

TRANSFORMING THE HYDRAULIC LANDSCAPE OF THE BASIN OF THE MEXICO IN
THE POSTCLASSIC AND COLONIAL PERIODS:
THE CASE OF CHAPULTEPEC

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Transforming the Hydraulic Landscape of the Basin of Mexico in the Postclassic and Colonial Periods: The Case of Chapultepec

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By the end of the Postclassic Period, the Aztecs had developed a thriving hydraulic system in the Basin of Mexico. Composed of aqueducts, dikes, causeways, wetland farming, and canals, the hydraulic system supported the urban population of Tenochtitlan and large-scale agricultural production. Critical to the ecological success of the Aztecs, the hydraulic system was also deeply embedded in social elements of society, including history, politics, and religion. This analysis focuses on the multiple functions of a single site on the hydraulic landscape. The site of Chapultepec, a small outcropping southwest of the city of Tenochtitlan, represented the balance of social and the ecological aspects of water management in the Postclassic Period. After the Spanish conquest in AD 1521, Chapultepec transformed to meet the needs of colonial society, yet managed to maintain elements of the pre-Hispanic significance.

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Chapter 1: Introduction

Although the content of archaeological discussions tends to oscillate with new theoretical perspectives and material evidence, there are certain topics that continue to resurface throughout the history of the discipline. Ancient water management is one of those topics. How societies utilized water and developed functioning systems to control such a critical resource relates to a variety of ecological and social aspects of past societies. Recently, archaeological studies of water management have spanned wide geographic areas and timescales, but one particular place, the Basin of Mexico, has continued to receive considerable attention.

The scholarly focus on the Basin of Mexico is a consequence of the unique ecological niche created by an enclosed basin and the long history of human occupation. For centuries, the peoples of the Basin of Mexico experimented and invented various water management techniques with the primary goal to increase agricultural productivity. By the time a small migrant group, later to be called the Aztecs, arrived in the Basin of Mexico in the fourteenth century, a number of agrarian confederations were thriving on the shores of the vast lake system. Building off of the previous hydraulic strategies practiced in the Basin, the Aztecs developed a complex water management system to mitigate environmental risks and support a growing urban population. Creating an immense “hydraulic

landscape,” the Aztecs grew their imperial city by successfully manipulating their natural and built environments.

Aspects of the hydraulic landscape have been at the center of archaeological debates since the early twentieth century. Beginning in the early 1940s and 1950s, scholars, like cultural ecologist Julian Steward (1955) and historian Karl Wittfogel (1957), attributed successful management of natural resources, including water, as a contributor to the rise of early states in semi-arid environments. In the following decade, immense regional surveys conducted by William Sanders and colleagues emphasized the growth and development of agricultural practices and subsequent irrigation strategies in the rise of the state in Central Mexico (Sanders et al 1979). The large-scale surveys published in *The Basin of Mexico: Ecological Processes in the Evolution of a Civilization* by Sanders et al (1979) and small-scale surveys like the analysis of chinampas from aerial photographs by Pedro Armillas (1971) exemplified the growing interest of archaeologists in the ecological aspects of human-environment interactions in Central Mexico.

The contributions of these ecological perspectives provided insight into settlement patterns, modes of subsistence, and social organization (Joyce and Goman 2012:2), but two major shifts in the past twenty years have changed the direction of human-environmental studies in the Basin of Mexico. The first shift has been the refocus on the Aztec capital, Tenochtitlan, buried beneath modern day Mexico City. Excavations in Mexico City have been conducted since the early twentieth century, but recently more material evidence has emerged from extensive salvage excavations. Leading the way, Mexican archaeologists, Margarita Carballal

Staedtler and Maria Flores Hernandez (1981, 1997, 2006), have greatly enhanced the understanding of the Aztec hydraulic system by analyzing both the physical environment and the hydraulic structures like dikes, causeways, and canals.

Coupled with the material evidence, archaeologists and cultural anthropologists like Teresa Rojas Rabiela (1981, 1991) have turned towards the rich ethnohistorical documentation from the Colonial Period to shed light on the nuances of the Postclassic and Colonial hydraulic systems.

The second major shift contributing to a new perspective on ancient hydraulic systems is the general theoretical move towards understanding the symbolism and meaning behind human-environmental interactions. In this view, it is as equally important how a society utilized the environment as to how they perceived it. In the edited volume by Lisa Lucero and Barbara Fash (2006), *Precolumbian Water Management: Ideology, Ritual, and Power*, the objective is to present the “varied aspects of water and a unified perspective of how water was conceived, used, and represented in ancient Mesoamerica” (2006:3). The incorporation of the symbolic and ideological aspects of water management follows the larger theoretical trends of landscape archaeology. Instead of focusing primarily on the physical and material features of the environment, human-environmental interaction includes the ways in which humans understand and identify their surroundings according to their worldviews (Ashmore and Knapp 1999; Ashmore 2002).

As the pendulum of theoretical interpretations pushed hard to the side of symbolic and ideological aspects of human-environmental interactions, it is

important to still consider the ecological factors of how humans interact and utilize the landscape. Therefore, the goal of this analysis is to bridge the theoretical gaps between the ecological and the symbolic functions of the hydraulic system by focusing on one particular hydraulic site. The Spanish conquest and subsequent rebuilding of Mexico City destroyed many pre-Columbian hydraulic structures (Mendez et al 2011:6), but the site of Chapultepec survived the conquest and remains a significant landmark in Mexico City today. Also known as the Aztec toponym “grasshopper mountain,” Chapultepec represents the multiple functions of the hydraulic system in both the Postclassic and Colonial periods (Armijo Torres 2005, Verdugo Reyes 2005).

In order to analyze the cultural and ecological significance of Chapultepec within a multi-scalar context, my research explored a wide range of sources addressing the hydraulic function of Chapultepec as part of the larger ecosystem. In a research trip to Mexico City, evidence was gathered at the Technical Archives of the Instituto de Anthropología e Historia and through first-hand exploration of Chapultepec Park. First, I examined technical reports in the archives of the Instituto de Anthropología e Historia in Mexico City for evidence of Postclassic and Colonial hydraulic features and lake topography. I selected four reports from excavations conducted in Chapultepec Park (Espinosa Rodriguez 2007; Onofre et al. 2007) and metro excavations in Lake Texcoco (Carballal Staedtler and Flores Hernandez 1981 & 1997). Outside of the archives, I explored and photographed the contemporary expanse of Chapultepec Park, which remains a major tourist attraction of Mexico City today.

Finally, to complement the research conducted in Mexico, I utilized the rich body of ethnohistorical documents to gain insight into conquest and colonial narratives of water management. Fray Diego Duran's *Histories of the New Indies* (1581), Bernardino Sahagun's *Florentine Codex* (1588), and colonial pictorial sources serve as primary resources recording social elements of the Aztecs in the first decades after the conquest. Although they are not picturesque snapshots into the past, the ethnohistorical documents provide valuable details using a single perspective from a moment in time during a turbulent and multivocal colonial transition (Brumfiel 1983).

With a variety of material and ethnohistorical evidence, the objective of this analysis is to gain a better understanding of the single hydraulic feature at Chapultepec, and how a pivotal structure for water management also reflected social and ecological needs of the Postclassic and Colonial societies. The following chapter will define a hydraulic landscape and the theoretical underpinnings of ancient water management. In chapter 3, I will present a background of the ecological setting of the Basin of Mexico and a brief history of the Aztec people. Chapter 4, the case study of this analysis, will illustrate the social and ecological implications of the construction and use of Chapultepec over two major time periods. Finally, Chapter 5 will address the continual transformation of Chapultepec into modern day, and will provide an avenue for further research to expand on current understandings of the Aztec water management system.

Chapter 2: Defining a Hydraulic Landscape

In order to succeed in illustrating the importance of the site of Chapultepec, it is necessary to first establish the larger context of the hydraulic landscape. The meaning of landscape has changed throughout the history of archaeological thought so the goals of this chapter are twofold. The first goal is to present the concept of “landscape” as a manifestation of both the physical and social aspects of human interaction with the environment. For this specific case, the term landscape will be directly applied to the hydraulic system of the Basin of Mexico. Second, landscapes will be discussed as transformative across both space and time. With an established framework of the hydraulic landscape, this analysis will be able to explore the hydraulic landscape witnessed in the Postclassic and Colonial Periods of Central Mexico.

Archaeological Perspectives of Landscapes

For much of the history of the discipline, archaeologists considered landscapes to be the “neutral backdrop” of cultural events (Ashmore and Knapp 1991:6). Throughout the first half of the twentieth century, archaeologists focused primarily on the excavation of particular features (Willey and Sabloff 1993). As field methodology and modes of analysis continued to develop, the 1950’s and 1960’s witnessed a shift in archaeological practice and theory that began to incorporate the environment into archaeological interpretations. Using ecological and adaptationist models, scholars like Julian Steward (1955), Gordon Willey (1953), and Lewis Binford (1968) concentrated on the influence of environmental factors on the core

elements of social organization including settlement patterns, economies, and demographics (Joyce and Goman 2012:2).

The ecological interpretation of landscape influenced localized studies throughout Central Mexico, including the large-scale surveys of Sanders and colleagues (1979). Through the lens of the cultural evolutionary paradigm, the driving questions behind early environmental landscapes were the ecological factors influencing social organization and the rise of the state between 1000 BC and AD 1520 (Sanders et al 1979:10). In order to answer larger questions surrounding social complexity, scholars concentrated on the human-environmental interactions that directly affected modes of subsistence and settlement patterns. For example, Jeffery Parsons (1976) published the analysis of environmental factors impacting agricultural production and the amount of food necessary to sustain the large urban population of Tenochtitlan (1976:243). The emphasis on universal environmental factors that drive societies towards greater levels of complexity dominated archaeological discussions of landscape and the environment through the early 1990's (Fisher et al: 2009).

As the field of archaeology continued to grow, many scholars grew frustrated with the limitations of the ecological approach. Centering on the environmental factors affecting societies, the ecological approach left little room for the symbolic and ideological understanding of the surrounding environments by past cultures. Out of this frustration, a new theoretical movement emerged in landscape archaeology that redirected archaeological focus towards the perception of the past landscape. As defined by Wendy Ashmore and A. Bernard Knapp in the edited

volume, *Archaeologies of Landscape: Contemporary Perspective*, a landscape “is the arena in which and through which memory, identity, social order, and transformation are constructed, played out, re-invented, and changed” (1991:10). Therefore, landscape was not just material environment utilized by humans, but rather a space that people moved through, conceptualized, and experienced (Johnson 2010: 107).

The material versus the social or experiential notions of landscape polarized archaeological interpretations of human-environmental interactions. Arguably, this divide still exists today, but a number of recent publications are attempting to eliminate the theoretical gap to understand “simultaneously [the] social, political, symbolic, material, geological, and ecological” aspects of landscapes (Joyce and Goman 2012:3). Instead of isolating a single facet of an ancient landscape, the goal is to broaden the scope of analysis to account for the multitude of factors that influence the interplay between humans and their environment. As demonstrated in the recent publication, “Bridging the theoretical divide in Holocene landscape studies: social and ecological approaches to ancient Oaxacan landscape,” Arthur Joyce and Michelle Goman argue for the “inseparability of the material, social, and symbolic dimensions of landscapes” (2012:1). Incorporating both natural and built environments, the conceptualization of landscapes integrates the ecological relationships of humans and the environment, and the political, religious, and social representations projected onto the environment. Although difficult to achieve, this broad approach allows for archaeologists to investigate the multidimensionality of landscapes.

Setting the Stage: The Hydraulic Landscape

The breadth of factors that compose a landscape is so complex that it is nearly impossible for a single analysis to encompass a comprehensive view of a landscape at any single moment in history. The landscape of the Postclassic Valley of Mexico is a perfect example of the limitations of landscape archaeology. With a variety of different cultural groups living within a vast basin environment, the number of ways in which humans used, perceived, and interacted with the surrounding landscape is difficult to grasp. Therefore, it is necessary to decrease the scope of this analysis by studying one layer of the Postclassic landscape. In other words, the intent is to study a landscape within a landscape.

The focus of this analysis, therefore, is to investigate the hydraulic landscape of the Postclassic and Colonial periods. The Aztecs achieved immense success by devising a hydraulic system that relied on the agricultural management of wetlands and the harvest of lacustrine resources (Scarborough 2009:62). Through the construction of a series of hydraulic features, the Aztecs created a hydraulic system that sustained the growing population of the capital city of Tenochtitlan and supported the growth of the empire. An overview of the entire hydraulic system will be further addressed in Chapter 3, but it is important to note that the concept of a hydraulic landscape incorporates the ecological and social implications of landscape archaeology. The hydraulic landscape is not a single entity, but rather a composite of both the ecological adaptations to the environment and the social conceptualization of the physical space.

Transformative Landscapes

The multifaceted characteristics of a hydraulic landscape is further complicated by the understanding of landscapes as both transformative and flexible. In congruence with the expanding definition of landscapes, many scholars have adopted the concept of landscapes as palimpsests (Ashmore and Knapp 1999; Ashmore 1999; Fisher et al 2009). Originating as a terminology for the reuse of manuscripts, palimpsests represent the continual building and rebuilding of landscapes. According to Fisher and colleagues, landscapes are “palimpsests in the sense that human-environmental choices are always conditioned by previous landscape decisions in non-linear fashion” (2009:6). Building upon both the physical and cultural environments, a single landscape is like a strand of a web, with the present irreversibly connected with the past.

In a constant state of transformation, landscapes are both “historical and dialectical” (Cronon 1994:14). Therefore, landscapes contain immense life histories that both reflect the past human-environmental interactions and influence the present and future interactions (Endfield 2008:4). This layered interpretation of landscapes can complicate archaeological understandings of the past since not all life histories are marked in physical constructions (Ashmore 2002:1178). Gaps in material evidence certainly exist, but the recurrent construction and reconstruction of landscapes is particularly pertinent to a study assessing the transition between the Postclassic and Colonial periods.

The Spanish conquest of AD 1521 disrupted ecological and cultural life-ways established by the Aztec Empire, but the post-conquest world did not entirely stamp

out the pre-Columbian culture. Instead, colonial society transformed through “ambiguous and hybrid relationships” of the two distinct cultural groups (Lyons and Papadopoulos 2002:7). Instead of a dichotomized society of the conquering Spanish people and conquered indigenous people, Colonial Mexico existed in a state of “betweenness or middle ground” (Lyons and Papadopoulos 2002:7). In this sense, the Colonial Period was a time of intense negotiation and renegotiation of cultural relationships.

As social relationships were built and rebuilt in the Colonial Period, so was the perception of the landscape of Mexico City. As Ashmore and Knapp argue, “conquest frequently involves the destruction of history... the landscape is remade, and [with] its symbolic markings no longer visible, society becomes disoriented” (1999:19). In general, Europeans treated landscapes as an object of conquest- a mentality that resonated with class relations and land tenure developed in the Old World (Sluyter 2001). Based on Old World technology and ecological understandings, the Spanish people greatly transformed the environment of the Basin of Mexico. Introducing new technologies and plant and animal species physically changed the material landscape, but the implementation of new land-tenure systems and systems of social stratification also transformed the conceptual colonial landscape (Fisher et al 2009:11; Sluyter 2001:411). Thus, the landscape of Colonial Mexico did not erase the indigenous past, but as a palimpsest of the Basin of Mexico, entered a new phase of construction of the material and social environment.

The renovation of a landscape is directly evidenced in the hydraulic landscape of the Basin of Mexico. To continue this study, the scope of the analysis

will continue to reduce from the large-scale concept of landscape presented in this chapter, the hydraulic landscape in Chapter 3, to a single hydraulic feature presented in the case study of Chapultepec. Although not a complete overview, Chapter 3 will offer insight into the larger ecological setting of the Basin of Mexico and the make-up of the hydraulic landscape as witnessed by the Spanish conquistadores upon their arrival to the Basin in AD 1519.

Chapter 3: Background

Housed in the unique ecological setting of the Basin of Mexico, the construction of the Postclassic hydraulic landscape depended on the interplay of ecological and social factors. The primary goal of this chapter is to present the environmental factors that influenced the construction of the hydraulic landscape, including freshwater and saline lakes, climatic variation, and natural resources. Equally important to environmental factors, this chapter will present a general overview of the culture referred to today as the Aztecs. The final section will briefly address the entirety of the Postclassic hydraulic landscape created by the Aztecs. By understanding the extent of the hydraulic landscape, it will then be possible to scrutinize a single hydraulic feature at Chapultepec hill in Chapter 4.

The Environment

The Basin of Mexico is located between the north latitudes of $19^{\circ}03'$ and longitudes of $20^{\circ}14'$ and $98^{\circ}11'$ and $99^{\circ}30'$ west of the Greenwich line. Spanning $7,000 \text{ km}^2$, this high altitude basin (average 2224 m.a.s) currently houses approximately 21 million people in the metropolitan area of Mexico City. The modern day urban expanse of Mexico City differs greatly from the once vast lake system on which the Aztecs built their empire. Nestled between the Sierra de Pachuca to the north and the Sierra de Chichinautzin to the south, the Sierra de las Cruces to the east and Sierra Nevada to the west, seven lakes formed on the bottom of the enclosed basin.

The lake system formed over 30 million years as the Basin underwent immense geological changes caused primarily by volcanic activity and tectonic movement. The Basin is located in the Trans-Mexican Volcanic Belt or the “Neovolcanic Axis,” and sits between two major faults: the Humboldt fault and the Chapala-Acambay fault (Padilla y Sanchez 1989:20). Frederick Mooser (1963) divides the Basin into zones based on the two major faults to the north and the south, and the intermediate area in between. From the Late Paleocene to the Late Pliocene (~2 million years ago), major uplifts eventually closing the Basin, forming a vast system of lakes and lagoons (Padilla y Sanchez 1989:22).

The enclosure of the Basin marked an important transition in the ecological makeup of the Basin of Mexico. Until the final completion of the Spanish-initiated drainage project at the turn of the twentieth century, snowmelt, spring water, and rainfall runoff accumulated in shallow lakes at the bottom of the Basin floor (Sanders et al 1979:81). Additionally, natural springs formed around the lake system generated from the subsurface aquifer that absorbed excess precipitation and lake runoff (Sosa-Rodriguez 2010:677). Although commonly referenced under the single name of Lake Texcoco, the system was composed of seven lakes [Figure 1]. Listed according to their relative elevation to Lake Texcoco (0m), the additional lakes were: Zumpango (+6m), Xaltocan (+3m), Xochimilco (+3.5m), Chalco (+3.5m), Mexico (+0.85m) and San Cristobal (+3m) (Bradbury 1971:181). The lakes to the north, eventually separated by the construction of the Netzahualcoyotl dike in 1449, contained brackish, saline water and the lakes to the south held fresh water.

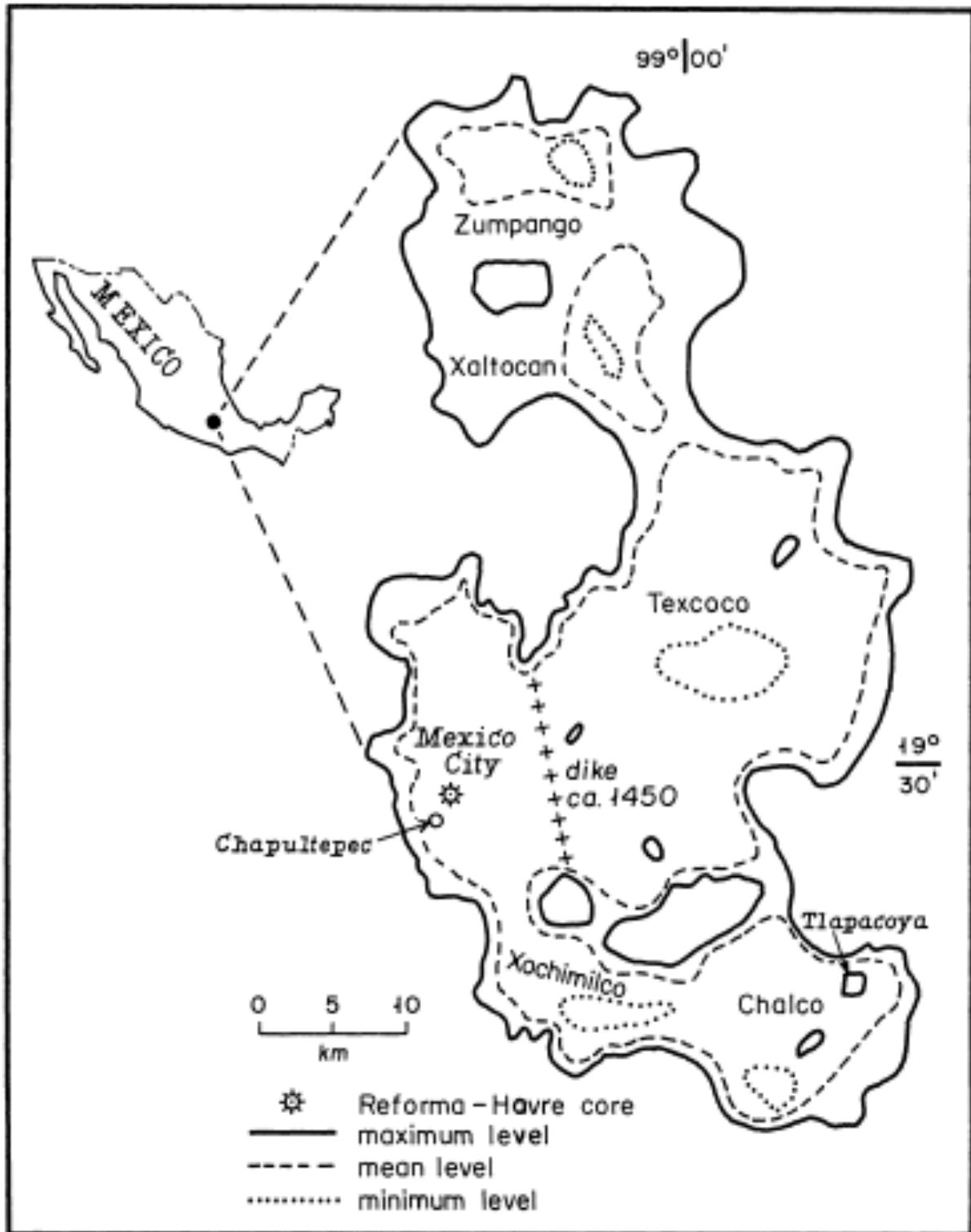


Figure 1: Map of the Lake System of the Basin of Mexico (Bradbury 1971:182)

As the lowest lake in the basin, Lake Texcoco acted as a terminal drainage for the other lakes and is a prime example of an inland saline lake. Inland saline lakes are common in both hemispheres and tend to appear in endorheic basins between 20° and 40° latitudes, usually in semi-arid environments (Alcocer and Hammer 1998:292). Drainage, inflow of thermal springs and carbonate-rich ground water, and shallowness contributed to salinity levels in Lake Texcoco higher than seawater (Lamb et al 2009:2001, Sosa-Rodriguez 2010:677). It is estimated that Lake Texcoco once held 225 million cubic meters of water with a maximum depth of 5.57 meters (Carballal Staedtler and Flores Hernandez 1981:6). The salinity of the largest lake spanning over 700 square km was one of the many ways the natural environment affected how humans exploited resources of the lakes (Mooser 1963:52).

In addition to salinity levels, climate variation was a pivotal factor in the creation of the microenvironments within the valley, and contributed to the eventual settlement pattern and technological innovations of its early human occupants. According to S.E. Metcalfe (1987), Mexico is located in a “climatically sensitive belt,” with trade winds, a sub-tropic high-pressure belt, and the Westerlies contributing to atmospheric circulation (1987:211). Today, the climate is sub-tropical with monsoonal rainfall of 500-1000mm, mostly in the summer months between July and October (Lamb et al 2009:2001). Through the use of pollen, tephrochronology, diatoms, stable isotopes, organic geochemistry, and speleothems, multiple studies demonstrate the constant changes in the paleoenvironment of the Basin of Mexico from the Late Glacial Maximum (19,000-16,500 years BP) to modern day.

From the Late Glacial Maximum (1900-16,500 years BP) to the early-to mid Holocene (10,000-5,000 years BP), the climate oscillated from dry to humid conditions, transforming the Basin environment and continuously changing the lake levels. Cooler temperatures resulted in the transformation of the Basin of Mexico from expanding grassland into a swamp-based ecosystem (Lamb et al 2009:2011, Bradbury 1971:180). By the end of the mid-Holocene, arid conditions lowered the water levels of the lake system, creating shallow, stagnant pools of water with a high concentration of aquatic plants. Periodic flooding washed into the highly saline lake system, mixing fresh water run-off from nearby active volcanoes into the shallow waters (Lamb et al 2009:2012). According to Lamb et al (2009), little large-scale change occurred in the Basin's climate after 5,000 years BP.

Perhaps the late Holocene did not experience dramatic changes seen in previous geological periods, but the availability of climatic studies allows for a more focused understanding of climatic variation beginning in the Formative Period (ca. 1500-400 BC). Utilizing oxygen isotope compositions of stalagmite in the Juxtlahuaca Cave in the Sierra Madre del Sur, geoscientists conclude that the lake systems reached their peak volume around 500 BC (Lachniet et al 2012:260). After 500 BC, evidence from stalagmites, paleolimnology, and dendrochronology support the argument that rainfall variability eventually led to drying conditions during the Classic Period and a 150-year mega-drought culminating in AD 770 (Endfield 2008:13, Lachniet et al 2012:259). After centuries of climatic drying, wetter conditions returned to the basin of Mexico in the AD 1450s.

From the mid-Postclassic through the Colonial era, climate fluctuations persisted in the Basin of Mexico. Descriptions of flooding as well as maritime military tactics in the works of Diego Duran (1581) and Bernardino Sahagún (1588) indicate deeper lake levels by the time of the conquest in AD 1521 (Metcalf 1987:215). After the conquest, rainfall data, dendrochronology, and written records reveal continued fluctuation between wet and dry conditions. Unmistakably, atmospheric circulation, rainfall, and other natural elements played a key role in the decadal variation of the Basin's climate (Lachniet et al 2012).

The episodic nature of the Basin's climate affected human subsistence and settlement patterns, primarily in the development of agriculture. Generally, the warm summers and abundant rainfall created fertile, arable land for farming. Winter frosts, monsoons, and localized rainfall patterns, however, created a challenge for agriculture and required additional features to stabilize crop production (Sanders et al 1979:82). To combat unpredictable conditions, early farmers in the Basin of Mexico developed a variety of hydraulic features, including canals, dams, aqueducts, and basic chinampa farming (Nichols and Fredrick 1993, Sanders et al 1979). By developing productive agricultural and irrigation techniques, occupants of the Basin increased food procurement in a biologically rich environment (Scarborough 2009:69).

The episodic climate variation and salinity levels caused difficulties for agricultural production, but the lacustrine environment offered an immense amount of natural resources for people of the Basin of Mexico. From the early occupations, humans exploited the abundance of natural resources within the fresh and saline

lake system, including mammals, fish, aquatic birds, aquatic macrophytes, zooplankton, algae, and aquatic biota (Alcocer and Hammer 1998:312, Rojas Rabiela 1998). In addition to the flora and fauna, the salinity of the lakes also provided the critical resource of salt. From the saline lakebeds, humans procured both 'salt' –pure sodium chloride- and 'tequezquite'- impure mixtures of sodium carbonate, bicarbonate, chloride, and sulphate (Alcocer and Hammer 1998:304).

For thousands of years, humans profited from the rich lacustrine environment and arable land in the Basin of Mexico. Since the earliest evidence of occupation at Tlapacyoa around 22,000 BP, the human-environmental interactions continued to change as humans exploited the natural environment (Lamb et al 2009:2001). By the time of the Postclassic period (AD 900-1521), a series of agrarian-based confederations lined the lakeshores of Lake Texcoco. Practicing dry land and wetland agriculture, these “small, autonomous, internally unstable and mutually hostile political domains” lay the groundwork for the Postclassic hydraulic landscape of the Aztecs (Brumfiel 1983:266).

The Postclassic Period: The Aztecs

The Aztecs are one of the most studied groups of the Basin of Mexico, but there are many misconceptions regarding this ancient group. The term Aztec itself has caused disagreement among scholars. To many, the Aztecs refers to the Triple Alliance, an alliance formed by the three altepetls (Nahuatl for city-state) of the Tenochtitlan, Tlacopan, and Texcoco (Carasco 1999). For others, the term “Aztecs” should be expanded to include inhabitants of the Valley of Mexico who spoke the Nahuatl language and traced their origins to the mythical location of Aztlan, an

unknown location north of the Basin of Mexico (Smith 1996:4). For this analysis, the term “Aztec” is applied to primarily to the group of Nahuatl speakers called the Mexica, who founded the city of Tenochtitlan.

Tenochtitlan is commonly referred to as the capital of the Aztec empire. According to colonial chronicler Diego Duran’s *History of the Indies* (1581), Tenochtitlan was founded in AD 1325 after the Mexica were exiled into the swamps of Lake Texcoco (Duran 1994: 42). The group split and built two separate cities on a series of artificial and natural islands forming the Island of Mexico [Figure 2]. The island contained two altepetls, Tenochtitlan and Tlateloco, which remained separate until the people of Tenochtitlan conquered Tlateloco in AD 1473 (Duran [1581] 1994:262). Although ethnically separate, the hydraulic system benefited both cities on the island and often reference to water management refers to Tenochtitlan and Tlateloco.

The history of the Aztecs involves the interplay of myth and history, as a small, migrant group rose to become the dominant polity in the Basin of Mexico. Located in the core of the Aztec empire, Tenochtitlan required a unique balance between the natural environmental and the built urban setting (Garcia Acosta 2007:133). Utilizing a variety of techniques, the Aztecs managed to construct a city in the middle of a brackish lake. To mitigate the environmental risks and challenges facing the water-locked city, the Aztecs constructed a large and complex hydraulic landscape that physically altered the environment.

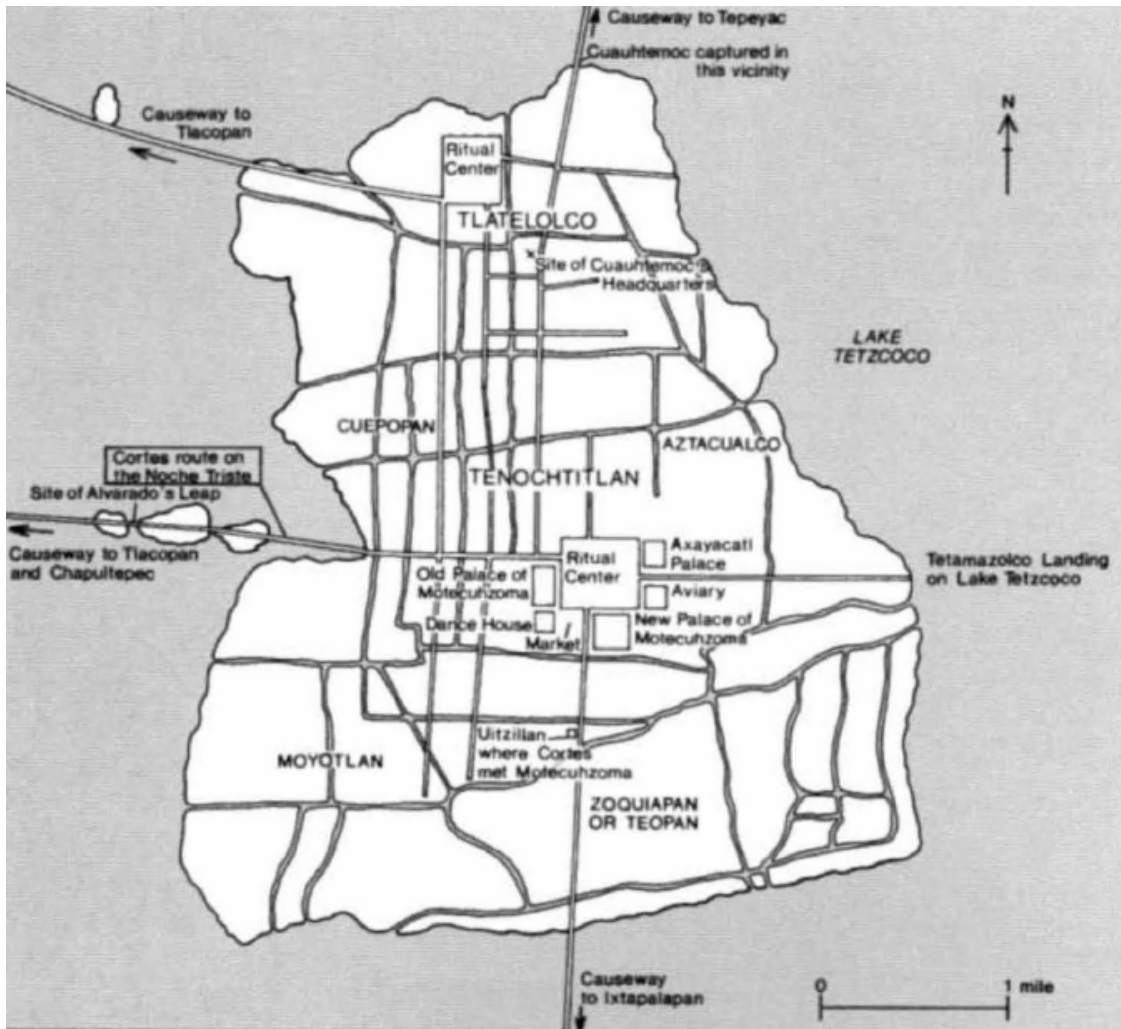


Figure 2: Map of the Island of Mexico; Tenochtitlan located in the south-central area and Tlatelolco in the north (Townsend 2009:22).

The anthropogenic impact on the lake system occurred rapidly in the two centuries of occupation on the island of Mexico (AD 1325-1521). First, as the cities of Tenochtitlan and Tlatelolco expanded outward, the Aztecs built a series of artificial platforms connecting natural islands to create the urban center over the once marshy ecosystem (Townsend 2009:18). Second, in efforts to maximize agricultural potential in the area, the Aztecs eventually separated the brackish water to the east from the less saline water to the west (Mendez et al 2011:6). These efforts also raised the water levels depending on human needs. Thus, the hydraulic

landscape consisted of both a natural and built environment to support the urban center.

The Postclassic Hydraulic Landscape

The hydraulic landscape of the Postclassic Aztec society incorporated a number of techniques and strategies to utilize, control, and manipulate the environment. Through a series of excavations and ethnohistorical analyses, scholars are beginning to see the complexity of the Postclassic hydraulic landscape. As seen in Figure 3, Lake Texcoco and the southern lakes of Chalco and Xochimilco were covered with an extensive network of hydraulic features. The entirety of the Postclassic hydraulic landscape contained a variety of structures, but five main components will be discussed below: causeways, dikes, canals, chinampas, and aqueducts.

Causeways

With the majority of the urban population located on the shorelines of the lake and the island cities of Tenochtitlan and Tlateloco, causeways provided entrance in, out, and across the lake system. Causeways passing north to south through Tepeyac, Tlateloco, Tenochtitlan, and Coyoacan, and east to west from Tlacopan to Tenochtitlan served primarily as roads, but also as docks and simple dikes (Becerrill and Jimenez 2007:149). The docks, or embarcaderos, were located as key locations for regional trade within and on the shores of Lake Texcoco and Lake Mexico, including Chalco Atenco, Ayotzingo, Teteloc, Xochimilco, Mexicalizingo, and Huitzilopochco (Hassig 1985:62).

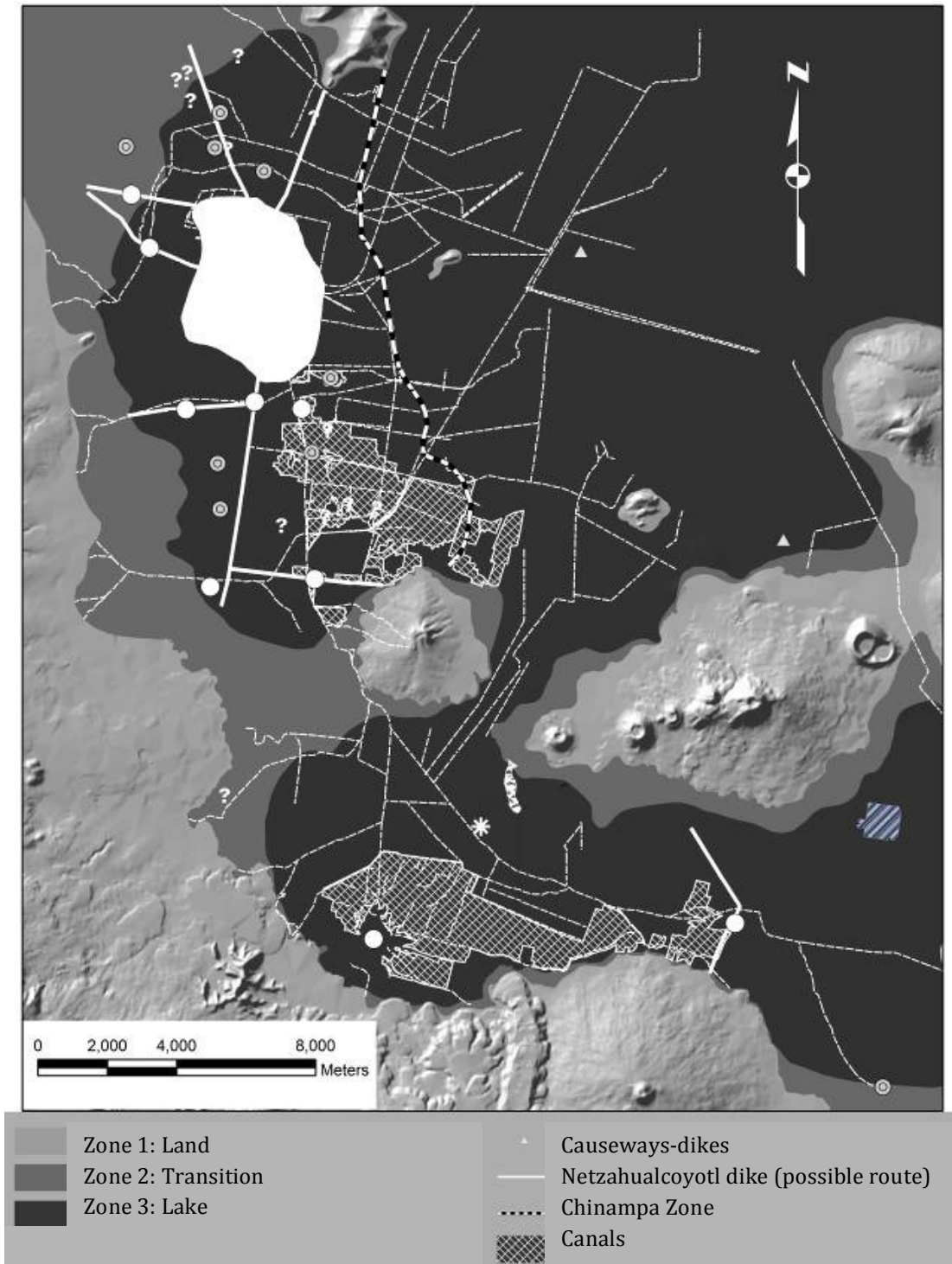


Figure 3: Map of the Hydraulic System of Lake Texcoco, Chalco, and Xochimilco based on Geotectonic Anomalies, modification and translation of table by author (Mendez et al 2010:6)

Additionally, causeways acted as dikes, separating the saline and sweet waters and helping to control the circulation of water around the artificial urban platforms (Carballal Staedtler and Flores Hernandez 1997:8). These seemingly simple constructions of sands, rocks, and gravels dictated the flow of people, information, and goods into the hub of the Aztec Empire, but also mitigated the waters around the cities.

Dikes

Causeways functioned secondarily as dikes, but the Aztecs also constructed purposeful dikes to prevent the inundation of the city from frequent floods and to control the level of the lake waters. Constructed with a series of wood, plaster, and mud, dikes protected agricultural and residential areas from the constant threat of flooding (Sosa-Rodriguez 2010:679). Lined with sluice gates, dikes were able to precisely control lake levels within the dammed areas (Scarborough 1991:130). Besides controlling water levels, dikes served the important purpose of separating sweet and brackish water. Arguably the most impressive dike was called the Netzahualcoyotl dike after the overseer of the project, the ruler of the Texcoco. Requiring 20,000 men to construct it, the dike was built in 1449 using “stones and earth enclosed by stockades interlaced with branches” (Coe 1964:98). In 1498, another Texcocan ruler, Nezahualpilli, enhanced the dike and Viceroy Don Luis Velasco reworked it again during the Colonial Period in AD 1555 (Carballal Staedtler and Flores Hernandez 1981:137,138). A second major dike was built in the northern part of Lake Texcoco called the San Lorenzo dike that ran approximately 1750

meters from the east to the south of Tenochtitlan, passing near the Peñon de los Baños (Carballal Staedtler and Flores Hernandez 1981:101).

Canals and Channels

Running parallel to the large dike embankments, the Basin was also crisscrossed by a widespread network of canals. Following Doolittle's definition, canals were a "specific form of irrigation that involves the transport of water from a source by means of gravity flow through artificially constructed open conduits" (1990:13). Lined with stucco, canals differed only slightly from channels that were short and narrow waterways that diverted natural streambeds to prevent stream meandering and flooding (Doolittle 1990:13). Associated with both inland and lake-based agriculture, small and large-scale canals and channels traversed the landscape, sourced from permanent springs and floodwater irrigation.

Chinampas

Separated by canals, one of the most impressive water-based agricultural practices is known as chinampas. Derived from the Nahuatl word *chinamitl* meaning "cane fence or enclosure," they are often erroneously labeled floating gardens (Rojas Rabiela 1991:276). Their design consisted of artificial platforms devised from organic and inorganic materials crosscut by a series of canals that provided transportation in between plots and irrigation. As seen in the *Plano en Papel de Maguey* [Figure 4], the chinampa fields followed a fairly generalized linear and uniaxial orientation (Sluyter 1994:561). Piling artificial soil created each plot; then willow trees were planted in between plots that eventually formed a living wall.

Once their roots were established, the plots were enriched through a process of mucking (spreading organic materials from canals) and manuring (spreading of compost) (Armillas 1971:654). The maintenance processes enabled continual cultivation and reuse of natural materials to sustain the agricultural system.

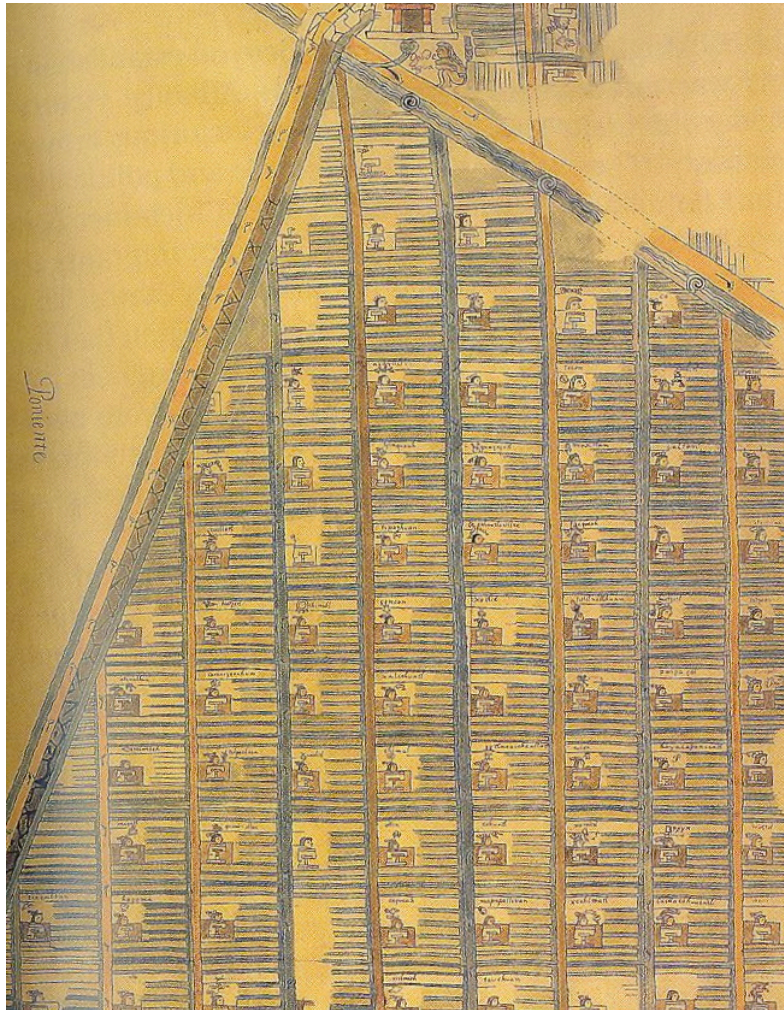


Figure 4: Excerpt from the Plano en el Papel de Maguey (Evans 2004:461)

A very effective agricultural practice, chinampas employ a complicated strategy of moisture capturing through seepage, drainage, and artificial construction to create a fertile agricultural plot (Armillas 1971:653). Although not unique to Mesoamerica, with chinampa-like agriculture found in many parts of South America, they provided an abundance of crops including maize, tomatoes, green tomatoes, squash, chilies, climbing beans, chía, amaranth, cayote, chilacayote, various ornament flowers, marigold, aromatic herbs, quelites, quiltonil and quelite cenizo (Rojas Rabiela 1991:277,280). Engineered for efficiency, chinampas greatly altered the pre-Hispanic landscape of the Basin of Mexico.

Aqueducts

The success of the chinampas depended on access to freshwater, a resource also required to sustain the urban population of the Island of Mexico in the brackish waters of Lake Texcoco (Coe 1964: 98). Without a fresh water supply on the island, the Aztecs targeted the numerous springs by the lakes filled by the extensive aquifer beneath the Basin that collected excess precipitation (Sosa-Rodriquez 2010:677). In order to transport the freshwater to the island of Mexico, the Aztecs built large aqueducts that carried water from the springs to holding tanks in the city center (Bercerrill and Jimenez 2007:151). The primary function of aqueducts was to provide freshwater for agricultural and residential purposes, but also contributed to diluting the brackish water when water was deliberately passed through the sluice gates on dikes and causeways (Scarborough 1991:130).

Although a number of small aqueducts existed primarily for agricultural purposes throughout the Basin, two major aqueducts were constructed during the

Postclassic Period. The first aqueduct transported freshwater from the hilltop of Chapultepec to the Island of Mexico. Withstanding floods and a series of reconstructions, the Chapultepec aqueduct continued to function as the city's main water source through the Colonial Period (Cabrera 2005: 32). A second aqueduct was constructed to connect the five springs at Coyoacan to Tenochtitlan (Bercerrill and Jimenez 2007:152). Although the project proved disastrous, the construction of aqueducts represented a vital strategy to affectively manage the natural environments around the city.

Although additional features existed in the hydraulic landscape, the large-scale projects of causeways, dikes, canals, chinampas, and aqueducts required corporate investment to maintain the system by the Aztec altepetls. By the time the Spanish conquistadores arrived in AD 1521, the hydraulic landscape of the Basin of Mexico was deeply rooted in various realms of Aztec society. In the following chapter, this analysis will assess the complexity of a single landmark and how it contributed to the social and ecological realms of the hydraulic landscape.

Chapter 4: Chapultepec- A Case Study

As mentioned in Chapter 3, Chapultepec hill sourced much of the freshwater delivered to the Island of Mexico via the Chapultepec aqueduct. The ecological importance of Chapultepec was unmatched for the survival and growth of the Island of Mexico and surrounding areas dependent on the lake system. In addition, the significance of Chapultepec expanded beyond sole ecological benefits and became embedded into the sociopolitical culture of the Aztecs. This chapter will address the diverse functions of this single site throughout the Postclassic Period and its transformation after the Spanish conquest.

Background of Chapultepec

Chapultepec is a natural hilltop located in the southwest region of modern Mexico City, previously on the southern banks of Lake Texcoco. From a small number of excavations, archaeologists argue that human occupation at Chapultepec spans far back in the history of the Basin of Mexico. Excavations in the 1960's by Beatriz Braniff and María Antonieta Cervantes offer the earliest archaeological evidence of occupation of Chapultepec in the Coyotlateloc phase (650-800 BC). Additional excavations by María de la Luz Moreno y Garcia in 1999 uncovered small rock and adobe structures of basalt and three human burials with offerings indicating continual occupation during the Metepec phase (450-600 BC) (Onofre et al 2007:4). With little archaeological evidence after the Metepec phase, the ethnohistorical document of Fernando Cortes de Alva-Ixtlilxóchitl suggests the Toltecs occupied the hillside during the Classic and Epiclassic periods (AD 300-

1000) (De la Torres 1998:21). By the time the Aztecs arrived in the valley of Mexico in the early Postclassic, Sixteenth century chronicler, Diego Duran, claims that the Tepanecs Confederation controlled of the territory of Chapultepec (Duran 1994 [1581]: 29).

Exploiting the Ecological Landscape

The long span of occupation at Chapultepec prior to the arrival of the Aztecs indicates its ideal location in proximity to a valuable resource: fresh water. Necessary for consumption and agricultural production, few cities faced a greater challenge accessing this precious commodity as Tenochtitlan and Tlateloco (Coe 1964: 98). The decision to build the Aztec cities in the center of the lake presented both advantages and disadvantages for the Aztecs. In the early phases of occupation, the location in the brackish lake proved difficult for the development of the Island of Mexico. Diego Duran, described early settlement as one of modest beginnings. He wrote,

In the year one thousand three hundred and eighteen after the birth of Our Redeemer Jesus Christ, the Aztecs began to build the city of Mexico-Tenochtitlan, making humble houses and thatched huts on top of the earthen mound they formed, because, as I have said, this was a great lagoon, much of it covered with rushes, reeds, and cattails [with little solid ground] (1998 [1581]:51).

Without access to fresh water, the growth of the Aztec cities was stifled. In order to supply the Island of Mexico with this critical resource, the Aztecs targeted water sources off the shores of Lake Texcoco.

Due to the extensive aquifer beneath the hill, numerous freshwater springs within close proximity to Tenochtitlan made Chapultepec the ideal site to provide

water for the urban center (Sosa-Rodriguez 2010:677). Evidenced through a series of pre-existing canals, the water source at Chapultepec had already been tapped by the time the Aztecs began to expand their empire. According to excavation by Maria de la Luz Moreno Cabrera (2005), a series of small canals were constructed over the hillside of Chapultepec. Some spanning up to 25 meters in length, canals reinforced by stucco and stabilized by tree trunks carried water to various locations on the hill (Cabrera 2005:33). The small network of canals indicated the potential of Chapultepec to source larger areas with freshwater, including Tenochtitlan.

In order to access the spring water, the Aztecs first devised a simplistic aqueduct made of stakes, reeds, and mud, but the organic materials quickly disintegrated (Bercerrill and Jimenez 2007:151). It was not until the year AD 1418 that a second, more permanent aqueduct was constructed. The second aqueduct consisted of two open troughs that brought water from Chapultepec into the Island of Mexico. The general projection of the aqueduct is illustrated in Figure 5. Although it is not known how the aqueduct traversed the land between Chapultepec and the lakeshore, scholars have identified how the Aztecs constructed the aqueduct across Lake Texcoco and into the center of Tenochtitlan.

Illustrated in Figure 6, Mexican engineer Jose Luis Bribiesca Castrejón hypothesized that the Aztecs created artificial islands similar to chinampa agricultural plots to hold the aqueduct above the water (Doolittle 1990:121). By weaving reed mats together to form 7-meter wide rafts, the mats were floated to their desired location and anchored with stakes deep into the lakebed.



Figure 5: Hydraulic System, including the Pre-Hispanic Chapultepec aqueduct, superimposed on map of Modern Mexico City (original source).

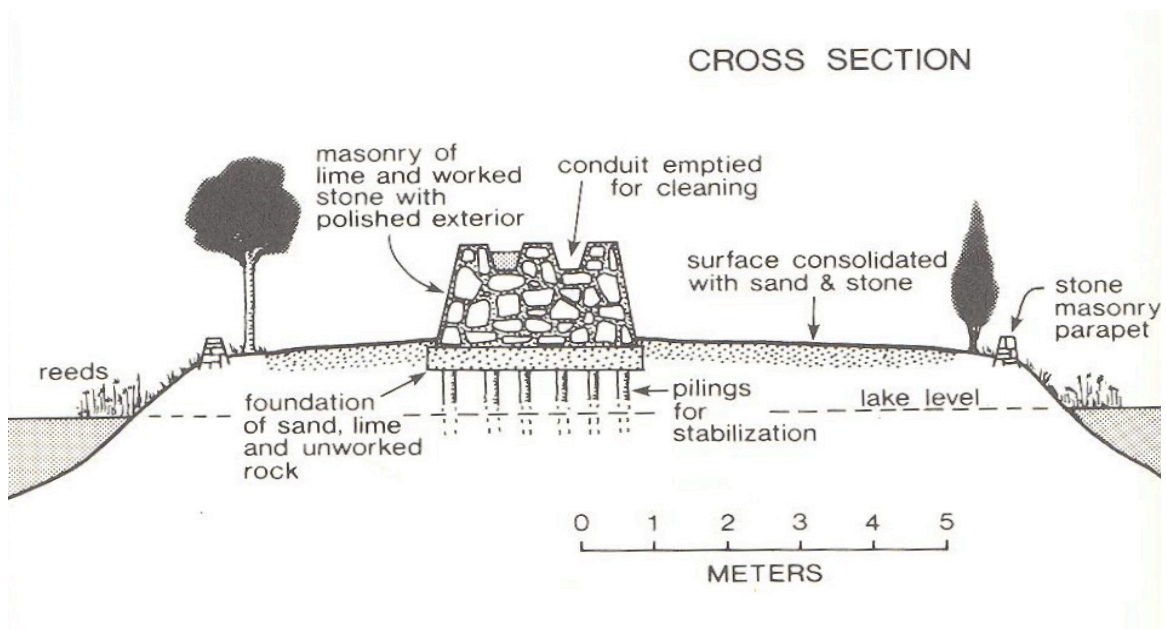


Figure 6: Cross-section of the first Chapultepec aqueduct based on Briebesca Castrejón's analysis (Doolittle 1991: 120).

Earthen materials like rocks, mud, and sod were loaded onto the rafts to create artificial islands to hold the wooden planks of the aqueduct conduits (Doolittle 1990:123). Extending 12km in length from the base of Chapultepec to Tenochtitlan, the aqueduct carried water into the city through its 7m wide channel (Becerrill and Jimenez 2007:152).

After passing through the open-air troughs of the aqueduct across Lake Texcoco, excavations from metro lines in the Zocalo of Mexico City reveal that the freshwater was stored in subterranean holding tanks under the Temple Mayor (Armijo Torres 2005:84). As documented in the Codex Osuna (1565) [Figure 7], commoners would purchase water from the underground reservoirs and transport the water via canoe back to their residences (1947 [1565]: 205). The elaborate system alleviated early stresses on the capital city to provide freshwater for consumption, and proved to be an invaluable adaptation to the ecological setting in Lake Texcoco for agricultural purposes.

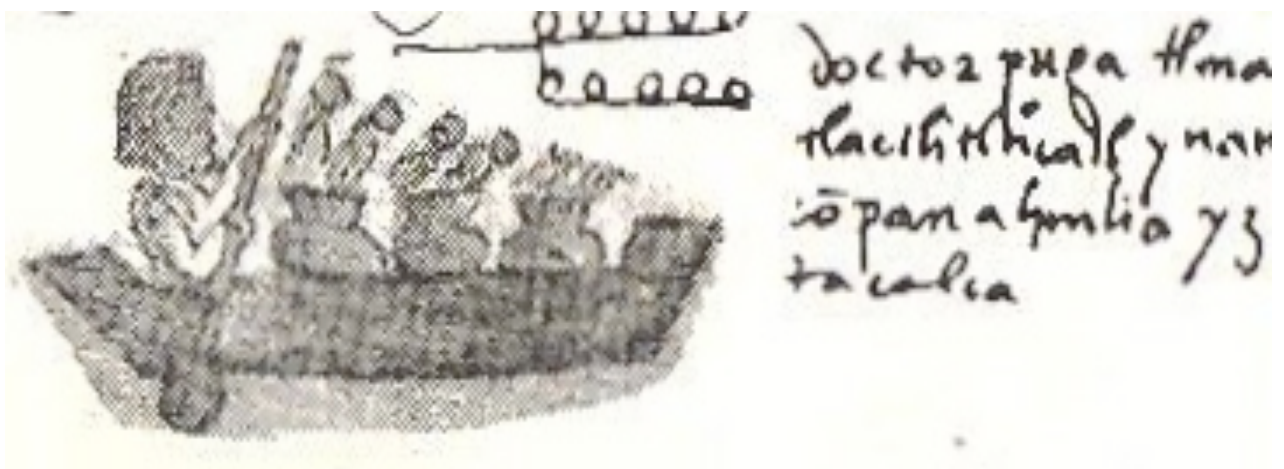


Figure 7: Image of an Individual transporting water in large, ceramic containers (jarras) via canoe (Codex Osuna 1947:205)

In addition to the water supply to the cities, the aqueduct was also a part of the Aztec water management strategies to control the water and salinity levels of the lake system. In the less saline southern lakes of Chalco and Xochimilco, chinampa agriculture spanned approximately 9,000 ha, proving to be an essential asset to the Aztec economy and market system (Sluyter 1994:571). The success of chinampas depended on low lake levels so the plots would not be inundated and the diversion of brackish waters from the northern lakes. In AD 1449, the Aztecs and their allies constructed the Netzahualcoyotl dike to protect the chinampas from the saline waters. Coupled with the physical barrier of the dikes, the Chapultepec aqueduct pumped freshwater into the lakes to protect the chinampas from overly saline waters (Scarborough 1991:130).

Monitoring the salinity and lake levels was an essential strategy for agricultural production and for mitigation of the greatest threat to Tenochtitlan: flooding. Sitting in the middle of a lake, Tenochtitlan was very susceptible to flooding and many agricultural and residential plots were inundated when lake waters rose too high. The Codex Mexicano indicates the first major flood recorded on the island was in AD 1385 (Garcia-Acosta 2007:134), and floods continued to cause severe damage to Tenochtitlan for the next two centuries. The next major flood occurred in AD 1446, destroying the Chapultepec aqueduct only thirty years after its construction (Becerrill and Jimenez 2007:152). Three years later, the Chapultepec aqueduct was rebuilt again, this time with the support of a neighboring polity and member of the Triple Alliance, Texcoco. With the aid of the Texcocan leader, Netzahualcoyotl, the Aztecs rebuilt the aqueduct in AD 1465, resting on

larger artificial islands and enlarged in both width and height (Doolittle 1990:123). The new and improved aqueduct amplified the amount of freshwater flowing into Tenochtitlan and the surrounding lakes.

The construction of the hydraulic features of the dikes and the Chapultepec aqueduct demonstrate the ecological importance of the Aztecs' interaction with the environment. In order to survive and flourish in the middle of Lake Texcoco, the Aztecs required a "profound knowledge of the lake's topography and environmental characteristics allowed for the effective mitigation of hazards" (Garcia Acosta 2007:134). Powerful not only in its ability to aid in risk mitigation, the Chapultepec aqueduct was essential to the growth of the Aztec empire. As archaeologist Mario De la Torres questions,

Had the water springs not existed in Chapultepec, how long would the *great Tenochtitlan* have remained in existence? Would the Aztec's nomadic temperament relived? It is not known. What is certain is that for Mexico, more than a recreational spot, the forest with its hill has been a crucial factor for its subsistence (De la Torre 1998:35).

Undoubtedly, the aqueduct built from Chapultepec to Tenochtitlan provided an essential resource to the ecological success of the Aztecs and proved to be a testament to the Aztecs' knowledge of the natural world.

The Social Landscape of Chapultepec

The aqueduct from Chapultepec altered the ecological landscape of the Basin of Mexico by providing a habitable location for the empire in an otherwise hostile swamp. The importance of Chapultepec for the ecological survival of Tenochtitlan is undeniable, and as the site grew in ecological importance, it also became a symbol of social elements of Aztec society. As historian Doris Heyden explains,

The interaction of man with his natural environment is responsible for many religious concepts, for myths, rituals, and plastic representations, and even for sociopolitical concepts (1989:42).

In this sense, the Aztec relationship with Chapultepec expanded from solely a site of ecological importance to a landmark that became deeply rooted in the history, politics, and religion of the Aztecs.

Making History at Chapultepec

Recorded in numerous ethnohistorical documents, the site of Chapultepec was conceived as a central landmark in the history of the Aztecs (Heyden 1989:48). Much of Aztec history captured in codices interchanges between ideas of myth and history, incorporating sacred places, divine activity, and historical events into a single narrative (Heyden 1989:48). The interconnectedness of myth and history challenges Westernized concepts of history, and requires an emic understanding of how the Aztecs interpreted their world and perceived their surrounding environment. As sites like Chapultepec became enwrapped in both the ecological and social landscapes, they also became places of identity and heritage. Within an ethnically diverse society, the Aztecs propagated unifying narratives that “brought together people of widely differing social status into relations of interdependence” (Brumfiel and Robin 2012:678). To enforce a unifying history, the Aztecs emphasized the “rags to riches story” of the rise of the Aztec state (Smith 1996:28) and the ancestral ties to ancient cultures of the Basin of Mexico.

The “rags to riches” story of the Aztecs began with the migration of a small group into the Basin. Captured in thirteen ethnohistorical documents, the Aztecs took shelter at Chapultepec after traveling from the northern land of “Aztlán”

(Onofre et al 2007:5). Immigrating between AD 1250-1300, the Aztecs were quickly uprooted from the lush hillside and relocated to the uninhabitable, “isolated, and snake-infested” place of Tizaapan (Smith 1996:42). Following the narrative of Duran (1581), the Aztecs established their subsidiary place in Culhuacan until they committed unacceptable sacrifice in a ceremonial wedding to their principle deity, Huitzilopochtli. Fleeing from the wrath of the leader of Culhuacan, the Aztecs sought refuge in the cluster of natural islands located in the swampy waters of Lake Texcoco. The Mexica established their capital city on the small set of islands, which was a territory of another polity based in the city of Azcapotzalco (Smith 1996:43). The regional dominance of Azcapotzalco was short-lived; “Azcapotzalco’s hegemony was founded on an unstable complex of payoffs and alliances similar to those in earlier petty kingdoms, and its power soon disintegrated” (Brumfiel 1983:271). Through a set of political maneuvers and military success, the Aztecs advanced their position as a tributary province of the Tepanec Empire.

Capitalizing on their military success and politically advantageous marriages, the third tlatoani of the Aztecs, Chimalpopoca found favor with his grandfather, Tezozomoc, leader of the Tepanecs. In a political scheme to challenge the traditional power relationship between the dominant and tributary polities, the Aztecs demanded building materials for the second phase of construction on the Chapultepec aqueduct (Duran 1994 [1581]: 66). Met with great hostility from the Tepanec elite, the Aztecs were given the materials to expand the aqueduct to approximately seven meters wide across the 12 km between Tenochtitlan and Chapultepec (Becerrill and Jimenez 2007:152). The tension grew between the

polities, and eventually caused the War of Independence between the Tepanecs and the Aztecs of the Triple Alliance (Tenochtitlan, Texcoco, and Tlacopan). The original construction of the aqueduct provided a critical advantage for the island cities and became a symbolic gesture of the military and political power of the Aztecs.

In addition to the symbolism of political independence, Chapultepec was perceived as a sacred site that linked the Aztec heritage to the once dominant group of the Toltecs. Known for their military strength, the Toltecs were a revered society that thrived between the 10th and 12th centuries (Townsend 2009:44). After their collapse, many emerging confederations claimed Toltec heritage to claim territorial rights in the Basin of Mexico, including the Aztecs. According to the *Relación histórica de la nación tulteca* Alva- Ixtlilxóchitl, the Toltecs “spoke of the hill as a living god” that was to be cleaned and pruned frequently to appease the deity (De la Torre 1998:15). Alva- Ixtlilxóchitl’s narrative continues to explain that the last leader of the Toltecs, Ectin, “stayed at Chapultepec after his father’s death and the dispersal of his people until he made a pilgrimage to Aztlan, becoming the ‘patriarch’ of the Aztecs” (De la Torre 1988:21). The narrative of Alva-Ixtlilxóchitl is just one example of the Aztecs claiming the “prestigious Toltec descent” (Townsend 2009:32). With ancestral ties to the site, the victory over Chapultepec was a symbolic act of the Aztecs’ rightful reclamation of the territory.

Legitimizing Political Power

As descendants of the Toltecs and a strong military state, the Aztecs quickly adopted Chapultepec as a site to project the sociopolitical strength of the empire in the Postclassic Period. In a dramatic display of power and authority, the spring

water that eventually was taken to Tenochtitlan was first directed to the royal retreat at Chapultepec. Covering an expansive territory of vast green spaces, hunting grounds, gardens, sculptures, chapels, benches, pools, and fountains, Chapultepec served as an exclusive and luxurious park for the Aztec elite (Evans 2000:89; De la Torre 1988:32). Symbolizing the success of the Aztec empire through the visible exhibition of wealth and extravagance, Chapultepec represented the power of Tenochtitlan and its allies. Built with the aid of the other altepetls of the Triple Alliance, the exclusive retreats at Chapultepec capitalized on the historical significance of the site to exemplify the power of the Aztec elite (Evans 2000:211).

Outwardly, Chapultepec reflected the wealth of the Triple Alliance, but it also represented a competition between the city-states of Tenochtitlan and Texcoco. The impressive retreat at Chapultepec was rivaled only by the pleasure gardens of Texcotzingo of Texcoco. Both designed by Netzahualcoyotl, Chapultepec and Texcotzingo lay on a direct line connecting the two polities (Evans 2000:213) [Figure 8]. In order to physically demonstrate the superiority of Tenochtitlan, the aesthetic spaces of the royal retreats were designed to reflect the greatness of the individuals experiencing the exclusive spaces.

Elites from Tenochtitlan not only sought solitude and rest in the gardens of Chapultepec (Duran 1581), but also used various methods to aggrandize their rulership at Chapultepec. In an emblematic expression of royal authority, the pathways of the gardens were lined with cypress trees, or *ahuehuets*, that served as metonyms for the Aztec rulers (Evans 2000:90).

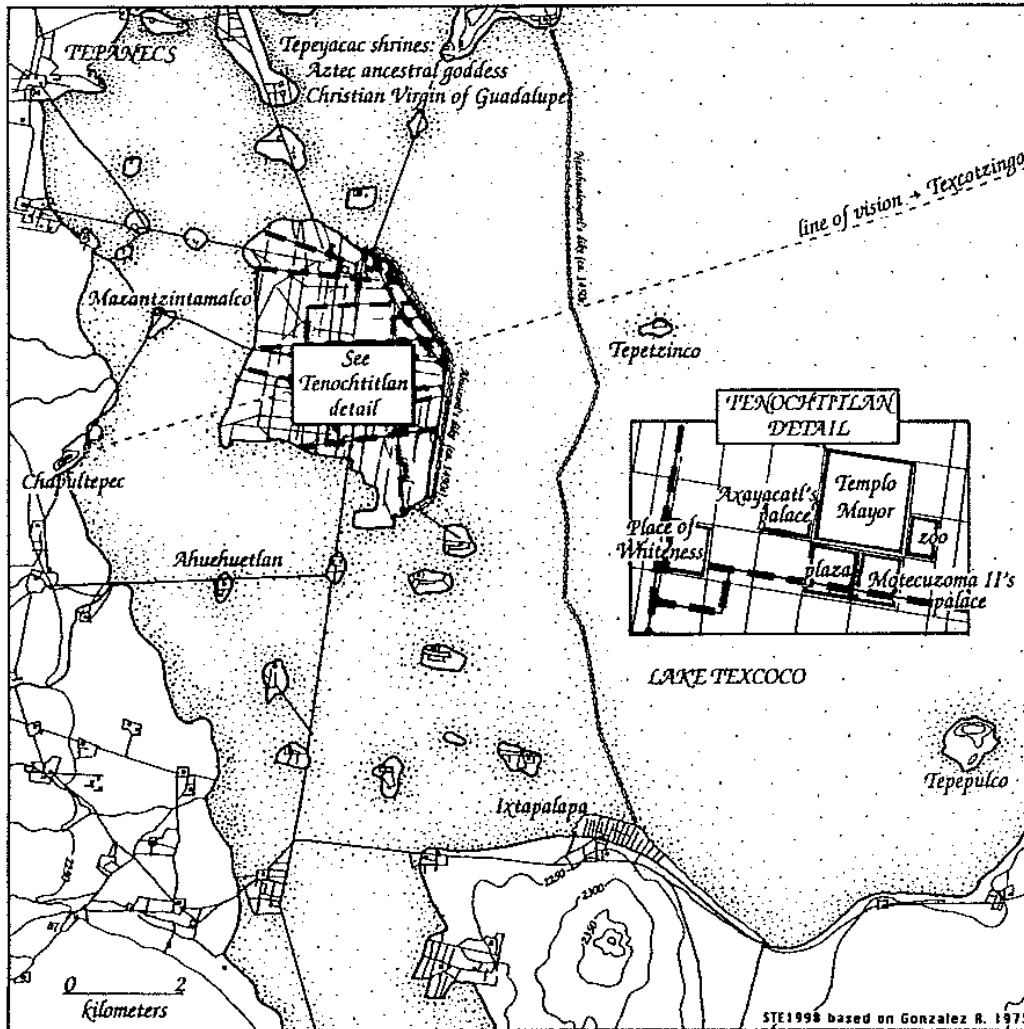


Figure 8: Direct line of Texcotzingo and Chapultepec across Lake Texcoco and the Island of Mexico (Evans 2000:213).

Living for more than a century, the ahuehuetl trees symbolized the longevity of Aztec reign and the strength of individuals leading the empire. Beyond the figurative power of trees, the Tenochtitlan rulers carved their images into the rocky outcroppings at Chapultepec. The *History of the Indies* (1581) describes the imperial projects of Moctezuma Ilhuicamina to carve his image to “bring him glory and praise after his days were done” (Duran 1994:244). Following suit, Moctezuma Ilhuicamina’s successors, Axayacatl, Tizoc, Ahuizotl, and Moctezuma Xoyotzin,

ordered the carving of their images alongside the existing one to cement their places in Mexican history.

In close proximity to the royal images, Tenochtitlan elite experienced the amenity of royal baths, now known as the Baños de Moctezuma. Although looters had previously disturbed the site, Beatriz Braniff and Maria Antonieta Cervantes undertook the first archaeological excavations of the baths in 1966. These excavations revealed a rectangular tank constructed from tezontle, stone, sand, and gravel (Espinosa Rodriguez 2007:15). A later excavation in 1974 uncovered a variety of objects in the seven-meter deep structure, including a sculpture and a basalt head of the deity Tlaloc, and a torso of a feminine figure carved out of andesite (Espinosa Rodriguez 2007:15). The most recent archaeological investigations headed by Guadalupe Espinosa Rodriguez in 2006 and 2007 suggest that the walls of the subterranean baths were covered with stucco and painted with a red pigment (2007:152). The excavations of Espinosa Rodriguez are part of a large-scale restoration project that has restored the Baños de Moctezuma today.

Assumed to be merely for pleasure, ethnohistorical documentation indicates that the baths served multiple functions for the Aztec elite. A section of Duran's narrative refers to bathing as part of the ritual process. As part of Moctezuma Xocoyotzin's inauguration, he was instructed to "be ready to see the morning star as soon as it appears so that when it does you will take your ritual bath, purifying yourself and anointing yourself with the divine pitch" (Duran 1994 [1581]: 391). Albeit brief, the mentioning of bathing as a cleansing procedure may indicate a ritual function of the Baños de Moctezuma.



Figure 9: Cypress Trees at Chapultepec (photograph by author)



Figure 10: Restored Baños de Moctezuma (photograph by author)

Additionally, the Tlaloc artifacts found at the Baños of Moctezuma connected the elite space to the divine presence deeply associated with the element of water.

Housing the Sacred

The presence of Tlaloc figurines is a pattern found at Chapultepec that directly correlates to the ideological conceptualization of water. Water was an essential element to Aztec religion and was considered to be associated with two principle deities, Tlaloc and Chalchuihtlicue. Following the descriptions in the *Florentine Codex*, Tlaloc, the god of rain, “caused the trees, the grasses, the maize to blossom to sprout, to leaf out, to bloom, to grow... And also were attributed to him the drowning of people” (Sahagún 1982 [1588]: 7). The might of Tlaloc’s power rested on the fertility of the land from rainfall, and his destruction came about in the form of floods. As a testament to his veneration, Tlaloc’s altar sat adjacent to the principle solar deity, Huitzilopochtli atop the Temple Mayor. His counterpart, Chalchuihtlicue, translated as Jade Skirt, represented all flowing water from springs, lakes, and rivers (Duran 1971 [1574]: 263). Together, the deities of water granted the Aztecs the sustenance as well as destruction.

A variety of sites around the Basin of Mexico were dedicated to Tlaloc and Chalchuihtlicue, including Chapultepec. Atop the hillside, a temple dedicated to Tlaloc was constructed to allow the principal deity to overlook the source of Tenochtitlan’s water supply (Doolittle 1990:121). Recent excavations conducted by INAH in the Chapultepec Restoration Project (2005) have also produced numerous ritual instruments at Chapultepec, including perfumers with copal, carbon, and wood residues (Armijo Torres 2005:87). The permanent presence of a priest of

Tlaloc and ritual materials indicate that Chapultepec was conceived as a spiritual space dedicated to the appeasement of the deities responsible for providing Tenochtitlan with the precious resource of water.

Evidently, the site of Chapultepec projected deliberate messages of religious and sociopolitical power alongside the ecological importance of the site. By the end of the Postclassic Period, Chapultepec was one feature of the hydraulic landscape that provided sustenance to the urban population of Tenochtitlan, promoted agricultural production, and mitigated risk from flooding. The landmark, however, was also conceived as a critical link to a common heritage and history, an elite space of power and wealth, and a sacred site for the divine. Cemented in both the material and social environment, the significance of Chapultepec was quickly realized by the Spanish conquistadors when they entered the Basin of Mexico in AD 1519.

The Colonial Transition

When fighting erupted between the Spaniards and the Aztecs in AD 1520, Chapultepec became an immediate target to weaken the defenses of Tenochtitlan. The Spanish army destroyed the Chapultepec aqueduct, which according to Hernán Cortés, was “a cunning stratagem... to deprive the city of freshwater” ([1521] 1971: 209). Without the direct flow of water, Tenochtitlan resorted to clandestine supply deliveries from indigenous allies brought to the city at night by canoes (Díaz del Castillo [1521] 2012: 402). Despite the supplementation of water by surrounding areas, the lack of a direct source contributed to the weakening of defenses of Tenochtitlan before the city surrendered on August 13th, 1521 AD.

Destroying the aqueduct proved to be a successful military strategy during the conquest, but it became clear that the aqueduct was critical to the rebuilding of Colonial Mexico City. As one of the first acts after the conquest, Cortés ordered the aqueduct to be reconstructed along the Postclassic trajectory (Armijo Torres 2005:89). As indicated in the Colonial Uppsala Map (alternatively called the Mapa de Santa Cruz), the aqueduct and tank system designed and implemented by the Aztecs remained relatively unchanged as Mexico City was redesigned [Figure 11]. Despite the change in authority, colonial Mexico City faced the same environmental challenges as Tenochtitlan and relied on the Postclassic hydraulic system to supply the city with water.



Figure 11: Path of water from Chapultepec aqueduct into the tanks in the city center of Tlateloco depicted in the Mapa Uppsala- emphasis of water route added by author (Linne 1948).

Throughout the first two centuries of the Colonial Period, Mexican architects continued to reinforce the Chapultepec aqueduct. Executed between 1612 through 1621 under Maestro Mayor de Obras de la Ciudad, Juan Gomez de Trasmonte, an expansionary project directed water down Tacuba Street through a series of 900 arches (Armijo Torres 2005:97). In addition to the Chapultepec aqueduct, two new aqueducts were constructed during the colonial period called the Santa Fe and the Belem aqueducts (Cabrera 2005:34). The Santa Fe aqueduct began in the town of Santa Fe and ended at Chapultepec, depositing water into reservoirs for later consumption in Mexico City (De la Torre 1988:55). The second aqueduct, Belem (or Belén) seen in Figure 12, passed down Chapultepec Avenue to the *Salta de Agua* through a series of 904 arches (De la Torre 1988:56). The maintenance of the Chapultepec aqueduct and the construction of two more in the colonial period demonstrate the importance of the spring-fed aqueducts from Chapultepec, which required the Spanish conquistadors and later colonial administrations to invest in the conservation of the freshwater source.

Within a continued reliance on the ecological component of this feature of the hydraulic landscape, the social perception of Chapultepec also transformed with colonial society. Much like the Postclassic Period, Chapultepec represented three major elements of colonial society: religion, political agenda of the elite, and a shared history. Changing to reflect the colonial era, the meaning of Chapultepec reflected the hybridity of the Postclassic and Spanish cultures in Colonial society.



Figure 12: *Arcos de Belén* in Mexico City today (photograph by author)

The first transformation of Chapultepec in the Colonial Period was the conversion of symbolic-religious-ritual space (Cabrera 2005:21). In a symbolic gesture of the implementation of Catholicism in New Spain, a church dedicated to San Miguel Archangel was constructed atop the Postclassic temple of Tlaloc in AD 1524 (Verdugo Reyes 2005:112). The physical placement of the Catholic Church over the Postclassic temple appears to enforce the colonial agenda to convert the indigenous populations to Christianity. The project, however, was not a symbol of Spanish dominance. In fact, the indigenous populations of San Miguel Chapultepec helped to finance the church construction with the aid of Fray Lucas de Morales and Fray Alonso de Molina (Verdugo Reyes 2005:112). Although critical details are missing regarding the intention behind the indigenous population's involvement in the church, it is likely that religious associations developed in the Postclassic were not eliminated in the Colonial Period as the two groups, Spanish and indigenous, used the space simultaneously.

As indigenous and colonial groups worked to construct the religious institution at Chapultepec, members of the new elite class desired to lay claim to Chapultepec. The second transformation of Chapultepec was the reconfiguration of the space to reflect the elite class of colonial society. As conquistadores divided and organized the newly acquired territories after the conquest, Chapultepec quickly became a contested piece of land. Cortés, alongside Juan Jamaillo, Gonzalo de Salazar, García de Holguín, Gonzalo de Alvarado, and La Malinche, made the first attempt to lay claim to Chapultepec (Verdugo Reyes 2005:111). Although little evidence has been found regarding the early land titles, De la Torre suggests (1988)

that García de Holgún earned ownership over the prized pools of Chapultepec on January 19th, 1526 and La Malinche received the land opposite of the pools two years later (1988:39). The inter-group competition for Chapultepec indicated the transfer of Chapultepec's value as a sign of wealth and prestige under the new colonial authority.

In order to prevent privatization of the park by a select few, the colonial administration appealed to the Spanish Crown for help. On December 16th, 1537, Viceroy Antonio Mendoza wrote,

It is not advisable that anyone has personal interventions, except the person in charge (the Viceroy) and the City Council, because other than this site, there is nothing closer in the area to enjoy some recreation, and also because it is where water is born from the foundation, which supplies the city. I have thought it wise to inform your Majesty about this and beg of you not to grant anyone personal water supplies from there; it would be very harmful for the reasons given above (De la Torre 1988:47).

Mendoza's concern for "personal interventions" and individual entitlement to the land were ratified when Charles V ordered by royal decree that Chapultepec was to remain a public place in AD 1530 (Onofre et al 2007:12). As a state institution, the land and water at Chapultepec remained under control of the colonial government.

Without the threat of individuals like Cortés and La Malinche appropriating Chapultepec, the colonial elite was concerned with guarding Chapultepec from the lower classes of colonial society. In an attempt to limit public access to the park, Viceroy Luis de Velasco ordered a wall to be constructed around the park to "contain the hunting game" (Verdugo Reyes 2005:112). Demonstrated in Francisco Cervantes de Salazar's colonial narrative between two Spaniards touring Mexico City in AD 1554, the wall not only controlled the animals, but also people. One

character, Alfaro asks why there is a wall that allows so few to enter Chapultepec and Zauazo responds, “so that the Indians that pass do not dirty the water” (Cervantes de Salazar 1993 [1554]:84). The sentiments captured in Cervantes de Salazar’s dialogue indicate that with a physical barrier in place, the colonial elite could spend weekend retreats with other members of the courtesan elite in the gardens of Chapultepec without interruption from lower classes of colonial society (Verdugo Reyes 2005:112).

In addition to the wall, Velasco also ordered the construction of an elite residence on top of the ruins of Moctemuzza’s palace. Over a century later, Viceroy Bernado de Gálvez constructed a castle on the highest point of Chapultepec hill. Depicted in the nineteenth century illustration by Casimiro Castro, the Castillo de Chapultepec served as a welcoming place for new viceroys arriving from Spain (De la Torre 1988:53) [Figure 13]. The extravagant celebrations continued at the Castillo through the eighteenth century until the excessive expenses forced the Crown to suspend the festivities (de la Torre 1988:52).

Despite the changes in aesthetics and infrastructure at the park, the continued presence of the colonial elite mirrors the Postclassic conception of Chapultepec as an elite space. Even under state ownership, the gardens at Chapultepec remained a private retreat to be enjoyed by an exclusive class. Although little is recorded regarding the significance of Chapultepec for other classes of colonial society, its prominence on the landscape made it a visible landmark to all citizens.



Figure 13: Nineteenth century painting of the Castillo de Chapultepec titled, "Litografía Portal del Coliseo Viejo Chapultepec" (Cabrera 2005:25).

No matter the social class, Chapultepec would have represented a changing landscape and a remnant of the Aztec past in a rapidly changing colonial world.

Throughout the Colonial Period, citizens of Mexico City faced the same environmental challenges as the previous occupants of Tenochtitlan, but responded to them in different ways (Endfield 2008:4). During the first century of the Colonial Period, many of the Pre-Hispanic water management strategies remained standard practice, including the use of aqueducts, dikes, canals, and dams (Gibson 1664:237, Rojas Rabiela 1981:240). Between AD 1604-1620, however, Mexico City experienced a series of devastating floods that promoted the decision to drain the lake system (Garcia Acosta 2007:135). After various failed attempts, the lake system was almost completely emptied except for the southern lakes of Chalco and Xochimilco by the early twentieth century (Linne 1947:179). While many features of

the hydraulic landscape disappeared along with the lake water, Chapultepec endured as a central landmark in Mexico City.

Even after the Colonial Period, Chapultepec became ingrained in Mexican culture. By the early 1800's, Chapultepec housed a military academy. In 1864, a palace to house the monarch of the Second Mexican Empire, Maximilian, replaced the academy. By 1900s, Porfirio Díaz funded the refurbishing of Chapultepec in an effort to beautify and modernize Mexico City (Waklid 2007:105). Through this effort, elite restaurants and snack stands were built around artificial lakes and manicured greenery, and public art attracted visitors to Chapultepec. Today, the site of Chapultepec has been renovated to match the urban bustle of Mexico City as tourists can rent segways to travel around the 686 hectares and visit the National Museum of History in the Castillo.

Chapter 5: Conclusion

As the site of Chapultepec transformed from the Postclassic to the Colonial Period, its function as both a social and ecological facet of the hydraulic landscape remained constant. Serving a multitude of functions in a multi-scalar context, the site of Chapultepec exemplifies the interplay between humans and their environments that is facilitated by both the ecological needs and cultural understanding of the landscape (Fisher et al 2009:4). Located in one of the “most climatically sensitive areas of the world” (Endfield 2008:10), the ecosystem of the Basin of Mexico directly impacted how humans utilized natural resources and lived within the environment. Facing climatic variability and high salinity levels of the lake system, humans had to find ways to cope with the natural conditions of the environment. As a strategy to manage the environment, the Aztecs created the extensive hydraulic landscape. Arguably at its center, the survival of the city of Tenochtitlan depended on the success function of the Chapultepec aqueduct. With gallons of freshwater traveling through the aqueduct to Tenochtitlan, provided the water source for residential uses and increased wetland agricultural productivity in less-saline water. Even after the conquest, the reliance on Chapultepec as a freshwater source in the Colonial Period demonstrates the fundamental ecological value of Chapultepec to support and maintain the urban population.

The ecological significance of the Chapultepec aqueduct to Tenochtitlan and Mexico City is apparent, but the relationship between humans and the environment is not one sided. It is also important to consider the “gradual and irreversible

transformations” of the ecosystem from both natural and anthropogenic processes (Carballal Staedtler and Flores Hernandez 2006:158). As part of the Aztec’s strategy to manipulate the environment, the Chapultepec aqueduct physically altered the lakes’ ecosystem by changing salinity and water levels, and disruption natural water flow by the artificial supports of the aqueduct. With further research in the ancient lakebeds of Mexico City, it may be possible to trace the consequences of the hydraulic construction on the natural environment. As one of many large-scale structures in Lake Texcoco, understanding the impact of the Chapultepec aqueduct can contribute to the larger question of how both natural and man-made environments affected and were affected by human occupation and subsistence strategies.

Although the ecological function of Chapultepec is a critical component of the Postclassic and Colonial hydraulic landscape, limiting this analysis here would omit a critical component of human-environmental relationships in the Basin of Mexico. The unique ecosystem of the Basin of Mexico not only affected how people lived within the landscape, but also how they perceived it. This knowledge of the environment can, as Georgina Enfield states, “effectively become part of the cultural and infrastructural fabric of thought, discourse, and practice of a society or a community” (Enfield 2008:72). Expanding the beyond the ecological importance of the site, Chapultepec became a physical manifestation of religious, political, and historical dimensions of society.

Sitting atop the summit of Chapultepec, the temple dedicated to Tlaloc physically connected the origin of the critical natural resource to the divine.

Capitalizing on the divine association and the migration history, Chapultepec was a “material metaphor” for the strength of Tenochtitlan to not only provide a critical resource for its citizens through large-scale public works, but also for the success of the empire to afford such lavish amenities at the headwaters of the Chapultepec springs (Scarborough 1991:106). The symbolism of Chapultepec resonated with the elite class who demonstrated their wealth and authority through the aesthetic beauty of Chapultepec Park. Although hard to identify in historical records and archaeological research, however, the significance of Chapultepec was not limited to the top classes of Mexican society. Conceivably, with further research in colonial archives and excavations in larger areas of Chapultepec Park, it will be possible to incorporate the multiple perspectives of the hydraulic landmark as it transformed through time.

The continual alteration of both ecological and social importance of Chapultepec across time periods highlighted in the analysis encapsulates how humans impose meaning onto the natural and build world. As Fisher and colleagues write “it is never just an environmental story, but rather a complex mosaic of human action, unintended consequences, [and] natural change” (Fisher et al 2009:5). Therefore, this analysis demonstrated the complex web of factors contributing to the Postclassic and Colonial hydraulic landscapes and how the single site of Chapultepec bridged the ecological and social needs of society.

Although this analysis is small compared to the immense studies occurring in the Basin of Mexico today, it can contribute to a new discussion about ancient water management and the numerous dimensions of past landscapes. Particularly in the

Basin of Mexico, the dichotomy between ecological and social factors of landscapes has narrowed the focus of archaeological investigations to neglect the multitude of factors involved in water management strategies. By focusing on a single hydraulic landmark, one is able to understand the blending of ecological and social importance of Chapultepec over time. While the material and ethnohistorical evidence utilized in this analysis has created a better understanding of Chapultepec's function in the Postclassic and Colonial Periods, there is still an opportunity for further research that incorporates additional perspectives of the site. Furthermore, as more research emerges about individual hydraulic features, it will be possible to broaden scholarly attention to begin to comprehend the entire

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