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Liquid Liberalism: Environment, the State, and Society in Porfirian Mexico

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LIQUID LIBERALISM:
ENVIRONMENT, THE STATE, AND SOCIETY IN PORFIRIAN MEXICO

by

KATE STOGSDILL

Under the Direction of J.T. Way

ABSTRACT

In this thesis, I propose that Mexican water works during the Porfiriato influenced the development of modernity because of hydrology's link between society and environment. These two canals in particular provide a window on the relationship between the state and environment that connects the two in the efforts of state formation. The Gran Canal and the Canal de la Viga both worked as tools for social and political construction for Mexicans to imagine modernity for themselves and for their country.

INDEX WORDS: Mexico, Mexico City, Hydrology, Gran Canal, Canal de la Viga, Porfiriato, Modernity

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KATE STOGSDILL

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INTRODUCTION: LIQUID LIBERALISM

In the second century (CE), the cities of Texcoco, Cuicuilco, and Teotihuacán all contained densely packed populations of humans in the Valley of Mexico. Texcoco was located in the northeast area, Teotihuacán in the north, and Cuicuilco in the southwest. For some time, these different peoples traded amongst each other and competed to be the dominant group in the Valley. Cuicuilco had a slight lead over Teotihuacán and Texcoco because of its rich water supply from rainfall, run-off water, and rivers from the volcanic Ajusco Mountains, which in turn produced healthier and more abundant crops. A massive volcanic eruption around 100 CE from the Xitle volcano buried Cuicuilco in mountain and ash, effectively wiping them out of the economic system and the ancient map of the Valley. The eruption completely obliterated their city, covering their crops, burying the best soil in the valley, and poisoning their precious waters. As a consequence, the people living around Cuicuilco migrated to the next best area, Teotihuacán.¹ This area was more developed, centralized, and successful than Texcoco as a result, in part, of its having a sustainable and reliable water supply. This area became the new leader in the Valley of Mexico, later to be eclipsed by the Mexica Aztec city of Tenochtitlan. Located on an island in Lake Texcoco, Tenochtitlan would later become the capital of New Spain, finally evolving into the Mexico City we know today.²

The people in the Valley of Mexico, then, have a long and trying relationship with their environment. The Aztecs, successors to the Teotihuacán culture, were the first to drastically reshape the Valley by taking the designs of the Teotihuacán's poorly managed *chinampas* and

¹ The cause of the fall of Cuicuilco is unknown to scholars, but the explosion of Xitle seemed to have finalized the civilization's exit from the Valley. The total collapse of a society tends to be more complex than a singular factor, as Jared Diamond argues in *Collapse: How Societies Choose to Fail or Succeed* (New York: Penguin Books, 2006), but a combination of warring groups, nomadic invasions, and environmental depletion mixed with climatic disasters seems to be the most likely explanation.

² Exequiel Ezcurra et al., *The Basin of Mexico: Critical Environmental Issues and Sustainability* (New York and Tokyo: United Nations University Press, 1999), 32.

corporatizing them from individual use to supporting the city and exporting throughout the empire. Also known as “floating gardens,” *chinampas* are small plots of land in shallow lake beds used for agriculture.³ One of the first things that the Spanish did after conquering Tenochtitlan was to fill in the *chinampas* to make roads in order to move by horseback, mule train and other types of transport animals, crops, and precious metals, effectively changing the city's environment.⁴ Even in the early National era, the Revolutionary years, and as late as the 1970s and 1980s, the governments of Valley of Mexico have tried to control their naturally aqueous environment to achieve their various ends.

In this expansive history of the relationship between Mexicans and water, I am interested in two bodies of water that ran through the *Distrito Federal* (Federal District) during the nineteenth-century. First is the water of a canal in La Viga, a small neighborhood that lies to the south of Mexico City. The second is the water that inspired Porfirio Díaz (president, 1876-1911) to construct the Gran Canal, which was one of the most influential modernizing projects of the nineteenth-century. Although the waters of the Canal de la Viga and the Gran Canal originated from the same hydrological system in the Basin of Mexico, they, and the canals that they traversed, inspired different reactions from the people who used the hydrological works, especially in terms of Mexican state formation and the creation of modern identities.

The Canal de la Viga was part of a colonial hydrological project that failed to drain the water from the capital city.⁵ Because of its proximity to the city, the canal was one of the most popular places for water vessels of all kinds (some rumored that steamboats used the Canal occasionally⁶) to embark from and move around the city. Although many other water routes lost

³ Ibid, 34.

⁴ For more on this “ecological conquest,” see Alfred Crosby's *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport: Greenwood Press, 1972) as well as his *Ecological Imperialism: The Biological Expansion of Europe, 900-1900* (Cambridge: Cambridge University Press, 2004).

⁵ Crosby, *The Columbian Exchange*, 36.

⁶ *Memoria de la obras del sistema de drenaje profundo del Distrito Federal 2*, (Mexico City: Departamento del Distrito Federal, 1975), 140.

their popularity in the nineteenth-century, the Canal de la Viga remained busy, a place where people and merchandise were on the move. Its use was not only commercial. Although the water inside was foul with the human waste that amassed as it wound its way through neighborhoods, the Canal de la Viga remained a preferred spot for locals to use as a market ground and for tourists to take a break from the city.

The central city itself was no stranger to water or waterworks. Mexico City had no canal system that effectively and completely drained its water, which would prove to be a problem time and again throughout its history. The streets collected storm water, leaving stagnant pools that manifested disease and stench. These waters only ever disappeared in the dry months, leaving dust composed of filth and feces that blew around in the dust storms. These wet conditions in Mexico City have tormented humans since they began living in the area, and because of this the leaders of every major political era (Aztecan, colonial, independence, and beyond) unleashed major efforts to control or lead the waters out of the Valley.⁷ It was not until the construction of the massive 30-mile long Gran Canal in 1900 that the Valley was considerably—but not entirely—drained and relieved of some of its problems.

The leader behind the Gran Canal was the liberal dictator, Porfirio Díaz. When Díaz took office in 1876, something changed—a new understanding of people and environment began to take shape in conjunction with the evolution of Mexican modernity. Up until the Porfiriato, a term used to connote the 35-years that Díaz exerted control over Mexico, the water in the Valley of Mexico had worked alongside other factors that deterred state formation. The unruly, invasive, flood-prone environment proved to be an obstacle itself as the various governments of Mexico attempted to assert themselves over both people and land. Under Díaz, though, a change in

⁷ See the second part of the Junta Directiva del Desaguame del Valle de México's, *Memoria histórica, técnica y administrativa de las obras del desagüe del Valle de México, 1449-1900* 1 (Mexico City: Tipografía de la Oficina Impresora de Estampillas, 1902), 31-251. For a discussion that contradicts the popular history of the Aztecs having used the waters sustainably and successfully, see "An Old World Before it was New," in Shawn Miller's, *An Environmental History of Latin America* (Cambridge: Cambridge University Press, 2007).

relationship between people and environment occurred. Economic growth and political stabilization symbolized the Porfiriato, and created a kind of “golden age” for Mexicans who prospered from it. The country experienced modernization that was heavily influenced by a dramatic increase in foreign investment, specifically from Western Europe and the United States, in a way that no other previous government had been able to achieve. This is in part because of the way that Díaz embraced nineteenth-century liberalism.

Both the Gran Canal and the Canal de la Viga exemplify how Porfirians used the environment in their project propelling Mexico into the modern, liberal world. The Gran Canal made a model of Mexican achievements in technology and understandings of contemporary science. The Canal de la Viga grew into a kind of Victorian playground where higher-class people go and explore the traditions of Mexico and still experience the comforts of a modern world.

In this thesis, I propose that Mexican water works during the Porfiriato influenced the development of modernity because of hydrology’s link between society and environment. These two canals in particular provide a window on the relationship between the state and environment that connects the two in the efforts of state formation. The Gran Canal and the Canal de la Viga both worked as tools for social and political construction for Mexicans to imagine modernity for themselves and for their country.

Liquid Liberalism

Porfirio Díaz came into power just as the governments of France, Germany, England, and the United States were in the throes of modernization. Industrialization and urbanization forced these countries to reconsider the architecture and construction of their cities, as well as the formation of their states. Díaz and Mexico became part of this modernization process as Mexico City began to experience the same burdens of modernity that confronted places like

Paris, New York, London, and Munich, such as over-population, high mortality rates, and public health and sanitation issues.⁸ The problems of urban expansion coupled with the new intellectual environment changed nineteenth-century liberalism, the leading political philosophy in these countries. Positivism, the belief that any rationally justifiable allegation could be logically verified, together with scientific politics, took the liberal notion of the free individual (over the corporate entity) who was at liberty to participate in social progress and economic development and replaced it with ideas from Auguste Comte, Herbert Spencer, and “social Darwinism.”⁹

What positivism and the new nineteenth-century liberalism preached was the interpretation of society as an organism, in which every person was a responsible member. The same model is applied to the economy, in which individuals had assigned roles that needed to be fulfilled. The *científicos*, Díaz's self-named troop of advisers inside his government, argued that the only way to understand how a state ran was by revealing, as historian Charles Hale wrote, “[the] science of society that followed the procedures and objectives of the science of nature.”¹⁰ Díaz was sensitive to the way that foreigners interpreted his capital city, as evidenced by the vast number of guests and ambassadors that he invited and to the city over the 35-years of his rule.¹¹ Therefore, draining the waters of the Valley of Mexico might reveal the natural “science of society” that Mexico always had, but was drowned out by the nineteenth-century scientific politics that continued to fill the Valley. That is, the Porfirians believed that Mexico had the potential to be amongst the modern nations, but it would take a large project that would exemplify all the necessary modern traits to prove themselves. The Gran Canal was just such a

⁸ Miller, *An Environmental History of Latin America*, 143.

⁹ Charles Hale, *The Transformation of Liberalism in Late Nineteenth-Century Mexico* (Princeton: Princeton University Press, 1989), 4 and 205.

¹⁰ *Ibid*, 206.

¹¹ William Beezley, *Judas at the Jockey Club and Other Episodes of Porfirian Mexico* (Lincoln: University of Nebraska Press, 1987), 27.

project.

It appeared that Mexicans were in a predicament that, had it not been for the saving grace of industrialization, might have prevented their entry into the world of modern nations. Efforts to industrialize sought to alter and control the Mexican landscape and environment, making Mexicans the ultimate victor over an environment that symbolized immorality, filth, poverty, and a weak state.¹² Díaz pumped millions of pesos into projects to industrialize and modernize the nation, such as telegraph lines and railroads, improvements in mining, agricultural technology, research in science such as archeology, biology, and geology, as well as improvements in public health and hydrology.¹³ Through its focus on ideas about environment and control in the modernizing process, this thesis examines how the Porfirian ideology affected conceptions of public health and imaginations of water, resulting in projects that altered the environment to look cleaner and, therefore, healthier. It argues that Porfirian hydrology projects highlight multiple intersections between projects of social and environmental control in which the national character was debated:

The Gran Canal, then, exemplified how specific conceptions of modernity prompted authorities to undertake water management and hydrological projects. However, the relationship between liberal ideology and liberal infrastructure building during the Porfiriato did not always line up in such a way that allowed the former to inspire the latter. The chain of events was more complicated than that, as the Canal de la Viga demonstrates. In the case of La Viga, the environment itself was a protagonist in Mexicans' construction of modernity for themselves and

¹² Carolyn Merchant was the first to pinpoint the idea of humans controlling nature and their environmental impact in her book *Death of Nature: Women, Ecology, and the Scientific Revolution* (San Francisco: Harper & Row, 1983).

¹³ Mark Overmeyer-Velázquez, *Visions of the Emerald City: Modernity, Tradition, and the Formation of Porfirian Oaxaca, Mexico* (Durham: Duke University Press, 2006), 61; Milada Bazant, "La enseñanza y la práctica de ingeniería durante del Porfiriato," *Historia Mexicana* 3 (1984): 254-297.

for their country.

Water, State, and Self

In the wide field of literature about the Basin of Mexico, Claudia Agostoni stands out for research about Díaz's modernization of the capital via public health improvements. Her book, *Monuments of Progress: Modernization and Public Health in Mexico City, 1876-1910*, makes the argument that effort to control water were linked to Díaz's ideas about the modern state, leading me to believe that the unruly environment, itself, was very much involved in the formation of a modern Mexican state. Of the Gran Canal, Agostoni writes that, “the draining and cleansing of the menacing environment, and thus the conquest of the water that had besieged it throughout its history, was seen as an essential requirement for its prosperity and modernity.”¹⁴ Whereas the Gran Canal is an example of how conceptions of modernity influenced water works and hydrology, my thesis takes this argument further by including a case study of the Canal de la Viga as an example of how the environment affected people’s conceptions of modernity. This example underscores what I argues is a dialectical, back-and-forth relationship between water and people—a complicated, living dialogue between environment and society.

Water and society influencing one another in a single environment is a key part of this thesis, since this relationship affects identity formation and state-building. As Mike Davis shows in *Ecology of Fear: Los Angeles and the Imagination of Disaster*, Los Angeles in the early twentieth century demonstrates the social implications of environmental discourse. The city government “eulogized its waterscapes and natural fertility” in order to attract visitors and migrants from the Midwest and South, just as Díaz did with Mexico City and artists and authors

¹⁴ Claudia Agostoni, *Monuments of Progress: Modernization and Public Health in Mexico City, 1876-1910* (Calgary: University of Calgary Press, Boulder: University Press of Colorado, and Mexico City: Universidad Nacional Autónoma de México, 2003), 115.

did for La Viga.¹⁵ Similarly, as my thesis will show, the Gran Canal and the Canal de la Viga represented the same cutting-edge state formation and modern identity constructions that Los Angeles advertised, but were not as honest as their lithographs and press releases portrayed them to be. As Davis argues, the state needed to show that these hydrological works not only functioned properly, but were the prototypes to be modeled after.

The historical case study of Canal de la Viga suggests that even when nature stays the same, individuals change their identities and imaginations of nature to keep up with social trends. As suggested in a foreword by William Cronon, there is a dialectical relationship between people and their environments when one or the other changes.¹⁶ The Canal de la Viga was a point of contact between people and the environment. The changing ways in which the residents of La Viga could “modernize” themselves worked in conjunction with an otherwise unchanging environment. Local elites’ beliefs about modernity revolved around using the canal as a status symbol. As William Beezley shows in *Judas at the Jockey Club and Other Episodes of Porfirian Mexico*, the two major segments in society, the upper class and the lower class, “existed side by side in the cities and countryside” rather than as a split between urban and rural.¹⁷ My thesis supports Beezley’s argument. While the upper class used the canal for leisure activities and the lower class used it for practical purposes, the significance is that both classes coexisted in the same space, using the same material, but in ways that perpetuated class and racial binaries. I would further his argument by suggesting that environment, specifically the uses of water, helped to maintain these divisions.

¹⁵ Mike Davis, *Ecology of Fear: Los Angeles and the Imagination of Disaster* (New York: Metropolitan Books, 2000), 10.

¹⁶ William Cronon, “Foreword: Time and the River Flowing,” in Mark Cioc’s *The Rhine: An Ecobiography, 1815-2000* (Seattle: University of Washington Press, 2002), x.

¹⁷ Beezley, *Judas at the Jockey Club*, 6.

Vulnerability Theory in Practice

I will be writing an environmental history in order to examine a small time in history that had comparatively large consequences on both nature and culture. Donald Worster defines environmental history as “the interaction between human cultures and the environment in the past.”¹⁸ The history of the canals shows the intimate relationship that people, society, and environment experienced, expressing itself in two ways explained by Donald Hughes. First, by using ecological analysis as a means to root around human history, Hughes explores the “changes in human societies as they relate to changes in the natural environment.”¹⁹ Second, as a means to understand the social implications of environmental history, Hughes is “interested in what people think about nature, and how they have expressed those ideas in folk religions, popular culture, literature and art.”²⁰ The social implications of environment are at the core of understanding the ways that the modern Mexican self was constructed, whereas an ecological analysis of human history helps to explain the construction of “environmental vulnerabilities.”

Gregory Simon and Sarah Dooling define vulnerabilities in their book, *Cities, Nature, and Urban Development: The Politics and Production of Urban Vulnerabilities*, in terms of social systems: “the degree to which a system (or series of interconnected systems) is susceptible and responsive to (either as adaptations or mitigation) the adverse effects of shocks and stresses.”

Vulnerable aspects of a society can also be thought as “systemic and integrated socio-ecological drivers.”²¹ According to the authors, these socio-ecological drivers produce and perpetuate environmental vulnerabilities, causing them to accumulate until the social system breaks down.

¹⁸ Donald Worster, *The Ends of the Earth: Perspectives on Modern Environmental History* (Cambridge: Cambridge University Press, 1988), 289.

¹⁹ Donald Hughes, *An Environmental History of the World: Humankind's Changing Role in the Community of Life* (London: Routledge, 2001), 4.

²⁰ *Ibid*, 4.

²¹ Sarah Dooling and Gregory Simon, eds. *Cities, Nature and Development: The Politics and Production of Urban Vulnerabilities* (London: Ashgate Publishing Company, 2012), 3.

By using this theory, I assert that the watery environment of Mexico City influenced the state to restructure its built environment (by rebuilding canals, wells, and the sewage system) as well as society's imaginations of water (as a force to be controlled instead of as a natural phenomenon). They did so in order to defend themselves from further destruction caused by naturally occurring weather phenomena and the inadequacies of the built environment. Events like flooding and disease accrued vulnerabilities in the form of death and failed infrastructure that had accumulated for hundreds-of-years. In the case of Mexico City, Díaz believed that the use of state-of-the-art technology, engineering, and science could mend his drowning city, whereas the case of La Viga, stinking from the rotting waters of the canal, shows how the same conditions lent themselves to a social reconstruction of environmental spaces. While the Gran Canal actively worked to alleviate the conditions that made the city vulnerable, the social and natural environment created by the Canal de la Viga perpetuated class-, gender-, and race-based stereotypes.

Chapter Outline

This thesis is divided into three chapters and concludes with an epilogue. Chapter one, "Waterlogged States," backgrounds a large amount of time in the history of the Valley of Mexico, beginning with the geological creation of the Valley 25 million years ago and the first appearance of humans some 12,000 years in the past. From the very start, it was evident that the people who settled into the Valley of Mexico did so for a single reason: the availability of water initially made agriculture and hunting more manageable. But as time progressed, the relationship that tribes had with water became tedious and water management plans were necessary in order for the first humans to fully develop their societies and survive.

From ancient civilizations, to the colonial era, and up through independence until 1876, a

common thread shows how flooding, waste waters, and drought in the Valley threatened each civilization. The environment sometimes was the cause of a society's collapse, as in Teotihuacán, and other times it offered legitimacy to a leader's right to rule, as in Moctezuma's devotion to create a city-saving dike. Regardless, water management, among other factors, often deterred state formation in the Valley of Mexico, giving context to the situation which Porfirio Díaz confronted as he came into his presidency nearly 1000 years after major water management plans had begun in the Valley of Mexico. Starting in 1876, ideas about water changed, as liberal scientific and philosophical thought developed in dialogue with the environment.

The second chapter, "The Ebb and Flow of Environmental Relationships," examines the ways in which ideas about the environment in the Valley changed in conjunction with Porfirio Díaz's 35-year dictatorship. Through the hydrological work of the Gran Canal, Mexico experienced new stage of state building that stressed the rearranging of Mexicans' relationships to their aqueous environment. This chapter will answer two questions: first, how did the population experience the ebbs, or vulnerabilities, of the environment, and second, how did related social and political relationships change as the Porfiriato progressed?

Ultimately, it was through the literature produced by the state that Porfirians asserted their capability to be modern in the eyes of the modernizing world. Technical writings that explained the Gran Canal to engineers, politicians, and investors were published throughout the Gran Canal's construction and disseminated to the rest of the world. The major text used in this chapter, the mammoth *Memoria histórica, técnica y administrativa de las obras del desagüe del Valle de México, 1449-1900*, acted as the state's apple orchard, and state-published pamphlets were picked from portions of its pages. The American Civil Engineers in 1907 and the members at the Pan-American conference in 1901 received pamphlets that were compromised of

sections nearly verbatim to the *Memoria*, but that were different in key respects.²² The two publications had significantly different audiences. The first used information that would be appealing to engineers, while the second was written to engage the states- and businessmen at the conference. They are similar, though, in that both publications chose to describe Mexico as a country that still needed modernizing projects, appealing to the problem-solving minds of engineers, as well as the pocketbooks from the foreign countries' representatives. By recognizing and acknowledging these differences, Porfirians described the Mexican state in such a way that made it more appealing to modern societies like those of Great Britain, the United States, and France.

The final chapter, “The Canal de la Viga and Mexican Modernity,” analyzes the often complex relationship that different people had with built and natural environments. Located in a small neighborhood just outside of Mexico City, La Viga offered a space of both built and natural environments that people interacted with and occupied: the Canal and Paseo de la Viga were the built environments which elite Mexican and foreigners used to experience a romantic Mexico, whereas the natural elements, such as the water and fish in the canal, belonged to the la Viga natives to use for their benefit. This chapter draws on the William Beezley's *Judas at the Jockey Club*, which he argues that both upper and lower class people occupied the same space in Mexico, but that a “natural” division of class was practiced. La Viga is emblematic of such a division in terms of how people used the environment: *los ricos* used the waters in leisure, whereas *los pobres* used it for necessity.

A rich pool of sources comes from La Viga: foreign and Mexican elites under what Beezley calls the “Porfirian Persuasion,” (a culture similar to Victorian and *belle époque* culture abroad) published their travel journals, wrote short stories and poems, and made paintings and

²² Junta's, *Memoria histórica, técnica y administrativa de las obras del desagüe del Valle de México, 1449-1900* 1-3; *Brief Sketch of the Drainage of the Valley of Mexico, written expressively for the delegates of the Pan-American Congress* (Mexico City: Tipografía de Francisco Díaz de Leon, 1901); *Drainage Works in the Valley of Mexico, Information Written for the Members of “American Civil Engineers”* (Mexico City: Tipografía de la Dirección General de Telégrafos, 1907).

photographs of the canal and the inhabitants. These sources create a romantic image of La Viga that was beautiful, clean, and steeped in tradition. Contesting this image, though, were another set of Porfirians, ones who adhered to sanitation, hygiene, and policy, and who saw La Viga as a place that threatened public health. These two, seemingly separate, groups of elite Porfirians can be seen throughout Mexico in the final decade of the Porfiriato, but La Viga proves to be a particularly fruitful case study to see this. While socialite-Porfirians perpetuated the racial stereotype that contended that poor Mexicans were backwards Indians, through cultural and social practices, policy-Porfirians adhered to cutting-edge scientific discoveries to maintain the status quo. Socialite-Porfirians enjoyed that Canal de la Viga because it was an environment that reinforced their dominant social ranking over the Vigans. Meanwhile, the policy-Porfirians saw too much of traditional Mexico in the chaotic landscape, and it would be through their research and conclusions that the state ultimately shut down the Victorian playground in the 1930s.

While the Canal de la Viga was torn down, The Gran Canal failed as a modernizing project in a different way, as the Epilogue will show. The Gran Canal failed to drain the Valley of Mexico, and instead made the city even more vulnerable to earthquakes, landslides, sinking, and other health hazards. The Mexican state has yet to find a suitable form of water management that provides enough fresh water and waste management for everyone in the city, but also one that does not pollute the surrounding environment. This water crisis in Mexico is far from being a surprise or even a new development in the Valley's history. As this thesis will show, people living in the Valley of Mexico continued to have a contested relationship with their environment and water since they began to create settled societies.

CHAPTER 1: WATERLOGGED STATES

This chapter provides a broad background of how the different empires and states in the Valley of Mexico attempted to manage their environment to their benefit. Following chronological order, the first two sections look at the geological construction of the Valley and how the first humans built a relationship with the water surrounding them. Compared to the rest of the world, the early populations in Mesoamerica took longer to shift from nomadic lifestyles to sedentary ones because of the abundance of wildlife that the Basin had to offer. Once tribes did settle down, though, the Valley of Mexico became one of the world's major hotbeds of communities, in large measure because the large amount of water available on which people could rely. As populations grew, the relationship that they shared with their environment grew more precarious as they relied ever more on the watershed for survival.

The third section examines the first great civilization in the Valley of Mexico, that of the Teotihuacanos in 100 BCE. By using tree-ring and stalagmite data from around the area, researchers have shown that the ancient societies' cultural development often hinged on the state of water in the Valley. The presence of too much water, probably resulting in floods, death, and crop destruction, created tension within the Teotihuacán Empire that became difficult to manage. These tensions might have led the leaders of this empire to create more honorific buildings and tributes in order to please the storm god, Tlaloc, which in part led to considerable environmental damage from over-logging the area. The lack of trees and roots to hold the ground together would have created an environment even more vulnerable to flooding, leaving some historians to conclude that irreparable environmental damage led to the downfall of the Teotihuacán Empire.²³

Although defeated by their environment, the Teotihuacanos initiated a system of

²³ Ezcurra, *The Basin of Mexico*, 33.

agriculture that a proceeding civilization would take full advantage of, and use to their benefit. The Aztecs, who were a combination of Nahuatl-speaking tribes in the Valley of Mexico in the mid-1400sCE, became masters of the *chinampa* (commonly known as the “floating gardens”) system. Their understanding of the waters in the Basin of Mexico allowed them to create dams and dikes that separated the briny water from the fresh, as well as to attempt to protect themselves from flooding. This section looks at the Aztecs’ successes with the environment, but it is important to point out that the *chinampas* did not allow them to take full control of the water. Instead, the Aztecs lived in an unreliable balance with their environment. Several trial and error attempts to manage the Valley’s waters resulted in famines from destroyed crops, out-migration, revolts, and further deforestation. As well, the construction and maintenance of the *chinampas* required a large amount of manpower, a resource that they obtained through war. The excessive violence and battling initiated by the Aztecs was one of the reasons that the invading Spanish found allies so easily in the 1520s.²⁴

Colonial Mexico saw a drastic change in environmental management. Distrusting “Indian” knowledge and experience with water, the Spanish deconstructed the indigenous canals, dikes, and dams and erected paved streets in their place. Soon, floods became catastrophic, dissuading people from the Spanish metropolis from immigrating to the New World. In order to create a desirable locale for Spaniards to move to permanently, something had to be done about the lakes. The colonial government was the first to consider draining the lakes in the Valley as opposed to coexisting with and managing them, but it was not until the late 1700s that any kind of sizable draining would occur.

The years 1820 to 1876 conclude this chapter, as the newly independent Mexico dealt with politics, economy, and the opening of the world market in addition to the vulnerability of their capital city. Since the Aztec flood of 1449, a trend became prevalent in the management of water in the Valley of Mexico: only after a harsh flood occurred did the state summon up the

²⁴ Ibid, 34.

funds to attempt to control the water. This was especially true during this 56-year period, since Mexico City did not experience any major flooding until 1856. The government responded with a competition for engineers and architects to propose plans that would permanently drain the Valley. Then a decade of dry weather with mild rains, in combination with significant foreign and domestic political crises, put the project off until a particularly wet summer in 1865 revitalized the plans. The sudden, albeit less than unpredictable, threat of inundation always seemed to kick-start plans that were long forgotten. The second chapter will take a closer look at this theory of immediate vulnerability and dormant vulnerability, but for now, a 25-million year background is needed.

A Valley Is Born

10-.6 million years ago

The Basin of Mexico occupies about 9600km² of space in the country now known as Mexico. In the Cretaceous era (110-65 million years ago), the same area used to be under water as part of a shallow sea, but volcanic activity during the Eocene era (65-45 million years ago) created the landscape that would someday become home to the third most populous city in the world.²⁵ It was at the end of the Eocene, though, that the Basin of Mexico began to take its shape. The Basin formed within 25 million years with most of it culminating in the last three phases. First, the Sierra de las Cruces, which comprises the western limits of the Basin were born, as well as the basement of the Sierra Nevada (the common name of the Trans-Mexican Volcanic Belt), beginning the construction of the eastern limits.

In a matter of nine million years, the Trans-Mexican Volcanic Belt forced the central and western sections of the North American continent to spread, thus resulting in the finished formation of the Sierra Nevadas, including the now-iconic Popocatépetl and Iztaccihuatl

²⁵ Censo de Poblacion y Vivienda, "Población total según sexo, viviendas habitadas e indicadores seleccionados por zona metropolitana" (Distrito Federal: Instituto Nacional de Estadística y Geografía, 2010).

volcanoes. The Ajusco Mountains finished forming within the last million years, which effectively blocked the Valley water's egress to runoff currents that would lead it away to the Pacific Ocean. Once the alluvial plane was shut off by the Ajuscos, sediment could accumulate more rapidly and raise the landscape, creating lakes that occupied about 1500km² with a watershed that covered 7000km² (Pre-Aztec estimates).²⁶

Once the water levels dropped, five lakes emerged that were connected from North to South: Zumpango, Xaltocan, Texcoco/Lago de Mexico, Xochilmilco, and Chalco. For the most part, each lake had its own water supply either from mountain springs, river, rain water collection, snow melt, or run off that they then shared between tributaries. Lake Texcoco was separate from this pool of collection methods: being the southern-most lake, it was not close enough to the mountains to receive their runoff waters. Instead Texcoco remained the shallowest lake, nearly lagoon-like, that filled with rain water and the runoff from the rest of the lakes. In addition to being the shallowest, the waters in Texcoco had no other lake to flow into, making evaporation the only way for water to leave the lake. As a result, sediments that were soluble in the evaporation process were left behind, mainly those with high salinity; therefore, this process of water evaporation-salt crystallization resulted in Texcoco having the briniest water in the Basin, while the other four lakes were fresh water.²⁷

The First Humans

12,000 years ago

The arrival of humans in the Valley of Mexico has no agreed-upon date, but it is generally accepted by ethnologists, geologists, and geographers that people migrated via the

²⁶ Ezcurra, *The Basin of Mexico*, 7-8; Mark E. Fenn, L.I. de Bauer, and Tomás Hernández-Tejeda, eds., *Urban Air Pollution and Forests: Resources at Risk in the Mexico City Air Basin* (New York City: Springer, 2002), 4-5; JFW Negendank, "Some Aspects of Volcanic Rocks of the Valley of Mexico," *Bulletin Volcanologique* 37, no. 3 (1973): 292-293; Graham T. Nixon, *The Geology of Ixtaccihuatl Volcano and adjacent areas of the Sierra Nevada and Valley of Mexico* (Vancouver: University of British Columbia, 1989), 2

²⁷ Ezcurra, *The Basin of Mexico*, 8.

Bering Strait in the northern region of the Americas between 30,000 and 50,000 years ago, and reached the tip of South America 8,000-12,000 years ago.²⁸ The oldest agricultural site found in the Valley of Mexico is some 12,000 years old and was found at the edge of Lake Chalco, in the south east corner of the contemporary Mexico capital. The Valley of Mexico was an ideal space for early people to voyage to and remain because of its mild temperatures, large and plentiful game, as well as the vast amount of water sources.

Setting up permanent villages around lakes was beneficial for the early tribes for a number of reasons. First, the presence of water sustained the large populations of animals located in the area. Besides housing aquatic life, the lakes in the Valley of Mexico were the life source for other animals, such as the mammoth. The Valley is known for the largest kill sites of mammoths in all of Mesoamerica, begging the conclusion that the Valley was an ideal place for larger mammals as well. In fact, the largest number of kills took place around the banks of Lake Texcoco, according the number of mammoth fossils found in the area.²⁹

Once the landed animal supply began to run low, the reliable source of water also meant that keeping and maintaining crops was easier than it was before, resulting in the phase out of hunter-gatherer tribes to growing communities that relied on agriculture. The placements of these communities was vitally important: if the village was in an area too elevated, then the amount of animals was even more scarce and water was harder to come by, but if it were too low, their crops would be susceptible to flooding and ruin during the rainy seasons. Large populations bloomed into cities, creating a total population of around 150,000 around 100 CE. The oldest of these cities, Tlatilco, emerged from the shores of Lake Texcoco in the north and became one of the major chiefdoms in the area. The second was Cuicuilco in the southwest,

²⁸ Burton Kirkwood, *The History of Mexico* (Westport: Green Press, 2000), 16.

²⁹ S. Gonazalez, D. Huddart, L. Morett-Alatorre, J. Arroyo-Cabrales, and O.J. Polaco, "Mammoths, volcanism and early humans in the basin of Mexico during the Late Pleistocene/Early Holocene," *The World of Elephants* (Rome: International Congress, 2001).

which boasted the highest population and cultural productions of the age.³⁰ Cuicuilco had the richest supply of water from Xochilmilco Lake as well as the alluvial flooding from the Ajusco Mountains, causing the population to grow and flourish from the abundant source of aquatic animal protein and the finest soil for growing crops. Unfortunately, Cuicuilco's glory ended abruptly with the Xitle volcanic eruption, sending whatever population remained in the surrounding areas north to Tlaltlilco.

The Rise and Fall of Teotihuacán

100BCE-700CE

Teotihuacán was situated in the northeast of the basin and had a population of about 30,000 around the time of the Xitle explosion. Five centuries later, the population was 150,000, making Teotihuacán one of the largest cities in the world at the time. One hundred years later, though, the behemoth collapsed to about 10,000 residents for reasons unknown. Archeologists know that a fire started in the city's heart around 550CE with considerable material damage around the fire's horizon, indicating that rebellion and dissent were common. Bad administration of economy and politics may have also been a factor, as indicated by the fear tactics that the Teotihuacanos used during their massive sacrifice ceremonies. Nomadic incursions and social problems have also been suggested as reasons for Teotihuacán's collapse, along with considerable environmental and climatic change.³¹ While the answer to the Teotihuacán's fall lies in a combination of these causes, this work focuses specifically on the factors that made the society vulnerable due to environmental and climatic changes, since these had lasting impacts not only on the Teotihuacanos, but on the Aztecs, the Spaniards, and the Mexicans to come.

The Teotihuacanos were the first to implement the *chinampa* system as a way to work cohesively with their swampy environment. The *chinampas* were plots of rectangular land that

³⁰ Ezcurra, *The Basin of Mexico*, 32.

³¹ Matthew S. Lachniet, "A 2400 Year Mesoamerican Rainfall Reconstruction Links Climate and Cultural Change," *Geology* 40, no. 3 (3/2012): 259.

were incredibly arable for agriculture since they were constructed in the middle of the lake beds and drew nutrients directly from the water. They ranged from small plots for personal use, to massive 300ft x 30ft farms.³² In addition to the “floating gardens,” as they would come to be known by foreigners, waterways were included in the *chinampa* system that allowed for canoe traffic between plots, farms, and cities. Not only were the *chinampas* crucial for food crops, but they were important to the Teotihuacanos for the movement of lumber from around the basin to the city center, where they built honorific pyramids to their deities.

The Sun Pyramid, erected originally in 175 CE in the main city Ciudadela, remains the third largest pyramid in the world and the second largest in Mesoamerica, standing at 225m across and 246m high.³³ A building of this size, in addition to the pyramids surrounding it, the paved streets leading up to it, the stone apartment complexes built nearby to stay close to the pilgrimage sight, would have taken a generous amount of the natural resources found around the basin.³⁴ That this was the case is evidenced by the fact that even today, the area around Ciudadela and Lake Texcoco remains completely stripped of natural woody plants.³⁵ One environmental theory for the ancient city's decline was the complete deforestation in the area. Once trees disappeared, the ground became less rigid from the tree roots and vegetation, causing topsoil and gardens to wash away during the rainy season, resulting in over-sedimentation of aquatic life's habitats, and bringing higher risks of drought during the dry season.

Another theory, proposed by geoscientist Matthew Lachniet, suggests that climate and cultural change are intricately linked and that drastic changes in climate can result in total

³² María del Carmen Jorge, Barbara J. Williams, C. E. Garza-Hume, and Arturo Olvera, “Mathematical accuracy of Aztec land survey assessed from records in the Codex Vergara,” *Proceedings of the National Academy of Science in the United State of America* 108, no. 37 (11/2011):15053-15057, doi: 10.1073/pnas.1107737108.

³³ The temple La Danta at the El Mirado settlement in Guatemala ranks as the largest pyramid, beating the Sun Pyramid by just a few meters. Robert Sharer and Loa Taxter, eds., *The Ancient Maya* (Stanford: Stanford University Press, 2006), 253.

³⁴ Kathleen Berrin and Esther Pasztory, eds., *Teotihuacan: Art from the City of the Gods* (San Francisco: The Fine Arts Museum of San Francisco, 1993), 25.

³⁵ Ezcurra, *The Basin of Mexico*, 33.

societal collapses.³⁶ Using cultural information about the Teotihuacanos, Lachniet concluded that, since the society relied on spring and lake water sources, “that could have resulted in human susceptibility to drought.” After conducting an experiment by analyzing oxygen isotopes in stalagmites found in caves around Ciudadela, Lachniet discovered that there was a single and great drought that spanned from 690CE to 870CE, peaking in 770CE. “Climatic drying and water-table lowering,” Lachniet wrote, “may have resulted in double peril for Teotihuacán by decreasing spring discharge for irrigate and rainfall capture for domestic consumption.”³⁷ During the “Big Fire” of 550, effigies of the Storm God, Tlaloc were one of the more conspicuous smashed statues around the outskirts of the fire, suggesting that the Teotihuacanos may have felt abandoned by their deity during the drought.³⁸

The Waters of the Aztec Empire

800CE-1500CE

After Teotihuacán fell, a power vacuum emerged in the Valley of Mexico that a tribe named the Toltecs seized. For two hundred years, the Toltecs took advantage of the lack of political organization to create their own empire in the Tula Valley east of Teotihuacán, spreading a culture that was very similar to the Teotihuacanos. During this time, the population in the Valley of Mexico grew to 125,000 people, suggesting that tribes grew or immigrated into the Valley.³⁹ The Toltecs were centered in the Tula Valley, where they perpetuated the cultural and social achievements of the Teotihuacanos and gained control of more cities. Their empire grew too large to sustain, though, and after a decade of drought in 1150, coupled with dissent brought about by their harsh rule, the Toltec's power declined.

The 12th century was a violent one for the tribes in the Valley of Mexico, eventually

³⁶ Lachniet, “A 2400 yr MesoAmerican Rainfall Reconstruction,” 260.

³⁷ *Ibid*, 261.

³⁸ *Ibid*, 261.

³⁹ Dan M. Healan, *Tula of the Toltecs: Excavations and Survey* (Iowa City: University Iowa Press, 1989), 235.

resulting in the demise of the Toltecs and the rise of several warring groups. In the 15th century, three city-states would commit themselves into a triple alliance: Texcoco, Tlacopan, and Tenochtitlan formed the group that today is known as the Aztecs. Around 1430, the Aztec Empire took control of the Valley of Mexico, with Tenochtitlan at its center. By this time, the construction of waterways throughout the Valley had reached an all-time high as culture after culture continued to build on the Teotihuacanos' *chinampas*, creating the most productive agricultural system in Latin America (although the Amazons, Incas, and Mayans used *chinampa*-like systems, the Aztecs had perfected their system by recycling as much waste as possible to work in conjunction with the natural fertility of the Valley).⁴⁰ There were 95 known water control mechanisms, 50km of dikes, waterways, and aqueducts, and an unknown—but sizable—amount of space dedicated to *chinampas* for personal and city use. Because of this manipulation of nature, the Valley of Mexico was one of the world's most densely populated places, owing its demographic boom to this environment.⁴¹

The field of pre-Hispanic hydrology is woefully undeveloped in the historical record, and is, unfortunately, covered mainly from a Spanish point of view. Despite these limitations, historian Shawn Miller uses a close reading of the Spanish sources to debunk a myth that surrounds the pre-Hispanic cultures in Latin America: the Pristine Myth.⁴² This myth propounds that the first peoples in Latin America were so connected and full of respect for their environment that they did not damage it or make any dramatic environmental changes. We know this to be misleading, as the evidence already presented indicates. Depleting landed-mammal food source 12,000 years ago led to the dependence on aquatic protein sources, which inspired the Teotihuacanos to build their gardens to manage agricultural and aquatic life. Due to their successful agricultural system, their population and city grew, which resulted in the depletion of their woodlands. In turn, the absence of roots to hold the soil down changed the

⁴⁰ Miller, *An Environmental History of Latin America*, 19.

⁴¹ *Ibid*, 22.

⁴² *Ibid*, 9.

construction of the ground in the Valley, making floods more common and less preventable.

The Aztecs relied on the *chinampas* for water management and for agriculture. Any other uses were considered as secondary, such as protection from invading people and transportation around the canals surrounding the *chinampas*. Flooding, naturally, was a problem for the *chinampas*, since prolonged periods of being underwater would utterly destroy the crops. Drought was another issue, but was more manageable. Crops were located close to canals so that during dry seasons, farmers could dig irrigation channels from the canals to their fields. One reason for the intricacy of the large amount of waterways, though, was to avoid salinization of the *chinampas*.⁴³ The only way that water left the Basin was through evaporation, leaving behind sediments like salt in the water. Over the years, the societies of the Valley had constructed enough dikes, ravines, and canals to channel the salty and flood waters away from their crops, while constructing separate waterways and aqueducts to lead fresh water into the fields.

When crops failed, people starved. The Valley's societies were vulnerable to famine and disease. Out-migration and death tolls rose, as did the human sacrifice rates as the Aztecs prayed to Tlaloc, the borrowed rain god of the Teotihuacanos. Controlling the water levels and their chemistry was a high priority for the Aztecs, who were in a continuous battle to maintain their power in the Valley. The environment played a role in this struggle. The research performed by Matthew Lachniet reveals a long-standing and deep connection between weather patterns, specifically the wetness and dryness of an environment, and cultural advances in a society. By analyzing the oxygen isotopes in a stalagmite found in the cave found directly under the Teotihuacanos' Sun Pyramid, Lachniet was able to determine exactly how wet or dry each year was; from this, he built a timeline that allowed him to map the cultural timeline of the Valley of Mexico against the area's wettest and driest conditions.

This data revealed that the Valley experienced periodic droughts, and correspondingly

⁴³ Ibid, 21.

developed cultural commonalities that emphasized the importance of water and water management. One notable correlation came in 1449, the year in which the construction of the largest dike in Tenochtitlan coincided with the wettest conditions revealed by the oxygen isotopes in the stalagmite.⁴⁴ Lachniet's research shows that it was no coincidence that Aztec Emperor felt pressure to alleviate his capital city's vulnerability to flooding, because he was, in fact, ruling during an epoch prone to excessive rain. Indeed, according to Lachniet's findings, rainfall levels rose after Tula declined, leading us to believe that from the time of their arrival in the Valley, the Aztecs were submerged in hydrological necessities. While it seems as if the Aztecs had the greatest understanding of how best to manage the lakes' water levels, the argument still stands that water management was a challenge to the state during times of flood or drought. Their ability to separate the brackish water from the fresh, to route waters with canals and dikes, as well as to use water resources for transportation were all impressive feats for an ancient culture, but their population still relied on the basic control of this aspect of nature. When the lakes overflowed into the city, the emperor's ability to communicate with the gods was questioned and his regime was threatened.

Such a situation presented itself when a particularly large flood inundated Tenochtitlan in 1449. Friar Juan de Torquemada, a Spanish friar, missionary, and historian in the New World, collected stories and conducted interviews to reconstruct the 1449 flood nearly a century after the event. So great was the flood that the entire city was inundated and people could only move around the city by boat or canoe. Several hundred people drowned and an innumerable number suffered from crop damage.⁴⁵ The Aztec emperor, Moctezuma, received counsel from local engineers, who suggested the construction of an enormous dike 16.7km outside the city. The Nezahuatcoyotl dike was named after that successful poet-engineer and lord of the city of Texcoco, and Torquemada added that, "with [the construction of the dike completed] the city

⁴⁴ Lachniet, "A 2400 yr MesoAmerican Rainfall Reconstruction," 261.

⁴⁵ Enzo Levi, "The History of the Drainage of Mexico," *Water Resources Development* 6, n.3 (11/1990): 202.

was secured, because it broke the blows of the brackish waters and prevented these from mixing with the fresh water on which the city was founded.”⁴⁶ Not only did Nezahuatcoyotl’s structure help to prevent more floods from destroying the city and disrupting Aztec life, but he crafted it in such a way that would keep the over-sedimented and salty waters of Texcoco from entering into the *chinampa* fields and killing the crops. The dike was a major success and spoke to the vast understanding that the Aztecs had of their environment and the most effective ways to manage it before it could completely destroy them.

Colonial Mexico

1521-1820

A tertiary benefit of the Aztec waterway system was that it offered the capital a defense against invaders. The ability to escape on foot as well as to have easy access to supplies or reinforcements was not easily managed when the city of Tenochtitlan was in the middle of the lake. The Spanish intended to march on the capital and take it by force, but when they descended the mountain slopes from sacking Cholula in 1519, they realized that marching would no longer be possible. Upon seeing Tenochtitlan for the first time, conquistador Bernal Díaz wrote that, “when we saw so many cities and villages built in the water and other great towns on dry land and that straight and level causeway going towards Mexico, we were amazed...on account of the great towers and cues and buildings rising from the water, all built of masonry. And some of our soldiers even asked whether the things that we saw were not a dream.”⁴⁷ The Spanish conquistador Hernán Cortés met with the Aztecan emperor Moctezuma on one of those causeways, while hundreds of people paddled their canoes through the water to

⁴⁶ Fray Juan de Torquemada, *Monarquía Indígena* 1 (Federal District: National University of Mexico, 1975-83), 219.

⁴⁷ Bernal Díaz, *The History and the Conquest of New Spain* (Albuquerque: University of New Mexico Press, 2008) 190-191.

observe the meeting.⁴⁸

The Aztec Empire fell two years later, and with the last major stronghold defeated, the Spanish established the capital of their own empire where Tenochtitlan once stood. Having sufficiently conquered the human population of Mexico, the Spaniards in the capital then turned to the environment. The lakes were a burden to them, as Europeans had evolved from depending on human labor to human *and* animal labor; canoes were considered a downgrade when the Spanish relied on horses as their main source of transportation. The Spanish immediately started filling in the ancient canals and *chinampas* in order to elevate the ground and create roads. Unfortunately, raising the ground to meet Spanish feet hampered the surface drainage of the city which the Aztecs had worked diligently to protect. In addition to filling in canals, the Spanish proceeded to take down dikes, including the important Nezahuatcoyotl dike. The structure had already received considerable damage during the siege of the city since the Spanish cut holes into it in order to move in and out via canoe. The dike was also made of precious lumber and stone that the Spanish needed in order to rebuild and fortify New Spain. The lumber in the water structures became priceless because of the excessive logging that the Spaniards performed all around the valley, causing them to be even more vulnerable to environmental disaster because of an increase in surface runoff and silting during the rainy season.⁴⁹

Major flooding began in the city in 1553, followed by floods in 1580, 1604, and again in 1629. Instead of turning to the Aztec knowledge of the environment, a knowledge that had been accumulated after hundreds of years of their predecessors' trials with water management, the Spanish preferred the methods of what was familiar: they turned to Dutch models of environmental control.⁵⁰ In 1608, the first serious attempt to drain the flood waters that inundated the city was completed; El Tajo de Nochistongo attempted to drain Lake Zumpango

⁴⁸ Kirkwood, *The History of Mexico*, 39.

⁴⁹ Ezcurra, *That Basin of Mexico*, 35.

⁵⁰ Levi, "The History of the Drainage of the Valley of Mexico," 203.

with a 15km long open canal that ended in the Tula Valley. This project took four years to complete, and it affected more than just the hopeful residents of an inundated Mexico City: close to 130,000 *indios trabajadores* (Indian workers) came from all over the Basin of Mexico to work on the *desagüe*, including some 3,500 women who saw that the workers were fed and housed.⁵¹ In all, the project cost the colonial government 413,324 pesos.⁵²

To the embarrassment to the officials, el Tajo de Nochistongo did not prevent future floods, and other, greater hydrological projects emerged. The Spanish—ironically in this case following theories held by the Aztecs—believed that there was a natural drain in the Basin of Mexico. The trick was only to find it, discover why it ceased to lead the waters out, and to fix it. After the failures of Nochistongo, they concluded that the drain was not in Lake Zumpango, and after the flood of 1629, the viceroy of New Spain needed to find faster solutions. As Mexico City sat underwater for about five years, the population dwindled from 20,000 Spanish residents to a mere 400, who had learned to use canoes much the way that their former Aztecan enemies had.⁵³ Mexico City had a year's rest from flooding when the deluge returned in 1635, this time taking 30,000 Indian lives either as a direct result from the flood or the resulting famine and disease.⁵⁴

Instead of trying to find another sinkhole in another part of the Basin, the officials and scientists in New Spain agreed in the late 1630s that the new drainage project, el Canal de Huehuetoca, would drain the flood waters, as opposed to preventing them entirely. The open canal would act as a quick fix, temporary for as long as it took the Spaniards to find the nonexistent drain and mend it. An additional 5,000 Indians were employed for this job that lasted for two years, costing 885,000 pesos.⁵⁵

⁵¹ *Memoria histórica, técnica y administrativa de las obras del desagüe del Valle de México* 1, 110.

⁵² *Ibid*, 110.

⁵³ Joel Simon, *Endangered Mexico: An Environment on the Edge* (San Francisco: Sierra Book Clubs, 1997), 66.

⁵⁴ *Ibid*, 66.

⁵⁵ *Memoria histórica, técnica y administrativa de las obras del desagüe del Valle de México* 2, 189.

Given the Spaniards' failures to find a drain, drastic changes to the transportation infrastructure of the Valley were delayed. Even though some of the ancient canals were transformed into roads, transportation by canoe remained popular among the masses. The canals offered quick and cheap routes in and out of the city, and connected the villages around the lakes with the capital in more efficient ways than roads could. In addition, the *chinampas* outside of Mexico City remained functioning and provided the colonists with produce; instead of buying a horse and cart, the horse being one more mouth to feed, the farmers could rent or take their own rafts across the lakes and through the canals with their merchandise and go directly into the city. Traveling via waterway was so popular that the Spanish government implemented a tax system in order to keep records of the traffic and goods that went in and out of the city. The farmers had to pay taxes on what they brought into the city and pay to dock their rafts to sell their merchandise, similar to the system used for boats that docked at harbors after sailing across the sea.⁵⁶

For the next 150 years, the Mexican viceroy tried, again and again, either to drain the Valley or to minimize the damage from flooding with both small and large hydrological projects. It was not until el Canal de Huehuetoca connected to another project in 1796 that the water-table in the Valley of Mexico began to drop noticeably. At last, it seemed like the lacustrine environment would finally disappear and give peace to the colonists.

Inundated Independent Mexico

1820-1876

Upon winning their independence from Spain, a privileged, elitist, and liberal core of Mexicans took up where their former government left off with the *desagüe* of the Valley of Mexico: planning to do nothing until the city was inundated. This is not to say that the newly

⁵⁶ Ezcurra, *The Basin of Mexico*, 36.

formed Mexican government was not busy. Coups and counter-coups plagued the 1820s, and then problems in northern Mexico during the 1830s led to the annexation of Texas in 1836, leaving the state scrambling to maintain control of the North. The 1840s are marked with issues between the United States and Mexico, culminating in the Mexican-American War from 1846-1848. Mexico lost its northern territories (modern day California, Nevada, Utah, Arizona, New Mexico, Kansas, Colorado, Wyoming, Oklahoma, and New Mexico), and emerged from the conflict owing millions of dollars in debt.⁵⁷

Coming up for air from the crisis in 1856, the Ministry of Development held an open competition for Mexicans to participate in: propose a manageable construction plan that could successfully drain the Valley of Mexico, and see themselves become the head engineer of their project. The winner was Francisco de Garay, a Mexican man who had studied architecture in France. He proposed that a great canal be built between Lake Texcoco and the beginning of the tunnel that was part of el Tajo de Nochistongo. The government might have undertaken this project, but unfortunately, the State experienced more internal problems. A civil war erupted from 1857-1861 ending with a liberal win, only to be defeated by the French invasion of 1861. Mexico came under a Mexican-French monarchy led by the Austrian duke, Emperor Maximilian I. It was not until 1865 that the Emperor saw that Garay begin his project.⁵⁸

For the first time, Mexico would use machinery to help aid the construction process. As opposed to hands, shovels, and baskets, the workers now had “an excavator to work in the trenches; some locomobiles [small, steam-powered carts that ran on tracks] for drains and for extraction in the shafts; a special stationary machine for drains, and some dredges for the clearing or excavation of lakes or canals,” all of which came straight from Europe.⁵⁹ The work would consist of a canal that would be 30.5km in length and a 10km-long tunnel, and would rely on older *desagüe* projects to lead the lake and flood waters to the Tula valley that same way

⁵⁷ Levi, “History of the Drainage of the Valley of Mexico,” 209.

⁵⁸ *Ibid*, 208.

⁵⁹ *Ibid*, 209.

that the Huehuetoca Canal proposed to do. With a team of Mexican and European engineers alike, Garay broke ground in 1865. After eight months, shafts for the tunnel were sunk and 70,000m³ of earth were extracted from the trench leading to the Tula valley.⁶⁰

Sadly, Garay did not get enough done to impress the Emperor. After domestic and foreign pressures, the project halted in 1866. After a few weeks' delay, work resumed under the direction of Garay's replacement, engineer Miguel Iglesias. Little more had been completed during the rest of the Emperor Maximilian's reign, when Benito Juárez, liberal winner of the civil war, ousted the Mexican-French monarchy to restore his liberal republic.⁶¹ Convinced by the Ministry of Development that the work was of the utmost importance, Juárez set funding aside to continue Garay's *desagüe* under yet another head engineer but again, Mexican politics got in the way and the work slowed to a cease in 1869. Juárez died in 1871 and his successor did not accept the Ministry of Development's reports regarding the *desagüe* of the Valley, leaving the project dead in its tracks until the flood of 1877. Porfirio Díaz was in office at the time of the flood and saw an opportunity to prove himself to his country as well as to the rest of the modernizing world.

Conclusion

Even though the consequences of flooding in the Valley of Mexico had decreased significantly by the late nineteenth-century, the number of people affected by it had increased. People in the city who experienced the deluge in their streets and walkways during the summer storms could not contact their friends and families outside the Valley by using canoes as their predecessors had done. The government's reputation of being unable to protect its capital city from flooding followed it from centuries prior. The late nineteenth-century, though, had something in store for the rebellious environment that in ages past had since deterred state

⁶⁰ Ibid, 209.

⁶¹ Manuel Perló Cohen, *El Paradigma Porfiriano: Historia del Desagüe del Valle de Mexico* (Mexico City: M.A. Porrúa Grupo Editorial, 1999), 56.

formation: contemporary engineers would be offered a chance that allowed for them to construct a hydrological project without interruption and with full financial support.

The next chapter will examine this time in Mexico, known as the Porfiriato, when the state took its most aggressive action against the watery environment of its capital city. Taking advantage of peace time and foreign interest in Mexican land and economics, Porfirio Díaz and his advisers constructed the greatest and most extensive draining project that the Valley had yet seen in an effort to end the problems that Mexicans had with their environment. In the process of taming the waters, Díaz would be able to claim to be what no other leader in the history of the Valley had ever been: everlasting master over the environment and bringer of modernity.

CHAPTER 2:
THE EBB AND FLOW OF ENVIRONMENT AND STATE RELATIONSHIPS:
MEXICO CITY AND THE GRAN CANAL

By the late 1800s, an ensemble of engineers, doctors, and hygienists from Mexico, Europe, and the United States were in Mexico City and the surrounding Valley. The reason for their visits: to heal and help the sick people afflicted by, they believed, the shallow lakes that inundated their environment during the rainy months of summer and choked them with toxic dust in the dry seasons. José María Guyosa was walking around Lago de Texcoco in 1892, taking in the scenery, making notes about the sights, smells, and tastes that he encountered. His description of the water as “black and greenish foul-smelling mud,” summarizes his superficial conclusions about the condition of the lacustrine environment.⁶² The same description could be used to describe so many other dead or decayed things: a pile of garbage, the end of a sewage line, or a rotted wound.

So terrible was the environment for Guyosa that he experienced painful headaches that required him to retreat to his residence, where he continued to suffer. It was publicized incidents like Guyosa's that fired Díaz's desire to drain as much of the lakes as he could, just as Guyosa's experience fueled him to help Porfirians and Mexicans annihilate the malodorous and marshy environment. The Gran Canal began construction in 1879 with the help of research and constant observation by men like Guyosa and the other physicians, sanitationists, and public health advisers in order to eliminate the threat to Mexicans' health and state development.

Where the last chapter explained how water, in part, deterred state formation in the Distrito Federal, this chapter will examine how Porfirians used the Gran Canal as the ultimate “disciplinary” tool to control a most unruly aspect of the state. Officially completed in 1900, the

⁶² J.M. Guyosa, *El Valle de Mexico: ventajas que resultarian a la salud publica con el desagüe* (Mexico City: Imprenta de Joaquín G. Campos y Comp, 1892), 29.

Canal checked the waters that had plagued the Mexican government for centuries, and the state believed that it could finally put to an end the environmental hazards that made so many people vulnerable. This chapter is divided into five sections. The first section comments on the vulnerable environment that prompted the Mexican government's decision to build the Gran Canal when they did. Gregory Simon and Sarah Dooling suggest in their theory about environmental vulnerability that the environment, urban landscapes, and the human population in that space share a contentious relationship that, upon analysis, reveals certain social and cultural ideas of that population.⁶³

The social and cultural ideas that coalesced in the decision to build the Gran Canal were conditioned by the intellectual environment seeping into Mexico from more developed Western nations. The issues of water control and flood management were ones that people in the Valley of Mexico had faced since they first established permanent residence there. The era of liberalism, though, saw governments begin to take a more rigid approach to the issues that proved to be problematic. Mexico was not the only nation to face problems resulting from urban population growth, hygiene and sanitation, and environmental disasters. France, Germany, the U.S., and England—among many other countries in Western Europe—created and shared their own plans. Mexicans were particularly enthusiastic about England's research on sanitation and the *belle époque* urban architecture erected in France.⁶⁴

The following section of this chapter details the role that Porfirio Díaz played in the creation of the canal. Díaz had three reasons to build the Gran Canal: the lake beds would provide quality land to sell for agricultural use, sanitation and public health for Mexicans in the capital would improve immensely, and the massive structure would act as a symbolic tribute to the modern accomplishments of the Porfirian state. The chapter concludes by examining the literature published by the state that described the construction process and was used to

⁶³ Simon Dooling and, *Cities, Nature, and Development*, 4.

⁶⁴ For example, Paris and Mexico City both had low average life spans during the latter half of the 19th century. Miller, *An Environmental History of Latin America*, 143.

disseminate information to the rest of the world. A consideration of what Porfirians chose to highlight or downplay in these publications makes their purpose clear. Beyond simply wanting to share information, Porfirians were interested in stressing just how much Mexico had achieved in science, architecture, and engineering. They believed that the completed Gran Canal was one of the structures that ranked Mexico among the rest of the world's elite, modern countries.

Environmental Vulnerability Theory

The socio-ecological drivers that put people at risk in the environment of the Valley of Mexico are multiple: favoring land travel to waterways in an environment dominated by water, using an open water system as the city's personal sewage and dump site (some even say that it acted as a temporary grave for the Spanish who lacked land to bury corpses⁶⁵), stripping the land of trees and top-soil for city-architecture, and the tendency to react to environmental dangers only after catastrophes occurred seem to be the greatest drivers, as well as the most conspicuous, through the Valley's human history. Gregory Simon and Sarah Dooling derived several critical questions from their theory regarding environmental vulnerability theory, two of which I apply to Mexico City. The first asks what it means to be vulnerable. How could the people in the Valley of Mexico be *vulnerable* to their environment?

As it was described in the last chapter, Mexico City was in a precarious geographical position, causing the centuries old vulnerabilities of flooding, disease, and sewage mismanagement to accrue from the start. Governments continually tried to drain and route the waters in Mexico City in order to defend themselves from further destruction wrought by the *natural* environment, such as weather phenomena and the geology of the Basin, and the *built* environment of sinking streets, poorly constructed buildings, and poorly maintained canals. Their attempts to move water away created an even more unstable environment because the city began to sink due to collapses in the water shelf as a consequence of the rapidly shifting

⁶⁵ Simon, *Endangered Mexico*, 65.

and decreasing lake water. Events like flooding, disease, and earthquakes amassed vulnerabilities in the form of death and failed infrastructure that accumulated for hundreds of years. From 1822-1900, there were about 78 floods in the Distrito Federal and the State of Mexico.⁶⁶ In the case of Mexico City, Díaz believed that the use of state-of-the-art technology, engineering, and science could mend his drowning city: the Gran Canal worked to alleviate these vulnerabilities.

The second question extended by environmental vulnerability theory concerns the degree of endangerment and risk to which a society is subject. Is a society encapsulated in a vulnerable environment in constant danger, or might it be implied that it exists in an elevated, but not imminent, state of risk? The difference between the two conditions is slight, but important. Simon and Dooling write, “Experiences of being at risk can intensify as conditions change and threats emerge; likewise, experiences of risk can be alleviated by minimizing exposure to harm and shifting the risk to a different place or group of people.”⁶⁷ It is my contestation that a society in constant danger is more willing to seek solutions to its vulnerability in comparison to a society which experiences an elevated state of risk. I would further argue that the Mexican government controlled the state of environmental risk that Mexicans perceived in order to fulfill or protect its own agenda.

For example, in the year 1864, there were four floods in the Distrito Federal that infected homes with flood and sewage waters, and yet, only one newspaper, *El Pájaro Verde*, described the event.⁶⁸ Records show that the capital city experienced flooding every single day for the month of August in 1865.⁶⁹ Why did the Mexican government, then under the rule of Emperor Maximilian, not take action at this time to clean the homes, the streets, and start a new project

⁶⁶ The work of Antonio Escobar Ohmstede was used for this calculation from *Desastres Agrícolas en México: Catálogo Histórico 2*, (Distrito Federal: Centro de Investigaciones y Estudios Superiores en Antropología Social Fondo de Cultura Económica, 2004).

⁶⁷ Simon and Dooling, *Cities, Nature and Development*, 10.

⁶⁸ The floods were 29-31 August, September, October, and 1 December 1864. Escobar Ohmstede, *Desastres Agrícolas en México*, 92.

⁶⁹ *Ibid*, 93.

to keep the city clean? The state did nothing of the sort because it served no purpose to do so: the state did not have the means or the technological knowledge and ability to fix the problem of constant flooding. Furthermore, these floods were proof that the drainage project at the time, Garay's canals which crossed five major lakes, failed due to the radical shifts in government, unsupported finances, and lack of technology. The Mexican state was not eager to make itself look incompetent by publicizing this information by addressing the floods of 1864. When it was suitable, society remained at an elevated state of environmental risk, a condition that was familiar to Mexicans who lived at the flood lines.

Díaz championed the interpretation of the environment as being in constant and imminent endangerment, however. In 1887, a year after 300 homes were destroyed in a two-day storm, another flood swept through Mexico City, grabbing the attention of two newspapers, *El Diaro Hogar* and *El Siglo Diez y Nueve*, which listed what businesses were affected and how the flood occurred.⁷⁰ This event also gave Díaz the opportunity to make an announcement to the people of the capital, where he described the terrifying event, characterizing it “as making it more difficult to drain the capital.”⁷¹ This would not do for Mexico City because Díaz had plans to make it an urban center on par with Paris, London, and Chicago, and muddy homes blurred the line between city and countryside.⁷² In order to gain the support of the elites in Mexico, Porfirians saw that this story about the flood reached the national press, making headlines in more than one of the most popular newspapers. By conducting this publicity campaign, Díaz intended to persuade citizens to believe that their capital was beyond a simple “elevated risk,” and that their environment threatened to overturn the city with floods, stagnant waters, disease, and filth. The natural environment worked in conjunction with the nineteenth-century intellectual environment to create the circumstances that allowed for Díaz to change the country's imagination of nature and its control. In the next section, I will describe nineteenth-century

⁷⁰ Agostoni, *Monuments of Progress*, 55.

⁷¹ Porfirio Díaz, cited in Escobar Ohmstead, *Desastres Agrícolas en México*, 170.

⁷² Agostoni, *Monuments of Progress*, 55.

liberalism that allowed for the shift in understanding nature and politics.

Doused Political Discourse

Water in the nineteenth-century came to symbolize and indicate many things: cleanliness, health standards, hygiene, sanitation, and mortality. At first, it was France who led the way in experiments that connected water to science and health, but soon the field of public health and sanitation grew internationally. For example, in 1884, the famous German doctor leading the way in tuberculosis research, Robert Koch, gave a seminar in Berlin about cholera, and its distribution via contaminated water. By 1885, versions of his lecture were published and used in Mexico.⁷³ As their experiments gained popularity, scientists' and hygienists' publications were translated and made available to wider audiences. Another example comes from Sweden: a pamphlet from the famous Finnish hygienist, Albert Palmberg, made its debut in the Swedish language in 1889, and described the public health standards in Britain, Belgium, France, Germany, Austria, Sweden, and Finland. It was published in French in 1891, in Spanish in 1892, in English in 1893, and was reprinted in 1895, making Palmberg's research very accessible to interested parties, like those in Mexico City, who were eager to compare and contrast health systems that worked and failed.⁷⁴

Scientific thinking that figured into successful health systems increasingly developed connections between odor, atmosphere, and impurity. Scientists believed that scent-free, clear water resulted in clean and morally aligned people.⁷⁵ Great Britain's noted social reformer,

⁷³ Alejandro Tortolero Villaseñor, "Transforming the Central Mexican Waterscape," in Christian Brannstrom, ed., *Territories, Commodities and Knowledges: Latin America Environmental History in the Nineteenth and Twentieth Centuries* (London: Institute for the Study of the Americas, 2004), 125.

⁷⁴ Heikki Vuorinen, "The Emergence of the Idea of Water-Borne Diseases," in Petri S. Juuti, Tapio S. Katko, and Heikki S. Vuorinen, eds. *Environmental History of Water: Global Views on Community Water Supply and Sanitation* (London: IWA Publishing, 2007), 111.

⁷⁵ The research performed by Pierre Jean George Cabanis began these theories by grounding them in experiments and methods in the mid eighteenth century; Honoré de Balzac was an admirer of smells and the way that they detect class status, and used it in his *La Comédie humaine* to make an olfactory map of Paris. See Charles-Leonard Pfeiffer, *Taste and Smell in Balzac's Novels* (Tucson: University of Arizona, 1949) and Alain Corbin, *The Foul and the Fragrant: Odor and the French Social Imagination* (Boston: Harvard University Press, 1986) for more information.

Edwin Chadwick, picked up these conclusions in the publication, *Report on the Sanitary Condition of the Labouring Population of Gt. Britain*, completed in 1842. This and the subsequent research about the sanitary conditions of urban centers produced by the British made them the new leaders of the sanitation movement that wielded the most influence on countries like Mexico.⁷⁶ For Chadwick, there were four conclusions that he drew from his research concerning the sanitation of Great Britain's urban centers: 1) that disease was caused by “atmospheric impurities produced by decomposing animal and vegetable substance, by damp and filth, and close and overcrowded dwellings,” 2) that disease is always present under these conditions and can be alleviated by “drainage, proper cleansing, better ventilation, and other means of diminishing atmospheric impurity,” 3) that cleanliness relies on the purity of water, and 4) that “the primary and most important measures...within the recognized province of public administration, are drainage, the removal of all refuse of habitations, streets, and roads, and the improvement of the supplies of water.”⁷⁷

The standout development that Chadwick made was to claim that the state was responsible for the health of its citizens by providing, in the very least, the removal of the most harmful medium of disease: uncontrolled-water. Not only did he connect state formation and the control of water, but he also continued to link the moral character of people and their environment. For example, he contended that when an urban environment did not have fresh, clean water, it tended “to incite the habitual use of ardent spirits,” which resulted in an immoral, sick, and degenerate urban class.⁷⁸

This link between the character of a sector of society and its immediate environment was not Chadwick's own theory. Wilhelm Riehl's *The Natural History of the German People*,

⁷⁶ It may be deduced that, for this reason, the *Junta* and Díaz chose a British form to take over the construction of the Gran Canal, since Great Britain was, by this time, prolific in its sanitation and hygienic infrastructure. Edwin Chadwick, *Report on the Sanitary Condition of the Labouring Population of Gt. Britain*, ed. Michael Walter Finn (Scotland: Edinburgh University Press, 1965), 422-423.

⁷⁷ *Ibid*, 422-423.

⁷⁸ *Ibid*, 197-198.

published in four volumes during the 1840s and 50s, was the first to suggest that the national character of a state and its people comes directly from their relationship with their natural environment.⁷⁹ Rhetoric that tied environment to state character, like Riehl's theories, was a problem for Díaz since the Mexican environment could be so out of control and destructive. The forests of Germany protected and strengthened the German people, just as the seas of Great Britain gave the peasants certain sea-worthiness.⁸⁰ In the meantime, the flood waters of Mexico seemed only to represent immorality and contamination.

A Maliciously Benevolent Dictator

While some historians strive to discover Porfirio Díaz's true intentions for wanting a modern state—be it for his own pride or for the good of Mexico—I argue that Díaz was nothing more than the product of his era.⁸¹ He embodied the contemporary contradiction: on the one hand, he cared deeply about the Mexican people, and by applying European philosophies that proposed adherence to social ordering, he hoped to lift his city out of the swamps to create the modern and enlightened citizenry. On the other hand, Díaz had massive amounts of profit on the line that required Mexicans adherence to the strict hierarchy of the new liberalism which resulted in thousands of *peones* (peons) toiling away on the drainage project or clearing their homes to make way for farm land. If we follow the popular human body metaphor proposed by the *científicos*, then some individuals were lucky enough to be the heart or the brain of Mexico City, while the rest of Mexican citizens had the mundane job of keeping the city alive.

Several Mexicanists agree that the terminus of the Gran Canal was the greatest modernizing accomplishment made by Díaz, but most importantly, Díaz himself thought the

⁷⁹ Wilhelm Riehl, *The Natural History of the German People*, translated by David Diephouse (Lewiston: The Edwin Mellen Press, 1990), 63.

⁸⁰ *Ibid*, 47-49.

⁸¹ Especially in comparison to Benito Juárez, Porfirio Díaz comes out with as a more contested character. See Paul Garner's chapter, "The Civilian and the General, 1867-1911," in William Beezley, ed., *A Companion to Mexican History and Culture* (Marlton: Wiley-Blackwell, 2011), 288-315.

project would be his crowning glory in Mexico City. After the completion of the canal, “[Díaz] considered Mexico City to be the showcase of this regime and the most visible symbol of order and progress,” writes Porfirian historian James Garza.⁸² Controlling the waters in the city was an all-time necessity if Díaz was going to show the industrialized world that his country was worth taking interest in. Claudia Agostoni, another Mexican historian, writes that “the draining and cleansing of the menacing environment and thus the conquest of the water that had besieged [the capital] throughout its history, was seen as an essential requirement for its prosperity and modernity, and this conquest was also regarded as an indicator of progress and civilization.”⁸³ Agostoni and Garza interpreted Díaz's actions as a tool for economic prosperity and a way to get one foot into the modern world market. Historians like these see less of the benevolent dictator, as Díaz approved uprooting villages, preferred foreign investment over local markets, and sold rich lake-bed land to the highest bidder instead of making it available to the recently displaced villagers.⁸⁴

Other historians tend to interpret the actions of Díaz as part of a mission to make the modern Mexican, who was, first and foremost, healthy. Emily Wakild writes, “By controlling the liquid of life in the city and expelling inconvenient run-off, [Díaz] wanted to protect citizens from disease and property from destruction.”⁸⁵ Healthy citizens implied a healthy city as well as a robust work force, similar to the healthy forest-peasants of Germany described by Riehl. Differing interpretations aside, however, historians cannot separate the state's health reasons from the economic opportunities that lake draining offered. The purpose of modernization projects was, as Tortolero Villaseñor wrote: “to expand irrigation as a means to boost agricultural productivity and to drain lakes for health and economic reasons.”⁸⁶ A healthy

⁸² James A. Garza, “Conquering the Environment and Surviving Natural Disasters,” in *ibid*, 319.

⁸³ Agostoni, *Monuments of Progress*, 115.

⁸⁴ Tortolero Villaseñor, “Transforming the Central Mexican Waterscape,” 131.

⁸⁵ Emily Wakild, “Naturalizing Modernity: Urban Parks, Public Gardens and Drainage Projects in Porfirian Mexico City,” *Mexican Studies/Estudios Mexicanos* 23, no. 1 (Winter, 2007), 120.

⁸⁶ Tortolero Villaseñor, “Transforming the Central Mexican Waterscape,” 121.

working class was the backbone of a prosperous economy, and as Tortolero Villaseñor also points out, a prosperous economy also had the means to import foreign firms for their technological and mechanical superiority. If the modern state was at stake, though, then Díaz was sure to bring his country up to the standards set by the industrialized world.

Constructing the Canal, Reinforcing the State

The drainage project had three components: the canal, the tunnel, and the drainage ditch. Construction began in 1879 under guidance from the former project head engineer, Francisco Garay. He would be replaced in 1884 by *científicos*, Don Luis Espinosa and Ricardo Orozco. The project had three main goals: “first, to stop the floods; second, to receive the dirty water and residue from Mexico City and drive them outside of the Valley; and third to control the waters in this same Valley, and, when it is necessary, to remove that which can harm it.”⁸⁷

Unfortunately, construction ceased from 1880-1884 under a new puppet government controlled by Díaz, but picked up again after the flood in 1886 with new vigor and immediacy. Also in 1886 a governing board was created in order to oversee the project: the *Junta Directiva del Desagüe del Valle de México* (Board of Directors for Draining the Valley of Mexico) consisted of *científicos* who handled contracting, day-to-day affairs, and releasing press announcements. Even though *científicos* were put in charge, Díaz micromanaged the entire project by demanding daily reports and any updates or unforeseen issues.⁸⁸

At first, the *Junta* contracted two American firms, Bucyrus Company and Read and Campbell, to run the construction sites. The Mexicans disliked their management and spending, but mostly felt that the Americans could not keep to the strict deadline of finishing the project.⁸⁹ Flexing its muscles, the *Junta* dissolved its contracts with the Americans after three years and

⁸⁷ *Memoria histórica, técnica y administrativa de las obras del desagüe del Valle de México* 1, IX.

⁸⁸ Perló Cohen, *El Paradigma Porfiriano*, 31.

⁸⁹ The first of three documents rescinding the contract with Read and Campbell lists the *Junta's* grievances with the contractors, the breaks from their original contracts, as well as a detailed receipt of how Read and Campbell spent the money granted to them by the *Junta*. *Memoria del Desagüe del Valle de México, Apéndice al Libro Quinto*, 257-267.

made a power move over to the British contractor, Pearson & Son, in 1889. The American companies, interested in maintaining their reputation, kept some of their engineers on the project, with the *Junta's* approval, who continued to oversee the work and the use of machinery.

Pearson & Son was represented by Weetman Pearson, who left a rich archive of letters and journal entries between himself and the Vice President of the *Junta*, José Yves Limantour. Historian David Aguirre argues that places in Latin America, like Mexico, were an unofficial part of the British Empire during the late nineteenth-century because of the amount of infrastructure built by the British and land that they owned for agricultural purposes.⁹⁰ A close reading of the correspondence between Pearson and Limantour about the Gran Canal, however, reveals a relationship far more complex than one of simple dominance and subordination. Limantour's central task was to attract foreign investment, just as much as it was, as historian Paul Garner writes, "to protect Mexico's economic and political sovereignty."⁹¹ This goes directly against Aguirre's assertion. The power wielded by Limantour and the *Junta* is an example of how the state perceived itself as a modern entity because of its independence from empires. Limantour constantly argued down the prices that Pearson and his representatives suggested for all of their projects in Mexico (Pearson was involved in several projects that included the Gran Canal). Both Limantour and Pearson respected each other and developed a relationship that honored each other's wishes and financial business, neither was the master of the other.

John Body, the chief manager for Pearson & Son in Mexico, kept his own notes about what he experienced while working on the drainage project, offering more intimate details than the pennies and soils recorded by the *Junta*. While the actual nationality of the workers has not been unearthed, Body labeled them as "Indians" who removed dirt and stone "to a distance of

⁹⁰ David Aguirre, *Informal Empire: Mexico and Central America in Victorian Culture* (Minneapolis: University of Minnesota Press, 2005).

⁹¹ Paul Garner, *British Lions and Mexican Eagles: Business, Politics, and Empire in the Career of Weetman Pearson in Mexico, 1889-1919* (Stanford: Stanford University Press, 2011), 75.

100 feet, in a rough net or basket, each man carrying and digging alternately.”⁹² Body was impressed by the work completed by laborers, writing that “the Indians execute all kinds of earthworks very satisfactorily provided care is taken to keep the work at proper time and level.”⁹³ The workers were probably a combination of Yaqui Indians from northern Mexico, expelled locals, Chinese coolies, and run-of-the-mill laborers in need of work. Enough accidents happened at the construction site of the tunnel and canal that a hospital was constructed nearby specifically for the men injured on the job.⁹⁴ Overall, more than 12,000,000m³ of Mexican soil was excavated, some 4,800,000m³ coming from the hand-labor. After spending money on contractors, excavation equipment, lumber, stone, iron (and other construction metals), as well as paying the engineers and the day-laborers, the total cost of the drainage project was 15,967,778.17 pesos (approximately US\$1,232,899 in today's currency). Pearson alone made 7.8million pesos.⁹⁵

Once finished in 1900, the canal covered over 30 miles of Mexican land, starting from the barrio of San Lázaro east of Mexico City; the open canal then winds through the Distrito Federal, the state of Mexico, then the state of Hidalgo before leading out to the tunnel by the Tula Valley. Its greatest width was 6.4m, and its maximum depth was 22m. While most of the canal's length was dug out by hand and shovel, dredges were brought in by the English. Díaz was so impressed by these magnificent machines, eye-sores though they were, that he had them christened like ships leaving for the sea. They were The Carmen, The Lucy, The Conchita, and The Annie; the biggest, The Carmen, was named after his publicly admired and beautiful wife.⁹⁶ The entrance to the canal in San Lázaro served as the stage for Díaz's public announcement of the project's completion, an affair that boasted national and international

⁹² John Body, cited in Agostoni, *Monuments of Progress*, 129.

⁹³ *Ibid*, 129.

⁹⁴ Rosenda Esperaza, “Reseña Administrativa y Económica de la Junta Directiva,” in *Memoria histórica, técnica y administrativa de las obras del desagüe del Valle de México*, 544-5.

⁹⁵ Agostoni, *Monuments of Progress*, 129; Tortolero Villaseñor, “Transforming the Central Mexican Waterscape,” 130-132.

⁹⁶ Miller, *An Environmental History of Latin America*, 144.

guests. Overall, under the leadership of the head engineer Luis Espinosa, the canal had taken 21 years to be completed.

While the canal covered the most land ever used for such a purpose and boasted the use of the highly technical English dredges, the tunnel was also an impressive piece of the project. It was finished at 3 a.m. on the morning of New Year's Eve, 1894, after nine years of construction. Unlike the canal, which incorporated pre-existing irrigation and water paths in its design, the 10km-long tunnel was constructed from the ground up during Díaz's reign. No state-of-the-art technology was used, but the fact that the tunnel could pump water out at a rate of $18\text{m}^3/\text{sec}$ using the forces of gravity alone piqued the attention of engineers and urban architects alike, while the whole project's height, size, and length awed the audience during its inauguration.

A Water-Built State

The *Junta* kept very close notes about certain aspects of the canal's construction for its own records, for its reports to the president, and to keep on hand for later publications. This section, focusing on the final use of these notes, argues that publications were an important means by which Porfirians expressed their conceptions of modernity. By using these publications, the Mexican state could interest an international audience in the Gran Canal, and once that was achieved, they could draw attention to the city, the new crop-land, and opportunities for more projects. By publicizing the accomplishment of the Gran Canal, Díaz believed he could obtain glory for Mexico City and the country.

In 1901, the *Junta* released the massive three-volume history of the drainage system titled *Memoria histórica, técnica y administrativa de las obras del desagüe del Valle de México*. The contributing authors, four in all, created five parts in the first volume that described 1) the history of the Valley of Mexico from the conquest of the Aztecs up through the 1850 drainage

project, 2) the physical description of the construction, 3) the technical description of construction—including geological, chemical, and mechanical descriptions (taking up two parts), and 4) a detailed and descriptive financial report. The second volume is an appendix to first, including receipts, soil descriptions, and correspondence. The third volume is dedicated to maps and cross-sections of the Gran Canal and the projects before it. Independent authors and publishers borrowed different sections of the all-encompassing *Memoria* to disseminate information to various target groups: economists, politicians, engineers, architects, scientists, and hygienists. Porfirians wanted to show international and local interests that Mexico was serious about this modernizing agenda, and these authors and publications made a commotion of certain narratives that shone particularly on Mexico's successes in the project.

One way that these publications made an example of Mexico as a competent and respectable business partner was their affair with the American companies. First, though, the question of why the *Junta* chose foreign firms to tackle the drainage project instead of training their own men in engineering, management, and architecture needs to be considered. The most prominent *científico* and Díaz's most trusted adviser, José Yves Limantour, was quoted in the *Memoria* as saying that these foreign men “have acquired enough experience in similar tasks, have the tenacity and spirit to see through tasks of this nature, and surpass all difficulties be they technical or economic.”⁹⁷ The use of overseas contracting made the Porfirians seem cutting-edge, drawing as they did on the latest foreign technology. It also displayed how much more highly the state's leaders regarded foreign imports than they did home-grown knowledge.⁹⁸ Considering how long it had taken Francisco de Garay—a Mexican architect trained in London and Paris—to construct his portion of the Gran Canal in the previous drainage project, , Porfirians lost the trust they held for their own people and wanted to work directly with the foreign experts who had developed new techniques.

⁹⁷ Rosenda Esperaza, “Reseña Administrativa y Economica de la Junta Directiva,” 556-7.

⁹⁸ Garner, *British Lions and Mexican Eagles*, 66.

Relationships with foreign contractors were not always free of troubles. The Americans, for example, did not display the “tenacity and spirit” that the *Junta* was looking for, and the contract was dissolved. Rosenda Esperaza, author of the financial section of the *Memoria*, wrote that the Americans found the work to be “not possible...inconvenient and prolonged...and [the funds] too insufficient to cover the costs of the works.”⁹⁹ Esperaza wanted to make the Mexican government appear at ease and like an ideal business partner to the readers of the *Memoria* by downplaying the near catastrophe of losing of a contractor. Instead, he stressed the amount of modernization and long-term investment needed to confront the difficulties of the Valley’s aqueous environment. “The water,” he wrote, “which usually requires ceaseless pumping; the water today, specifically in Zumpango, makes the powerful new facilities insufficient; the water, finally makes it difficult to calculate successfully the cost of the work in the future.”¹⁰⁰ By articulating the environmental necessity for trustworthy contractors, Esperaza seems to imply that the American companies did not prioritize the Gran Canal project as the Porfirians desired. Releasing Read and Campbell and Bucyrus, he argues, was a symbol of Mexico’s ability to cast out unworthy service-providers in order to achieve only the best and most modern structures for the country. By making this claim, Esperaza suggests the notion that the Porfirians found themselves in a better position than Americans, in terms of modernizing projects and hydrology.

Not surprising, though, was how much this same example was downplayed when this material was made for a specifically American audience. The issue of the American companies’ dissolved contracts was glossed over in the 1901 publication of the *Brief Sketch of the Drainage of the Valley of Mexico, Written Expressly for the Delegates of the Pan-American Congress*, and was hardly mentioned in the 1907 *Drainage Works in the Valley of Mexico, Information Written for the Members of the Society of “American Civil Engineers.”* Not wanting to upset the

⁹⁹ Rosenda Esperaza, “Reseña Administrativa y Economica de la Junta Directiva,” 578.

¹⁰⁰ *Ibid*, 578.

giant of North America, Mexico preferred to demonstrate its superior contracting and management skills without being disrespectful. The Mexican government, which in the very early twentieth-century controlled a majority of the presses in the Distrito Federal, was pumping out propaganda that lured in two different types of people: the type with the technically trained eye, keen on making a name in engineering, and the investor, interested in making a profit on Porfirian modernization projects.

In 1907, the *Drainage Works in the Valley of Mexico, Information Written for the Members of the Society of "American Civil Engineers"* was published inside Mexico City. The 33-page pamphlet was an abridged translation of some of the *Memoria's* highlights, released seven years after the Canal's stately unveiling, a period which the American engineering audience had not received any news. Porfirians wanted to recapture the interests of these engineers with a pamphlet dedicated specifically to them. Other factors contextualized the significance of the timing: in 1910, the Mexican state would host a great celebration of its Independence Day centennial anniversary, which also happened to correspond with Díaz's 80th birthday. It is not unusual that the government would begin to catalogue its achievements in the years leading up to this event.

By bringing attention back to the drainage project, Porfirians hoped to remind engineers that Mexican modernizing projects were still ripe for the picking. The country aspired to gather the interest of these technically minded individuals, invite them to visit the Gran Canal during the celebrations of 1910, and hopefully convince them to invest in their own, new projects for Mexico. As the leaders of a country with such a grand accomplishment as the canal, Porfirians were eager to be relevant in the conversations about modernization by enticing more projects, specifically cash-crops in the lakebeds or other agricultural experiments.¹⁰¹ Even though the American companies did not work out initially, Porfirians still invited them to partake in future projects.

¹⁰¹ Tortorlero Villaseñor, "Transforming the Central Mexican Waterscape," 121.

Publications such as the English-language release of 1907 built on a history of state-produced literature intended to situate Mexico within the world of advanced nations. Many date to the Pan-American conference of 1901. This conference, the second meeting after the first convention in 1890-91, was significant for Mexicans since it would be held in their capital. At the first conference, held in Washington D.C., a precedent of “economic mechanisms of cooperation” was established and the United States presided over the conference as host country.¹⁰² Key statesmen, as well as economic and cultural representatives, from eighteen different countries were present for the first delegation, making a show to each other for marketable competition and interest. For as smoothly as the first conference had gone ten years prior, the Mexicans believed that the same honors would be bestowed onto them as the hosts of the second conference: the same respect and attention that the United States wielded would be passed down to its southern neighbor, and they would take advantage of it.

From 1901-2, delegates from the U.S., Central, and South America gathered in Mexico City, just one year after the completion of the Gran Canal. In a conference that was dominated by trade agreements, economic systems, and security/borderland conversations, the *Brief Sketch of the Drainage of the Valley of Mexico, Written Expressly for the Delegates of the Pan-American Congress* seemed out of place. Another abridged version of the *Memoria*, the *Brief Sketch* used more description, history, and financial data than the technological processes detailed in the 1907 *Drainage Works in the Valley of Mexico*. Specifically, the *Brief Sketch* focused on describing the Valley of Mexico, previous drainage projects, how the canal was built, which materials were used, who the contractors were, how much they spent, and the final dimensions of the canal.

The audiences that the state was interested in capturing were the politically trained men who attended the conference and would want to work with Mexico to make international trade

¹⁰² Monica Herz. “Does the Organization of American States Matter?” *Crisis State Research Centre*, paper 34 (4/2008), 5.

relationships and investments in agriculture. By showcasing the Gran Canal, pointing out its colossal features, their knowledge about soils, hydrology, and engineering, and their ability to negotiate with multiple and foreign companies for nearly two decades, the Mexican state expressed its modernity on an international scale. *The Brief Sketch* made it clear where the State situated itself within the North, Central, and South American continents: “The 17th of March 1900 will always be a memorable day on account of the works which were on that date inaugurated. [...] It will make of Mexico one of the most agreeable places of residence amongst the Capital Cities of the American Republic, for its beauty, salubrity and climate.”¹⁰³ The Pan-American conference of 1901, while not receiving the European countries that the *científicos* preferred, still offered Mexico the opportunity to be the dominant country south of the United States (given by the way they treated the U.S. companies in some of the publications, it would seem that Porfirians might assert that they exceeded the Americans in modern business manners). As a dominant country, Mexico hoped to be amongst the other modernizers in the world to participate, not as a peripheral country, but as a core economic system.¹⁰⁴

The Porfirians were not explicitly calling themselves or the state of Mexico modern, but they were intentionally expressing their claim to modernity through these and other texts. They believed that their Gran Canal would eliminate the status that had haunted the country's past: a capital at the mercy of its environment. This was a city that lost one-third of its population to disease within a decade's time: 83,000 city residents died between 1867 and 1877, a mortality rate that both shamed and charged Díaz and his advisers.¹⁰⁵ Their liberal mindset abhorred traditional markers that infiltrated and infected their capital city. The mud and filth that floated in with storm and flood water was too reminiscent of the countryside to belong in a metropolis. The Gran Canal achieved what environmentalist Joel Simon claims to be “one of the most

¹⁰³ *Brief Sketch of the Drainage of the Valley of Mexico, Written Expressly for the Delegates of the Pan-American Congress*, 17.

¹⁰⁴ “Core” and “periphery” borrowed from Immanuel Wallerstein, *World Systems Analysis: An Introduction* (Durham: Duke University Press, 2004).

¹⁰⁵ Miller, *An Environmental History of Latin America*, 143.

monumental ecological transformations in human history.”¹⁰⁶ Perhaps Porfirians were unaware of how “monumental” a change their Gran Canal ushered in for the Valley's environment, but they were not blind to how impressive their feat was in a history of thousands of years of lakeside culture, and their publications made sure that their carefully picked readers appreciated this fact as well.

Conclusion

Even though Mexico had other significant modernization projects completed and gaining respect while the Canal was still in construction, Mexican environmental historian, Shawn Miller, saw the Gran Canal as the one project that totally encompassed the entire modernization package like no other could: “to conquer time and space, the geographic distances and the topographic obstacles that stood in the way of extending the tentacles of globalization beyond the seaports.”¹⁰⁷ In addition to conquering time and space, the Gran Canal worked in conjunction with Díaz's goals to create the modern state by attracting foreign investment and boosting the confidence of the Mexican government. It is not often that a state can boast about controlling a force of nature, and then make a profit from it.

It could be argued that the Gran Canal failed to be the great modernizing tool for Mexicans because of the continual flooding to the city streets, the eventual rise in urban mortality rates, and the inability to create a successful sewage system. Díaz, though, saw the Canal as a point of departure for his country, as a real model of modernity and control that the Mexican state accomplished in the name of the state and for the health and happiness of its future. In truth, Díaz's pride came from taking water—a deadly, unpredictable, and filthy character in the national history of Mexico—and taming it into the ideal Mexican citizen.

The following chapter will continue the saga of modernity by leaving the heart of Mexico

¹⁰⁶ Simon, *Endangered Mexico*, 68.

¹⁰⁷ *Ibid*, 139.

City and looking more closely at individuals. The Canal de la Viga, one of the failed Spanish drainage projects that avoided pre-Porfirian, Independence-era demolition, offers a unique window for historians to perceive how nature influenced the construction of the modern self. Where the Gran Canal firmly rooted the positivist, scientific, and technologically-minded person to their belief system, I will argue that the Canal de la Viga imposed a modern individual immersed in contradictory relationships between romanticized ideas about modernity and the reality of environmental conditions. By doing so, I will answer another crucial question posed by Simon and Dooling's vulnerability theory: How are conditions of being vulnerable created and perpetuated by uneven, discriminating, and exclusive levels of access to economic resources, political power, and strategic alliances?

CHAPTER 3:
THE CANAL DE LA VIGA AND MEXICAN MODERNITY

Cora Hayward Crawford and her family left eastern United States the 1880s destined for what she called, “The Land of the Montezumas.”¹⁰⁸ She traveled from the top of the state Chihuahua down to the coast of Veracruz, but not before she spent several weeks in the country's capital, Mexico City. There, she visited churches, ancient architecture, and learned the country's history, but it was the *chinampas* that animated her the most. She wrote, “Perhaps no point in Mexico inspires more romantic interest in the heart of the tourist than the so-called Floating Gardens; and, therefore, it is with no little enthusiasm that we start on our trip to these isles sacred to the memory of early Aztec occupation in the country.”¹⁰⁹ Taking a quick trip from her hotel in a street-car, she and her travel companions found themselves stepping out onto the Paseo de la Viga, at which point they were “beset by a score of vociferous boatmen” who were ready to take them down the canal in their decorated boats.¹¹⁰

It was not until their guide weeded through the *boteros* (boatmen) that he found one who would charge a reasonable price to take the whole party down the Canal de la Viga and then into the *chinampas*. It was on the canal that Crawford described such relaxation and pleasure that readers would surely wish that they themselves were there next to her:

“The Viga is exceedingly interesting, with its banks shaded by graceful trees, and with its boats passing to and fro, stirring in the breeze. It is a narrow strip of water, intended only for small boats, and is the great thoroughfare by which the natives bring in their loads of vegetables for the city markets. Our boatman propels us with a sort of gentle, undulating motion by pushing with his long pole, now against the shore, now against the bottom of the canal, keeping time with snatches of songs interrupted by the exchange of sallies with his fellows.”¹¹¹

Crawford had a fun time at the Floating Gardens once she got there, where she spent the

¹⁰⁸ Cora Hayward Crawford, *The Land of the Montezumas*, 2nd ed. (New York City: John B. Alden, 1889), 23.

¹⁰⁹ *Ibid*, 277.

¹¹⁰ *Ibid*, 277.

¹¹¹ *Ibid*, 277-78.

afternoon exploring and making comments about the traditional rituals of the Indians of (presumably) old and honorable Aztec heritage. When her party was finished with visiting the *chinampas*, they boarded the boat and floated straight back down the Canal de la Viga, where “the novelty of the ride and the scene was too great for monotony,” and then, “unwillingly we stepped upon the shore again at the point where we were to take a car to the city.”¹¹²

Crawford's judgments of La Viga were not unique, as several foreigners visiting Mexico City used the Canal de la Viga to gain access to the famous Floating Gardens. In addition to travelers enjoying what La Viga had to offer, the neighborhood was also popular with elite Mexicans. Contemporary Mexican historian Luis González Obregón mentioned La Viga in a description of the Day of the Dead festival in the capital city, setting the people in La Viga in a different lens than the rest of the celebrating people.

He described the men in the neighboring suburb, La Orilla, as having well-trained horses, pure silver buttons, leather and kit-skin pants, and ostentatious ornaments on every piece of their clothing. The historian then went on to say, “And the poor people, principally in La Viga, how happy they are, how elated, eating candy on the muddy banks of the canal, covered endlessly with boats, like flower boxes, manned by natives from the good old days of Moctezuma, dressed in their traditional clothing.”¹¹³ The description of La Viga begs images of nature and simplicity, of a tradition that can be visited and viewed without necessarily needing to participate in it. La Viga, in the eyes of the privileged and leisured, was an amusement that could not be missed on the itinerary.

We discovered in the first chapter that water acted as a deterrent in the process of state building, but found in the second chapter that Mexico experienced a moment's peace that

¹¹² Ibid, 280.

¹¹³ “Y la gente pobre, principalmente en la Viga, qué alegre, qué regocijada, comiendo golosinas a la orilla del canal cenagoso, cubierto por infinitas chalupas, tripuladas por pintorescas floreras indígenas de los buenos tiempos de Moctezuma, de trajes típicos.” Luis González Obregón, *La Vida in Mexico en 1810*, cited in *Remembranzas del Canal de la Viga, Iztacalco y Santa Anita* (Distrito Federal: Delegacio Iztacalco, 1993), 49.

allowed Porfirio Díaz to reassess and then control Mexico's natural resources, allowing Porfirians to rework the environment in conjunction with state formation efforts. This final chapter will look at the continuing relationship between water and society at a more local level that reveals contradictions and paradoxes as some Mexicans aspired to modernize according to world standards. This chapter examines how the built and natural environment of a neighborhood on the outskirts of Mexico City ebbed and flowed with modernization efforts according to how individuals interacted with the two different environments. The *barrio* (neighborhood) of La Viga offers a window to view how individuals used their environment to construct modern self-images that they thought would reflect Victorian and *belle époque* culture during the latter half of the nineteenth-century.

This chapter is comprised of three sections. The first section will be an analysis of William Beezley's *Judas at the Jockey Club and Other Episodes of Porfirian Mexico*. Beezley finds that during the Porfirian era the pluralism of the lower class and the upper class became stratified and distant in the pursuit of modernization and progress. Focusing on La Viga in this chapter, Beezley's argument comes to life as images and descriptions of the canal portray the growing schism between *los de arriba* ("the upper class") and *los de abajo* ("the lower class"). By combining his ideas about socially-determined culture with people's experiences with the environment, Simon and Dooling's vulnerability theory emerges from the folds: *los de arriba* involved themselves with a nature that was built for them in the form of picnic areas, sidewalks, and tourist-sized boats, whereas the natives of La Viga settled for the natural environment, the "raw" features that allowed them to wash clothes and catch fish, but also being the most vulnerable to the pollution that so often plagued the canal. This section will apply vulnerability theory to environmental and cultural methods in order to set the stage for La Viga's history during the Porfiriato.

The second section will describe the birth of La Viga as a canal and then as a popular meeting site. Because of its placement close to the city and to the well-traveled lakes within the

Basin of Mexico, La Viga grew into a place that was used by a variety of people since colonial times and became more than just a canal. Paintings, photographs, poems, and journal entries from elites and traveling foreigners reveal that La Viga's environment was important to them in remarkably different ways than it was for Vigans themselves.

These elite-produced sources evidence Beezley's theory explored in the first section of this chapter: the characters in their poems and stories and the subjects in their paintings and photographs are separated completely in terms of their social class, which resonated with how they used their environment. Elites envisioned themselves apart from nature and included the native Vigans as another element of the tourist attraction that is La Viga. By doing so, *los ricos* (the rich) relied on the canal to see Mexico and participate in leisure activities that would complement their modern characteristics. The poetry, photographs, paintings, and tourist-driven blurbs in advertisements reveal the space as a safe, controlled, and romantic escape from the modernity of Mexico City.

To conclude, sources from scientists, hygienists, sanitationists, and some visitors reveal a different La Viga that at once contradicts yet resonates with the romantic interpretations of the place. In reality, La Viga harbored an environment that did not meet the sanitation requirements of the Porfiriato, and to some Porfirians, it represented a failure of the state to provide hygienic entertainment for its moneyed visitors. This section of the chapter suggests that the schism between the rich and the poor was more complicated than Beezley proposed: in the decades leading up to the Revolution of 1910, lacerations could be found all over society that divided people within their economic and social classes. Furthermore, I propose that the environment is one medium that Mexican historians should use in order to reveal these differences, as La Viga does with the two very different Porfirian Persuasions.

The Vulnerable Environment of *Judas*

While the Mexican State employed engineers to plan and construct drainage projects like the Gran Canal, they had Mexico City and the rest of the Valley of Mexico to look after. Regardless of the weather, modernization was still the primary goal, and in the 1890s Porfirians decided to change their urban landscape for the betterment of transportation and to accommodate city residents. Persuaded by a Philadelphia lumber company, the Porfirian government agreed to lay wooden boards down on some of the cobblestone sidewalks and streets in the city; by doing so, they hoped to add a couple inches of distance from flood, run-off, and inundated sewage waters, as well as add some traction for horses and mules to keep their footing. This was also a way to keep the filthy mud and water off the regime's "silver dollar wheels" of the newly minted automobiles that drove through the city, a metaphor used in several newspapers to describe Mexican prosperity.¹¹⁴ These wooden sidewalks were a source of pride for urban architects and Porfirians during the winter, but the first flood of the rainy season promptly drowned their egos. The wooden planks of progress were covered with water, swelled, and then drifted away down the streets, leaving the naked and gray cobblestones of the previous years under flood water and endangering people and animals in the way.¹¹⁵

William Beezley uses this anecdote, among many others, in the introduction to his monograph *Judas at the Jockey Club, and Other Episodes of Porfirian Mexico*. Porfirians still clung to the imagined success of the wooden sidewalks because, according to Beezley, the appearance of progress was more important than its success, "whether or not stone sidewalks sprung into the air or blocks of Philadelphia wooden pavement swirled in the water and mud of traditional Mexico."¹¹⁶ In *Judas and the Jockey Club*, Beezley is most concerned about showing how the gap between poor and rich Mexicans was a fundamental part of class-based cultures, and of traditional versus modern cultures, during the Porfirian era. He makes the argument that while Mexican elites identified as "Positivist European modernists," poor Mexicans were isolated

¹¹⁴ See, for example, *Mexican Herald*, 10/9/1895.

¹¹⁵ Beezley, *Judas at the Jockey Club*, 9.

¹¹⁶ *Ibid*, 10.

and discriminated against based on their inability either to access or to resist to the changes posed against their traditional lifestyle.¹¹⁷ In the end, the transition from one of the oldest standing social dichotomy in Mexico's history—*los de arriba* and *los de abajo*—into a standoff between cultures significantly influenced the events that tore the Porfirian dictatorship down and ushered in the Revolution in 1910.

Taking Beezley's argument and combining it with Simon and Dooling's vulnerability theory reveals the answer to the question posed at the end of the last chapter, that is, in what ways are conditions of being vulnerable created and perpetuated by uneven, discriminating, and exclusive levels of access to economic resources, political power, and strategic alliances? Beezley describes Mexico as being split into two groups: the traditional, rural, and poor people bumping shoulders with the modern, urban, and rich people. This is understood as a long-standing relationship in Mexican history when Beezley describes that the seating arrangement for bullfights in the sixteenth-century was the same as it was in the late nineteenth-century: poor people in the sun, rich people in the shade.¹¹⁸ By following a tradition that was steeped in colonial traditions, *campesinos* (“country folk” or “peasants”) continued to bear the brunt of the less advantageous circumstances which made them the more vulnerable to their environment. The Porfiriato, though, complicated this traditional hierarchy as elite Porfirians expected their countrymen to modernize alongside them by accepting newer trends in technology, while at the same time perpetuate typical stereotypes about the “Indians” and peasant workers.

For example, in Beezley's second chapter, “Rocks and Rawhide in Rural Society,” he shares an anecdote that describes the way that the *campesinos* responded to Porfirian-style modernity. When manual laborers were given wheelbarrows to move rocks, dirt, and bricks, they would often move them aside and use their more familiar and traditional tools like baskets. Such was the case that John Body noted when he described the men moving dirt and rock to make

¹¹⁷ Ibid, 6.

¹¹⁸ Ibid, 5.

the Gran Canal with only baskets on their backs. Multiple sources from around the country, though, remarked that some of these rural workers used the wheelbarrows in a more unique and probably more stressful way: “One worker working on the church loaded his wheelbarrow with bricks, lifted it onto his head, and trudged over to the masons. After emptying it, he replaced the wheelbarrow on his head and returned to the brick pile for another load.”¹¹⁹

This comical story may be illuminated by the theory that James Scott proposes in *Domination and the Art of Resistance*. Rural Mexicans participated in a passive-aggressive rebellion against the Porfiriato, leaving behind a “hidden transcript,” as Scott calls it, for historians to read into and discover more about the subaltern populations of *campesinos*.¹²⁰ Wheelbarrows would not lift all of rural Mexico from poverty, and neither would any other modern tool thrust into their hands. Their comfort lay in the traditions of their families and their villages, and they held fast to these rituals when Porfirians offered a dizzying amount of modernization and rapid change.

There are several reasons as to why the people in La Viga chose to do as they did. As an analysis of several images will show later in the chapter, Vigans opted to wear more traditional clothes—for comfort or because they received more tips by foreigners who wanted the *full* Aztec experience?—and preferred to use more old fashioned methods of labor. The most obvious of these was their choice to use the canoe, a form of transportation used as early as the Teotihuacanos. Why didn’t they use wagons drawn by horses or mules to pull their goods into the city? Why did the *campesinos* working at the church misuse the wheelbarrows? To answer, Beezley writes, “Poverty was hard enough; few wanted to compound this hardship with the frustration of vain efforts to change these conditions.”¹²¹ In this way, Vigans were vulnerable in their environment because they were either incapable of change for lack of opportunity or

¹¹⁹ Beezley, *Judas the Jockey Club*, 74.

¹²⁰ James Scott, *Domination and the Arts of Resistance: Hidden Transcripts* (New Haven: Yale University Press, 1990).

¹²¹ Beezley, *Judas at the Jockey Club*, 77.

resistant to modernity because the idea of molding to a different lifestyle was too large a burden to bear when hundreds of years of oppression had shown them otherwise.

In the absence of more complete sources, this chapter relies on the point of view which elites held of Vigans according to their desired experience, meaning that those seeking the “Land of the Montezumas” saw Indians unchanged by technology and modernity. In contrast, the Porfirians who looked for a way to change La Viga saw the dirty and unsanitary environment duplicated by its backwards inhabitants. In this way, though, the perpetuation of the vulnerability of the inhabitants of La Viga was certain through the eyes of the privileged; if they were part of the fauna, to be admired in their natural habitat alongside the fruits, vegetables, and flowers growing in their *chinampas*, then such was the way of their life and it was meant to be kept as a romantic moment in time. Regardless of floods or droughts, both of which affected the canal waters, and regardless of the high pollution levels in the canal and the surrounding area, Vigans were meant to stay as they were, continuing an existence that served to fulfill elite imaginations.

In addition to the individuals who held romantic points of view, there were also more policy-driven Porfirians who saw La Viga as a hazard to the public health. Putting their desires for a picturesque culture aside, these individuals saw that the canal was a place that collected disease and brought it into the city, and it was no coincidence that such a hazardous and dirty environment, in their eyes, yielded drunken and lazy inhabitants. Porfirians of this nature threatened to completely shut down the water-based way of life that Vigans had known for their entire lives and depended on. So on the one hand, Porfirians boxed the people of La Viga into a stereotype that perpetuated traditional ancient Mexico which, in turn, kept them in a pigeonhole: that all poor people were Aztec Indians and backwards with their traditions. But on the other hand, distinctly different Porfirians threatened the existence of a way of life preserved by the people of La Viga because of the state's beliefs about hygiene and sanitation. Either way, the people of La Viga remained at the bottom of the social ladder, and would remain so for as long as leisured Porfirians had the time to visit the suburb for their own agendas.

In accordance with Beezley's description, though, the lower class and upper class Mexicans cohabitated the same space: rural and urban, poor and rich, traditional and modern all existed together, but remained separate like oil floating on water. In the same way that *los de abajo* faced the sun during the *corridos*, the exact same social stratification played out in a photograph taken on the banks of the Canal de la Viga in 1885 by photographer American William Henry Jackson (*figure 1*). A boat intended to carry a small amount of passengers stands docked by the shore. In front is the *botero*, or oarsman, dressed plainly and brandishing his boat's flag colors for the camera. In the back are two men sitting underneath the boat's awning, enjoying the shade; both of them are wearing suits and bolo hats, smoking cigarettes and leaning one elbow outside the boat in a relaxed and comfortable manner. The *botero* is standing in the sun while the men who paid for the excursion are sitting in the shade, exemplifying the evidently "natural" social ordering described by Beezley.

By using Beezley's conclusions as a jumping-off point, we see that the Mexican environment, as well as the nation's culture, was a critical factor in conditioning the way that individuals experienced social ordering and vulnerability. La Viga is one such environment for historians to see these constructions that were based on the use of the environment: how different people used its waters, who took what water crafts and where they went, and their experiences with the Paseo de la Viga and Canal de la Viga differed greatly and inform us how modernity influenced people's relationship and interactions with the environment.

The Water and the Walkway

There are two histories of the built environment in the town of La Viga: the Canal de la Viga, and the Paseo de la Viga. The Canal de la Viga was built in 1750 as part of a greater water management plan. Some historians believe that this canal system had been part of the pre-Hispanic canals that moved water around their city to help manage flooding and agricultural production, and that it later became a part of the colonial system out of convenience or

necessity.¹²² The Canal de la Viga and a few other canals would grant access to a square-like moat around Mexico City (*figure 2*). This moat, never completed, was to serve the purpose of controlling storm waters, offering protection to the city, and managing sewage. Additionally, the square canal system would have made use of the old waterways that bore trade and transportation from around the Valley.

If we could take a boat ride on the entire canal system, we would need to pass the towns of Culhuacán, Mexicalzingo, Iztacalco, and Santa Anita before embarking on the Canal de la Viga and going directly into Mexico City.¹²³ As well, these canals crossed two of the five major lakes—Xochimilco and Chalco—to meet up with the main lake on which the city was founded, Lake Texcoco. Because of these connections, people far from Mexico City had the opportunity to make the commute into a major urban center. Unfortunately, the square canal system never quite made the connections it needed to, as was the case with most of the colonial *desagüe* projects. Only one-half of the project was completed, creating an “L” around the northern and eastern sides of the city, leaving La Viga as the only major southern access point for people to enter the capital via water crafts.

The Canal de la Viga was a popular spot for trading because of its placement as the city's gatekeeper, and was host to hundreds of boats bearing, among many other things,

“sesame, grasspea, ocher, sulfur, rice, sugar, calves, cascalote, coffee, coal, sheep, barley, beef jerky, Campeche wax, old copper, hides..., potatoes, salt from Colima, ground salt..., snuff..., bulls, [various cows], mahogany, Mexquite, cedar..., beams, floors, tables, hinges, foreign brandy, sugar, nails, dried chile, cacao, cognac, printed books, mezcal, foreign papers, turpentine, tar, iron, yarn, bran, oak wood, wool, and machinery.”¹²⁴

Casimiro Castro published a lithograph of La Viga in 1855 in the popular picture book *México y*

¹²² María de la Luz Moreno Cabrera, “La Garita de la Viga: un sitio histórico en la Línea 9 el Metro de la Ciudad de México” (Thesis, Escuela Nacional de Antropología e Historia, 1995), 43.

¹²³ *Guía completa de la ciudad de Mexico area metropolitana y alrededores : informacion autentica de calles, numeración de casas y un plano seccionado de la ciudad* (Distrito Federal: Guía Roja, 1978), 97.

¹²⁴ Araceli Peralta Flores, “El Canal de la Viga,” *Antropología: boletín oficial del Instituto Nacional de Antropología e Historia* 54 (1999): 3.

sus Alrededores, which has been reprinted several times under state tutelage in the last century and a half, showing the notable sights and tourist-worthy places in Mexico City (*figure 3*). Castro depicts the many ways of transportation that was associated with La Viga in this single image: foot travel, horse, carriage, and at least three different kinds of boats. It is clear by the picture, though, that the preferred method to enter the City was through the canal with boats.

In 1751, a *garita* (checkpoint) was established at the end of the Canal de la Viga on the border of Mexico City. Here, the state collected taxes on goods, trade and exchange, and for passage in and out of the city. Even after the colonial era ended, the *garita* was necessary to organize the flow of trade into the city: from 1858-9, a total of 2,220 water crafts passed through the waters of La Viga and into Mexico City.¹²⁵ The Canal de la Viga remained open and functioning when the other canals were covered, filled in, or forgotten during the nineteenth-century as a result of boat traffic and taxes collected by the Garita de la Viga. Even with the invention of the locomotive and the automobile, and the increasing pressure to drain canals to replace with streets, the Canal de la Viga stayed where it was, waters flowing, and the *garita* was still collecting its taxes in the late nineteenth-century.¹²⁶

The second part of La Viga is its famous Paseo de la Viga. Built in the late 1700s during the colonial age under the Bourbons, the Paseo de la Viga came under the reforms of the Count of Revillagigedo, the viceroy of New Spain. The Count's legacy includes many additions to Mexico City, including street lights, paved streets, aqueducts, and sanitation laws as he intended to make the city into a credible, proud, and attractive colony for Spain.¹²⁷ The Paseo de la Viga became a river walkway that was paved for the easy access of foot-traffic and carriages. It was two miles long, had trees lining both sides of it, and even included some picnicking areas with benches and tables. The Paseo de la Viga was often thought to be a place

¹²⁵ "685 trajineras, 960 de porte, 90 de medio porte y 485 chalupitas;" Peralta Flores, "El Canal de la Viga," 3.

¹²⁶ Ezcurra, *The Basin of Mexico: Critical Environmental Issues and Sustainability*, 36.

¹²⁷ Peralta Flores, "El Canal de la Viga," 4.

for leisured people to walk down for amusement, tranquility, and relaxation. For people who did not have the time to lounge or go for a stroll, the Paseo was a place to set up markets for vendors, dock boats into the canal, and drive teams of horses.

One image shows exactly how the Paseo was used for both sides of the social spectrum (*figure 4*). In another state-published book like Castro's, the lithograph "El Paseo de la Viga" features *los de arriba* sitting on stone benches with cigars, hearing stories being told by jongleurs, meandering about the Paseo, or walking onto boats for a ride downstream. *Los de abajo* spent time with their privileged counterparts either as said entertainers, as the *boteros* holding the ladies' hands as they walk onto their boats, or as the view that the men smoking their cigars can enjoy. The latter scene proves to be particularly interesting when we look at it more closely (*figure 5*). On one side of the canal sits the cigar-smoking gentleman with two other companions, cane leaning on his legs, wearing fashionable clothes and bolo hat. He is not participating in his friend's conversation, rather his back is turned away from them and he faces the viewer. On the other side of the canal is a woman sitting on her knees, washing clothes in a stream from the canal. Her own clothes are plain, her head uncovered, and she is focused on her chores and not on the man. Interestingly enough, it appears that the man is pointing across the stream and directly to her, as if to acknowledge her existence and look upon her labor.

It is evident that there is a class distinction between these two individuals: one lounging with his friends, the other working alone, one dressed lavishly, the other plainly. Also evident are the examples of modern and traditional by the way that the woman is sitting, bent over, on the ground, washing her clothes in a stream, whereas the man is sitting upright on a piece of furniture. The space between them indicates their separation, but he is also pointing at her either with interest, to beckon her, or perhaps in recognition. The simultaneous existence of social disparity, as Beezley showed, can be interpreted by his acknowledgment of her; in addition, the picture also displays the same incongruity that the two experienced with their environment. The impoverished woman is relegated to a space that equates her to her natural

surroundings: the stream from the canal, the chore of washing her clothes with the canal water directly, and her body seemingly rooted to the ground like the tree next to her. *El rico*, in the meantime, is assigned to an engineered environment that requires maintenance, such as the stone bench that he sits on.

In this image, the viewer gathers a sense of two worlds coming together: there are people who come to visit the canal, to look upon on it, travel around to other cities, and then there are people who rely on the canal to do business, complete chores, and earn money. They meet with one another, share stories or business, but are separated, as the water separates the washerwoman from the smoking *rico*. It is bold to say that this environment is responsible for reproducing these ageless social distinctions; instead, historians need to see how the environment reflects them, and to question if it offers a space that might even challenge them. Because worldly and traveled visitors sought out La Viga during their travels, both native Vigans and elites have the opportunity to see how the other lives—one in a complete state of vulnerability, the other privileged to live above risk—and interact with each other.

The Paseo de la Viga was constructed alongside the Canal de la Viga and both are built environments, but one catered to the men and women who used horse-drawn transportation imported from Spain, whereas the other was just an extension of the water that was already there and used for centuries before. Because of the way that water and the city built upon each other during the colonial era, late nineteenth-century Mexico needed to organize La Viga so that it was a useful space for both the state and its citizens while not being reminiscent of colonization and oppression. Contemporary ideas about what nature *was* and what nature *ought to be* influenced the way Porfirians imagined the green-space.

The Modern Landscape

Unlike in the case of the Gran Canal, some Porfirians were not concerned with completely redirecting the environment of La Viga. Instead, they needed to re-imagine this

environment as something that could serve the state more appropriately and would represent modernity in the progressive Porfirian way. Mexican historian Mark Overmeyer-Velázquez argues that, during the Porfiriato, Mexicans around the country sought ways to honor their leader and their nation by building their urban centers in new and more efficient ways. Furthermore, he writes, “increasingly rationalizing the city's spatial arrangements meant countering the perceived illegibility, the politically autonomous, decentered and ungovernable quality of unregulated space.”¹²⁸ La Viga seemed to be under the state's control by way of the *garita* contributing to the state's revenue, but it was not a coincidence that La Viga became a legal part of Mexico City in 1900, the height of the Porfiriato.¹²⁹ Porfirians desired to have a better command over La Viga for two reasons. The Canal de la Viga was a symbol of the Spanish Empire, an entity that Mexican elites had fought against only 65 years prior to Díaz's ascent to presidency. To add salt to the wound, it was an example of how the Spanish *failed* to service their colonists by way of a possibly pre-Hispanic canal. The colonial establishment represented the colonial traditions that Mexico inherited, decidedly non-modern characteristics that implied mercantilism, monarchy, and an ultimate failure of control.

In addition, the canal also represented anti-modernism in that it remained a popular site of activity for transportation and trade when most other canals were turned into roads. Streets could be used for the far-more modern forms of transportation such as horses, carriages, and automobiles. They could be paved, cleaned, and maintained, whereas the canal was littered with dirty and non-draining water, and could not be connected to sidewalks and alleys as streets could. The mode of transportation on the canal was not the steamboat but rather the *chalupita*, which is a traditional water craft constructed by thrifty individuals with cheap materials put to float down the canal. Just as Beezley argues, the Porfirian Persuasion influenced elites to replace traditional or rural modes of life with what they imagined to be more technical and

¹²⁸ Overmeyer-Velázquez, *Visions of the Emerald City*, 40.

¹²⁹ Perló Cohen, *El Paradigma Porfiriato*, 259.

practical.

In the eyes of Porfirians, La Viga and its waters were out of their control, which potentially threatened their standing as a liberal government; the environment needed to serve a purpose other than a crowded trading site used primarily by *los de abajo* across the lakes. Instead of re-purposing the area by filling in the canal and turning it into any other street, Porfirians transformed it into something that it already was: green-space. Imagining La Viga as green-space, in opposition to an overrun satellite to the urban center, gave the area a purpose that served the state more directly by embellishing the environment with a desirable title. “Porfirians had a predilection for *urban green space*,” writes urban historian Emily Wakild, “which allowed them to reintroduce nature into their national plans.”¹³⁰ La Viga served this function perfectly as Porfirians continuously manipulated La Viga's environment to yield material improvements: instead of creating arable land for agriculture and industry, La Viga cultivated leisure space for Porfirians.

Many people, Mexican and foreign, visited La Viga and felt so inspired by their vacation that they recreated its image in the form of prose, paintings, photographs, or as a memory in a journal. Romantic descriptions of this space spread, and the state advertised it in the several picture books from this time for tourists to purchase or borrow. The most effective means to spread the word about La Viga, though, was in the multiple written descriptions made for travelers and curious Mexicans alike. In one of these descriptions, written by the well-published Manuel Rivera Cambas in his *Mexico Pintoresco Artístico y Monumental*, the “picturesque” quality of La Viga is laid out:

“the canal travels between buildings whose balconies and windows allow for them to enjoy the picturesque spectacle that is offered by the canoes filled with produce and flowers, and similarly, the greater bundles moved by the oar of the *indígena*; in the canal slips the canoes, almost without rowing, and crosses some *indígena* kneeling beside the rustic crib of his child, and then the grand wooden rafts appear that the city uses to lead people here.”¹³¹

¹³⁰ Wakild, “Urban Parks, Public Gardens and Drainage Projects,” 103.

¹³¹ Manuel Rivera Cambas, *Mexico Pintoresco Artístico y Monumental* (Mexico City: Editorial Nacional,

Rivera's experience was hardly unique since the Canal de la Viga served more than just *los de arriba*, but also stood as a place that people could use to complete their chores. Besides a place for *boteros*, the canal was used for fishing by men and women did their laundry in streams that were carved out from the main canal.

The poems of Guillermo Prieto Pradillo remained popular and a source of pride for Mexicans as he drew his inspiration from local scenes and events. In his poem "Paseo de la Viga," he describes another exciting and exotic scene for foreigners to look forward to if they visited the canal: "In the transparent canal/ranked as the best/are the fandango canoes/that traverse the current./There go the people like pineapple/and there go their joyful songs/and tenacious dancers/who gather as in a fight./Two Indians at the ends/drive the boat/and provide directions with their oars."¹³² The poem goes on to describe the cries in the song, the costumes that the dancers wear, and how all of this can be seen from the shores on the Paseo. The bright description and the prospect of seeing a traditional dance performed on a boat from the safety of the walkway was enticing, and left the imagination eager for these kinds of sights.

Although the canal was initially intended for lower class people to use for transportation in and out of the city, it was with descriptions found in Pradillo's poem, Castro's painting, and Cambas' book that drew the Porfirian Persuasion, or the state sponsored high culture, out of most of the upper class visitors. Mary Ashley Townsend kept close notes of her first experience floating down the canal, commenting on the culture shock she felt between herself and the residents of La Viga. She believed that what she saw could have been a scene straight from "the Aztec days." She wrote, "The same sort of boats propelled by the same sort of people moved upon the water, and the door of our carriage seemed to have admitted us into a place

1882), 41.

¹³² Guillermo Prieto Pradillo, "Paseo de la Viga," in *Remembranzas del Canal de la Viga, Iztacalco y Santa Anita* (Distrito Federal: Delegacio Iztacalco, 1993), 13.

and among the avocations belonging to three centuries ago.”¹³³ La Viga served to the upper class as a leisure space for them to participate in what they believed to be ancient pastimes in a safe and romanticized way.

There exists an imaginary relationship between the privileged, white European descendant and the vintage, brown Mexican, in which white individuals romanticized the activities of the “Indians” and made them resonant with Republican ideals, such as thriftiness, hard work, and nationalism.¹³⁴ Townsend was not disgusted by the women washing their clothes in a stream, even though she herself would have been unlikely to wear Viga-water clothes; rather, she writes that it was not out of the ordinary to see women using streams to wash clothes. She gives the poor women the benefit of being hard workers and using whatever means they had to complete their chores, but still keeping herself distant enough to remain a viewer.

Photographers set themselves up on the banks of the canal, on different boats, or on top of bridges along the canal to capture moments in La Viga. Some photographs, like the one of women washing clothes captured anonymously in 1900, are candid and aspire to capture the everyday affairs of La Viga (*figure 5*). Other photographs aim to catch the follies of the elite on their vacations, such as a picture caught in 1900 of a boat of eight upper class women (*figure 6*). Everyone, including the *botero*, is facing the camera; the women are smiling, waving their hands or their kerchiefs at the photographer; a man at the front of the boat has his own camera turned to the photographer, maybe taking a picture of the women's escorts who were left behind on the Paseo. Perhaps they, too, are waving at their wives or daughters, returning their smiles.

¹³³ Mary Ashley Townsend, *Here and There in Mexico: The Travel Writings of Mary Ashley Townsend*, ed. Ralph Lee Woodward (Tuscaloosa: The University of Alabama Press, 2001), 217.

¹³⁴ The Third French Republican values, along with their sanitation system and urban planning, were also popularly borrowed by Porfirians and worked into their own government's program. See the French histories Alice Conklin, *A Mission to Civilize: The Republican Idea of Empire in France and West Africa, 1895* (Stanford: Stanford University Press, 1997) and Patricia Tilburg, *Colette's Republic: Work, Gender, and Popular Culture in France, 1870-1914* (Oxford: Berghahn Books, 2009) for discussions on Republic ideals in Europe and expressed abroad.

Regardless, comparing this image of the women on the boat to the women washing clothes further proves the coexistence of people in shared spaces, but also shows the specific separation in wealth in the way that the two parties spend their time. One clearly enjoyed the prospects of being watched and took the time to pose for a picture, while the others were so consumed in their work that they did not seem even to take notice of the photographer's presence.

The American engineer, painter, and writer, Francis Hopkinson Smith, took on the same spectator position that Townsend and the photographers exhibited upon interacting with the people in La Viga. By focusing on their work habits, Smith made the Vigans in his story, "La Canal de la Viga," appear innocent and forgave their backwardness with colorful descriptions that combined work with beauty. In addition to this, though, he also described them as creatures completely different from him and in need of documentation and description. In a sketch he dedicated to la Viga, he observed a resident in the canal working, idealizing her appearance:

"If you think grace died with the Greeks, watch this girl for a moment. She is barely sixteen; her eyes are dark and luminous, her hair a purple black, tied in two great braids down her back; her teeth white as milk; her neck, arms, and bust exquisitely modeled; her fingers small and tapering, and her feet tiny enough to dance on Persian carpet. She has a skin that is not the red of the Indian, nor brown, nor quadroon; it is light as though transparent copper."¹³⁵

This woman turned into his muse as he saw all the fine qualities that the Mexican Republic had to offer under the Porfiriato. She was young and beautiful and her body mirrored her hard work, which in turn was a reflection of the healthy state of the nation. In his story, this girl is unaware of her admirer, for she has but one task while at La Viga, "to sell her cargo before the hot sun shall shrivel it up."¹³⁶ With this in mind, this "daughter of Montezuma," symbolized the great potential that lower class Mexicans had to be proud of themselves and do good work for their country.

¹³⁵ Francis Hopkinson Smith, *A day at Laguerre's and other days: being nine sketches* (Boston and New York: Houghton, Mifflin and Company, 1892), 98-99.

¹³⁶ *Ibid*, 99.

Emphasizing her supple body, the many ethnicities in her skin, and the very minute details of her body comes off as borderline erotic, and it would appear that he is making the woman to be some kind of Constitutive Other, sexually and ethnically. She is very much the object for the subject to look upon and discover for his or her pleasures. Even though her body and actions recall to his mind foreign civilizations, Smith writes of them in a way that is separate from her as if to solidify that she only works to *remind* him of the Persians or Greeks and not embody them wholly.

Delving into how Smith's story made Vigans disconnected from him becomes further complex when his object—the young *botera*—is placed back into her environment, the setting of the story. Here, the characters can “revel only in the sunlight, the palms waving over the low walls, the blazing, dazzling white of the great building opposite, the deep blue of the sky overhead, and the superb carpet of color dotted with figures beneath.”¹³⁷ It is only in the midst of the “mass of blue lakespur and ragged sailors” that his eyes fall upon their object, as if implying that without her true nature around her, the girl would have passed by without being noticed. La Viga's environment created such a stark difference between the way that people interacted with their surroundings that Othering practically falls into Smith's lap. He is forced to observe the woman from afar, because they are separated by water; she sells the produce grown in her garden, giving her an earthy aura that Smith picks up on; she is participating in a tradition, that of food vending, that people in the Valley of Mexico have performed for hundreds of years, making her seem all the more exotic to him.

The next couple of lines, though, collared Smith's true intent: “Every moment is grace itself. That she comes of an indolent race only adds to her beauty.”¹³⁸ Here, Smith reveals the paradox embodied by the Porfirian Persuasion as it floated down La Viga by acknowledging her as an ethnic Other who is handcuffed to a natural, ancient environment from her imagined past.

¹³⁷ Ibid, 98.

¹³⁸ Ibid, 99.

While Porfirians preferred modern amenities such as technological advancements that allowed for European leisure activities, they still relied on traditional hierarchies which required some people to remain endlessly at the bottom of society. The “indolent race” that Smith refers to can only be the lower class natives of Mexico, Pradillo's rowing Indians, the washer woman in the “Paseo de la Viga” painting. Regardless of how hard she worked, Smith's woman would always have this identity as long as she worked a food boat on the Canal de la Viga.

The Modern Reality

La Viga was a space occupied by the upper and lower class at the same time, one always in the presence and constant observation of the other, as Smith and Townsend made clear in their detailed accounts. Elites and visitors idealized their experiences and it would seem that they had an enjoyable, if not entertaining, time on the banks of the canal. But another memory of la Viga emerges from the journal of America businessman David Hunter Strother. In August of 1879, Strother and his friend took a walk from their temporary homes in Mexico City to La Viga, where he concluded that “This is a dirty neighborhood...naked & partially occupied by ponds of Green [*sic*] & muddy water. Grim [*sic*] old walls, Massive Churches [*sic*], crumbling & weedy walls, deserted & half ruinous buildings.”¹³⁹ Strother's view of La Viga is an entirely different world from Smith's bright and bustling descriptions, stripped of all the romance and sunshine.

Strother described the Paseo and Canal de la Viga as “a broad muddy & ill kept drive along the banks of the muddy canal with double rows of shade trees, not very thrifty, & rude stone benches & seats, pulque shops, Eating [*sic*] & amusement gardens, swampy flats growing cane cactus & corn yards & wretched adobe tenements.”¹⁴⁰ He did not see the hardworking Indians participating in republican goals, but rather the “fifty lusty fellows [who]

¹³⁹ David Hunter Strother, in *Porte Crayon's Mexico: David Hunter Strother's Diaries in the Early Porfirian Era, 1879-1885*, ed. John E. Stealy (Kent: The Kent State University Press, 2006), 109.

¹⁴⁰ *Ibid*, 110.

were drinking [in the Pulque Shop] & talking somewhat noisily” and the *boteros* who tried to take advantage of the white tourists by over charging them for a ride down the canal.¹⁴¹ This is the image of La Viga that the Porfirians involved in policy-making saw: a dirty, decaying village that represented the failures of the state to provide a habitable space.

It is difficult to remember that the water that flows through the Canal de la Viga is the same water that plagued the city with disease and filth, over flowing the streets, and the cause of flooding. The closed water system in the Basin of Mexico resulted in shared water streams throughout the city and its satellite neighborhoods, and even though La Viga was remembered by some people as a handsome and fun place to watch market goers, *boteros*, and other *peones*, they neglected to remember some of its more foul characteristics. Even Smith writes, after leaving the *botera* in the canal, that “You begin to note the foul water strewn with waste leaves, decayed fruit, and the offal of the market. You become aware of the stench and the reeking filth...You turn in disgust to enter the stifling market, where barelegged peons are drenching the foul stone flags [*sic*] with fouler water from the canal...”¹⁴² The water that flowed through the canal was probably not clean and the leading cause for stench and grime; not only was it used to clean dirty laundry, but it was also a waste site for restaurants, shops, and people's homes. The canal collected the debris from the Paseo, and considering how much waste accrued on that road from people and their animals, the canal must have been very full already from other-waterly debris.

Recall the lithograph from before depicting all of the people who used the area to deploy their boats and imagine the high degree of litter and debris left behind from the crafts using the canal and the Paseo alone (*figure 3*). People would anchor their boats to either side of the shore, lined up, back to front for two miles, and sell their goods. Not only was the water sullied from the trash and movement from the canal-side market, but the canal was used for other

¹⁴¹ Ibid, 110.

¹⁴² Smith, *A Day at Laguerre*, 100.

chores, such as the washer women and the fishermen. Like most other sources of moving water, the canal was probably used by locals to toss sewage in, take baths, and remove trash from their homes and businesses. When the Paseo was cleaned—even if Strother claims that was ill-kept—the debris from carriages, horses, people, and animal herds was all swept into the canal. La Viga was still part of the Basin of Mexico water system, the very one that does not naturally drain. The Canal de la Viga presented a similar problem that the flood waters in the capital did: the waste combined with the water emitted horrible smells that were uncomfortable and uninviting, if not dangerous and harmful according to the popular beliefs held by sanitationists about filth and atmosphere.

Emerging from the new sciences discussed in chapter two was a split between the goals and accomplishments of Porfirians, creating subdivisions within Porfirians themselves. In fact, Beezley addresses the fact that a “Porfirian” identity was slippery. Upon describing the mix of religious, political, and economic identities of Mexican elites, Beezley writes that “these predilections constituted a somewhat ill-defined but pervasive popular sense of what a number of Mexicans thought about their country and future.”¹⁴³ For this reason, he makes the argument that Mexican elites were under a persuasion that was controlled by the popular culture maintained by the Porfirian state, hence the “Porfirian Persuasion.”

Beezley's points are well taken, but are complicated by Charles Hale's work, *The Transformation of Liberalism in Late Nineteenth Century Mexico*. Hale follows the indisputable argument that something changed in the nineteenth-century that led to a shift in politics, that Porfirio Díaz required a different type of policy making in his government. The former government under Benito Juárez head started some of the liberal qualities Díaz was looking for: free-market economy and the denouncement of Church authority.¹⁴⁴ In order to accelerate the capitalist transition begun in Mexico under Juárez, Díaz looked for certain characters that would

¹⁴³ Beezley, *Judas at the Jockey Club*, 13.

¹⁴⁴ Hale, *The Transformation of Liberalism in Late Nineteenth-Century Mexico*, 5.

help him place Mexico in the same ranks as Europe and the United States, people who used the modernizing rhetoric and who followed the leading discourses about city planning and state-formation. These were mostly men, who self-identified as “journalist-intellectuals,” received their education from abroad, adhered to French positivism under Auguste Comte and Henri de Saint-Simon, and exemplified conservative-liberalism.¹⁴⁵ Modernity was not the exclusive domain of politicians and scientists, however, and shared conceptions of modernity bridged the gap between these policy-Porfirians and socialite-Porfirians. Their shared faith in cutting edge technology, the desire to go faster and farther with less effort, following trends from Europe and America, and a distrust of traditional institutions are the major commonalities that present a united front for Porfirians in the government and in society.

The canal waters were a challenge to policy-Porfirians' efforts to control the environment and provide an appropriate space for socialite-Porfirians to enjoy their time off. Instead of offering a green space that featured small streams rolling through gardens, water fountains with blooming stone roses, or small ponds with wildlife and lily pads by reading benches, the waters of the canal were so untamed that, left to their own devices, they were a symbol of Mexico's historical Indian past. It was too narrow to allow for steam boats or even big and luxurious watercrafts. It was too popularly used by the locals as an outdated mode of transportation to fill in without causing too much of a commotion, and it also still collected a small amount of revenue that the state could use. What were these Porfirians to do with this mess?

The answer: they did nothing. It remained a dark smudge on their agenda that they could do nothing about except color La Viga as a tourist destination and nothing more. The state sent scientists, hygienists, sanitationists, and physicians to La Viga to conduct experiments on the water and soil, which would amount to nothing for Porfirians. It was not until five years after Porfirio Díaz fled the country in 1910 that La Viga was labeled a “high risk zone” for the public's health, and then, in the 1930s, the process began to drain the canal and replace

¹⁴⁵ Ibid, 20.

it with a road.¹⁴⁶

¹⁴⁶ Peralta Flores, "El Canal de la Viga," 6.



Figure 1: No Title, Henry Jackson Turner, 1885. Boats intended to take tourists down the canal were set up in the same way that traditional corridas were, with the privileged boat-rider seated under the awning, and working class botero in the sun.

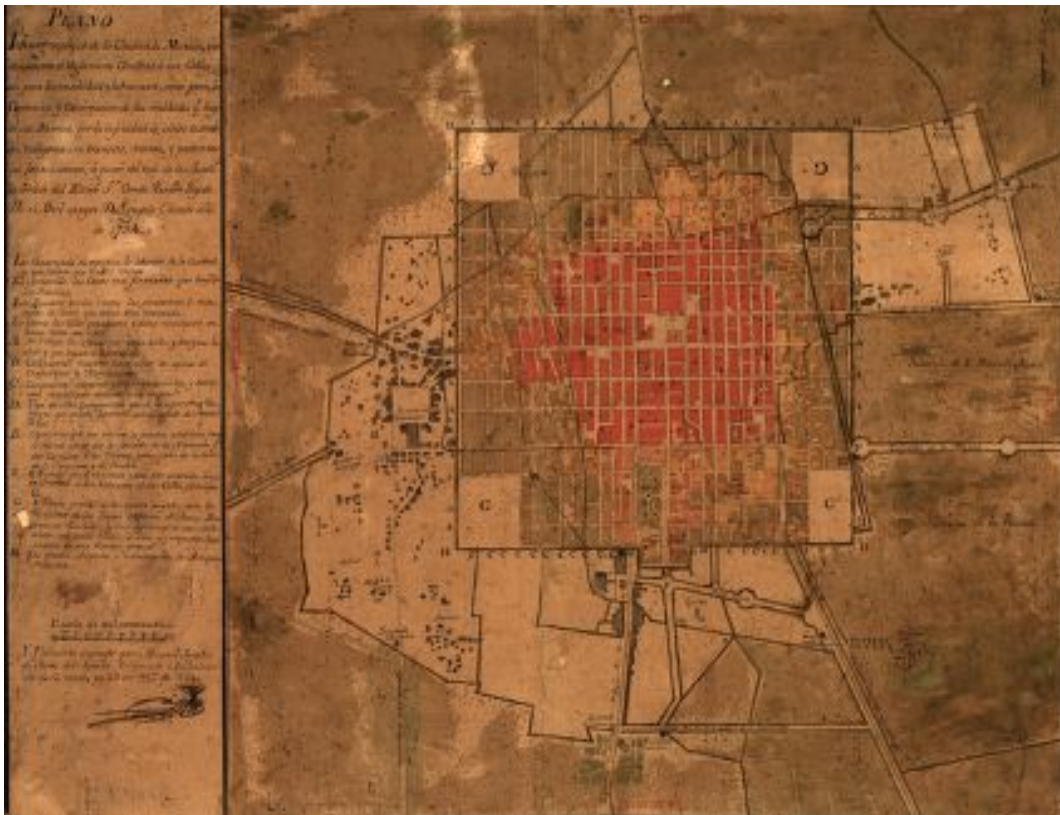


Figure 2: "Plano iconográfico de la Ciudad de Mexico" by Ignacio Castera, indicating what the square canal was intended to look like. Only a portion of it was completed, half of the south-eastern corner, which connected to the Canal de la Viga.

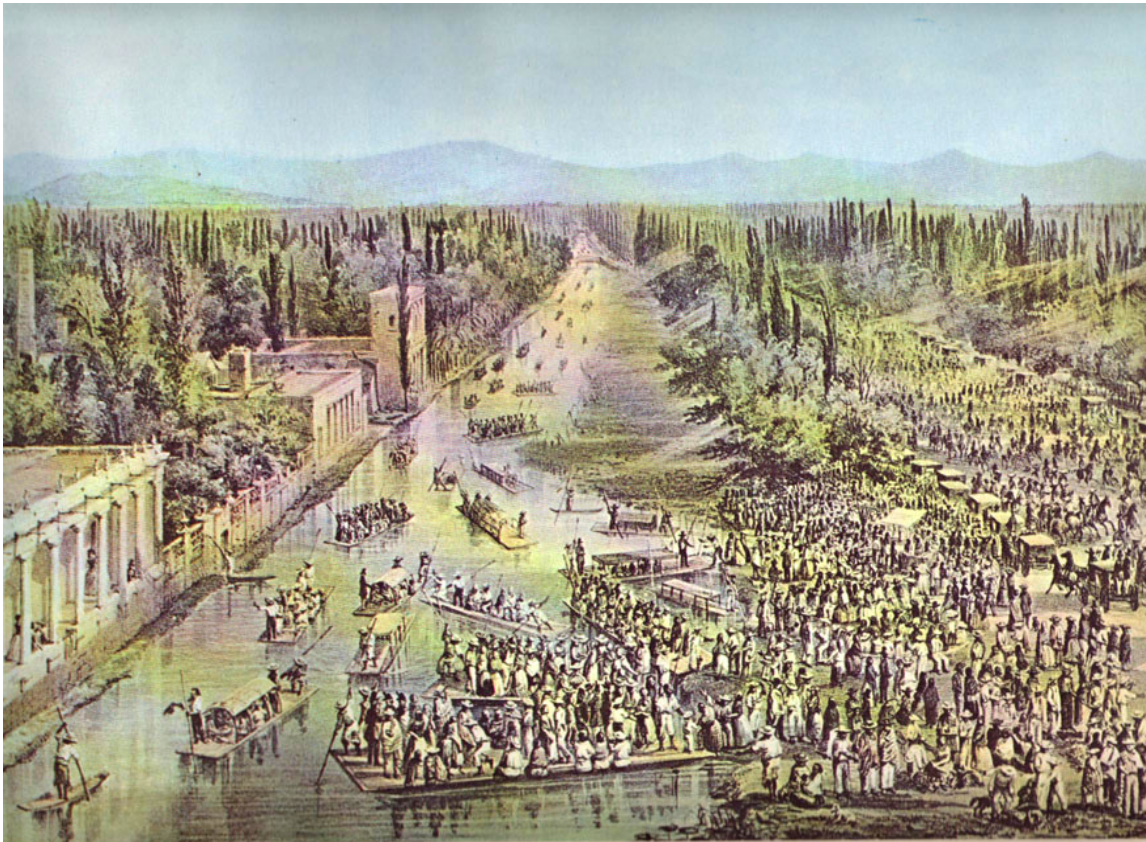


Figure 3: "Canal de la Viga," Casimiro Castro, 1855. Both upper and lower classes used the Canal de la Viga and the Paseo de la Viga for a variety of reasons and in multiple ways, whether it was walking or riding down the Paseo, or taking bus boats, tourist canoes, or personal water crafts down the canal.



Figure 4: "Paseo de la Viga," Album Mexicano, 1885. People used the Paseo de la Viga nearly as much as they used the Canal de la Viga for a variety of reasons. This lithograph shows the many ways that both rich and poor Mexicans spent their time in La Viga. "Paseo de la Viga," *Album Mexicano*, 1885

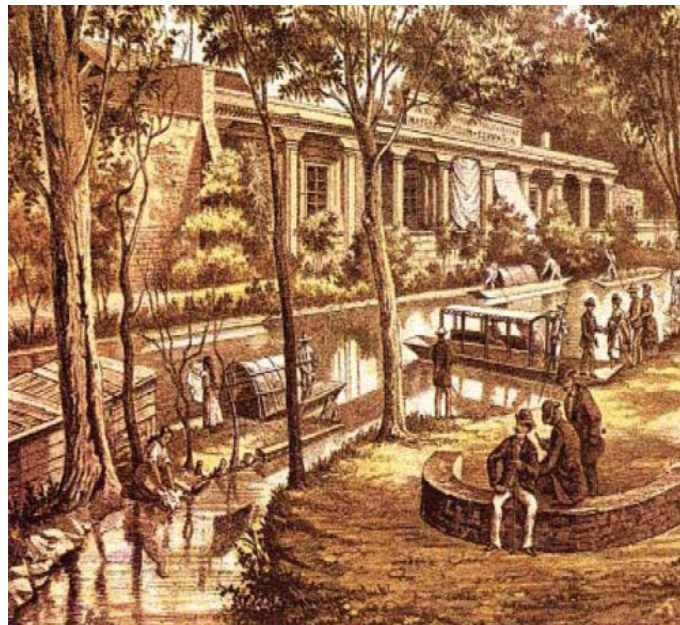


Figure 5: "Paseo de la Viga," *Album Mexicano*, 1885. *close up* A closer look at "Paseo de la Viga" reveals more of a connection than initially seen between all of the people in the painting.



Figure 6: No Title, Anonymous, nineteenth-century. Women washing clothes in dug out streams of the canal was not an unusual sight for tourists.



Figure 7: "Canal de la Viga in Santa Anita," Anonymous, 1900. Women on a boat float down the canal, posing for their picture to be taken probably from shore or from a bridge somewhere downstream.

EPILOGUE

La Calzada de Viga

By the 1920s, the water level in the Canal de la Viga was considerably lower than it used to be as a result of the Gran Canal and the sinking of the city. Reasons listed for draining and then filling in the canal varied from flood warnings, to public health hazards, to the general unattractiveness of La Viga without its quintessential *chalupitas* and festivals. It would seem that the Mexican sentiment was, again, divided on how it felt about the closing of the canal. This time, it would not matter what the popular opinion was. Alejandro Tortolero Villaseñor writes, “In the end, it is obvious that the league composed of Richardson, Pearson, the Noriegas, Cuesta Gallardo, the young scientists, medics, and engineers would be more powerful than Ramos' pencil, Prieto's pen, and the delicious revelry of the people.”¹⁴⁷ In the late 1930s, the canal was completely covered and converted into a street, the *Calzada de Viga*. It was outfitted with streetcar tracks, cobble paved roads, and sidewalks in front of the shops. The festivals ceased, and the foreign elites no longer sought out the Canal de la Viga to experience the romanticized customs of Mexico's native past.

Although the vast amount of leisure space was destroyed, the Calzada de Viga did manage to maintain some of the traditions that the Canal de la Viga preserved: *el mercado de la Viga* (La Viga Market) is, present day, one of the best spots in the city to buy fresh fish, and the *mercado de Jamaica* blossomed in the 1950s as a result of the need to restore the agricultural requirements of the locals. Today, the *mercado de Jamaica* specializes in flowers. La Calzada de Viga recently emerged as another tourist destination in the capital, according to some tourist guides, but the number of tourists visiting the *mercados* will never match the amount of people who used and visited the Canal de la Viga on a good day.¹⁴⁸

¹⁴⁷ Alejandro Tortolero Villaseñor, *El Agua y su Historia: México y sus Desafíos Hacia el Siglo XXI* (Distrito Federal: Umbrales de Mexico, 2000), 98-99.

¹⁴⁸ See Paula Mónaco Felipe's article, “La Nueva Viga, paseo marino en el DF fuera de las guías turísticas,” *La Jornada*

Thirty-four Feet Deep

While scientists and engineers assumed their victory over the Canal-turned-Calzada de la Viga, they woefully lost the war against the water system in the Valley of Mexico. What once was hailed as the bringer of modernity to Mexico is hidden from the public today. The Gran Canal is no longer the tourist attraction that it used to be. It cannot be easily found and remains untitled and unmarked on maps or signs in the city. Upon discovering its current location, Shawn Miller wrote that “the canal stinks of musty sweetness, and has, due to the mixing of excrement, urine, rinsed soap, industrial effluent, and dissolved toilet paper, sewage’s characteristic gray color. Rotting pipes set in ranks along the canal’s edge send surging charges of foamy liquid crashing onto the water’s surface.”¹⁴⁹ Joel Simon described the water as “black sludge,” writing that “the sludge carried by the [Río de los Remedios] backed up with the canal, forming an enormous swamp of sewage that spread over acres.”¹⁵⁰ The three goals of the Gran Canal—to prevent flooding, drain the lakes, and send waste water out of the City—failed in different measures and for different reasons.

An inundated Mexico City in 1900, 1901, and 1910 proved that the Gran Canal did not prevent the flooding that it promised to. To Díaz’s embarrassment, the flooding happened during the country’s centennial Independence Day celebrations; Porfirians hoped that their esteemed guests would not notice the sandbags lining the streets and walkways.¹⁵¹ It was not until after a flood in 1952 that the Mexican government agreed to place pumping stations around the city that would lead flood waters away.¹⁵² This consumed massive amounts of power and electricity, however, leaving the city vulnerable when the pumps broke down and water would quickly overwhelm the water works and stop up the streets.

<http://www.jornada.unam.mx/2008/04/11/index.php?section=gastronomia&article=a10n1gas>
(accessed 6/21/2013).

¹⁴⁹ Miller, *An Environmental History of Latin America*, 140.

¹⁵⁰ Simon, *Endangered Mexico*, 74.

¹⁵¹ Agostoni, *Monuments of Progress*, 132.

¹⁵² *Ibid*, 72.

The pumps acted as a quick solution while another great *desagüe* was laid out. In 1959 plans were drafted for a deep drainage tunnel, one that would be 198m deep with a length of over 80km. The construction began in 1967 and the project was finished in 1975, when yet another Mexican president, José López Portillo, opened a new set of flood gates with the promise to end flooding. The mayor of Mexico City, Octavio Senties Gómez (1971-1976), said in his speech at the new *desagüe*'s inauguration, "In the years before the nationalist Revolution of 1910 when the Gran Canal was inaugurated you heard names like Reed, Campbell, Harris, Pearson. Today, neither these names nor other similar ones appear in the credits. This work was made by Mexicans."¹⁵³ It was not until the 1980s when the new drainage project was fully functioning.

The reason as to why this drainage system was built so deep underground was in response to another problem that created a vulnerable capital: the city was sinking, including the Gran Canal. A system that initially shuttled water at a rate of 90m³/sec is now reduced to 7m³/sec.¹⁵⁴ Since Hernán Cortés first encountered Tenochtitlan, the area has sunk approximately 10m and recent calculations show that since the 1950s, the city sinks more than 3ft every year.¹⁵⁵ The growing population required more wells to bring people fresh water. In 1900 there were 1000 known wells constructed in the city, whereas now, there are 4820 wells pumping 11,000 gal/sec of water.¹⁵⁶ Initially, Porfirians and their future followers believed that draining the lakes would help to dry out the spongy soil and create a firm ground for urban infrastructure, but it did just the opposite and created an environment that made the city sink. The state first recognized the sinking in 1925, but did not attribute it to the wells and diminishing underground aquifer until 1946.¹⁵⁷ Their solution was to try to reduce water use in the city and import water from outside the Valley of Mexico but this posed a problem. The physical difficulties

¹⁵³ Octavio Santies Gómez, 1975, cited from Joel Simon, *Endangered Mexico*, 73.

¹⁵⁴ Miller, *An Environmental History of Latin America*, 147.

¹⁵⁵ Simon, *Endangered Mexico*, 69.

¹⁵⁶ *Ibid*, 87.

¹⁵⁷ Miller, *An Environmental History of Latin American*, 147; Simon, *Endangered Mexico*, 69.

of bringing water from outside the valley, over the hills and mountains, and into the aquifer would prove to be an expensive challenge. In fact, 10% of Mexico City's total output of energy is drained by the city's water management: pumping fresh water in while leading waste water out.¹⁵⁸

The waste waters were, in fact, sent out of the city and into the Tula Valley as planned by the Porfirians in 1900. The Tula Valley is now the biggest irrigation area utilizing waste water in the world.¹⁵⁹ Unfortunately, though, the city's 52m³/s stream of raw waste water is mostly untreated by the time it discharges into the Tula Valley, making infections from bacteria, such as hookworm, rampant amongst individuals who use water for personal use in the Tula Valley or consume any kind of agricultural product that is irrigated with the water.¹⁶⁰ The issue of treating the waste water is contested in the Tula Valley: on the one hand, it has rich stores of organic matter that farmers want to use to irrigate their fields, but on the other hand, there are an estimated 350 water sources (both man-made and natural) that supply over 500,000 people with drinking water that has been contaminated with the agricultural water.¹⁶¹

Treating the water would necessarily include the Mexican government's spending part of its revenue researching and constructing sanitation plants, as well as farmers changing a style of life that they have practiced for over a century (much like requiring Vigans to adapt to a life without their Canal). With the water left untreated, people became sick. As was mentioned before, hookworm is common among areas that rely on untreated waste water, but also cases of E. coli and other bacterial infections are common as well. Simon goes as far as to suggest that a cholera outbreak in the Mezquital Valley in 1991 was a result of the Valley's reliance on

¹⁵⁸ Simon, *Endangered Mexico*, 62.

¹⁵⁹ Blanca Jiménez, "Treatment Technology and Standards for Agricultural Wastewater Reuse: A Case Study in Mexico," *Irrigation and Drainage* 54 (2005): 23.

¹⁶⁰ Alma Chávez, Catalina Maya, Richard Gobson, Blanca Jiménez, "The Removal of Microorganisms and Organic Micropollutants from Wastewater During Infiltration to Aquifers After Irrigation of Farmland in the Tula Valley, Mexico," *Environmental Pollution* 159 (2011): 1355.

¹⁶¹ Chávez, Maya, Gobson, Jiménez, "The Removal of Microorganisms and Organic Micropollutants from Wastewater," 24; Jiménez, "Treatment Technology and Standards for Agricultural Wastewater Reuse," 1356.

the waste waters of Tula.¹⁶² According to the interviews that he had with farmers in the areas—even with some who experienced cholera attacks themselves—supported the Valley's commitment to keeping the irrigation waters untreated. One farmer said to Simon, “the black waters [from the Gran Canal] don't do anything bad...We will never let the authorities take them away from us.”¹⁶³ While the hazards of consuming vegetation grown in raw sewage has yet to be documented from the Tula Valley, the daily and long term exposure to the waste water makes both people and the environment vulnerable to degradation and death.

Conclusion

Using the Gran Canal and the Canal de Viga as case studies, his thesis set out to explore the intersections between environment, environmental management, and state formation in the context of the scientific, progress-oriented liberalism of the Porfirian era in Mexico. Various actors emerged who played critical roles in the dialogue between environment and society, and even though most these actors are no longer around to see the end results of their labors or leisures, a commonality emerges: their interconnectedness in environmental vulnerabilities. Just as the Vigans continued to expose themselves to the murky waters of the canal to sell their goods, present day lower class Mexicans stand up for their access to water that make them ill and contaminate their food, drinking water, and land. This cycle may not have the same explicit racial connections that they did during the Porfiriato, but the social connection is still there: the *campesinos* must endure an unsafe environment, not safeguarded or regulated by their government, which thereby connects them to the “natural” environment as their Indian predecessors did in 1900. “Liquid liberalism,” as I have called the collection of Porfirian projects and attitudes surrounding the Gran Canal and the Canal de la Viga, hurt the environment, failed to solve the Valley’s problems, and perpetuated differences of class and race that remain within Mexican society to this day.

¹⁶² Simon, *Endangered Mexico*, 74.

¹⁶³ Gerardo López, cited in *ibid*, 75.

This cycle of exposing poor populations to hazardous environments and perpetuating the vulnerability of an entire class of people to the environment could be broken should Mexican officials choose to end it. In fact, some authorities are getting creative in trying to solve the multifaceted water problems in their capital; treated waste water now fills the dried Lake Texcoco as an effort to control the dust storms that rage through the Valley and capital during the dry season. The treated waste waters also prove promising for the return of the old ecology from before the *desagües*; birds from Northern lands in the U.S. and Canada migrate down to the lake during the winter, showing that vegetation thrives on this waste water. This might prove that the treated water can be used for agricultural purposes, as well as for healthy and safe human use.¹⁶⁴

In an attempt to analyze the effects that Porfirian water projects had on the environment, this thesis discovered that the environment itself was also a protagonist in historical change. In essence, the environment served as a “landscape” that was navigable via social classes and that influenced state formation, a fact that has existed since people in the Valley of Mexico began manipulating their water system on a large scale. William Beezley's argument that the growing schism during the Porfiriato between rich and poor Mexicans by cultural means can also be extended to environmental separations, as *los de abajo* were ostracized by *los de arriba* to the point of being depicted as if they grew out of the ground like the trees surrounding the canal. The Gran Canal, too, symbolized specific Porfirians' relationship to their habitat in the Valley, but as opposed to being forced to coexist with that vulnerability, they desired to bring the waters under their control and usher in modernity in their wake. Their failure, in a long line of their ancestor's failures, has had consequences that makes Mexicans today just as, if not more, vulnerable to their environment as they were centuries ago.

¹⁶⁴ Blanca Jiménez, “Water and Waste Management in Mexico City,” in Larry Mayr, ed., *Integrated Urban Water Management: Arid and Semi-Arid Regions* (Paris: Unesco/Leiden: Taylor and Francis The Netherlands, 2009): 84.

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