

The Practice of Three Waters.

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Program Authorized to Offer Degree:

Department of Architecture

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University of Washington

Abstract

The Practice of Three Waters.

Chair of the Supervisory Committee:

Peter Cohan

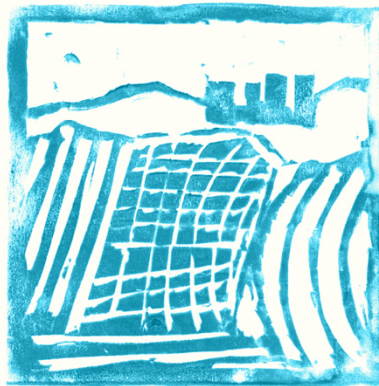
Department of Architecture

In 1325, the Mexicas arrived at the Valley of Mexico to form their society on a constructed island in the center of a system of lakes. This society formed a set of cultural, ritual, and infrastructural practices that embodied the Three Waters of the Valley they called home: Drinking Water, Sweet Water, and Salty Water.

Today, the lakes have disappeared, the city has grown exponentially, and the practices associated with each of the Three Waters are no longer observed. As a result, Mexico City is thirsty, dormant, and sinking. This project proposes three interdisciplinary *practices* that aim to reconnect the contemporary urban form with the hydrological cycle of its place. A community rain catchment and cistern system reconnects Drinking Water with Sky. A water treatment fabric reconnects Sweet Water with Surface. A series of infiltration wells reconnect Salty Water with Earth. Together, these three proposals constitute the practice of Three Waters.

The Practice of Three Waters.

Thesis Project by Jeremy McGlone



Drinking,
Sweet,
Salty.



This project is dedicated to the migratory birds of the Americas, who call all of the basins on this beautiful continent home, in one season or another.

Acknowledgements

Thank you Peter, Jennifer, and Rob for giving me constant support, insight, and encouragement in the process of drawing, talking about, and making architecture and all things adjacent.

Thank you to friends and family, especially Jozz, for allowing water to be an abundant source of conversation.

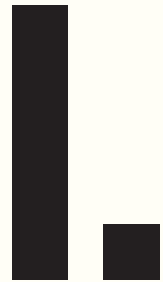
Gracias a todxs los que me han mostrado lo hermoso que es el Valle de México.



Figure 0
Texture collage of the three
proposed practices in their place
along the hydrological cycle.

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Valley of Mexico from the Santa Isabel Mountain Range

Fig. 1

José María Velasco Gómez, Oil on Canvas. 1875.

The Formation of a Basin.



This elevated basin was governed by a natural hydrological cycle.

It is believed that between the years 1150 and 1300, the Mexicas migrated from Aztlán in present day Sinaloa or Baja California to the temperate Valley of Mexico to start the process of establishing their constructed island¹. The Mexicas

submerged logs into the shallow Sweet Water lakebed, layering stone, plaster and lime on top of it². While not impractical, the manmade construction of the lake was a massive societal and infrastructural undertaking. Before this, smaller societies

had formed themselves on the lakes shores. However, before the arrival of the Mexicas, urban-scale manipulations of the hydrologic system by humans had not taken place. The diagram below shows how that system functioned:

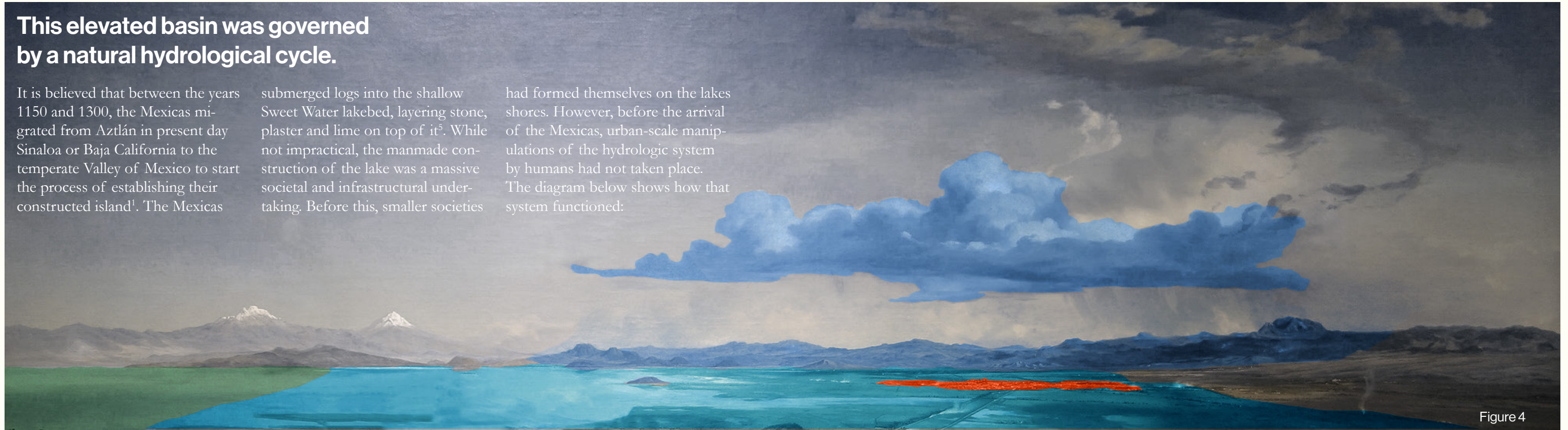


Figure 4

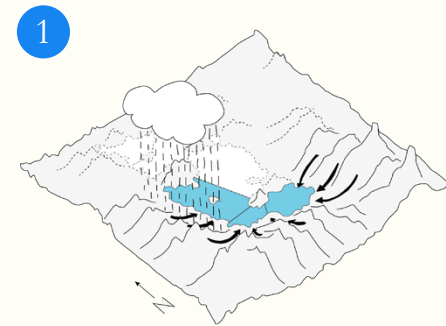


This is how that cycle functioned:

Tenochtitlan was a constructed island in the middle of the northernmost Sweet Water lake, the Laguna of Mexico. The Sweet Water in blue was separated from Salty Water in green by a dike.

Fig. 3 Water cycle diagram.

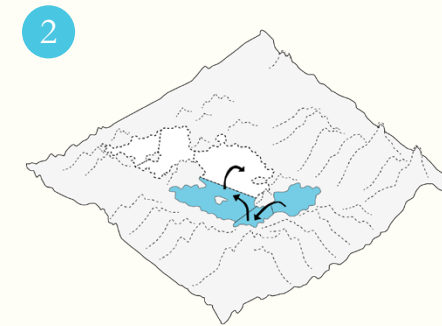
Fig. 4 Jose Maria Velasco Gomez. *The Valley of Mexico from the Santa Isabel Mountain Range*. Oil on Canvas. 1875.



Rainwater fell disproportionately in the mountains to the south and west of the basin. This water would flow down the sides of the mountains into a series of freshwater lakes the natives called Sweet Water.

Fig. 5 INEGI, *Relieve de la superficie de la ciudad de Mexico*. 1:250,000. May 28, 2024.

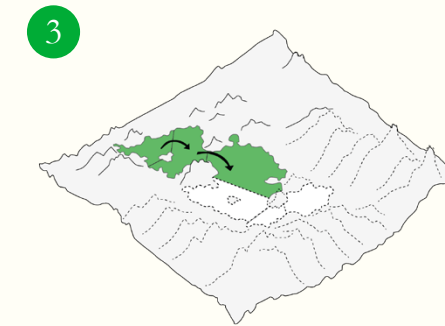
1 Fernando Abitia. *Migración Azteca desde Aztlán a Tenochtitlán: Una Revisión del Códice Boturini*. Aztecas.top blog online, 2017. Accessed June 2024.



The now Sweet Water would descend the cascading elevation Sweet Water lakes from southeast to northwest. These lakes from highest to lowest elevation were Chalco, Xochimilco, and Mexico.

2 Luca Ferrari. *The Geochemical Puzzle of the Trans-Mexican Volcanic Belt: Mantle Plume, Continental Rifting, or Mantle Perturbation*. UNAM, 1999. Accessed June 2024.

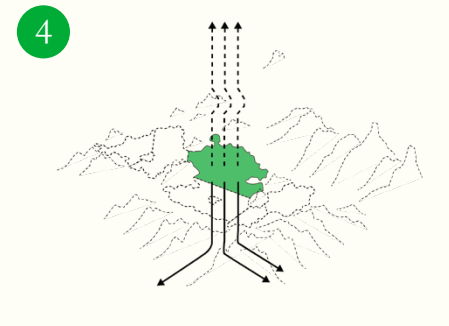
3 Mireya Imaz. *Historia Natural del Valle de México*. 1989. Revista Ciencias 15: 15-21. Facultad de Ciencias, UNAM. Accessed June 2024.



Conversely, water running gradually down from the north would cascade from northwest to southeast in a series of Salty Lakes named Lake Zumpango, Xaltocan, and Texcoco.

4 Comision Nacional Forestal (National Forestry Commission). *El arbol nacional*. Gobierno de Mexico. March 21, 2016.

5 Bertina Olmedo Vera, *Tenochtitlan*. Arqueología Mexicana núm. 107, pp. 59-65.



Both the Salty lakes and Sweet lakes terminated in the largest surface area and lowest lying Salty lake, Lake Texcoco. The water in this lake would either evaporate during the dry winter or seep into the water table.

The Valley also had its own rich ecology.

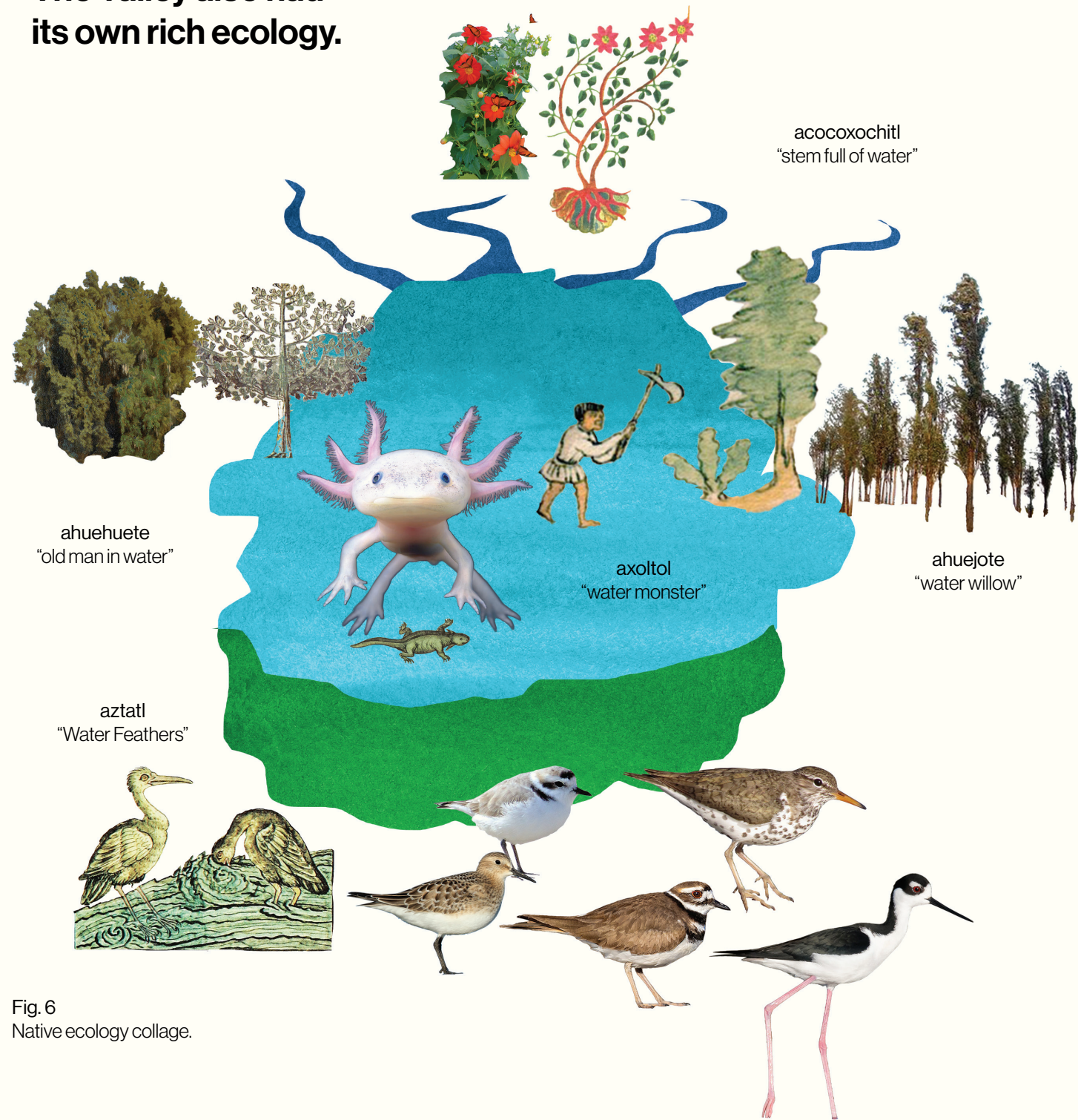


Fig. 6 Native ecology collage.

6 San Diego Zoo Wildlife Alliance Library. *Axolotl (Ambystoma mexicanum) Fact Sheet: Taxonomy & History*. Updated May 7, 2024. Accessed June 2024.

7 Federico Navarrete Linares. *Los orígenes de los pueblos indígenas del valle de México. Los altépetl y sus historias*, digital edition, UNAM, Instituto de Investigaciones Históricas. 2019. Accessed June 2024.

The characteristics of the Valley of Mexico as a temperate river basin above 2,200 meters in elevation at its lowest point³, endow it with an incredible ecology of non-human residents. The sides of the mountains grow native flowers such as the

acocoxochitl ‘stem full of water’. The beds of the Sweet Water lakes sprout trees such as the ahuehuete ‘upright drum in water’. The amphibious Sweet Water resident the axolotl ‘water monster’, is endemic to the Valley of Mexico. Their name



Figure 7 Elevation diagram superimposed on the Braun & Hogenberg Map of 1582.

stems from the Mexica shape shifting god Xolotl⁶, for their ability to regenerate almost all body parts past childhood.

For the majority of its 11,000 years of human habitation, the shores of the Valley of Mexico’s

lakes did not hold more than 20,000 human inhabitants⁷. This lack of centralized political power meant that the lakes were home to a majority non-human community for the greatest part of its hydrologic existence. While other communities

occupied the Valley, living among the lakes to the scale of Tenochtitlan had not been experimented with before. Today, Mexico not only sits as the highest elevation city in North America, but also is its most populous⁶.

1520

The Valley was hugged to the west, south, and east by volcanic peaks, forming the basin for the previously outlined series of freshwater lakes to the west and south, and saline lakes to the east and north. Inhabitants of the Valley called the freshwater lakes Sweet Water. The saline lakes they called Salty. Between 1325 and 1520, Tenochtitlan was constructed as an island on the Sweet Water of the Laguna of Mexico, the lowest of the Sweet Water lakes.

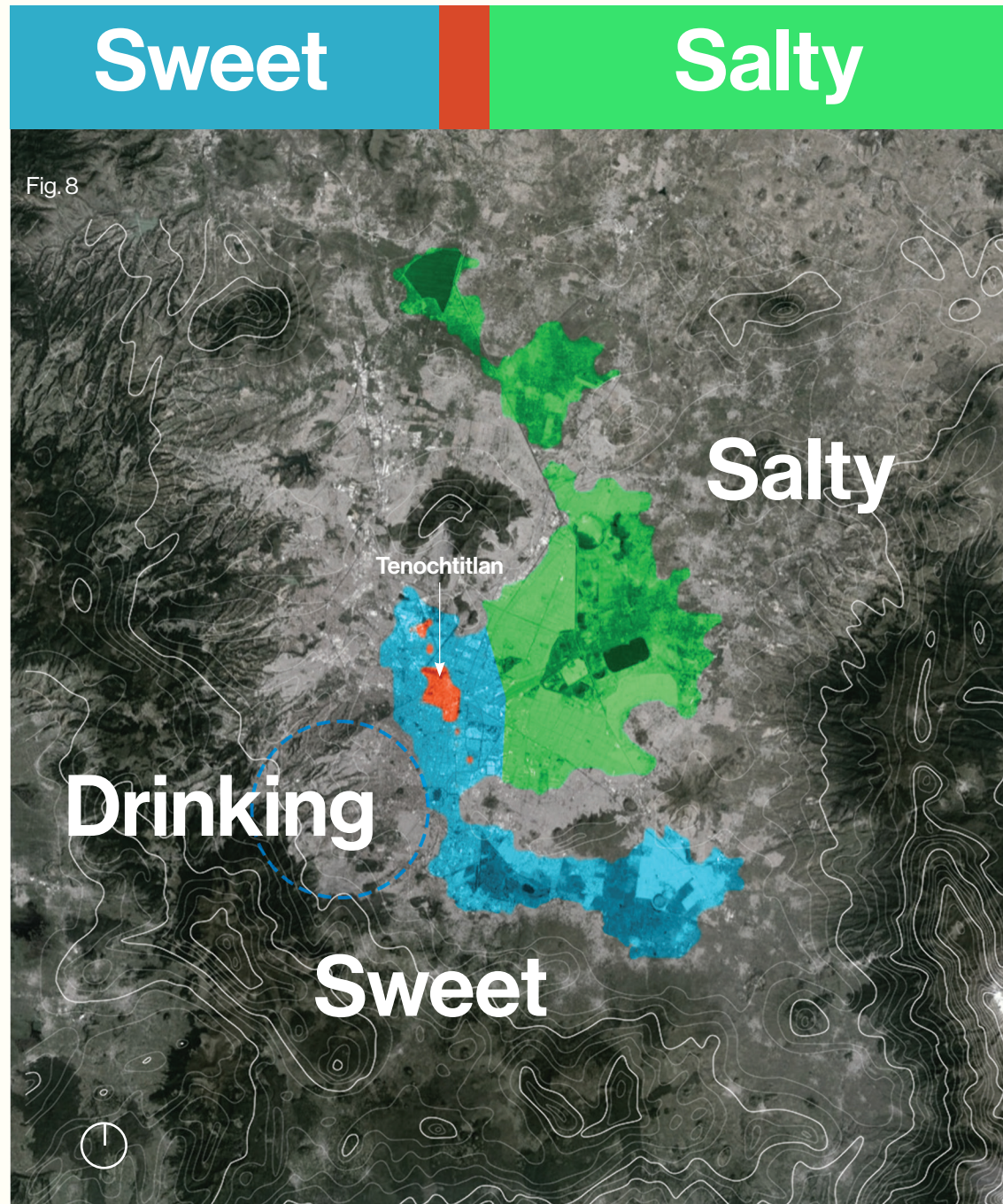


Fig. 8 Urban relation diagram.

Fig. 9 Thomas Kole. *a Portrait of Tenochtitlan*. 2023-2024, Blender overlay on aerial images. Accessed June, 2024.



2024

Today only the ghosts of these lakes exist. The fragments that do remain have no meaningful practice connected to them and no meaning in the public urban consciousness. Drinking Water, Sweet Water, and Salty Water are contaminated, overextracted, underutilized, hidden, disposed of, and unseen. However, the hydrologic cycle that perpetuates the lakes remains, like the few vestiges of something invisible yet not everlasting.

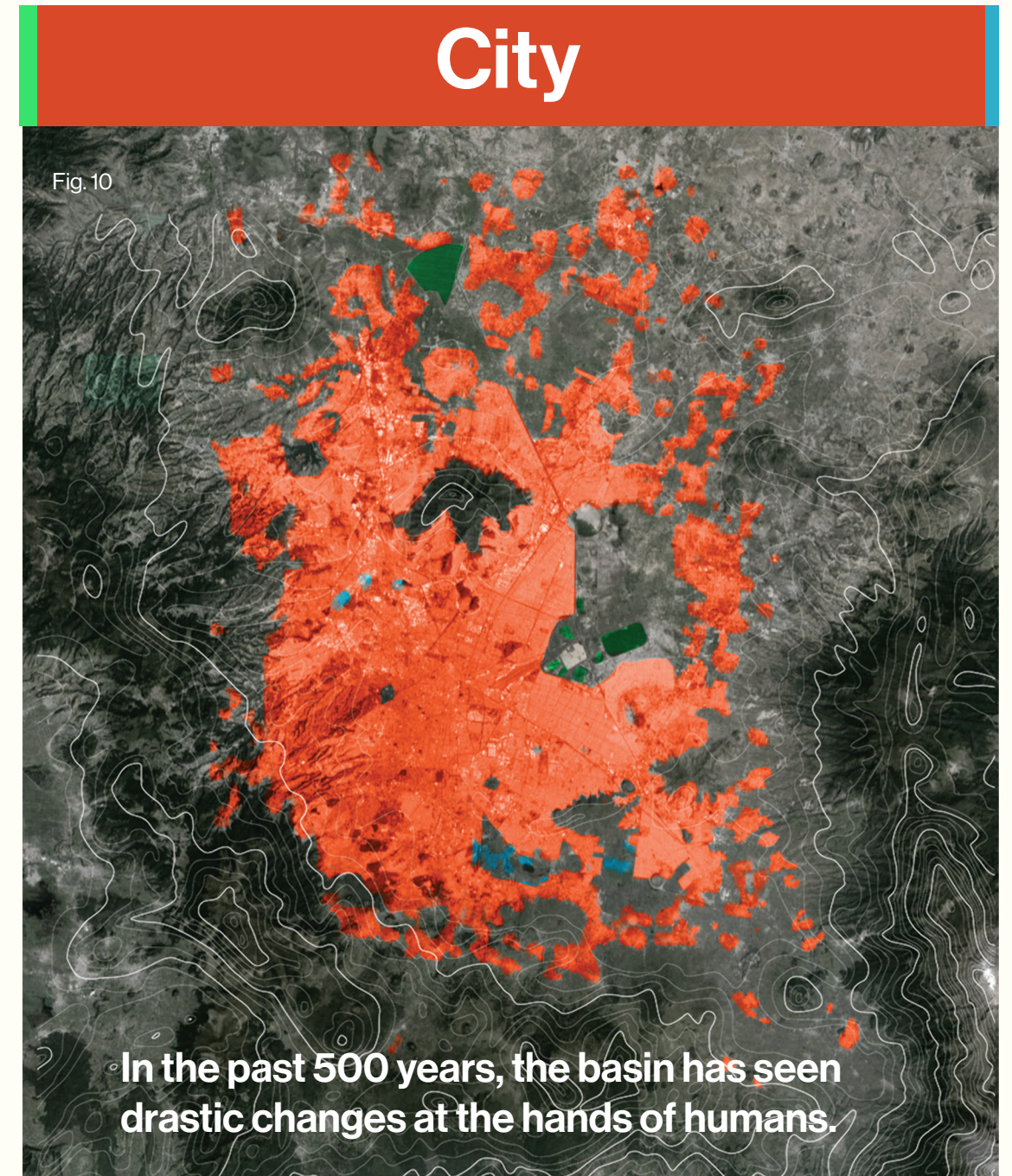


Fig. 10 Urban relation diagram.

Fig. 11 F.E. Camacho Mezquita. *Vista aerea de la Gran Ciudad de Mexico*. Flickr. Uploaded March 2, 2013.





Nuremberg Map
 Fig. 1
 Cartographers of Hernán Cortés, ca. 1524 (Spanish)

The Practice of Three Waters.



Figure 2
Triple Alliance collage plotting.

In 1429, Tlacopan, Tenochtitlan, and Texcoco formed a political alliance that unified the Three Waters for the first time.

Tlacopan

Societal orchestration of the Three Waters was the product of a political unification of three cities to centralize their governance. Tlacopan was the furthest to the west of the Triple Alliance, in the Drinking Water mountains. Tlacopan limited Tenochtitlan's access to Drinking Water previous to the allegiance¹. The right to Drinking Water in the western mountains was a constant source of conflict, death, and centralized political might.

Tenochtitlan

Tenochtitlan was founded in 1325. The origin story has it that an eagle landed on a rock outcropping on the Sweet Lakes. This eagle caught a snake on the rock outcropping, signaling its divine significance². The Mexicas over one hundred years pushed logs into the bottom of the shallow lakes, and propped volcanic stone on top of it. This constructed island reached a population of 200,000 under this alliance³.

Texcoco

While Drinking Water was long part of the purview of Tenochtitlan, its relationship with Texcoco was something new. Texcoco was led by the warrior-engineer-poet Nezahualcoyotl ('Fasting Coyote'). Nezahualcoyotl used his power to unify the Three Waters, spearheading infrastructural projects including a dike and aqueduct that brought into sharp focus the capacity of human manipulation of water in the Valley³.



Fig. 3
Leaders of Triple Alliance, Azcatitlan Codex.



Fig. 4
Tepetzco of Triple Alliance, Osuna Codex.

Fig. 2 Collage plotting of Triple Alliance in relation to contemporary City.

Fig. 3 Leaders of Triple Alliance, *Codex Azcatitlan*. Nahuatl on european paper, 1530.

Fig. 4 Tepetzco of Triple Alliance, *Codex Osuna*. Nahuatl on european paper, 1565. Section of page 34 (folio 496).

1 Jesús Monjarás-Ruiz. *La Triple Alianza*. Arqueología Mexicana, January 1998. num 15. pp. 20-25.

2 Xavier Noguez. *Tira de la Peregrinación. La migración mexicana*. Arqueología Mexicana, 2006. num. 81, pp. 48-53.

3 Jay Silverstein. *The Tenochca Empire of Ancient Mexico: The Triple Alliance of Tenochtitlan, Tetzco, and Tlacopan*. Latin American Antiquity Journal, September 2000.



Santa Cruz (Uppsala) Map, 1550 - 1556

Fig. 5: The Santa Cruz map was a watercolor map painted upon the arrival of the Spanish in Mexico City (Tenochtitlan) between the years of 1550 and 1556. The map shows image of plants, animals, and daily life in the lacustrine city. Mexica artisanship is evidenced in the map through its distinguishing the Three Waters via pigmentation in the watercolor.

Fig. 5 Tlahcuiloh artists. *Santa Cruz Map (Uppsala Map)*. Nahuatl on european paper, 1550-56.

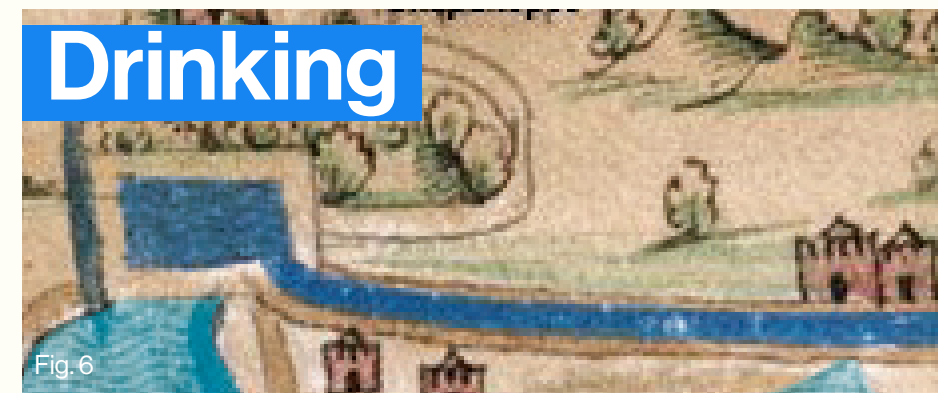


Fig. 6



Fig. 7



Fig. 8

The Three Waters were the framework for a set of ritual, cultural, and infrastructural practices in the Valley of Mexico.

The Three Waters not only constituted a hydrologic cycle for the Valley of Mexico that existed well before human habitation, it constituted a heirarchy for a set of cultural, ritual, and infrastructural practices that kept the Three Waters in their powerful whole. Drinking water was intercepted in the mountains and carried over the Sweet Water lakes. Sweet Water was of good enough quality to grow crops and wash oneself in, but not to drink. The Salty Water lake was where all of this cycle ended, and began again. Water was born, used, and returned⁴.

Fig. 6 Tlahcuiloh artists. *Santa Cruz Map (Uppsala Map)*. Nahuatl on european paper, 1550-56.

Fig. 7 Tlahcuiloh artists. *Santa Cruz Map (Uppsala Map)*. Nahuatl on european paper, 1550-56.

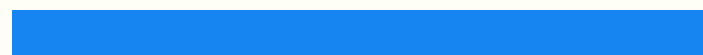
4 Hernán Cortés. *La Gran Tenochtitlan*, UNAM General Direction for Formatting and Publishing, 2003.

Fig. 8 Tlahcuiloh artists. *Santa Cruz Map (Uppsala Map)*. Nahuatl on european paper, 1550-56.

Mexica gods embodied the immense forces of the Three Waters.

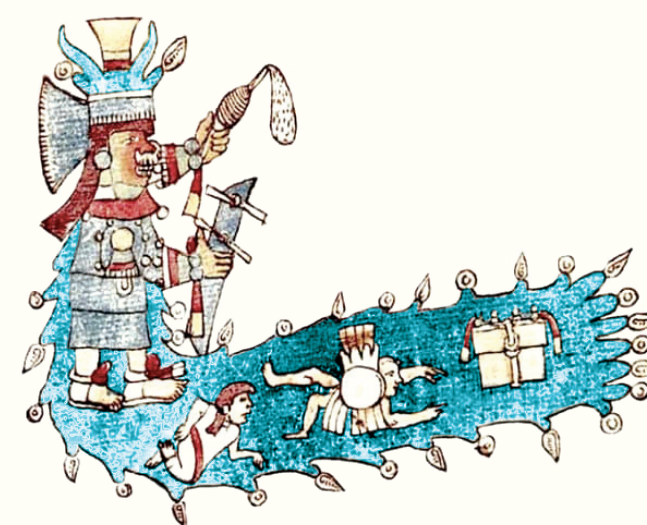


Tlaloc
Magliabechi codex
Fig.9



Tlaloc brought the rain.

Tlaloc was the god of Rain. His goodwill brought water from the sky in the mountains surrounding the Valley. His headdress, seen above in his depiction in the Magliabechi codex, was made of the feathers of the serpent. The Serpent's feathers presented Tlaloc with the ability to connect with the cosmic sky: the birthplace of water⁵.



Chalchiuhtlicue
Telleriano-Remensis codex
Fig.10



Chalchiuhtlicue orchestrated active water.

Chalchiuhtlicue was the goddess of active water, whereas her brother Tlaloc its creation. Chalchiuhtlicue had the keen sense and power for water's advantageous use. Chalchiuhtlicue means in Nahuatl, the native language group of the Mexica 'she of the jade skirt', as the gleam of the precious stone on her fabric resembled running surface water⁶.



Quetzalcoatl
Telleriano-Remensis codex
Fig.11



The Serpent's Mouth was the great unknown.

Quetzalcoatl was the feathered serpent. The god's feathers connected him with the cosmic, his serpent body with the physical and human. Quetzalcoatl was the destroyer of the four suns, and the creator of the fifth and current sun. He was the arbitrator between Mexica society and its place in the cosmos⁶.

Fig.9 Tlaloc. *Codex Magliabechiano*, Nahuatl on european paper, 1529-53.

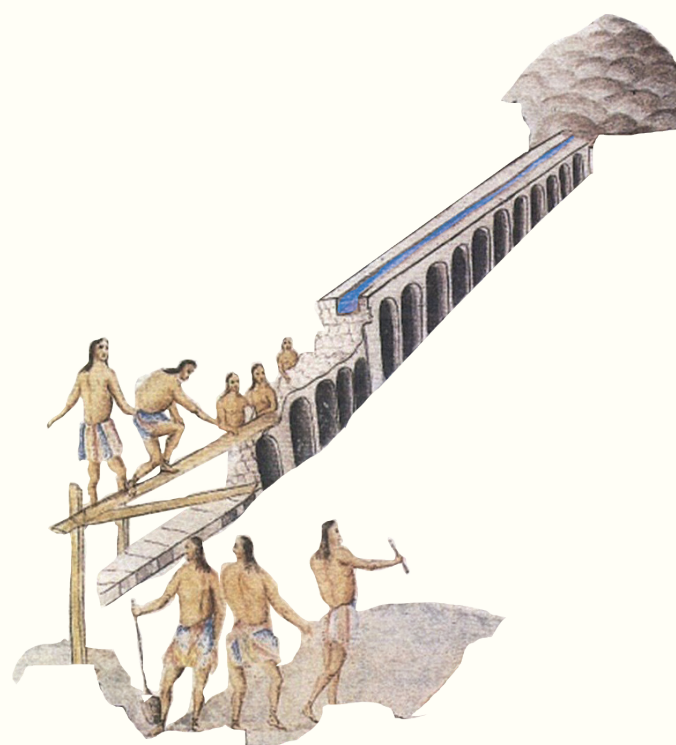
Fig.10 Chalchiuhtlicue. *Codex Telleriano-Remensis*, Nahuatl on european paper, ca. 16th century.

Fig.11 Quetzalcoatl. *Codex Telleriano-Remensis*, Nahuatl on european paper, ca. 16th century.

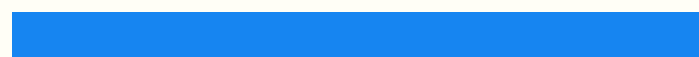
5 Johanna Broda. *cosmovisión y meteorología indígenas de Mesoamérica*. Institute of Historical Investigations, UNAM 1997.

6 Blas Castellon Huerta, *El Sistema de drenaje de la Ciudad de México*. *Pádi Boletín Científico De Ciencias Básicas E Ingenierías Del ICBI*. 2021. Vol. 9(17), pp. 24-30.

Infrastructural practices harnessed these forces.



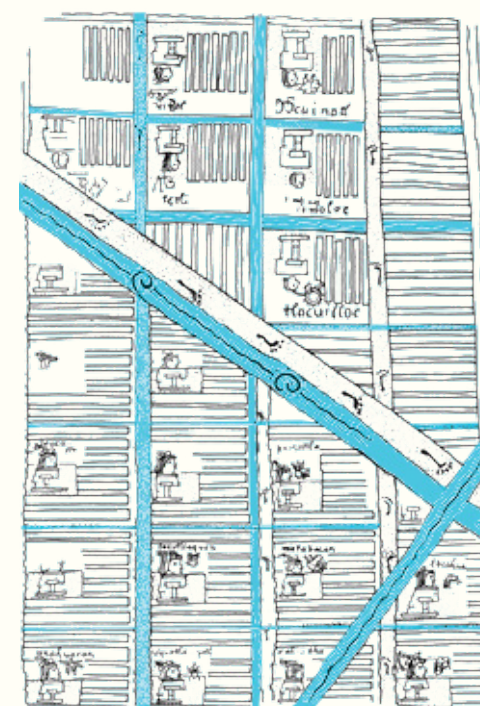
Construction of Aqueduct
Aubin codex
Fig. 12



Moctezuma I's Aqueduct

The aqueduct constructed to take water from Chapultepec ('grasshopper hill') to Tenochtitlan was a political mandate under Moctezuma I with the help of the Triple Alliance. Logs were submerged into the bottom of the lakebed, and volcanic stones propped on top of them⁷. This original aqueduct washed away with a flood in 1449, and was reconstructed using sturdier materials under the guidance of Nezahualcoyotl⁸.

Fig. 13 Chinampas of Xochimilco. *Matricula de Tributos*, Ink on bark paper. ca. 1542.



Chinampas of Xochimilco
Plan on Maguey Paper
Fig. 13

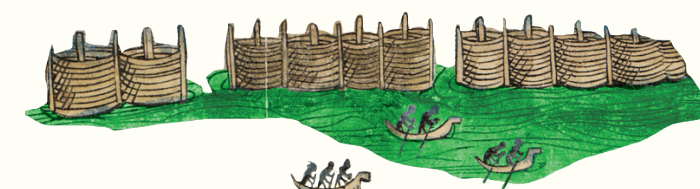


Xochimilco's Chinampas

In Xochimilco, south of Tenochtitlan, and at the edge of the Sweet Water lake Lake Xochimilco, growing beds called "chinampas" were constructed. Logs were submerged into the lakebed to create their framework. Tule, a native sedge to the Valley was woven around the log formwork of this soil basket, and alluvial soils from the lakebed were dug up and placed into it⁹. This practice of constructing beds remains to this day.

Fig. 14 Hernán Cortés. *Nurenberg map of Mexico City*. ca. 1524. Folded leaf of plates. Edward E. Ayer digital Collection (Newberry Library).

⁷ J.A. Raynal-Villasenor. *Hydrologic and Hydraulic Works of the Aztec Civilization*. World Water Resources, 2020. vol. 6, pp. 237-254.



Dike of Nezahualcoyotl
Nuremburg Map
Fig. 14



Nezahualcoyotl's Dike

The Dike, made of volcanic stone and wrapped in logs, kept Salty Water from overflowing into the Sweet Lakes and killing the harvest in the wet summer. It also restricted the flow of Sweet Water into the lower-lying Salty Water lakes in the dry summer, when the Sweet Water was a more precious resource⁷.

⁸ Juan Carlos Olivas. *Ciudades de agua: Tenochtitlan*. PhD Diss. Pontificia Universidad Católica de Valparaíso, 2012.

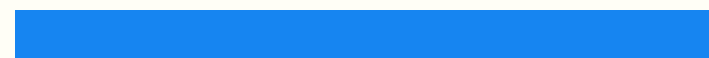
⁹ Berenice Jiménez González et al. *La gente de las chinampas y sus viviendas*. Arqueología Mexicana, num. 184, pp. 32-39.

Fig. 12 Moctezuma I's Aqueduct. *Aubin codex*, Nahuatl on european paper, 1576-1607.

Their cultural practice defined their character within society.



Practices Aqueduct
Cozcatzin & Duran codices
Fig.15 - 16

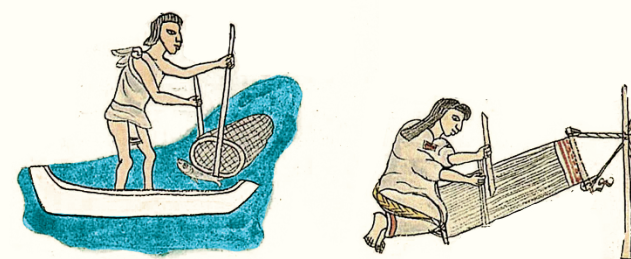


Drinking Water is obtained and provisioned

Drinking Water was a source of political power. Drinking Water was technically not a contiguous part of Tenochtitlan, which was bordered on all sides by Sweet Water. It was therefore a scarce and coveted resource for the city. Moctezuma I's ability to obtain and provision it was a symbol of his divine right as a political leader. This is still true today.

Fig.15 Carving of Moctezuma's Statue at Aqueduct. *Codex Cozcatzin*, Nahuatl on european paper. 1572.

Fig.16 Moctezuma checking aqueduct cistern, Chapultepec. *Durán Codex*, Spanish account of Aztec society written by Diego Durán, 1581.



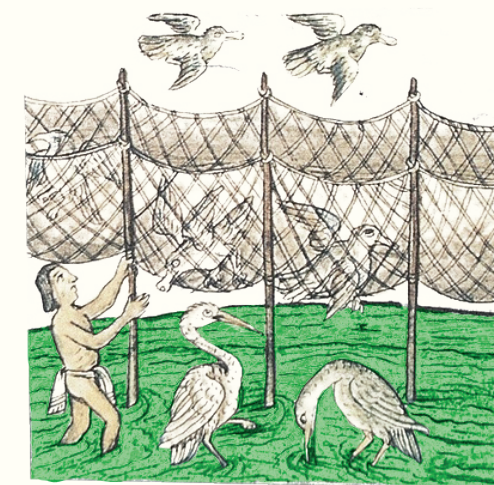
Practices of Xochimilco
Mendoza codex
Fig.17



Sweet Water is used

Sweet Water was the water of advantageous use and daily life. The Sweet Water was not fresh enough to drink. However, it was good enough to be the home of non-human natives, to grow human subsistence, and use daily for bathing, weaving, and cooking. Sweet Water was active, it was physical, it was useful.

Fig.17 Practices of Xochimilco. *Mendoza Codex*, Nahuatl on european paper, 1541. Lamina 60.



Practices Lake Texcoco
Florentine codex
Fig.18



Salty Water drowns and recharges.

Salty Water was the immense, incomprehensible, and uncontrollable. Birds were trapped on its shore, and the body of water was traversed in canoe. However, if Drinking Water was owned and distributed, and the Sweet Water made use of by humans, the Salty Water evaded our manipulation and control. Salty Water acted upon us.

Fig.18 Practices of Lake Texcoco. *Florentine Codex*, Ethnography by Bernardino de Sahagún originally published in Spanish titled *The General History of the Things of New Spain*.

Ritual practices payed tribute and respect to these distinct characters.



Atemoztli
Florentine Codex
Fig.19



Where the water is born

Inhabitants of the Valley of Mexico would climb the mountain of Ajusco ('where the water is born') hugging the western edge of the Valley to ask Tlaloc for his gift. Those who journeyed would set up temporal shelters and bring ceramic vessels filled with their offerings¹⁰.



Huey Totzoli
Florentine codex
Fig.20



Where the water turns

During the dry winter, inhabitants of the Valley would pilgrim to the bend in the river Culhuacan ('where the water turns'). Corporeal offerings of young corn or seeds were offered to the gods of fertility where the water turns in hopes that they would gift a fruitful harvest¹⁰.



Atlcahualo
Florentine codex
Fig.21



Between two flags

Lastly, inhabitants of the Valley would journey in canoe to the middle of Lago Texcoco, the lowest-lying and largest lake. Here sat an immense drainhole named Pantitlan ('between two flags'), flags surrounded the drainhole to warn canoes of the danger. Here human sacrifices were thrown into the vortex during Atlcahualo ('when there was a lack of rain')¹⁰.

Fig. 19 Atemoztli. *Florentine Codex*, Ethnography by Bernardino de Sahagún originally published in Spanish titled *The General History of the Things of New Spain*.

Fig. 20 Huey Tozotzli. *Florentine Codex*, Ethnography by Bernardino de Sahagún originally published in Spanish titled *The General History of the Things of New Spain*.

Fig. 21 Atlcahualo. *Florentine Codex*, Ethnography by Bernardino de Sahagún originally published in Spanish titled *The General History of the Things of New Spain*.

10 Bernardino de Sahagún, 1499-1590. *Florentine Codex: General History of the Things of New Spain*. Santa Fe, N.M. Salt Lake City, Utah. The School of American Research. University of Utah, 1970.

Together, the practices of the Three Waters formed society in the Valley of Mexico.

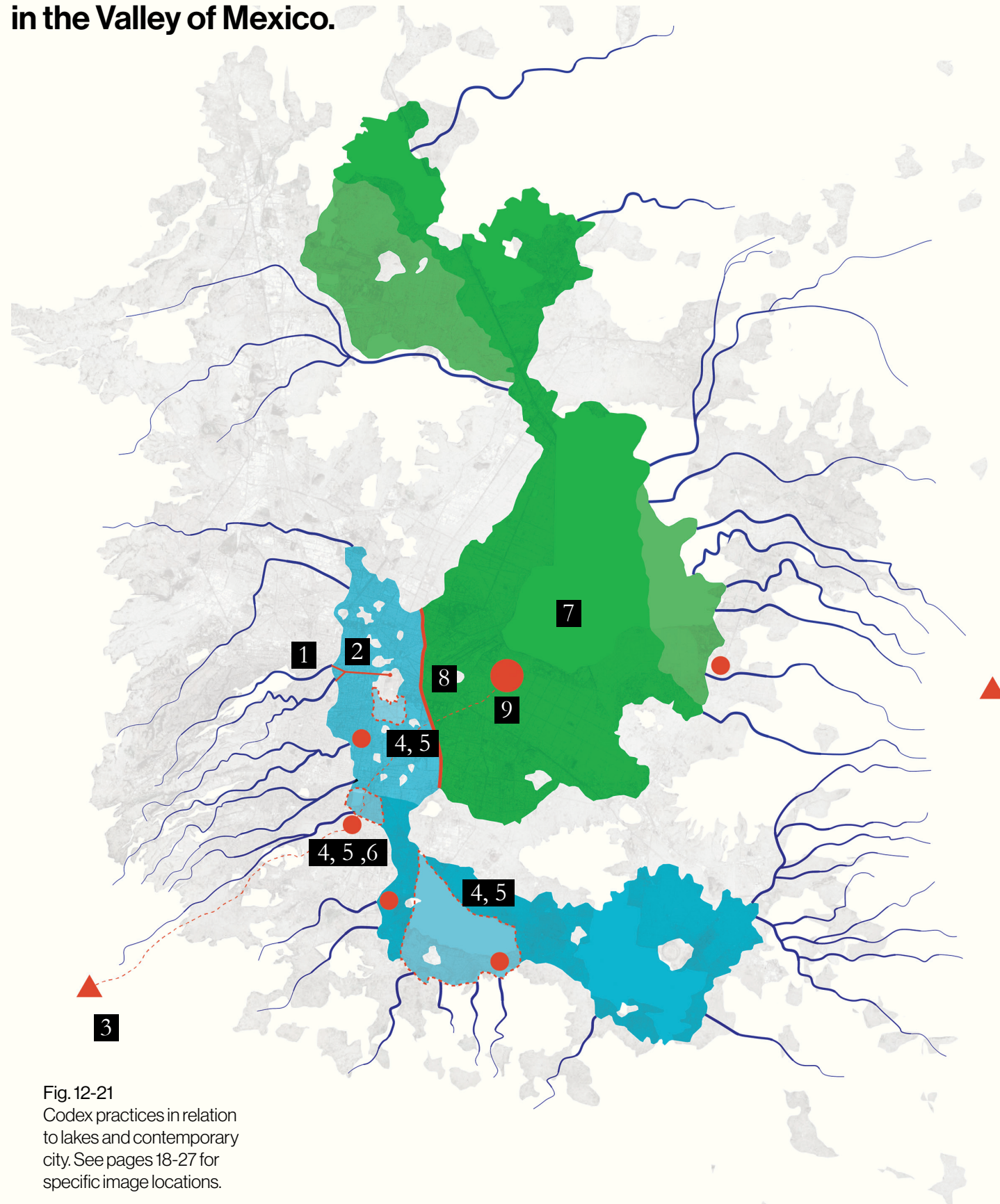
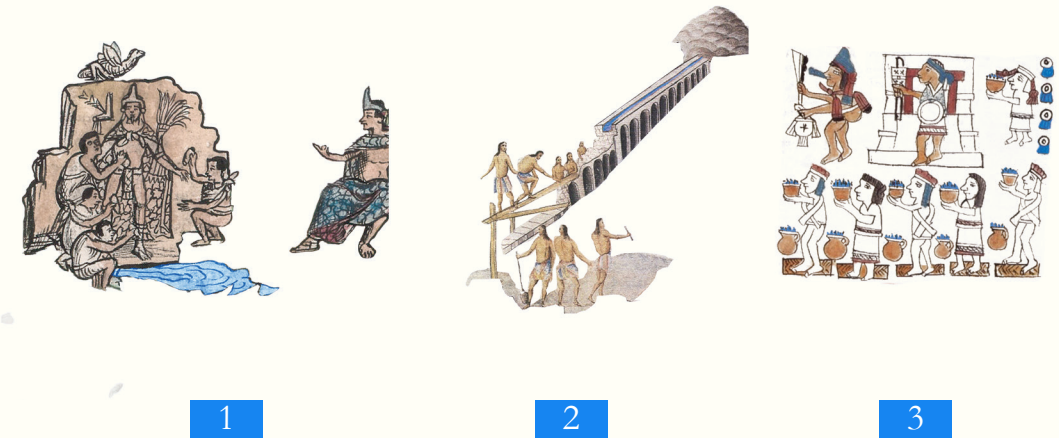


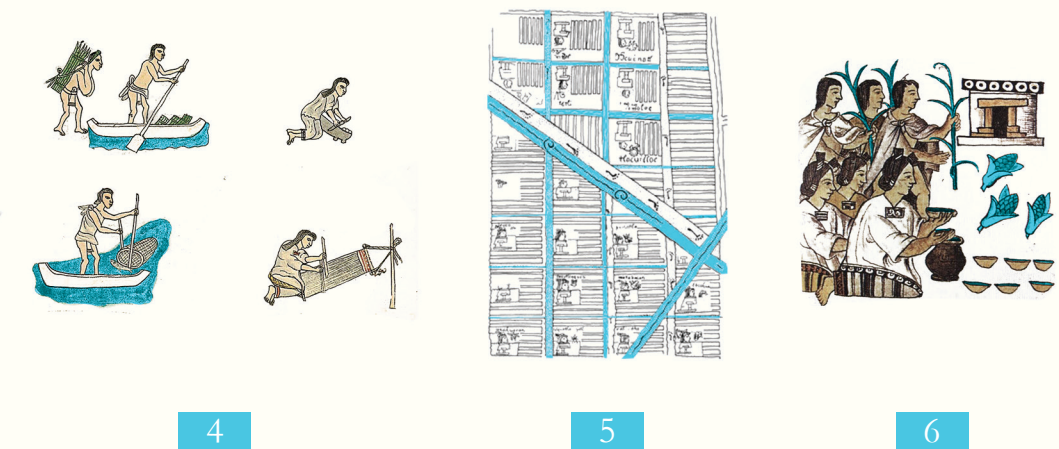
Fig. 12-21
Codex practices in relation to lakes and contemporary city. See pages 18-27 for specific image locations.



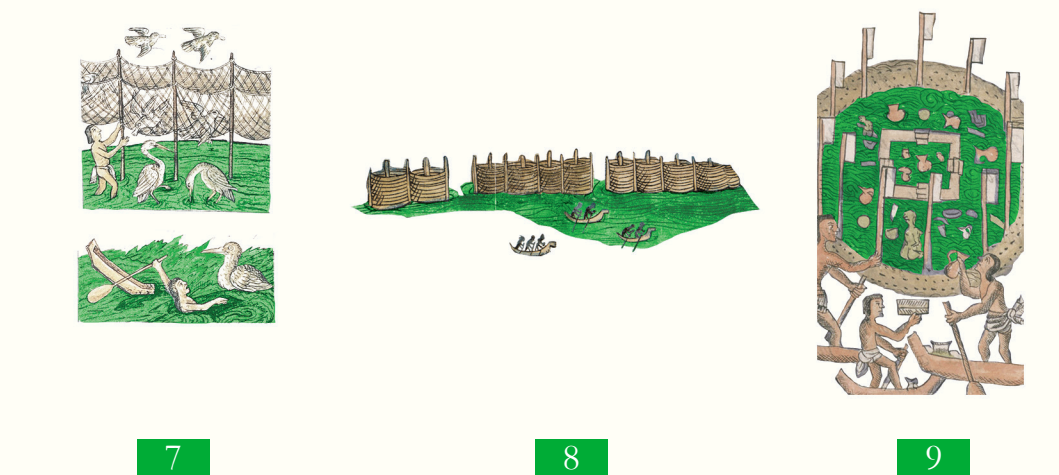
Drinking



Sweet



Salty





Construction of the 'Western Outlet'
Fig.1
Cuartoscuro, 2022.

Disappearing Acts.



The Fall of Tenochtitlan
Fig. 2
Unknown Artist. *Conquest of México*
by Cortés. Oil on Canvas. 17th century.

Then, in 1521, the Spanish arrived.

- 1 Valeria Añón. *La caída de Tenochtitlan: narrar la destrucción*. Centro de Estudios de Teoría y Crítica Literaria, 2010.
- 2 Bernardo R. Ortiz de Montellano. *Medicina, salud y nutrición Aztecas Siglo XXI* Editores, CDMX, MX 2003.
- 3 María del Carmen Martínez. *De Tenochtitlan a las hibeuras: la Quinta carta de relación de Hernán Cortés*. E-Spania: Revue électronique d'études hispaniques médiévales. 2017.

1521

In 1521, less than one hundred years after the political, infrastructural, cultural, and ritual unification of the Three Waters, Hernán Cortés and the Spanish arrived at the Valley of Mexico. The Spanish did not set off on a conquest to dry the lakes. How-

ever, they did dismantle the societal framework of cultural, infrastructural, and ritual practices that composed their healthy coexistence. Upon arriving in Tenochtitlan (present-day Mexico City), Cortés was amazed at just how

much labor and resources the Mexicas employed to maintain their lacustrine infrastructure of aqueducts, canals, and dikes for Drinking, Sweet, and Salty Waters¹. Cortés envisioned a Mexico where the largely pescatarian communities

of the Valley of Mexico would dry the surrounding land for the domestication of livestock in the Spanish way. Before this, communities of the Valley subsisted on primarily fish and birds from the lakes², as well as crops from their beds, most impor-

tantly corn ('*elotl*'). Cortés' contribution to the situation was therefore less in causing the disappearance of the lakes, and more the dismantling of the conscious practice needed to maintain a society that based itself in their hierarchical whole.



Fig. 3
Nuremberg Map - 1524

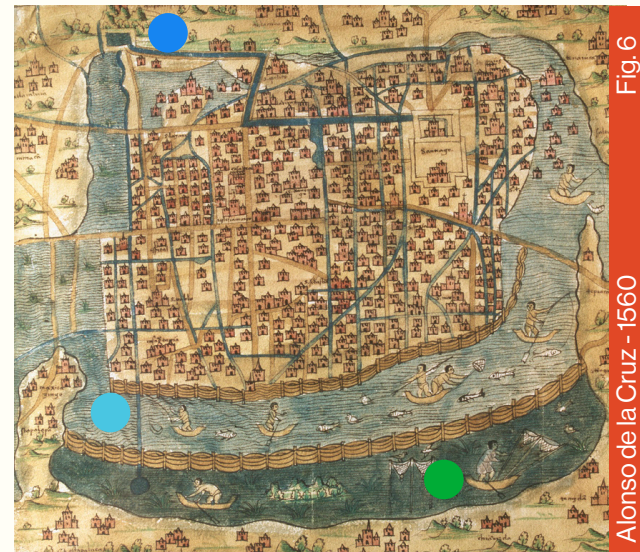


Fig. 6
Alonso de la Cruz - 1560



Fig. 8
Juan Gomez de Transmonte - 1628

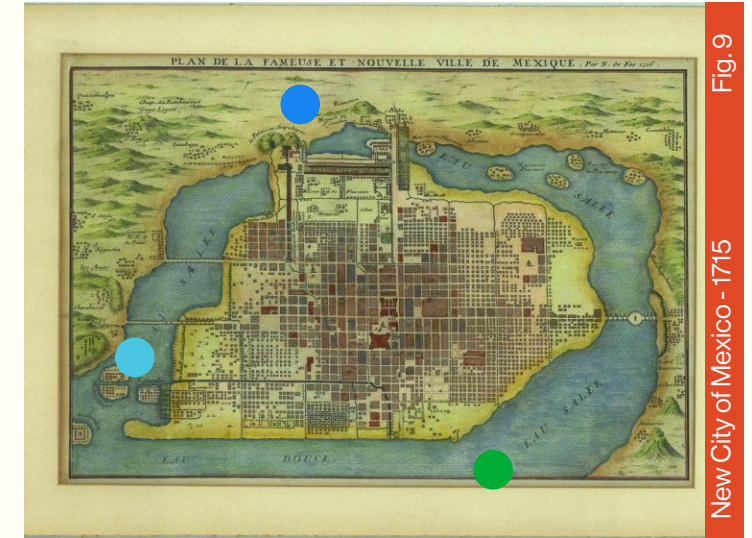


Fig. 9
New City of Mexico - 1715

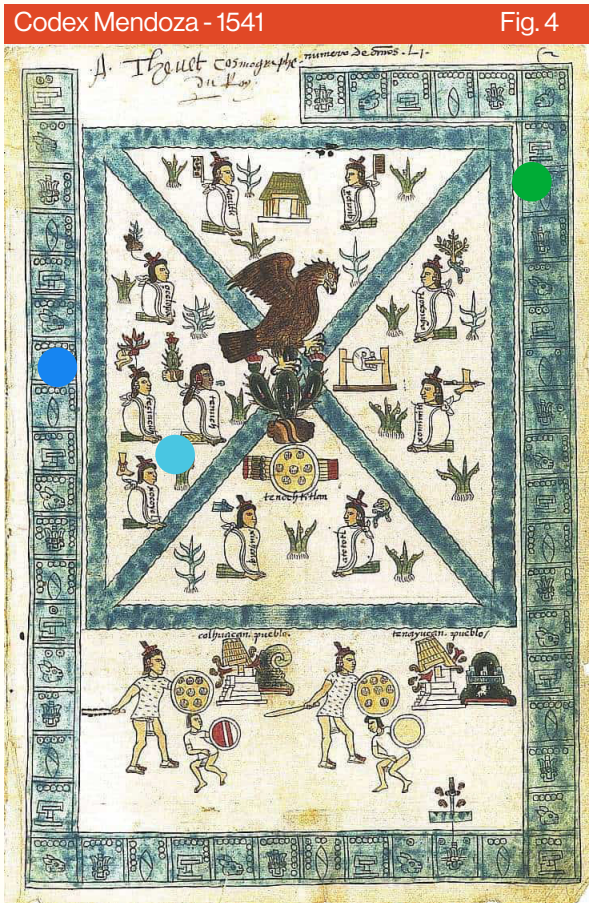


Fig. 4
Codex Mendoza - 1541

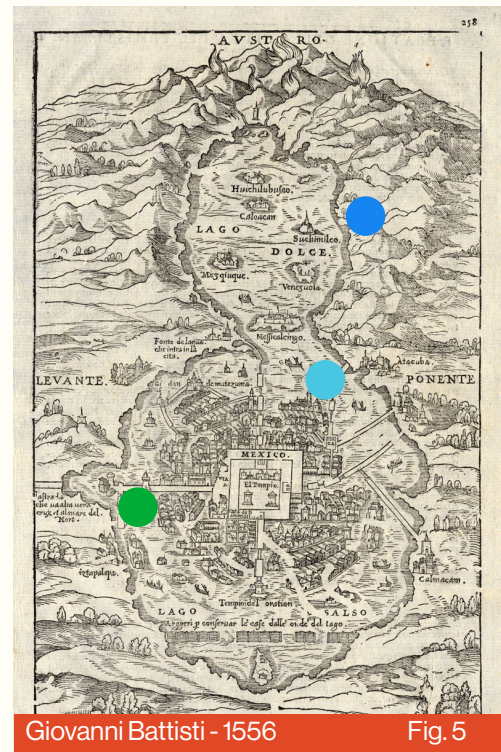


Fig. 5
Giovanni Battista - 1556



Fig. 7
Braun & Hogenberg Map - 1582

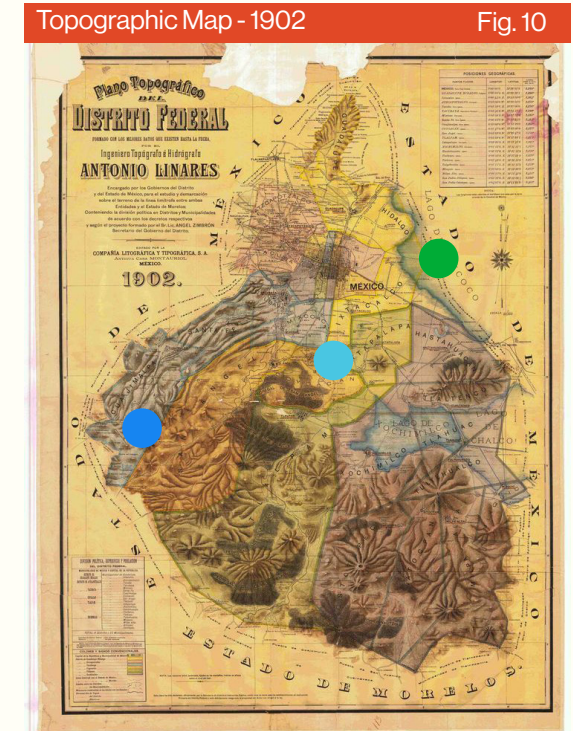


Fig. 10
Topographic Map - 1902

The disappearance of the Waters did not happen all at once.

- Chapultepec - Drinking
- Laguna of Mexico - Sweet
- Lake Texcoco - Salty

North on Map

Fig. 3 Hernán Cortés. *Nuremberg map of Mexico City*; ca. 1524. Folded leaf of plates. Edward E. Ayer digital Collection (Newberry Library).

Fig. 5 Giovanni battista Ramusio. *Navigazioni e Viaggi, Tenochtitlan*. 1556. Courtesy of the Syndics of the British Library.

Fig. 7 Georg Braun and Frans Hogenberg. *Mexico, Civitates Orbis Terrarum, Liber Primus*. Köln, Gottfried von Kempen, 1582.

Fig. 9 Nicolas de Fer. *Plan de la Fameuse et Nouvelle Ville de Mexique*. 1715.

Fig. 4 Tenochtitlan. *Mendoza Codex*, Nahuatl on european paper, 1541.

Fig. 6 Tlahcuiloh artists. *Santa Cruz Map (Uppsala Map)*. Nahuatl on european paper, 1550-56.

Fig. 8 Juan Gómez de Trasmonte. *Form and Establishment of Mexico City*. 1628. University of Texas Libraries Collections.

Fig. 10 Antonio Linares. *Topographic Map of the Federal District*. 1902.

III.

Fig. 11
Infrastructural growth / wa-
ter surface area diagram.

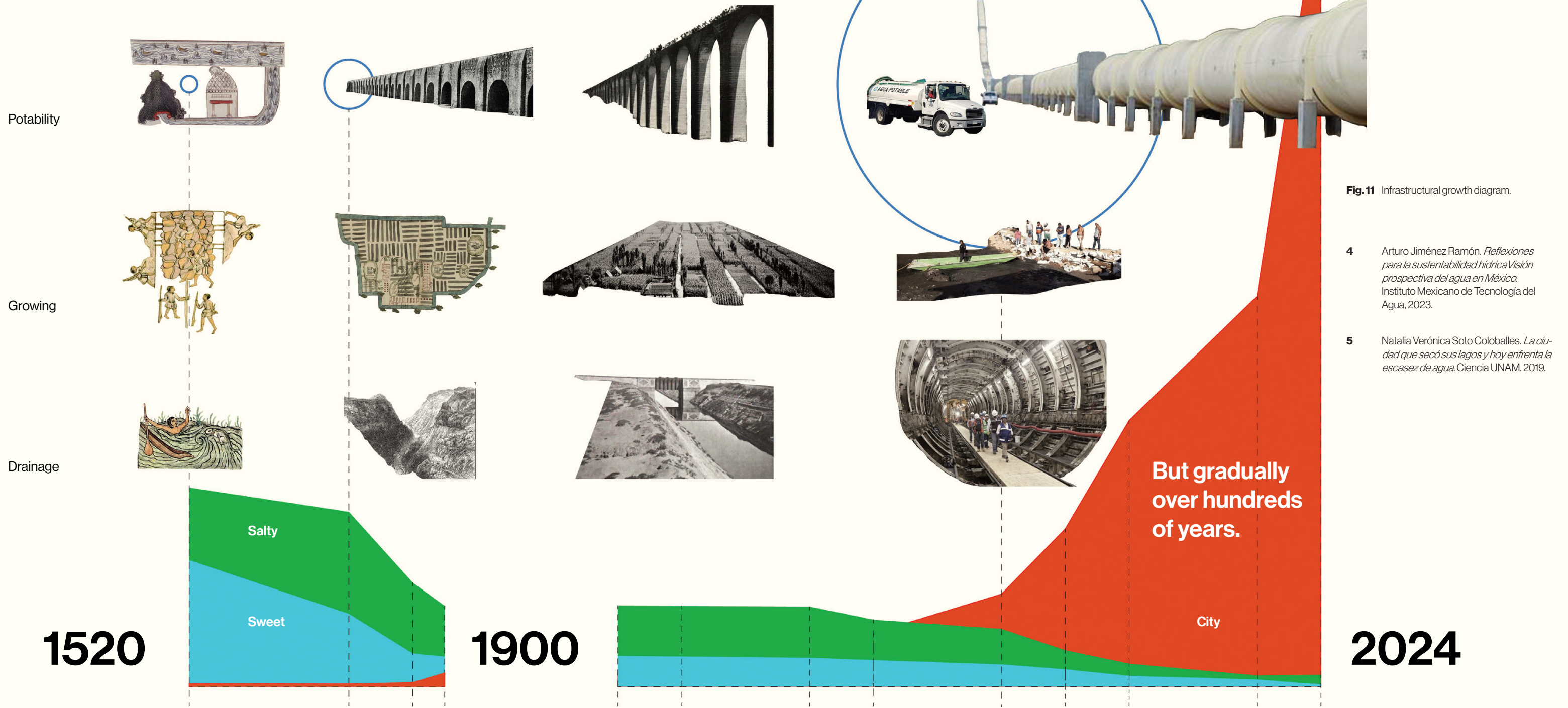


Fig. 11 Infrastructural growth diagram.

- 4 Arturo Jiménez Ramón. *Reflexiones para la sustentabilidad hídrica Visión prospectiva del agua en México*. Instituto Mexicano de Tecnología del Agua, 2023.
- 5 Natalia Verónica Soto Coloballes. *La ciudad que secó sus lagos y hoy enfrenta la escasez de agua*. Ciencia UNAM. 2019.

From the arrival of the Spanish in 1521, the infrastructures related to Drinking, Sweet, and Salty Waters exploded. The methods for obtaining and provisioning Drinking Water have become longer, wider, further reaching, and more exploitative. The

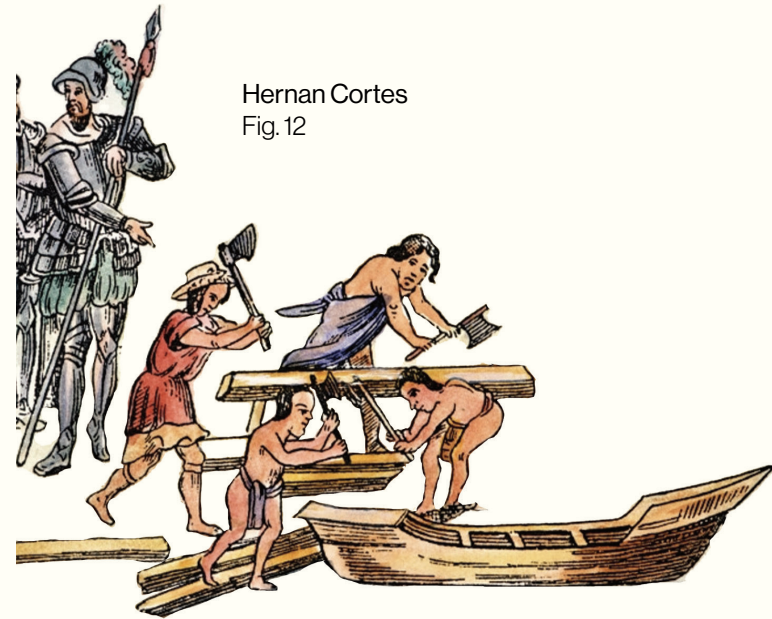
shallow Sweet Lakes for daily use are becoming smaller, more contaminated, and more vulnerable to urban development. The surface of the Salty Lakes has been subject to the systematic infrastructural campaigns to rid the city of it⁴. Systems

of increasing size aim to push storm and blackwater out of the city at exponentially larger, wider, more intensive scales. When viewed as a proportionate timeline, this explosion in infrastructural scale has been concentrated to the last 50 years.

The graph above shows the relationship between the surface area of Sweet Water, Salty Water, and City from 1521 with the arrival of the Spanish to today. The circles above it show the increasing diameter of the system to bring Drinking Water

into the city⁵. Whereas the practice was once to harness the natural characteristics of water in their place within the valley, the current practice is to rid the valley of their perceived complications: a societal framework set in motion in 1521. Today, the city

is thirsty, dormant, and sinking. The only water left to rid the valley of its hydrologic cycle each summer. One has to wonder: what next for the reincorporation of water's place in the city?



Hernan Cortes
Fig. 12

Porfirio Diaz
Fig. 13



German Martinez (CONAGUA)
Fig. 14

Their systematic disappearance can be understood as a series of sociopolitical shifts in the history of the City.

Fig. 12 Hernán Cortés. *Aubin codex*; Nahuatl on european paper, 1576-1607.

Fig. 13 Unknown Artist. *Painting of Such President of Mexico Porfirio Diaz Mori (1830-1915)*. Exhibited currently at the Museum of the temple and ex-convent of Santo Domingo de Guzman. Oaxaca, Mexico.

Fig. 14 Government of Mexico, *Four new functionaries take their oath to be integrated in the initiatives of the institution of CONAGUA*. Photograph. Retrieved from Government of Mexico. Uploaded March 23, 2023.

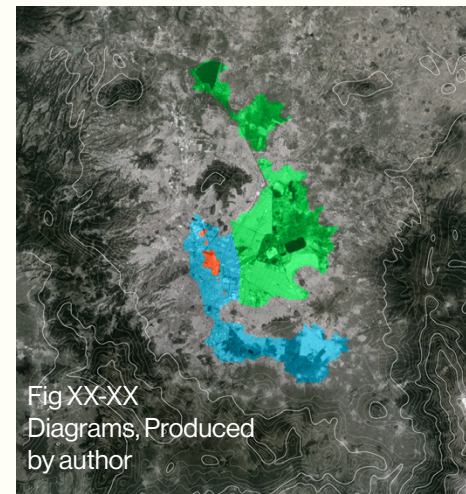
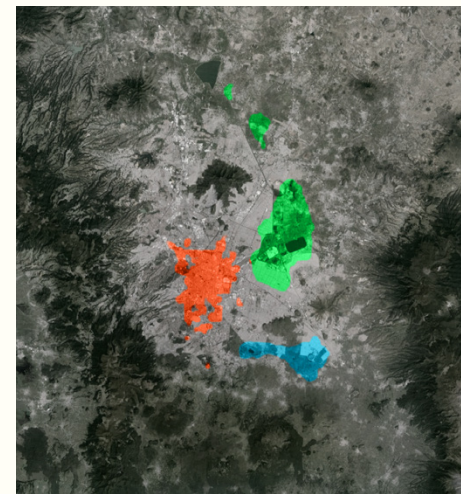
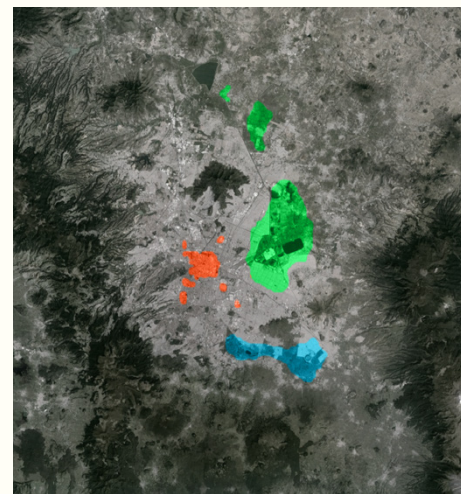
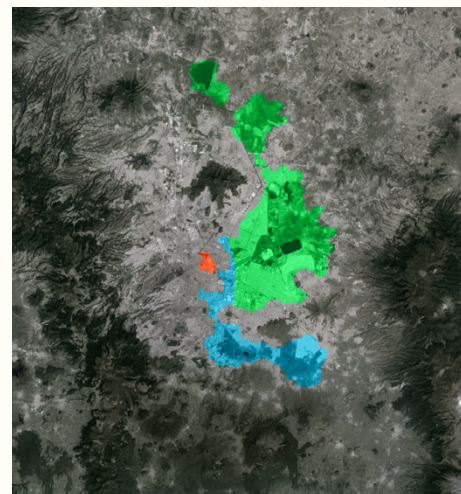


Fig XX-XX
Diagrams, Produced by author



1520

Pop. 200,000

1750

Pop. 200,000

1910

Pop. 1 Million

1940

Pop. 2 Million

2020

Pop. 22 Million

The organized disappearance of the Three Waters can be understood as the product of three major socio-political moments in the Valley of Mexico's history. The first is the arrival of Cortés. The arrival of the Spanish in 1521 meant the dismantling of the care and attention needed to orchestrate the Three

Waters. Under Cortés, the Sweet Lakes directly surrounding the city were dried to make room for domesticated livestock⁶. The next socio-political moment that changed the trajectory of the City's relationship with water didn't come until the end of the 19th century. The election of militant leader Porfirio Díaz in

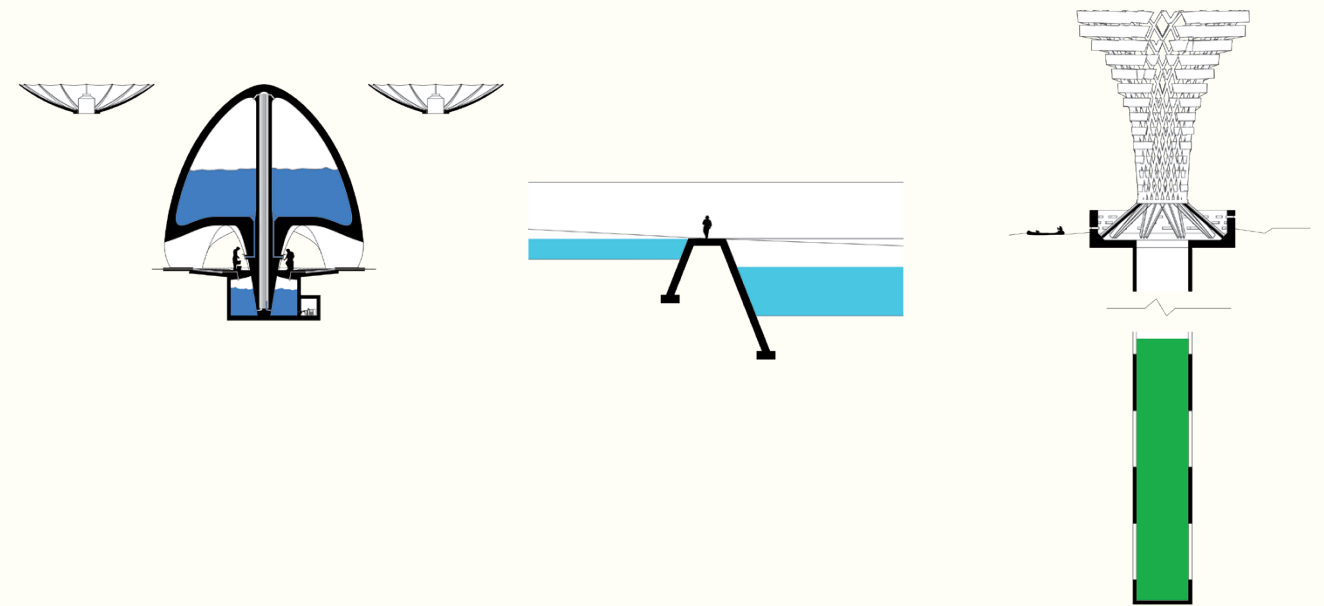
1884 coincided with the political and economic centralization of Mexico. Díaz's thirty years in office were marked by grand infrastructural gestures to conquer the saline lakes⁷. Díaz implemented the system of taking waters out of the valley via large culverts called the "Grand Outlets" that continues today.

The last is the institution of Conagua (National Commission of Water). CONAGUA was formed in 1997 to administer the reception and distribution of water throughout the city. This branch of the Mexican government is the Moctezuma of today, tapping neighboring communities for their water and bringing

it into the Valley via hidden tubed canals. Administering the extraction wells and Lerma-Cutzmalala System, CONAGUA decides who gets water and how much. Similar to Drinking Water, storm and blackwaters are pumped out of the Valley and dumped on neighboring communities without their input. That highly

contaminated water is then used to grow the crops that feed the city. Water that enters the Valley of Mexico today is hydraulically forced to leave at the hands of humans and their city. Water for sustenance is extracted from distant lands and communities⁸.

IV.



Contemporary Practices.

The three proposals are practices that reconnect the Three Waters with their hydrological place in the contemporary urban form.

The three proposals follow a drop of water as it makes its way through the hydrological cycle and the contemporary city. A drop of water falls in the Drinking Water mountains in the southwest of the Valley of Mexico. it runs down the side of the mountains into the Magdalena River Basin. at the birth of that River is Padierna.

That water then follows the Magdalena River to Mixcoac, at the southwestern edge of the densest part of the city. Here, the water is already so contaminated that it becomes tubed, buried, and hidden. Not long after, it reaches the edge of the lakebed of the former Sweet Water lakes.

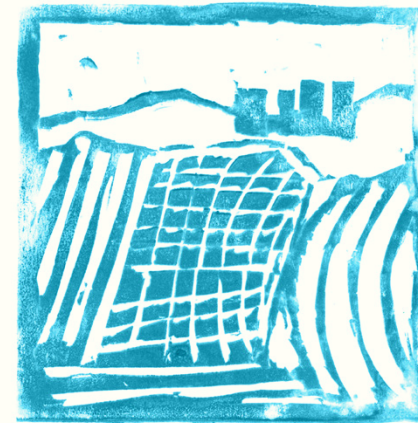
The Magdalena River becomes the Mixcoac River, and then the Churubusco River. At its transition to the Churubusco River sits Chalchiuhtlicue's Skirt. Once the Sweet Water reaches Chalchiuhtlicue's Skirt, it is pumped out of the Sweet Water lake bed towards the Salty Water lake bed.

This water travels in unseen tubed rivers of increasing diameter and flow rates to the Serpent's Mouth.



Tlaloc's Headdress

The Reconnection of Drinking Water and Sky



Chalchiuhtlicue's Skirt

The Reconnection of Sweet Water and Surface



The Serpent's Mouth

The Reconnection of Salty Water and Earth

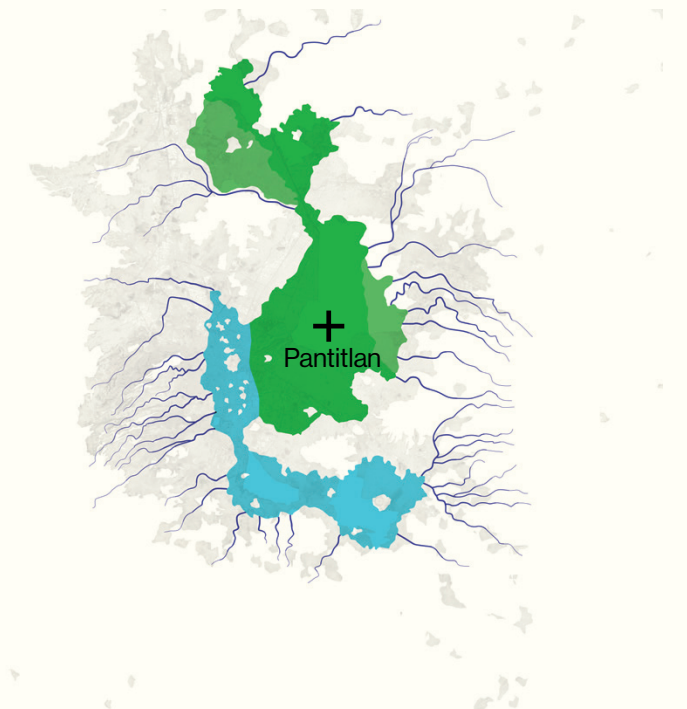
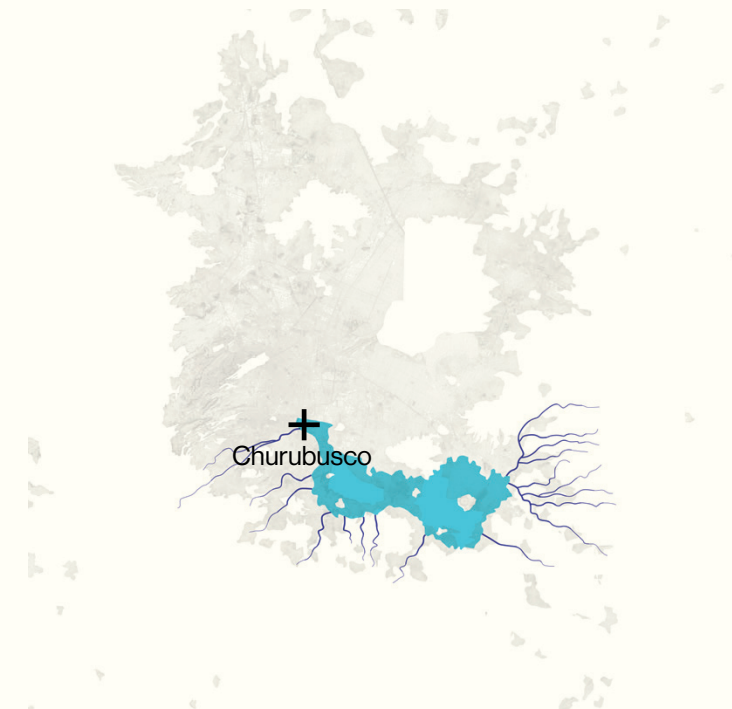


Fig. 1-6
Diagrams and lithographs.



Tlaloc's Headdress

The Reconnection of Drinking and Sky

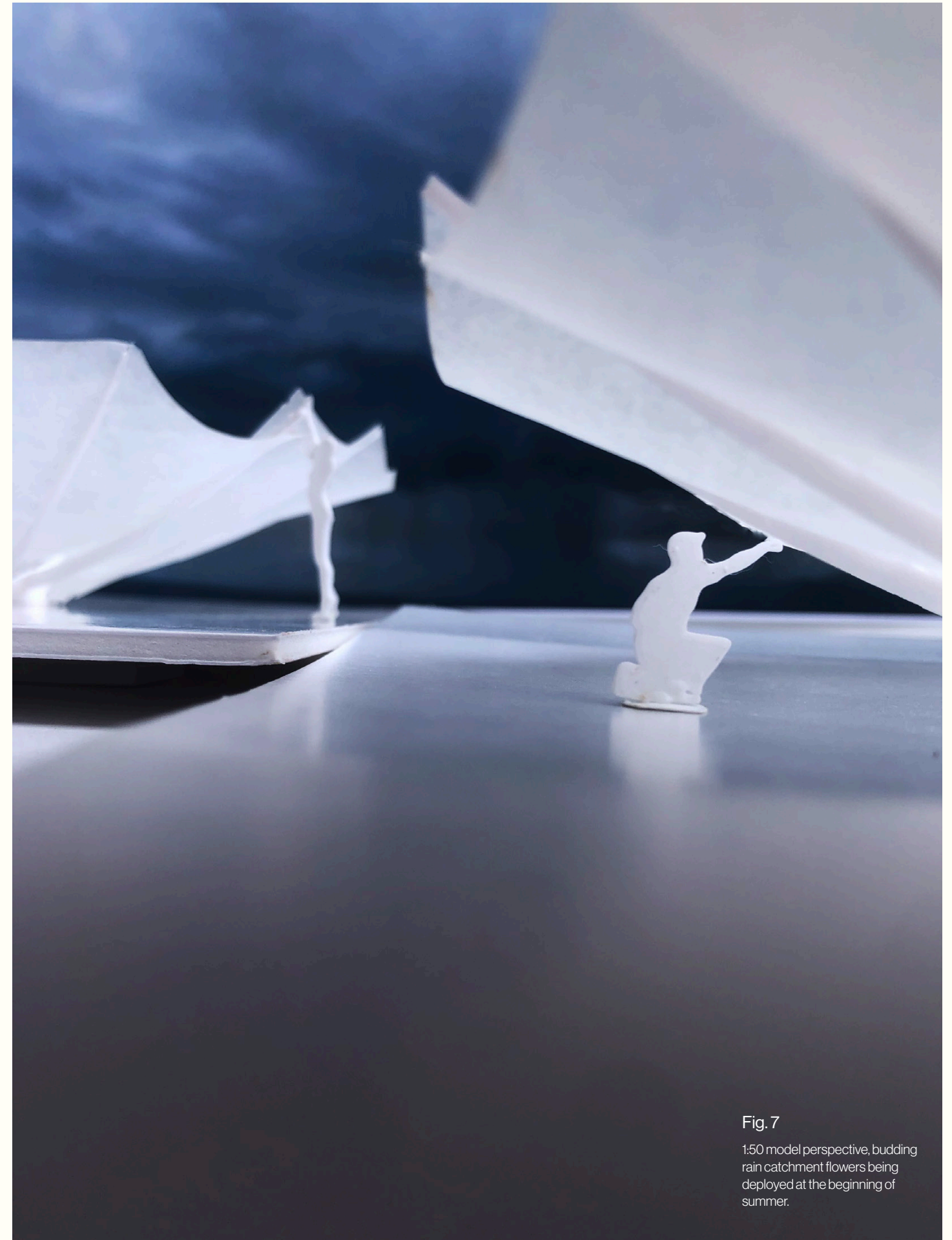


Fig. 7
1:50 model perspective, budding
rain catchment flowers being
deployed at the beginning of
summer.



Tlaloc
Fig. 8

The feathers on Tlaloc's headdress brought water clear enough to drink down from the cosmos. He deposited this water in the vessels circling the Valley.

Tlaloc is as old as Mesoamerican civilization. He has come to embody a variety of phenomena important to the basins of the Mesoamerican landscape, including rain, lightning, and agriculture¹. However, just as Tlaloc embodies the benevolent and life-giving forces of these sacred elements, he also embodies their more destructive side, such as floods, droughts, storms, and famine¹.

Like the other Gods, Tlaloc was born from the splitting of Tezcatlipoca by Quetzalcoatl. In the formation of the Earth and Sky in the beginning, Tlaloc embodied the relationship with water generally, but most powerfully water from the sky². Tlaloc brought the storm, which brought the rain, which brought the floods, as well as the droughts. Everything started with the crack of lightning and the wash of water falling from the sky.

Because Tlaloc connected Mexica civilization with the life-giving water of the valley, he was thought to live where it was born: the mountains. Tlaloc was thought to be the ruler of a group of smaller gods named the Tlalocan². Rain would fall from the sky when these Tlalocan

used long sticks to smash water jars that sat inside the mountains. The lightning striking the earth, and the resounding thunder were the sound of these Tlalocan performing their rain ritual.

Representations of Tlaloc are many and varied through Mesoamerican culture, but some characteristics serve as identifiers of the Rain god in his cult and iconography. For example, Tlaloc's eyes were bordered by circles, the form of curled snakes, and his mouth graced with fangs just like a serpent's. Tlaloc's body is often cast as black or green, and he carries a banner of paper stained with hule. Tlaloc's headdress is composed of star eyes, as well as the feathers of the emerald bird and the heron. The feathers of the headdress evoke Tlaloc's connection with the cosmic otherworld and the sky⁴.

In the capital of Tenochtitlan, the Aztecs constructed two principal temples at the spiritual and political center collectively named Templo Mayor. One of these pyramids was dedicated to the god Huitzilopochtli, the god of the dry season. The other pyramid was ded-

icated to Tlaloc, and was adorned with his iconography⁴. The stairs were painted blue, and his temple was oriented to the north, which marked the summer solstice and the arrival of the wet season in the riverbasin.

While Tlaloc's iconography didn't directly carry the image of agriculture and harvest, his command of storms and rain were heavily connected to the outcome and success of Tenochtitlan's agrarian system.

A darker side to the mercilessness of Tlaloc in years of violent storms and floods, is that his water from the sky ruined harvests, destroyed infrastructure, and caused many deaths. The practice of appeasing Tlaloc's power was equally ruthless. Children, often sick, were sacrificed to Tlaloc as their stature was thought to resemble Tlaloc's Tlalocque: his little disciples who lived in the mountains⁴.

Tlaloc's image was also intricately intertwined with the object culture of storing water. Ceramic vessels for the storage of the precious liquid resource carried the image of Tlaloc long before the Aztecs, and long after as well⁵.

Fig. 8 Teotihuacan Artists. *Almena Tlaloc*. Clay, 200-650. Currently exhibited in Museum of Anthropology, Mexico City.

1 Tlaloc. *Codex Rios*. Italian translation and augmentation of *Codex Telleriano-Remensis*. ca. 1556. Retrieved from Foundation for the Advancement of Mesoamerican Studies. Accessed June 2024.

2 Tlaloc. *Codex Ixtlilxochitl*. Nahuatl on European paper. ca. 1582. Bibliothèque Nationale de France. Retrieved from Library of Congress Online Archive. Accessed June 2024.

3 Tlaloc. *Codex Rios*. Italian translation and augmentation of *Codex Telleriano-Remensis*. ca. 1556. Retrieved from Foundation for the Advancement of Mesoamerican Studies. Accessed June 2024.

4 Mark Cartwright. *Tlaloc*. World History Encyclopedia. August 21, 2013.

5 Olivier Tomado de Guilhem. *Tlaloc, el antiguo dios de la lluvia y de la tierra en el Centro de México*. *Arqueología Mexicana* núm. 96, pp. 40 - 43.

Meanwhile, Mexico City is thirsty.

The current system for the obtainment and provisioning of Drinking Water is twofold. The first source is the Lerma-Cutzmala system, which accounted in 2024 for 31.8 %⁶ of the non-heirarchical sink and shower water domestically used in the City. In the Lerma-Cutzmala System, water is extracted from wells and bodies of water in the neighboring Valley of Bravo. This immense amount of water is then pumped over 50km and 1100 meters in elevation change into the city⁶, being distributed in below-grade pipes or water transport trucks called 'pipas'.

The rest of the water (66.3 %) is extracted from the water table that Mexico City sits on⁶. This water is taken from both the shallow and deep aquifers via dug extraction wells that spread themselves out throughout the city. Interestingly, these extraction wells populate parts of the city either adjacent to the Drinking Water mountains or in the former bed of the Sweet Water lakes Chalco, Xochimilco, and Mexico. Like the water from the Valley of Bravo, this water is distributed via below-ground tube or pipa truck.

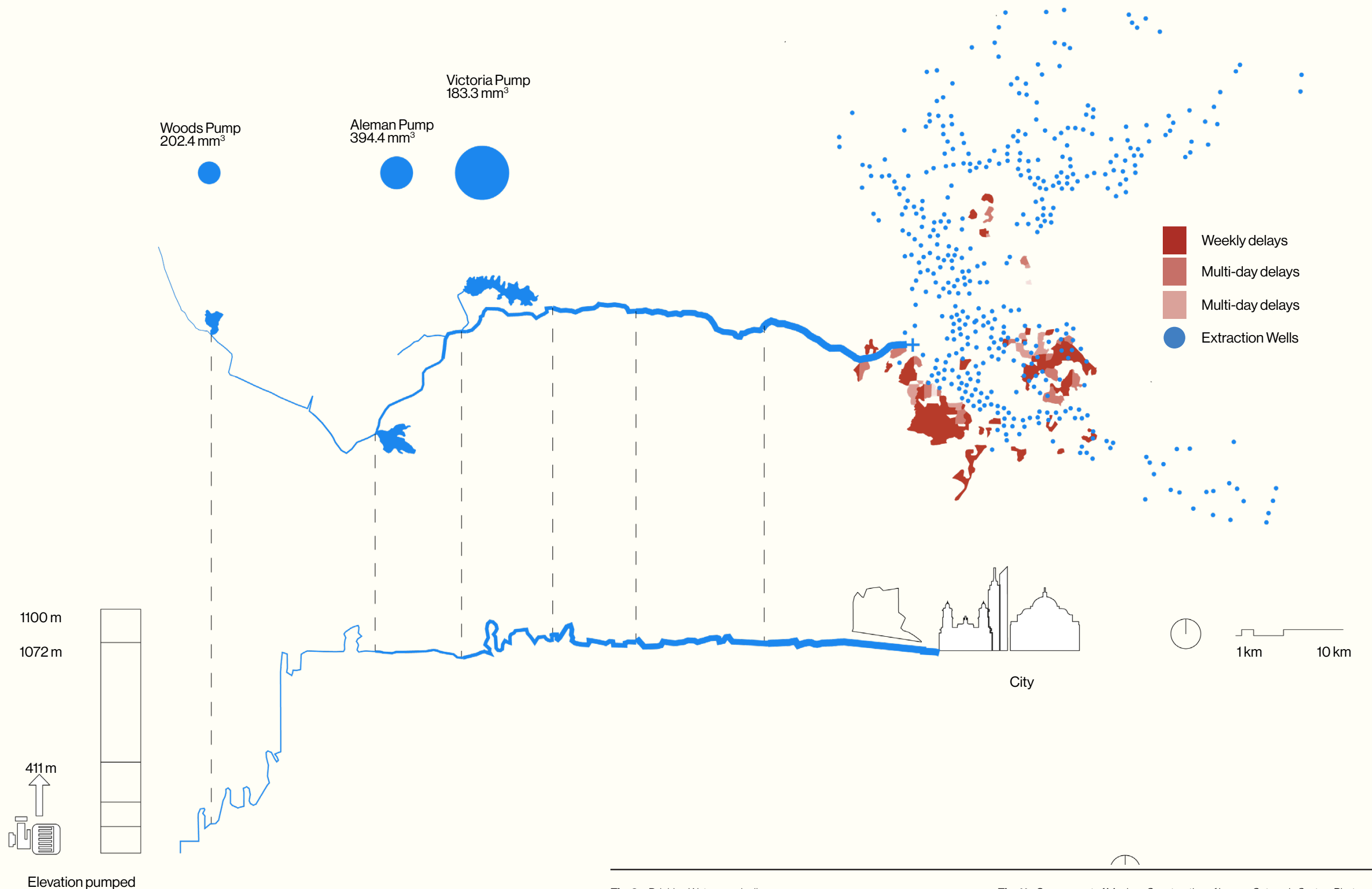


Fig. 9 Drinking Water supply diagram.

Fig. 10 Cuatroscuro, *Pipa Taking Potable Water from Extraction Well Site.* Photograph. El Sol de Mexico online. Accessed June 2024.

Fig. 11 Government of Mexico, *Construction of Lerma-Cutzmala System.* Photograph. adn40 online. Accessed June 2024.

⁶ Rodrigo Callejas Torres. *Los problemas por la falta de agua potable en las alcaldías de la CDMX.* PanCDMX Online, January 2021.

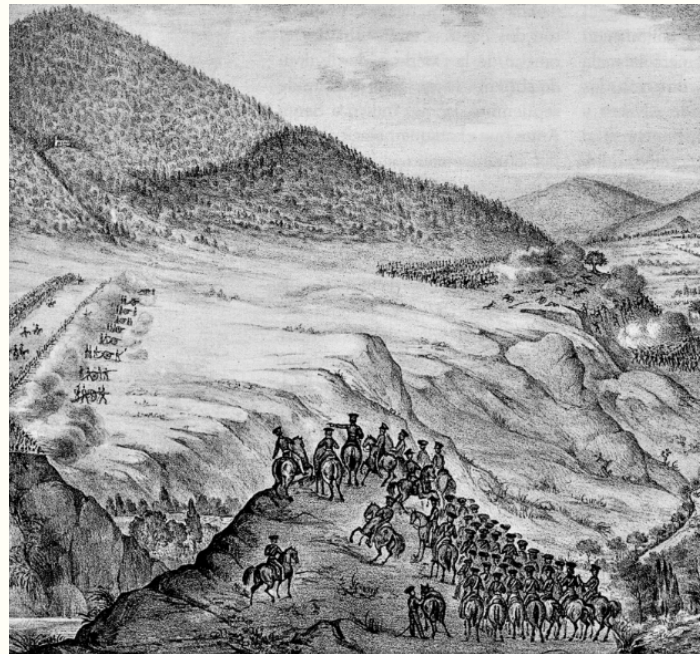


Ajusco "where the water is born"

Lomas de Padierna

Fig. 12
Google Earth collage of
Padierna.

Like many other zones of the City, Padierna has seen drastic changes in the last one hundred years.



1847

Battle of Padierna

Fig.13

Print depicts the United States' invasion of Padierna in Mexico City in August of 1847. The US Army would continue down the Magdalena River Basin to Churubusco, the site of Chalchiuhltlicue's Skirt.

Padierna, like many neighborhoods, has seen drastic changes during Mexico City's rapid urbanization in the past 100 years. The district sits at the foot of Ajusco, Nahuatl for "where the water is born", at 2,600 m in elevation, 400 m above the bottom of the Valley. Up until the mid-



1970

Lomas de Padierna, 1970

Fig.14

Photo depicts Padierna at its first stages of inhabitation due to urban expansion. At this point, Padierna was an outpost for those working railcar-adjacent jobs as Padierna was a more economic and convenient option than more central parts of the City.

20th century, Padierna was uninhabited by humans. The district was part of the mid-century expansion of the City to territories along the railcar route that transported goods between Cuernavaca and Mexico City⁸. A series of textile plants were installed along the Magdalena River

to use the energy of the running clearwater brook for power. Padierna would gradually grow in population while remaining off the map for infrastructural projects set in motion by the city. Today it is a familial, low-density, middle-class commuter community.



2022

Lomas de Padierna, 2022

Fig.15

Photo of Lomas de Padierna today. Padierna has seen gradual development, but still finds itself off of the development of many infrastructural networks based on location on the mountainside.



2023

Heroes of Padierna, Christmas 2023

Fig.16

Padierna is characterized by its incredibly strong familial values as a middle-class and low-density zone of the city. This image, via the school's Facebook page, shows a Christmas celebration at their historic primary school.

Fig. 13 Unknown Artist. *Battle of Padierna (Battle of Contreras)*, 1847. Woodblock Print. Retrieved from Government of Mexico.

Fig. 14 Unknown Photographer. *Urban Nostalgia: Ajusco in amazing black and white photos*. Photograph. INAH. Retrieved from MXcity online. Accessed June 2024.

Fig. 15 Unknown Photographer. *Selling Apartment in Tekit 830, Lomas de Padierna, Ciudad de Mexico*. Photograph. Nuroa. Published by CORPORATIVO DAYMOI - LIC ROLDAN. Accessed June 2024.

Fig. 16 Unknown Photographer. *Christmas Party, Heroes of Padierna*. Photograph. Facebook. Published by "Heroes de padierna 10700", December 31, 2023. Accessed June 2024.

7 Monica Sanchez, host. *19 de agosto de 1847: La Batalla de Padierna*. Efemérides IMER (podcast). 2003. Accessed June 2024.

8 Julia Roman. *Historia de los ferrocarriles de México*. Anales Del Instituto Nacional De Antropología E Historia. 1933. 4(8), 389-448.

Padierna is low-density in relation to other comparable neighborhoods.

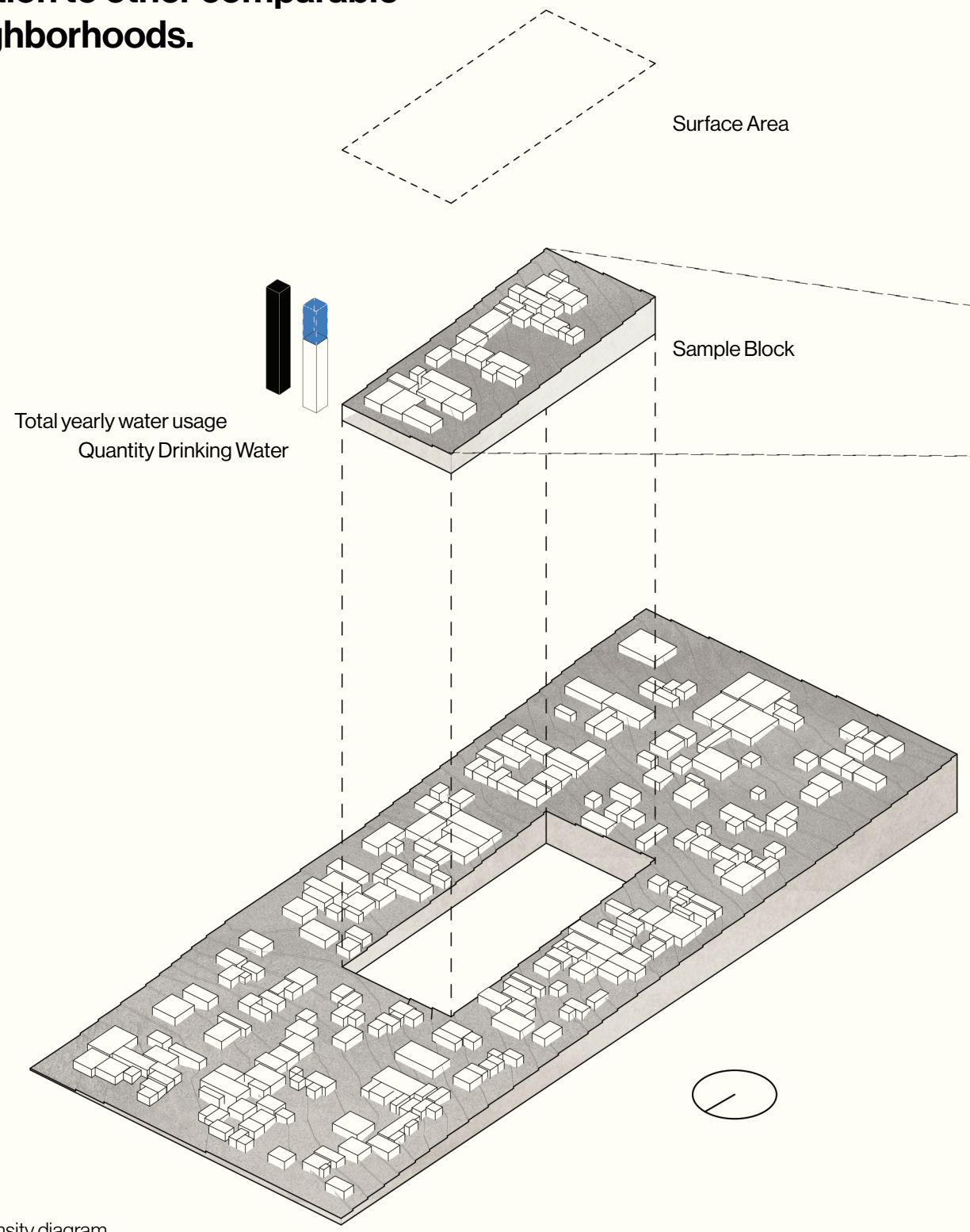
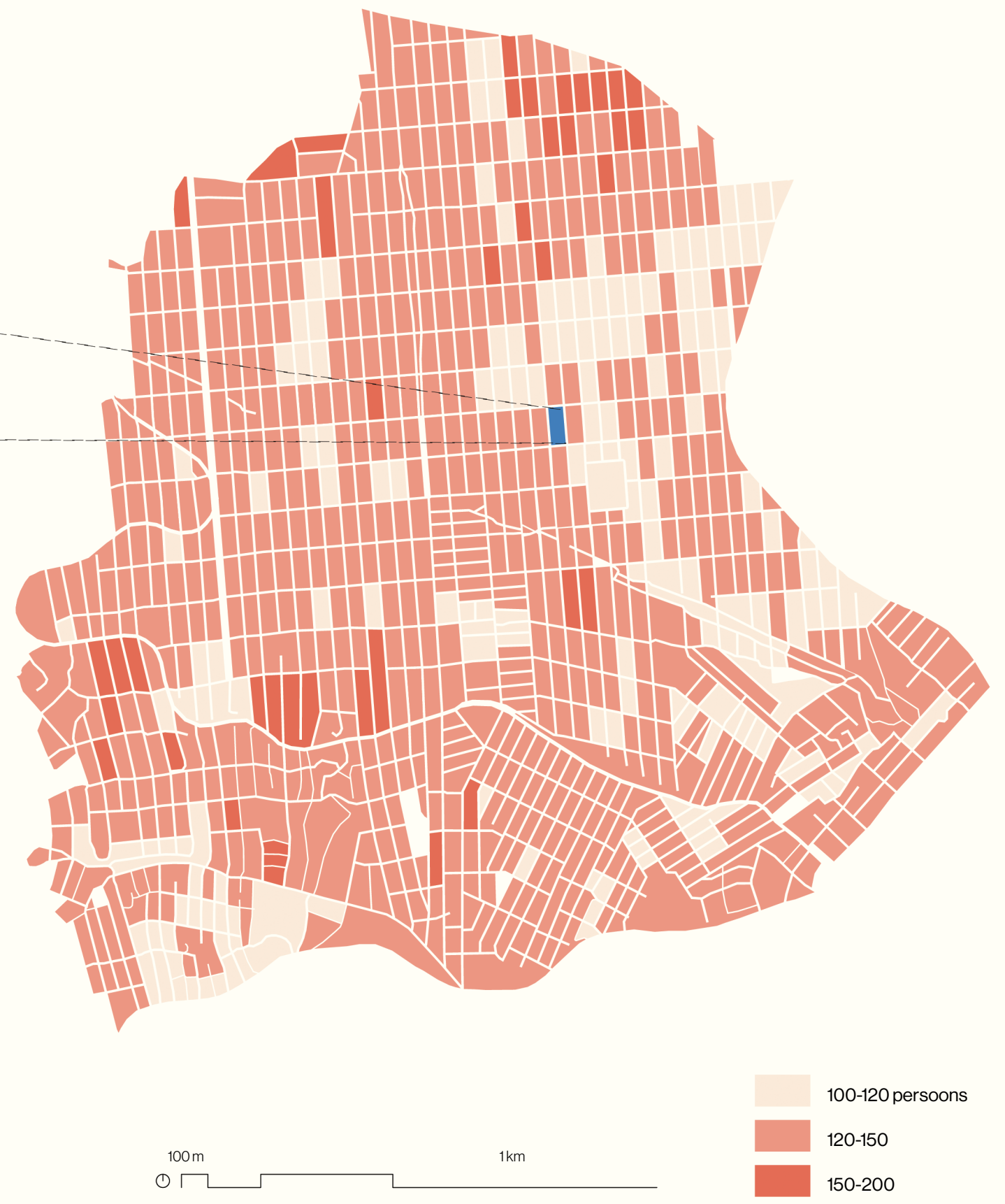


Fig. 17
Block density diagram.

Sample Block



Block Density Padierna

Yet Padierna has the unique potential to harvest its Drinking Water from the sky.

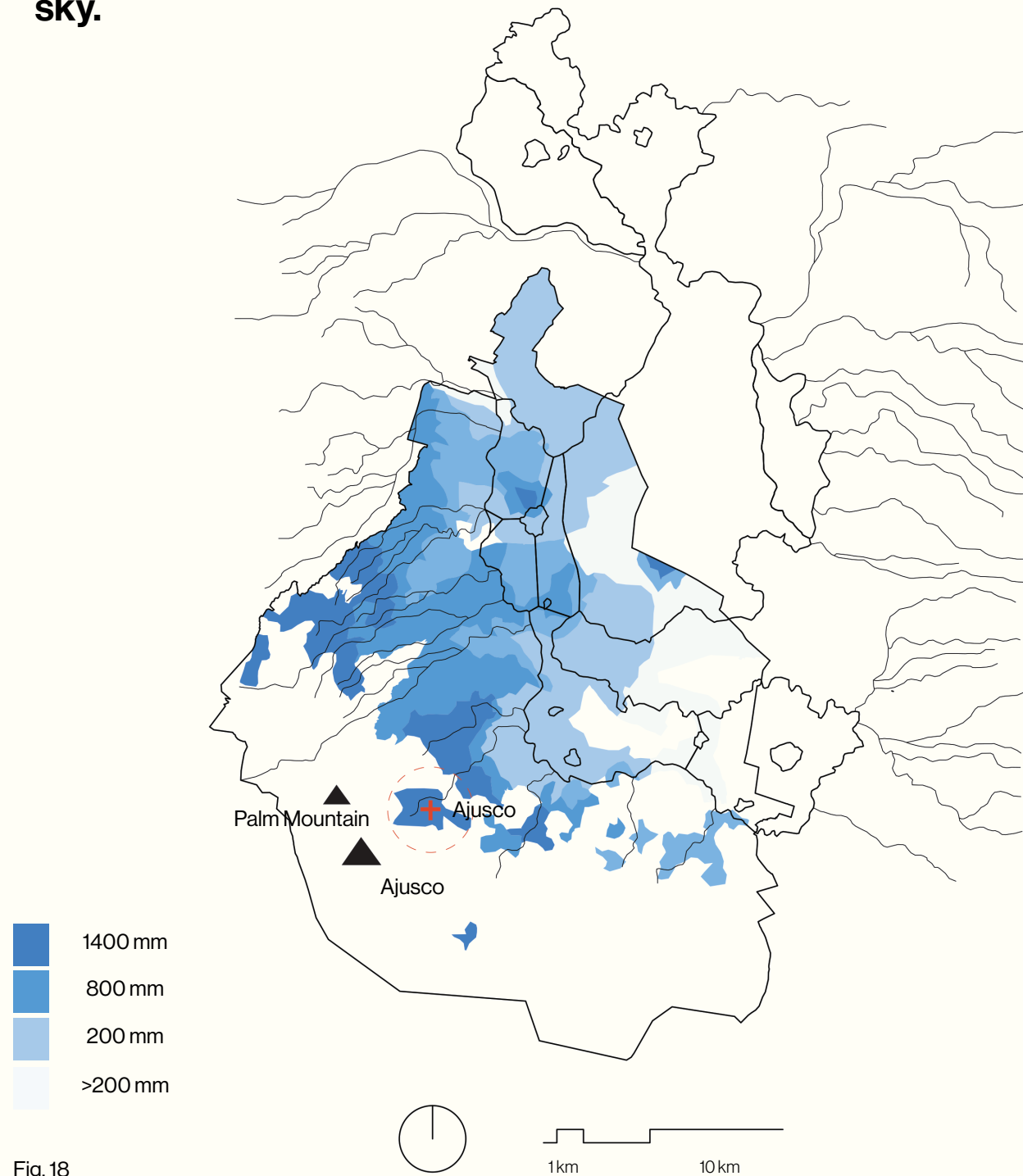


Fig. 18
Precipitation diagram.

Yearly Rainfall

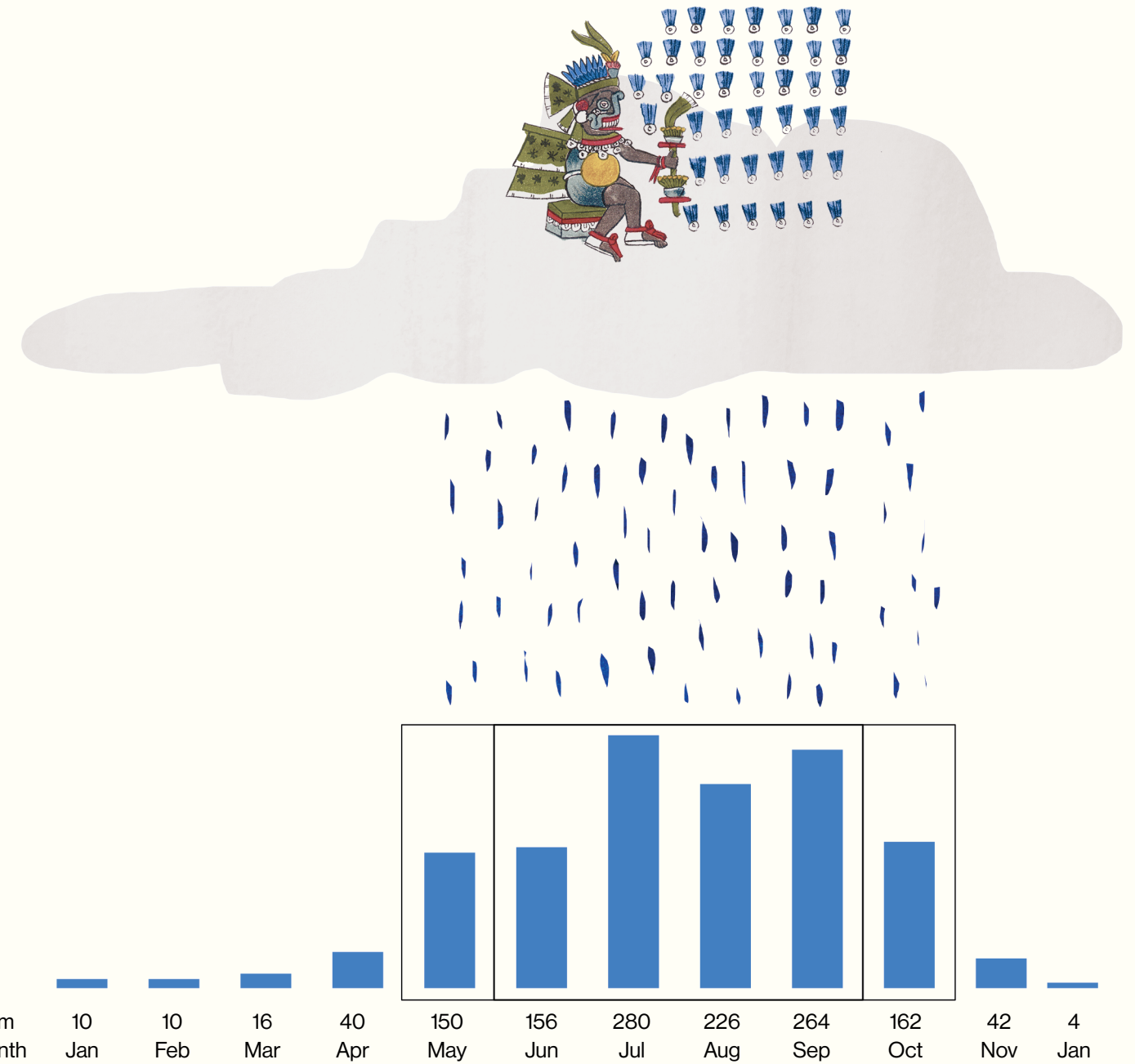


Fig. 19
Precipitation distribution diagram.

Monthly Rainfall Distribution

The current practice in Padierna is to wait weekly at the municipality or pay a private water supply truck to secure Drinking Water.

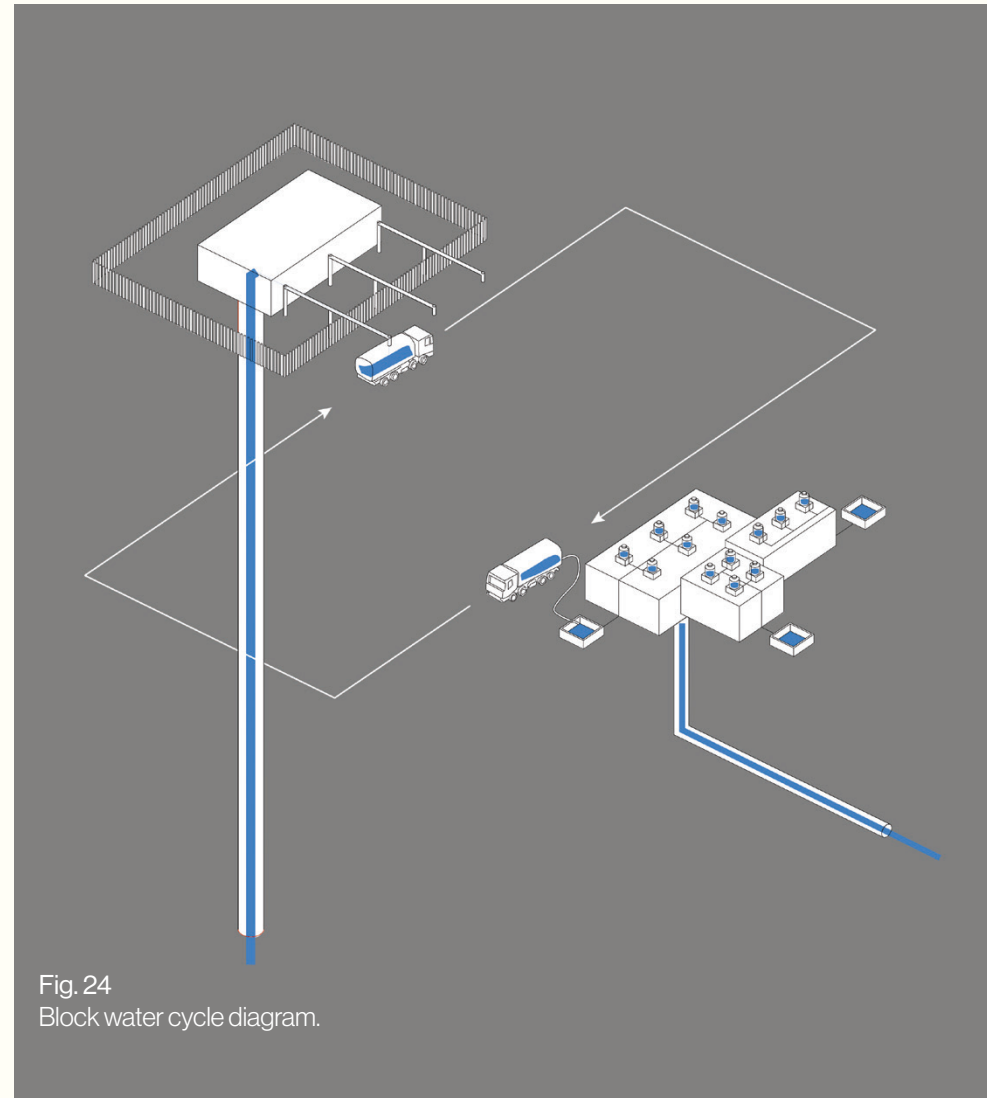


Fig. 24 Block water cycle diagram.

Tlaloc's Headdress receives rainwater, filters it, and stores it in a community cistern at the scale of the block, sized for their yearly Drinking Water consumption.

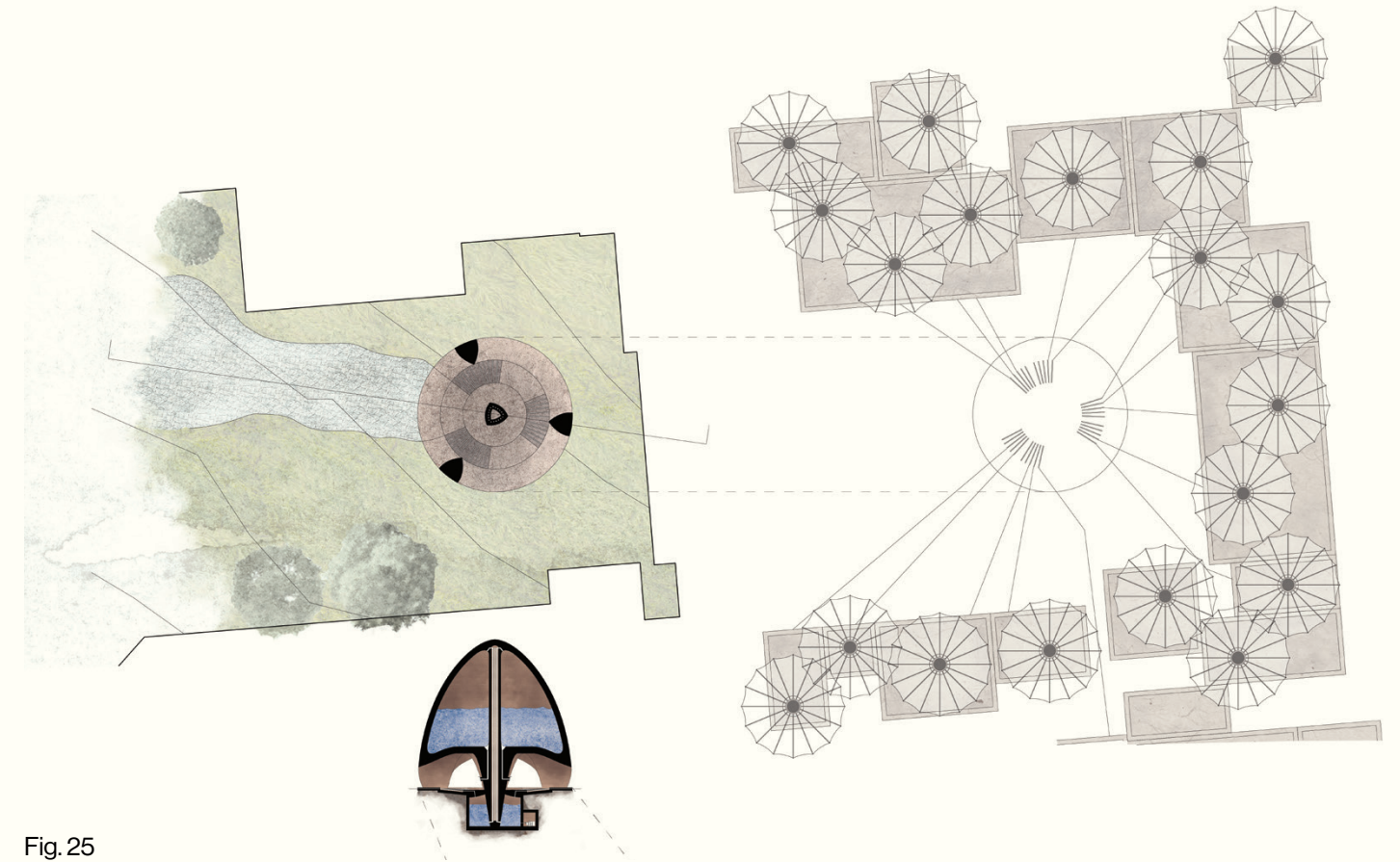


Fig. 25 Community raincatcher and cistern plan.

A Pipa truck arrives at the site of a city-administered extraction well. This truck pays SACMEX to fill their truck with the water tapped from the water table and filtered at the extraction site⁹. This truck then drives around the city, filling its customers below-grade CMU cisterns

at great expense. As the city guarantees water to its citizens, they have the option to wait weekly at their municipality to receive their weekly Drinking Water in vessels they can personally transport. However, this method is time-consuming. These below-grade cisterns range from

1,000 - 10,000 L, and are pumped periodically based on need into the smaller volume plastic rooftop cisterns called Tinacos. The Tinacos range between 450 - 2,500 L¹⁰ and gravity feed the non-hierarchical sink and shower water that is used within the home at the turn of a faucet.

Fig. 20 Luis Castillo. *Pipa sits at extraction well*. Photograph. La Jornada online. Accessed June 2024.

Fig. 21 Unknown Photographer, *Pipa deposits Drinking Water into sub-grade cistern*. Photograph. Facebook. Published by 'PIPAS De AGUA PEREZ', May 25, 2021. Accessed June 2024.

Fig. 22 Unknown Photographer, *Pipa deposits Drinking Water into sub-grade cistern*. Photograph. Gobierno Municipal. Retrieved from El Sol de San Luis online. Accessed June 2024.

Fig. 23 Unknown Photographer, *Tinaco*. Photograph. Babson College. Retrieved from The Babson Collection, Vol. 732.

9 Fanny Miranda. *En CdMx, dos pozos extraen agua de acuífero caliente y de 15 mil años de antigüedad*. El Milenio Online. Published February 2, 2024.

10 Rotoplas. *Tinaco*. Rotoplas e-commerce site. Accessed June 2024.

11 Jennifer Gutierrez. *Water Scarcity and Supply Challenges in Mexico City's Informal Settlements*. Penn Institute for Urban research. November 2019.



Fig. 26
Community cistern
perspective.

In this sense,
Padierna owns
its own right to
Drinking Water.



Fig. 27
Tlaloc Vessel, Aztec,
produced between
1325 - 1521.

The rain catchment and cistern system integrates itself into the current urban language. Padierna's blocks are very low-density compared to other parts of the City. The actual surface area of development on the block scale occupies a small percentage of the actual buildable area. As

of now, those unbuilt portions of the block remain heavily populated with vegetation. Because of this, the compressive brick cistern sits within the unbuilt space characteristic of almost all blocks in the entire Lomas de Padierna neighborhood. The tripod structure of the cistern opens

to the street, but the two other mouths open to the block's interior. Community members pass into the mouth of this vessel, and turn an iron handle to release their abundant rainwater harvest. The only rule is one must bring their own vessel.

Fig. 26 Community cistern perspective.

Fig. 27 Aztec Artists. *Tlaloc Vessel*. Clay, ca. 1325-1521. Currently exhibited in Museum of Anthropology, Mexico City. Retrieved from INAH digital collection.

12 Johanna Broda. *cosmovisión y meteorología indígenas de Mesoamérica*. Institute of Historical Investigations, UNAM 1997.

13 José Contel. *Tlaloc, el cerro, la olla y el chalchihuitl una interpretación de la lámina 25 del Códice Borbónico*. Itinerarios: revista de estudios lingüísticos, literarios, históricos y antropológicos. 2008. pp. 153-183.

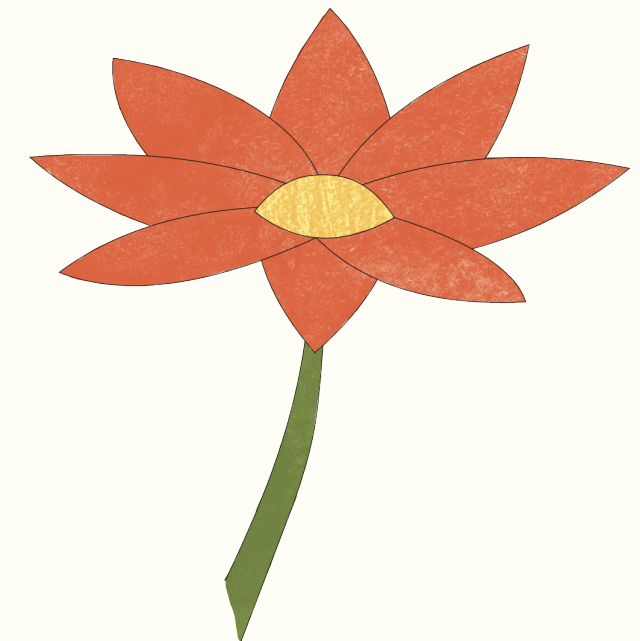
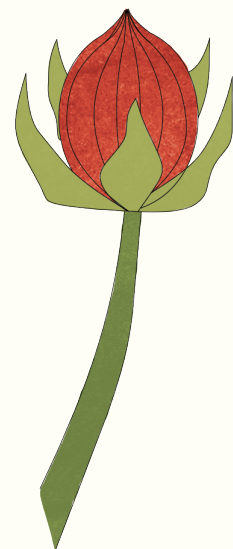
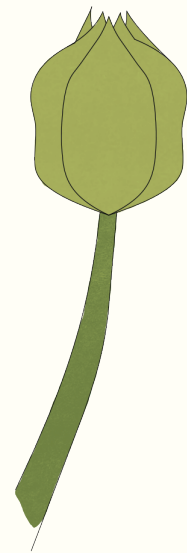
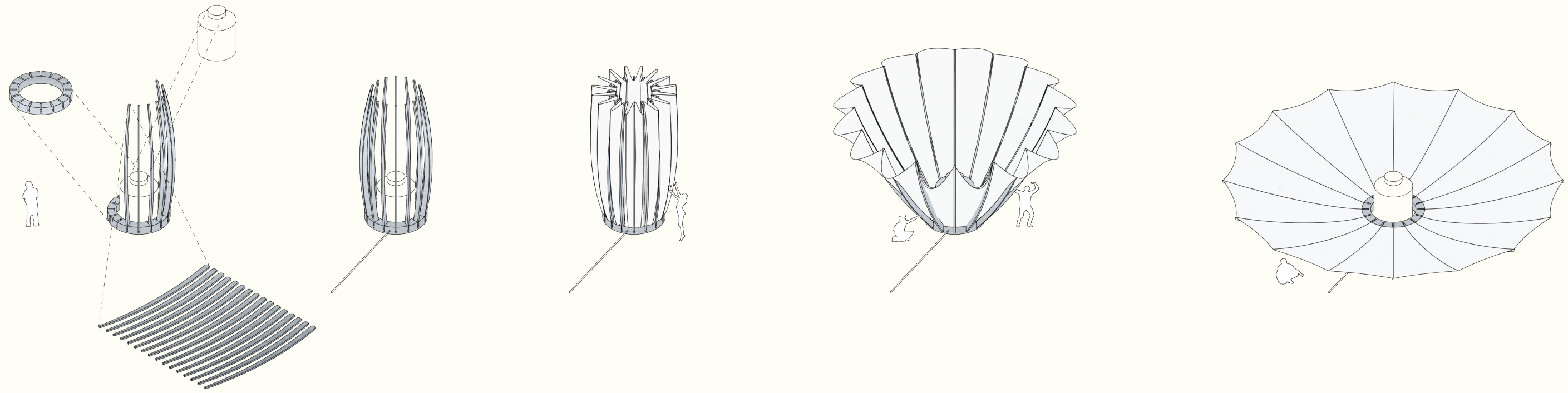


Fig. 28
Extruded aluminum
raincatcher in relation to the
Acocoxochitl.

The raincatcher takes its form after the native Acocoxochitl, meaning “stem full of water”.

The Acocoxochitl is Nahuatl for ‘Stem full of water’, and grows natively in the Drinking Water mountains where Padierna is situated. Like the petals around the Acocoxochitl’s bud, the extruded aluminum frame of the raincatcher system rests around the ubiquitous plastic rooftop cistern, the tinaco.

A tensile fabric is placed around the aluminum frame at the turn of spring, and the frame is let down, awaiting the summer rains.

Whereas the Acocoxochitl holds water in its stem, the raincatcher system sends its water harvest through copper pipes, to be filtered and then deposited into the

cistern.

The accessibility and commonness of the materials used for the manufacturing and installation of these raincatcher flowers means that anyone can service them, and buy spare parts at the local ferreteria or Wal-Mart.

The cistern shares in the tradition of “the vessel of water”, and its cultural relationship to Drinking Water, abundance, and ownership.

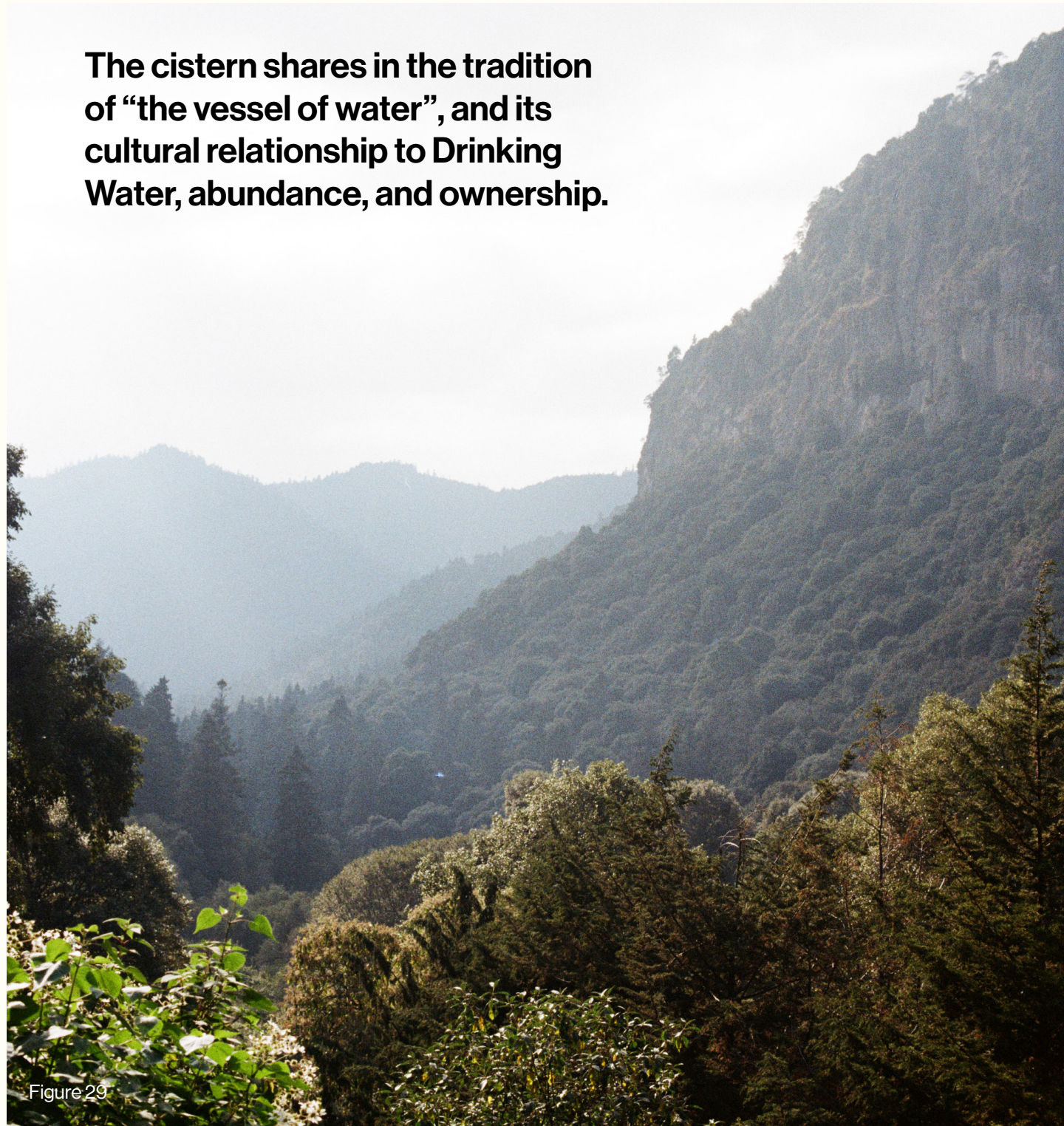


Figure 29

The Nahua story for the peaks and valleys of their land was that a large serpent was passing in and out of the earth's surface, and through that maneuvering large hills were formed. Caves were the mouths of these serpentine monsters. At the beginning this hill was tepetl, in relation to the prefix 'tepo', which meant 'grand

rock', and 'atl', which meant 'water'¹⁴. This glyph was given the color green to match the tree-covered hills that surrounded the river basin. Just as the serpent was presented as having red and yellow lips, the tepetl glyph took on these graphic characteristics. The red and yellow of the serpent's mouth became the source

of water for the Nahua. This glyph was representative of the life-giving mountains surrounding the elevated riverbasin that the Mexica people inhabited. They developed a sacredness and mythology to the hill, the place where water enters the world, and the rain that these tepetl collected¹⁴.



Fig. 30



Fig. 31



Fig. 32



Fig. 33

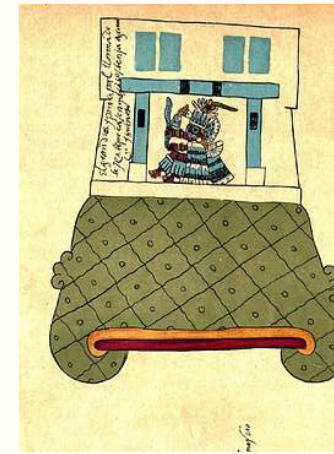


Fig. 34



Fig. 35



Fig. 36



Fig. 37



Fig. 38



Fig. 39



Fig. 40



Fig. 41

Fig. 29 Magdalena River Basin. Photograph. December 2023.

Fig. 30 Tepetl, Chapultepec. *Aubin codex*. 1576-1607.

Fig. 31 Tepetl, Chapultepec. *Codex Chimalpopoca*. 1570.

Fig. 32 Tepetl, Aztlán 'Water Feather'. *Aubin codex*. 1576-1607.

Fig. 33 Tepetl, unknown. *Aubin codex*. 1576-1607.

Fig. 34 Tepetl, Tlaloc, Huey Tozoztli. *Codex Borbonicus*. ca. 1521.

Fig. 35 Tepetl, Tacuba. *Codex Azcatitlan*. 1530.

Fig. 36 Tepetl, Tenochtitlan. *Codex Cozcatzin*. 1572.

Fig. 37 Tepetl, Unknown. *Codex Cozcatzin*. 1572.

Fig. 38 Tepetl, Chapultepec. *Durán Codex*. Written by Diego Durán, 1581.

Fig. 39 Tepetl, Chapultepec. *Codex Telleriano-Remensis*. ca. 16th century.

Fig. 40 Tepetl, Texcoco. *Codex Osuna*. 1565.

Fig. 41 Tepetl, War on Chapultepec. *Codex Rios*. ca. 1556.

14 Ulises Valiente Arguelles. *el glifo cerro-tepetl y su transito historico*. February 1, 2012. arkeopatias.wordpress.com.



Figure 42
1:200 models of community
cistern to be shared by a block
in Padierna.

This cistern is pulled on by the community year-round.



Figure 43
1:100 section of community cistern to be shared by a block in Padierna.

The community cistern, like the tepetl, therefore becomes both a source and a place. It is a source of Drinking Water: the water is received on the roof with the rain catchment flowers, filtered, and deposited into this compressive brick cistern. Like the mouth of the tepetl, the turn of a faucet releases this abundance of

Drinking Water. However, like the tepetl and the history of the water-filled mountains surrounding the basin, this cistern is also a politicized place. The entire block shares its abundance as the smallest contiguous sociopolitical entity for its harvest and storage. Like the tepetl, the reception of Tlaloc's gift is not only

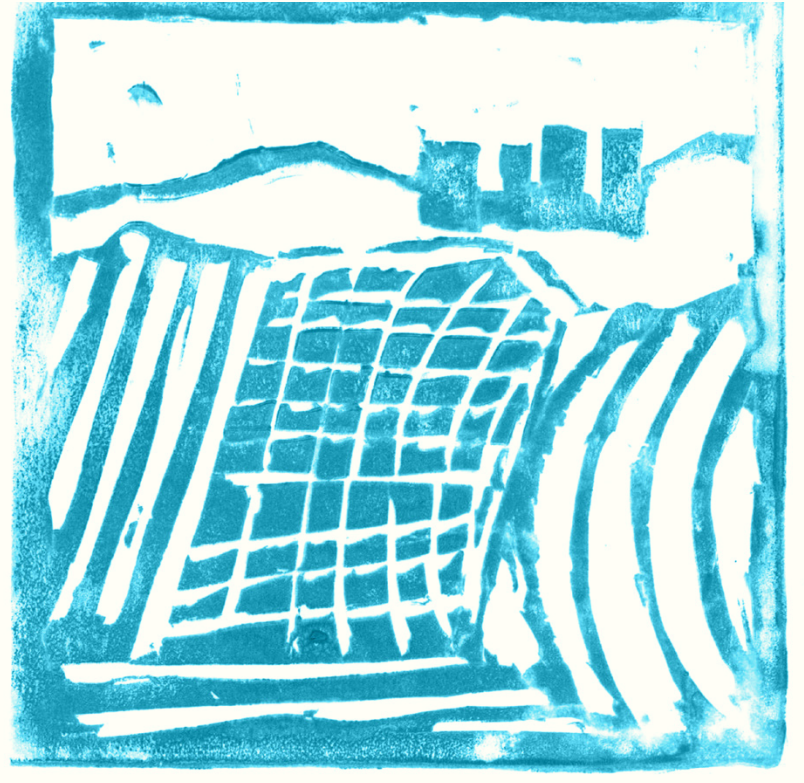
about the reception of water, but who has control and ownership over its distribution. This cistern serves as a decentralization of the current system of ownership over Drinking Water, and a community activator for the both abundant and thirsty zone of Padierna.



Figure 44
1:200 model of rain catchment flowers and community cistern to be shared by a block in Padierna.



Fig. 45
Perspective of plumbing work
being done on cistern and com-
munity members pulling from tap.



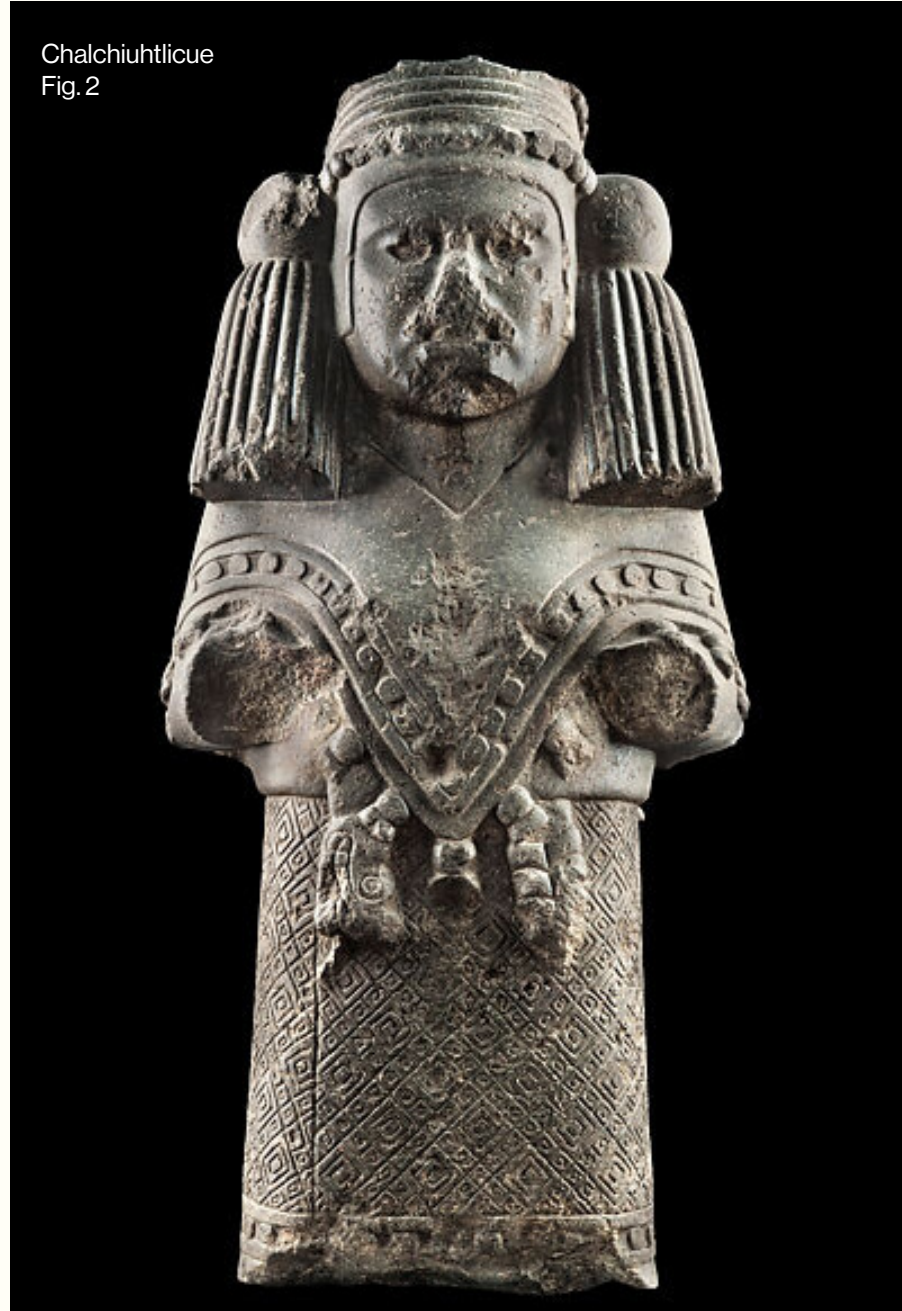
Chalchiuhtlicue's Skirt

The Reconnection of Sweet and Surface



Figure 1
1:50 model perspective of water
spilling over through slits in retain-
ing walls.

Chalchiuhtlicue
Fig. 2



Chalchiuhtlicue commanded the active surface waters that gleamed like the jade of her skirt.

While Tlaloc was the provider of water in the Valley of Mexico, Chalchiuhtlicue was the symbol of its advantageous use. Chalchiuhtlicue started appearing in the Aztec pantheon during the late 12th century, when the Mexica civilizations around the Valley of Mexico started to establish themselves, and grow in population and cultural practice¹.

Depending on the story, Chalchiuhtlicue was either the sister or wife of Tlaloc, and the two share many qualities, such as their relationship with water, the Tlalocan, the serpent, and the fertility that water provides. However, Chalchiuhtlicue grew to signify water as an active surface force. According to Aztec myth, Chalchiuhtlicue destroyed the fourth sun with her floods, which she provoked in her anger towards Tlaloc. She built a bridge to the fifth sun, which humans live in to this day, and those who were in good standing with the goddess were allowed to cross it into the fifth sun, while those left behind were turned into fish.

Chalchiuhtlicue in Nahuatl means 'she of the jade skirt', 'Chal-chiu' meaning 'jade' and 'tlicue' 'skirt'¹. The precious and glimmering green stone was understood in Aztec culture to resemble the sheen of

flowing water in the brooks, streams, canals, and lakes. Because of this, jade was the central iconographic reference in her imagery as the orchestrator of flowing, active, surface water. Chalchiuhtlicue was not only associated with water, but what grew from it.

Chalchiuhtlicue's representation communicates her fundamental differences and similarities to her brother Tlaloc. For example, unlike Tlaloc her figure is often shown with images of aquatic life found in her springs, brooks, rivers, and lakes, such as snakes, fish, and crustaceans². She is also adorned in the beautiful and precious stones of Aztec culture, such as gold, jade, and turquoise, whose gleam and preciousness were very frequently referenced in relation to the same characteristics in flowing water. The freshwater springs, which fed the brooks, which fed the canals, which maintained the lakes, which allowed for harvest, which in turn sustained life were in their own right equally as sacred as the variety and richness of precious stones found at their beds. While Tlaloc was the purveyor of Drinking Water from the sky, Chalchiuhtlicue was the maestra of the Sweet Water throughout the valley.

Like Tlaloc, Chalchiuhtlicue

has a headdress, but hers is made out of the earthly and mortal bands of cotton and amaranth seeds. While Tlaloc is identified by his headdress and other forms of fine and ritualistic jewelry, Chalchiuhtlicue is identified by her blouse and skirt³.

Chalchiuhtlicue was also often shown holding a pitcher of water and a bouquet of flowers. A stream of water often flowed out from underneath her stool, swirling, with streaks of jade at its edges. A male and female baby are often depicted swimming in the river underneath her, completely at the mercy of her force over the rivers and canals of the Valley⁴.

There were many sacrifices and rituals associated with Chalchiuhtlicue, and almost all had to do with rivers, lakes, reproduction, and fertility. Offerings were made on the shores of the Sweet Water lakes to ask for a good harvest, plentiful fish, purification of the waters, and the rebirth of cultivated goods⁵. Offerings were also made to the goddess of the jade skirt to ask for mercy from floods and waterborn diseases, of which both were plentiful in the Valley of Mexico.

Fig. 2 Aztec Artists. *Chalchiuhtlicue*. Diorite, ca. 1500. Currently exhibited in Museum of Anthropology, Mexico City.

1 Dehouve, Daniel. *The Rules of Construction of an Aztec Deity: Chalchiuhtlicue, the goddess of water*. *Ancient Mesoamerica*. June 28, 2018. Num. 31, pp. 7-28.

2 Bernardino De Sahagún, *De los Dioses*. trans. Arthur J. O. Anderson and Charles E. Dibble, in *Florentine Codex: General History of the Things of New Spain*. Trans. 1970.

3 Diego Durán, Fernando Horcasitas, Doris Heyden, and Miguel León-Portilla. 1975. *Book of the Gods and Rites and the Ancient Calendar*. In *Civilization of the American Indian Series*. 1975.

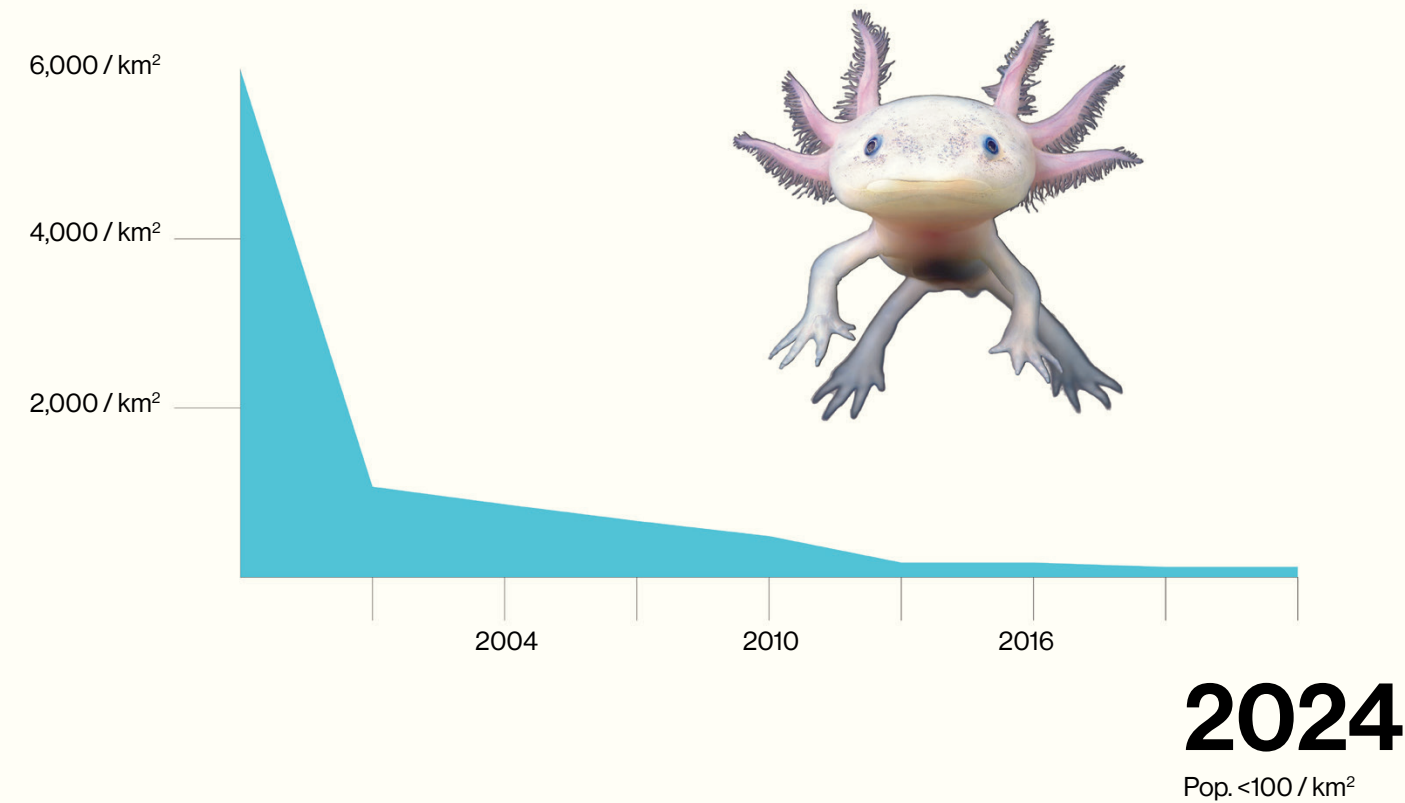
4 Sylvie Peperstraete. *Chalchiuhtlicue, or "Jade Skirt": the Aztec Goddess of Water and Fertility Rites*. *Art & cultures*, 20, pp. 158-167. November 11, 2019.

5 Leonardo Lopez Lujan, Marie-France Fauvet-Berthelot. *La Chalchiuhtlicue de la casa del risco*. *Arqueología Mexicana*, núm. 172, pp. 76-85. January 2022.

Meanwhile, the City is dormant.

1998

Pop. 6,000 / km²



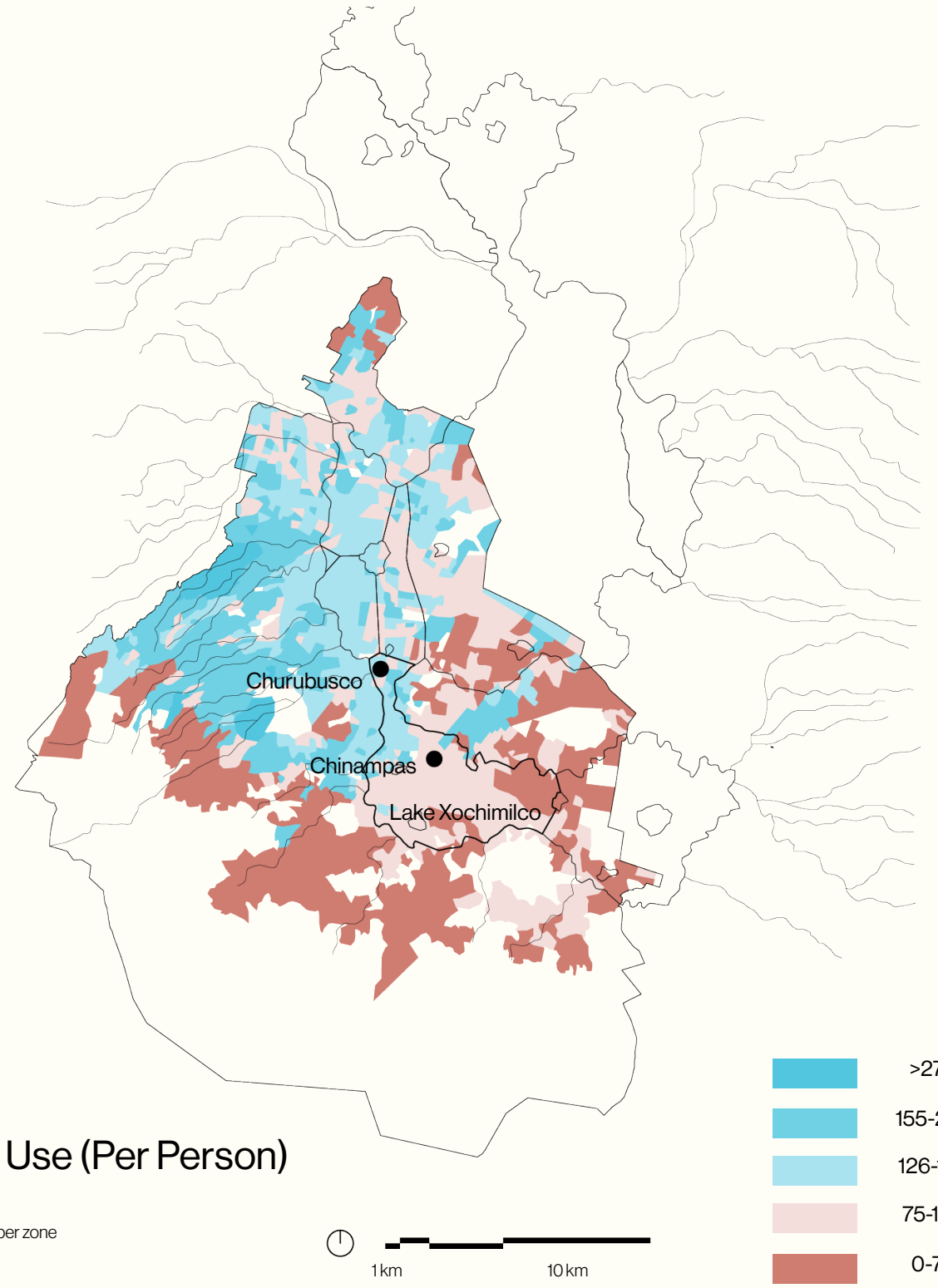
Axolotl Population

Figure 3
Diagram of Axolotl population.

The former beds of the Sweet Water lakes no longer have the life that they once did. Ever since the Spanish dried the Lake of Mexico directly surrounding the City, life on the Sweet Water surface has been systematically deconstructed. As seen in the graph above, the popula-

tion of the endemic amphibian the Axolotl 'Water monster' has been decimated within the past twenty years due to the contamination and drying of the canals of Xochimilco⁶. Likewise, communities that sit on the beds of the former Sweet Water lakes, today are dormant, us-

ing below-average volumes of water daily. At this rate, soon the chinampas will no longer exist, the Axolotl will be extinct, and the damage to the active, gleaming surface water irreparable⁸.



Daily Water Use (Per Person)

Figure 4
Diagram of daily water use per zone in Mexico City.

6 Victoria Contreras, Enrique Martínez-Meyer, Elsa Valiente, Luis Zambrano. *Recent decline and potential distribution in the last remnant area of the microendemic Mexican axolotl (Ambystoma mexicanum)*. Biological Conservation, Volume 142, Issue 12, pp. 2881-2885. 2009.

7 Juan Manuel Nunez. *La CDMX vive tiempos de escasez hídrica y desigualdad en el suministro de agua*. Centrus Magazine online. January 31, 2024.

8 Stephen Randal Voss, Ryan Woodcock, and Luis Zambrano. *A Tale of Two Axolotls*. BioScience journal, volume 65. November 11, 2015.

In Churubusco cross two Sweet Water sources.

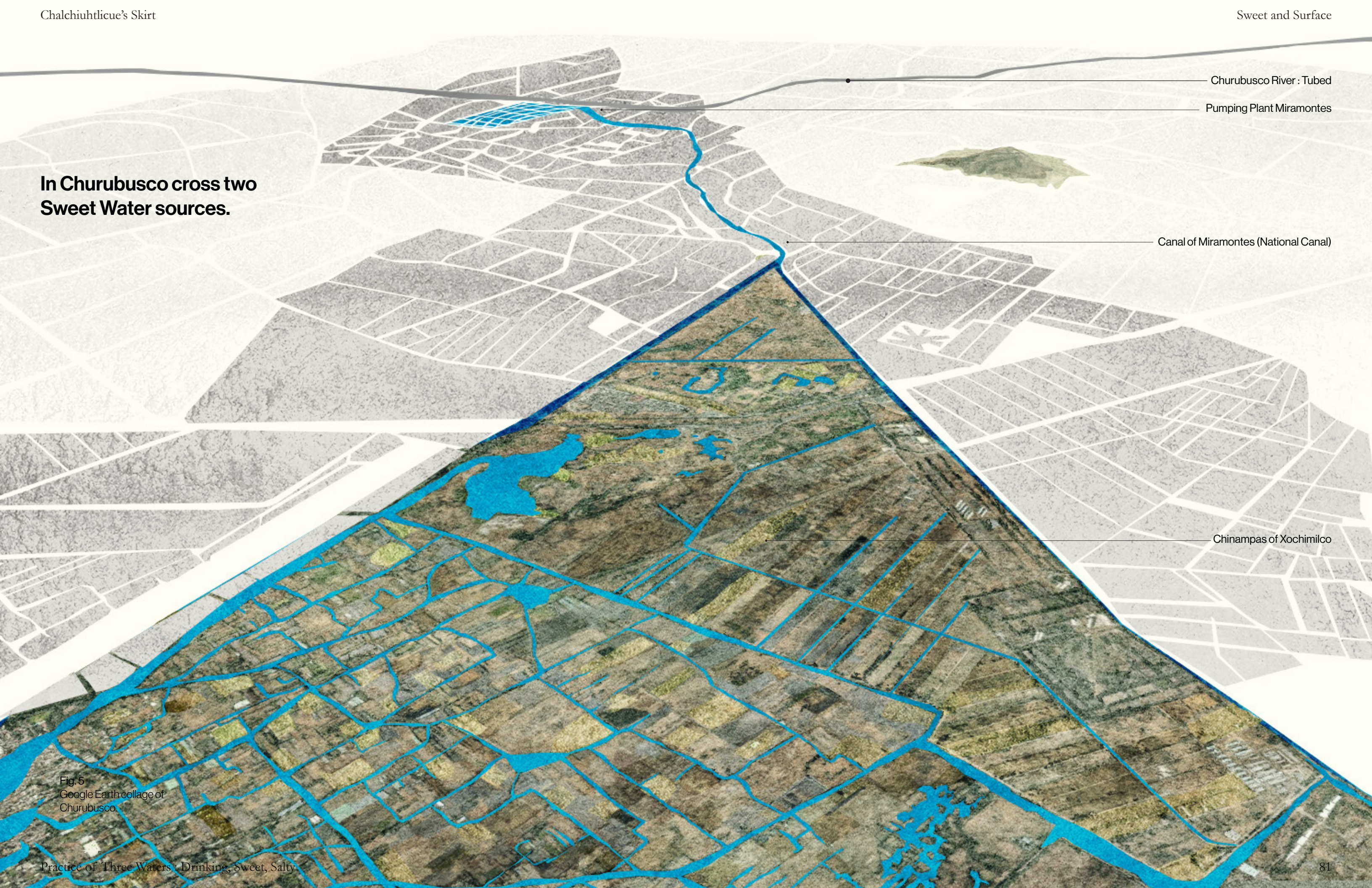
Churubusco River : Tubed

Pumping Plant Miramontes

Canal of Miramontes (National Canal)

Chinampas of Xochimilco

Fig. 5
Google Earth collage of
Churubusco.



The golf course at this crossing is part of a century-long deactivation of surface water in Churubusco at the expense of impermeable and inactive surfaces.

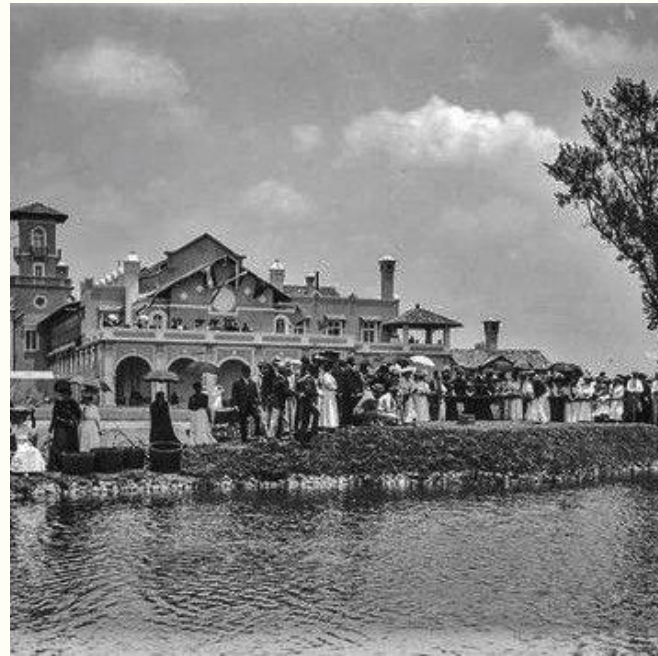


1900

Churubusco Convent

Fig.6

The convent at Churubusco was built in the 16th century out of the same volcanic stones as the pre-hispanic constructions. It was built as a Franciscan missionary outpost to educate both Spanish newcomers and Mexicans alike in the early days of the Spanish arrival and integration.



1905

Mexico Country Club Opening, 1905

Fig.7

Photo of the opening of the anglophile expat Mexico Country Club and their opening along the Churubusco River in 1905. At this point, both the Churubusco River and the Miramontes Canal (today National Canal) passed along the edge of the course as open waterways.



1960

Churubusco River, 1960

Fig.8

Photo of the Churubusco River bed being prepared by workers to be fed into a concrete tube. On top of it would go a freeway bearing the same name as the river. The installation of concrete culvert pieces would be the next step.



1964

Churubusco River Avenue, 1964

Fig.9

The Churubusco River was eventually tubed and paved over, making room for the car and a further reaching urban expansion in Mexico City. The tubing of Rivers and canals traversed by canoes in the city for the freeway was emblematic of an irreversible urban trajectory.

The Mexico Country Club at Churubusco was founded on the former Sweet Lake bed of Lake Xochimilco by a group of English-speaking golf enthusiasts in 1905⁹. The golf course was built before a lot of the major urban and infrastructural developments of the

area had occurred. Its location was convenient for the water-intensive sport. It sat at the end of the Miramontes canal, the water running from the chinampas of Xochimilco, and the River Churubusco, which descended the side of the mountain from Padierna. Both were open,

natural rivers at this time. The golf course was also a local low point in elevation. Water from the surroundings fed its heavy greenery. Today, the Miramontes canal (now the National Canal) remains open, but the River Churubusco has been tubed and buried under a freeway¹⁰.

Fig. 6 Unknown Photographer, *Exconvent of Churubusco, 1900*. Photograph. Retrieved from Bicentenario Magazine online.

Fig. 7 Unknown Photographer, *Inaugural Opening of Mexico City Country Club, 1905*. Photograph. Retrieved from El Universal online.

Fig. 8 Unknown Photographer, *Public Works on the Entubement of the Churubusco River, 1960*. Photograph. Flickr. Uploaded February 2, 2013 by 'maurortega'.

Fig. 9 Unknown Photographer, *Division del Norte and Churubusco River in the 60's*. Photograph. Flickr.

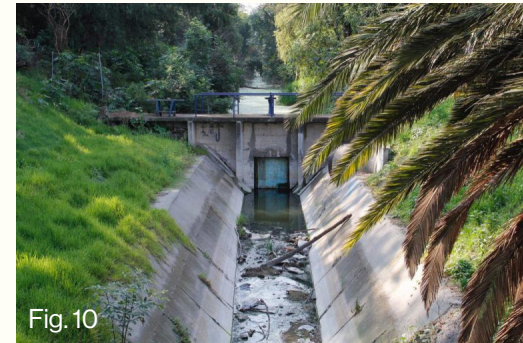
9 Mexico Country Club. *Nuestra Historia*. Mexico Country Club Official Website. Accessed June 2024.

10 Erika Montejo. *El hundimiento del terreno en la ciudad de México y sus implicaciones en el sistema de drenaje*. Tecnología Y Ciencias Del Agua, 13(3), pp. 13-18.

11 Miguel Ángel Garnica. *Los ríos de la ciudad que hoy ya no vemos*. El Universal online. June 20, 2017.

12 Fernando Sauri. *Ríos y canales en la CDMX: un pasado lacustre entubado*. Resilient Magazine. June 3, 2022.

The current practice is to pump these sources out of the lakebed.



Chalchiuhtlicue's Skirt keeps them, treats them, and puts them to good use.

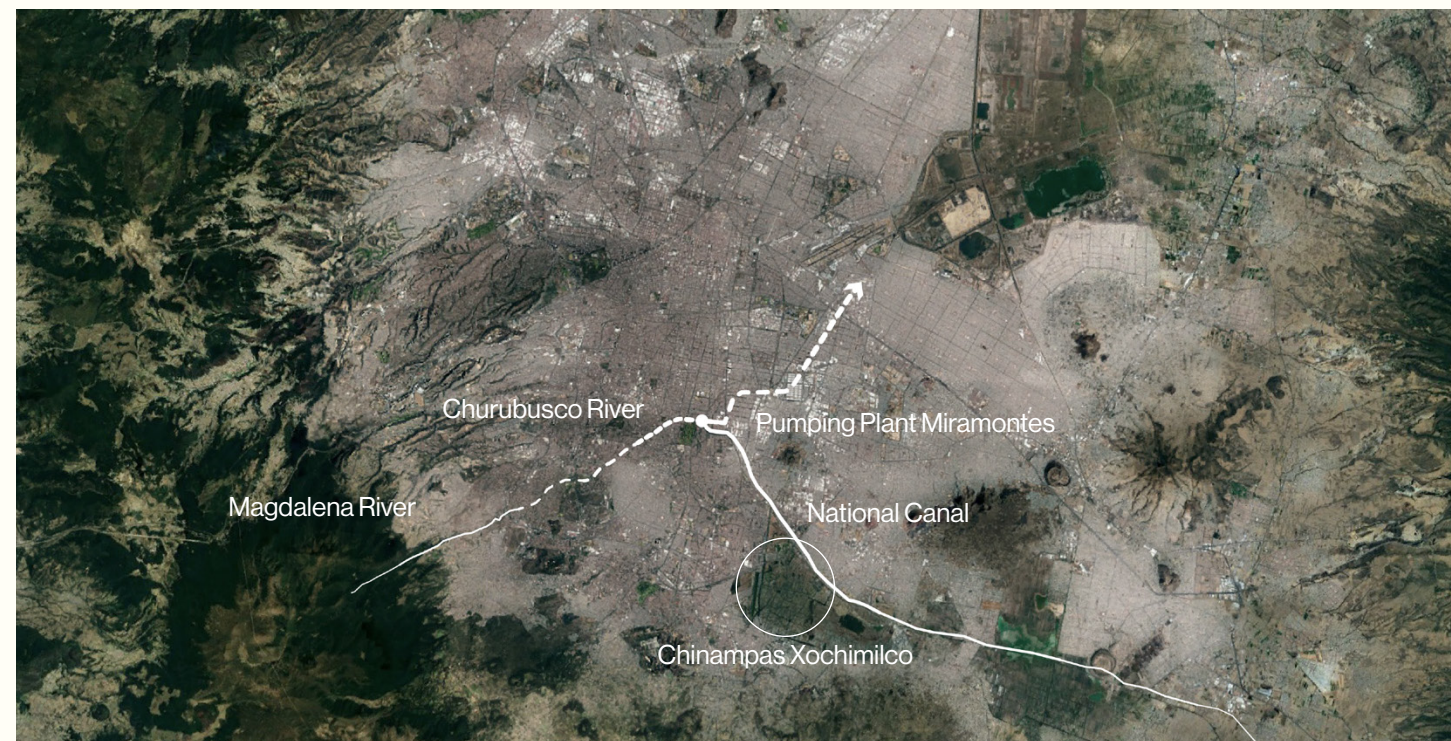
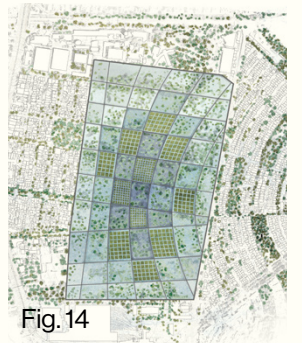
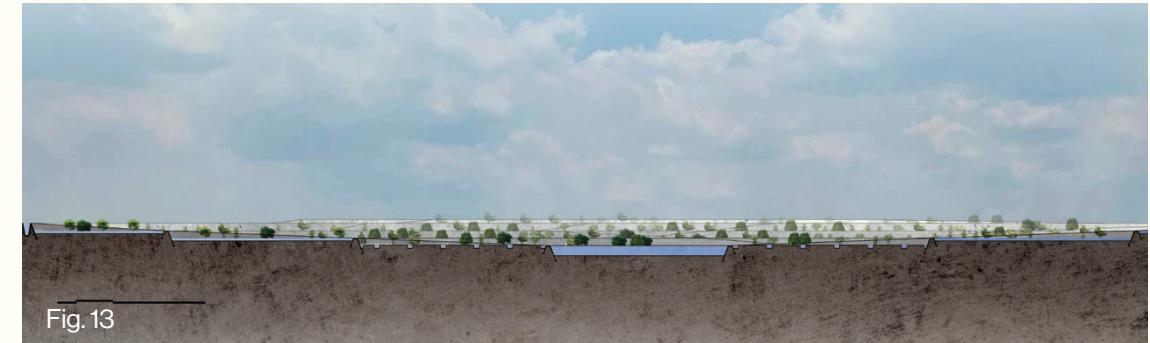


Figure 15
Current practice diagram of Churubusco.

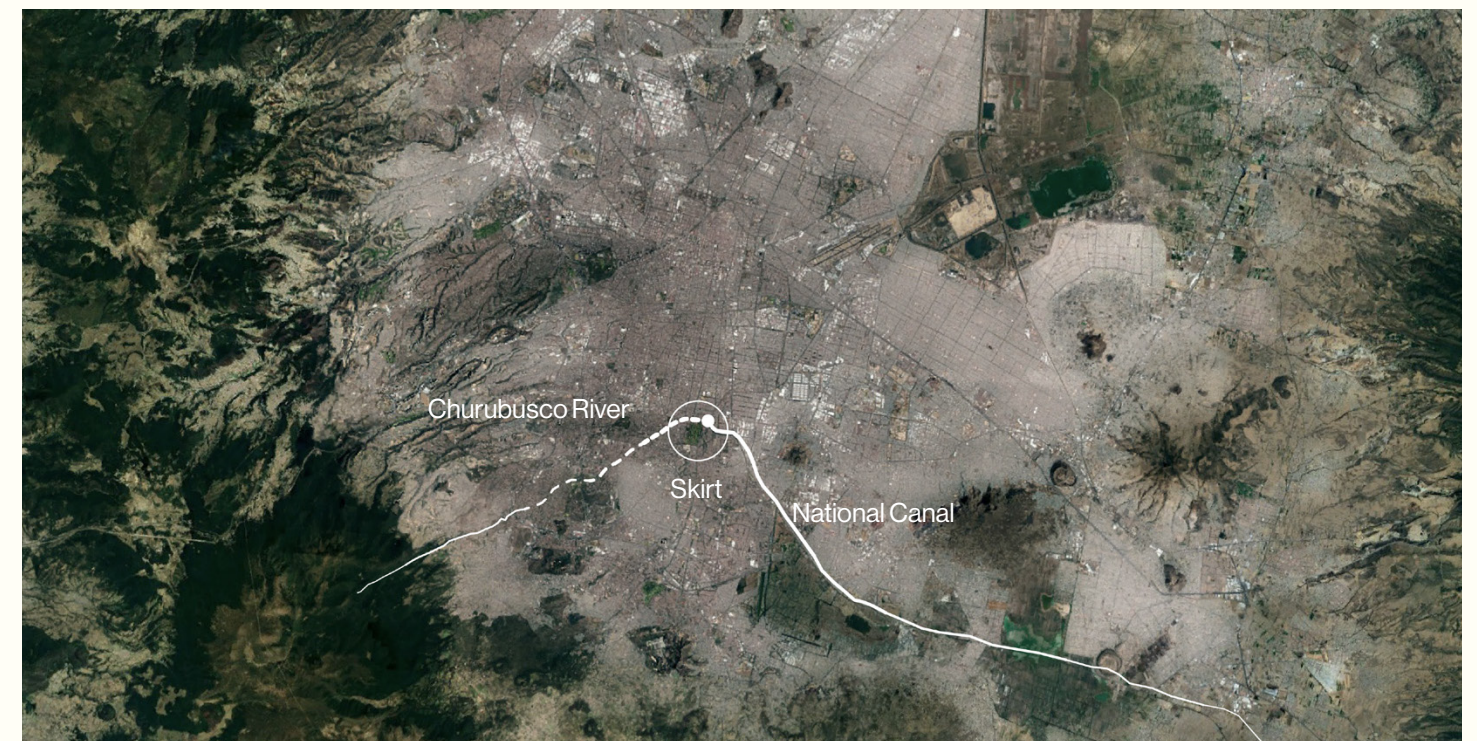


Figure 16
Proposed practice diagram of Churubusco.

The current practice of Sweet Water and surface in Churubusco is to treat the water of good quality from the Chinampas of Xochimilco and stormwater from the surrounding impermeable City as a burden. The Canal of Miramontes (today the National Canal), meets the tubed

and buried River Churubusco at the Miramontes Pumping Plant. The two water sources are pumped out of the bed of Lake Xochimilco and into the lower-lying bed of saline Lake Texcoco. At the corner of this crossroads between the Churubusco River and Miramontes Canal sits the

Mexico Country Club. This practice proposes converting the golf course into a fabric of active surfaces that treat the water from the river, canal, and stormwater runoff, and then use it for the growth of crops as a home for the decimated and endangered Axolotl.

Fig. 10 Simon Schatzberg. *National Canal, formerly Miramontes Canal*. Photograph. Retrieved from Mexico News Daily online. Published August 5, 2019. Accessed June 2024.

Fig. 11 Especial. *Explosive leak in Churubusco River*. Photograph. Retrieved from El Heraldo online. Published March 17, 2023. Accessed June 2024.

Fig. 12 Sistema de Aguas de la Ciudad de Mexico (@SacmexCDMX). *Operating on Miramontes Pumping Plant*. Photograph. Retrieved from X. Published April 8, 2020.

Fig. 13 1:1000 section across Skirt.

Fig. 14 1:10000 urban fabric plan of Skirt.

Like the weaving of a skirt, the deconstruction of the golf course connects the urban fabric that surrounds it.



Fig. 17
Urban inconsistency plan with former golf course.



Fig. 18
Urban fabric plan with proposed Skirt.



Fig. 19
Perspective of a couple buying Cempasuchil for their ofrenda during their walk between the Metro and Cineteca.

Water for Chalchiuhtlicue's Skirt is taken from two sources. During the dry winter, water that enters the Miramontes Pumping Plant from the National Canal is passed into the Skirt instead of being pumped out of the lake bed as a form of urban waste and burden. This water

is still of good enough quality to be treated at the scale of the Skirt. During the wet summer, the Skirt is fed by the stormwater runoff from the surrounding impermeable City. Being embedded in the lakebed of Lake Xochimilco, the Skirt is lower than its surroundings, and receives

an immense amount of water runoff to the golf course. The water that enters the Skirt is treated through a series of cascading water treatment beds that pass water towards its center. The first three outer levels of surface are for the passive treatment of entering water using native

trees such as the willows, the Ahuehuate and Ahuejote, as well as the native sedge Tule. The current Country Club is currently all imported plantings. By the time the water enters the edge of this fabric reaches the third bed, the native palette of plantings has treated it to a

point to which it can be used for the growing of crops and ornamental flowers. At the third level the fabric is home to commercial growing beds for enterprises displaced due to contamination and drought in Xochimilco. The next two levels of bed are used for personal growing

beds for community members that want to rent a smaller scale space for non-commercial use. The final, lowest, and best water quality bed is used as a sanctuary for the endemic Axolotl whose population in the canals of Xochimilco is threatened with extinction.



Beds 0-2

Passive treatment with native species



Bed 3

Commercial Growing Beds



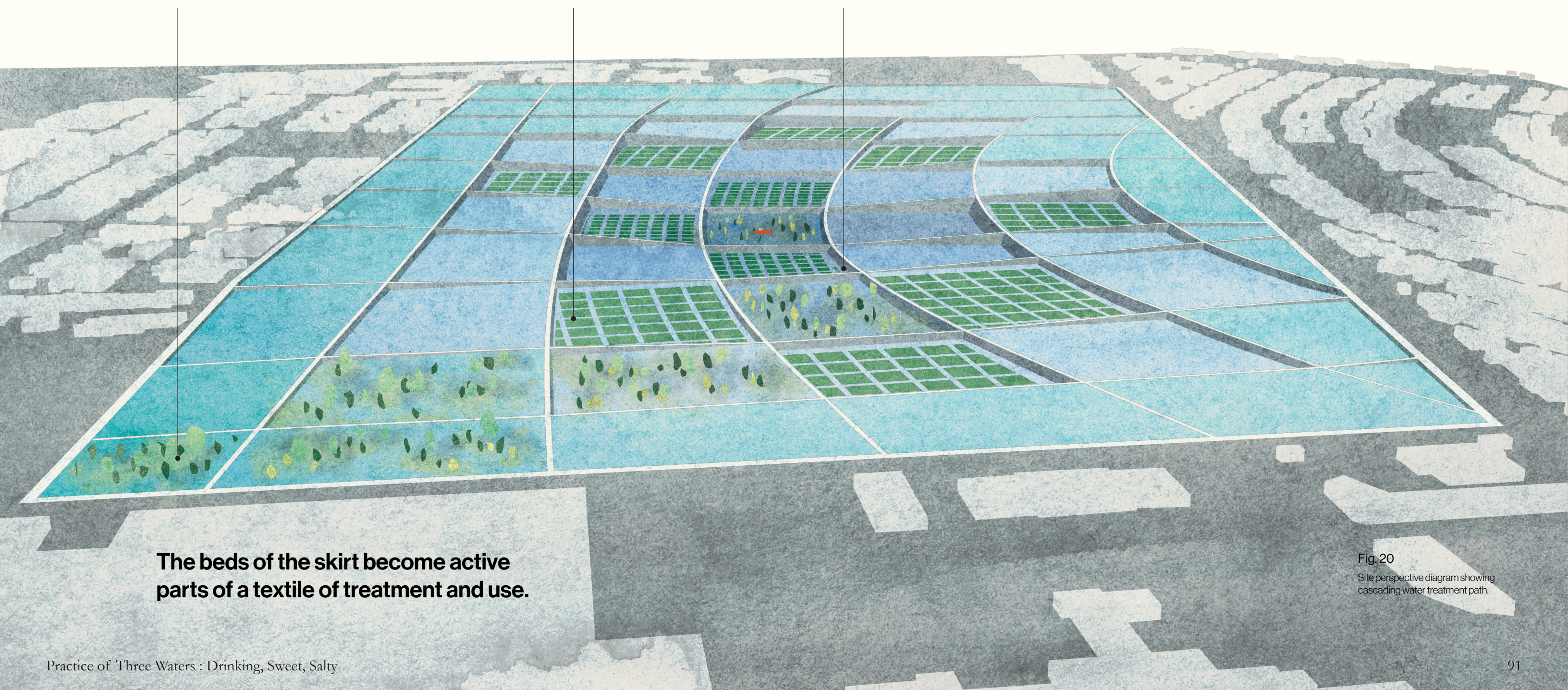
Bed 5

Personal Growing Beds



Bed 6

Axolotl Reserve



The beds of the skirt become active parts of a textile of treatment and use.

Fig. 20 Site perspective diagram showing cascading water treatment path.

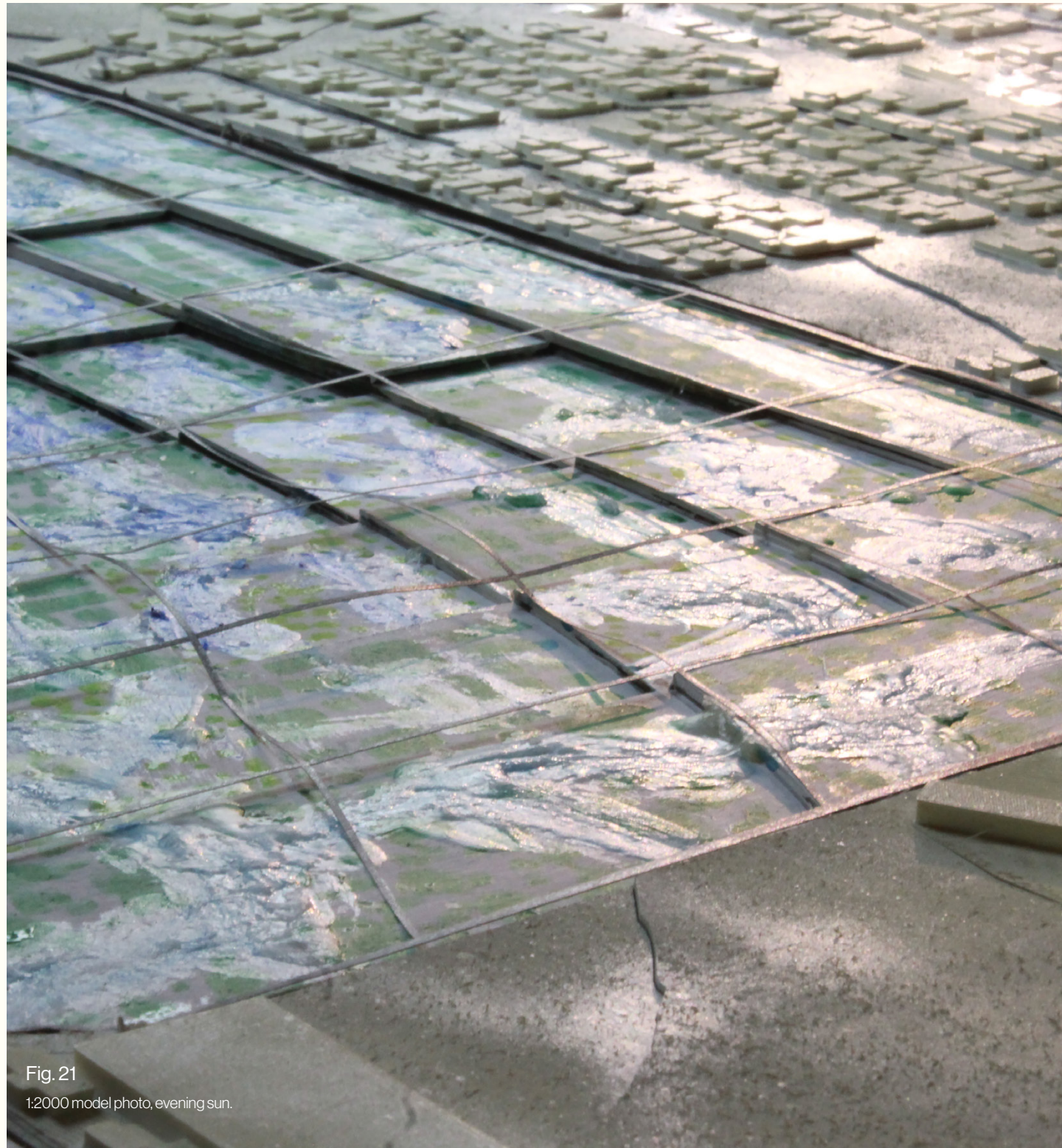


Fig. 21
1:2000 model photo, evening sun.

The current Mexico Country Club is surrounded by a 2.5 meter tall wall. The country club disrupts, disconnects, and excludes. The corner of the Churubusco River and National Canal is a dense and fully-developed urban collage. However, each side of the urban fabric surrounding the

modern day golf course is entirely different. To the west of the wall is a low-density and upper-class gated community of seasonal golf course-adjacent condos. To the east is a middle-class commuter neighborhood. To the north of the wall is an enormous national arts campus

only accessible presently by car. To the south is the Taxqueña transit center, the fourth most active Metro station in Mexico City and the largest regional bus station. The isolated development of these patches of urban fabric is caused by the golf course wall.



Fig. 22
Fountain at Casa Ortega, Luis Barragán 1940-42.



Fig. 23
Skirt spilling over, 1:50 model perspective.

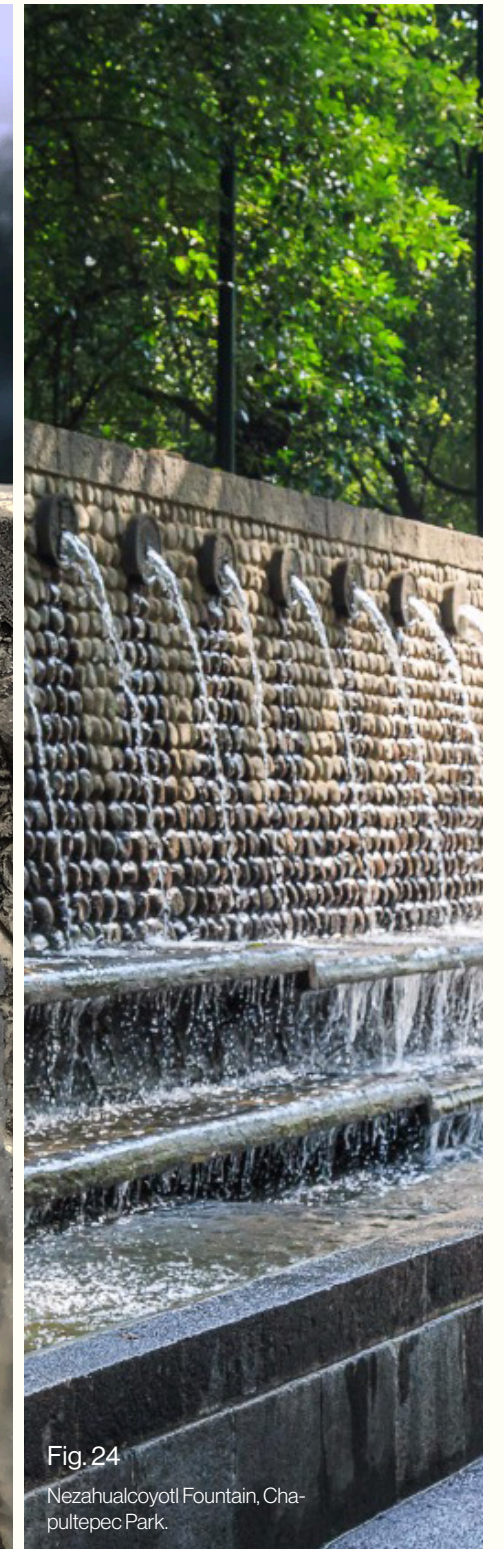


Fig. 24
Nezahualcoyotl Fountain, Chapultepec Park.

Fig. 21 1:2000 model perspective capturing evening sun on the water treatment fabric.

Fig. 22 Author, *Fountain at Casa Ortega*. Photograph. Taken December, 2023.

Fig. 23 1:50 model perspective showing texture of water spilling over retaining walls in relation to scale of human.

Fig. 24 Unknown Photographer, *Nezahualcoyotl Fountain, Chapultepec Park*. Photograph. Retrieved from *Getyourguide Magazine* online. Accessed June 2024.

Figure 25
 Perspective of commuters making their way to work on the Skirt. Commuters buy a warm atole and tamale on their way.



Fig. 25 Perspective of dawn on skirt showing locals taking their morning atole and tamales.

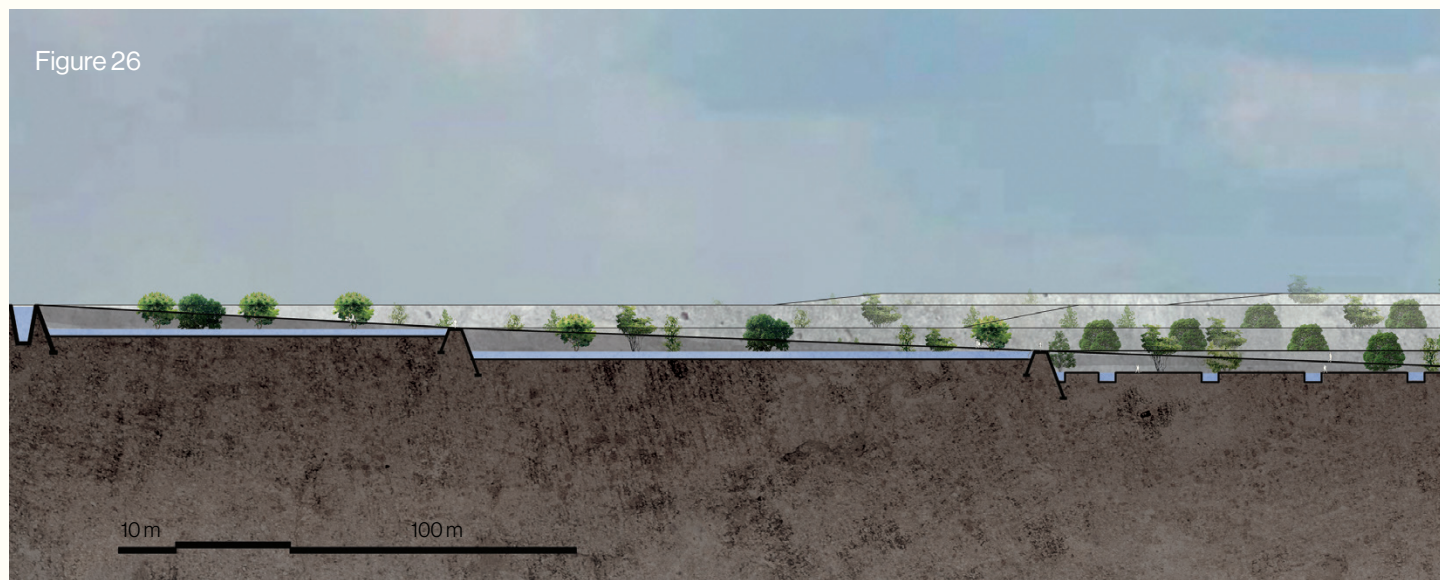
Fig. 26 1:1000 section of skirt water treatment and growing beds.

Fig. 27 Unknown Photographer, *Xochimilco, 1959*. Photograph. Retrieved from Mexico en fotos online. Uploaded January 8, 2016. Accessed June 2024.

Fig. 28 Unknown Photographer, *Xochimilco, 1910*. Photograph. Retrieved from Pinterest. Uploaded by user 'Salvador Ascencio Tapia'. Accessed June 2024.



Figure 26



While a context-specific contemporary practice, its atmosphere respects the rich spatial history of surface on the Sweet Water lakes.

Chalchiuhtlicue's Skirt offers an alternative practice in which the water treatment fabric weaves together the disparate urban fabrics that surround it. With Chalchiuhtlicue's Skirt, Mexico City's burgeoning middle-class can take a city bike (Ecobici) from the Metro Taxqueña over the volca-

nic rock wall to catch a movie at the National Cinema. Likewise, those growing crops and ornamental flowers in the Skirt's beds can transport their goods to the metro or adjacent neighborhoods for sale. The transformation of the golf course is a connector of the things around it,

while staying true to the architectural languages central to the advantageous use of Sweet Water historically. The photos above, in comparison to the perspective of the Skirt at dawn, show the atmospheric similarities between the Skirt and the Sweet Water lake beds through time.



The Serpent's Mouth

The Reconnection of Salty and Earth



Fig. 1
1:200 Model perspective of
reappropriated airport structure
as infiltration well "flag".



Quetzalcoatl
Fig. 2

The mouth of Quetzalcoatl was the creator and destroyer of worlds, both the end and the beginning.

Quetzalcoatl, or 'the feathered serpent' in Nahuatl, was one of the most cherished and proliferated spiritual and mythological figures in the Mexica canon. 'Quetza' meaning 'feathered', and 'Coatl' meaning serpent, fuses the image and associations of the serpent in Mexica mythology with the image and associations of the emerald bird's feathers.

Representation of the feathered serpent first began to surface in the Tolteca civilization, which occupied the Valley of Mexico prior to the Aztecs, spanning from 800CE to 100CE¹. The serpent's body represented the body of the human and the material world, and the feathers its relation to the spiritual and immaterial. For this, the feathered serpent was heralded as a mediator between an object-world and an 'inframundo'¹.

The Aztecs believed that two gods, Tonacatecuhtli and Tonacacihuatl, had created half of the world. They believed that the other half of the world, was created by their children Quetzalcoatl and Tezcatlipoca².

While Quetzalcoatl was known for his knowledge, Tezcatlipoca was very aggressive. The rivalry between the two brothers created the destruction of the eras of four suns. Which is why the Aztecs

believed themselves to live in the 'Quinto sol' or 'fifth sun'².

In one version of the myth, Quetzalcoatl and Tezcatlipoca are far more cooperative and not rivals. In this version of the story, the two gods actually create the fifth sun together, rather than it being a product of the destruction of the fourth sun.

The first things they create in this story are the first man and woman, the first fire, and the first rain².

They also created the earth and the sky as they transformed themselves into two giant serpents and tore apart the female reptile known as Tlatcuhtli. The split Tlatcuhtli formed with one half the sky and the other half the earth. Trees, plants, and flowers sprouted from the skin and hair of the torn creature, while the springs and caves formed themselves from her eyes and nose, and the valleys and the mountains from her mouth. Tlatcuhtli was so upset to lose her physical body in a brutal violation by the two gods, that the only way to appease her was to give her the blood and hearts of mortals that graced her former body³.

In the creation myth of humanity, Quetzalcoatl descends into Mitlan, the underworld, where he is sent to extract bones. The two

gods governing this underworld agree to give the bones to Quetzalcoatl that he was sent for, but only if he blows on a horn that has no holes. Quetzalcoatl, being the figure of knowledge and cleverness, lets worms devour the horn to form holes and puts bees inside it to give it a sound. He then leaves the underworld, pretending to not have the bones, claiming to want to leave them where they are. Angry with the betrayal, the governors of the underworld devise a trap to claim the betrayer. Quetzalcoatl falls into the trap, and the bones of man and woman fall and mix between each other. Quetzalcoatl proceeds to pick up the bones and escape the well, and give them to the large serpent god Cihuacoatl so that she can transform them into people, mixing them with corn and some of the blood of Quetzalcoatl⁴.

While the various stories and images associated with Quetzalcoatl vary, the themes remain constant: visits to the underworld, the creation of the duality of earth and sky, creation of the form of the riverbaisn (brooks, caves, valleys, mountains), sacrifice to the underworld, and the birth of humanity. Quetzalcoatl is the creator and destroyer of worlds².

Fig. 2 Aztec Artists. *Quetzalcoatl*. Diorite, ca. 1450. Currently exhibited in Museum of Anthropology, Mexico City.

1 Andrea Ochoa. *Adentrate en el Mito de Quetzalcoatl, el serpiente emplumada*. Architectural Digest online. September 28, 2022.

2 Mark Cartwright. *Quetzalcoatl*. World History Encyclopedia. August 21, 2013.

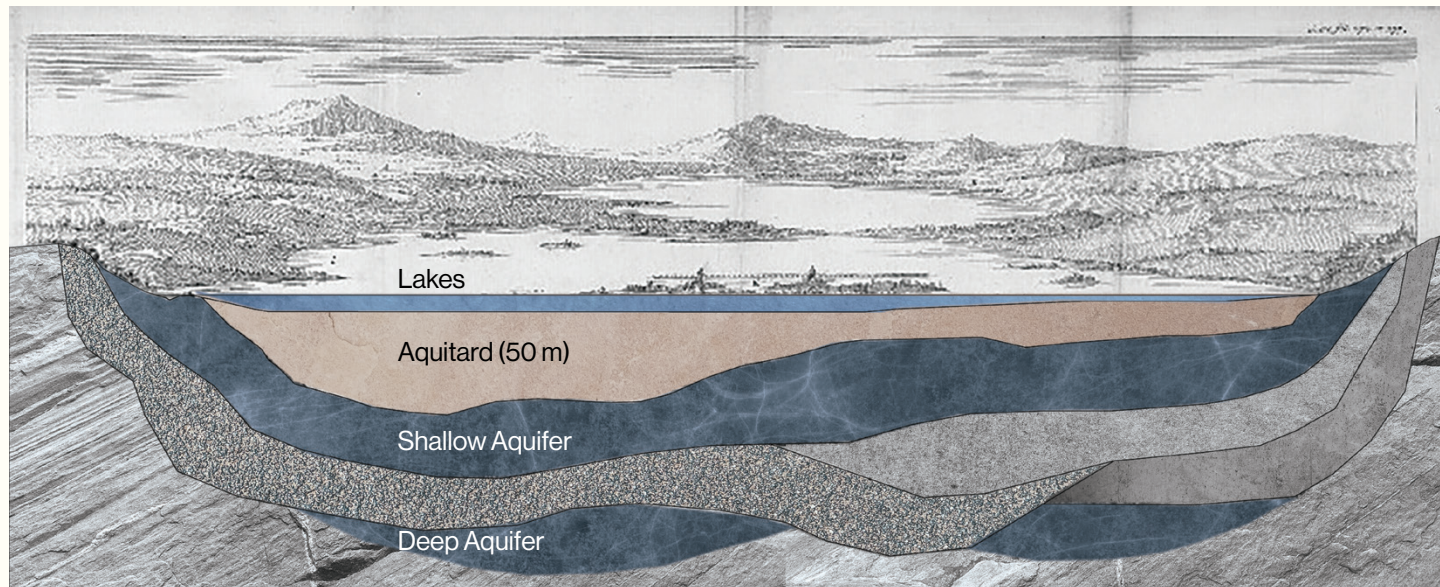
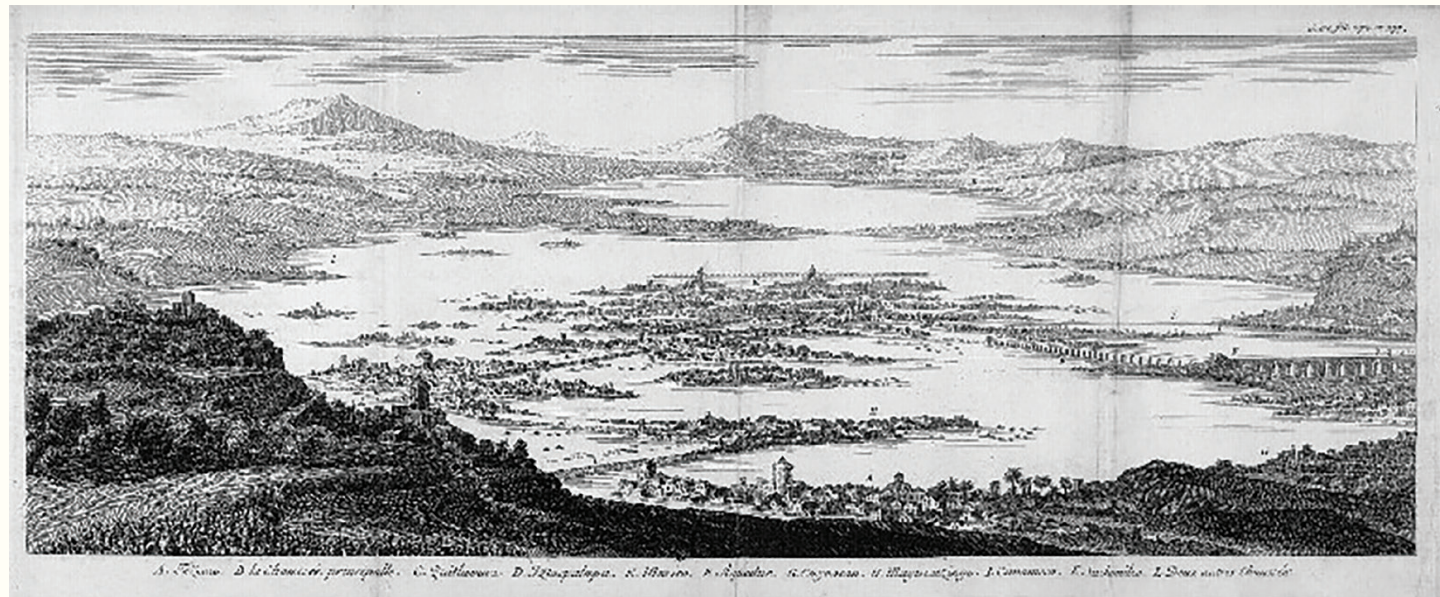
3 Kay Almere Read. *Mesoamerican Mythology*. Oxford University Press, USA. 2002.

4 David Jones. *Mythology of the Aztecs and Maya*. Southwater, London, 2003.

5 M.E. Miller et al. *An illustrated Dictionary of the Gods and Symbols of Ancient Mexico and the Maya*. Thames & Hudson, 1997.

6 M.E. Miller. *The Art of Mesoamerica*. Thames & Hudson, 2012.

7 National Geographic. *National Geographic Essential Visual History of World Mythology*. National Geographic, 2008.



Water Table Section

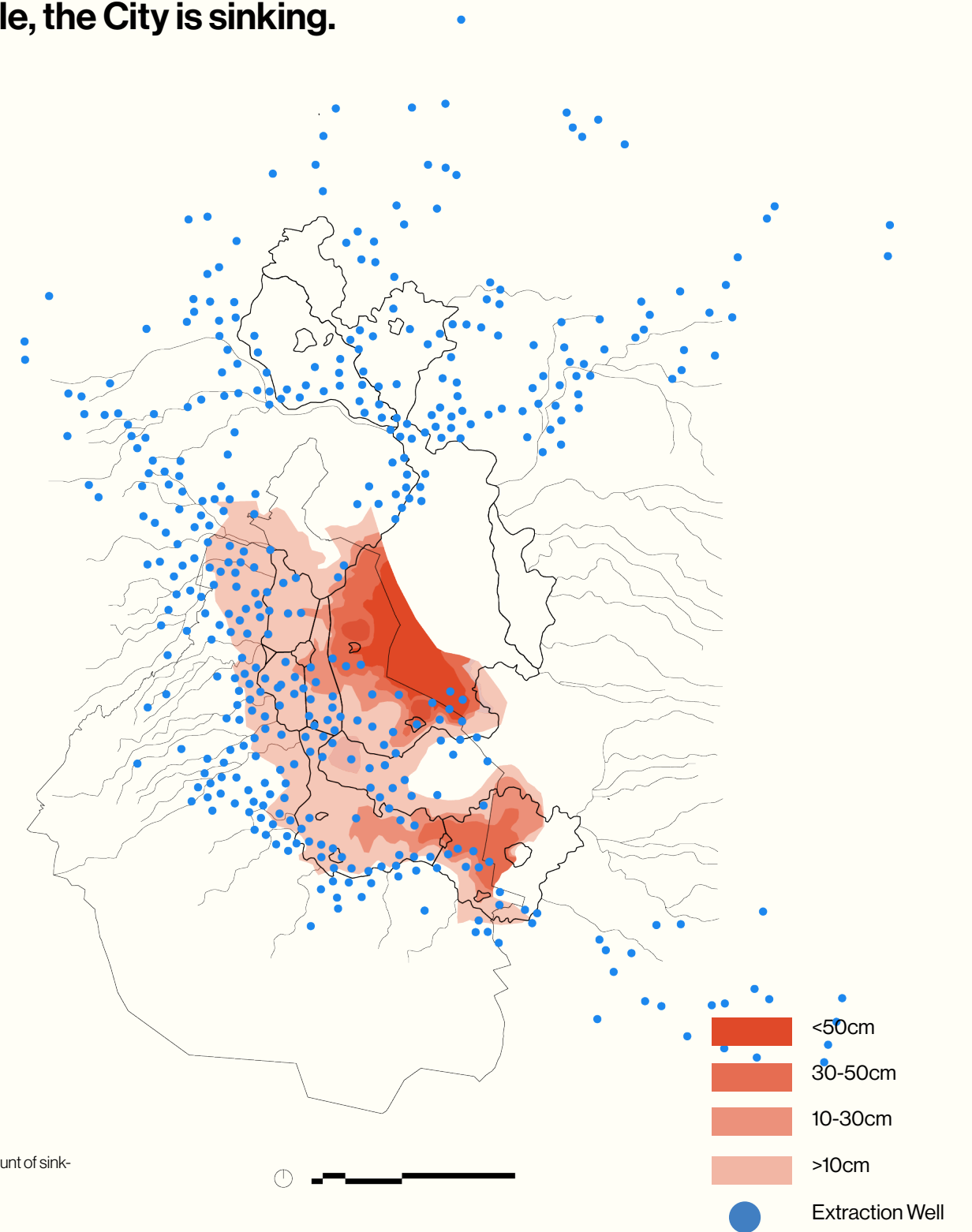
Figure 3
Water table section using Van Beecq's *a View of Tenochtitlan*.

Mexico City is sinking. The City has been pulling water out of the shallow and deep aquifers at a rate of 1 to 13 cubic kilometers per year since the year 2014⁸. The consequence of this extraction is that the city is sinking at an average of 35 centimeters a year⁹. However, that number does

not capture the entire story. Sinking is the most extreme in parts of the city that sit on the lake bed of the former Salty Water Lake Texcoco. Communities that find themselves on the ghost of the lowest-lying and most immense saline lake sink upwards of 50cm a year¹⁰, while the

communities that find themselves in the Drinking Water mountains or Sweet Water bed sink between zero and twenty centimeters a year. All the while, these communities are located where the water is being extracted, and used at higher rates.

Meanwhile, the City is sinking.



Sinking

Figure 4
Diagram showing amount of sinking throughout city.

Fig. 3 Donatus Van Beecq, Jan Karel. *View of Tenochtitlan*. Ink illustration on european paper as part of *History of the Conquest of Mexico or New Spain*. ca. 1712.

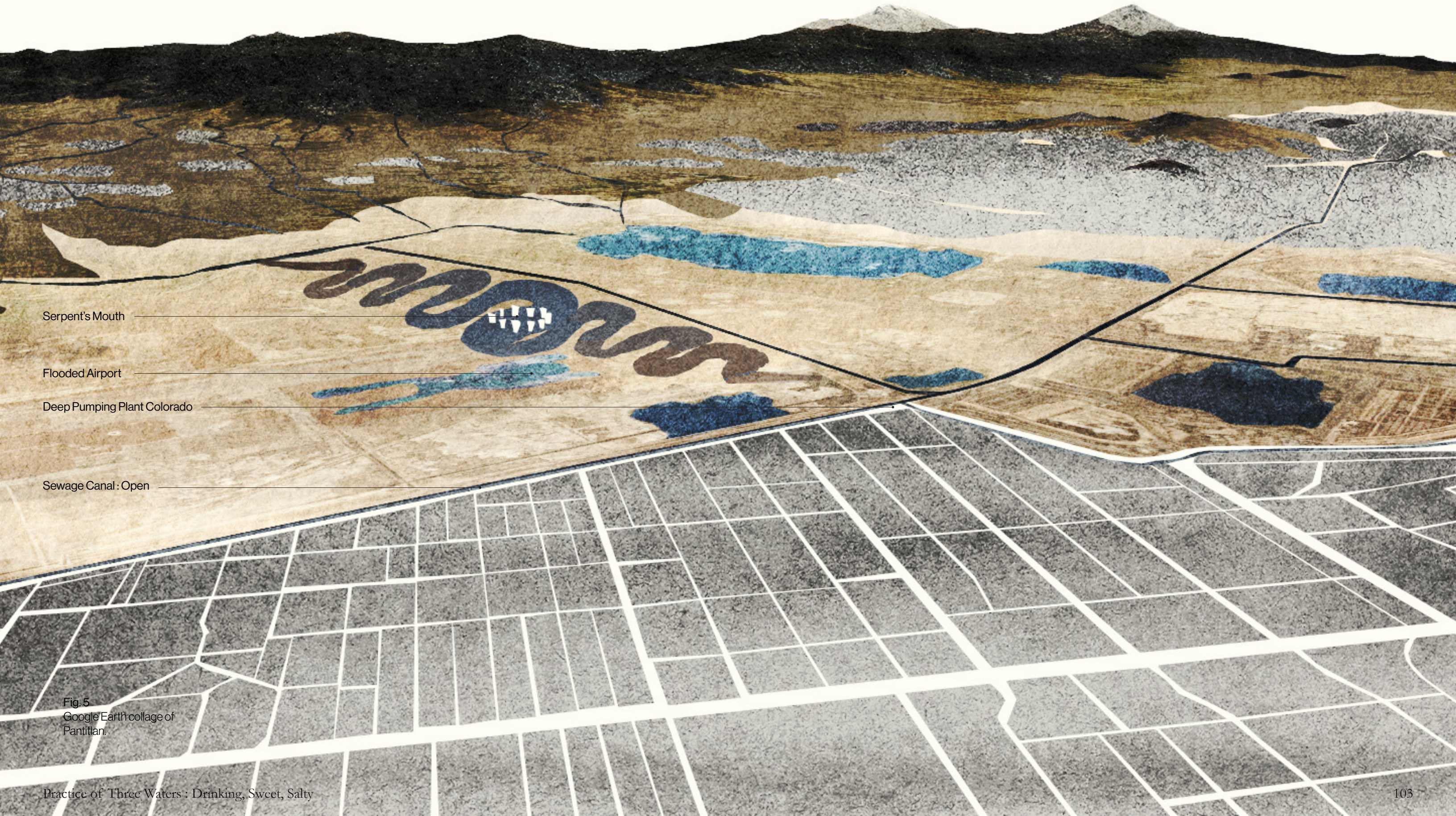
Fig. 4 Sinking diagram.

8 Gobierno de la ciudad de Mexico. *Atlas de Riesgos*. Secretary of Risk Management and Civil Protection. Last Updated May 29, 2024.

9 Gerardo Ruiz Solorio and Ma. del Rosio Ruiz Urbano. *Análisis multitemporal del acuífero de la ciudad de México de 1985 al 2009*. Diss. PhD: UNAM. October, 2010.

10 Juan Manuel Lesser Illades. *El hundimiento del terreno en la ciudad de México y sus implicaciones en el sistema de drenaje*. Tecnología Y Ciencias Del Agua, 13(3), pp. 13-18. 2004.

At the end of the Valley sits an airport overcome by water.



Serpent's Mouth

Flooded Airport

Deep Pumping Plant Colorado

Sewage Canal : Open

Fig. 5
Google Earth collage of
Pantitlan.

The airport was not the beginning of humans' attempts to overcome the water of the Valley of Mexico.



1940

Lake Texcoco
Fig.6

Photo by Norwegian civil engineer and photographer Ola Apenes during his time living in Mexico City. Photo shows the extent to which Lake Texcoco was largely intact as a water surface until the late 1950s.



1975

Nezahualcoyotl City, Lake Texcoco
Fig.7

Nezahualcoyotl was a large urban development which situated itself on the bed of Lake Texcoco. Nezahualcoyotl initiated momentum to locate parts of the city on the bed of the saline lake.



2017

Construction of Airport
Fig.8

Photo of the construction of the NAICM (New International Airport of Mexico City). Photo shows the extent to which the Foster + Partners project in collaboration with Fernando Romero architects was completed on the former saline lake bed.



2023

Natural Flooding of Airport Foundation
Fig.9

After the announcement of the discontinuation of the \$14 billion airport for the initiation of the Lake Texcoco Ecological Park, the foundation and below-grade systems of the airport naturally flooded. Today, that debris waits to be sold by the government.

Lake Texcoco is an immense territory adjacent and accessible to the economic heart of Mexico City. It is no surprise that modern infrastructure to allow humans to drain and dry the lake coincided with the real estate value and speculation of its territory. As seen in the photos above,

the extremely dense working-class neighborhood of Nezahualcoyotl was built while Lake Texcoco still seasonally existed¹¹. More projects to dry, pave, and conquer the Salty Water lake continued. However, the airport proved what the city already knew : the lakes continue living, de-

spite the efforts to systematically rid the valley of their memory. Current political campaigns talk about the restoration of the surface of Lake Texcoco as the only possible method to reverse the damage done¹². Meanwhile, the waters continue to collect at the bottom of the basin.

Fig. 6 Ola Apenes, *Lake Texcoco, 1940*. Photograph. Retrieved from Wikimedia Commons. Uploaded by user 'Oescalona', May 27, 2023. Accessed June 2024.

Fig. 7 Hector Garcia. *Nezahualcoyotl City, 1975*. Photograph. Retrieved from Pinterest. Uploaded by user 'Comunicacion Social Nezahualcoyotl', April 23, 2013. Accessed June 2024.

Fig. 8 Brett Gundlock. *NAICM, Texcoco, Mexico*. Photograph. Retrieved from Bloomberg online. Uploaded March 1, 2019. Accessed June 2024.

Fig. 9 Carlos Jasso. *Abandoned Structure Flooding, NAICM, Texcoco*. Photograph. Retrieved from Reuters online. Uploaded February 22, 2021. Accessed June 2024.

11 Ekkehard Buchoffer and Adrián Guillermo Aguilar. *Nezahualcoyotl: planeación urbana y ordenación espacial en la periferia de la Ciudad de México*. Geographic Investigations online. 1983.

12 Mexican Secretary of Communication and Transport. *Razones para la cancelación del proyecto del Nuevo Aeropuerto en Texcoco*. April 26, 2019.



And it won't be the last.

Figure 10

Foster + Partners. *NAICM, Texcoco, Mexico*. Computer-Generated Architectural Render. 2014. Retrieved from The Chicago Athenaeum Museum of Architecture and Design online. Accessed June 2024.

In 2014, Norman Foster, in collaboration with Mexican Architect Fernando Romero (son-in-law of Telcel magnate Carlos Slim), won the competition for Mexico City's largest infrastructural undertaking to date, beating out proposals by Zaha Hadid, SOM, Gensler, Pascal + Watson, and Teodoro Gonzalez de Leon. The project would cost north

of 10 billion U.S. dollars (today estimated at 13.1 billion), and cover 470,000 square meters, with a possibility of extending up to 743,000 square meters on the desiccated lake bed of Lake Texcoco¹³. The project would be serviced almost exclusively with air circulation and water infrastructure below ground¹³, allowing the terminals to be one large para-

metric roof structure similar to many Buckminster Fuller imaginaries.

However, the continuation of the project was dependent on the support of the current political administration of conservative president Enrique Peña Nieto. The election of ecological realist and working-class idealist



Figure 11

Paul Lucas (@paul_winginit), *NAICM, Texcoco, Mexico*. Photograph. Retrieved from X. Published October 27, 2021. Accessed June 2024.

Andres Manuel Lopez Obrador (known as AMLO) in 2018, put a halt to the project¹⁴.

The proposal included not only one new international terminal, but the ambition for a second and equally large extension providing the securement of funds and the continued support of the current administration. The scale of the proposal is

incredibly immense.

The photos above (fig. 10 & 11) show the plans for the lake's surface as compared to its status today as a flooded foundation and partially-built parametric roof structure.

The shape of the cancelled airport's flooded foundation resembles the Nahuatl glyph for 'happy person in water'.

¹³ Foster + Partners. *New International Airport Mexico City*. Accessed May 29, 2024.

¹⁴ Juan Luis Hernández Macías. *Cancelación del aeropuerto*. Nexos: Sociedad, Ciencia, Literatura 42, num. 512. pp. 32-33. 2020.

¹⁵ César Felipe Lima Gutiérrez. *Polarización política en la cancelación del Nuevo Aeropuerto*. Universidad Nacional de Colombia, 2018.

The collected stormwater and sewage that arrives at the bottom of the river basin is pumped up and out of the Valley.

The Serpent's Mouth keeps that hydrologic trash, treats it, and deposits it into the aquifer.

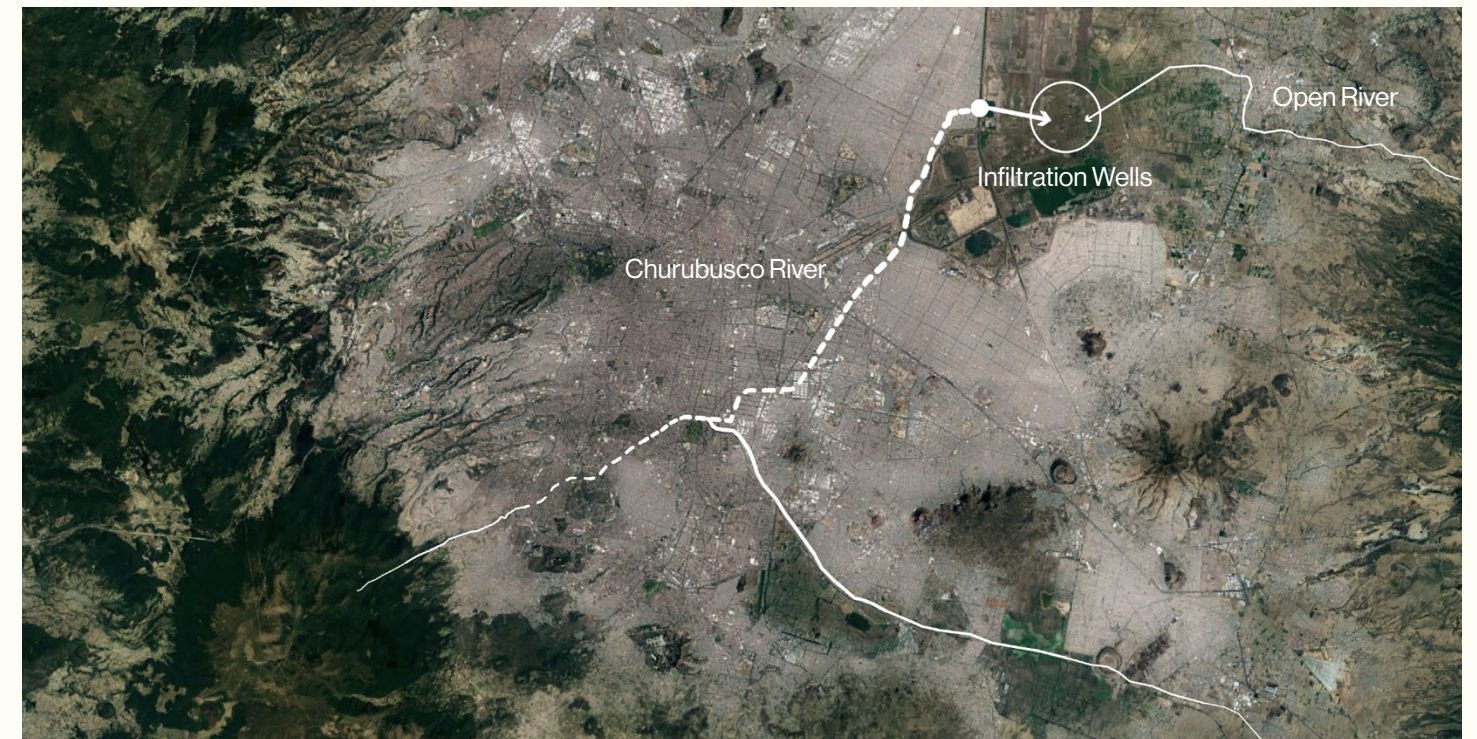
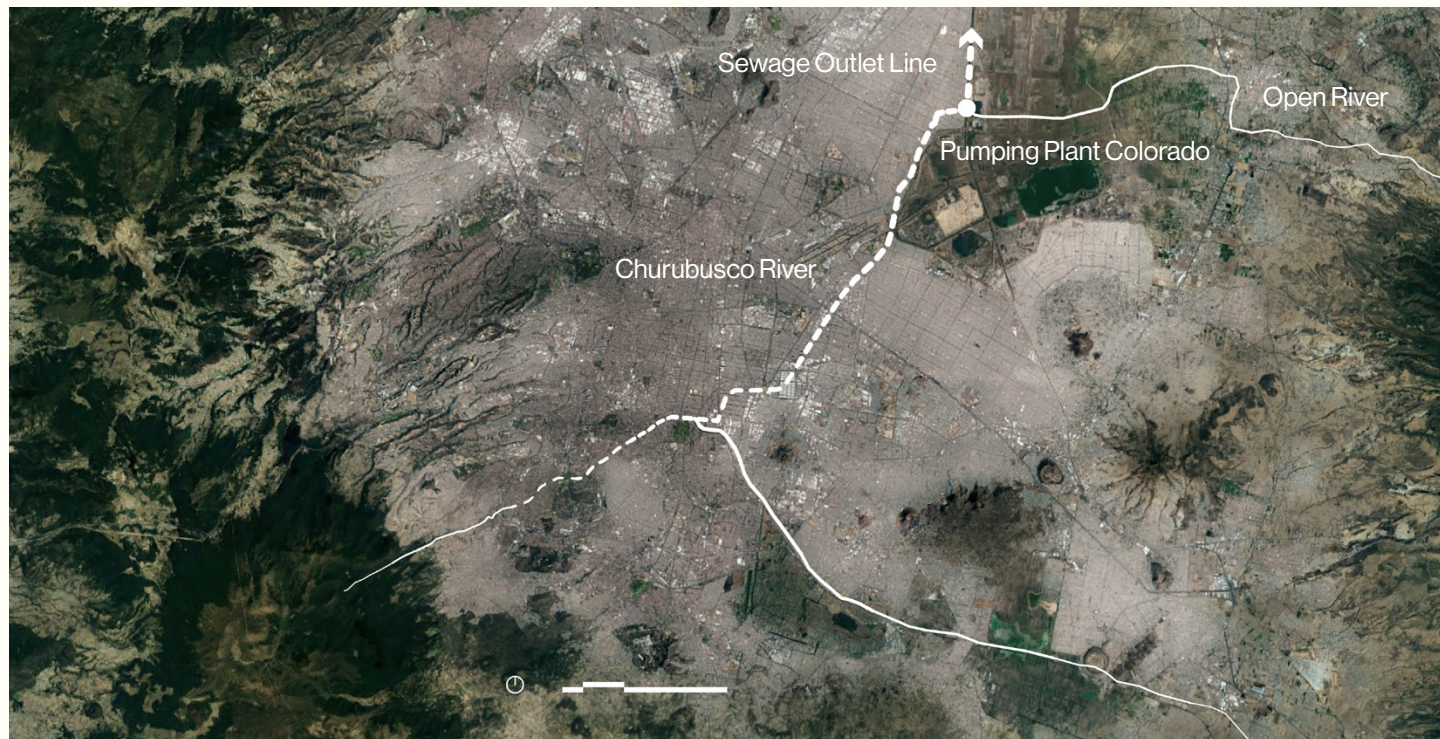
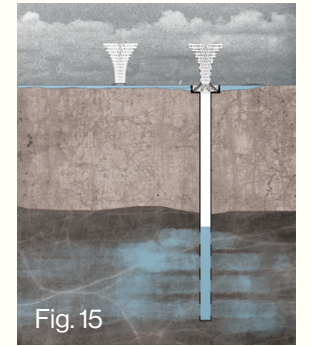


Figure 16
Current practice diagram of Pantitlan, produced by author, 2024.

Figure 17
Proposed practice diagram of Pantitlan, produced by author, 2024.

The city sewage system can be thought of as a system of increasing proportion. As water moves through the City, primarily from west to east, towards the bottom of the Basin at Lake Texcoco, the stormwater and sewage systems become increasingly wider in diameter, increasingly

hydraulically aided, and increasingly contaminated. The Serpent's Mouth is located at the most extreme of this increasing proportion. Water from the entire City ends up at the Casa Colorado Pumping Plant. The pumping plant was an infrastructural effort of CONAGUA under the ad-

ministration of Enrique Peña Nieto, the same president to initiate the airport on the same territory. The Pumping Plant pumps 20-30 cubic meters of stormwater and sewage out of the Valley per second, where the water meets the Grand Drying Canal en route out of the City¹⁶.

Fig. 12 Unknown Photographer, *Pumping Plant Colorado, Installation*. Photograph. Retrieved from INSPECTEC. Accessed June 2024.

Fig. 13 Francisco Santos. *Inauguration of the Pumping Plant Colorado*. Photograph. Flickr. Uploaded March 10, 2012 by 'Gobierno Federal'. Accessed June 2024.

Fig. 14 1:10000 plan of the Mouth's passive water treatment and infiltration well system.

Fig. 15 1:1000 section across Mouth showing infiltration depth through aquifer.

16 Ramón Domínguez Mora. "Diagnóstico resumido de los problemas de abastecimiento de agua y de inundaciones en el Valle de México." 2011.



Fig. 18
Perspective of the Serpent's Mouth from
its primary "user": the migratory shorebirds
that called Lake Texcoco home during their
travels.

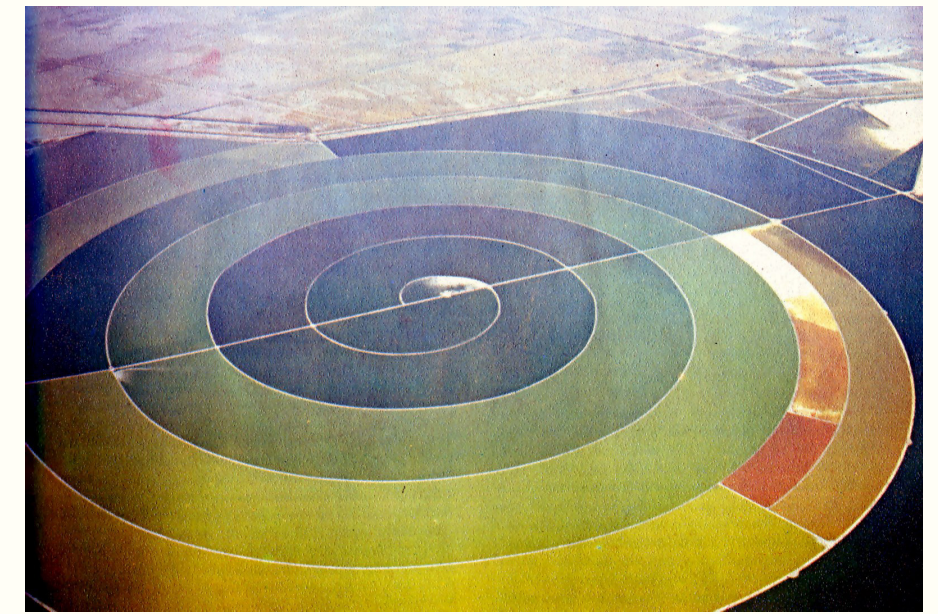


Fig. 20
Unknown Photographer, *Solar Evaporation Deposits, 'El Caracol'*. Photograph. Retrieved from Pinterest. Accessed June 2024.



Fig. 21
Alberto Kalach (@albertokalach1), *Lake Nabor Carillo, Texcoco, Mexico*. Photograph. Retrieved from X. Published June 14, 2020. Accessed June 2024.

The sewage water is sent through a snaking series of water filtration steps that use a native plant palette, absorbent soil, and surface area to treat it to a salvageable level.

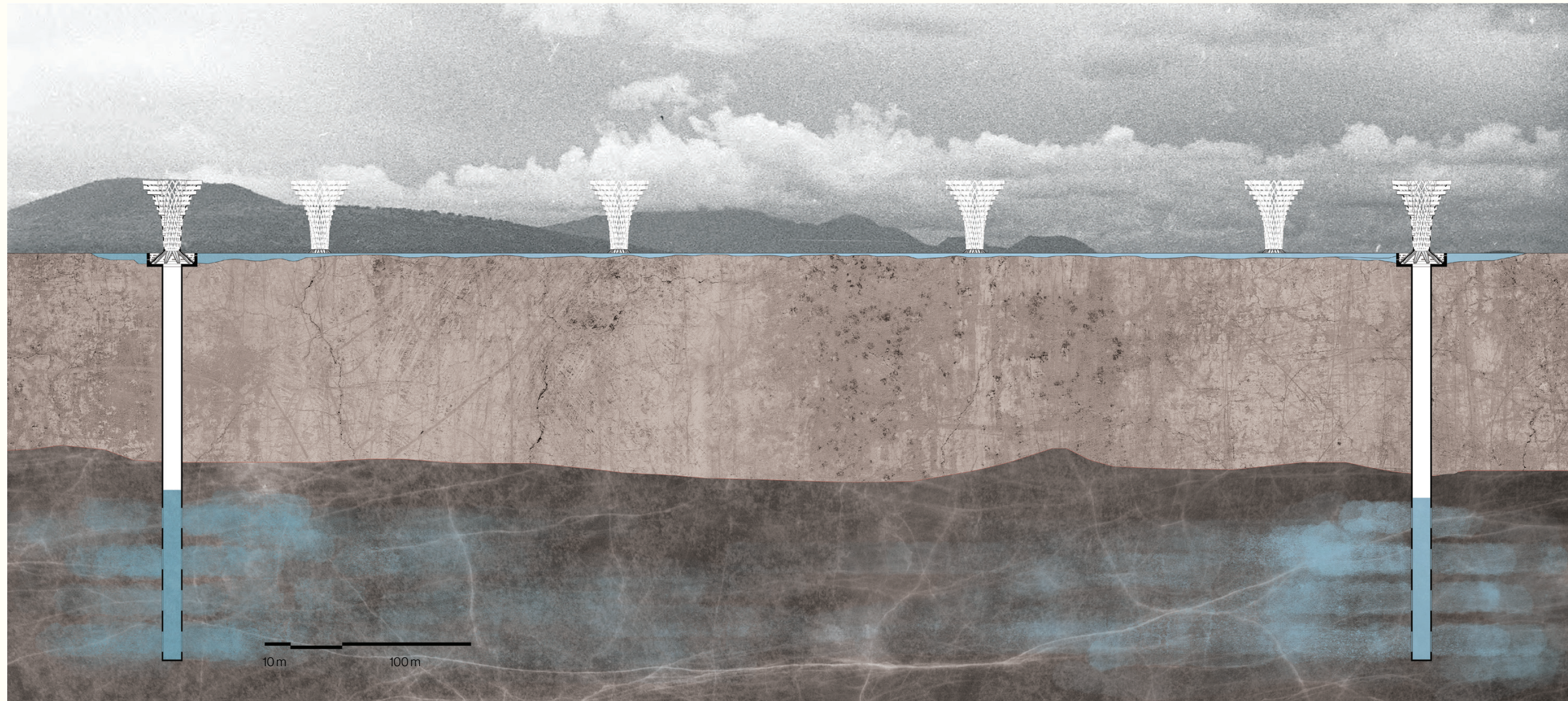


Fig. 22 1:1000 Section of the Serpent's Mouth showing relation between ring of "flags" and infiltration layers.

17 NGWA. *Principles of Induced Infiltration and Artificial Recharge*. Excerpt from NGWA Press publication *Ground Water Hydrology for Water Well Contractors*. Ch. 17, pp. 54-58. 1999.

18 Katja Luxem. *Managed Aquifer Recharge: A tool to replenish aquifers and increase underground water storage*. AGI (American Geosciences Institute). September 25, 2017.

19 María Victoria Vélez Otálvaro. *Métodos para determinar la recarga en acuíferos*. Diss. PhD.: Universidad Nacional - Medellín. 2004.

Once it is treated by the serpentine system, it is deposited into the aquifer via a set of passive infiltration wells.

There are many ways to recharge an aquifer, and they all have their advantages and disadvantages.

The least expensive forms for recharging an aquifer are infiltration pools, infiltration canals, and infiltration ditches. These methods require very little manipulation of earth and construction of infrastruc-

ture. In fact, in all three instances it is possible to have a functioning infrastructure with neither digging nor construction. Lake Texcoco was a natural infiltration pool for the water tables sitting under Mexico City¹⁷.

Increasingly more expensive options include infiltration galleries, aquifer soil treatment, percolation

tanks, subterranean dams, and infiltration wells (also referred to as dry wells). These more expensive methods are such because their implementation demands higher levels of earth manipulation, infrastructural construction, and water quality. For example, the infiltration wells¹⁸

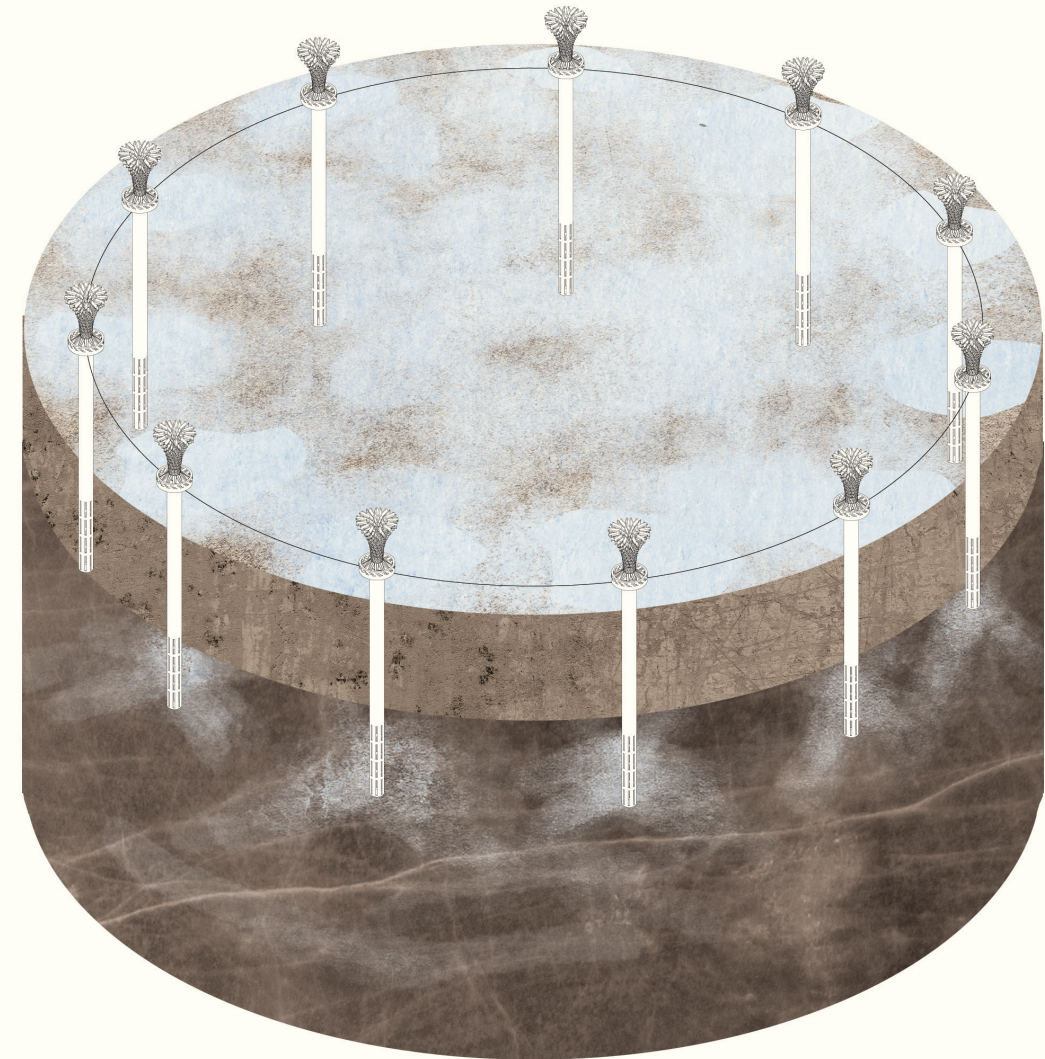
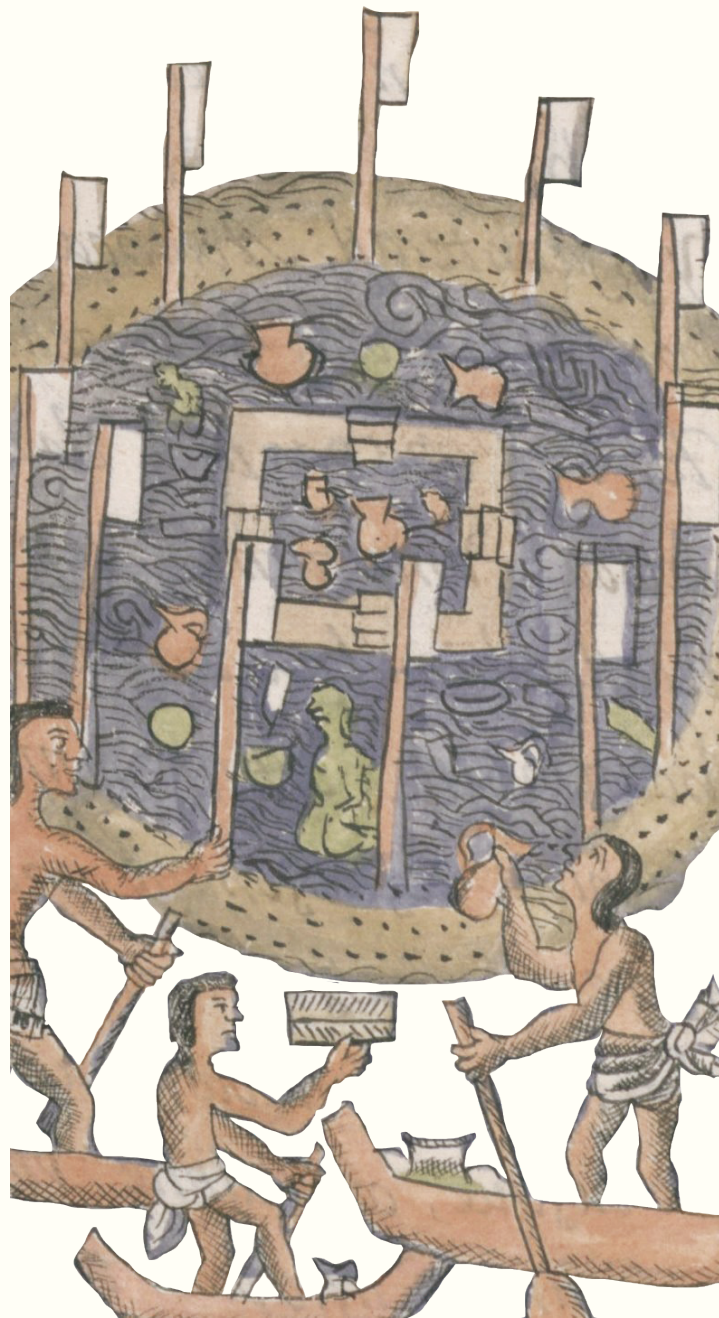
and the infiltration pools are the two methods to be implemented in this proposal, although both have considerably different advantages and disadvantages.

Because Mexico City sits upon a lacustrine clay layer, recharging the aquifer with the immediacy necessary to reverse a sinking city

demands a quicker entry of surface water into the water tables¹⁹.

The infiltration well was created for this dilemma. Although construction costs are quite high in comparison to other methods for the infiltration well, it requires almost no surface territory, and is able to exponentially increase the imme-

diacy of recharge. The infiltration well actually bypasses the impermeable aquitard layer that sits above most water tables, and injects that water directly into the water table soil¹⁹. The Serpent's Mouth therefore takes advantage of this system for aquifer recharge.



Like the sacrificial site of the drainhole at Pantitlan, eleven infiltration wells are arranged in a circle, with “flags” signifying their position.

In Aztec culture, a ritual calendar was set in place that reflected the hydrological cycle throughout the year. Etzalcualitzli, meaning ‘the feast of corn’ took place in the sixth month of the calendar year, today’s late May²⁰.

The ritual would start in the Drinking Water mountains, and con-

tinue past the Sweet Water lakebed. At its end, the priests would make their way into the Salty Water lake, where a series of flags named Pantitlan stood. The hearts of the young and sick would be put in a ritualistic offering box adorned with jade, and tossed into the sinkhole between the flags. Accounts say that the unpred-

icatable and turbulent waters at this sink hole would froth at the offering, and quickly swallow the precious hearts encased in jade²⁰.

The infiltration wells mimic the form of this ritual with the offering of treated storm and wastewater being given to the lake bed.

Fig. 23 Pantitlan. *Florentine Codex*, Ethnography by Bernardino de Sahagún originally published in Spanish titled *The General History of the Things of New Spain*. Retrieved from Getty.

20 Diego Durán. *Book of the Gods and Rites and the Ancient Calendar*. In *Civilization of the American Indian Series*, v. 102:24, 502, 63 plates. University of Oklahoma Press, 1975.

Fig. 24 Infiltration well with hydrological stratos axonometric. Shows water passing through aquitard to aquifer, in relation to Florentine Codex representation of Pantitlan.



Figure 25

It is speculated that around 20% of the 14 billion dollar New Mexico City International Airport had been constructed when it was cancelled by then President Andres Manuel Lopez Orbrador in 2018. A lot was left unfinished²¹.

The most iconic were the

vaulting parametric roof structures of Foster's design. Eighteen of the triangulated steel mesh members were left just shy of one-third complete. Today, they stand in the flooded central region of the cancelled terminals between eighteen and twenty-five meters high²¹.

As seen in the photo of the current state of the construction, the remaining parts include the foundation and below-grade drainage infrastructure, the foundation and bottoms of the parametric roof structure, and the steel structural members for the terminal floors.



Figure 26

Fig. 25 Foster + Partners with Fernando Romero Arquitectos, *NAICM* Computer-Generated Architectural Render. 2014. Retrieved from USA Today online. Uploaded September 3, 2014. Accessed June 2024.

Fig. 26 Carlos Jasso. *Abandoned Structure Flooding*, *NAICM*, *Texcoco*. Photograph. Retrieved from Business Insider Mexico online. Uploaded August 9, 2020. Accessed June 2024.

21 Juan Luis Hernández Macías. *Cancelación del aeropuerto*. *Nexos: Sociedad, Ciencia, Literatura* 42, num. 512. pp. 32-33. 2020.

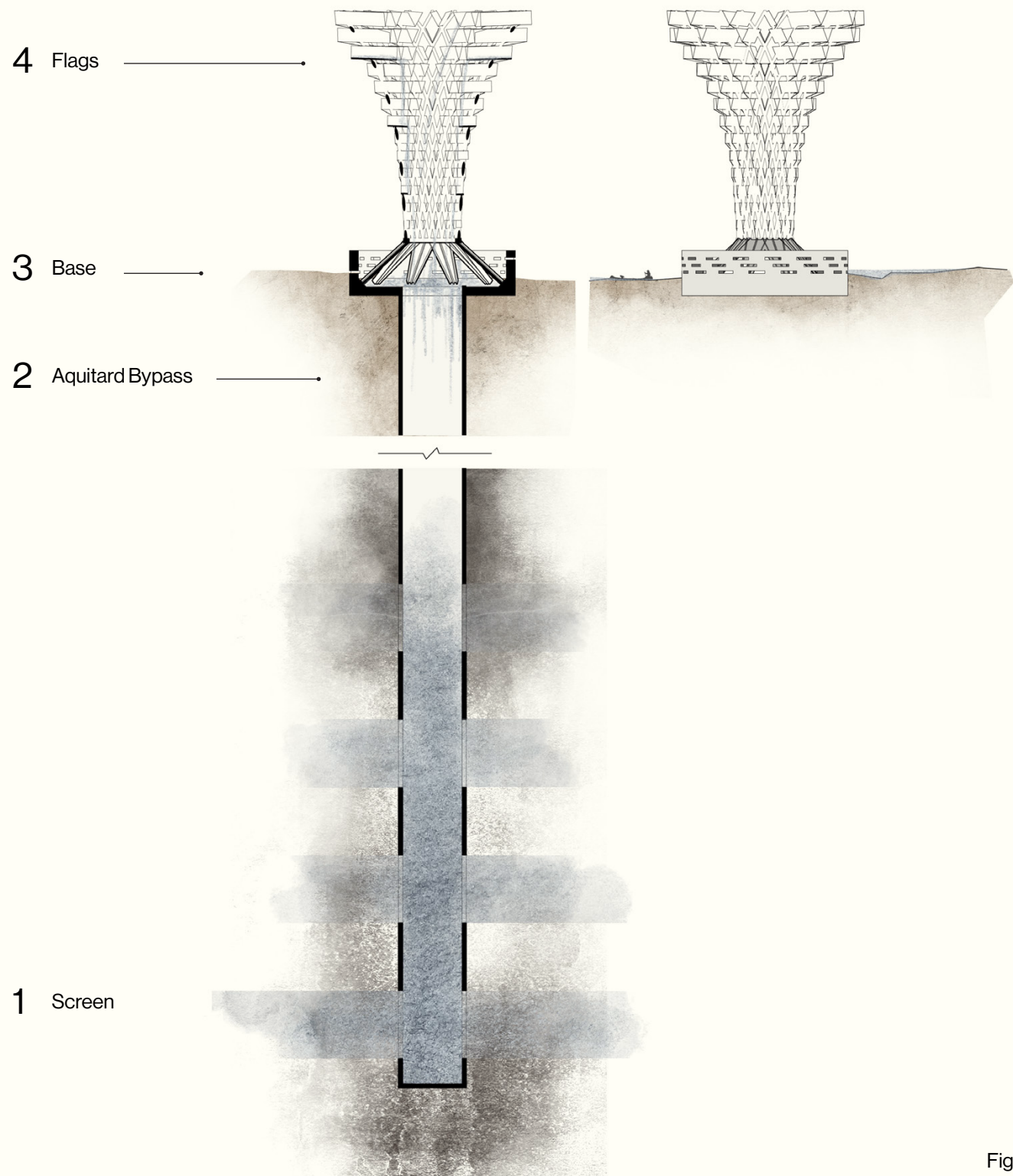


Fig. 27

Fig. 27 1:200 Section/Elevation showing airport parts incorporated into infiltration wells.

Fig. 28 Photo of 1:200 model of airport components as 3D printed or plaster poured pieces.

Fig. 29 Especial, *Construction of NAICM* Photograph. Retrieved from el Milenio online. Uploaded February 2, 2018. Accessed June 2024.

Fig. 30 Carlos Cordero. *Construction of NAICM*. Photograph. Retrieved from Quadratin online. Uploaded March 14, 2018. Accessed June 2024.

Fig. 31 Photographer Unknown, *Installation of Below-Grade Drainage, NAICM, Texcoco*. Photograph. Retrieved from t21 online. Uploaded October 26, 2016. Accessed June 2024.

All of the parts for the infiltration wells are repurposed components of the abandoned airport.

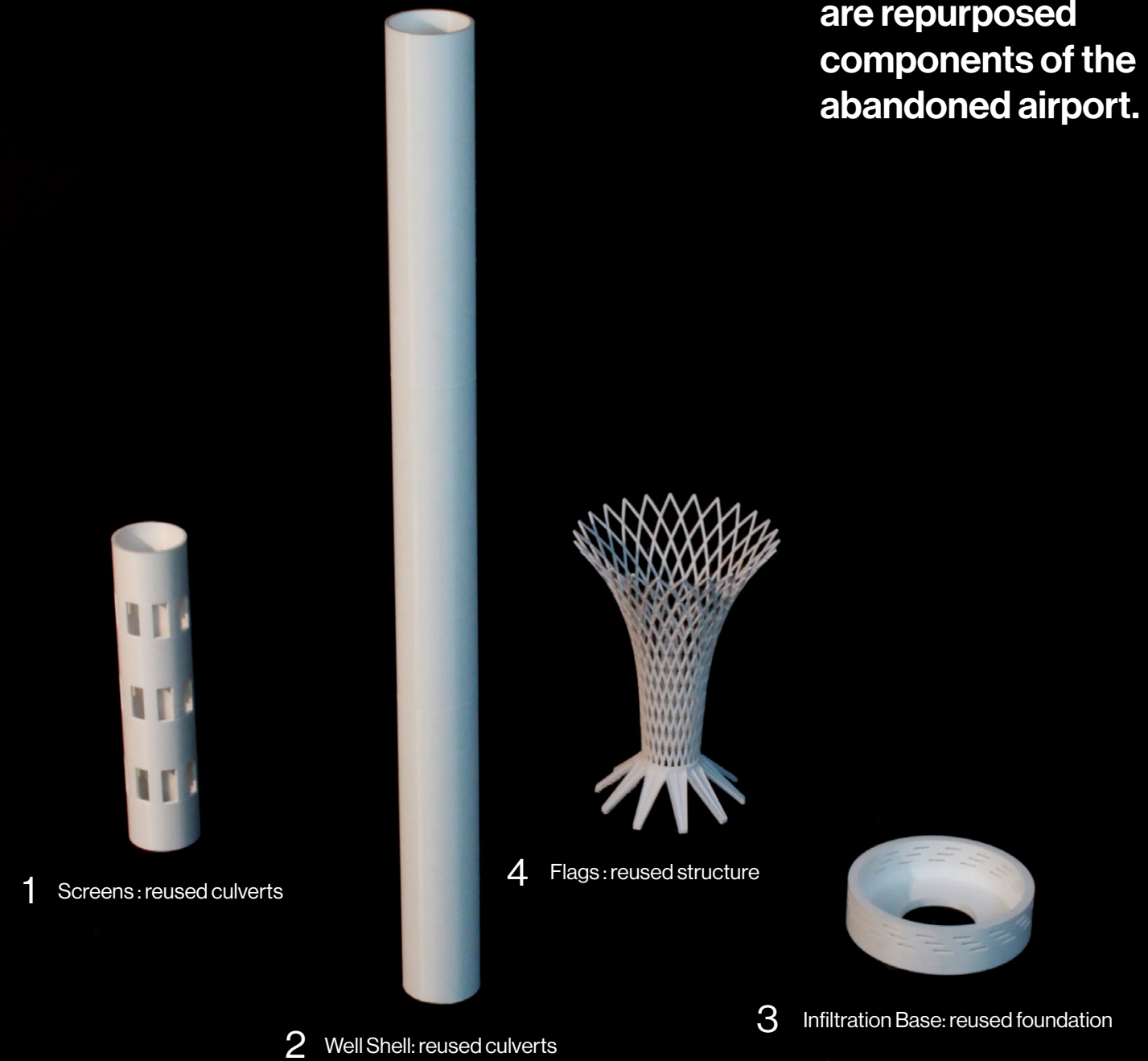


Fig. 28



Fig. 29



Fig. 30



Fig. 31

The parts are reimagined for their next life, as if the cancelled airport is one point in a duration of infrastructural efforts that the lake washes away with time.



Fig. 32

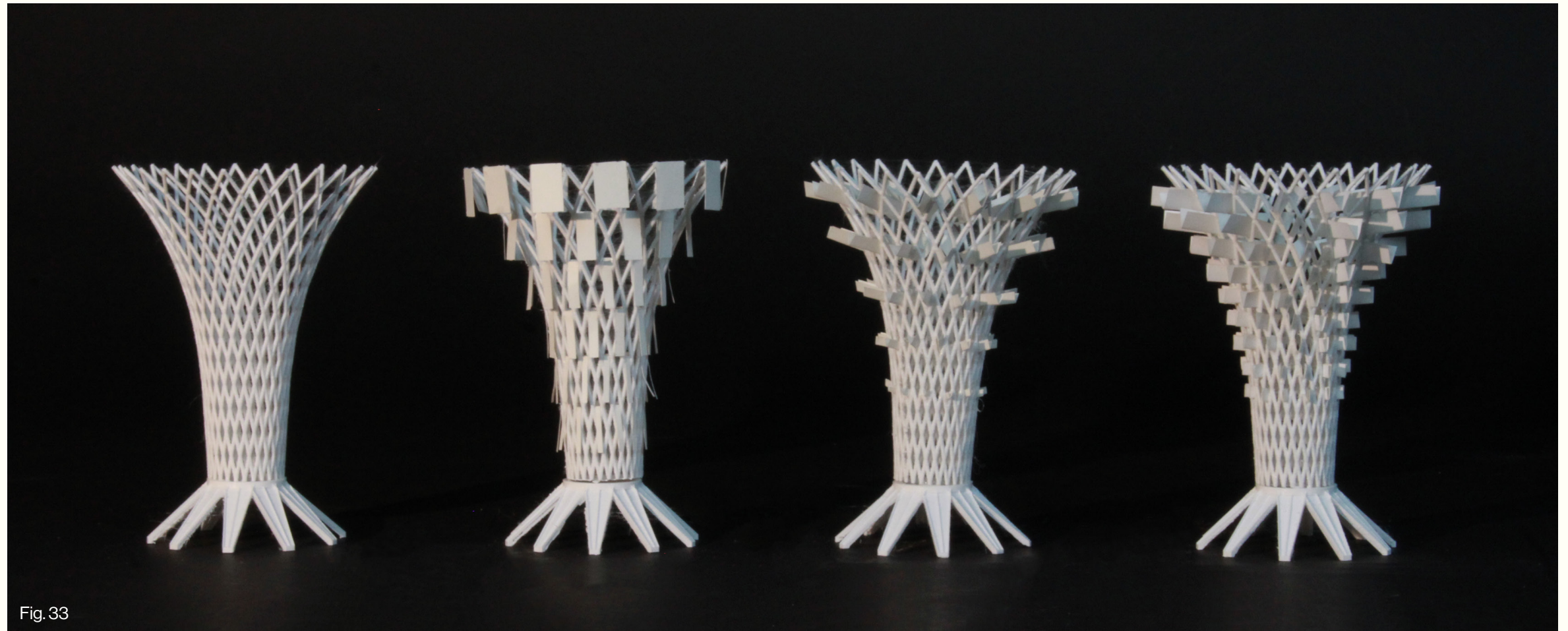


Fig. 33

Fig. 32 Escobedo, Helen. *Rain Towers (Torres de lluvia)*, 1986, sheet metal in wire mesh, New Orleans, USA.

22 Graciela Schmilchuk. *Helen Escobedo/arte y ciudad*. Debate Feminista 4, pp. 198-200. 1991.

Fig. 33 Photo of 1:200 skin model options. Models are series of iterations to be read from left to right.

23 Nancy Walkup. *THE SPIRIT OF PLACE* School Arts 99, no. 8 pp. 15-15. 2000.

In the image of Mexican sculptor Helen Escobedo's "Rain Towers", installed in New Orleans in 1986, the unfinished roof structures of Foster's airport are given sheet metal inserts that are tension hung from the weld point above them. Rain water that falls over Lake Texcoco

cascades directly into the aquifer.

The installation not only feeds the aquifer, but also turns the arrangement of spare airport pieces into an unnoticeable ghost of their former image. Just like the territory it was built on, with time inhabitants of the Valley will lose the image that

Foster + Partners projected on the landscape.

In a distant future, Lake Texcoco is completely restored, and the Serpent's Mouth too becomes another victim of the Lake. These pieces of human infrastructure are reused once more.



Fig. 34
View of the Serpent's Mouth from its primary "user": the migratory shorebirds that called Lake Texcoco home during their travels.



In the long run, this proposal to treat our own waste and undo our own wrong, will also be washed away by the waters of time.

Fig. 35-37 Lake Texcoco. *Florentine Codex*, Ethnography by Bernardino de Sahagún originally published in Spanish titled *The General History of the Things of New Spain*. Retrieved from Getty.

Fig. 38 Texcoco Natives : Migratory shorebirds. Perspective from inside Mouth.

The Salty Water has always been the great unknown. Mexica societies formed their cities in the Drinking Water mountains and Sweet Water lakes, but never attempted to conquer the Salty Water until today.

We have tampered to such an extent with the natural cycle of

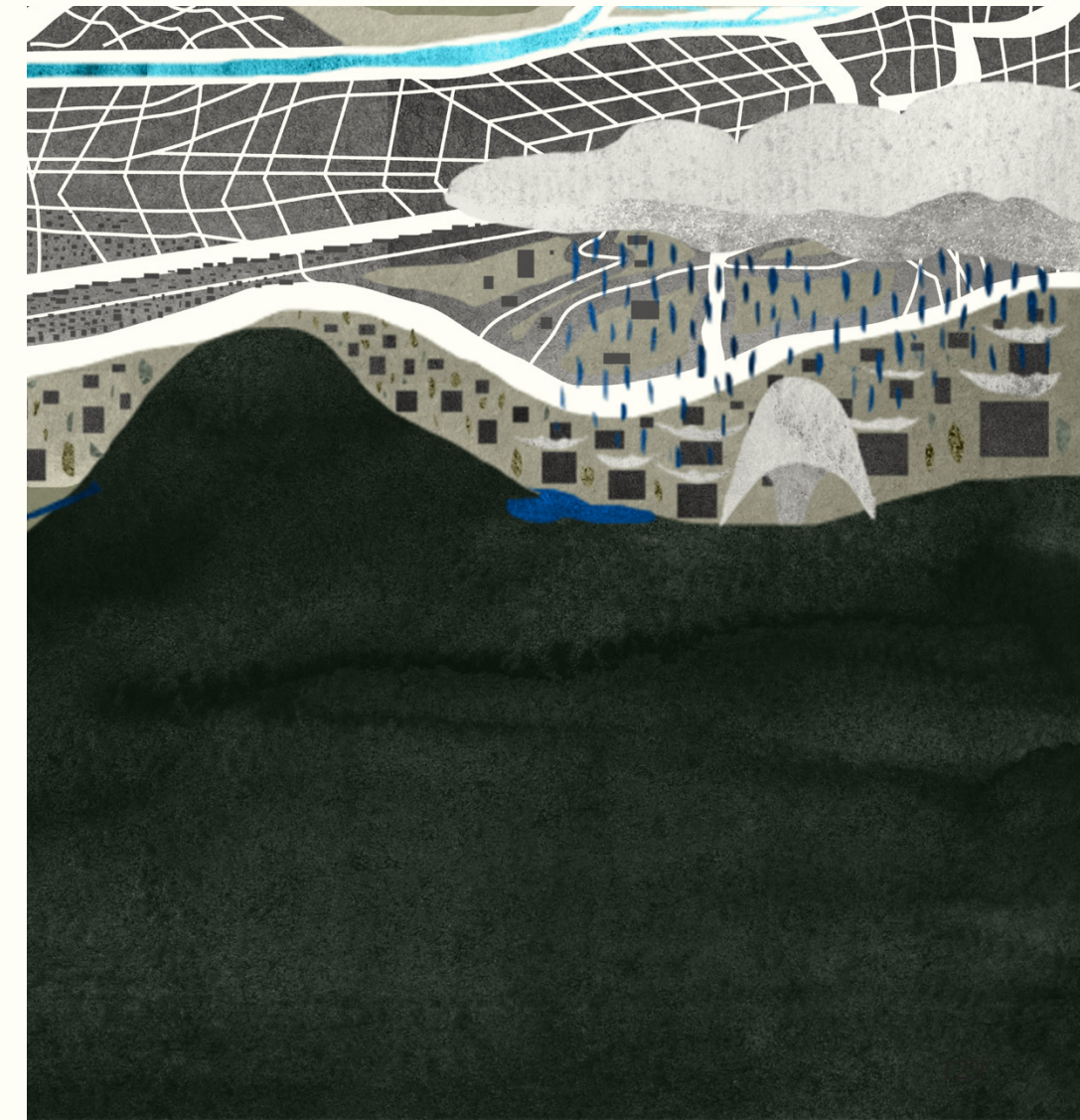
the Valley of Mexico, yet its Waters remains.

The Serpent's Mouth, like Tlaloc's Headdress and Chalchiuhtlicue's Skirt, are of the present urban moment for Mexico City. They propose alternative practices for our societal trajectories to create prob-

lems for which to create solutions. Ultimately, these proposals too will be abandoned, appropriated, reused, flooded. However, for this moment in time they offer a way of talking about an amazingly rich society in its hydrologic place: the Valley of Three Waters.



The end. The beginning.



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