some proposals to get started, albeit very slowly reversing this problem

**Key words:** pollution; environment; water; lake; aquifers; geographical location of Lake Xochimilco

**JEL code:** Q53

## 1. Introduction

In this work is geographically located to Lake Xochimilco within the mayoralty of the same name belonging to Mexico City. Subsequently factors are presented such as the total population of this area, a comparison with the total of Mexico City and other more populated mayoralties. Later, this district of Xochimilco is located using some variables such as economic units, occupied personnel, total gross production and fixed assets and some social aspects are mentioned as population and people in poverty. Subsequently I will aboard the serious pollution in the Lake of Xochimilco, which is located 28 kilometers from the Historic Center of Mexico City.

## 2. Geographical Location of Lake Xochimilco

Lake Xochimilco is in the southeast of Mexico City, in the mayoralty of Xochimilco, located 28 kilometers from the city center. It has an area of more than 2,428 hectares of marshes, surrounded by streets.

The territorial area of this mayoralty is 122 square kilometer which makes up 8.4% of Mexico City. It is bordered by the mayoralties of Iztapalapa, Tlalpan, Coyoacán, Tláhuac and Milpa Alta.

Socio-economic aspects of the mayoralty of Xochimilco

Xochimilco has a population of almost 416 thousand inhabitants by 2015, that is, more than 4.6% of the total population of Mexico City, which has almost 9 million people. As you can see the population mass is much smaller, compared to the mayoralties of Iztapalapa, with more than 1 million 800 thousand inhabitants and the Gustavo A. Madero with more than 1 million 150 thousand inhabitants.<sup>1</sup>

The economic importance of the Xochimilco in relation to the other mayoralties of Mexico City is not very

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<sup>1</sup> Inegi. *Mexico in numbers*, available online at: <https://www.inegi.org.mx/app/areasgeograficas/?ag=09>, retrieved 21 January 2020.

important, the total economic units only groups 4.2%, the staff occupied 1%, in the areas of total production and fixed assets does not get even 1%. Compared to the mayoralty of Cuauhtémoc, where fixed assets concentrate almost 73% of the total Mexico City<sup>2</sup>.

### 3. The Serious Pollution of Lake Xochimilco

Within this framework, to mention some geographical and economic aspects, Lake Xochimilco is severely polluted and does not help to mitigate even if progressively the situation of poverty in which almost half of the inhabitants of Xochimilco.

Indeed, the population in poverty, we find that almost 190 000 inhabitants, which corresponds to 45% of the total inhabitants live in poverty and extreme poverty a little more than 11 thousand 000 people. That is, although this mayoralty has a natural wealth, Lake Xochimilco, it has a serious contamination which does not help to reduce this situation in which its inhabitants live. That is why it is essential to try to mitigate this environment that this lake suffers.

However, it is important to mention that the Mexican state support for families living in this situation; through the Programa Prospera.<sup>3</sup> However, it was still insufficient. Of the total support given to Mexico City, the mayoralty of Xochimilco accounts for only almost 19%. Unlike the mayoralty of Venustiano Carranza which receives a little more than 26%, by 2015.

As already mentioned, Lake Xochimilco is seriously contaminated; farmers grow rosemary, corn and chard in chinampas, islands formed with a technique dating back to the Aztec era, from willows, lilies and mud.

The exaggerated exploitation of water aquifers over the past 50 years has damaged the springs, so authorities have had to load the waterways from a nearby sewage treatment station (Burnet, 2017).

Xochimilco has 116 kilometers of canals of the northeast divided into 253 sections, it was found that on its margins there are a total of 1374 discharges, of which 603 are blackwater and 771 of grays, according to the researchers Rosa María Serrano, Guillermmina Pérez Casimiro and Rosario Iturbe Argüelles (Institute of Engineering, UNAM, 2017) by its acronym in Spanish.

Xochimilco presents ecological problems, such as the dilation of the urban spot around the lake, which affects this aquifer mantle because the drainages of the homes are directed to the canals; this is a product of the poor functioning of the Cerro de la Estrella treatment plant which is very close to Xochimilco, they are very favorable elements to erode the background of the channels; they also become factors that help this area be completely destroyed by 2050.

In the same way as the plague of carp and tilapia that were incorporated in 1980 into the lake, they are predators of ajolotes, acociles and charal species endemic to extinction danger, which inhabit Lake Xochimilco.

The place has a great reach in ecological and cultural terms; it concentrates more than 140 species of

<sup>2</sup> Inegi. *Statistical and Geographical Yearbook of Mexico City 2017*. Table 11.6, p. 363, available online at: [http://internet.contenidos.inegi.org.mx/contenidos/Productos/prod\\_serv/contenidos/espanol/bvinegi](http://internet.contenidos.inegi.org.mx/contenidos/Productos/prod_serv/contenidos/espanol/bvinegi), retrieved 21 January 2019.

<sup>3</sup> PROSPERA is a social inclusion program that articulates and coordinates the institutional offer of social policy programs and actions, including those related to productive promotion, income generation, economic well-being, financial inclusion and education, food and health, aimed at people in extreme poverty, under co-responsibility schemes that allow families to improve their living conditions and ensure the enjoyment of their social rights and the access to social development with equal opportunities. There are currently 6.9 million beneficiaries and beneficiaries who have the supports in education, health and food.

Without however, in September 2019, this program was replaced by Scholarships for Welfare Benito Juárez, "in terms of administrative and implementation, but its characteristics are not the same," says Fátima Mass, project coordinator of the Mexican Institute for Competitiveness.

waterfowl, ajolotes, acociles, charals, and chinampas help to reduce pollution a little by capturing carbon.

The researcher at the Institute of Biology of the National Autonomous University of Mexico (UNAM), Luis Zambrano González stated that the subtraction of water in the last 50 years has caused the level of the aquifer to have dropped and the liquid has lost by holes, undergrowth or cracks, since the clay dries and causes ditches, in some cases more than three meters, which allows the water level to decrease (Notimex, 2017).

The National Autonomous University of Mexico (UNAM), asserts that the contamination in the is critical, concludes in a study, which specifies that the 183 kilometers of canals have slowly lost the quality in their water by the incorrect handling of solid waste, the indiscriminate use of pesticides, no control in changes in land use, aggression to protected natural area and the drying of channels to expand plots of land and streets.

Lake Xochimilco is one of the five lakes that form the lake basin of the valley of Mexico, in the center of the Mexican Republic. Although today it is reduced to a few canals that irrigate the northern half of Xochimilco and the west of mayoralty of Tláhuac. The lake covered an important part of what is now Iztapalapa and Coyoacán (Romero, 2017).

The destruction to the Xochimilco lake system, which is the last remnant of the entire lakes that housed the Valley of Mexico basin, is final. It is submerged between irregular settlements and waste discharges into its canals, are ingredients that contribute to jeopardize its international classification of Cultural Heritage of Humanity.

In addition, at least 3,500 drains are flow millions of litres of contaminated liquid daily. Faced with this situation, the inhabitants of these colonies affected by the pollution of the canals are defending themselves and accusing that the authorities of forgetting this problem.

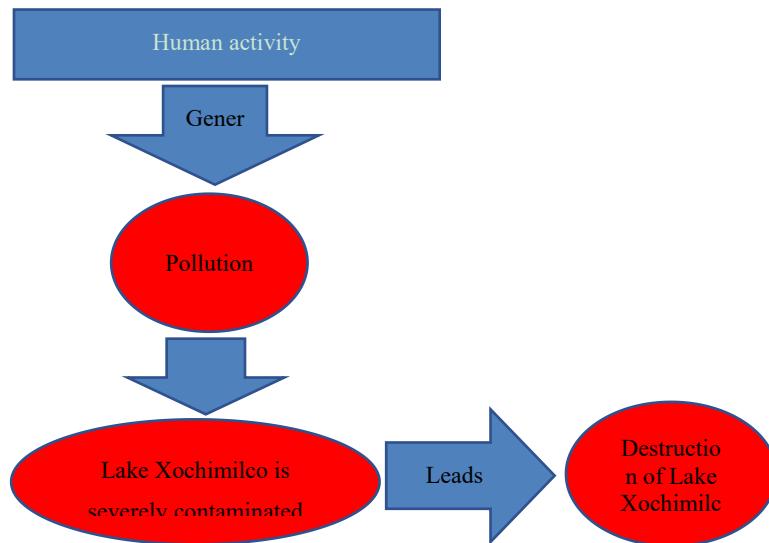
About drainage, in San Gregorio, for example, there is one that starts in the upper area of San Pedro Atocpan, at the neighboring town of Milpa Alta, and flows directly to the lake area of Xochimilco. In addition, of the four water treatment plants installed, the authorities relegated their proper functioning and three of them are useless (Fernández, 2015).

This environment is very disturbing, because this is where its inhabitants get the water for irrigation of vegetables such as: lettuce, spinach, carrot, tomato, chard, broccoli, pumpkin, quelites, celery, cauliflower, coriander, radish, etc., and water for human consumption.

Within this context, the water from the Xochimilco channels is a danger to the health, the lake is being contaminated by coliform bacteria. It was found in the liquid, which is a sign of faecal contamination, reported specialists from the Metropolitan Autonomous University (UAM) by its acronym in Spanish.

The sanitary standard establishes a limit of 2 000 coliform units per 100 milliliters of water and in the treatment plant of Cerro de la Estrella that supplies the Xochimilco there are 14 000 contaminated units (UAM, 2017), see Figure 1.

Water in the Xochimilco channels is heavily polluted Treated water pumped into the canals from Iztapalapa contains heavy metals. In addition, the illegal settlements in chinampas discard sewage in canals, which affects fish and crops. Now, much of the tilapia that is fished from the canals is used as an ingredient for cat food and many peasants grow flowers instead of edible produce.



**Figure 1**

In the face of this problem of the lake, an environmental situation very complicated by the project “Mexica de Amazon”, according to the Ejidatarios of San Gregorio El Programa de Manejo de Area Natural Protegida (ANP) by its acronym in Spanish. This has not considered into account prohibits activities such as the installation of a film set. This “ANP has a unique landscape system that provides multiple ecosystem services to Mexico City, which is home to 2% of the world’s biodiversity and 11% of national biodiversity, with 139 species of vertebrates, 21 species of fish, 56 amphibians, 10 species of reptiles, 79 of birds and 23 species of mammals” (Pantoja, 2019).

In this case of Xochimilco, as a proposal, sustainability can be achieved as noted by researcher Zambrano, with the return to production of Chinampera and agricultural without agrochemicals, fertilizers and pesticides for the cultivation of plants, and the growth of native species. In this same sense, Pedro Méndez Rosas, producer Chinampero, argues that the various sectors must help to take care of Xochimilco, with practices such as the closure of the household discharges do not throw garbage into the canals, it is very difficult to achieve these objectives. However, you have a precious good, which is a treasure (Burnett, 2017). It would be very important especially important to ban the use of highly polluting agrochemicals, to boost the increase of the ajolote, charal and acociles populations they are animals in the extinction danger. Try to educate the population about water care, not throw away trash and require authorities to build the drain that it does not discharge into the lake or the use of sewage treatment. I think it is very exceedingly difficult and costly, but if it is being done gradually, perhaps very slowly, some positive situation could arise in the future.

#### 4. Conclusion

In conclusion it can be said that Lake Xochimilco is very polluted, this situation it is not used in terms of improving the socio-economic conditions of the population; so it is essential to close the excessively contaminated discharges and not throw the garbage into the canals. I think it is very difficult, but it must try to raise awareness in the population because it is going to completely lose the Lake of Xochimilco. Also-I reflect and consider that the sustainability, the Mexican state must be aware of the great importance of the water care education, because it is a vital liquid for the population.

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