

THE FLEXIBLE LEVIATHAN

EL LEVIATÁN FLEXIBLE



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Hydro-Urban Acupuncture is a Mexico City-based think-tank run by Loreta Castro Reguera Mancera and Manuel Perló Cohen. HA works on water strategy that aims to minimize the distance between on-the-ground social participation and large-scale resource management. Below, HA discusses the particularities of the Iztapalapa's water scarcity and share their recent projects that aim to improve conditions there.

The lacustrine formations, or former lakebeds, that make up the Mexico City basin, stretch across an area of 1100 square kilometers, and were once composed of five distinct lakes. Iztapalapa's geologic profile is determined by its location within that basin. Located north of the Santa Catarina range, between the Texcoco and Xochimilco-Chalco lakes, its rich lacustrine soils were especially amenable for chinampa agriculture, and the firm soils of its hillsides appropriate for housing. The name of the territory comes from its location – Iztapalapa is a Nahuatl toponym that comes from the words *iztapalli*, meaning “slab;” *atl*, meaning “water;” and *pan*, meaning “over” – translated together as “over the water slabs” or “in the water of the slabs.”

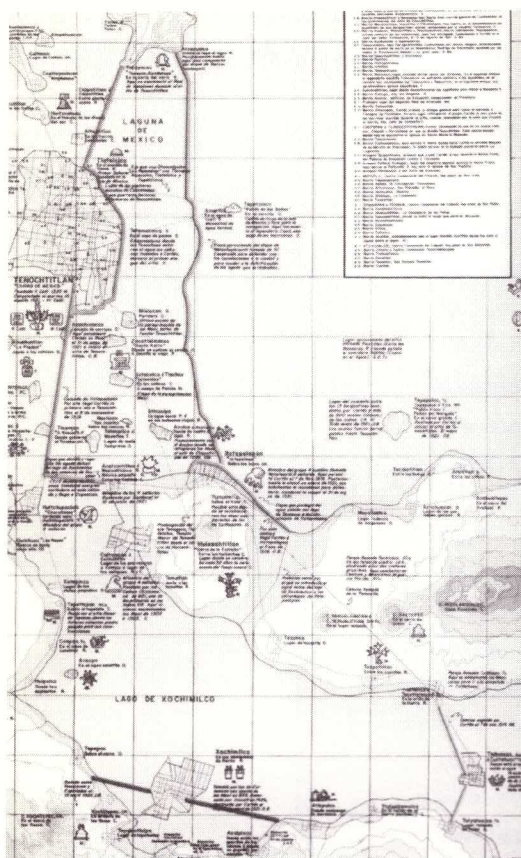
Iztapalapa's rich hydric and aquacultural past has largely disappeared. Today it is dusty – one of the most troubled boroughs (*delegaciones*) in Mexico City, suffering from a systematic shortage of water in both quality and quantity, recurring floods in more than fifty locations, and uneven subsidence, or settling of the ground. Through water-sensitive urban design, a group of experts at the Social Research Institute at National Autonomous University of Mexico (SRI UNAM) has proposed the establishment of a community in Iztapalapa that is capable of providing itself with better water quality through the implementation of a series of interventions that empower the small-scale, self-management of water resources.

From the Hydric Landscape to The Infinite City

The revision of the hydric history of the Iztapalapa borough should not be seen as an effort to recover a buried memory, but as a solid foundation to think, design, and promote new projects that aim to mitigate the borough's current problems in terms of water supply, sewage, and flooding. Understanding its past helps to understand the present and possible futures.

a Lakes and Pools

The human settlements located in what today constitutes the territory of Iztapalapa included diverse groups whose origins predate the foundation of Tenochtitlán in 1325. Several of these groups interacted



Reconstructed plan of the Tenochtitlán region. Detail of the historic thoroughfare Iztapalapa, the levee of San Lázaro, and the road of Tepeyac as a dike; the levee of Nezahualcóyotl and the possible floodgate in Atzacualco; the levee of Mexicaltzinco; the dike of Xochimilco; Dike of Tláhuac or Cuitláhuac; and the levee of Iztapalapa.

Plano Reconstructivo de la Región de Tenochtitlán. Detalle de la Calzada de Iztapalapa, albarradón de San Lázaro y Calzada del Tepeyac como un solo dique; Albarradón de Nezahualcóyotl y posible compuerta en Atzacualco; Albarradón de Mexicaltzinco; Dique de Xochimilco; dique de Tláhuac o Cuitláhuac y Albarradón de Iztapalapa.

with Texcoco lake, its brackish waters, and practiced a particular aquatic livelihood. Other groups were closer to the fresh waters that flowed from the lakes of Chalco and Xochimilco through a straight located between the Cerro de la Estrella and the Pedregal de San Ángel. Those fresh waters allowed agricultural activity and more useful and diverse fauna.

Possibly the first watershed in the history of what would become Iztapalapa was the construction of the Nezahualcóyotl levee. That structure was built in the second half of the 15th century during the reign of the fifth Aztec king, Moctezuma Ilhuicamina, to defend Tenochtitlán from the floods. The engineer Francisco de Garay (1888) recounts its construction:

This structure of stone and mud crowned by a strong masonry wall was protected on both flanks by bulwarks and had an extension of 16 kilometers. It divided the great lake in two. The larger one, on the east, became Lake Texcoco because this city was on its shores; the smaller, on the west, was named Lake Mexico because it surrounded the capital with its waters on all sides.

Iztapalapa's hydrology was divided since the mid-15th century. The overlap between the brackish habitat of Texcoco and the fresh waters coming from Chalco and Xochimilco produced a juncture. But it was not just the Nezahualcóyotl levee that marked Iztapalapa's destiny. Other edifications were important as well. The Mexico-Iztapalapa road, perhaps the longest in the valley, was one of them. Equally important were

the Mexicaltzingo dike that separated the Chalco and Xochimilco lakes from the Mexico lake preventing the overflowing of the former into the latter to curb the risk of floods in Tenochtitlán.

This group of projects meant a better utilization of the hydrological resources by the settlements inhabiting the basin before the arrival of the Spanish. At the same time, it represented a new hydrological order that transformed the natural environment but didn't always benefit the region's inhabitants equally. One of the best descriptions of the magnitude of the works before the conquest comes from Hernán Cortés himself, who, in his second report letter, narrates the strong impression the encounter with the city left on him:

The city of Iztapalapa could have between twelve and fifteen hundred inhabitants and is located along a large salt water lagoon, half of it in the water, the other half on the shores. Its Lord has some new houses, yet to be finished, that are as good as the best in Spain [...]. He has a large orchard next to them, and, over it, a viewing deck of beautiful corridors and halls, and, in the orchard, a large pool of fresh water, with very square walls of fine masonry [...].

b Big Infrastructure as Palliative Solution

During colonial times, Iztapalapa continued to be the meeting point of different lakes and hydraulic infrastructures. In the old maps, it can be seen how Lake Texcoco reached Iztapalapa. All the plans and maps from those times, show the Peñón del Marqués surrounded by water. An important area currently still within the borough formed part of the habitat and economy of the lake.

On the other hand, Iztapalapa was completely linked to the hydraulic corridor that ran from the Chalco and Xochimilco lakes down to Mexico City. This region was of great economic relevance because the Iztapalapa channel (later La Viga) allowed year-round navigation securing the city's supply of flowers and produce (Von Humboldt, 1978).

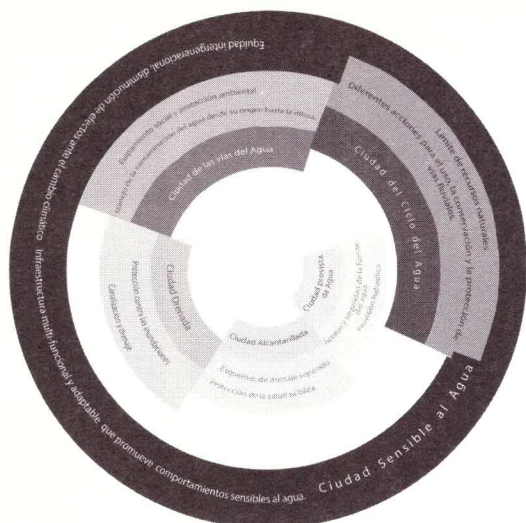
The process of draining the Mexico City basin to minimize the risk of flooding was coupled to the dependency of the hydrological system. The colonizers' lack of a proper understanding of the hydrological system produced a city where water came to be seen as a threat. Work to drain the basin began as early as 1604, the first of them being the Nochistongo Cut, followed by countless tunnels whose goal, unmet to this day, was to avoid the recurrence of floods.

c The Paradox of Excess and Scarcity

The borough of Iztapalapa is perhaps one of the best examples of the paradoxical hydrological condition in the Basin of Mexico, where there is an excess of rainfall that results in floods in urban areas, but where water is scarce during the dry season. Studying the causes of this complex problem, it can be concluded that one of the great historical errors was

Diagram of the evolution of the cities according to the 'Water Sensitive City' approach.

Diagrama de la evolución de las ciudades hacia la Ciudad Sensible al Agua.



the wrong water management originating in a lack of understanding of the hydrological context. Although the Metropolitan Region of the Valley of Mexico (MRVM) is located in a lacustrine environment that once spanned an area of 1100 km² fed by forty-seven rivers, it has developed without regard to that context, literally burying it.

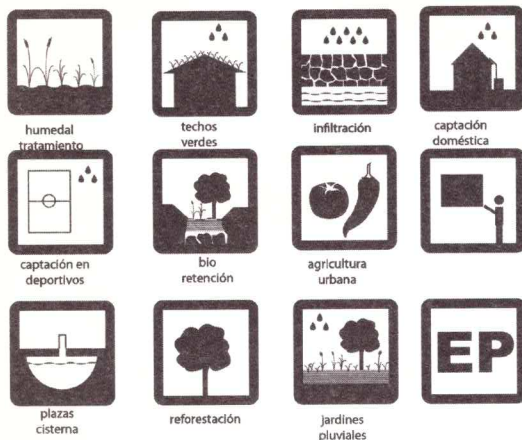
Approximately 25 percent of the city's potable water is imported from faraway basins at great energy and social costs. The aquifer has been overexploited, pumping more water than what is filtered, provoking uneven subsidence. Instead, a large percentage of annual rainfall (25 m³/s approximately) flows as runoff ultimately being collected by the same drainage system that pumps sewage through the mountains all the way to the Gulf of Mexico.

The mistakes of each one of these water management strategies can be witnessed collectively in Iztapalapa in the form of annual floods, water rationing, the appearance of faults, and differential subsidence. Up to now very little has been done to address the situation. A notable exception are the efforts of Alfonso Hernández, Director of Urban Services in the demarcation, which have been able to control flooding to some degree through the implementation of absorption wells. In spite of the wells though, both the local government and the citizen community have been left out of the matter, unwisely concentrating responsibility in the hands of Mexico City's water system administration.

Toward a Water Sensitive City

The current water management strategy in the basin of Mexico City is not sustainable. Due to fast urban and demographic growth, it is necessary to create a territorial plan that considers the landscape characteristics and employs them as infrastructure elements. This way, the site itself is turned into a tool and an essential design element to ensure the proper functioning of the city and its systems.

Proposals of this kind have been presented in other urban contexts around the world. Several Australian scholars refer to the Water



Set of icons show the 12 strategies for hydro-urban acupunctures for Iztapalapa.

Íconos mostrando las 12 estrategias de acupunturas hidrouurbanas para Iztapalapa.

Sensitive City and its benefits as an urban environment that amply considers its physical and social context with the purpose of making the best use of the hydraulic resources. The transition toward a city capable of merging with its water systems implies having tested alternative water management strategies. The diagram shown on page 62 explains these cases in detail.

Rebekah Brown of the Center for Water Sensitive Cities at Monash University, Melbourne argues that the transition toward a more water-sensitive urbanism initiates new processes that compete with old management strategies, and become politically complex. Nevertheless she argues, such a strategy results in systems resilient to grave problems (e.g. floods, droughts, heat waves, etc.) improving their capacity for innovation and the development of new trajectories (Howe, et. al., 2012). Transitioning toward greater awareness of the positive intersections between the urban and natural environments, and the capability to understand water as an ally is a must for the Basin of Mexico.

Our work at HA seeks to promote a change in attitude regarding water management in Iztapalapa through micro projects capable of involving both citizen communities and local authorities. Though we are aware of the difficulty of shifting the historical inertia of water management in the Basin of Mexico, there is strong evidence of the immediate positive impact that small scale interventions can have on communities that implement them.

Due to the character and scale of the interventions, it is worth mentioning that the type of strategies proposed are developed through “soft infrastructures.” These are low cost strategies that primarily use the landscape as the main manager and buffer. The idea is to create small, closed hydrological cycles able to satisfy most human needs by capturing rainfall so that reliance on the city’s hydraulic system is reduced.

Twelve strategies have been developed with the purpose of properly implementing these soft infrastructures in different locations within the borough. Some are more appropriate for the hillsides while others focus on the lakebed. The implementation of the strategies relies on a concerted effort between the community, the authorities, and specialists.

Implementation of Hydro-urban Acupunctures

Iztapalapa's hydrologic condition, oscillating yearly between excess and scarcity, is the ideal scenario for a project related to improving water management strategies. Nevertheless, the fact that such projects rely on the successful coordination of a series of government institutions has resulted in low implementation rates. With this in mind, the Hydro-urban Acupunctures (HA) team has decided to tackle the situation from a different angle.

A participatory phase that involved the community in the development of ideas, as well as a testing phase, have already taken place. We currently have projects of both types. Each has followed a complex process that is worth reviewing.

a Community Dialogues

The population of Iztapalapa is perhaps the most water-conscious in Mexico City. A large number of residents use low cost and easy to implement technologies for collecting and reusing water.

HA was in charge of consulting 30 community associations and academic institutions within Iztapalapa regarding an ideas competition calling for water management proposals within the borough. We found water scarcity to be a widespread problem and that up to 30 percent of the population is affected by periodic flooding. During these meetings, it became obvious that many locals use low cost strategies to collect rain water and even to treat sewage and refuse.

From these interviews, with the help of Estudio Rizoma, a video was produced to explain the current management situation, the state of the water bodies and the community efforts to use rain water ("Acupunturas Hidrourbanas Concurso por el Agua" on YouTube). This document was publicized across Iztapalapa to sensitize the population regarding the problems faced and the importance of their participation to help solve them.

b Two Roads to Action

To intervene in Iztapalapa it is necessary to be familiar with its history and the dynamics that dictate the functioning of its territory. During the six-month research phase on Iztapalapa's hydrological condition, HA was able to understand how the borough subsists despite its great lack of water and water infrastructure. The knowledge acquired by the team during this process led us to propose two main axes for action, a hydropark, and a design competition.

b.i Quebradora HydroPark

This project arises from a request from the borough authorities to develop a prototype for a hydro-urban acupuncture that could serve as a proof of concept to promote the development of further projects. We chose a site in the area of Santa Catarina, on the hillside of the range, neighboring

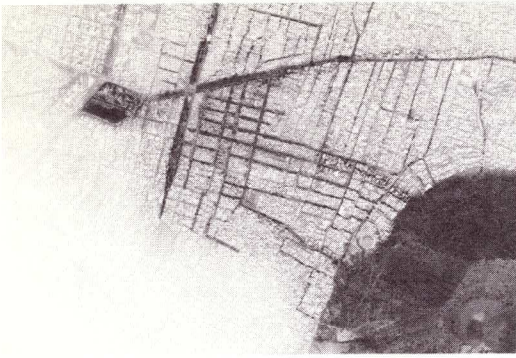


Image of the project "The Street as a Model of Hydrological, Urban and Social Restoration."

Imagen del proyecto "La Calle como Modelo Hídrico, Urbano y Social."

Ermita Iztapalapa Avenue, which used to border the lake and is the oldest in the borough.

The site is located on soils typical of mountain sides formed by cracked rocks good for water filtration. Currently the site works as an open-air infiltration well. Water runoff along Minas Street, previously flowing into Ermita Iztapala Avenue causing floods, is now channeled into the well.

Knowing the site's role regarding flood mitigation, we decided to highlight its importance in the landscape. The site known as *Quebradora* is proposed as a public space that will serve approximately 35,000 people. It will function as water infrastructure, open air space for leisure and sport, water management learning center, and urban farm. The project is a small intervention with a large impact.

b.ii Competition for Water

The Competition for Water, promoted by the borough authorities and the ISR NAUM, produced eight winning proposals one for each of the areas in which the borough is divided. They are the result of an intense promotion campaign targeting community groups and education institutions. The competition was broadcasted directly to 1,500 people and to 8,000 indirectly.

The intense promotion campaign resulted in 256 registered teams and 180 proposals. The Scientific Committee was in charge of selecting twenty-four finalist proposals and eight winners. The jury's criteria focused on finding an adequate proposal for each of the eight areas into which the borough is divided. Finalist and winner proposals shared in common the address to problems that were particular to each one of the subzones.

Among the results, two are worthy of mention: "The Street as a Model of Hydrological, Urban and Social Restoration" and "Educational Basins." The former was developed by students living in Iztapalapa and faculty members from the Architecture Department of the National Autonomous University of Mexico and the latter, by a group of neighbors who had as technical advisers two graduates from Harvard's School of Design. Both cases presented innovative ideas: the first one showed the potential of the street as a buffer and water storage; the second proposed the promoting better water management practices through the borough's school system.

de Garay, Francisco (1888). *El Valle de México*. Apuntes Históricos sobre su Hidrografía. Mexico.

Howe, Carol and Mitchel, Cynthia Ed. (2011). *Water Sensitive Cities (Cities of the Future)*. IWA Publishing, London UK. 278 pp.

von Humboldt, Alexander (1978). *Ensayo Político sobre el Reino de la Nueva España*. Editorial Porrúa, Mexico.

We find three main reasons that large-scale proposals to improve water management so often fail: the lack of credibility these kind of initiatives have stemming from their romanticism or the lack of experience of their authors; the historic inertia of piping and pumping water out of the basin; and the inherent risk of investing in novel proposals with no proof of concept. Though some of these reasons are legitimate, others seek to preserve the status quo that is so detrimental to the MRVM.

The HA Project proposes a strategy to raise awareness in the local population regarding the water related problems they face. The results are a precise diagnostic regarding the areas where projects and water management strategies are needed. HA presented an awareness raising strategy around the selected proposals promoting their implementation.

None of the eight winning proposals, nor the Quebradora HydroPark have been implemented. We think there are two main obstacles:

- 1 The projects the authorities can undertake are limited by their three-year long administration periods. This situation favors the allocation of resources in projects with high media presence but with little real impact. Projects with a span of more than three years are rarely undertaken.
- 2 The budget needs to be allocated a year before the projects begin. This would require the existence of executive projects that cannot be developed without liquidity. Complex proposals required adequate technical assessment are beyond the reach of the local authorities.

The above situation would be irrelevant if there were community groups strong enough to back initiatives that benefit them directly. The second project phase which considered the public diffusion of the winner proposals was not carried out due to a lack of funding and coordination. This weakened the obtained results that, if implemented, would be paradigmatic in terms of the participatory nature of the process and the sustainable approach to water management. The process to implement the ideas of Hydro-urban Acupunctures in Iztapalapa has been challenging. Nevertheless, we remain convinced of the need of these type of interventions and of how important it is for them to be linked to a participatory process.