Adaptive Reuse and Revitalization of Water Heritage in Nicosia, Cyprus

by

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Abstract

The bi-communal sewerage system developed for the divided capital of Nicosia, Cyprus has been lauded as a rare example of cooperation between the Turkish Cypriot and Greek Cypriot communities. The story of how the project was implemented, and the partnership to operate the system maintained, has been examined many times over in relation to conflict resolution and peace-building in Cyprus. The symbolism attached to the sewerage system as a unifying factor in the divided city contrasts sharply with the way in which the historical water system of the city has been remembered. In this thesis, conservation of Nicosia's water heritage is examined first from a historical standpoint; then as part of the capital's modernization project; and lastly from a planning perspective for the divided city. This research shows that water and waste systems served as one of the few consistent aspects of urban life, as the island changed hands and subsequent rulers of Cyprus imposed their own political, economic and cultural agendas on the capital. Based on this analysis of the historical water system, a conceptual framework that integrates conservation with a broader urban agenda for Nicosia is proposed. Conserved as a socio-technological network, remnants of the water system can be adaptively reused to increase water security at the municipal level. This conservation approach would revitalize the historical water system by leveraging its socio-cultural significance in order to address contemporary planning challenges.

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Chapter 1
Introduction

*Water should be the slave of man, to whom it is the first necessity; therefore his first effort in his struggle with the elements should reduce this power to vassalage. There must be no question of supremacy; water must serve mankind.*

- *Samuel White Baker, upon his visit to British colonial Cyprus in 1879*

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**FIG. 1** The 16th century walled city of Nicosia, divided by the UN-patrolled ceasefire line since 1974. City map by W. Hanson.

Tourism on the sunny island of Cyprus gravitates towards its sandy shores and sparkling Mediterranean waters. According to Greek mythology, Aphrodite first emerged from the sea in a peaceful cove near the modern-day Cypriot city of Paphos. Many tourists seeking sea, sun and sand never make the trip inland to Nicosia, the capital. Those who do are most likely curious about the last divided capital of Europe, as proclaimed on the municipality’s webpage. Since 2008, the opening of a pedestrian crossing in the historic walled city has allowed convenient access between the north and south for residents and
tourists. Along with greater freedom of movement, this act has also brought more attention to the conservation of the walled city as a whole. The area is contained within a 16th century fortress built by the city's Venetian rulers shortly before the Ottomans gained control of the island. Narrow, winding streets and traditional neighborhoods create a picturesque atmosphere, notwithstanding the barriers demarcating the United Nations (UN) peacekeeper-patrolled buffer zone that cuts through the center of the city. Historic buildings that house government offices or host tourism activities have received fairly consistent conservation work, but restorations of private properties in the south has increased in recent years as government funding has become available to cover up to 20 percent of costs. These conservation efforts have contributed to a much larger effort to revitalize the walled city by bolstering small workshops and businesses that weathered its years of decline, and attracting young homeowners and creative entrepreneurs with government subsidized rents in the south (al-Asad 2007, 5). Perceptions of its safety and security are changing.
The early modern water system of Nicosia has played a small supporting role in this conservation success story. The network of aqueducts, fountains, and storage tanks that supplied the city with water for hundreds of years is on the outskirts of the realm of conservation. Individual water features have been conserved as part of neighborhood-wide projects, but a negligible effort has been made to uncover the significances of the historical infrastructure, nor re-link its now disparate parts through conservation. Opportunities to preserve the historical water system of Nicosia are examined in this thesis, and the technological network is re-imagined using a different conservation framework that links directly to the city's broader planning agenda.

**Nicosia's water heritage**

*Development of the early modern water system*

The capital inherited by the British in 1878 had a traditional gravity-based water system. Two main aqueducts supplied the city with freshwater transported from the mountains ranges of the island (Bağışkan 2009, 546). Neighborhood fountains were part of the daily routine of life in the city, offering a gathering place for women and children to meet in the main squares and share the latest gossip. Fountain inscriptions invoked the largess of those individuals who had endowed the funds for their construction and upkeep. Under the long period of British rule,
which begun in 1878 through a formal arrangement with the Ottoman Porte in Istanbul and lasted through 1960 when Cyprus became a republic, water management made leaps and bounds. The official annexation of Cyprus as a crown colony in 1915 granted more regulatory power to the British, thus opening the door for administrative reforms. However, some of these reforms were heavy-handed in their execution, essentially dismantling important state institutions such as Evkaf, the Islamic religious foundation that managed evkaf properties designated for charitable uses, including aqueducts and public fountains. Britain’s deteriorating relationship with the colony had an impact on efforts to sanitize and modernize the city. In 1931 the first uprising against British rule took place, resulting in stifling political reforms that excluded Cypriots from participating in local government during the following three decades of colonialism.

Between 1878 and 1960, the water supply was subject to the same driving forces of modernization as other urban infrastructure in the capital. Water distribution tanks for apartment buildings were built to supplement public fountains; the city administrators also built additional public fountains in community centers like mosques and schools. Toilets were installed in modern houses for the expatriate community, although septic tanks were used throughout the city until the modern sewerage system was constructed beginning in the early 1970’s. Road improvements within the walled city went so far as to create a fourth opening in the historic walls near what is now Eleftheria Square. The new gate linked the walled city to the area south of the city, where British settlements were concentrated (City Profile). These road improvements directly impacted the hydrological landscape and the water system. Fountains that stood in the middle of the new street patterns were removed or moved (Interview with Bağışkan). The old riverbed of the Pedieos River, which had been diverted around the city in the 16th century and served as a the main commercial corridor for centuries, was covered over to become the new thoroughfare of Hermes Street (Keshishian
1978, 16; Bakshi 2012, 113). This street now forms the center of the Green Line - the ceasefire line in Nicosia patrolled by UN peacekeepers since 1974 that created the *de facto* partition of the island. During the British period, the city expanded outside the walls for the first time and development on the river floodplain increased. More abstractly, water underwent a transition in which it went from being viewed as a right of the people, to a commodity subject to administrative regulation. The social significance of water development projects as part of modernization processes has been analyzed and deconstructed elsewhere, but to the researcher’s knowledge this has not been done in the context of Cyprus (Gandy 2002, Gandy 2008, Kaika 2005, Loftus 2006, Swyngedouw 1999). However, it is known that similar efforts by the British to change age-old Cypriot traditions in rural areas, such as grazing rights, were initially met with subversive action (Morgan 2010, 108-09).

*The Politics of Conservation*

The walled city of Nicosia has faced extraordinary challenges to conserving its heritage. Today signs of economic and social revitalization on both sides of the Green Line are attributed to the Nicosia Master Plan. Since 1986, a joint team of professionals from the north and south have implemented a cadre of conservation projects in the walled city as part of this plan (al-Asad 2007, 2). Their work has received international acclaim by organizations like the Aga Khan Trust for Culture and Europa Nostra. This bi-communal partnership has weathered the political and social tensions that accompany negotiations for the reunification of Cyprus. Envisioned by the two mayors of Nicosia, Lellos Demetriades and Mustafa Akinci, who recognized the need for cooperation between the municipalities, this model is well-suited to holistically address environmental and social issues (Hocknell 1998, 238). Adaptive reuse of the historical water infrastructure could help the city achieve its sustainability goals in these areas, while signaling to stakeholders that Nicosia’s past may hold planning lessons for its
future. This joint project would increase awareness of water management in Nicosia, and call attention to critical questions about these policies that remain unanswered. The two sides of the island have formulated separate water development strategies, but the fact that some of the communication channels have been kept open for water management may indicate that further coordination in this area is possible (Charalambous, Bruggeman and Lange 2011, 15). As the capital, a strong statement made by Nicosia on this subject can have an impact on the rest of the island.

The historical emphasis placed on water development in Cyprus makes conserving the water system in Nicosia a viable option. Water scarcity is often cited as the second most significant problem on the island (Hocknell 1998, 226). In the Nicosia region, the effect of the division of the island on water management has been particularly pronounced. The development of a bi-communal sewerage system for the capital in the years following the division of the island demonstrated the exceptional status afforded water management by Turkish and Greek Cypriot officials. Statistics indicate that Cyprus is the most water-stressed country in Europe with the highest ratio of water withdrawal compared to its renewable freshwater resources (Lange 2010). Annual precipitation can vary significantly from the mean rate of 460 mm per year due to its semi-arid climate (Charalambous, Bruggeman and Lange 2011, 1). Cypriot society, which remained predominantly agrarian up until the 20th century, experienced years of low precipitation as intense droughts that spelled hardship and debt (Given 2000, 213). Cyprus has a high rate of evapotranspiration (86%), meaning that the far majority of water is transported back into the atmosphere (Charalambous, Bruggeman and Lange 2011, 1). Of the remaining rainfall, Nicosia is able to capture more stormwater for groundwater recharge than coastal cities in Cyprus. However, questions remain about the quality of stormwater runoff infiltrating the groundwater supply due to the lack of
information sharing between the north and south. A mutual non-recognition policy makes the answers difficult to obtain.

Conservation invariably draws attention to the past; in Nicosia's case, the past is a particularly fraught and contested. The colonial legacy in Cyprus, and the severe setback to modernization caused by the division of the island along ethnic, religious and linguistic lines still cast a long shadow over society. The early modern water system was undoubtedly once viewed as a symbol of economic development and coming prosperity that did not materialize as planned. What kind of reception would a conservation program focused on water receive? Peace-building and conflict resolution work in Cyprus has helped depict the historical conflict between Cypriots of Turkish and Greek origins in a more complex light, challenging people to look past their assumptions and envision a different future for the island. Perhaps it is time that heritage conservation directly engaged with the inherent complexity of Nicosia's past as well.

*The future of water management*

Re-imagining the water system as a technological network has two main benefits. The first is to underscore the integral role that end users of the water system played in shaping this system in the early years. Highlighting this connection with user behavior reasserts that water management is not merely a top-down process; concerted efforts on the individual level can make a difference. Secondly, it emphasizes the socioeconomic and cultural values that informed the system's design. It is poignant to ask what social values are being reflected by the water system in Cyprus today, as both sides develop long-term strategies for water security independently that rely on energy-intensive processes of desalination and new infrastructure development. Similarly, what values would be reflected in a joint approach to managing shared water resources at the local level? Uncovering the hidden significances of
modernizing the water system is the only way to re-imagine the system as a technological network, and conserve remnants of the system in a way that contributes to the city’s broader planning agenda.

**Research methods**

A three-pronged research methodology was used to develop a conservation framework for the early modern water system. Site documentation was undertaken in the field during January 2012. Documentation described the physical condition of these features using photos, measurements and sketches, noted how they were being used, and collected geolocation data. To supplement this data from the field, semi-structured interviews with researchers and municipal officials familiar with heritage management or water management in Nicosia were completed during the same trip. Lastly, historical research was conducted to construct a narrative account of the modernization of Nicosia’s water system, and the role of reuse and conservation of existing infrastructure. This research revealed continuities between the traditional system and modern systems for water and waste, rarely recognized in today’s discussions of these two prevalent areas for planning.

Descriptions and references about the buffer zone based on first-hand experience are only found up until 1974. Under the auspices of the Master Plan, the city has undertaken surveys, studies and plans related to heritage management since implementation began in 1986. This data is not readily available to the public, however. It includes a full survey of the walled city, which has an area of 2 square kilometers. About 2,800 buildings were documented on the southern side, 2,000 on the northern side, and 230 within the buffer zone. Of these buildings, approximately 1,100 in the south and 630 in the north are listed as officially protected due their historical and architectural importance. Presumably historical water features are included on this list of protected monuments. As for the buffer zone, a
buildings survey was completed in 2003 by a joint team of four architects from both sides (al-Asad 2007). A bi-communal study of the buildings in the buffer zone won the Europa Nostra award for research in 2011, while the rehabilitation of the walled city was recognized with the Aga Khan Award for Architecture in 2007.

Bibliographic searches of worldwide and regional online catalogs were not effective methods in identifying historical sources on this research topic. Instead, archival and library research in Nicosia proved most helpful. First, a list of visual archives on the island was compiled. Due to time constraints and the institutional policies though, only two searches were conducted in the archives of the Leventis Municipal Museum and the Republic of Cyprus’ Press and Information Office. Second, a list of primary sources such as traveler’s accounts was derived from the bibliographies of publications on relevant topics, like public works in Nicosia. Researchers on Cyprus were able to suggest other useful primary and secondary sources for water heritage research based on this list. In short, fieldwork in Cyprus was an essential component for this project not only for documentation reasons, but to determine fruitful directions for historical research.

The bibliographic searches of online catalogs revealed some significant findings, however. The first finding based on searches in OCLC Worldcat demonstrated that there has been a sustained academic interest in studying how to maximize the water resources of Cyprus.1 In recent decades, this research has centered on using scientific analysis and

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1 Searches for terms pairs in OCLC Worldcat revealed few sources relevant to this project, and no topics specifically written on the early modern water system anywhere in Cyprus. Searching for keywords “water”, “Nicosia” and “conservation” returned 44 hits, of which only 14 were viable citations for this project. However, all of these citations referred to “conservation” as natural resource conservation in topics like rural development, agricultural production, large-scale water infrastructure, and water security. The search repeated with “heritage” instead of conservation returned just 8 hits, of which none were viable for this project. The most closely related citations to this research topic were archaeological journal articles examining medieval water systems. The hundreds of journal articles found in a search for “water” and “Nicosia” were primarily in scientific areas of inquiry, such as testing for water quality, geology and climate research, and irrigation methods. Economic models for water pricing were also prevalent areas of research. The same search in books returned approximately 125 hits, of which many were government publications on water resources of Cyprus beginning in the early 20th century under British rule.
technological methods to increase or improve the water supply, rather than discover new groundwater sources. To a lesser extent, water pricing models have also comprised a specific research focus (Liang 2010). The historical development of urban water systems on Cyprus has been neglected in comparison. Restoring the narrative of the system's development can contribute to the study of best practices in water management on the island.

Bibliographic searches in country-based catalogs of academic theses and dissertations revealed another surprising finding. Based on the results of the worldwide catalog search, the researcher refocused her efforts on Greece and Turkey's academic catalogs which appear to subsume Cypriot academic research. The online catalog of Greek universities only listed doctoral dissertations, while Turkey's catalog contained master's theses and dissertations. This distinction could have influenced the search results, but sociocultural differences may also account for the results found. A search for "Nicosia" returned only 5 dissertations from Greek universities, none of which dealt with the modern era and disciplines related to this research topic. Conversely, the same search found 37 academic works from Turkish universities. Of these results, 13 of these were from architecture, city planning, and environmental engineering programs, dealing explicitly with urban studies in Cyprus. These projects focused on vernacular architecture, urban morphology, and even conservation. One conclusion to be drawn from this brief search is that Turkish researchers are more invested in studying the historical development of Nicosia, likely due to a much larger discipline of Ottoman studies and network of Ottoman historians in Turkey. It is possible that the lack of access to a strong academic network in this field may have impacted conservation policymaking and planning in Nicosia.

The study of urban space in Nicosia invariably runs into the Green Line, sooner or later. Many academic works have even focused on the spatial ramifications of the buffer zone on Nicosia, suggesting ways in which to understand this phenomenon better, or repair the urban
fabric once the conflict is resolved (Calame and Charlesworth 2009; Enotiades 1991; Grichting 2008; Kliot, Mansfeld, and Kotek 1999). Given that the fieldwork conducted on water heritage was primarily concerned with the historic city, the atypical political and administrative climate of Nicosia only indirectly affected the research. Most notably, the city's heightened security concerns may have been reflected in the city administrations' data management policies. City-level geospatial data readily available in many other cities was not given out to the public by either municipality. However, it is impossible to state to what degree this was due to security concerns, rather than social norms or technological capabilities. The extent to which this close-fisted approach to data management is a widespread practice on the island is not known, although water management data unrelated to bi-communal projects are not readily shared between the municipalities either. Overall, the political situation in Nicosia had less impact on this research than cultural and language barriers, which prevented the researcher from conducting interviews with non-English speakers, or using other research methods, such as surveys, to investigate the cultural meanings of water.

**Heritage conservation through adaptive reuse**

The water heritage of Nicosia's early modern water system is examined in the following chapters first from a historical standpoint; then as part of the capital's modernization project; and lastly from the perspective of planning and policymaking today. Rather than attempting a comprehensive analysis of the urban water system from each perspective, the research focuses on the role of conservation in each. However, it is anachronistically inaccurate to state that the Ottoman, British, or even Cypriot urban elite of Nicosia aimed to conserve the water system per se. This would imply that the heritage value of the system was recognized by key stakeholders and publicly acknowledged. In reality, the explicit and implicit evidence related to these public works strongly suggests that a wide array of other concerns informed the
design of the water system. Therefore, the more neutral phrase of “adaptive reuse” is employed to describe the propensity to reuse parts of the existing water infrastructure of the city, even as large-scale changes were made to the system as a whole.

Chapter 2 discusses how the water supply influenced urban development in Nicosia since the very beginning of the city c. 3,000 BCE. Starting in the 12th century, from which the earliest evidence exists to suggest that complex hydraulic systems had begun to spread throughout Cyprus, it is possible to identify specific examples of adaptive reuse from the Lusignan, Venetian, and Ottoman periods. Overall, this chapter situates water development in Nicosia within socio-cultural, economic, and political contexts to make the argument that the early modern water system is part of the cultural heritage of the island.

Chapter 3 explores why the historical water system of Nicosia has not been conserved as part of the island’s cultural heritage. Approaching this question from a critical standpoint, challenges to conserving socio-technological networks, as well as obstacles posed by the historical and political contexts are identified. Undergoing an interrupted process of modernization, Nicosia previously lacked the impetus or opportunity to conserve the water system and celebrate its shared heritage.

Chapter 4 demonstrates that water security for Nicosia needs to be addressed at the municipal level given the barriers to developing a security agenda for the island as a whole, and that the adaptive reuse of the historical water system would contribute to these objectives. By evaluating the current threats posed by climate change, urban development, and flooding to the city, a basic agenda is proposed. Then the importance of raising awareness about water management in the city is discussed as the first step toward knowledge-building and capacity-building among urban residents to address these issues. Lastly, the benefits of taking a bi-communal approach to implementing a water security program in the capital are examined.
In the conclusion, how heritage could serve as an important bridge between the two communities, and the municipal authorities regarding water security is explored further. It is clear that more investments are needed to help people understand the need for better water management in Nicosia, evaluate the options to help them conserve water, and participate in this discussion over the future of the capital. The water heritage of the city can be adaptively reused to help accomplish these goals by engaging the Turkish Cypriot and Greek Cypriot communities. Establishing this precedent opens the door for more sustainable development in the capital that responds to urban ecology, instead of the de facto political boundary. Despite the many transformations and transitions of the water supply and waste systems, water still has the power to shape the contours of urban life in Nicosia today.
Chapter 2
Transitions in Historical Water Development

FIG. 4 A British map showing the two chains of wells (arrows by the author) that supplied the city with water. From a topographical survey of the island by H. H. Kitchener between 1878-1883, Map 5/16.

This chapter traces the development of the historical water system in Nicosia, and particularly the adaptive reuse of the system during its transitions. In discussing this history of development, it would be inaccurate to speak of a conservation ethos. From the medieval to the modern age, water systems were developed which subsequently became obsolete or inadequate for the population's needs, and thus decayed, were removed, or replaced. By in large, the system's individual features were utilitarian, serving humanity's most quotidian needs. There was no impulse or conscientiousness to preserve the system in its entirety as an emblematic part of the history and culture of the island. However, water channels, chains of wells, and fountains were routinely incorporated into expansions of the existing system or repaired for economical reasons. As the island changed hands, the new ruling elite who settled in Nicosia invariably overlaid new social, political, and economic structures to
incorporate the island into a wider politico-cultural realm. Numerous changes to the built environment accompanied policy and administrative reforms in urban areas. Adapting existing infrastructure in cities often made the most sense as new rulers sought to reify their hold on power by shaping the urban form of the capital.

Today the remnants of Nicosia’s historical water system are recognized as having heritage value, as indicated by efforts to conserve these features in the historical built environment. Only a small part of what was a far more extensive system exists today, and these features have functionally been reduced to street decor.

Understanding the changing values that have been attributed to urban water heritage is the first step towards creating a conservation framework for the water system that takes into account its full significance in the past, and in the divided city of Nicosia today.

**Agricultural development and origins of the water supply**

The development of the urban water system in the capital is directly related to agricultural production in the region. While the cultivation of arable land began as early as 9,000 years ago on Cyprus, inhabitants only moved en masse toward the center of the island, where the Mesaoria Plain lies in between the island’s two mountain ranges, during the medieval period in order to escape the threat of sea-borne attacks (Delipetrou 2008, 9). A fertile plain for agricultural production was formed by alluvial-colluvial soils deposited over
time from the snowmelt of the mountains. Springs, rivers and groundwater served as the main source of water to villages in the Nicosia districts until water systems were expanded into the countryside (WDD 2003, 5). The result was an intensely cultivated area, the largest such continuous tract on the island (Delipetrou 2008, 175-189). While the application of animal and water-powered mills in commercial-scale baking operations had begun in other parts of the Eastern Mediterranean by the beginning of the first millennium CE, Cyprus did not reach this watermark until the beginning of the second millennium. The first historical evidence of a watermill dates to the 12th century, after which they became commonplace on the island based on travelers’ accounts and administrative records (Given 2000, 225). Records also indicate that for centuries, villages throughout the plain brought their cereal crops to mills near Kythrea on the south slope of the Kyrenia Mountains. Even today, the Turkish name for the city of Kythrea, Değirmenlik, refers to these mills. At the turn of the 20th century, the grain from these mills was used for bread to feed the population of Nicosia (Cobham 1908, 398). The strategic importance of this industry for the capital is illustrated by historical events in 1764, in which rebels diverted the water from the Kythrea flour mills, starving the people of Nicosia, in a revolt against the Ottoman administrator (Cobham 1908, 360).

Long before the 12th century, Cyprus would have taken part in the technological advances in water supply, housing, transport, food production, and entertainment that characterized the Greco-Roman Eastern Mediterranean between the 3rd century BCE and 2nd century CE (Lucas 2006, 49). The rural landscape of the Mesaoria Plain at this time was likely populated by villages clustered in areas with natural springs, numerous wells posing a hazard to unsuspecting passers-by, and irrigated fields using water delivered by systems of underground chains of wells. Known locally as laomia, these tunnel systems were based on the same principles as qanats to transport water over long distances, thereby mitigating loss by evapotranspiration (WDD 2003, 5; Kotsila 2010, 21). The building of these new water
Supply systems could serve as a catalyst for increased development nearby. In contrast, aqueducts were usually built to serve existing towns with a history of prosperity. Engineers therefore had to fit aqueducts into the existing urban fabric (Wikander 2000, 25-38).

Knowledge of Roman and in some cases, Hellenistic, aqueducts of Asia Minor (modern-day Turkey) underscore this point. Aqueducts frequently terminated inside the city walls with a spectacular, multi-story architectural facade to celebrate the civic accomplishment this feat represented. While Nicosia was certainly in existence at this point, a grand structure would not have seemed appropriate for such a small village.

Water was viewed as a necessity for life and gateway to prosperity in the agrarian society. A typical Cypriot’s encounter with the water system was quotidian, through such labor-intensive activities as fetching water for a household or grinding wheat for sale in the capital. The concept of adaptive reuse could not have extended much beyond repairing these systems when they broke down, or reusing parts of the system if they were beyond repair. However, technological developments were constantly occurring. Research on watermill technology has shown that the machine types that emerged in the first half of the first millennium CE such as the rotary handmill, beast mill, and vertical and horizontal wheel watermills, likely originated in or near the Mediterranean basin, and were subsequently diffused to other parts of Europe and Asia (Lucas 2006, 47-48). Despite a dearth of evidence to confirm the existence of complex water systems in Cyprus prior to the medieval period, it is almost certain that the process of adapting these imported systems for local conditions required ingenuity on the part of the Cypriots and others working the land. Any number of factors may have influenced which of these technologies were widely adopted, and which eventually faded into obscurity around the Mediterranean.

**The urban water system of the medieval capital**
Lusignan Nicosia

Rather than ingenuity, the medieval period was marked by “technological discard and regression” (Magnusson 2001, 4). However, it is impossible to conclude to what extent this described the situation on Cyprus. Based on geographic proximity, the island was well-positioned for greater exposure to ideas derived from the flourishing Islamic empires at the time. Scholarship has not determined the processes of diffusion for hydraulic solutions between Byzantine and Islamic territories with peripheral areas of the Latin West (Magnusson 2001, 7). The fact that Cyprus was captured in 1192 as a consequence of the Third Crusade, becoming part of the Latin Kingdom of Jerusalem, is plain evidence that it was fully entangled in the regional upheaval caused by the increasing instability of the Byzantine Empire in Constantinople, and changing geopolitical landscape overall in the Eastern Mediterranean (Arbel 2000, 159; Jennings 1993, 6). The question then becomes how did the urban water system come to reflect this change in political administration of the island, which had far-reaching consequences for urban form and the built environment?

The Frankish rulers did little to advance social, economic, or political systems on the island over their nearly 300 years of rule. Nicosia had already been established as a commercial and administrative center early in the Byzantine period. Self-identified as guardians of the Jerusalemite Frankish legacy, the Lusignans were mainly concerned with extracting the natural resources of the island, not with improving upon existing infrastructure unless it was vital to this end (Arbel 2000, 159). Like previous residents of the island, the urban elite appreciated the healthy climate offered by the city attributed to its favorable location, which resulted in comparatively “less....disease and natural calamity” (Jennings 1993, 251-253). Notably, urban society was extremely stratified during this period between Latins and non-Latins, while rural society had virtually no connection to Nicosia or other urban centers. Although numbers are unavailable, the far majority of the island’s population lived in
the countryside. At the end of the 15th century, the rural population comprised 80-85% of the total population (Arbel 2000, 203). Cypriots toiled in the countryside, probably only laying eyes on representatives of the regime when it came to tax collection.

Scarce information is known about the appearance of Nicosia itself in the medieval period, as well as the water system serving the capital. The Venetian walled fortress of Nicosia today is three miles in length, while the walls of the Lusignan capital have been described as nine miles long (Cobham 1908, 120). The capital was a garden-filled city encompassing a huge area, with the Pedieos River flowing through the center. Perhaps unsurprisingly due to the heavy-handed approach to administration of the island, the urban economy weakened leaving society unsettled during the 15th century, by the end of which authority had been ceded to the Venetians (Jennings 1993, 252-254). The extent of knowledge about urban water development during the period can be summarized as follows:

*We know that in 1468 there were underground water channels taking water to various parts of the city of Nicosia. A channel constructed out of wood ran between Nicosia and the village of Trahonas. In Nicosia itself an underground channel took water from a tower called St. Verredi to a location called Misericordia and then to the royal dyeworks. The Lusignan period also saw the creation and use of some aqueducts with fine stone walls of various types. These were built to provide the power for sugar or flour mills or to water fields. The aqueducts mainly run underground but where they cross a valley they are built with sound masonry and with rounded or pointed arches (Bağışkan 2009, 544).*

This description suggests some continuity in solutions - storage, underground channels, and aqueducts - applied to water development for agriculture and domestic use in and around Nicosia, as oppose to wholesale technological discard. To further contextualize this information is it necessary to draw a comparison with the civic water systems in medieval Europe.

Studies in Europe show that new complex hydraulic systems began to be built in the 11th century, and increased in number over the 12th and 13th centuries. However, in general most of the urban water systems dated from the 13th century and after (Magnusson 2000, 6).
Urban water systems had an array of benefits that garnered the support of the populace. These included increased reliability and access to water through diversification of outlets, enhanced water quality and wastewater removal, and tangential benefits for industries and public welfare. Due to these demonstrative advantages, civic water systems were highly demanded in many medieval cities, as attested by records of requests for branch extensions (Magnusson 2000, 26-31).

A renewed interest in city building and specifically the construction of urban water systems has to be attributed to multiple factors. Population growth in cities prompted many of these projects, but growth alone fails to explain the phenomenon in its entirety (Magnusson 2000, 25). This is particularly apt to Nicosia, as it seems wholly unlikely that Cyprus was experiencing a population boom at the time it was ruled as a Crusader kingdom by the Frankish Lusignans. There are no island-wide population surveys available before Cyprus became a Venetian protectorate in 1473, but upon this transfer of authority it is certain the total population was nowhere near its peak (Arbel 2000, 190, 215). An outbreak of the Black Death in the mid-14th century, and a virulent episode of malaria about a century later accounted for this lingering decline (Arbel 2000, 184; Jennings 1993, 305).

Sharing a pre-existing private water system could significantly reduce the cost of construction and maintenance of a system for the city. In fact, the lack of a "local nucleus" for a water system actually discouraged the construction of an urban water system in some cases. These private systems were built and maintained by religious houses (Magnusson 2000, 33-34). The powerful Greek Orthodox monasteries of Cyprus have not specifically been studied in terms of their hydraulic engineering, but again geographic proximity suggests that a link with later civic water systems is possible. The Silahtar Aqueduct that supplied Nicosia with water from the Ottoman period on surfaced about a mile south of the city, near the
metochi of the influential Kykkos monastery; this suggests that the system could have easily delivered water to the church as well (Bağışkan 2009, 547).

**Venetian Nicosia**

The long transition from Lusignan to Venetian rule in Cyprus is indicative of the importance placed by the Venetian empire on its trade relations in the Eastern Mediterranean. The Venetian widow of the last Lusignan monarchs of Cyprus retained her title and ruled alone for 16 years after the king's death. By the time the kingdom of Cyprus came under the direct rule of Venice in 1489, the foundations had already been laid to integrate it into the Venetian colonial system. The abundant natural resources and strategic location of Cyprus directly shaped urban administration on the island. Unfortunately, after the Ottomans conquered Cyprus almost all of Venetian administrative records were lost, leaving only “traces” of their rule (Arbel 2000, 67, viii). Venetian rule on the nearby island of Crete between 1212-1669 can provide some insight into how urban water management coincided with social, economic, and political forces in shaping that colonial capital. Although direct parallels cannot be made to Venetian rule in Cyprus, which began three centuries later than in Crete, the perceived success of the administrative model in Crete would have incited the Venetians to apply it in Cyprus as well. There is every indication that over the first three hundred years of Venetian rule in the Kingdom of Candia, as Crete was known, the colonial city developed into a highly sophisticated urban form (Georgopolou 2001, 10).

In this project of remaking the Byzantine capital of Candia into a Venetian capital, water related directly to efforts to create a orderly and defensible city. Urban administration seemed designed to impose an order that was previously unknown in the city (Georgopolou 2001, 76). Emphasis was placed on sanitation by a complex set of rules for street cleaning. Building regulations for private residences began to be set during this period for the first time.
Aesthetic guidelines for urban form were selectively enforced, typically in the most important areas of the city. Accounts that the harbor of Candia had become heavily silted and a dumping ground by the middle of the 14th century, preventing heavily-loaded commercial galleys from anchoring for fear of getting stuck, hints that administrators' motivation for these urban reforms may have been primarily economical (Georgopolou 2001, 71). The desire to maximize the value of its Mediterranean colonies directly shaped Venetian administration of the capitals.

Advances in warfare technology were the catalyst for significant changes in Candia and Nicosia. Both capitals received distinct new urban fortifications systems in the 16th century to better withstand cannon fire (Jennings 1993, 4). In 1567, anticipating an Ottoman attack, the Venetians reinforced Nicosia by reducing the area of the walled city and enclosing it in a perfectly round fortress with low thick walls and a deep moat (Jennings 1993, 253). At this time, the river was diverted around the city (Bakshi 2012, 113). Prior to this reduction of the urban area to that enclosed within the 3 mile-circuit of the new fortress, there are few records of the appearance of Nicosia aside from travelers' accounts (Jennings 1993, 253). Although Cyprus had prospered under the Venetians as a whole, there are indications that it lost trade to Aleppo after that city's conquest by the Ottomans in 1517. It is certain that several
accounts of Nicosia describe a city no longer in its prime as Venetian rule entered its last century. In 1507, only a quarter of the city was inhabited though the walls were noted as in good condition. A slightly later account from 1529 called the walls “old and weak”, though the city still had fine dwellings and gardens.

Water heritage was linked to the urban administration’s efforts to legitimize Venetian rule in Candia. In order to emphasize continuities with Byzantine rule on the island, Venetians incorporated the reuse of spolia in projects around the city. The most prominent example dates from 1575, just after the loss of Cyprus to the Ottomans, when the palatial residence of the duca was given a Renaissance facade. With the consent of Venice, marble pieces from the site of the first Byzantine capital of Crete were transported to Candia for the project (Georgopolou 2001, 96). There is less conclusive evidence to suggest that the repair and reuse of the water system was part of this systematic effort to reify Venetian rule in Candia. In 1625-26 remodeling work was done on the ornate fountain that served as the focal point of a piazza in the lower city of Retimo. This fountain had replaced an earlier one at the same site (Georgopolou 2001, 85).

This body of evidence strongly suggests that Cypriot cultural heritage must have been viewed through a political lens by its Venetian rulers. Of course, the fact that the Venetians took control of the island not from the Byzantines, but a Latin family from France, was significant. It must have been difficult then, as now, to date structures since parts of medieval systems bore strong resemblance to those of antique systems (Magnusson 2000, 2). Only those water features embellished by an inscription in Greek or Latin, or continuously in use even as these systems expanded or were renovated, were most likely to survive up until the Venetians entered the picture. At this time, it is not possible to determine how treatment of the water heritage in Nicosia coincided or diverged from the trajectory observed in Candia.
The single most important factor influencing the expansion of the urban water system in Venetian Nicosia was the population growth experienced during this period. The prosperity of Cyprus would have required increased accessibility to water in the capital for a growing population. The population increase has been attributed to the *pax veneziana* that accompanied their largely uncontested rule over this hundred years. They employed a repopulation policy to great effect and improved sanitation in Nicosia over this period (Arbel 2000, 188-189). Due to these measures, the first reliable population estimates which have survived record an increase by the 1520’s. 17-18,000 people lived in Nicosia alone. In the 1550-60’s, this number climbed to 20-25,000 (Arbel 2000, 197). Although Nicosia had never been plagued by malaria, efforts to improve urban conditions in Famagusta and other places located near salt lakes or in marshland may have increased the population of the island overall (Jennings 1993, 392). After an epidemic of malaria cases broke out at the end of the 15th century - just as the Venetians took direct control of Cyprus as a colony - they immediately invested in sanitary measures like drying up the Constanza swamps, considered the cause of Famagusta’s “bad air” (Jennings 1993, 305; Arbel 2000, 186). Improved “sanitary” measures in and around Nicosia, even at a smaller scale, could have had a great effect on reducing water-born diseases and improving the health of residents.

Shifts in urban society due to an increase in immigration to Cyprus may have exerted multiple influences on the development of the water system in Nicosia. The administration was able to successfully attract immigrants due to the wide familiarity in the region with Venetian rule, thanks to their centuries-old presence in the Eastern Mediterranean. Christians increasingly sought to escape Muslim rule by the Mamluks and Ottomans during this period (Arbel 2000, 178). For immigrants, Nicosia must have offered some cultural and economic advantages over the countryside due to its comparatively cosmopolitan society and the numerous services required by the colonial elite, who were largely clustered in the city (Arbel
Evidence of increased mixing between the urban elite and other parts of society in Venetian Nicosia may also have contributed to this sense of economic opportunity. Unlike their predecessors, who maintained strict divisions between Latin and non-Latin inhabitants of Cyprus, the Venetians made a concerted effort to open "institutionalized channels of communication" with the popolo (Arbel 2000, 203). These channels allowed the participation of rural inhabitants in the public life of the kingdom through local councils that were convened in the capital. This shift in urban administration may have been motivated by the need to monitor unrest and any organized action in the countryside, but it inevitably created greater access to the city for a segment of the population that was previously excluded (Arbel 2000, 209).

Based on this characterization of the city, it can be assumed that the urban experience on Cyprus was similar to that in Candia. In other words, the material well-being that accompanied Venetian rule provided new opportunities for a wider strata of society than ever before (Georgopolou 2001, 255). Notarial and court records, which exist in far greater number than for Venetian Cyprus, describe:

[inhabitants' of Candia] active role in the city, endowing churches, setting up shops in the marketplace, forming joint commercial ventures, selling and buying products, building houses, making their living fishing or toiling the land...comfortable if not palatial dwellings in the city and its suburbs, often containing gardens.... [and involvement] in the production and distribution of agricultural goods as well as in artisanal production (Georgopolou 2001, 256).

Beyond a doubt, the urban development of Nicosia would have necessitated a well-functioning system to deliver water to the city in order to support an increase in the residential population which was comprised of migrants from the countryside, immigrants from elsewhere in the Venetian colonies and Christians from around the Mediterranean; as well as a higher level of agricultural, artisanal, and industrial production on the island.
Enhanced flexibility to maneuver within urban society could have led to very subtle changes in the water system.

It seems certain that given the island’s overall prosperity, and the economic and social forces harnessed to create that prosperity, a process of urban change in Nicosia must have accompanied this period. The loss of Cyprus to the Ottomans represented the loss of the Republic’s richest and wealthiest colonial possession, as well as an important base of operations in the Mediterranean (Jennings 1993, 6). The Ottoman city ushered in a new phase of urbanism to rebuild Nicosia. The siege of 1570-1571 essentially leveled the city; as an urban and economic center it was decimated for some time afterwards. A survey from November 1571 identified only 235 adult males living in Nicosia (Jennings 1993, 256). The water system, and many other essential parts of urban infrastructure, must have been built anew under the auspices of Ottoman urban institutions.

Rebuilding Nicosia

Urban and rural society in Ottoman Cyprus

Unlike previous transition of power on Cyprus, the onset of the Ottoman administration represented a clean break with the old aristocratic class comprised of Latin families that had long-ruled the island. The religious values of the Islamic empire necessitated a new form of government, substantially different from what had came before (Jennings 1993, 6). Focusing on urban administration, centralized rule by the Sublime Porte in Istanbul necessitated the formation of a new class of ruling elite on Cyprus as local representatives of the state. Donations of public works essential to the rebuilding of the provincial capital was a clear path toward becoming part of urban elite. Muslim immigrants to Cyprus encouraged by the repopulation policy implemented by the Ottomans, as well as Greek inhabitants of the island who may have been persuaded to convert by the perceived socioeconomic and
political benefits, were equally capable of participating in the evkaf system as a way of climbing the new social ladder of Nicosia.

As the backbone of the Cypriot economy, agricultural developments were directly related to displays in wealth and status in the capital. Agrarian production on Cyprus under the Ottomans is marked by more continuity than change. Ottoman rulers inherited a mature system of monocultural agriculture imposed by the feudal aristocracy, and enabled by the careful management of wells, irrigation channels, and water mills (Jennings 1993, 6). Many of the water-rich locations where agriculture was concentrated were still the same, leading to a similar pattern of village settlements clustered along the major rivers; the Pedieos River was the most important and thus most heavily populated. Cereal grains like wheat and barley still comprised the majority of crops on the Morphou Plain, where wells could easily tap into groundwater sources. The foothills, at a slightly higher elevation, were planted with grains, fruits and vegetables, or commercials crops like cotton, sugar cane, flax, hemp and silk cocoons. Powerful springs emerged at these points. The intensive use of arable land resulted in terracing vines and small-scale horticulture along the sides of the valley at the highest elevations (Jennings 1993, 1-2; Given 2000, 215). While there is no indication of a decline in living standards following the Ottoman conquest in the historical or archaeological records, eventually forces of corruption pervaded the taxation system thus exposing the rural society to new vulnerabilities (Jennings 1993, 306). This demand for higher production on the part of exploitative ruling elites was largely met, however, by a rural economy that needed “to produce ... a large surplus, that would feed the household, pay the taxes, and provide a buffer against bad summers” (Given 2000, 227-228).

The water network served as not just an economic link, but a social link, due to its prevalent role in everyday rural life. Water mills served multiple villages; an estimate in the early 20th century suggested up to ten. There were stark contrasts between these shared
mills, and the more sophisticated machinery owned by the rich monasteries, which had the labor, storage room, and other means to produce large surpluses (Given 2000, 221). This contrast between technological applications helps underscore how the strata of society were defined by who Cypriots came into contact with based on their paths, over the course of the day, season, or year as they focused on the primary task at hand - maximizing the value of the current harvest. Even in this circumscribed society, people found ways to socialize and build connections. Evidence of these connections exist today as records of charitable foundations set up by villages and urban quarters to build public works like water systems, and memories of the local water mill as "a good place for meeting people from other villages and arranging marriages for your children" (Jennings 1993, 62; Given 2000, 227).

The Ottoman evkaf and early modern water system

The evkaf system in Cyprus was a specific form of collective ownership administered by the state, based on the vakf rules and principles in sharia law, to which the Ottomans subscribed (Caponera 2001, 99). Evkaf land bequeathed to the state generated revenue that could be dedicated to a specific charitable cause in perpetuity. Such causes, or pious foundations, could include mosques, cemeteries, fountains, or schools, among others. Multiple evkafs were needed to support the largest pious foundations. Significantly, the state rented out revenue-generating evkaf land and property, collecting income from the tenants that went toward supporting the pious foundations (Caponera 1973, 25). Property was distinguished from land by any built structures contained thereon, such as a house, shop, or mill (Jennings 1993, 386). Keeping track of such a large amount of land and property was challenging; only partial records of certain foundations survive today, including the evkaf of Sultan Selim II, commonly referred to as the Aya Sofya Evkaf (Yildiz 2009, 127). These evkafs
included a large number of charitable institutions, as well as a large number of income-generating properties that included all those seized from the former Latin rulers of the island.

Although the Islamic institution of evkaf grew slowly on Cyprus, the urban populace's dependence on services provided by pious foundations ensured its eventual success (Jennings 1993, 40). These services were utilized by nearly every strata of society, not just the poor, and were indispensable for the city to function. Outside the city, agricultural estates and water mills belonged to the Aya Sofya Evkaf in Kythrea, Machaira, and Yirnali (Yildiz 2009, 125). Within the city, hans and bedestans were significant revenue-generating properties. These structures were the foundation of urban economies during the Ottoman period, as they provided housing for the people and merchandise of caravans visiting the city briefly. A water supply was essential for the comfort of its residents and their animals staying in these buildings, as it was used for cooking, cleaning, and even ablutions for worship. Excerpted in an academic study of hans, a memoir by Hizber Hikmetagalar recalled that the privately-owned Haci Dimitri Han could house up to 200 animals in its stables, for example (Bakshi 2012, 116).

The cultural role played by evkaf properties like hans in knitting together the newly recreated urban society of Nicosia should not be overlooked. Built in 1572, the Büyük Han was the first han of Cyprus. This building, which was restored in the early in 2000's, is a representative example of the first Ottoman architectural
typologies to be introduced in Cyprus. Anita Bakshi argues in her article on the social life of these hans of Nicosia in the 1940s and 1950s that these commercial spaces helped maintain a peaceful coexistence in the city, based on their central roles in the urban economy. In the mid-20th century, ethnic compositions of neighborhoods in the capital were still rooted in the Ottoman millet system, which indirectly encouraged ethnic quarters. Different religious groups were dealt with as separate entities and thus they tended to cluster together. Hans were therefore one of the few places where people from different backgrounds tended to mix. Did fountains, cisterns, and wells once function as similar spaces in the city where Greek and Turkish Cypriots engaged in business, exchanged greetings, or even neighborhood gossip? At least some of this socializing around the street fountain between the different ethnicities happened in Ottoman times, as mixed urban quarters did exist in Nicosia. Neighborhoods like Taktakale and Omeriye—today located in the south—had substantial populations of Muslims and non-Muslims, demonstrating that neighborhood leaders had found a way to successfully represent the needs of all their residents to urban administrators. These mixed urban quarters proved that “familiarity with neighbors...became a defining features” of at least some neighborhoods (Bakshi 2012, 113).

Aside from their role in reinforcing social networks, water systems such as aqueducts and other water channels were given especial importance in the evkaf institution because other religious, economic, and social services institutions depended on them. The first evkaf for a water system on Cyprus was founded during the first year of Ottoman rule; 25,800 akce were spent on the construction of the Arab Ahmet Pasa aqueduct for the supply of water to Nicosia (Bağışkan 2009, 545). However, as is common in Nicosia up until this day, wells were also dug for private water supplies. Ottoman foundations that included water rights, mills and wells typically provided funds not just for construction but the repair and cleaning of the water system as well, and even salaries for these workers (Yildiz 2009, 130). Even those
endowed water systems
constructed specifically for
religious institutions may have
served a larger social network.
For example, a fountain in the
courtyard of the Aya Sofya
Mosque with a street tap
provided water for the mosque
as well as the nearby
marketplace (Yildiz 2009, 140).

Based on the low placement of the basin, it is suggested that this particular fountain was for
animals, further supporting the idea that it was intended for the use of shoppers and
merchants, as well as mosque-goers (Tuncer Bağışkan, personal communication).

The water supply to Nicosia
during Ottoman times consisted
of two conduit systems, which
conveyed water through a series
of wells and tunnels. These
emptied into aqueducts that
carried the water into the city.
Bağışkan suggests that two
systems actually supplied the
city throughout Lusignan and
Venetian times as well. It is possible that the placement of the Ottoman aqueducts were
based on the pre-existing aqueducts, but their specific paths are unknown. The two conduit
systems were the Arab Ahmet Pasa Aqueduct and the Silihtar Aqueduct. While the Arab Ahmet Pasa Aqueduct was part of a evkaf founded by former military commander who served as beylerbeyi between 1584-87, there is no vakf record of the Silihtar Aqueduct indicating that it could have been built solely as a private venture. The last records of the remaining aqueducts in Nicosia date to 1926 and 1928. Underground pipes were installed beginning in the 1930s, and the unused conduits eventually disappeared. Only small sections of the Silahtar Aqueduct remain (Bağışkan 2009, 546-547).

Public fountains connected to the water system are generally composed of two categories: sokak çeşmeleri or street taps for the use of neighborhoods, which were built into the wall of a building, fence or water tank; and meydan çeşmeleri or public square fountains, which were free-standing structures with a water tank. The latter usually had a tap on each side. Ablution fountains, called şarivanlar, located outside mosques and mescids are different in appearance, administration, and use. Public fountains provided water for the more utilitarian needs of men, such as laundry, drinking, and watering of animals. Bağışkan points out that travelers visiting Nicosia in 1563 and just after the conquest of the city in 1571 noted the prevalence of street fountains, meaning that the provision of public fountains would have been expected by the new Ottoman subjects of Cyprus. The majority of public fountains in Ottoman Nicosia were evkaf properties, to which

![FIG. 10 Street tap connected to a fountain inside the courtyard of the Mevlevi Tekke](image-url)
residents would have assigned their own cultural and social meanings to as neighborhood gathering spaces. The cost of water was probably one of the most prevalent associations made by daily users of the fountains. Each mahalle paid for the water drawn from public fountains in the area. The payment went toward the support of charitable institutions included in the vakf. Water was not available around the clock, but only at specific times of day (Bağışkan 2009, 559-560).

Water rationing was likely not a cause for concern in the Ottoman city. Islamic societies developed traditional principles of water management that became incorporated into religious law, which the Ottoman government would have applied in Cyprus. The basic right of individuals and communities to a clean and adequate water supply was one such principle. It is quite possible that customary laws related to water rights, based on Islamic traditions, were included in the law of the republic. Such codification would have followed a precedent set by French and British colonial governments in former Ottoman colonies that "declared water to be state property and introduced a government permit to every new water use," but still recognized the provisions of the Ottoman Civil Code, the principles of the shari'a and local customs (Caponera 1973, 40-41). As an illustration of this, in 1983 Cypriot water law recognized communal ownership of water rights, ab antiquo uses based on occupancy, and a customary law seemingly related to the right of thirst in shari'a:

FIG. 11 Public fountain in the Samanbahca neighborhood
A person retains the right to drink water, to water his animals or to take water in a jar, barrel or similar vessel for domestic use... (Kyraikidis 1983, 25).

The right to quench one's thirst, or the thirst of one's animals, is interpreted somewhat differently between the four schools of Islamic law (Caponera 2001, 96). However, the formal logic underpinning the right is based on the economic value attributed to animals in societies where wealth was partially measured in terms of animals, given the extent to which livelihoods were based on the labor and products derived from them. Although the right of thirst provides a precedent to take water for individual consumption, it also asks to what extent a society is responsible for meeting the needs of its members. The right to thirst serves as a challenge for societies to provide access to water for communities in times of need using any possible means (Wescoat 1998, 641). Cultural associations with water that persist in Cypriot society today have yet to be recognized in conservation practice of the water system.

By focusing on the continuities shaping the development of water systems in Cyprus, this chapter has shown how the water system served as a common denominator for development in and around Nicosia over the ages. Since the medieval period when the city's population began to swell for the first time, a pronounced interest in adaptive reuse of the water system, thanks to economic, social, and political motivations, was a constant. It is this continuity across distinct epochs of Cyprus' history that makes water development so fascinating, and elevates it to the level of cultural heritage. It ties together the story of the urban center with rural life, and effectively rewrites the history of Nicosia - which has overwhelmingly been depicted as a cycle of conquest and defeat - from a social perspective. This inquiry into water heritage emphasizes what happened after the conquest, as people used what agency they had available to rebuild livelihoods, social networks, and positions of power and authority in a city with marked changes in urban form, and residential patterns in terms of ethnic and religious backgrounds. Based on this historical reading of water
development, the water heritage of Nicosia is reframed as part of the living culture of Cyprus, worthy of conservation and interpretation, rather than a set of discrete monuments frozen in time, primarily of interest to tourists.

FIG. 12 Fountain of Hasan Mutallib/ Zehri Fountain
Heritage tourism in the walled city caters to curiosity about the history of the divided city. A self-guided heritage walk was created within the walls using minimal way-finding and interpretative signage as part of bi-communal conservation projects, which received financial and technical assistance from international organizations. In 2005, metal identification logos were installed in the south to identify the walking path, but in the north a faint blue line painted on the street and sidewalks still acts as the predominant visual cue (UNDP website). Following this line, the visitor meanders through the walled city along nondescript streets lined with quaint traditional houses and storefronts offering glimpses of scenes from everyday life. The path takes her past the major monuments as well, such as the Aya Sofya Mosque, a converted 13th century Gothic cathedral. Street maps showing the visitor "you are here" depict the walled city in its entirety, unlike most contemporary maps of the capital.
Crossing over into south Nicosia, these maps, the blue line and the interpretive signage all but vanish, perhaps due to more extensive redevelopment there. The ubiquitous presence of international franchises like Starbucks, McDonalds, and Debenhams - which are not present in the north as a result of international embargoes - no doubt shaped urban form and accompanying land uses in the south. Differences in the way the divided city has grown and developed may account in part for this lack of a consistent approach to how urban heritage is presented on either side of the Green Line. However, additional forces shape heritage politics and conservation in Cyprus, most prominently in the capital. The way in which social and cultural forces have influenced conservation of the historical water system in Nicosia remains unclear.

FIG. 14 The blue line and interpretive map in north Nicosia

The shared heritage of a socio-technological network

Remnants of the city's historical water system, dating from the Ottoman period but which remained in use during the British administration of Cyprus, directly challenge the historical image of a divided city. Just as the city is linked today by a shared sewerage system, it was once linked by a long-distance system of water channels manifest in the urban
environment by fountains, springs, and aqueducts. The interpretation and presentation of these historic structures make no reference to the technological system itself, but present the structures as discrete monuments. This creates an interesting opportunity to reframe these water features using a conceptual conservation framework of the system as a technological network instead.

There are particular challenges that emerge during conservation projects involving a socio-technological network like the water system. Rather than deriving its value from its aesthetic qualities, or a particular historical event or personage, the water system was an integral part of the urban system itself, making it difficult to answer which community maintains cultural connections to this heritage today or where to look for precedents. In Cyprus, the conservation of heritage sites with specific religious or ethnically-based connotations sometimes face complications stemming from the ongoing conflict, but at least there any number of projects to serve as models for how to navigate the process. Significantly though, the very reasons that would make the design and implementation of a conservation framework for the water system so challenging, also make the potential impact of this project that much larger. By conserving the historical integrity of a citywide infrastructure that served Nicosia for hundreds of years, this project has the capacity to challenge the only image of the city that generations of Cypriots have grown up with - as a
divided capital for nearly the past four decades in one of the United Nations’s longest peacekeeping missions.

At the same time, the valuable lessons learned in Cyprus from dealing with heritage politics should be applied in developing this new conservation framework for the water system. Analysis of the conservation field in Cyprus could afford to be more nuanced. Perhaps the most deep-seeded misconception associated with conservation is the perceived “neglect and misuse of Christian places [in the north],” which likely has more to do with Turkish secularism than is generally acknowledged (Balderstone 2007, 8). This brand of secularism, imported from Turkey, traces its beginnings as a broad-based political movement in Cyprus from as early as 1925 (Morgan 2010, 103-104). In the island’s history of ethnic conflict during the 20th century, Turkish secularism as a socio-political system of ideological beliefs strongly figures into that community’s response to the movement for enosis, or unification with Greece. Yet, examples of poorly-done conservation projects or neglect of heritage sites may still sometimes interpreted as weakly coded messages about cultural predominance. There are undoubtedly numerous examples of conservation projects of Islamic heritage in the south that are similarly misinterpreted in ways by the Turkish community.

Divergent approaches to heritage conservation on the island are partly due to the contrasting social narratives constructed after the division, based on specific political goals. In general, Turkish Cypriot political rhetoric can be described as separatist, and Greek Cypriot rhetoric as integrationist. Popular rhetoric, and the social narratives that support them, have informed policymaking on the island. This is particularly apparent in the walled city of Nicosia where the urban landscape has been reconstructed in a way that reflects each community’s experiences in the past (Papadakis 2006, 2). For example, after 1974 a “process of erasure” in the north changed all place names into Turkish ones. English names were erased, as well as
Greek streets named in the early 20th century by the residents of those communities. In contrast, after 1974 the Greek Cypriot policy was to preserve Turkish place names and begin looking after some Turkish monuments, especially mosques (Papadakis 2006, 5-6). These policies reflect contrasting narratives about displacement. For refugees fleeing to the north, “it was suggested that their movement from their homes in the south was in fact one towards the real and permanent home...For Greek Cypriots the situation was reversed. The refugees were continually reminded of their homes in the north and encouraged to think of them as their true homes” (Papadakis 2006, 10). The municipal administrations took steps they deemed necessary to support these narratives in the process of reshaping the divided capital, as part of the process of adjusting to the altered political landscape of Cyprus.

Against this socio-political backdrop, the challenges to conserving the water system of Nicosia become clearer. Its relative lack of importance in terms of ethnic-religious significance placed it quite low on the list of heritage priorities for both factions on the island, based on
their political standpoints. The mixture of Ottoman and British-era fixtures of which the system is comprised did not lend themselves to being differentiated, and thus conserved as easily as other technological networks. For example, sections of the 1905 railway line terminating in Kaimakli, just outside the walls of the city, have undergone conservation projects on either side of the Green Line. Aside from the contrast between the formal and functional aspects of the systems, the railroad has fewer layers of cultural significance than the water system, making it more straightforward to interpret as part of Nicosia’s cultural heritage. In contrast, every person utilized the water system in Nicosia on a daily basis; individual routines revolved around acquiring water and performing rituals enabled through the dependable delivery of an ample and clean water supply to the city. From health and safety, to economic development on the urban scale, to the comfort and quality of life of individual households, the water supply was associated with concrete benefits in a pervasive way that other technological networks simply were not.

Interpreting modernity in Cyprus

In the British period, the improvements made to drainage and waste disposal in Nicosia, coupled with renovations and additions to the water system from the Ottoman period, marked the beginning of the modernization of Cyprus. These changes made to the
system were far more subtle than in the case of technological networks that required brand new construction, like the telegraph and railroad. In this way, the water system may have seemed like a less effective emblem of modernization, and thus a less worthy candidate for conservation to illustrate this period of the island’s history. However, the very ambiguity and sense of process imbued in the historical water system may serve as an asset today, in the ongoing struggle to find a permanent solution to the conflict between the two communities. On an island divided along ethnic-religious lines, conservation of the historical water system can accomplish what similar projects cannot. It can address a transitional experience during a formative period in the capital’s modern history that reaches across ethnic and religious lines; and it can do so in a way that celebrates the social values associated with water heritage.

Values based on water experiences continue to percolate throughout Turkish and Greek Cypriot societies today in various forms, such as customary law related to water rights, and the intangible heritage of songs, stories, and folk art. In short, this project has the potential to demonstrate that socioeconomic factors significantly influenced the urban form of Nicosia, contradicting popular narrative that ethnic-religious forces have always played the primary role in shaping the city, as they do now.

As it appears today, the historical water system is essentially silent on this issue. There have been notable conservation projects in the north and south that have incorporated parts of the system, like street fountains. However, aside from the physical conservation of the structure and the addition of a sign with its name and date of construction, these projects fail to contextualize the historical significance of the water features. A recent example from the south is the Myloi Cultural Center located just outside the city walls. Named for the water mill preserved inside the contemporary cultural center, the project was lauded as a conservation project with tangible benefits for socioeconomic development. The sole remaining section of the Silahtar aqueduct in the city has been preserved in a small park opposite the Eleftheria
monument, located at the intersection of a main avenue that leads to the Archbishopric. In each case, the historical significance of the water feature is subdued by its conservation treatment; its conservation can almost be construed as a byproduct of the intention to beautify the vicinity or create a community asset. None of these projects make mention of the way in which water was delivered to these components or where it came from, even though this information abounds. For example, in Kaimakli, an extension of the Silahtar aqueduct was built to that area in 1813-1814 and then replaced presumably with a neighborhood distribution system in 1923 (Bağışkan 2009, 547).

FIG. 18 Conserved water mill in the Myloi Cultural Center

To what should this lack of interest in preserving the memory of the water system be attributed? While the challenges to heritage conservation posed by dual municipal administrations, and competing social narratives are certainly noteworthy, conservation and planning professionals of Nicosia...
have demonstrated an admirable aptitude and ethos for heritage conservation. The bi-communal framework for management of Nicosia's urban environment, known as the Nicosia Master Plan, deserves much of the credit for work to document and conserve the walled city over the last few decades. With the support of local political leaders, a large number of heritage sites from the Ottoman and British periods have been conserved, including mansions, hans, the former power station and post office from the British era (Balderstone 2007, 10). All of these bi-communal projects were funded by USAID and the EU through UNDP/UNOPS (Petridou 2010). To fully understand why the water system has not been considered a serious candidate for conservation, the experience of modernity in Cyprus particularly as it relates to social uses of technology needs to be unpacked.

*Modernity under colonialism*

From the very beginning of their administration of Cyprus in 1878, the British were primarily concerned with 'civilizing' the island's population through the domination of its natural resources to "improve the colony's productivity and economic value". The drama of the British colonial government's "reforming, redemptive mission of empire" played out most prominently in the rural areas of Cyprus, but muted tensions existed in the capital (Morgan 2010, 51). Contrary to the direct opposition and open hostility that met land rights reforms in the countryside, improvements to the water supply, drainage, and waste disposal in Nicosia were genuinely appreciated. According to the journal of the first British administrator, Sir Wolseley, in 1878 the city was "one great cess-pit into which the filth of centuries has been poured" (Wolseley 1991, 33). Each house had its own absorption pit, which left undrained, contaminated the well water within the city (Wolseley 1991, 27). Furthermore, the old riverbed was also used to dispose of waste, which was only washed away by winter torrents...
that swept through the walled city along the natural path of the river (Keshishian 1978, 16; Papadakis 2006, 6).

Rural encounters with British officials promoting so-called scientific methods and new technologies were met with skepticism and passive resistance by Cypriot farmers suspicious of the colonists’ motives, but the value of the improvements made to waste and water management in Nicosia and other cities was self-evident (Morgan 2010, 58). By 1879, open drains in the city had been replaced with iron pipes underground, and a sanitary method of waste disposal had been implemented (Nicosia website). Although the Ottoman aqueducts delivered clean water to Nicosia in sufficient quantities, Wolseley immediately addressed the inadequate water supplies of the other towns during his first year (WDD 2003, 9). He also attacked the seasonal flooding problem of the city caused by the overflow of the river near the Paphos Gate, which he attributed to inadequate engineering of the arched bridge there. Even worse, the bridge over the river was used to dispose of dead animals, attracting packs of dogs and resulting in a smell that was “far from pleasant” (Wolseley 1991, 109-110). Despite the success of these public works, the effort expended to introduce order and sanitation in the urban environment was directly connected to efficient cultivation in the field in the minds of the colonial administration. As such, on some level the changes made to the urban water supply must also have been symbolized this struggle between tradition and modernity taking place outside the city.

The installation of technological networks in Nicosia differed from the rural experience with modernity in significant ways. First, while Wolseley immediately undertook improvements to the capital where the British encampment were forced to spend at least part of the year, a more “selective modernization” process occurred in the countryside (Kaika 2005, 109-112). Unpopular land rights reforms, aimed at revitalizing the forest in order to create a sustainable logging industry, were bolstered by essential transportation connections like the
railroad. Similarly, telephone connections were installed between the ports and wine-growing villages in the mountains to support this burgeoning agricultural sector. However, investments that would have improved the quality of life for Cypriot villagers lagged far behind. The colonial administration was preoccupied with a series of attempts to improve irrigation, construct reservoirs for the storage of surface water, and access new aquifer resources between 1898 and 1934 that almost uniformly proved to be expensive failures (WDD 2003, 10-11). Meanwhile, even in the 1950s there were villages that remained unconnected to the main water supply of the island, relying on Ottoman-era sources for their water. It was not until the 1960s, after Cyprus had gained its independence, that every household was guaranteed a potable water supply (Morgan 2010, 266; WDD 2003, 14). Further evidence indicates that an inadequate investment was made in water infrastructure by the British. While fifteen dams had been constructed between 1945-58, the republican government embarked on its own building campaign after 1960. As compared with a water storage capacity of 6 million cubic meters in 1960, today the south has a capacity of 327.5 million cubic meters (WDD 2009, 6; WDD 2003, 18).

**Water and waste in the capital**

For lack of other alternatives, the colonial government built upon the Ottoman infrastructure of the water supply in Nicosia. The British did not have the funds nor was there a need to construct an entirely new water supply system in Nicosia, when the existing system functioned well enough. For this reason, the transition of the water supply to a subterranean, largely invisible network was gradual. Implementation of this plan to modernize the water supply closely depended on reforming management of the municipal water supply, which also proved to be a drawn-out, complicated process. On the state level, the Public Works Department charged with water development for the island was founded by the end of the
19th century. In 1939, a separate department that evolved into the Water Development Department (WDD) was established (PWD 2009, 14; WDD 2003, 9-11). While these entities were crucial to ensuring adequate access to water resources for the island as a whole, the founding of the Municipal Water Boards for the four main cities on the island during the 1950s was a critical step for Nicosia (Kyraikidis 1983, 20; Water loss website). Since the very beginning of British rule, the capital had lacked a formal body to advocate and administrate the municipal water system. As a result, it seemed that the system was especially vulnerable to ad hoc decisions regarding its management that were sometimes viewed suspiciously or unfavorably by the population.

As early as 1879, management of the aqueducts, the 'water fund', and other parts of the water system in the capital were reassigned to the municipality of Nicosia and hence the colonial government. In the legal case known as Evkafin su meselesi in Turkish, the decision to dissolve the water commission likely did not take into account the important role that the evkaf office played in Cypriot society, for Christians and Muslims alike (Bağışkan 2009, 560). Other legislative reforms regarding water management in Cyprus were enacted throughout the rest of the British administration. In the 1980s, contemporary water laws addressing the Nicosia water supply in south Cyprus were still based on colonial-era reforms dating from 1919, 1932, and 1959 (Kyraikidis 1983, 4). However, it is possible that when many of these reforms were made, they were merely a formality. The question of legal authority over water infrastructure would have dissipated after a system of earthenware pipes for transporting water to the city was finished in 1933, at which point the aqueducts became completely redundant, although the street fountains did not (Bağışkan 2009, 560). Islamic water law generally attaches ownership to those who have invested "work, infrastructure, and knowledge" to obtain water. Otherwise, water that is not stored in private containers,
distribution systems, and reservoirs are considered a form of public goods (Kadouri et al. 2001, 89).

It is significant to remember that the storage capacity of Cyprus was in the single digits in 1960; hence the urban water system of Nicosia developed in leaps and bounds after this date, while water development changed course after the invasion by Turkey in 1974 and subsequent division of the island. Today the water supply systems of the northern and southern municipalities are almost completely separate (Charalambous, Bruggeman and Lange 2011, 14). In the southern municipality today, the water system is fed by twelve water reservoirs. According to the Water Board of Nicosia, the conveyance method is gravity-based utilizing a single water tower and supplemented by 4 pumping stations (Water loss website). Less is known about the water supply of north Nicosia. In 2007, the project scope for North Cyprus was to include the replacement of main pipes totaling a length of 83 kilometers, house connections, and the installation of 3,800 domestic water meters (Launch of project, 2007).

In contrast to the development of the water supply, the sewerage system of Nicosia was a completely modern construction conceptualized in the 1960s. The drainage problems plaguing Nicosia were mitigated by work-arounds during the British era, likely due to the projected cost of building such a system and the deteriorating safety conditions for the British administration in the city (Morgan 2010, 65). The high clay content of the soil in much of the walled city, which slows absorption and thus prevents natural filtering processes from occurring, would have helped account for the ineffective absorption pits that Sir Wolseley observed distastefully in 1878 (Sewerage board website). The solution employed in Nicosia was to construct individual holding pits initially, and septic tanks later on that were routinely emptied. In the 1920s and 1930s the household “thunder-box” described as “a portable wooden structure which required sawdust to be sprinkled liberally through the hole after use” was switched twice a week during the night. Donkey-carts were used to collect the latrines in
the walled city, due to its narrow streets. Before the sewerage system was built in the walled city, this “frequent and expensive” process of emptying the city’s septic tanks and disposing of the waste outside city boundaries was seen as a “unpleasant nuisance” (Morgan 2010, 119).

Interrupted modernity

In 1968, drainage problems in the walled city were one of the main impetuses for the study to propose a sewerage system and separate stormwater collection system. Bordered by the Hilton Hotel to the south, the Venetian walls to the north, the Pedieos River to the west and the Pallouriotissa Industrial Estate to the east (Sewerage board website). This area, which had especially high clay content in the soil, formed Stage I and II of implementation in the project. These stages were undertaken between 1972 and 1988; in 1978, the mayors of north and south Nicosia reached the historic agreement to proceed with the bi-communal project to create the only shared urban infrastructure on the now divided island, marking the beginning of an informal municipal partnership. The following year the partnership for the
Nicosia Master Plan to create a physical master plan for the city was formalized, and has persisted until this day (Petridou 2010). Stage III of the initial sewerage plan from 1968 was only completed in 1995 (Sewerage board website).

The achievement of the bi-communal sewerage system, and the symbolism attached to it, has largely overshadowed the ways in which the system also demonstrates continuity with historical urban drainage patterns. Trunk A of the sewerage system follows the path of the old riverbed before it was diverted outside the city walls. More research is needed to determine the historical development of this corridor as a drainage path. One possible scenario suggests that prior to the arrival of the British in 1878, the dry riverbed ran alongside the Tahtakale street leading from the Famagusta Gate through the bazaar section (Salvator 1983, 18). Several bridges crossed this depressed path, primarily for use in the rainy season.

FIG. 21 [Left] Map from the Sewerage Board of Nicosia showing Trunk A, which follows the course of the former riverbed closely.

As part of the initial effort to improve drainage in the city, the British replaced open drains with iron pipes early on (Nicosia website). As one of the most important areas in the city, it seems probable that the riverbed would have been amongst the first drains to be improved. Even if this description is accurate, it also certain that this rudimentary drainage system was not extended throughout the city. At the time the bi-communal sewerage system was planned in 1968, "storm water collection had not been developed...at this time" for Nicosia as a whole (Sewerage board website). However, a mid-century city history and guidebook confirms that a drainage channel ran along the riverbed before Trunk A was built. In a map drawn in 1959, the old watercourse is referred to as the "city's underground rainwater drainage". In prose however, this same watercourse is described within the walled city as "entirely covered over in 1882, with the exception of a narrow depression through which rain water now runs in winter. ... Today the old river-bed through the city from Paphos Gate to Famagusta Gate serves the city's principal rain drainage system. The Greek call it Kotzirkas and the Turks Chirkeflı Dere, both words meaning the slimy torrent" (Keshishian 1978, 16). This leaves some uncertainty as to whether this channel was buried or not before the 1980s.

**Precedents in urban heritage conservation for Nicosia**

This description of the modernization process demonstrates that the unevenly paced-development of the water supply and sewerage systems led to highly differentiated
experiences for residents of Nicosia. There was no clearly defined transition to the modern water and sewerage systems for the city as a whole. The water supply system slowly disappeared from the urban landscape, where it had always formed an integral part of the urban fabric, as well as help knit together the social fabric of the city. Likewise, the familiar routines involved with waste disposal disappeared as well beginning in the 1980s. Over the course of the century, the visible changes associated with development of these systems would have been difficult to perceive as part of a cohesive or coherent strategy. Modern houses constructed on the periphery of the city were available for the colonial officials, offering the comfort of flushing lavatories at least in theory (Morgan 2010, 118). However, retrofitting the traditional houses in the walled city with modern plumbing was a challenge. Photos from the 1940s document the continued use of street taps in squares and important public institutions, like schools, in Nicosia, as well as the need for water delivery services in the walled city. Tuncer Bağışkan remembers his mother fetching water from a street tap outside their house in the walled city in the 1960's (Personal communication).

Concurrent with these traditional methods of water delivery, distribution tanks located on the street outside new multi-story buildings in the old city began to be built, supplying households with running water. Today these decommissioned distribution tanks can be widely seen throughout the walled city, though they have not been conserved in any way. Undoubtedly, many have been destroyed. Many people simply chose to move to the newer
suburbs of the city rather than retrofit their houses in their walled city. The intermittent violence in the walled city prior to its division and a general decline within the walls subsequently caused even more residents to migrate to the suburbs (Hocknell 236, 1998). It is probable, however, that modern houses connected to the municipal water supply had private boreholes for non-potable uses like watering gardens and lawns, washing cars, and other purposes. As part of legislation passed in November 2010, the Water Development Department subsidizes the construction of new private boreholes to encourage conservation of the potable supply (Charalambous, Bruggeman and Lange 2011, 18).

The colonial government was entirely dependent on the existing water system upon their arrival in Nicosia, and chose to incorporate parts of it as they gradually updated or replaced the infrastructure. When it came to the water system, urban administrators clearly saw the benefit of engaging with the city's tradition of street fountains. In a nod to the form and function of these fountains, the municipality prominently dated some of these renovations and new constructions. The limited budget for municipal works likely prevented any elaborate decoration of public fountains. The municipality also constructed new fountains in community nodes, such as mosques (Tuncer Bağışkan, personal communication).

2 This may not have been the case in rural areas. The British, who struggled constantly to develop good relations with rural populations, may have saw an advantage to embellishing village water tanks as a way of reminding villagers of their magnanimity.
Notably, while the location and appearance of these public fountains showed some
continuity with existing structures, British-era
distribution tanks, connecting individual households to the
municipal water supply, were especially utilitarian in their appearance. As a new
technology with no history of use in Nicosia, urban administrators weren’t compelled to meet
community expectations or expend effort on aesthetics. Further evidence that the urban
administrators of Nicosia valued the heritage of the water system is demonstrated by cases of
reuse. The 1827-28 fountain in Fig. 26 was originally a free-standing meydan cesmesi in the
Karakas Garden abutting the road. During road improvements in 1958, the British removed the fountain,
relocated it about ten meters north and preserved the face that included the Ottoman inscription praising its
founder (Bağışkan 2009, 565).

The British selectively conserved the historic environment of Nicosia in ways that suggest they attached value to the built heritage of the capital.

Although colonial administrators punched holes in the walls of the city for traffic on both
sides of the Kyrenia Gate in 1931, vandalism to the walls such as “breaches and thefts of stones from the ramparts” were duly punished (al-Asad 2007, 1; Schaar 1995, 32). Efforts were made to preserve the gateway to the Lusignan Palace that was located in modern-day Ataturk Square, but the structure was torn down due to safety concerns in 1905 (PWD 2009, 19). Cultural traditions were also upheld. For example, the British continued the custom of providing free meals for foreign visitors at the Mevlevi Tekke near the Kyrenia Gate, while daily meals were served to all at the Hala Sultan Tekke in Larnaca (Yildiz 2009, 135-136). Whatever their inchoate conservation ethos, British administrators of the capital must have had to choose between conserving parts of the urban heritage and advancing their urban agenda quite often. Despite the best of intentions, the colonial government’s perpetual funding problems would have curtailed expensive conservation works. Similarly, until Cyprus became an official crown colony in 1925, the British may have lacked the administrative powers to implement some of their plans for urban development (Morgan 2010, 72, 103). These challenges posed significant obstacles to conservation of the water system and other built heritage in a complex administrative environment.

Reframing the historical water system as shared heritage

The modernization of the water supply and sewerage systems of Nicosia cannot encapsulate the island’s experience with modernity in the same way that analyses for other cities can. The complexities that characterize its history as a British colony and then a conflict-torn island prevented Cypriots from commodifying new technological networks as emblems of modernity that symbolized an ideology of progress. The fact that these networks, like the water system, were imposed by an increasingly unwelcome colonial government further removed this possibility. After the 1931 riots that burned the Governor’s House to the ground, Cypriots lacked any avenue for political representation in the colonial government,
and their relationship with British administrators never recovered. A growing resentment of the colonial government in the last three decades of British rule, as well as the funding difficulties that characterized much of the colonial administration of the island, undermined efforts to turn the island into an efficient and profitable venture. British officials in Cyprus were not invested in the island in such a way that compelled them to commodify or then fetishize technological networks either. Rather, the rudimentary water and waste systems of the capital were likely another source of exasperation for British governors.

The EOKA campaign from 1955-1959 brought a halt to the modernization progress, and transformed the capital into a battleground; the popular commercial corridor of Ledra Street was nicknamed “Murder Mile” for its attacks on British servicemen. EOKA, the National Organization of Cypriot Fighters, and TMT, the Turkish Resistance Organization, were pitted against each other as supporters of enosis and taksim, respectively. Intercommunal violence flared up again after the island was granted independence in 1963. The eleven years between 1963 and the division of the island in 1974 has become a touchstone for the Turkish Cypriot community, whose leaders emphasized the intervals violence that occurred then as justification for the eventual invasion by Turkey (Papadakis 2005, 129). If the concept of modernity as a harbinger of progress did not collapse outright after the capital was divided along ethnic and religious lines, it was certainly dramatically reworked as each community constructed new historical narratives to explain and remember the outcome of the decade of self-rule.

After 1974, the two sides embarked on parallel paths to rebuild critical infrastructure, which took precedence over the next several decades. In a sense, a commodification of this twin pair of infrastructures did take place, although there was never quite the sense that these networks “embodied the promise and the dream of a good society” per se (Kaika and Swyngedouw 2000, 130). In the aftermath of the conflict, the new water supply and sewerage
systems of Nicosia were embraced by the international community and urban residents, though for different reasons. The sewerage system has been lauded as a symbol of progress towards peace and a tangible model of cooperation to be emulated by those involved in negotiations to end the conflict (Hocknell 1998, 226). However, the system also represents an emancipation from the urban sphere and its past associations with ethnic violence. In the modern sewerage system, wastewater was collected via pipes from individual households, transported outside the city, treated using a series of aerated lagoons located in the village of Mia Milia in the north, and even recycled for groundwater recharge and irrigation.

The disappearance of the sewerage system underground, once and for all, erased another reminder of daily life prior to the painful events of 1974, and the violence during the years leading up to it. Water and waste were domesticized, simply appearing from a faucet and vanishing down a drain. The celebration of any aspects of the water supply or waste systems that preceded this invisible, underground network would have been rejected by residents of the city who were trying to achieve a new normalcy, and antithetical to the historical narratives being rewritten at the time. In the political climate of Cyprus today, celebrating the urban water heritage of Nicosia has finally emerged as a real possibility. As the last visible manifestations of the pre-modern system, Ottoman and British water features, as well as the riparian landscape of the Pedieos River, can still invoke strong cultural associations. By harnessing traditional water meanings to work toward a brighter future for Nicosia, heritage conservation can help chart a path toward reunification that finds a way to salvage the past in order to create a stronger peace. Acknowledging the pain caused by the past would unequivocally refute the implications connoted by silence: “The dead of the other side did not matter, their pain did not count, their experiences were silenced, their fears declared unfounded” (Papadakis 2005, 132).
The adaptive reuses of the water system listed in the table below illustrate possible ways for the Turkish Cypriot and Greek Cypriot communities to engage with the past for their mutual benefit in the future. Conceivably, some recommendations could be implemented unilaterally by either municipality. However, the real strength in these proposed (re)uses lies in their bi-communal implementation to create place-based programs for environmental awareness-raising, public art, or water quality monitoring throughout the walled city.

Adaptive reuses of the historical water system

<table>
<thead>
<tr>
<th>URBAN ECOLOGY</th>
<th>HERITAGE CONSERVATION</th>
<th>URBAN DEVELOPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorporate this reuse of the water system into a public awareness-raising campaign in ways that foster an appreciation for the varied aesthetics of water, including its absence, and exemplify conservation values, like the use of recycled water or treated wastewater</td>
<td>Write the public history of the water system in Nicosia by recording and cataloguing related memories, stories and artifacts. (Re)define historical neighborhood boundaries based on access and use of fountains</td>
<td>Restore select fountains to working order to enhance public spaces for users</td>
</tr>
<tr>
<td>Reuse the historical infrastructure for goals related to water security, such as involving the public in the active monitoring of water quality levels, flood risk mitigation, or rainwater harvesting</td>
<td>Create an interpretive program to explain how the water system as a whole developed and functioned; describe how its form and function manifest religious and sociocultural values, as well as beliefs about health, sanitation, and environmental conservation that resonate with beliefs, values, or traditions of today</td>
<td>Incorporate nonfunctional fountains into community-scale planning and design in prominent ways to foster a sense of place</td>
</tr>
</tbody>
</table>

Integrate heritage conservation program with objectives for tourism planning (ex. creating a visitor’s path based on the historical course of the aqueducts through the city) | Beautify the British-era infrastructure, such as distribution tanks, as a public art project to promote awareness of water management |

as shown in the map in Fig. 27. In each case, some type of information would be exchanged between sides that could form the basis for more informed decision-making for ecological, heritage conservation, and urban development issues by each municipality separately, or together. Conserving the historical water system would be a new challenge for the municipal
partnerships formed as a result of the Nicosia Master Plan. Furthermore, this conservation framework offers the unique opportunity for the municipalities to address water conservation in the public realm, which doubles as the main political stage for the island. Water shortages in Cyprus have made demand management a priority for both sides of the island. However, campaigns are targeted to reach users in their kitchens, bathrooms, and backyards. Adaptive reuse of the historical water system can serve as the basis for a new effort to enhance urban

Expanding the Scope of Heritage Conservation in the Walled City

FIG. 27 A map of selected sites of the historical water system could form the basis of a new interpretive program about water heritage. Areas with priority conservation projects of the Nicosia Master Plan are identified (City map by W. Hanson). See Appendix for descriptions of each water feature.
water management in the capital as a whole. At this moment in the island's history, a bi-communal conservation project that reframes Nicosia's historical water system as a technological network would send a timely message about the need for cooperative models of water management.

FIG. 28 [Left] One of the two Ottoman water towers in the city, located in Solomon Square in the south; it has been turned into a Citizens' Service and Information Bureau. [Right] The other water tank is in the north; located in a school yard, it has been used for storage and as a canteen for the students
Chapter 4
Towards a Water Security Agenda for the Divided City

FIG. 29 The Pedieos River today to the west of the walled city; the river flows to the north, meaning the Turkish Cypriot community is downstream

Water management in Nicosia is at a crossroads. Across the island, the sight of desalinization plants, wastewater treatment plants, and other new infrastructure is more and more common as greater emphasis is placed on increasing the total supply of water resources. Water conservation and demand management strategies have taken on secondary importance. Certainly in northern Cyprus, where water was delivered intermittently even during the winter as recently as 2006, consumer behavior has not been the focus of efforts to foster more sustainable water management practices. Since 2000 in southern Cyprus, water policy has consistently incorporated demand management and developing non-conventional water resources (Lacovides 2001, 1). These efforts to securitize water resources have been developed at the highest levels of governance, and therefore conceive of water security for the north and the south as a whole, respectively. Viewed at the municipal scale, new methods to increase water security in Nicosia become viable that would benefit the public welfare.
A bi-communal project should be proposed for the capital to increase levels of coordination and cooperation around urban water management that builds on the accomplishments of the bi-communal sewerage system project and heritage conservation of the walled city. Conservation of the historical water system as a technological network fits squarely within this proposed framework for a human-centered water security strategy for Nicosia. Decades after the modern water and sewerage network of the city was buried, and the production process by which water enter and exits the home largely obscured, the historical water system can be adaptively reused as part of a locally-attuned awareness-raising campaign to relink the connection between the city and nature in the minds of the public.

Best stated by Bağışkan, “The street fountains [of Nicosia], despite no longer being realistically useable, are the only representatives of the full water supply systems that functioned on the island until the recent past” (2009, 560). As representative of the pre-modern water supply on the island, they also have specific socio-cultural significances and the ability to evoke visceral imagery from this era that can be leveraged in a public awareness campaign for water conservation. Adaptively reusing the water supply system in this campaign would illustrate that demand management needs to be addressed on a societal level, not just in the home. Hence, it would also pose the question in the public sphere of whether increased cooperation between the municipalities of Nicosia to address water issues in the city is necessary. The most economical, efficient, and environmentally-friendly strategies to do so could only be accomplished with coordination between the north and south.

**Evaluating Nicosia's water security**

Water security should not be defined by hydrological and geographical factors, but by the mechanisms in place to respond to direct and indirect threats to water resources. In the
context of Nicosia, this definition of security places considerable emphasis on the individual or citizen in direct contrast to the majority of security studies literature which considers the state to be "the major reference object that must be secured" (Brauch 22, 2008). However, the latter definition is laughably inadequate for Cyprus considering the four decade-long political conflict there, which has resulted in about 250,000 people living under an internationally-unrecognized government (Grichting 2008, 236). When it comes to water, this complex situation has ramifications for the Greek Cypriot community in south Nicosia - if not for the residents' water supply, then the urban ecosystem and historical monuments built within areas at risk of flooding in the walled city.

The definition of human security employed here to evaluate Nicosia's water security most closely relates to what Bogardi and Brauch refer to as the fourth pillar of human security - the freedom from hazard impacts - which builds on other pillars identified by the United Nations and various nation states (2008, 23). While hazards, both man-made and natural, are impossible to avoid, this premise holds that by understanding the wide range of variables that exasperate the danger and damage caused by hazards to people and the environment their impacts can actually be reduced. From an advocacy perspective, this necessitates the mobilization of resources available to a community to mitigate threats stemming from multiple political, social, economic and environmental factors (Brauch 24, 2008). While increasing accessibility to or sustainability of critical resources like water can be subject to endless debates over the science and politics of resource management, advocating for a human-centered policy to increase water security at the municipal level in Nicosia has a better chance of gaining a broader base of support. At its most basic level, it implies the need to protect society's most vulnerable populations, by warning them about impending hazards and empowering them to prepare for different contingencies (Brauch 24, 2008).
Climate and Precipitation

It comes as little surprise that water security in Cyprus is generally conceived of at a large scale along the de facto political boundary of the island, whereby total water resources are distributed fairly by the managing authorities. Therefore, water research less commonly focuses on localized conditions of security. This attempt to examine how a water security agenda for the municipalities of Nicosia could be formulated relies on scientific and policy studies that have looked at a larger scale than the city itself. In addition, more research on this topic has occurred for the south. In southern Cyprus, water policy takes into account the high variance in precipitation levels between years, as well as general trends in precipitation in different geographical areas on the island. The average annual rainfall is 460 mm. However, during a severe drought in 2007-2008, the island received only 272 mm of rain, forcing southern Cyprus to import water from Greece at a multi-million Euro cost (Hadjinicolaou et al. 2011, 442). As typical for the dry Mediterranean region, 86% of rainfall is lost through evapotranspiration in southern Cyprus, while a 2008 study of northern Cyprus found that Nicosia experienced evapotranspiration at a rate of 88% (Endreny 2008, 168). Southern Cyprus therefore receives 370 million cubic meters of renewable blue water per year (Charalambous, Bruggeman and Lange 2011, 1). In addition to annual variability of precipitation, there is evidence that inland areas receive substantially less rainfall than the coast of Cyprus. Compared to the average of 460 mm, a study testing regional climate change models noted that the average annual rainfall for Nicosia between 1976-2000 was actually calculated as 296 mm (Hadjinicolaou et al. 2011, 450). Over the course of a half century, the annual average maximum and minimum temperatures for Nicosia were predicted to rise by 1.54 and 1.58 degrees celsius, respectively, with statistical significance at the 95% level. At the same time, the rate of change predicted for annual average precipitation was -8%, although this finding was not statistically significant (Hadjinicolaou et al. 2011, 455). Viewed in this light,
securitizing the water supply in Nicosia may involve planning for even hotter summers where
the number of very hot days increase, and a decrease in the already scant rainfall occurs
(Hadjinicolaou et al. 2011, 450).

Urban Development

This description of the climatic factors does not indicate how residents of Nicosia
would experience changes in water management implemented in response to climate
changes. Current trends in water usage can be used as the basis to predict possible conflicts
on the island if water scarcity occurred in the future. In 2010, southern Cyprus's total water
demand for 2011 was estimated as: 60% for irrigation, 3% for livestock, 26% for domestic use,
4% for tourism, 3% for industries and 4% for landscape irrigation. Domestic water use in
Nicosia fell at the high end of the spectrum for average daily water consumption per person
in urban areas with 166 liters (Charalambous, Bruggeman and Lange 2011, 2, 8, 17). Although
agricultural irrigation does use the far majority of potable water, it is taken from the reservoir
supply. In the future, the domestic sector may compete more directly with the tourism sector
for water obtained from desalinization treatment plants, which supplies the majority of water
for these uses today (Charalambous, Bruggeman and Lange 2011, 14).

The importance of tourism for southern Cyprus cannot be overstated. The average
number of annual tourist arrivals between 1999-2011 was 2.4 million, although this number
ranged from 2.1 to 2.7 million arrivals per year during this period (Statistical Service of the
Republic of Cyprus, 2012). Tourism generates over 20 percent of the republic's GDP (USAID
2006, 10). Although the Greek Cypriot government has turned to desalination to meet the
demand of the domestic and tourism sectors, policymaking has not established how these
needs will be prioritized in terms of water allocation yet (Charalambous, Bruggeman and
Lange 2011, 5). Compared to the 166 liters used by a resident of south Nicosia on average in a
day, the same estimate for a tourist has been as high as 465 liters. Water consumption for
tourism is expected to grow from representing 18% of domestic usage to 30% by 2020 (USAID
2006, 59). Unsustainable and poorly regulated development in both southern and northern
Cyprus, often related to increasing the capacity of their respective tourism industries, has
created new difficulties for water management as well. After the referendum for the Annan
Plan failed to pass in 2004, a wave of new construction swept northern Cyprus. The number
of roads and developments that weren’t connected to municipal services multiplied. Unless
services are connected to informal strips of development, the houses, hotels, and casinos will
continue to rely on water tankers for their potable supply and septic tanks for wastewater
disposal, making it harder to regulate their services which likely pose a danger to the
environment (USAID 2006, 44-45).

Flooding Risk

In any discussion of climate change adaptation in Nicosia, stormwater management
and solid waste management will likely be a major concern due to the prevalence of flooding
in the district. An analysis of the 43 flood events in southern Cyprus over thirteen years, from
1994-2006, found that the largest number of floods (17) occurred in the Nicosia district. The
analysis showed that floods have occurred nearly every year, mostly in the larger cities such as
Nicosia, Larnaka and Lemessos. Almost certainly the higher ratio of impervious surfaces in
cities contributes to the flooding effect (Savvidou et al. 2008, 128). To what extent do urban
residents accept these events as an act of nature, and to what extent do they consider the
municipalities to be responsible for infrastructure improvements that would mitigate the
damage and danger posed by flooding? To add to this level of uncertainty, it is probably safe
to assume the science behind floods is not widely understood by the Cypriot public. While
two categories of flood events observed in Cyprus can be distinguished by the weather

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conditions in which they arise, the seasons in which they are most prevalent, and the average
duration of the event, to the average citizen a flash flood sweeping down the streets of
Nicosia comes as a surprise. It may also trigger fear.

The natural riverbed of the Pedieos River that bisects the city has repeatedly flooded
since the 19th century. A British travel writer commented on a flood that had broken through
the gate of the city, though there is no indication that he actually witnessed the event: “Once
in the town the flood rolled heavily down Triboti lane - an open river bed or sewer - and found
an outlet by the curve at Famagusta gate” (Dixon 1878, 252). More than half a century later in
1949, record floods were still causing widespread damage throughout the island, but to the
road system, and had to be rebuilt at great cost (PWD 2009, 34). It seems almost certain that
drainage problems along Hermes Street (called Triboti Lane above), which now forms the
east-west backbone of the Buffer Zone, have not been solved. As confirmation of this, on July
7, 2006 a storm flooded the center of the city when 15 mm of rain fell in 10 minutes, “flowing
into the Green Line, as if the former river was reclaiming its bed” (Grichting 2010, 7).

After recent flooding, a May 2012 headline from the Turkish Cypriot newspaper
Havadis refers to the pervasive fear of flooding among residents of Nicosia. Sensationally
titled, “Why did 3,000 people die in Nicosia? Nicosia’s fear of flooding is as old as history” the
article begins by referencing a historical disaster from November 1330 which caused great
loss of life. It then poses the question of whether the flooding that consistently affects the
walled city stems from inadequate infrastructure in the north (Havadis 20 May 2012).
Intuitively, this concern speaks to frustration about the lack of a role that Turkish Cypriot civil
society can play in environmental conservation. Although environmental NGOs in northern

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3 There is some doubt that Dixon did witness this flood, which he describes in rather grandiose terms in
the full text. In the journal of the first British administrator of Cyprus, Sir Wolseley accused the writer of
making up stories he had supposedly witnessed. Specifically, he described Dixon to be "of a Cretan-like
disposition in regard to the truth" (Wolseley 1991, 115).
Cyprus are at even further disadvantage, island-wide the sector is generally “quite fragmented with significant amounts of overlap and a large number of small, single-issue, unsustainable organizations” (USAID 2006, 40). Furthermore, scientific data on the environment is “weaker” than in the south (USAID 2006, 56). Having lacked vehicles for change for so long, Turkish Cypriots in north Nicosia may be less receptive to any new messaging calling for increased water conservation unless all of the deferred infrastructure upgrades needed in the north are made.

One of the most important - and difficult - upgrades will be to improve stormwater management in the Buffer Zone, and the walled city in general. Anna Grichting has asserted that ecological landscape planning should serve as the basis for all planning in the Buffer Zone, in order to finally provide an adequate catchment area for seasonal floods and harvest rainwater for reuse in this water-stressed capital (Grichting 2010, 7). While the need for design that integrates social needs with solutions appropriate for the geography and climate in the urban landscape is beyond a doubt, the choice whether to preserve the historic urban fabric or implement a stellar stormwater management system is not mutually exclusive. Natural and cultural resource management in the Buffer Zone would be strengthened by an integrative approach that takes into consideration all the facets of this linear cultural landscape. Local pride in the city’s cultural heritage can only strengthen cultural and environmental stewardship in the walled city, as demonstrated in 2001 when a bi-communal team rebuilt one of the bastions of the Venetian fortress after the wall collapsed during a storm (Grichting 2008, 274). The potential of the bi-communal sewerage system to become an “epochal punctuation mark in Nicosia’s post-partition history: the moment when geographical separation had to take the functional factor into account” (Hocknell 1998, 240-241) has long been recognized. Similarly, the adaptive reuse of the historical water system of Nicosia
presents another rare opportunity to bridge the political, economic, and social separation of the island as warranted by the potential benefits to water security in the capital.

**Raising public awareness about water management**

Nevertheless, proposing that there should be an increased level of coordination for water management in Nicosia is still controversial, in part because environmental threats to water security have been conceptualized at a much larger scale. The success enjoyed by the Cypriot government, particularly in the three largest urban areas of Nicosia, Larnaka and Limassol, in reducing water losses and implementing demand management strategies also obscures the need for such coordination in the capital. In general the Town Water Boards for these areas receive high marks in their operations. Reviews have been positive, noting that they are “improving the services they provide, recovering all their financial costs, effectively intervening, and reducing losses in network” (Kotsila 2010, 36). The Town Water Boards have been more successful in reducing losses than either municipal or community-managed water systems in the south, which have experienced up to 40% of inflows lost (Kotsila 2010, 39). Strategies for demand management range from economic incentives such as subsidies for installing more sustainable water infrastructure in private homes and buildings, to legislature prohibiting wasteful uses of potable water, to promoting tips and techniques for conservation, and outreach “to cultivate a sustainable water conscience” (Kotsila 2010, 40).

There is some room for improvement in this area, however, which has basically become a permanent fixture of water policy. For example, Limassol’s residents rejected the idea of using recycled water for aquifer recharge, demanding reservoir water instead (Kotsila 2010, 39). In all likelihood, the municipality of south Nicosia has never seen the need, or even considered the prospective benefits of coordinating water management strategies throughout the city as
a whole. At some level, their geographic position upstream may also have obscured the need for coordination with the Turkish Cypriot municipality in the north.

The leaders of northern Cyprus face very different day to day challenges related to water management. Governmental structures in place to address health and safety threats posed by water and sanitation systems are ineffective (European Commission 2006, 2-3). Access to external technical expertise and funding sources for development are more limited, due to the international embargo and resultant isolation incurred. The backlog in infrastructure upgrades that developed over the decades has had serious consequences for the Turkish Cypriot community (European Commission 2006, 2). First and foremost, testing by EU agencies found that a large proportion of the population, which included residents of Nicosia, receive drinking water that is non-potable, mostly due to high salinity but at times due to poor bacteriological quality. Bottled water is commonly bought as a result (European Commission 2006, 12-13). The island's largest aquifer and most significant source of the water supply for the Turkish Cypriot community, the Morphou aquifer, is unconfined and therefore particularly vulnerable to contamination from wastewater seepage and agricultural runoff (European Commission 2006, 15).

Since 2006, EU development aid for the Turkish Cypriot community has started to address this backlog. From 2006-2010, €264.5 million was allocated by the European Commission as part of a new aid program implemented by UNDP/UNOPS (European Commission 2011, 8). The replacement of old asbestos water pipes to reduce water losses in several cities, including Nicosia, was largely completed by 2010 as part of this program. As a result, while rationing had been a commonplace measure in 2006 to deal with water scarcity, “uninterrupted water supply could be achieved in the winter season for the first time since many years” in 2010 (European Commission 2011, 3; European Commission 2006, 3). Prior to this program, several USAID-funded projects related to water and sewerage infrastructure
projects in north Nicosia had been finished. These included a Water Leakage Detection Project, the installation of pre-paid water meters and renovation of house connections, and upgrading the bi-communal sewerage system between 1999-2005. Environmental sub-projects related to Nicosia were also implemented during and after this period (UNDP website; USAID 2006, Annex B:11-14).

The development projects that have improved delivery services discussed above have paved the way for a new investment in outreach and education about water issues on the island, but resentment and skepticism may still be entrenched in the Turkish Cypriot community. The poor quality of the water supply would need to be thoughtfully and sensitively-presented to the public. The best way to effect change in consumer behavior may be to frame water management as an environmental justice issue in order to engage community.

Creating a "sustainable water consciousness" in the north won’t be possible without investing in human capital along with hard infrastructure. Specialized skillsets are needed to help compensate for the "serious historical lack of planning for, and implementation of, investments in treatment plants, network rehabilitation, storage and (to a lesser extent) laboratory services" (European Commission 2006, 5). Moreover, part of this investment must prepare citizens to hold water and sanitation services accountable to health and safety standards. Considering that “formal levels of service or customer service standards for water supply and sanitation do not exist” in the north, substantial work will be necessary to acquaint people with even basic water management issues, much less standards for the reuse of treated wastewater, sludge recycling from treatment plants, or pre-treatment for industrial discharge (European Commission 2006, 3). However, it is reasonably certain that developing a broad base of popular support for reforming - and enforcing - policies related to water management will hasten change, and thus be well worth the effort.
The benefits of raising public awareness about water security issues would outweigh the costs associated with it. A tailored approach that addresses the cultural history of the water system in the city would more effectively drive this message home. There is no doubt that outdated assumptions and misconceptions negatively affect water management today. For example, considering that the use of public fountains in Nicosia is well within living memory, it comes as no surprise that there is “an historic reluctance to pay even modest charges” in the Turkish Cypriot community for good water and wastewater services. This reluctance also reflects “a generally low level of public awareness of the value” of such services to public health and safety (European Commission 2006, 4). As a result, “In Nicosia charges are ... set at a level far below the cost of providing the service” thus crippling efforts to improve service provision or address water quality (European Commission 2006, 4). This lack of knowledge and understanding regarding environmental conservation in general has been identified as a major threat to sustainability on the island, to be addressed through development programs (USAID 2006, 47-48).

By investing in human capital and public awareness, local officials and administrators would demonstrate their concern for environmental justice. Moreover, these efforts would show that municipal leaders understand that water management is not a technocratic issue. Infrastructure upgrades and installation alone will not solve any of the inefficiencies in the water supply for northern Cyprus. While it would be overly reductive to say that the investment made in water infrastructure through development aid for northern Cyprus is too confident in the power of technology, the fact remains that the impression left by such infrastructure may be that machines - not people - will solve Cyprus’ water problems. The installation of new water infrastructure like pre-paid meters may also have created unintended consequences for how water conservation and demand management are perceived by the public. While a member of the water supply department described the
reception to the pre-paid meters program as positive because it saved people money, research into similar programs elsewhere have found negative impacts on communities (Özlem Özderen, personal communication).

Loftus’ study of methods to control water usage using pre-paid meters and other means in Durban showed that disadvantaged areas in the city became the target of zealous efforts to effectively minimize consumption through technological applications installed in the home and community. Prior to this wave of regulation in conjunction with the adoption of a free basic water policy for the entire city, water conservation had previously focused on the “rich, hedonistic customers of the city” who used a disproportionate amount of water. Although the poor were relieved of the burden of debt by the policy itself, due to technology like flow limiters, they had their access to water severely reduced to inadequate levels, which simply replaced their paradox instead of solving it (Loftus 2006, 1024, 1034-1036).

Despite the numerous differences between the contexts in which these programs were implemented, a striking similarity in both cities is the historical existence of two classes of citizens in each. Given that technology actually widened the gulf in the quality and quantity of water services between different socio-economic groups in Durban, the Turkish Cypriot municipality and their partners should be cautious before treading further down this path. The implication for policymakers is that water management strategies should be tailored to specific communities, particularly when those communities have drastic socioeconomic differences, to say nothing of different administrative systems. The pre-paid meter system in Turkish Cypriot Nicosia seems to be based on a similar principle to the progressive block tariff system utilized by domestic water suppliers in the south (Charalambous, Bruggeman and Lange 2011, 7). Commodifying water through these types of policies may more closely align administrative practices in the water sector, but it will not contribute to the overall goal of achieving parity in economic development on the island.
These recommendations to create a more human-centered water management strategy in Nicosia are equally as applicable to both sides of the Green Line. As noted, water security for the city is a shared concern and municipal-level interventions may be effective in improving security, or at least preventing conflict (Charalambous, Bruggeman and Lange 2011, 26). Paid for by the government of the republic, 1.5 million cubic meters of potable water are sent to north Nicosia each year according to the Water Board of Nicosia. Although the water supply systems of the city have become nearly separated over time (Charalambous, Bruggeman and Lange 2011, 14), groundwater leaching and environmental threats to the riparian ecosystem of the Pedieos River cannot be effectively managed separately. Given the infrastructure-centric interventions to improve the water and sewerage systems of Nicosia over the past few decades, it is clear that a marginal effort has been made to identify other types of interventions that could be implemented at the municipal level to increase water security. Rather than taking proactive measures, the focus has been on identifying problem zones or components of the infrastructure system that are failing, and methodically tackling these repairs (European Commission 2006, 13). Notably, a 2005 study of general environmental issues in Cyprus commissioned by USAID found that the majority of indirect threats to the biological diversity⁴ of the island involved water management: namely, saltwater intrusion/increased soil salinity; overexploitation and contamination of surface and ground water; insufficient wastewater infrastructure; and inadequate solid waste disposal (USAID 2006, 58-61). None of these threats can be mitigated through technological improvements alone; community capacity-building is essential to finding sustainable solutions for Nicosia.

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⁴ The 2005 study defined biological diversity as the variety and variability of living organisms broadly including a wide diversity of plant and animal species, communities and ecosystems.
A bi-communal approach to water security

The benefits of implementing a new human-centered strategy to increase water security in the city are demonstrative, but the pressing question for policymakers, municipal officials, and administrators on both sides of the Green Line is whether community-capacity building should be a bi-communal project. It seems possible that the environmental priorities in each community may be better addressed separately. The lessons learned from related bi-communal projects may also be relevant. Looking to the bi-communal sewerage system, the multiplier effect or larger impact of this project is not easily quantified.

Examining the history of what is essentially transboundary resource management in Nicosia more broadly, informal arrangements involving the water supply and electricity for years following the division of the island may have actually "gave little more than a confused and inherently contestable message to both communities" rather than improved conditions for reunification (Hocknell 1998, 239). In other words, the cooperative relationship built has not been proven to contribute to peace-building and conflict resolution in Cyprus. Given these uncertainties which the municipalities are no doubt familiar with, perhaps the way forward is not to begin by conceptualizing the project as bi-communal, but to jointly explore the benefit and drawbacks of either approach before deciding how to move forward. After all, part of the cultural context for planning in Nicosia must also acknowledge the hard line taken by official Turkish Cypriot policy against "viewing 'cooperation' in the urban context as anything but a de-politicized planning initiative." In direct contrast, the general Greek Cypriot outlook considers the possible "recreation of a unified Nicosia as an attractive confidence-building measure" that bodes well for an eventual peace settlement for the island (Hocknell 1998, 240). Of course, as discussed above while some of the objectives of the public awareness campaign could be accomplished separately, other issues necessitate coordination between the municipalities for monitoring and data sharing, for example, as well as the
cooperation of a more environmentally-savvy and active civil society that recognizes the need to look past the *de facto* boundary in this case.

Whether or not this more human-centered approach to water security at the municipal level is undertaken as a bi-communal project, integrated planning for natural and cultural resource management would still enhance key strategic objectives for international partners like the EU and USAID. The overarching objective of foreign aid in Cyprus is to foster the economic development of the Turkish Cypriot community through economic integration with the south. Laying a firm foundation for northern Cyprus to eventually implement the *acquis communautaire* and successfully integrate into the EU is explicitly stated as an additional goal of the EU aid programme (European Commission 2011, 3). In 2006 USAID/Cyprus began formulating a new strategy targeting the “longstanding economic and political isolation of the Turkish Cypriot community” as part of a “common UN-EU-US policy”. Under this policy, cultural heritage and environmental protection projects have been implemented in order to increase “economic and social interdependence between the two communities on issues of common interest” (USAID 2006, 41-42). USAID programs addressing the inadequate “level of public awareness of environmental issues in Cyprus” have been implemented in Nicosia. Projects such as the Pedieos River Flora and Fauna Survey, and Pedieos River and Green Corners of my Neighbourhood Garbage Clean-ups helped informed the public of the potential benefits of conservation by offering citizens the opportunity to be engaged in their own backyards, so to speak (USAID 2006, Annex B: 25). The agglomerated effect of these programs was to offer an alternative model of sustainable development for the island that preserves natural and cultural heritage.

USAID’s Supporting Activities that Value the Environment (SAVE) program that ran from 2005-2011 focused on building the Turkish Cypriot community’s capacity for effective natural and cultural heritage resource management (SAVE website). The program described
these irreplaceable resources as “a well-recognized patrimony, a primary source of pride, and ... opportunity for the island’s population to develop and share respect for millenia of multi-cultural history” (USAID 2006, 43). What is striking about this characterization of the island’s heritage is the lack of any acknowledgement of the intra and inter-communal struggles to control land, water and other valuable resources of Cyprus over the last millennium. Yet, part of the pride and respect felt for this patrimony is precisely due to the struggles waged by Cypriots to work the land and create a living for themselves under difficult conditions, which needs to be acknowledged.

The ongoing EU-funded restoration of the belediye pazari, the covered municipal market, located next to the Buffer Zone in north Nicosia similarly misses an opportunity to present and interpret the building in its full historical context. A video about the imminent opening of the market on YouTube uploaded in May 2012 by the UNDP Partnership for the Future program insists that “For the people of Nicosia, it is much more than a market…” Depicted as a repository of memories and traditions, it is implied that the market could fulfill this role in the city again. Its spatial location “almost at the mathematical centre of the walled city” is noted to demonstrate the importance of proximity to promoting economic integration of the city (UNDP, 2012). In this promotional video, the physical building itself is depicted as the factor which imbued its genius loci making it a neighborhood gathering place. In reality, it was the mix of people who used the space - some of whom no longer have a stall there, or have even visited that side of the city in decades.

The heritage value of the market is inherently tied to its neighborhood context. The fact that it was located in the city’s main market area dating from the medieval period onwards (Bakshi 2012, 1), or that this linear market area along Hermes Street once formed the natural watercourse of the Pedieos River, arguably influenced the site’s development far more than its actual form. In addition to any nostalgic memories of the municipal market that
Turkish and Greek Cypriots share, the mitigation of potential natural hazards to the municipal market is also a shared concern. Conceivably, the restored market can serve as potential rallying point for both communities to take critical steps toward increasing the municipality's water security and reducing the flooding risk to cultural heritage, businesses, and residences in and around the former riverbed. Taking this course of action would ensure investments in the economic integration of the city, like the marketplace revitalization, are sustainable over time.

Viewed in their historical context, the fountains and other remnants of the historical water system offer a unique opportunities to connect heritage conservation to water management in the walled city. Presented and interpreted as a technological network, these waterworks can be adaptively reused to inform the public about a range of environmental issues related to protection of water sources, and water-related public health and safety concerns overall. Dispersed throughout the walled city, they can transform the immediate area around them into learning and discussion spaces where the invisible water infrastructure is made visible by proxy. Originally conceived of on the neighborhood scale, they are easily
associated with the end use of the water supply in the kitchen, bathroom or yard where conservation needs to occur. This project would perfectly refute the notion that nature can adequately be protected in “isolated pockets,” by calling attention to these urban manifestations of a much more extensive network, thereby illustrating the “inherent linkages between sites and large tracts” in an ecosystem (USAID 2006, 47-48). Increasing the water security of Nicosia will start with knowledge-building to help people understand the extent of existing problems related to the water and sewerage networks, their implications for health, safety, and environmental sustainability in the divided capital, and finally, the ways in which the average citizen can intervene.
Chapter 5
Conclusion

The ineluctable link between water heritage and water security in Nicosia has gone unacknowledged in policy and planning. The role of the user is central to both, yet related initiatives have overwhelmingly focused on improvements to the infrastructural shells of the historical and modern water and waste systems. While there is obviously a need to prioritize projects that have immediate benefits in terms of providing better water quality in adequate quantities to residents, the truth remains that long-term sustainable water management needs to address values and behavior. By integrating planning for conservation of the historical water system with a water security agenda for the city, this can be more easily accomplished.

While the adaptive reuse of the historical water system may be more economical if the fountains and other remnants of the water system were utilized in their inoperative forms, other possibilities to reintroduce water as an invigorating and transformative element in the city should be considered. This thesis has discussed ways in which the modern water supply and sewerage systems of Nicosia have been forgotten and obscured, in part because they represent a historical continuity with a traumatic past that is legible in the urban landscape. Can these deeply-ingrained grievances simply be allayed? Repurposing the historical water system may not be sufficient to reframe the technological network as a shared asset for the city as a whole; certainly, it would not herald the transformation of the divided city. A comprehensive analysis of the historical water system, mapping both its intangible and tangible significances in today’s city, is needed to construct a plan that goes beyond adaptive reuse, to the full revitalization of the water system. The beginning steps taken in this thesis to map and research the water system can serve as the foundation for further research in this vein (See Appendix).
However, given the universal importance attached to water as a scarce resource in Cyprus, the idea of reintroducing water features into the urban environment is intriguing. By tying these new water elements to specific places in the city or specific times of the day, it becomes possible to call attention to different areas and activities of social, cultural or environmental significance, celebrate the panoply of life in the city, and stress the range of aesthetic experiences offered by water. The idea of water aesthetics itself should be expanded to include where the water came from - perhaps from across the Green Line - and whether it was recycled, treated, or stored. While it is possible to imagine that some of the street fountains could be restored to working order, or otherwise improved on or converted to a use that supported the water security agenda, these initiatives would ring hollow unless equal emphasis was placed on addressing the most critical issues related to health and safety on this agenda.

A bi-communal approach to concerns like groundwater leaching and stormwater management would demonstrate municipal leaders' commitment to urban sustainability. An immediate environmental concern, groundwater leaching is worsened by unsustainable
development and the lack of effective stormwater and solid waste management in parts of the city. When it comes to water issues, the urban ecosystem will not be sustainable without additional cooperation between the north and south. The Pedieos River offers a focal point to enhance stormwater management in the city. A coordinated approach between the north and south to ecologically-based planning for the riparian landscape has not occurred. However, in the south, Nicosia Municipality is on the verge on completing the multi-year, multi-million euro construction of an 18-kilometer pedestrian and bike path along the river. The path connects the entire greenway and improves safety and circulation for users. 2.6 kilometers of the path falls within Nicosia. Beginning upstream at the Tamassos Dam built in 2002 (WDD 2009), it ends at the Green Line in a municipal park near the Paphos Gate to the walled city. The character of the river in north Nicosia cannot be more different; choked with

FIG. 32 A river crossing in the south, showing a stormwater outlet

FIG. 33 Channelized river in the south
overgrowth, there are no public access points directly to the river. Instead, parking lots behind office buildings and apartment buildings abut the east bank, while the west bank remains largely undeveloped. Whereas the south has utilized the river as an asset to spur new development, it remains a territory off-limits in the north.

Neither approach is ideal in terms of embedding a conservation ethos for the river in society, but more disturbing is the gap between these two ways of thinking about the river. Addressing the water security of the city would have to lead to a unified plan of action to protect and sustainably develop the riparian landscape. The revitalization of the historical water system, as described above, could play a central role in the success of such an initiative to turn the seasonal river into a shared ecological, and perhaps even recreational, asset between the Turkish Cypriot and Greek Cypriot communities.

At the same time, revitalization is not simply constituted by reusing the historical water system alone. Water heritage has the unique capacity to help fabricate a memory of the city prior to the division. Existing memories have been warped by new social narratives, and faded due to the mundane passage of time; in the nearly forty years since the division, the two communities on the island have constructed their own versions of events, based on selected memories and individual interpretations. While bridging these gaps in understanding could take a lifetime, creating a new social memory of the past about the
historical water system is within reach. The potential benefits of doing so are open to speculation, but at the most basic level it would call attention to the subjectivity of the process by which memories are made. An incremental shift in the focus from the facts of history, to the multiple truths based on personal experiences may create new common ground on which dialogue between the Cypriot communities can occur. By looking to the past, it is possible for Nicosia to chart a new course for its future. The adaptive reuse of the historical water system in a way that disrupts how the city was viewed in the past, and challenges people to view it differently in the future, would be indispensable to this process. Weaving these disconnected and neglected bits and pieces of urban heritage back into the urban fabric must be concomitant with an effort to make the historical water system meaningful to people, on a personal level, once again.

A veritable feast of architectural and planning solutions have been proposed for Nicosia that envision a future of peace for the divided city. Architectural and landscape elements have been re-imagined as patching the rent caused by the Buffer Zone in the urban fabric, and knitting together seemingly diametrical facets of the urban experience - historical/contemporary, north/south, Turkish/Greek. In one recent study, the Green Line is described as a “military infrastructure” that reframed as an ecological corridor, can “translate...into an instrument of planning and reconciliation...” (Grichting 2010, 254, 306). The research that resulted from a 2010-2011 U.S.
Fulbright Scholar’s work in Nicosia identified the underutilized fortress moat as an opportunity to catalyze revitalization in surrounding neighborhoods, and unification of communities in the capital. Proposing a “continuous and flexible public space that will promote cultural activity and tourism”, these desirable outcomes would arise from the “shared physical and historical experience” achieved (Hanson 2012, 32-33). This thesis has proposed to conserve the historical water system of Nicosia as a socio-technological network, and adaptively reuse water heritage as a key component of a new bi-communal effort to formulate a water security agenda for the city. Like other projects, it strives to improve the quality of life in Nicosia. However, it distinguishes itself by proposing smaller-scale interventions that could easily fit into existing daily life of the capital. Inherently, water conservation needs to become part of the routine of everyday life in order to foster sustainable water management in the capital. This series of punctures in the ordinary space of the divided city may be more effective than monumental endeavors at disrupting the cycle of fear and suspicion that has cast a pallor over Nicosia for almost half a century, and allowing for new community relations to grow.
A map of selected sites of the historical water system could form the basis of a new interpretive program about water heritage. Areas with priority conservation projects of the Nicosia Master Plan are identified (City map by W. Hanson). See table on the next page for descriptions of each water feature.
<table>
<thead>
<tr>
<th>Map ID</th>
<th>Name</th>
<th>Feature description</th>
<th>Dates associated</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Büyük Hamam</td>
<td>bath</td>
<td>16th century</td>
<td>Ottoman</td>
</tr>
<tr>
<td>2</td>
<td>Fountain of Hasan Mutallib/Zehri Fountain</td>
<td>public fountain</td>
<td>Constructed 1910; restored 1977</td>
<td>Ottoman</td>
</tr>
<tr>
<td>3</td>
<td>Fountain of Es-Seyyid Mehmet Emin Efendi</td>
<td>public fountain</td>
<td>Repaired between 1816-21</td>
<td>Ottoman</td>
</tr>
<tr>
<td>4</td>
<td>Distribution tank *</td>
<td>distribution tank</td>
<td>-</td>
<td>British</td>
</tr>
<tr>
<td>5</td>
<td>Fountain of the Selimiye/Ayasofya Mosque</td>
<td>street tap</td>
<td>Endowed 1894</td>
<td>Ottoman</td>
</tr>
<tr>
<td>6</td>
<td>Water tower ** in the Selimiye/Ayasofya Mosque school</td>
<td>water tower</td>
<td>-</td>
<td>British</td>
</tr>
<tr>
<td>7</td>
<td>Distribution tank</td>
<td>distribution tank</td>
<td>-</td>
<td>British</td>
</tr>
<tr>
<td>8</td>
<td>Distribution tank</td>
<td>distribution tank</td>
<td>-</td>
<td>British</td>
</tr>
<tr>
<td>9</td>
<td>Mevlevi Tekke</td>
<td>street tap</td>
<td>17th century or later</td>
<td>Ottoman</td>
</tr>
<tr>
<td>10</td>
<td>Fountain of Ali Ruhi in the Küçük Medrese</td>
<td>public fountain</td>
<td>1828-29</td>
<td>Ottoman</td>
</tr>
<tr>
<td>11</td>
<td>Büyük Han</td>
<td>mescid with ablution fountain</td>
<td>16th century</td>
<td>Ottoman</td>
</tr>
<tr>
<td>12</td>
<td>Fountain of Ali Ruhi in the Laleli Mosque</td>
<td>street tap</td>
<td>1827-28 with later additions</td>
<td>Ottoman</td>
</tr>
<tr>
<td>13</td>
<td>Fountain of Müftü Berberzade Haci Mustafa</td>
<td>street tap</td>
<td>1893</td>
<td>Ottoman</td>
</tr>
<tr>
<td>14</td>
<td>Fountain of Pabuçcuzaüde Hüseyin Efendi</td>
<td>street tap</td>
<td>1933</td>
<td>British</td>
</tr>
<tr>
<td>15</td>
<td>Fountain of Ali Ruhi in Kuru Çeşme</td>
<td>public fountain</td>
<td>1828-29</td>
<td>Ottoman</td>
</tr>
<tr>
<td>16</td>
<td>Omeriye Hamam</td>
<td>bath</td>
<td>16th century</td>
<td>Ottoman</td>
</tr>
<tr>
<td>17</td>
<td>Water tower in Solomon Square</td>
<td>water tower</td>
<td>Constructed between 1927-1937</td>
<td>British</td>
</tr>
<tr>
<td>18</td>
<td>Silahtar Aqueduct</td>
<td>aqueduct</td>
<td>1805-09</td>
<td>Ottoman</td>
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<tr>
<td>19</td>
<td>Famagusta Gate ***</td>
<td>aqueduct</td>
<td>1805-09</td>
<td>Ottoman</td>
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<tr>
<td>20</td>
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<td>distribution tank</td>
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<td>British</td>
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<tr>
<td>21</td>
<td>Restored fountain</td>
<td>street tap</td>
<td>-</td>
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<tr>
<td>22</td>
<td>Bayraktar Mosque ****</td>
<td>cistern</td>
<td>16th century with later additions</td>
<td>Ottoman</td>
</tr>
<tr>
<td>23</td>
<td>Samanbahca neighborhood</td>
<td>public fountain</td>
<td>Constructed between 1918-1925</td>
<td>Ottoman</td>
</tr>
</tbody>
</table>

* Replaced an Ottoman public fountain (see Bağışkan 571-572)
** The site also contains a British public fountain for use by the school (Interview with Bağışkan)
*** Sections of the Silahtar Aqueduct are visible near the gate, as well as a British street tap dated 1933; the historical course of the city's main drainage channel along the riverbed, and locations of iconic public fountains are documented in drawings, maps, and photos (see Salvator, Keshishian, and Thomson)
**** As an important religious site and also the end of the Arab Ahmet Paşa Aqueduct, various water features have been recorded at this site. The mosque was closed during the researcher's visit, hence its addition here is based on historical data (See Bağışkan 546-547, 101-107)
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Lange, Manfred A. 2010. “Climate Change, Desertification and Water on Cyprus”. Powerpoint presented at the ENGAGE project; the Management Centre and the NGO Support Centre of Cyprus, Nicosia.


