

Encountering Ecological, Urban Solutions for the Future: Mexican Urban Fabric¹

Indigenous: occurring or living naturally in a particular area or environment; native. **intrinsic;** innate. **Urbane:** having or showing the refined manners of polite society; elegant. **Elegant:** chosen wisely.

Matthew Teti
North Carolina State University

Any idea bringing people and water closer together, other than recreation or bathing, might seem ridiculous to many architects and planners. Floods, infiltrations and leaks, to name a few, are always perceived negatively. At the detail scale, for instance, the architect makes dry, warm, day lit, and enduring shelter. At the city scale, the planner similarly makes barriers between intrinsic hydrologic systems and artificial urban systems. Both architects and planners use a philosophy and material set of separation in an effort to protect people, the building, and urban fabric from the natural environment.

Contradicting this approach we find the Mexica culture, renamed Aztec in the early 1900s. Rather than avoiding water, the Mexica people embraced water around their homes and in their principal city, Tenochtitlán. In 1325, they settled Tenochtitlán on an island in Lake Texcoco, the largest of five interconnected lakes in the Valley of Mexico.²

The lacustrine landscape guaranteed sustenance. On one hand, numerous products could be gathered, fished, or hunted, including some algae, and other plants, fish, edible insects and larvae, aquatic birds, amphibious, reptiles and crustaceans.³ On the other hand, the area also offered the necessary materials to build *chinampas*--staked out rectangular plots for intensive agriculture, which produced crops such as corn, tomatoes, chili, medicinal herbs, and flowers. Similarly, mud and stones were accessible to artificially increase the island, construct a dam and canals that would allow Mexica planners to separate the salty water from lake Texcoco and bring the fresh water from Xochimilco and Chalco closer to the city of Tenochtitlán. In fact, the area was so naturally rich, and the Mexicas were so efficient in developing farming and gathering techniques that six other cities (Tlatelolco being the largest with 20,000-30,000 inhabitants), over forty smaller towns and settlements, and numerous villages populated the area. It is estimated that by 1519 the population of the Island

City had reached 150,000-200,000 people and covered an area of 12 sq km. while the entire basin of Mexico was occupied by 1,000,000 inhabitants.⁴

In 1521 Spanish settlement began dismantling the architectural and cultural significance of Tenochtitlán into its own Mexico City, a city that would provide the population an infrastructure suitable in stature to later become the administrative capital of the Viceoyalty of New Spain and later as the federal capital of Mexico today. Despite the great environmental and cultural significance, the indigenous city and most of its surroundings are now unrecognizable. However, in spite of 500 years of Eurocentric urban planning, sprawl and pollution, the area of lake Xochimilco (28 km. south of Mexico City) remains, partially intact, as a thread for a productive, urban fabric, which may help inform future urban design where the indigenous with the urbane, the intrinsic with the machine, and the futuristic with the ancient may interweave.⁵

This paper displays an analysis of the ancient city of Tenochtitlán in the context of the graduate course “*The Laws of the Indies and the Latin American City*. From its origins to its influences.”

AN INTERDISCIPLINARY CLASS AND STUDY

The Laws of Indies (1573) was Spain’s first synthetic guide on the establishment of towns or cities in the Americas. In its 148 ordinances, this document offered instructions that ranged from the selection of the site to the form of the settlement: a grid plan. However, by the time these Laws were published and enacted, the grid plan had evolved from an incipient irregular grid to the model we know today, facilitating not only the establishment of thousands of towns and most of Latin American current major cities, but the construction of the largest empire overseas to that date. Thus, The Laws of Indies is proof that this grid model was not necessarily an idea that came from Spain to the Americas, but rather the Crown’s legalization of a practice that had been taking place for over half a century in its colonies. What is more interesting is how these ordinances were later adopted in the seat of the Crown itself to “modernize” its medieval cities.

The graduate seminar “*The Laws of the Indies and the Latin American City*. From its origins to its influences” traces the origin of the use of the grid plan in Spanish America, the impact of its use during the colonial period, and the influence this urban experience later had in Spain. In general, students are expected to question urbanism and architecture as “instruments of change,” that is, as cultural artifacts that facilitate cultural changes, or rather, erasures. Likewise, they are invited to analyze the effects of the use of a standardized model throughout an extensive geographic region. In specific, by studying the making of a Spanish American city, students were asked to investigate to what extent the urban experience preceding the writing of the Laws of the Indies may have influenced the legal document. Important to note is the methodology employed to uncover and analyze a city’s urban process. Using historical maps and information students reconstruct the making of the city, recording the streets, public spaces, significant buildings and changes in the natural environment. While most cities were founded *ex nihilo*, others were founded literally on top of and in combination with *a priori*, indigenous urban fabric. With this graphic exercise they can identify, in a documental manner, the possible timing and grounds by which, in the case of Mexico City, the indigenous city of Tenochtitlán was Spanish-ized. These original drawings constitute an



1

important document for future studies of this city.

An inventory of the existing natural systems before the founding of Tenochtitlán reveals the many favorable, intrinsic resources and conditions in the lake basin of Mexico, formally known as the Valley of Mexico. Mountain ranges that reach 3652 m and 4341 m above sea level form a closed, 3000 sq km (approximately) watershed basin and protect it from direct hurricane forces, but residual rainfall occurs from marine storms. Because the landscape to the north of the valley slightly rises, there is no outlet for water, thus, five interconnected lakes made up the basin. Lake Texcoco, the largest of the five lakes was the lowest in the valley; hence its salinity.

The intrinsic hydrology of the Valley of México geologically varies. As a closed hydrological basin, it has three geologic zones: the upper mountains of granite and basaltic soils, a middle piedmont of clay, silt, sand, and basaltic soils, and a low plain of clay with a high water content. The low plain, lacustrine ecosystem receives its water supply from melting snow from the mountains, seasonal rain flow, and many springs fed from massive aquifers.⁶

It was the islet in Lake Texcoco that in 1325 the Mexica selected for the settlement of their capital city: Tenochtitlán. From here, their emperors ruled a section of central, present day Mexico, from the Pacific Ocean to the Gulf of Mexico.⁷ As all urban fabrics, Tenochtitlán required abundant water sources for irrigation and productive agricultural support. The Mexica-Aztecs had inherited and had been practicing a productive way of growing within the intrinsic gifts and limits of the Valley's hydrology. Tenochtitlán's existence, in a pre-Eurocentric, pre-horse, pre-industrialized, pre-fossil fuel paradigm persuasively illustrates the productivity of their way of life. Crouch and Johnson credit the stability of 320,000 inhabitants of Tenochtitlán and The Valley to the Mexica-Aztec's agricultural method, *Chinampas*:

Chinampas farming is one of the most intensive and productive agricultural systems ever devised. Farmers could cultivate seven different crops, including two of maize, for a total of thirteen times as much produce as dry-land farming in the same area. About 23,000 acres at the south end of Lake Chalco supported at least 100,000 people living on the land and another

Figure 1: Mesoamerica and Tenochtitlán

100,000 nearby. A family could survive on less than half the food it grew while working only 200 man-days per year, freeing the surplus to support the aristocrats, artisans, soldiers, and bureaucrats of the metropolis. It seems likely that the Texcoco plain, with similar production, supported another 120,000 people. Adding the produce from outlying areas, the farmers of the area could have supported millions at the capital. The construction of Chinampas was a profitable investment of time and energy.⁸

During the rainy season, the brackish waters of Lake Texcoco intermixed with the lower lakes of the valley, Xochimilco and Chalco. In order to maintain the purity of the spring fed waters of southern portion of lake Texcoco around Tenochtitlan, lake Xochimilco and Lake Chalco, in 1440-1469 the Mexica built a 10-mile dyke.⁹ These fresh water lakes became the massive irrigation fields, as well as fish and waterfowl habitat, as described earlier, supplying most of the Valley with a mostly vegetarian but supplemented with lean meats diet. Waste, collected by city sanitation workers and transported in canals by canoe, fertilized the Chinampas. The plans below illustrate not only the grid-like nature of Mexica domestic Chinampa farming but also its extent and presence within the city.

Urban fabrics require potable water and sanitary water. Tenochtitlán and its inhabitants had a noteworthy standard of cleanliness

Aztec cities were kept extremely clean. In Tenochtitlan no fewer than 1,000 workers swept the city's public places daily and public toilets were built on the impressive causeways that led into the city. Aqueducts carried clean drinking water into the teeming capital from springs in the hills around. The Aztecs took a bath everyday—which would have been unheard of in Europe at the time—and used herbal preparations as deodorants and to sweeten the breath. At every meeting with the conquistadors, the [emperor's] courtiers sprinkled the Europeans with incense—which the Spaniards took as a mark of respect, but which might have been a way of fumigating the air. Richer inhabitants of Tenochtitlán had their own steam bath in or alongside their home, and there were many public steam baths for poorer citizens.¹⁰

Urban fabrics also require public passage for local and external circulation, for the transport of goods, and public exchange. A network of canals, integrated with the ceremonial, civic, and domestic architectural, public markets, family-owned Chinampas and fishing waters all interweaved with the orientation and placement of the textural, urban grid of the city. A pre-equestrian environment, Tenochtitlán's canals provided the means for the mass transport of people, crops, goods, defense and transit, which supported the economic, political, and cultural productivity of a major civilization. As shown in the historic plan series above, the canals not only aesthetically complete a grid structure but also reveal the extent that water and waterways contribute to life and society in Tenochtitlán in general. Comparing the graphic urban fabrics of 1519 and 2013 strikingly highlights the difference between the indigenous and Eurocentric planning results. The first displays clear and abundant water integration from the domestic scale to the urban scale. The second displays not only the absence of water at the domestic scale but also the extent of transformation.

The sectional series below, of the intrinsic, landscape and urban landscape conditions, at the height of Mexica urban achievement in 1521, displays a sectional urban fabric that subordinates the non-living architecture, such as

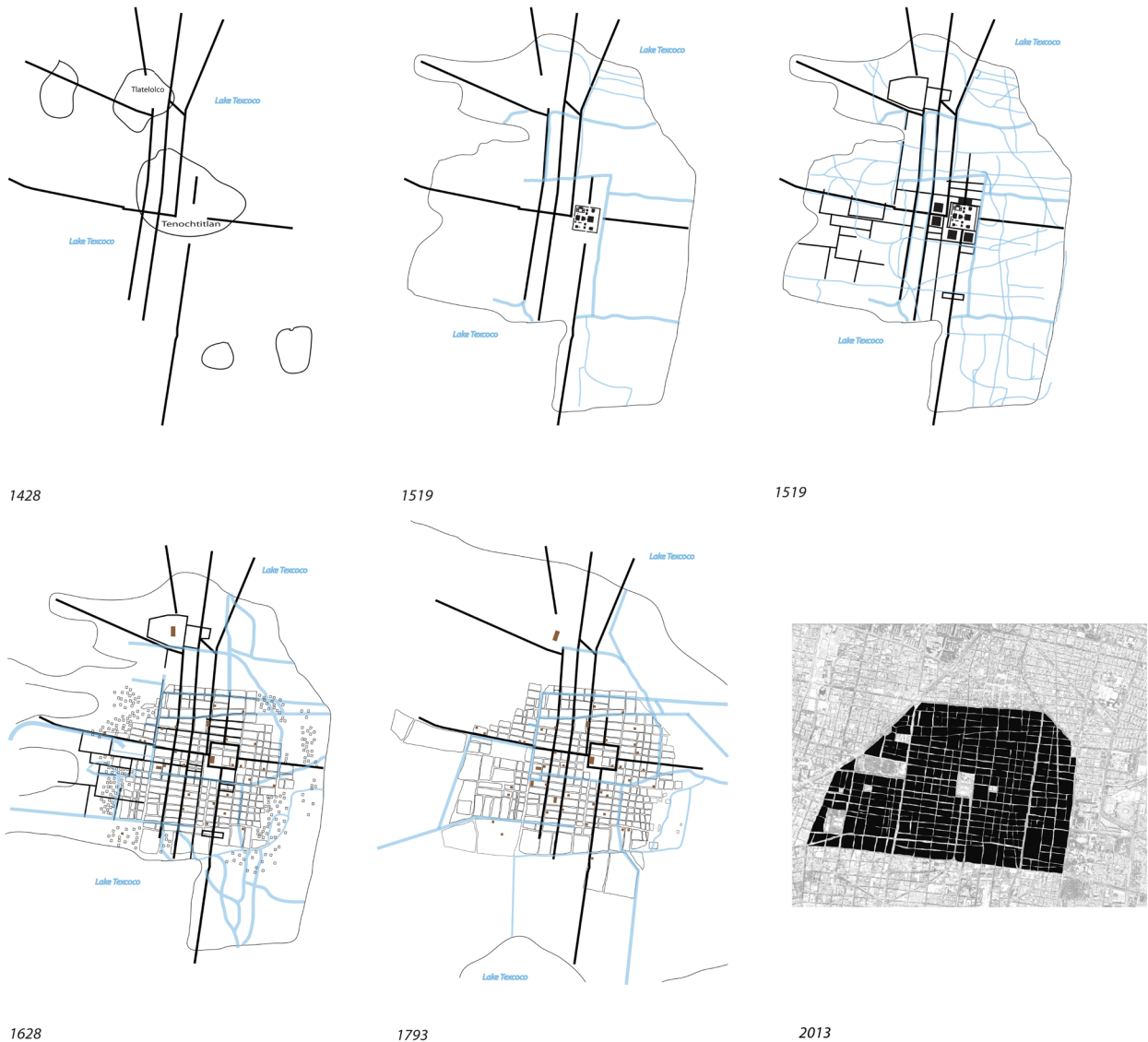
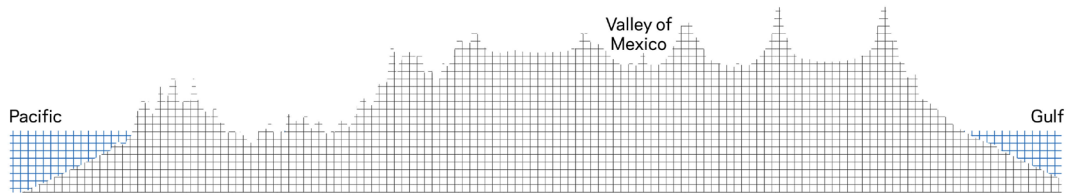


Figure 2: Historical progression, in plan, of Tenochtitlán (1428) to Mexico City (2013)

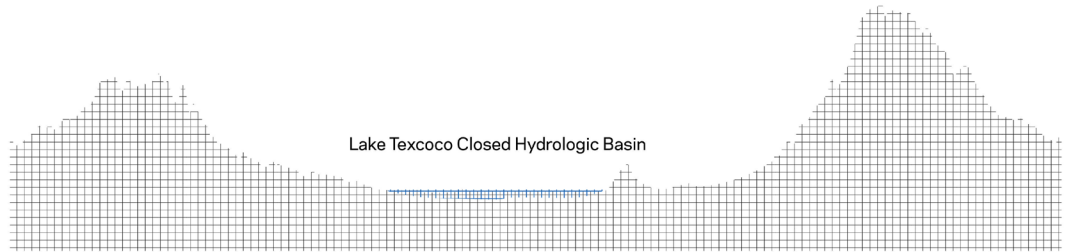
temples and, palaces, and elevates the architecture of landscape: a closed, water basin at a continental scale, a conjunction of intrinsic elements at the domestic scale.

An historical progression of Mexico City from the Pre-Hispanic era to the current day, tracing the city blocks and building purpose, reveals that the Spanish and later Mexican urban planners were unaware or disregarded the importance and relation of water to its people. Furthermore, the Spanish settlers took advantage of almost every other aspect of a pre-existing infrastructure while transforming the land and waters considerably.

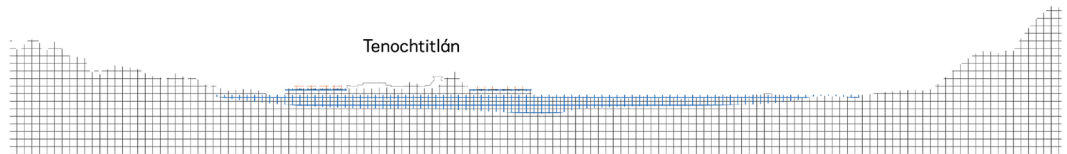
From 1521 onward, Tenochtitlán's, then Mexico City's urban fabric would grow to reflect the beliefs and culture of the European conquistadors as history shows. In the case of the central, ceremonial district, Spanish architectural aesthetics replaced existing indigenous aesthetics. In the case of the canals and agricultural methods, Spanish and later Mexican planning converted the canals to streets and exchanged the Chinampas, lacustrine farming



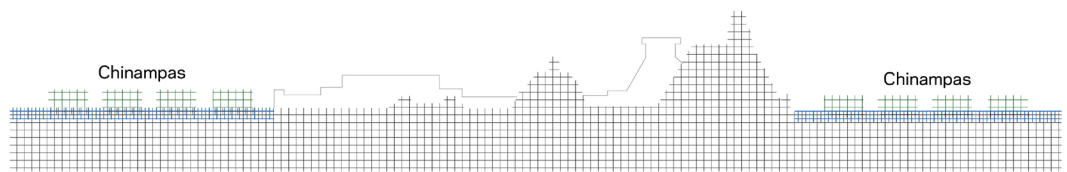
Mexico-Global Section



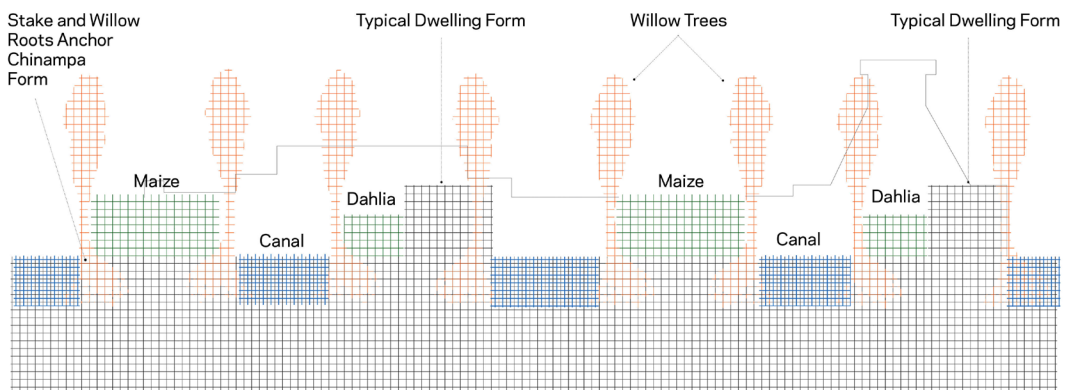
Valley of Mexico-Regional Section



Lake Texcoco 1521-- Lacustrine Section



Tenochtitlán 1521--Urban Section



Chinampa--Urban/Domestic/Landscape Section

3

Figure 3: Tenochtitlán (1521) Sectional Fabric.¹¹

for large scale, dry-land farms and ranches.

Once a place of water abundance, Mexico City and its history shows a trend toward dehydration. Now, the ninth most populous city in the world, Mexico City must pipe water from outside of the Valley of Mexico in order to supply demand, and it primarily uses water, within the urban fabric as ornamentation.

Crossover between built and natural environments occurs at thresholds, but even a threshold implies the end of one type of space and the start of another type of space—a veritable delineation between realms—as if the realms could be separated. Clearly, history and science show that the cost of our ordered thresholds comes at the expense of our misunderstood nature. And, in this sense, the current architecture and planning of Mexico City segregates rather than integrates, a preconception that neither the urbane nor the intrinsic can afford.

CONCLUSION

This study reveals the outcome and importance of separating or connecting physical place with political, and by extension, cosmological beliefs. It also reveals the importance of elegant urban planning decisions: placement within favorable latitude and altitude, reliable and consistent climate, consistent water management practices, the proximity of hydrologic and agricultural resources, and the proximity of natural and artificial waterways within urban fabric.

How does this help the future? It offers a low-tech strategy. Rebuilding the intrinsic within the urbane might include the following: clean up current, culturally abandoned waters, amplify and insert more waterways into urban fabric as lacustrine, urban gardens and as canals replacing some public streets, which could be considered additional green space. Large scale interventions like this could reduce urban, heat island effect, provide more green, public, outdoor space, natural cooling and ventilation, irrigation closer to urban domesticity, and integration of building and site interaction into a more comprehensive cosmology of urban fabric and landscape vitality.

In an effort to find harmonious, ecological designs, many theorists have envisioned future urbanity as a living machine. Also, many architects, with an effort toward closed-loop systems, have designed sites and buildings as living machines. Urban fabric, because it represents a concentration of environmental separation, needs to follow a similar trend in order to reconnect with the gifts and limits of itself—the elegant, the intrinsic.

ENDNOTES

1. I would like to thank Professor Patricia Morgado, Ph.D. for her encouragement and her assistance in writing this paper.
2. The lakes are: Zumpango, Xaltocan, Texcoco, Xochimilco and Chalco. These occupy a surface of 800-1000 sq km and was shaped as a result of intensive volcanic activity in the area. See, Teresa Rojas Rabiela. "Las cuencas lacustres del altiplano central." *Arquelología mexicana*, XII (68), 20-27.
3. Jeffrey R. Parsons and Luis Morett. "Recursos acuáticos en la subsistencia Azteca. Cazadores, pescadores y recolectores." *Arquelología mexicana*, XII (68), p. 38-43, 39.
4. Teresa Rojas Rabiela. "Las cuencas lacustres del altiplano central." 27.
5. Secundino Beceril, "Xochimilco: In the Path of a Giant" *South American Indian Information Center*, Volume 10, Issue 13, p. 18.
6. Van Tuerenhout, Dirk. *The Aztecs: New Perspectives*. Santa Barbara: ABC-CLIO, Inc. 2005. p. 24.
7. Smith, Ernest Michael. *Aztec City-State Capitals*. Gainesville: University Press of Florida. 2008. p. 66.
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9. Calnek, Edward E. "Settlement Pattern and Chinampa Agriculture at Tenochtitlan". Diss. University of Rochester/*Society for American Archaeology*. 1970.
10. Phillips, Charles. *The Aztecs & Maya World*. London: Annes Publishing Ltd. 2005. p. 180.
11. I would like to thank my niece, Julia Tran (BFA, Temple University) for her assistance and support.