A CLIMATOLOGICAL AND CONTEXTUAL ANALYSIS OF ROMAN WATER TECHNOLOGIES IN CYPRUS

A Thesis

presented to

the Faculty of the Graduate School

at the University of Missouri-Columbia

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

by

GRETCHE N STRICKER

Dr. Marcus Rautman, Thesis Supervisor

MAY 2015
The undersigned, appointed by the dean of the Graduate School, have examined the thesis entitled

A CLIMATOLOGICAL AND CONTEXTUAL ANALYSIS
OF ROMAN WATER TECHNOLOGIES IN CYPRUS

presented by Gretchen Stricker

a candidate for the degree of master of arts,

and hereby certify that, in their opinion, it is worthy of acceptance.

________________________________________
Professor Marcus Rautman

________________________________________
Professor Susan Langdon

________________________________________
Professor Benyamin Schwarz
To my family who has always supported me and my wild ideas.

And to Heather, my cage-mate, and Elizabeth, my crazy cat friend, for supporting me and encouraging me through the process.
ACKNOWLEDGEMENTS

I would like to express my deepest appreciation to my thesis advisor, Dr. Rautman for his guidance and patience throughout the year. I would also like to thank my committee members, Dr. Langdon and Dr. Schwarz for their assistance, advice, and support throughout this entire process. I would also like to thank Dr. Dale Lightfoot for friendly correspondence on the qanats of Cyprus which greatly aided my research.

I would also like to thank Dr. Michael Toumazou, Dr. Derek Counts, Dr. P. Nick Kardulias and the Athienou Archaeological Project for allowing me to participate in the project the past four years. And I also want to thank Dr. Erin Walcek Averett for first bringing me to Cyprus and starting this whole process.
# TABLE OF CONTENTS

ACKNOWLEDGEMENTS ........................................................................................................ ii

LIST OF FIGURES AND TABLES ......................................................................................... vi

ABSTRACT ................................................................................................................................. ix

Chapter

I. INTRODUCTION: THE CLIMATE AND HISTORY OF ROMAN CYPRUS ................................................................... 1

   I.1 Introduction to Ideas of Roman Water Use ......................................................................... 1

   I.2 Roman Cyprus and Sites and Excavation History ................................................................. 6

   I.3 The Climatological Condition of Cyprus .......................................................................... 12

II. LONG-DISTANCE SUPPLY AND MANAGEMENT .............................................................................. 15

   II.1 Introduction ....................................................................................................................... 15

   II.2 Aqueducts .......................................................................................................................... 15

       II.2.1 Description ................................................................................................................. 15

       II.2.2 Paphos ....................................................................................................................... 18

       II.2.3 Kourion .................................................................................................................... 20

       II.2.4 Salamis ..................................................................................................................... 23

       II.2.5 Pipes and Conduits ................................................................................................. 25

       II.2.6 The Aqueduct and Topography .............................................................................. 27

   II.3 Qanats ............................................................................................................................ 28

       II.3.1 Description ............................................................................................................... 29

       II.3.2 Qanats on Cyprus .................................................................................................... 30

   II.4 Conclusion ....................................................................................................................... 32

III. URBAN DISTRIBUTION AND STORAGE ....................................................................................... 34

   III.1 Introduction .................................................................................................................... 34
### III. Urban Distribution and Storage

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>III.2.1</td>
<td>Kourion</td>
</tr>
<tr>
<td>III.2.2</td>
<td>Amathus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>III.3.1</td>
<td>Salamis Reservoir and Cisterns</td>
</tr>
<tr>
<td>III.3.2</td>
<td>Amathus Reservoir Nymphaeum</td>
</tr>
<tr>
<td>III.3.3</td>
<td>Kourion Fountain House and Eustolios Cistern</td>
</tr>
<tr>
<td>III.3.4</td>
<td>Storage in Domestic Contexts</td>
</tr>
<tr>
<td>III.4</td>
<td>Patterns in Urban Distribution and Storage</td>
</tr>
<tr>
<td>III.5</td>
<td>Storage in Religious Contexts</td>
</tr>
<tr>
<td>III.6</td>
<td>Storage Capacity in Relation to the Near East and North Africa</td>
</tr>
<tr>
<td>III.7</td>
<td>Urban Storage and Constant Off-Take</td>
</tr>
<tr>
<td>III.8</td>
<td>Conclusion</td>
</tr>
</tbody>
</table>

### IV. Use and Display of Water in Cypriot Society

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>IV.2</td>
<td>Fountains</td>
</tr>
<tr>
<td>IV.2.1</td>
<td>Soli</td>
</tr>
<tr>
<td>IV.2.2</td>
<td>Kourion</td>
</tr>
<tr>
<td>IV.2.3</td>
<td>The Cypriot Environment and Public Displays of Water</td>
</tr>
<tr>
<td>IV.3</td>
<td>Baths</td>
</tr>
<tr>
<td>IV.3.1</td>
<td>Kourion</td>
</tr>
<tr>
<td>IV.3.2</td>
<td>Amathus</td>
</tr>
<tr>
<td>IV.3.3</td>
<td>Salamis</td>
</tr>
<tr>
<td>IV.3.4</td>
<td>In Context: Antioch</td>
</tr>
<tr>
<td>IV.3.5</td>
<td>In Context: Lycia</td>
</tr>
<tr>
<td>IV.3.6 In Context: Cilicia .................................................................</td>
<td>75</td>
</tr>
<tr>
<td>IV.3.7 Cypriot Baths in Context ..................................................</td>
<td>78</td>
</tr>
<tr>
<td>IV.4 Domestic Displays of Water ...................................................</td>
<td>79</td>
</tr>
<tr>
<td>IV.4.1 Domestic Level .......................................................................</td>
<td>80</td>
</tr>
<tr>
<td>IV.4.2 Domestic Displays of Water in Relation to the Cypriot Environment</td>
<td>81</td>
</tr>
<tr>
<td>IV.5 The Church and Use and Display ..........................................</td>
<td>82</td>
</tr>
<tr>
<td>IV.5.1 The Episcopal Basilica of Kourion ....................................</td>
<td>84</td>
</tr>
<tr>
<td>IV.5.2 Campanopetra of Salamis ..................................................</td>
<td>86</td>
</tr>
<tr>
<td>IV.5.3 The Growing Power of the Church ......................................</td>
<td>87</td>
</tr>
<tr>
<td>IV.6 Conclusion ..............................................................................</td>
<td>88</td>
</tr>
</tbody>
</table>

| V. CONCLUSION .................................................................................. | 91 |
| V.1 Concluding Observations ....................................................... | 91 |
| V.2 Caveats and Future Avenues of Research ................................. | 96 |

BIBLIOGRAPHY .................................................................................. 98

FIGURES AND TABLES ...................................................................... 114
## LIST OF FIGURES AND TABLES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Plan of Roman Cyprus. Map generated by Gretchen Stricker</td>
<td>114</td>
</tr>
<tr>
<td>1.2 Plan of the site of Paphos. After: Balandier 2012, fig. 01</td>
<td>114</td>
</tr>
<tr>
<td>1.3 Plan of the site of Kourion. After: Megaw 2007, fig 1.A</td>
<td>115</td>
</tr>
<tr>
<td>1.4 Plan of the site of Amathus. After: Aupert 2000, fig. 03</td>
<td>115</td>
</tr>
<tr>
<td>1.5 Plan of the site of Soli. After: des Gagniers 1985, plate C</td>
<td>116</td>
</tr>
<tr>
<td>1.6 Plan of the site of Salamis. After: Megaw 1986, fig. 03</td>
<td>116</td>
</tr>
<tr>
<td>2.1 Map of water features (grey) and aqueduct remains (blue) leading to Nea Paphos. 34°47.09” N and 32°25’51.91” E. Google Earth. October 23, 2013. February 12, 2015</td>
<td>117</td>
</tr>
<tr>
<td>2.2 Path of Kourion aqueducts. Split at Triandafilos indicated in yellow. After Last 1975, Map 01</td>
<td>117</td>
</tr>
<tr>
<td>2.3 Kourion aqueduct as it passes stadium showing old and new pipeline. Dotted lines are suggested route of aqueduct but there is no archaeological evidence to support this. After Last 1975, fig 08</td>
<td>118</td>
</tr>
<tr>
<td>2.4 Map of Salamis aqueduct with the source at Chytroi, preserved remains, and city indicated. Source: 351324N 334056.33’E. Google Earth. February 6, 2015. February 12, 2015</td>
<td>118</td>
</tr>
<tr>
<td>2.5 Terracotta pipes from the Kourion conduits. After: Last 1975 fig 07</td>
<td>118</td>
</tr>
<tr>
<td>2.6 Cross section and Aerial view of a qanat. After Lightfoot 2008 fig 02</td>
<td>119</td>
</tr>
<tr>
<td>2.7 Distribution of qanats in Cyprus. Indicated by blue dots. After: Lightfoot 2008, fig 04</td>
<td>119</td>
</tr>
<tr>
<td>2.8 Distribution map of qanats in Cyprus (indicated by dots) with average rainfall and elevation. After: Lightfoot 2008, fig 08</td>
<td>120</td>
</tr>
<tr>
<td>3.1 Line of Kourion aqueduct (red) within city and water storage features (blue). After: Last, 1975, map. 2, and Megaw 2007, fig. 1.A</td>
<td>120</td>
</tr>
<tr>
<td>3.2 Plan of water distribution in Amathus. After: Aupert 2001, plan 1</td>
<td>121</td>
</tr>
</tbody>
</table>
3.3 Plan of reservoir cistern of Salamis. After: Bauer 1989 fig 07 and 09.............121
3.4 Plans of Byzantine Cisterns from Salamis. After: Taylor 1933 fig 02............122
3.5 Plan of Nymphaeum Reservoir at Amathus. After: Aupert 2001, plan 01.........122
3.6 Plan of Kourion Fountain House. After: Last, 1975, fig. 09.........................123
3.8 Plan of House of Theseus. Cisterns are indicated in blue. After: Młynarczyk 1990, pp. 169...............................................................................................................................124
3.9 Plan of Episcopal Basilica, Kourion with water features in blue and pipes in pink. After: Megaw 2007, fig 1.Z.............................................124

Table 3.1 Chart of cistern capacities in Cyprus, the Near East, and North Africa. This table does not reflect all of the cisterns from Cyprus, but only those from the cities mentioned in the thesis. Adapted from Kamash 2013 pp. 102............................125

4.1 Plan of fountain at Soli. After: Ginouvés 1985, fig. 12..............................126
4.2 Plan of Kourion fountain. After: Christou 1996, pp. 51.............................126
4.3 Plan of the baths in the House of Eustolios. After: Christou 1996, pp. 27.....127
4.4 Plan of the Kourion public baths. After: Christou 1994, pp. 51...................127
4.5 Plan of the Amathus public baths with rooms labeled. After: Aupert 2001, plan 01.128..................................................................................................................128
4.6 Plan of bath gymnasium at Salamis. After: Wright 1992, fig. 150.............128
4.7 Plan of Bath C at Antioch. After: Elderkin 1934, plate V...........................129
4.8 Plan of baths at Rhodiapolis, Lycia. After: Farrington 1995, fig. 09..........129
4.9 Plan of baths at Göcuk Asari, Cilicia. After: Hoff 2013, fig 12.15..............130
4.10 Plan of public baths at Kourion with series of rows highlighted. After: Christou 1994, pp. 51....................................................................................................................130
4.11 Impluvium in the House of Dionysos, Paphos with hunt mosaics. Source: Kondoleon 1994, fig. 172.................................................................130

4.12 Plan of the phiale in the atrium of the Episcopal Basilica at Kourion. Source: Megaw 2007, plate 1.X.................................................................131

4.13 Plan of the phiale in southwest court of the Episcopal Basilica at Kourion. After: Megaw 2007, fig. 1.N.................................................................131

4.14 Plan fountain at Campanopetra, Salamis. After: Roux 1998, plan 03.............132

4.15 Reconstruction of the fountain at Campanopetra. After: Roux 1998, fig. 65........132
This thesis explores the trends of water usage in Cyprus during the Roman period. It seeks to challenge traditional ideas of water usage as a constant off-take system and apply the methods of Andrew Wilson and Zena Kamash to Cyprus. This thesis takes into account the climate and eastern Mediterranean context of Cyprus when analyzing the water technologies in use. By examining the long-distance supply, intramural distribution and storage, and use and display of water on Cyprus this thesis argues that the Roman period brought about a great deal of change in water usage. However, despite the greater increase in supply, the water technologies in use on a public, private, and religious level display marked tendencies towards water conservation and frugality. These trends parallel the conscientious use of water in North Africa and the Near East. This thesis places Cypriot baths within the contexts of Antioch, Lycia, and Cilicia to investigate possible places of inspiration in Cypriot bath design.
Chapter I

Introduction: The Climate and History of Roman Cyprus

I.1 Introduction to Idea of Roman Water Use

The Roman empire was a vast expanse that included diverse geographic regions, climates, and cultural traditions. Roman water consumption only encompasses one aspect of Roman life in the empire. During the Roman period technology, engineering, necessity, and taste for water changed radically. Roman engineers took the advances made in the Hellenistic period and developed them to unprecedented heights.\(^1\) Throughout the empire these technological advances brought about increased urbanization and mechanization.\(^2\) People could live in places where the environment had restricted them previously. This is not to say that all Romans in all places and times received these new technologies and ideas of consumption with open arms. Ancient authors like Horace and Seneca are only two examples of Romans who were adverse to certain trends in water consumption.\(^3\) Horace associates the baths with an urban environment and laments the loss of the countryside to urbanization. Seneca, a stoic, complains about the raucous noises which accompany a visit to the baths.\(^4\) He sees the baths as an excess of luxury.\(^5\)

Water use is culturally conditioned. Certain trends appear based on social rules, class, local environments, and religion.\(^6\) In places where there is easy access to water, there can be greater use of water, which areas with scarcer water resources would see as a luxurious use

\(\text{---}\)

\(^1\) Wikander 2000b, 649.
\(^2\) Wikander 2000b, 650-2.
\(^3\) Horace Epistles 1.11.11-4, pp. 320; 1.14.14-5, pp. 336; Satires 1.3.137-9, pp. 34; 1.6.125-6, pp.76.
\(^4\) Seneca Epistles 56.1-2, pp. 372.
\(^5\) Seneca Epistles 86.4-13, pp. 310.
\(^6\) Kamash 2013, 181.
of water. Thus, what is a luxury for some is a necessity for others. For instance, by the end of the first century CE, the citizens of Rome considered baths and bathing an integral part of daily life. They not only served as places for people to clean themselves, but also served a social service whereby people would meet, attend lectures, and make dinner plans. In other parts of the world, this was not so. In her recent study of Roman water use in the Near East, Zena Kamash points out that, some water technologies, like latrines, were not accepted by certain groups of people, namely the Jews, due to religious taboos concerning the disposal of waste. When the Romans conquered other parts of the Mediterranean, these attitudes towards water consumption had to be carefully negotiated. Kamash notes that in the Near East, places with heavy Roman influence, like political and economic hubs, tend to be more receptive of the Roman water technologies than other areas. Despite this, baths are one of, if not the most, common architectural feature found in Roman settlements across the empire. The sheer number of them implies their popularity as a cultural institution. To feed these baths, aqueducts were usually necessary to create a sufficient supply of water. But in areas where water is scarce, other facilities, like wells and cisterns, are critical in supplying the baths with necessary water.

Recent studies of Roman water consumption have sought to challenge traditional empire-wide theories of water consumption in favor of examining regional and cultural trends. This study takes recent advances in Roman water studies and applies them to Cyprus, an island in the Eastern Mediterranean. For the past four summers I have been excavating at

---

7 Hodge 1992, 6; Fagan 1999, 188.
8 Fagan 2006, 203.
9 Kamash 2013, 184.
10 Kamash 2013, 183.
11 Yegül 2010, 2.
12 Yegül 2010, 2.
a rural site in the Mesaoria Plain of central Cyprus and have become intimately aware of modern concerns about water on the island. Because of this I took an interest in Roman ideas of water on Cyprus. Studies of Roman water technologies are well published, but not in relation to Cyprus. There have been some smaller studies on individual sites, especially Kourion, by Joseph Last in the 1970s, and Salamis, by Albert Bauer in 1989. These but these studies focus on specific sites and do not examine the island as a whole. In the case of Kourion, Last’s was published posthumously and so there are gaps in his report. In addition, much of the Kourion city center has been excavated since Last’s research and so his conclusions need updating. Demos Christou has updated parts of Last’s study but has not published any larger work on his research. Skevi Christodoulou also recently published an article on the Roman baths and water supply on the island, but her article focuses on epigraphic evidence. Her dissertation expanded on this article.

Outside of Cyprus, there have been three major scholars whose work influenced this study. In his investigation of water usage in Roman North Africa, Andrew Wilson challenges traditional ideas of constant offtake in relation to North Africa. He looks at the large cisterns usually found at the terminus of aqueduct networks in North Africa. He notes that almost every single aqueduct ends in one of these large cisterns. He also explains that additional measures were taken to control the output of water throughout the city. He concludes that the idea of constant off-take is not applicable in all parts of the Roman Empire, especially in places where water is scarce, like North Africa. In her 2013 doctoral

---

14 Christou 1996, 47-52.
15 Christodoulou 2007.
16 Christodoulou 2014.
dissertation, Zena Kamash, builds on the work of Andrew Wilson, but focuses on the water technologies of the Roman Near East.\textsuperscript{18} The idea of constant off-take is only one part of her larger study of water use in the Roman Near East. Other topics that she addresses are the economy of water, cleanliness and hygiene, and religious, namely Jewish, uses of water. The work of Fikret Yegül on Roman baths and bathing also contributes to my work. Yegül discusses bathing in different parts of the Roman world, including the different parts of Asia Minor and the Levant. He examines trends in bathing over time and the factors that played into these trends. However thorough Yegül’s studies are, he does not include Cyprus in his study. My research seeks to apply the methods used by these scholars to Cyprus in order to fill in the gap in the literature.

This study asks these unexplored questions: What types of water technologies were in use during the Roman period on Cyprus? Do the general trends of water usage point to a lavish or conservative approach? And, how do these trends fit into the trends of the greater Mediterranean context and within the climatological context of the island? This study builds on earlier work in these ways: it applies the methods of recent scholars to the island of Cyprus; it places trends in the water technologies of Cyprus within the greater Mediterranean context; and it builds a more comprehensive basis for future studies of Roman water technologies in the Near East. This study has these goals: to explain how water was transported over long distances; to examine trends in water storage and distribution intramurally; to place the uses and displays of water within the larger Mediterranean context; and most broadly, to examine the use of water technologies on Roman Cyprus.

\textsuperscript{18} Kamash 2013.
This thesis seeks to place the water technologies in use in Roman Cyprus within their greater climatological and physical context. Chapter II looks at the technologies of long-distance supply focusing on the use of aqueducts and qanats. Chapter II describes the aqueducts of Paphos, Kourion, and Salamis before examining the trends that arise from their descriptions. Chapter III discusses intramural storage and distribution. This chapter looks at urban distribution networks of Kourion and Amathus in order to locate trends in water facilities and their placement and to evaluate the concept of constant off-take within the Cypriot urban setting. After considering the distribution trends, Chapter III looks at notable water storage facilities at Salamis, Amathus, and Kourion. This chapter addresses storage in domestic and religious context to investigate how private groups viewed water conservation. Finally this chapter places the storage facilities of Cyprus within the context of the Near East and North Africa. Chapter IV addresses public and private use and display of water. This chapter begins with looking at the large public nymphaea of Soli and Kourion before going into the baths of Kourion, Amathus, and Salamis. This chapter places these baths with the contexts of Antioch, Lycia, and Cilicia to investigate possible places of inspiration in Cypriot bath design. The chapter then discusses domestic displays of water and its relation to the Cypriot environment. Finally, this chapter discusses water display features in the churches of Kourion and Salamis. Chapter V summarizes the other chapters and concludes that while certain aspects of water use on Cyprus fit into the trends comparable to those of the Eastern Mediterranean, in other places, like in bathing structures, Cypriot trends do not.
I.2 Roman Cyprus and Sites and Excavation History

The expansion of Roman authority over Cyprus in the mid-1st century BCE was a direct result of the *Lex Clodia de Chypro*, which made Cyprus a Roman colony in 67 BCE. However the law was not implemented until 58 BCE by M. Porcius Cato at which time he incorporated the island into the province of Cilicia. During its first decades of Roman rule, Cicero tried to protect the island from the interests of Roman businessmen. After the civil war, in 22 BCE, Augustus made Cyprus an imperial province that was ruled by a proconsul. At this time, Cyprus entered a period of relative prosperity lasting almost three centuries. The island was divided into four districts, Paphos, Salamis, Amathus, and Lapethos (figure 1.1). The major cities, as noted by the geographer Ptolemy in the second century, are Paphos, Salamis, Amathus, Arsinoe, Chytroi, Karpasia, Kyrenia, Kition, Kourion, Lapethos, Soli, Tamassos, and Tremithus. Not all of these sites will be discussed in this thesis. Roman rule did not drastically change the condition of the island, and trade and industry enjoyed safe communications and uniform currency. Despite its prosperity, no cities were granted the status of *civitas*. While life was influenced deeply by Roman civilization the language and culture remained predominantly Greek-influenced. Greek-influenced cities remained the center of the island’s life and there was more municipal autonomy than under the Ptolemies.

This thesis focuses on five major urban sites on the island: Paphos, Kourion, Amathus, Salamis, and Soli. These sites were chosen because they contain examples of

---

19 Maier and Karageorghis 1984, 224. P. Clodius was captured by pirates off the coast of Cyprus and Rome demanded the Ptolemies pay the ransom. Even though they barely paid anything, the pirates still let Clodius free and he went back to Rome and passed the law making Cyprus a Roman province. Ptolemy committed suicide and the island was taken by Rome.
20 Maier and Karageorghis 1984, 248.
21 Maier and Karageorghis 1984, 248.
22 Mitford 1980, 1295.
24 Mitford 1980, 1295.
Roman water technologies and a variety of published materials. Paphos lies on the western coast of Cyprus (figure 1.2). The city of Paphos served as the provincial capital through the mid-fourth century CE. The city experienced a number of earthquakes, which greatly affected the layout of the site. The first occurred in 15 BCE, after which the city, with generous contributions from Emperor Augustus in Rome, was rebuilt.\(^{25}\) The second earthquake occurred in 76/77 CE and the Flavians rebuilt the city.\(^{26}\) The prosperity of Roman Paphos declined in the middle/late third century CE. Under Diocletian, in 293 CE, Cyprus was put under the charge of Antioch and its praetorian prefect, and thus Paphos lost its main power.\(^{27}\) In 332 and 342 CE, Paphos was again destroyed by earthquakes, and while it was restored, precedence was given to the city of Salamis by Emperor Constantius II.

Luigi Palma di Cesnola began the first archaeological work on the site and excavated some of the tombs on the Palaeokastro necropolis.\(^{28}\) In 1862, Franz Unger and Carl Georg Theodor Kotschy tried to find the aqueducts north of the city. In 1934 the Cypriot Department of Antiquities excavated a small cistern on the southern edge of the theater.\(^{29}\) Excavations of the House of Dionysos began in 1962 and under the direction of Kyriakos Nicolaou and then in 1977 under Sophokles Hadjisavvas with the Department of Antiquities. Then in 1965, the Polish Centre of Mediterranean Archaeology in Cairo began focusing its excavation on the southwest part of the city, the Maloutena Hill and the House of Theseus, under the direction of Kazimierz Michałowski and in 1966 under Wiktor A. Daszewski. The

\(^{25}\) Mitford 1980, 1310; Maier and Karageorghis 1984, 250.  
\(^{26}\) Mitford 1980, 1310.  
\(^{27}\) Mitford 1980, 1375.  
\(^{28}\) Cesnola 1878, 223.  
\(^{29}\) Taylor 1934.
Paphos Archaeological Project began in 2011 under the direction of Ewdoksia Papuci-Władyka and the Jagiellonian University Institute of Archaeology.

Kourion sprawls over the summit of a rocky bluff about 100 meters above the Mediterranean on the southeastern coast of Cyprus (figure 1.3). It is almost inaccessible on three sides. During the Roman period, it was relatively peaceful and construction was cyclical, especially due to earthquakes.\(^{30}\) Epigraphic evidence points to heavy influence and building by Augustus, Nero, and Caracalla.\(^{31}\) The 4-6\(^{th}\) centuries CE saw rebuilding after major destruction between 370 and 380. At this time only the city center was restored and occupied with the Sanctuary of Apollo was left to squatters. In the 5-6\(^{th}\) centuries, Kourion housed a prosperous, moderately sized settlement. This ended during the Arab raids, around 636, when the settlement moved to nearby Episkopi, which was further inland and had access to a reliable water source.

From 1934 to 1954, the University Museum of the University of Pennsylvania, under the direction of Bert Hill Hodge and George McFadden, conducted excavations to trace the history of the city.\(^{32}\) Short preliminary reports were published but the deaths of Daniel and McFadden halted the publications. From 1956 to 1958, A.H.S. Megaw with the Cypriot Department of Antiquities and then from 1974 to 1979 with the Dumbarton Oaks Center for Byzantine Studies excavated the Episcopal Basilica. In 1975, Demos Christou with the Department of Antiquities of Cyprus began excavating the city center including the agora, baths, nymphaeum, domestic structures, and parts of the intramural water system.\(^{33}\) In 1997, the first large scale pedestrian survey began under Stuart Swiny and the Sotira

\[^{30}\text{Costello 2014, 12.}\]
\[^{31}\text{Mitford 1980, 1316.}\]
\[^{32}\text{McFadden 1938.}\]
\[^{33}\text{Christou 1996 and 2001; Hersher 1995.}\]
Archaeological Project in order to understand the land and the organization and development of the city.\textsuperscript{34}

Amathus is just east of Kourion, on the south-central coast on the island (figure 1.4). It is both accessible to the sea and the countryside, which makes it a key location for shipping and agriculture. While Amathus was a major urban center in Archaic times, the Ptolemies had little interest in the city and abandoned the acropolis, where there is a major sanctuary to Aphrodite, and built a tholos bathing establishment and gymnasium in the lower city.\textsuperscript{35} Under the Romans, the population declined and the acropolis was virtually abandoned except for the Sanctuary of Aphrodite, which was granted the rite of asylum in 22 CE.\textsuperscript{36} In 77 CE, a ramp was built to connect the lower city to the acropolis. In the second century CE, Hadrian repaired the water system, nymphaeum, reservoir and the fountain of the agora.\textsuperscript{37} The city celebrated a small resurgence under the Antonines and thrived from the reign of the Severans to that of Gordian III. However the city was no longer a part of the major shipping routes. In the early seventh century, John the Almsgiver transformed the sanctuary of Aphrodite to a center of Christian worship. St. Tychon is also said to have built a church there.\textsuperscript{38} The fortifications were strengthened, under Justinian.

The first excavations of Amathus began in 1862 under Eugene Melchior, the Vicomte de Vogüé, with Edmont Duthoit and William Waddington. These excavations uncovered the stone vases of the acropolis and the village of Ayios Tychonas. Over the years, a number of people, beginning with Cesnola, began excavating the tombs, including A.H. Smith and J.L.

\textsuperscript{34} Swiny and Mavromatis 2000, 438.
\textsuperscript{35} Aupert 2000, 32.
\textsuperscript{36} Mitford 1980, 1318.
\textsuperscript{37} Aupert 200, 34.
\textsuperscript{38} Aupert 2000, 35.
Myres, and the Swedish Cyprus Expedition. In 1975, Pierre Aupert and Antoine Hermary, sponsored by the French School of Athens began systematic excavation of the acropolis including the Sanctuary of Aphrodite and the Christian basilica.\textsuperscript{39} Contemporaneously, the Department of Antiquities began excavation of the lower city at the base of the acropolis.

Soli lies on the west side of the northern coast of Cyprus on the Bay of Morphou and was the most important city of northwestern Cyprus (figure 1.5).\textsuperscript{40} The settlement is about 70 m above sea level and enjoys views of the surrounding area and access to the sea. Soli was also close to much coveted copper mines which played greatly into the city’s prosperity. In 12 BCE, Herod the Great was granted the right to half of the mines in exchange for 300 talents.\textsuperscript{41} Under the Antonines and Severans, Soli enjoyed its greatest period of Roman expansion.\textsuperscript{42} In this period there was much building in marble and building of the agora, including the nymphaeum.

Excavation of the site began from 1927 to 1931 with the Swedish Cyprus Expedition. The expedition excavated the area around the theater and a few outlying temples. Then from 1964 to 1974 the University of Laval excavated the basilica and the lower city. These excavations were under the direction of Jean des Gagniers. The results of the Canadian excavations were published in two volumes, \textit{Solì, Dix Camagnes de Fouilles}.\textsuperscript{43} Due to the political situation in the north archaeological excavation of the site has been suspended since 1974.

\textsuperscript{39} Preliminary reports are published in the \textit{BCH}. More extensive, but not complete, reports can be found in the \textit{Amathonte} volumes.
\textsuperscript{40} Mitford 1980, 1327.
\textsuperscript{41} des Gagniers 1985, XXIII.
\textsuperscript{42} Mitford 1980, 1328.
\textsuperscript{43} des Gagniers 1985; Ginouvès 1989.
The site of Salamis, located on the eastern coast of Cyprus, has a long history of occupation and wealth (figure 1.6).\textsuperscript{44} Even in the Hellenistic period, it was the largest city and cultural center of this island.\textsuperscript{45} During this time, the city shifted northwards, probably due to the silting up of the harbor. From about 294 BCE through the early Augustan period, public building at the site increased. The gymnasium complex was part of this building program. Even though not the political capital of the island, Salamis remained the industrial capital.\textsuperscript{46} The city prospered, but was destroyed in 76/77 CE due to an earthquake and was rebuilt by the emperors Trajan and Hadrian. Hadrian even had several honorific statues with inscriptions citing him as the benefactor of the city.\textsuperscript{47} Two more earthquakes, in 332 and 334 CE, destroyed the city again. This time only part of the city was rebuilt under Constantius II and it was renamed Constantia at this time. It was at this time that the city became the political capital of the island again. The rebuilt city regained prominence and was restored to its former size, however only the central part was fortified by walls. During the Arab raids from 647-8 the city was pillaged and burned.

Exploration of Salamis began in the 19\textsuperscript{th} century. In 1862 Eugene Melchior, the Vicomte de Vogüé, with the epigraphist William Waddington, and architect Edmont Duthoit wrote a description of the ruins of the gymnasium and the basilica, Campanopetra. In 1890, a British expedition began excavation around the gymnasium but did not complete excavations of any one building. In the mid-1920s and in 1933, G.E. Jeffrey, the inspector of Ancient Monuments, and Joan du Plat Taylor, the assistant curator, excavated mostly early Christian buildings. Excavations then halted due to World War II. From 1952 to 1959, excavations

\textsuperscript{44} Mitford 1980, 1321.
\textsuperscript{45} Karageorghis 1969, 167.
\textsuperscript{46} Mitford 1980, 1322.
\textsuperscript{47} Karageorghis 1969, 185.
resumed under A.I. Dikigoropoulos and Vassos Karageorghis on the gymnasium. In 1959, Karageorghis directed both the excavations of the gymnasium and the theater. He then continued excavating until 1974. From 1964 to 1974 the French Mission to Salamis by the University of Lyon under the direction of Jean Pouilloux excavated the tombs, the bothros of St. Barnabas basilica, and Campanopetra. In 1974, excavations were interrupted by Turkish occupation of the northern third of the island.

I.3 The Climatological Condition of Cyprus

Cyprus is a dry, rocky island in the Eastern Mediterranean. It has little freshwater resources and high average summer temperatures with a relatively low average rainfall. Despite the temperate climate, Cypriot summers are warm and dry with most rainfall occurring from December to February. Today, the city of Limassol’s, a modern city between Kourion and Amathus, winter (December to February) temperatures average 9-17.9 degrees Celsius. The summer (June through August) temperatures average between 24-27 degrees Celsius. In Paphos, the winter temperatures average 11-13 degrees Celsius and the summer, also 24-27 degrees Celsius. However, across the entire island average temperatures range from 29-22 degrees Celsius, from the Mesaoria Plains to the Troodos Mountains, with highs of 36-27.49 In the winter, the average temperature from the plains to Troodos are 10-3 degrees Celsius and lows of 5-0. The high summer temperatures of much of the island are indicative of low precipitation rates, something the ancient builders would have had to be aware of when building open channels for water conduits. These temperatures are reflective

48 Cyprus Department of Meteorology 2006.
49 Cyprus Department of Meteorology 2006.
of the rainfall. The Troodos receive the highest amounts of precipitation, both rain and snow, averaging 1,000 mm, and the southwestern slopes, including the regions of Paphos and Kourion, receiving an average of 450 mm, and the eastern areas of the central plains, like Salamis, between 300 and 350 mm.\textsuperscript{50}

Less than 5\% of the island’s rainfall occurs in the summer. Modern average rainfall is only 480 mL and can be as low as 182 mL (1972/3) and as high as 759 mL (1968/9).\textsuperscript{51} Of Cyprus’s total land mass of 9,521 square kilometers, only 10 km are made up of water and total renewable water resources also only reach 0.78 cubic kilometers.\textsuperscript{52} In Limassol and Paphos, the month of January has the most average days with precipitation, only 9-10, whereas both cities in June, July, and August and September for Paphos average below one day of precipitation.\textsuperscript{53} With so little precipitation, water supply and storage became important to consider.

The average temperature of the northern hemisphere has risen since the Roman period, particularly in the last 50 to 100 years.\textsuperscript{54} Therefore knowing the modern temperatures can give a basis for understanding ancient climates. Ancient climate studies suggest that the Roman East went through periods of heating and cooling. The Dead Sea levels suggest two peaks of wetter climate during the Roman Empire, the first ending in 200 CE when there was a sharp drop in levels followed by almost 200 years of rising levels leading to the second peak.\textsuperscript{55} Studies also suggest relative stability in the East from 100 BCE to 250 CE. However, literary evidence from the Talmud names droughts that occurred in Palestine between 210

\textsuperscript{50} Cyprus Department of Meteorology 2006.  
\textsuperscript{51} Cyprus Department of Meteorology 2006.  
\textsuperscript{52} Central Intelligence Agency 2011.  
\textsuperscript{53} Cyprus Department of Meteorology 2006.  
\textsuperscript{54} Mann et al. 2008, fig 03.  
\textsuperscript{55} McCormick et al. 2012, 180-88.
and 220 and multiple records show evidence for drought between 311 and 313.\textsuperscript{56} Around 400, there was a period of increased precipitation in the Levant but a period of cooling in the early sixth century with droughts in Palestine from 523 to 538. These studies suggest that the East during the Roman period saw relatively consistent periods of climate and rainfall with few interruptions.

\textsuperscript{56} McCormick et al. 2012, 188.
Chapter II
Long-Distance Supply and Management

II.1 Introduction

Long-distance water supply is a way to provide a constant source of water from a source to a point of consumption. This allows even large cities to exist and thrive in areas where there is little access to water. Settlements are able to grow if there is a constant water source. Long-distance water supply also allows settlements to be located in places more desirable for other reasons, like close to the coast or near other non-portable natural resources. This section discusses two long-distance water conveyance technologies, aqueducts and qanats. Both of these systems allow for water to be transported over great distances in order to supply settlements with water. Aqueducts are a way of transporting water at, just below, or above ground level, while qanats transport water at a subterranean level. These technologies are discussed in relation to their use on the island at three large urban centers with both religious and political interests: Paphos, Kourion, and Salamis. This chapter describes the different technologies in use, both in general and how they appear on Cyprus, and notes their relationship to the Cypriot environment, special or distinguishing features, and how they affected the lives of those who utilized them.

II.2 Aqueducts

II.2.1 Description

Aqueducts are the best known way of transporting water over long distances in the Roman Empire. Substantial sections of more than 600 aqueducts survive in all parts of the
empire, and have been studied from a number of perspectives. For example, Trevor Hodge has written extensively on Roman aqueducts and water supply, especially in relation to the hydraulics of aqueducts. Other choose to examine the aqueducts of a specific city or region, like Daṿid ʻAmit, Joseph Patrich, and Yizhar Hirschfeld’s analysis of the aqueducts of Israel. Aqueducts move water from a non-local source to a city by means of gravity-fed underground piping and channels and aboveground arcades and bridges. Aqueducts were first used in Minoan Crete and Mesopotamia in the early second millennium BCE. The Romans expanded on the earlier aqueduct forms by adding architectural features, like arcades. For example, the Romans used arcades in place of siphons, an invention of the Greeks, to span valleys. Siphons work via a system of pressurized pipes, forcing the water down and then back up a valley. If the water of a siphon is moving too fast or if there are any air bubbles, the pipes may be damaged. Siphons range in size. For instance the Madradag aqueduct, in Pergamon, contains the deepest known siphon, built from 197-159 BCE by King Eumenes II. This siphon is 190 m deep and 3,000 m long.

Aqueducts mostly take the form of built masonry or concrete channels with vaulted or slabbied-stone roofing. Typical Roman aqueducts are a surface channel which followed the contours of the land. The Romans used both arcades and siphons to cross valleys, depending on the depth of the valley, and often added multiple pipes side by side. The channels were usually 0.50 to 1.00 m below the ground. The process of building an aqueduct consisted of digging a trench, building the conduit, and then covering it back up. The

---

60 Angelakis, Savvakis, and Charalampakis 2007, 96.
61 Hodge 1992, 346.
62 Hodge 1992, 93.
proportions of a conduit were governed by the necessity of maintenance and cleaning, thus large enough for human access. The channels when in use were probably only half to two-thirds full of water.\textsuperscript{64}

It was important to maintain an even downward gradient to the aqueducts, especially to avoid sloshing and stagnancy of the water. However the Romans also used siphons, cascades, or drop shafts in order to descend heights rapidly and to aerate the water.\textsuperscript{65} Settling tanks, small basins, and mesh filters allowed sediments to gather at the bottom and allow clear water to flow. Maintenance was a constant concern, especially in areas where the water has a high mineral content.\textsuperscript{66} These minerals would line the conduits and pipes creating a buildup which had to be removed periodically. The walls of the conduits were normally lined with waterproof cement to protect against leeks and seepage. The cement also lessened the friction of the water on the walls and to create a continuous uniform surface.

The Romans also built in concrete with waterproof linings, which was a cheap and adaptable material. They introduced the use of settling tanks and storage structures along the aqueduct networks, in order to purify and store water. Individual pipes of the aqueduct could be made of terracotta, wood, stone, or lead.\textsuperscript{67} The selection of material might reflect the availability of stone or terracotta across the Roman Empire.\textsuperscript{68} In the eastern Mediterranean, stone pipelines, which are stone blocks with holes cut in the middle and joined together as

\textsuperscript{64} Hodge 1992, 97.
\textsuperscript{65} Wilson 2008, 299.
\textsuperscript{66} Wilson 2008, 240.
\textsuperscript{67} Hodge 1992, 208. Throughout the empire lead is by far the most common material for intramural transport. It is poisonous, a factor the ancients did know about, however there was usually enough calcium carbonate buildup which would insulate the pipes. Water also moved through the pipes fairly quickly so it did not have a long exposure to the lead. Lead is cheap and usually available in large quantities (a result of direct mining for a byproduct of mining silver). It is also easy to handle and very malleable. However it is heavy so the cost of transport can be high.
\textsuperscript{68} Lead is the most common way of conducting water within the city, with the exception of a few places, like Britain, where wooden pipes are used even though lead is a plenty.
the conduit for the water, were often used. The Romans maintained the Greek tradition of ceramic pipe distribution in the eastern Mediterranean instead of lead.\(^6\) Piped water went to a small number of elite private houses, and was usually a sign of wealth and status, not utility.\(^7\)

\textit{II.2.2 Paphos}

Scattered aqueduct remains are known in the regions just north of Paphos, indicating a water course ran from north to south (figure 2.1).\(^8\) The documentation of this aqueduct is sparse. The aqueduct of Paphos is first mentioned by Richard Pococke in the 1738.\(^9\) The next mention of the aqueduct is by Loizos Philippou in the 1940, who seems to refer more to cisterns at the aqueduct’s terminus in the Fabriaka Hill of the city.\(^10\) He also mentions seeing pipes leading to the town. In the 1970s, Sophocles Hadjisavvas recorded visible parts of the aqueduct in his archaeological survey of the Paphos environs. From this account, a general path of the aqueduct can be described. The visible remains of the aqueduct are as follows.

At Khlorakas-Vrysodhia there is a Roman settlement about one mile west of the modern settlement, close to the beach. Here there are also wells and springs. At Khlorakas-Vrexi, there is a farmhouse with two water cisterns cut into the rock. Here there are also a few reservoirs that are linked by a small channel. At Kissonerga-Sykarin, just north of the village, there is a farmhouse with a rock cut rectangular reservoir and water channels attached. More built sections of the aqueduct are apparent at Khlorakas-Palloura and Lemba-

---

\(^7\) Wilson 2008, 304.
\(^8\) Hadjisavvas 1977, 225.
\(^9\) Pococke 1738, 226.
\(^10\) Philippou 1949, 22.
Xerolimni but are covered by 2.50 m of soil. At these locations the aqueduct is partially built and partly cut into the rock and covered with plaster. A bridge of the aqueduct is preserved where it crosses over a stream that passes through the village of Lemba. This bridge is built of dressed stone.\(^74\) It does not seem very big and a rectangular channel runs on top.\(^75\)

With the exception of Khlorakas-Vrexi, the remains of the aqueduct do not coincide with customary water features. If the aqueduct begins in the region of the modern village of Tala, as Hadjisavvas suggests, which is around 300 m above sea level, then it would roughly follow the contours and elevation of the coast to reach Paphos. Kissonerga, Lemba, and Khloakas all hug a ridge that roughly follows the coastline and are located just over 100 m above sea level. If these areas of water features and settlements coincide with the path of the aqueduct, they were likely used as access points, where the local population or inhabitants of the farmstead were responsible for the upkeep of that section of the aqueduct in return for their own personal access to water.\(^76\) These settlements might have also sprung up at these locations due to the tapping of a local supply, as there are streams which run by most of them. If so, the aqueduct could have also tapped these springs for additional supply, especially for compensation in drier years. Roman milestones at Lemba and Khlorakas might suggest that the north-south Roman road, running from Paphos to Polis, and the aqueduct have similar courses, a common occurrence in the Roman Empire as it allowed easy access for maintenance and cleaning of the aqueduct. These satellite settlements might also be a part of the concentration of Roman settlements along the coastal road.\(^77\) However, this is all speculation and cannot be proven until further research is done.

---

\(^{74}\) Hadjisavvas 1977, 227.
\(^{75}\) Hadjisavvas (1977) does not give measurements for the bridge.
\(^{76}\) Wilson 2008, 299.
\(^{77}\) Bekker-Nielsen 2004, 128. It is unclear if the roads or settlements came first.
Within Paphos, remains of the Roman aqueduct might survive on the Fabrika Hill in the northeastern part of the ancient city.\(^7^8\) This would also place the aqueduct’s entrance to the city between the North and North East Gate of the city’s walls, coinciding with early written accounts of the aqueduct. This possibility is suggested by the large terracotta pipes about 2 m below ground level, just within the city limits, south of the Fabrika Hill. According to Jolanta Młynarzyk, the Fabrika Hill is the best location for the outlet of any long range supply, because its high elevation creates a natural “pressure tower” to direct water to different locations.\(^7^9\) Młynarzyk further argues that part of the quarries of the Fabrika had been turned into a main water tank, from which supplementary systems, dating to the Hellenistic period, would have radiated. Some of these are apparent under the much later castle of Saranda Kolones. Earlier visitors to the site also wrote that they were able to see cisterns in the Fabrika Hill.\(^8^0\) It is unclear if these tunnels would have been used during the Roman Period.

**II.2.3 Kourion**

The long-distance water supply at Kourion is a gravity-fed system with sources near Sotira, 7 km away, and Souni, 9 km away (figure 2.2). Luigi Palma di Cesnola first noted the remains of the aqueduct system around the area of the stadium.\(^8^1\) He followed the line of the aqueduct from the stadium to as far as the Temple of Apollo.\(^8^2\) In the 1960s, Colonel Joseph S. Last, a Fellow of the Society of Architects in London, extensively surveyed and studied

---

\(^7^8\) Młynarzyk 1990, 222.
\(^7^9\) Młynarzyk 1990, 223.
\(^8^0\) Pococke 1745, 226; Philippou (1948, 22) uses the term “reservoir” and says that it provided water for Nea Paphos, but he is not specific about locations and often dates monuments to the wrong period.
\(^8^1\) Cesnola 1878, 00.
\(^8^2\) Cesnola 1878, 341.
the system.\textsuperscript{83} Demos Christou, working on behalf of the Department of Antiquities in the 1980s and 1990s, expanded the work of Last and excavated of the intramural water system, including the area of the nymphaeum and baths.

The Sotira conduit is 11 km long and the one from Souni is 22 km long. The Sotira aqueduct begins 300 m above sea level while the Souni aqueduct is 457 m above sea level. The city of Kourion is around 118 m above sea level. Therefore the Sotira line drops 182 m before it reaches the city, with an average descent of 16.50 m/km. The Souni conduit drops 339 m, with an average descent of 15.40 m/km. Both conduits generally follow the contours of the land and often act as the demarcation between arable and non-arable land.\textsuperscript{84} There does not appear to be any siphoning or arcade bridges and the conduits detoured around ridges and valleys, adding significant additional length to the aqueduct. In some places channeled stone blocks raise the water to the surface, like at the stadium.\textsuperscript{85} The conduits often pass nearby other streams, which were perhaps tapped in times of drought.\textsuperscript{86} There are some small occupation sites, often farmhouses, at different points along the line, usually at the heads of cultivable valleys. Some have pipes that lead from the aqueduct to the settlement, usually smaller than the main conduit that may indicate an auxiliary or domestic supply.\textsuperscript{87} The two conduits approach each other and enter the city from the northwest.

\textsuperscript{83} However Last died before he could publish his research, and his manuscript was published by G. Roger Edwards of the University Museum of the University of Pennsylvania.

\textsuperscript{84} Last 1975, 42. Last’s article is the most complete study of the water supply of Kourion at this time. However subsequent excavation has greatly increased the knowledge of intra-city water storage. Last also died in the midst of writing the article and a fellow scholar finished the publication. However there are specific areas where the editor notes information is missing. The published article is mostly in metric units but there are a few places where non metric units are used. I have converted the measurements to metric.

\textsuperscript{85} Last 1975, 42.

\textsuperscript{86} Last 1975, 43.

\textsuperscript{87} Last 1975, 43. Last makes a specific point that this would necessitate extreme care to avoid abuse.
The West Sotira Conduit, as Last refers to it, has its source at the bed of the Ypsimasikarka spring about 1.50 km northwest of Sotira. It was said to be a perennial spring in antiquity, however today it is not.\(^8\) The aqueduct runs in a south and easterly direction in a rock cut trench with a depth up to 2.50 m as it approaches the Sanctuary of Apollo Hylates and the city proper. About 750 m north of the sanctuary, at Triandafilos, it runs into a distribution box which diverts the pipeline towards two locations. One goes to the sanctuary and the other to the stadium and Kourion city proper. The overall path of this line seems to head towards the large cistern near the Northwest Building of the Sanctuary next to the Temple of Apollo Hylates. The stadium belongs to the Antonine period and its building prompted the relocation of the line southwards, parallel to the stadium’s southern exterior wall (figure 2.3). Part of the pre-stadium line is still apparent within the stadium.

The East Souni Conduit fed water from Souni into the main supply at Platania, where there are three springs.\(^9\) The East Conduit piped water directly from the springs, perhaps to keep the water pure.\(^0\) In some places, the conduit goes around, not over, geographical features, often adding significant length. For example, at Kandou, if a bridge had been added, the conduit could have been 2.50 km shorter. Last suggests that the detour also served other smaller sites and settlements along the way.\(^1\) At other places, in order to navigate steep terrain, cisterns are used. The Souni conduit also served two other sites before it reached Kourion proper. The aqueduct uses existing structures as buttressing and for channels, like at the House of the Achilles Mosaic and when it approaches a Hellenistic tomb.\(^2\)

---

\(^8\) Last 1975, 43.
\(^9\) Last 1975, 48.
\(^0\) Last 1975, 48.
\(^1\) Last 1975, 48.
\(^2\) Last 1975, 49.
Estimates of water delivery are complicated by the unknown output of the source springs, whether or not the intermediate streams were tapped for water, and the amount of evaporation that would have occurred. Last also estimates the date of the aqueducts to be second century CE (West) and third or fourth century CE (East). The construction of the East Conduit coincides with a dry period in the Roman East. This line might have been built to support dwindling water resources coming from the West Conduit. The construction of this conduit might also reflect a growing need for water from the inhabitants of Kourion.

II.2.4 Salamis

A third Roman aqueduct on Cyprus supplied the city of Salamis on the island’s northwest coast (figure 2.4). Richard Pococke described the aqueduct during his travels in Cyprus in the 18th century. Camille Enlart, writing in the late 1800s, also noted the location of some of the remaining arcade bridge. In the early 1900s, Eugene Oberhummer surveyed the area around Chytroi and described what he saw of the aqueduct. Since then, there has been no excavation on the aqueduct, although several scholars have mentioned the aqueduct and discussed its dating and pointed arches.

The earlier Roman aqueduct probably dates back to the rule of Nero, due to an inscription on the aqueduct; however there is no evidence of earlier foundations or spolia of

---

93 Last 1975, 53.
94 Last 1975, 55. Last dates the West Conduit based on a piece of a broken lamp which was found on top on the first pipe near the stadium. The initial conduit would also have come before the stadium as it had to be rerouted once construction of the stadium began in the second century. He dates the second, East Conduit, based on a comparison of the pipes with those found in the excavations if the Expedition at Kouklia by T.B. Mitford and J.H. Iliffe.
95 Pococke 1745, 216.
96 Enlart 1899.
97 Oberhummer 1903.
this aqueduct. This however might be due to its unexcavated nature. The inscription designates Nero Claudius as the builder of the aqueduct sometime in the mid-first century CE. Oberhummer noted that part of the aqueduct was constructed above ground and part existed as a ground channel, and so there might be evidence for the earlier aqueduct below ground level. The standing parts of the aqueduct have a controversial date. Stewart suggests either the reign of Phocas (602-610) or Heraclius and Constantine III (613-641) due to the damnatio memoriae on the Titular Inscription on a portion near Chytroi. The last 2.30 km took about 12 years to complete, probably a result of availability of local and imperial funds and the local work force.

The aqueduct originates near Chytroi, about 40 km and about 200 m above sea level to the north of Salamis. The actual source of the aqueduct is the Kephalovrysi at the foot of the Pentadaktylos, about 749 m above sea level near Kythera where there is a higher average rainfall. The actual length is unknown. It probably entered the city in the western wall and ended in a reservoir in the forum. A branch might have brought water to the Bath-Gymnasium, in the northern part of the city. The aqueduct drops almost 200 m over its 40 km length, for an average descent is 5 m/km.

The remains of the aqueduct include rubble and traces of more than 30 piers. The aqueduct is made of worked local limestone with an interior of concrete (opus caementitium). The best preserved section is at Ayios Seryios (Yenibogazici) about 2.30 km northwest of Salamis. Preserved are two complete arches with about half an arch

99 Nicolaou 1963, 48; Stewart 2012, 12. The inscription was found on white marble in the village of Angastina, which is almost directly in line with the path of the aqueduct.
100 Woodhead 1968, no. 675; Nicolaou 1962, 48-9; Christodoulou 2010, 291.
101 Oberhummer 1903, 232.
102 Stewart 2012, 12.
103 Bauer 1989, 208.
104 Bauer 1989, 209.
preserved on either side. This section stands to a height of almost 9 m with pointed arches and pillars 3.50 m apart. The bases are roughly 2 m square. The masonry between the arches and the channel is made up of irregular stone in two or three courses.105

II.2.5 Pipes and Conduits

In addition to looking at the path of the aqueducts, it is also important to examine pipes used in the individual conduits. These pipes can be used to calculate rate of flow for the aqueduct which would indicate how much water is running through the system and can be used to discuss regional trends in material use. When used for the line of the aqueduct, pipes, unlike channels, would run at full capacity which means that the water is almost always under pressure and the line need only to be roughly level.106 Trevor Hodge argues that this implies that a line of pipes would be easier to lay than one of channels.107 He also argues that pipes allow for greater independence of the contours of the land, and are thus more flexible than the traditional conduit. However a pipeline aqueduct does not allow for as much capacity, because of the size of the pipes is limited by the potter and his wheel. Multiple pipes are needed to maintain a higher level of output, especially if both pipes and open channels were used in the same aqueduct.

Examples of pipes used in Cypriot aqueducts come from the aqueducts of Kourion. These pipes are wheel-made terracotta and come in a large and small sizes with spigot and socket ends (figure 2.5). The West Sotira conduit dates earlier than the Souni course and has

---

105 The use of the pointed arches is not standard practice, and the Salamis aqueduct might represent a unique use of such technology as Stewart (2012) suggests or might reflect later repairs to the system.
smaller pipes. They are about 0.20 m in the diameter and 0.20-0.50 m in length, and run in double or triple lines. The East Souni conduit has larger pipes, 0.30-0.35 m in diameter and 0.30 cm long. These pipes, on the basis of these measurements, quadruple the capacity of the Sotira conduit, perhaps reflecting the growing needs of the population. Within each aqueduct, the pipes were laid in single or double lines, side by side or superimposed. Both sets of pipes may not have been used at the same time, as one set usually shows extreme wear or degradation when next to the other line. This might also suggest a rising need for more water. If at some point the people of Kourion began using more water, perhaps to supply the newly constructed baths or nymphaeum, another line of pipes might have been laid to supplement what was already coming from that aqueduct. Both lines would have supplied water at the same time. The wear and degradation might just represent the fact that this line is older. Pipe conduits do not have the capacity of channels and multiple lines must be laid in order to maintain a higher rate of flow. This might be especially the case at Kourion because both channels and pipes are used in the conduits. The wear or degradation of the pipes might also be a result of poor preservation. Some pipes have inspection holes, probably to check leakage and sediment buildup. It seems odd that the Cypriots would use pipes in their aqueduct lines and still adhere so closely to the natural topography. It seems as if the Cypriots were both easing and hindering their work by using pipes to avoid having to also calculate an exact slope for the channels and still stay close to the topography of the landscape. More work must be done in order to investigate whether pipes were used at strategic parts of the aqueduct lines or whether the use of pipes and channels happens more arbitrarily.

108 Last 1975, 43.
II.2.6 The Aqueduct and Topography

The physical environment and topography are also important factors since the path of the aqueduct reflects the physical environment. This section describes how Roman aqueducts interact with the physical environment. All of the aqueducts discussed utilize the closest mountains for a water source. Both the Paphos and Kourion aqueduct systems run from a mountainous region to the coastal site. The Salamis aqueduct begins at the base of a mountain range and runs across flatter ground. Chytroi, the beginning of the Salamis aqueduct, is only about 250 m in elevation and thus the aqueduct has much less of an overall drop. This necessitates arcade bridges to carry the water down an even slope, not the natural gradient of the land. The aqueducts of Kourion use closed pipes and channels placed in the ground to transport the water, even if it means adding significant length to the line.

The 40-km length of the Chytroi-Salamis aqueduct is almost double the length of the East Conduit at Kourion. Both the Paphos and Kourion aqueducts are much shorter, due to their location near the Troodos Mountains, where there is a higher rainfall. The distance from Tala, where Hadjisavvas suggests the aqueduct begins, to Paphos is only around 8 km, and Souni and Sotira are 9 and 7 km away, respectively. Chytroi is about 40 km from Salamis. Despite being 7 km away, the Sotira line of the Kourion aqueduct is 11 km, and Souni is only 9 km away, but the aqueduct line is 22 km long. Last suggests that the Souni line is so long because it was built to service settlements along the way to Kourion. Hodge points out that this is a rare occurrence elsewhere in the empire because aqueducts are considered an urban feature for an urban population, even if they exist mostly extramurally. It seems unlikely that so much time, energy, and money were used to service such a small population, unless they had no other access to water.
II.3 Qanats

Another type of long-distance water transport used on Cyprus is the qanat. Qanats, also called chain wells and laoumia, are another system of long-distance water supply, especially in arid climates, where evaporation affects exposed water channels. A qanat is an underground tunnel which taps into water sources, like aquifers, and transports water from that source to another, usually for irrigation (figure 2.6). Qanats have been used for millennia, but in the mid-20th century scholars became interested in their origins and transmission.\(^{109}\) Since then detailed studies of qanat use in specific periods and countries, particularly in the Near East, have been undertaken.\(^{110}\)

Qanats have a controversial origin.\(^{111}\) They are traditionally thought to have begun in Persia (modern Iran), due to the sheer quantity in the region. However some argue that they appear in the Arabian Peninsula by the first millennium BCE.\(^{112}\) The earliest securely dated qanat actually comes from Egypt and dates from 443 BCE onwards. Despite earlier suggestions that the technology was spread by invaders and refugees, it is now believed that their use expanded across Africa by means of Saharan trade routes, moving from Egypt to Algeria, to Roman Africa.\(^{113}\) Qanats probably began as a byproduct of mining as an easy way to drain the mine.\(^{114}\) Roman expansion of qanat technology increased the distance between vertical shafts.

\(^{109}\) MacFadden 1942; Cressey 1958; Evenari et al. 1971; Ron 1989.
\(^{110}\) For Syria see Caponera 1954; Goblot 1979; Fleming and Barnes 1993; for Jordan and the Levant see Lightfoot 1997; For Cyprus see Lightfoot 2006 and forthcoming; for Iran, Beaumont 1973 and Lightfoot 1997.
\(^{111}\) Wilson 2008, 292.
\(^{112}\) Qanats are difficult to date unless their building is accompanied by documentation. Ceramics and archaeological material nearby are usually used to suggest a date of origin.
\(^{113}\) Wilson 2008, 292.
\(^{114}\) Hodge 1992, 22.
II.3.1 Description

A qanat is made up of a series of tunnels and vertical shafts that rise at set intervals that vary depending on the length of the qanat, in order to allow for maintenance and access. Qanat technology shows the use of complex water systems for communities outside of the main civic and commercial centers.\textsuperscript{115} One of the main benefits of qanats is the lack of evaporation of the tapped water. A qanat, like an aqueduct, is a gravity-fed system with a normal gradient of 0.50 m/km.\textsuperscript{116} The horizontal tunnels were usually 0.60 by 1.20 m in section and are left unlined. With qanats, groundwater is usually tapped at a considerable depth, as they usually tap into natural aquifers at the base of hills or mountains, which provide the maximum height for this gravity fed system.

The qanats of Cyprus have not been extensively published, but the evidence available resembles the many examples of the nearby mainland, for example those in Jordan, Israel, and Syria. The qanats of Jordan for example are concentrated in the area of the piedmont between and elevation of 350 and 900 m. This is probably because water obtained closer to the mountains is of higher quality than that farther away.\textsuperscript{117} In Jordan and Syria, the Romans gravitated towards the areas with layers of silica deposits that form permeable formations nearer the surface. Here, the Romans would build their qanats into solids beds of limestone. Another characteristic of Roman qanats in Jordan is the transmissive flow of the aquifers, meaning that the output flow of water from the aquifer is a rate that would make the qanat useful. There are few areas in Jordan where there is a shallow aquifer with transmissive flow that were not tapped the Romans.\textsuperscript{118}

\begin{flushleft}
\textsuperscript{115} Wilson 200, 293.
\textsuperscript{116} Hodge 1992, 23.
\textsuperscript{117} Lightfoot 1997, 443.
\textsuperscript{118} Lightfoot 1997, 447.
\end{flushleft}
II.3.2 Qanats on Cyprus

Dale Lightfoot has done extensive research on the use of qanats in Cyprus. His research shows that the greatest concentration of qanats occurs in the central Mesoaria Plain, with small concentrations around Paphos, Polis, and Limassol (figure 2.7). Those found in the Troodos Massif are only at the northeastern foothills along rivers. Qanats also run along the center areas of the Karpass Peninsula. They sometimes follow the path of a river, sometimes not. Lightfoot identifies 275 individual chain well tunnels at 118 different sites, representing several occupation periods from the Roman period to British colonization.

Lightfoot suggests that qanats were introduced to and gained widespread acceptance in Cyprus during the Roman period. He uses artifacts and architectural features to suggest a rough starting date of the Roman period on the island. This relatively late date could be due to the fact that while the Persians controlled the island earlier, they did not alter the political framework, but rather the kings of Cyprus paid a tribute to the Persian king and gave ships to the Persian fleet. The Cypriot kings were even still allowed to mint their own coinage, during Persian rule. Large-scale Roman construction of qanats occurs elsewhere in the Near East, like Syria and Jordan. Therefore construction of qanats on Cyprus would coincide with qanats construction elsewhere.

The introduction of qanats in the preceding Hellenistic period however is not implausible. A qanat-like feature does appear on the island in the form of a Hellenistic karstic formation spring tunnel in Yeroskipou just east of Paphos. This feature’s tunnels tap the

---

120 Lightfoot does not provide dates for individual qanats. Part of this is because the research was presented in poster format, but also qanats are reused, even to the present day, and a secure start-date is often difficult.
121 English 1968; Lightfoot 1997.
limestone aquifers horizontally.\textsuperscript{122} Beyond the location of the Yeroskipou channel, not much is known about the formation, including the output and end location, thus it is unclear as to whether or not this led to the city of Paphos or the fields around it. The building of a qanat-like feature in Paphos during the Hellenistic period might be a result of the Ptolemaic presence on the island. The Ptolemies, who ruled Cyprus at this time, utilized qanats in Egypt and the Ptolemaic aristocracy in Paphos was also known for building Egyptian inspired tombs in the area as well which reflected those at Alexandria. This physical presence of Egyptians on the island, and especially in Paphos, might have increased the need and demand for food, which would increase the demand placed on local farmers, and necessitate an increased water supply. The Egyptians might have used their knowledge of the qanat system to bring water to meet the population’s growing demands.

The widespread use of qanats during the Roman period is not an isolated situation. The Romans were also responsible for the proliferation of qanats in Jordan and Syria as well. For example, in Syria, 40 percent of qanat sites are found in the immediate area of Roman outposts and guardhouses.\textsuperscript{123} In Jordan, every qanat is associated with a Roman settlement. There, as in other places, the Roman political system funded and organized qanat building, even if they used local builders.\textsuperscript{124} In these places, the building of qanats increased the population in otherwise uninhabitable areas of the frontier. As in Syria and Jordan, qanats on Cyprus cluster near large Roman sites like Polis, Paphos, and Kourion. There are a few to the north of Salamis but none directly in the area. Polis, Paphos, and Kourion are geographically more suitable for qanats than Salamis due to their location near the Troodos Mountains.

\textsuperscript{122} Spring tunnels often have no vertical shafts to the surface and their geological configuration is slightly different than that of a qanat.
\textsuperscript{123} Lightfoot 1997, 437.
\textsuperscript{124} Lightfoot 1997, 437.
In Cyprus, the qanats are found where surface water is sparse and the average rainfall is less than 400 mm, which Lightfoot suggests is typical of other places, like Iran and Syria (figure 2.8). The qanats occur where there are gentle surface gradients and the elevation is less than 1000 m above sea level. They occur in places with a highly permeable surface and aquifer materials, usually in places with alluvial soil in limestone bedrock. This is similar to Jordan where almost all the qanats lie in areas just under 1000 m in elevation with aquifers fairly close to the surface. In Jordan, it seems that Romans built qanats with a shallow aquifer and transmissive flow whenever possible. Perhaps this is also true for Cyprus. Doing so would increase the water flow to the necessary agricultural fields of the Mesaoria Plain which have significantly less rainfall than the rest of Cyprus. Building these qanats would allow for increased agricultural output and a better fed Cypriot population. Thus if the trends in the presence of qanats on Cyprus reflect the building trends of the Romans, the result would be increased access to water for irrigation. The presence of Romans on the island, like the presence of Egyptians in Paphos, would have increased the demand for food. Thus by building qanats, the Romans would create an infrastructure that would allow farmers to meet the needs of a growing population.

II.4 Conclusion

The use of long-distance water transportation technologies on Cyprus allowed for the settlements of Paphos, Kourion, and Salamis to grow and thrive. Aqueducts and qanats allowed for more water to enter the cities and meet the growing needs of the population, whether it be water for bathing and drinking, or water for irrigation. The aqueducts of Cyprus

---

125 Lightfoot 2008; Lightfoot 2007, 7.
are both similar to and different from each other, with common purposes, but different construction techniques. All adhere to the topography almost exclusively even though in some places the materials used allow for more flexibility. They also all have different construction techniques. The Kourion aqueduct relies on pipes and open channels all placed at or below ground level, whereas the Salamis aqueduct relies only on an arcade bridge and utilize pointed arches. The aqueducts work with their respective environments, reacting to the topography of the terrain and ease of access to non-local sources.

The qanats of Cyprus flourished in the Roman period and their construction techniques and environmental trends fit into the trends of the nearby Syria and Jordan, showing that the Romans learned a successful technique, probably in the Near East, and spread it to other places to allow them to flourish. Overall, during the Roman period, the building of aqueducts and qanats allowed the large and important cities of Paphos, Kourion, and Salamis to flourish.
Chapter III

Urban Distribution and Storage

III.1 Introduction

This chapter describes the urban distribution of water on Cyprus, any similarities or differences among sites, the significant urban and domestic storage installations, and the relation of all of this to the idea of constant off-take. After the long-distance supply reaches the city, it must be distributed or stored before reaching its final destination. This occurs through a network of pipes, conduits, and storage facilities, like different types of cisterns. In drier climates where water must be conserved, this process becomes very important.

Traditional scholarship has suggested that aqueducts imply the principle of constant off-take. According to this view, aqueducts create a lavish, ostentatious, and wasteful culture of water consumption because water is constantly running through the system without larger concerns for conservation and storage. This line of thought originates in study of the urban distribution patterns of Pompeii, because of its state of preservation, and the works of ancient authors like Vitruvius and Frontinus. Andrew Wilson challenged this idea with his work on urban water storage and distribution in Roman North Africa, arguing that the theory of constant off-take does not apply everywhere, especially in North Africa, where the use of large reservoir cisterns at the end of an aqueduct suggests a conservative use of water. Wilson argues that because rainfall in most parts of North Africa is variable and unpredictable, the building of aqueducts allowed for urban populations to survive better in

---

times of drought. Zena Kamash applies Wilson’s ideas to the Near East, showing a similar occurrence of water conservation in place.128

This chapter discusses the distribution of water within the cities of Kourion and Amathus in relation to the idea of constant off-take and conservation. The chapter addresses the significant water storage facilities at Salamis, Kourion, and Amathus in order to show the different types of large-scale water storage units present on the Cyprus. Then the chapter discusses domestic storage at Paphos to show how water was managed and conserved at the household level. Next the chapter examines the trends in water distribution and storage in these urban contexts. Finally, it explains water storage features in the Episcopal Basilica of Kourion to show the church’s concern over the supply of water. The chapter concludes by comparing and contrasting water storage features and trends in Cyprus with those in North Africa and the Near East.

III.2 Urban Distribution and Storage

III.2.1 Kourion

The conduit of the aqueduct moves across the city of Kourion feeding a number of different complexes and storage facilities (figure 3.1). The aqueduct enters the city from the west near the House of the Achilles Mosaic. North and east of this house are three more cisterns along the aqueduct’s urban conduit.129 Twenty meters to the east, the cistern’s pipeline leads to small baths, adjacent to the House of Achilles Mosaic (M-8).130 The channel

---

128 Kamash 2013, 102.
129 Last 1975, 49.
130 Last placed the acropolis of Kourion on a grid, which he uses to note the location of different features; the coordinates are noted here in parentheses. Refer to figure 3.1.
continues to the small bath that may have been used for private domestic bathers. Nearby, a channel enters the lower cistern on one side and leaves on the other. It is a bottle-necked cistern that collected rainwater. There is also a platform for drawing water and an aperture that might have been used for transferring water from one cistern to the other. From here, the conduit moves in an easterly and southeasterly direction passing by a number of houses, like the House of the Gladiator Mosaic. The conduit fills two cisterns (L-21) and a line splits off towards the fountain house (P-20). The main line joins with the wall of Kourion and follows it toward the city baths and nymphaeum. As the conduit reaches the baths it sharply turns south and moves towards the group of cisterns, about 40 m south of the nymphaeum (R-24).

These four cisterns lay in a north to south orientation, and probably functioned as both settling tanks and reservoirs. A later building constructed on top of them used the cisterns as its foundations. Another cistern in the forum, measuring 9.50 x 8.50 x 3.50 m, dates to the early Hellenistic period. One of the Hellenistic cisterns was filled in to accommodate the stoa. Two other Roman cisterns in the agora, rectangular in plan, measure about 4.50 x 3.50 x 1.50 m, and were originally lined with red plaster. In the northwest part of the forum there is a keyhole-shaped settling tank, which is fed from the north by a rock-cut tunnel. A separate tunnel to the east might connect to the main conduit. This conduit appears to move southeast from the agora towards the basilica and from the basilica to the stadium and House of Eustolios.

---

131 Last 1975, 50.
132 Last 1975, 50.
134 Swiny 1982, 110.
III.2.2 Amathus

The aqueduct of Amathus enters the city from the northwest at the North Wall, which it uses for support. In the seventh century CE, a water tank was added to some of the rooms around Tower C, the easternmost tower of the North Wall. This tank was fed by water from lead pipes outside the walls and distributed water elsewhere using terracotta pipes. An earlier cistern and drain lie near Tower A.

Terracotta pipes near Tower A distribute water to the different sites in the plain, namely the agora. The agora is at the base of the acropolis where the land becomes even and faces the inner harbor. The conduit enters the agora area from northwest into the nymphaeum-reservoir measuring 9.30 x 5.80 m (figure 3.2). Here one conduit leads to a triangular pool next to the reservoir-nymphaeum and another conduit moves southeast outside along the path of the West Portico in front of the shops. This conduit is made of hollowed-out column drums laid end to end. About halfway down the portico the conduit branches into two: one line cuts across the paved square eastward with no clear destination, while the other follows the North Portico towards the Roman baths. About halfway across the square a line of underground terracotta pipes runs perpendicular from the main conduit towards the fountain in the center of the paved square.

At least four drains are known to run through the agora. One drain is outside the entrance to the West Portico. This drain might be connected with the section on the other side of the fountain in the paved square as the two lines seem to be in line. To the east of the fountain another drain runs perpendicular to the one running across the square. Other evidence for drains is found outside the Roman baths along the East portico. A large drain

---

135 Christou 1993, 750.
runs in the middle of the South Street which is 30 m long, connecting the east and west ports of Amathus.\(^{137}\)

### III.3 Cisterns and Notable Storage Facilities

Once the water reached the city and was dispersed, it was stored in a number of ways, two of these including fountain houses and cisterns. The oldest fountain houses were built at springs or to access ground water. A fountain house offers a way to store and display water, but also provides a place where people can socialize.\(^{138}\) At some, the focus is more on the cultic setting and access is restricted because of the size and location. At these, there are often niches for votives. By the fourth century BCE however, this function of the fountain house was maintained mostly in sanctuaries and settlements obtained water from other sources, like aqueducts.\(^{139}\) Some had more consideration for the user, with wider steps for multiple users to access the water at once. For example, the fountain at Delos had a wider staircase with room for several people to utilize it at once.\(^{140}\) In the Hellenistic period, fountain houses were predominantly square with draw basins and entrance halls.\(^{141}\) Sometimes, the fountain houses had attached reservoirs which acted as daily storage tanks.

\(^{137}\) Papageorghiou 1991, 818.
\(^{139}\) Glaser 2000a, 417.
\(^{140}\) Courby 1912, 103-19.
\(^{141}\) Glaser 2000a, 425; Mairui 1928, 79-82; Wilberg 1923 266-73; Knackfuß 1924 263-78.
Cisterns worked in conjunction with wells, though cisterns do not access a water source directly, but are supplied by pipes, channels, or rainwater instead. The point of cisterns is storage rather than supply. Cisterns vary in size, ranging from less than 15 cubic m, like many at Kourion, to almost 300,000 cubic m, like the Mokius Cistern in Constantinople. Their shapes vary as well, ranging from conical to rectangular, both of which are common on Cyprus. Cisterns can be found anywhere an individual wants to collect water, in private domestic contexts, or in large public areas. When in domestic contexts, cisterns were usually subterranean and part of impluvia, which are interior pools set below an open portion of the roof and are filled by rainwater. Cisterns could also operate in larger urban contexts, storing and regulating waster for different public monuments, like nymphaea and baths. These cisterns tended to be larger, above ground, and had a system of barrel vaulting to roof them.

Large cistern complexes are sometimes found on aqueduct networks. These fall into two categories: terminal and reservoirs on branches. The entire aqueduct discharges into a terminal reservoir that governs the entire distribution system. Reservoirs that occur on branches of the aqueduct regulate that particular branch of the aqueduct, and they frequently are connected to large bath complexes. When cisterns are associated with bath complexes, they supply the complexes while minimizing the impact on the rest of the distribution system.

---

142 Wells are the earliest and simplest form of water supply. They are used wherever water can be accessed by digging a hole until it hits the water table. Wells were not dug deeper than needed because much effort is needed to draw water. Often circular or square in section, dug into the rock or lined, and the vertical shaft of most wells is only as large as the person who digs them, often 0.8-1.0 m. Most wells in Cyprus are not published or discussed beyond mentioning location.

143 Hodge 2000, 29. For example, in Athens the population first relied on wells until the fourth century; when the wells dried up, the people turned to cisterns as a water source. Then, when the water table rose again, the population reverted back to wells. Hodge 1992, 60; Miller 1974, 194-9.


145 Impluvia seem to be a Roman (Pompeian) household feature but they do occur elsewhere in the Empire.

146 Wilson 2008, 304.
system. Because there is no evidence for a structure at the terminus of the aqueduct which would allow the inhabitants of Kourion to control the flow of water running through the system, these cisterns would be filled overnight in order to be ready for the next day, allowing the aqueduct to serve the rest of the system during the day.\textsuperscript{147}

Often cisterns were located on the supply line where the aqueduct entered the city, allowing the water to settle and purify before being dispersed through the city; this type of cistern is called a \textit{castellum divisorium}. The water enters the \textit{castellum} in one unit and leaves through multiple outlets, sometimes directly feeding one single feature, like baths or large nymphaea, or leading to another distribution box elsewhere.\textsuperscript{148}

However prevalent and useful cisterns were, the water within can be of lower quality than wells and other sources of running water, because stagnant water is not aerated and often stale;\textsuperscript{149} but steps can be made to avoid stagnation. Vitruvius suggests building cisterns as double or triple-interconnected cisterns, which allows water to flow through them in order to aerate and filter the water.\textsuperscript{150} This not only aerates the water but also filters out sediments: as water passes through each cistern the sediments settle at the bottom, leaving the cleaner water to move on to the next cistern.

Cisterns appear at most sites of Roman settlement, although they are more common in drier climates.\textsuperscript{151} In places with low amounts and irregular patterns of rainfall and variable seasonal distribution, the inhabitants would try to safeguard against unnecessary risk.\textsuperscript{152} Increasing the number of storage facilities as well as supplementing natural supplies with

\textsuperscript{147} Wilson 2008, 305.
\textsuperscript{148} Hodge 1992, 280.
\textsuperscript{149} Wilson 2008, 290.
\textsuperscript{150} Vitruvius 8.6.15.
\textsuperscript{151} Hodge 2000, 21; Wilson 2008, 287; Kamash 2013, 99.
\textsuperscript{152} Wilson 2001, 83.
those from aqueducts would allow inhabitants some relative security if there was less rain in a particular season. The number of cisterns in these locations illustrates their importance and supplementary forms of water access.

III.3.1 Salamis Reservoir and Cisterns

There are two notable water storage features at Salamis. The first is the reservoir attached to the end of the forum.\textsuperscript{153} The other is a cistern that lies closer to the shoreline. The date of the reservoir is contested, scholars suggesting construction dates coinciding with either the earlier aqueduct or the later (figure 3.3).\textsuperscript{154} The structure adjacent to the agora measures 52.20 x 13.30 m in plan and is at least 5 m deep, and is made of limestone and mortar. A total of 36 columns stand in three rows. The entire complex could have been roofed, probably by a series of barrel vaults.\textsuperscript{155} The water entered the reservoir by a channel that wrapped around the reservoir walls from the southwest corner to the middle of the north wall, where it flowed into main body of the cistern. In the northeast corner, about 6 m above the base, there is a 1 m wide doorway, which probably would have led to a stone staircase and platform used for drawing water or cleaning. In the east wall, about 5 m high, there are three vertical slots, perhaps for discharging water elsewhere to the site, perhaps giving the reservoir a \textit{castellum divisiorum} function. In his study of the cistern, Albert Bauer suggests a water depth of 5 m due to the height of the base of the vaulting. With the displacement of the

\textsuperscript{153} Most sources (Taylor 1933; Bauer 1989) refer to this reservoir as a \textit{loutron}. However, the term \textit{loutron} usually refers to a basin used for bathing. I have chosen to call this structure a reservoir due to its size and the vaulted roofing.
\textsuperscript{154} Munro, Tubbs, and Wroth 1891, 62; Bauer 1989, 213.
\textsuperscript{155} Bauer 1989, 214.
columns, Bauer calculates the water capacity to be 38,000 cubic m, making it the largest water storage facility on the island.

Bauer suggests that the aqueduct originally entered the city from the west, just northwest of the reservoir. Here the aqueduct seems to split: one line runs along the old city walls towards the Bath-Gymnasium and the other towards reservoir. The reservoir also lies within the Justinianic walls of the city. These walls encircle a much smaller section of the city than the older fortification walls, but still include the Church of St. Epiphanius. The rebuilding of fortification walls in Late Antiquity was a common theme throughout the eastern Mediterranean, however the exact reason for this phenomenon is unknown, but it does not seem to be for defensive purposes.156 Often these monuments acted as signifiers of space, identity, status, and conflict. The intramural location highlights the importance of having a backup water supply in case of an attack or siege, or if the main water supply was cut off.157

The other large storage facility in Salamis is a cistern, about 180 m from the modern shoreline, beneath what might be a domestic or religious structure (figure 3.4).158 This cistern was excavated in 1933 by Joan du Platt Taylor and the Department of Antiquities. The cistern is composed of two roughly cylindrical chambers about 4.80 m deep and a diameter between 2.75 and 3 m at their largest point. These two chambers are joined by a double passage, measuring 0.70 by 0.90 m. These two chambers taper slightly towards the top and become nearly oval in shape. The cisterns are covered by a flat slab of cut stone placed on top of the neck. The walls of the chambers are built of roughly cut stone except for the last 1

---

156 Foss and Winfield 1986, 8; Creighton and Liddiard 2008; Bakirtzis 2010, 353; Anderson 2013.
158 Taylor 1933, 98. Available measurements for this cistern are approximate. Taylor did not excavate the surviving superstructure.
m of its length, which is hewn directly into the rock. The walls are faced with a hard gypsum cement about 0.075 m thick. At approximately 1-m intervals from the bottom, 0.18 m bands of cement project inwards from the sides. There are inscriptions and paintings in the first cistern and three red crosses in the second. The cisterns are connected to the superstructure by rectangular shafts. The first shaft is 0.76 x 1.40 x 2.60 m and opens to the roof of the first cistern and becomes narrower at the top. The second shaft is 2.74 m long and of similar width and depth. This shaft tapers considerably more than the other towards the top and is closed by two blocks of stone. There is a cemented channel on the south side of the cisterns, which measures 0.15 x 0.20 m.\textsuperscript{159} Joan du Plat Taylor suggests an initial date of the first century CE with a significant period of disuse and a reopening under Constantius II’s rebuilding. Later in the fifth or sixth century, Taylor suggests a house or a church, was built over the original structure.\textsuperscript{160} This building probably has a religious function due to the crosses and inscriptions painted in the cistern.\textsuperscript{161} In other parts of the site, namely at the Bath Gymnasium, precautions were taken to cover up Classical imagery in the niches of the \textit{sudatoria}, in the later periods.\textsuperscript{162} These actions might reflect a growing interest in Christianity at Salamis in the fifth and sixth centuries.

\textit{III.3.2 Amathus Reservoir Nymphaeum}

Another significant water storage facility is the Amathus reservoir nymphaeum. This facility was excavated by the French expedition in the late 1970s. As a line of the aqueduct of Amathus enters the agora area, it settles into the reservoir-nymphaeum through a niche in the

\textsuperscript{159} Taylor 1933, 98.
\textsuperscript{160} Taylor dates this due to the references to Epiphanios in the cistern inscriptions.
\textsuperscript{161} Taylor 1933, 101; Whitehouse 2003, 253.
\textsuperscript{162} Karageorghis 1969, 187.
back wall (figure 3.5).\textsuperscript{163} The conduit connecting it to the aqueduct is a rectangular stone conduit but the exact path of this connection is unclear. This storage facility is a deep tank, measuring 9.30 x 5.80 m in plan with two columns on the façade. At some point after its original construction, a water trough was added in front of the façade with a pierced base to connect it to the water conduit. Sometime later the nymphaeum was divided in half, the western portion filled in, an open drainage system added, and the eastern section vaulted. This reservoir-nymphaeum supplied pressurized water to the agora fountain and Roman baths. This reservoir has a temple-like façade, for which Pierre Aupert finds no parallels before Hadrian.\textsuperscript{164} This information, combined with the knowledge of Hadrian’s restructuring of the water system, suggests a Hadrianic date for the structure.

The Amathus reservoir-nymphaeum began solely as a nymphaeum before it was filled in and a vaulted roof was put over one half the structure. It seems as if filling in half the nymphaeum would decrease the amount of water it held, however, by adding the roofing, the entire function of the nymphaeum changes. The Amathus nymphaeum no longer acts as a large scale display of water, rather the function changes to one of storage, with roofing to help decrease the amount of evaporation. This suggests a greater interest in storing water than displaying it. The ability to use water as a decorative feature implies that whoever is displaying the water has the necessary wealth to use it more liberally.\textsuperscript{165} Thus the conversion of the nymphaeum to a reservoir, which still had the decorative appearance of a nymphaeum with the temple-like façade, implies a more conservative approach to the water’s use.

\textsuperscript{163} Papageorghiou 1992 968.
\textsuperscript{164} Aupert 2000, 41.
\textsuperscript{165} I will discuss this further in the next chapter.
III.3.3 Kourion Fountain House and Eustolios Cistern

There are two significant water storage features in Kourion, apart from the cisterns which vary in size and litter the areas of the agora and baths. The fountain house and the cistern north of the House of Eustolios. The fountain house (figure 3.1, P-20) is an underground, slightly pointed, barrel vaulted structure measuring 6.00 x 2.75 x 3.50 m (figure 3.6).¹⁶⁶ Three of the sides are carved into the bedrock and the fourth is made of stone. In the northeast wall the end of a terracotta pipe is apparent. This pipe seems to point towards a cistern to the north (L-21), however a definite connection to the water supply is unknown. West of the fountain house, a flight of six steps leads down to a passage which runs alongside it. This passage is connected to the fountain house by a window. A structure was built on top of the fountain house at a later period and it is unclear if the fountain house still functioned at that time.

The largest known cistern at the site is north of the House of Eustolios. The surface opening roughly measures 4.00 x 7.00 m (figure 3.7).¹⁶⁷ This rectangular cistern is just north of the House of Eustolios’ baths. It is unclear how this cistern was filled- with rain water or a connection to the rest of the water supply system- but a line of the intramural conduit seems to lead into the basilica, and it might run farther east towards the theatre and House of Eustolios. If it is connected to the rest of the water system, it is the last place for water storage and settlement. The water from this cistern supplies the baths, pool, and latrines within the house itself; it might store enough water to give the baths a constant supply without putting a strain on the rest of the system. This cistern is filled at night, when the need

¹⁶⁶ Last 1975, 56.
¹⁶⁷ There are no measurements published for this cistern. It appears in aerial photographs of the House of Eustolios, but does not appear on plans. The measurements listed above are approximated using the ruler tool in Google Earth.
for water is low throughout the city, and then used during the day without the bath users having to worry about supply.

**III.3.4 Storage in Domestic Contexts**

There are two large elite houses with water storage features in Paphos. The House of Dionysos and the House of Theseus. The House of Dionysos has three large pools, or *impluvia*, which act as a way to store and display the water.¹⁶⁸ The House of Theseus is the largest and longest occupied house in Roman Paphos (figure 3.8). The house was built in the second half of the second century CE and was used until the seventh century. It is a rectangular peristyle house built over at least two Hellenistic city blocks. Most of the rock-cut cisterns within the House of Theseus originally date from the Hellenistic period;¹⁶⁹ some of these cisterns were even used throughout the Roman period. The ones that remained in use through the ⁴th century CE, were slightly altered from the pear-shape with pockets,¹⁷⁰ to a circular or rectangular shape. The circular or rectangular-shaped cisterns had a set of stone blocks set above a circular mouth creating a shaft of access for contemporary habitation.¹⁷¹ This type of cistern is evident in Rooms 13 and 40 at the entrance to Room 39. The House of Theseus in Paphos has a Late Rome cistern in Room 66A. The apse of Room 69, under an early wall, is an early Roman court with a well.¹⁷²

---

¹⁶⁸ These pools will be discussed more in the next chapter.
¹⁶⁹ Młynarzyk 1990, 190.
¹⁷⁰ This form is common in Paphos specifically and Cyprus generally.
¹⁷¹ Młynarzyk 1990, 190.
¹⁷² Młynarzyk 1990, 171.
III.4 Patterns in Urban Distribution and Storage

A number of patterns in the water features emerge from the discussion of urban distribution and storage of the site in Cyprus. One such pattern is the location of large storage containers near the main agora. The agora would have been the city center and a place for congregation, markets, and public business. Access to water would be necessary for the people in the city center, especially if they were spending long periods of time there. Water would also be necessary for the shops that flanked the agora, depending on what was being sold there and whether production was happening in the shops themselves. At Amathus and Salamis, these storage containers were the first points of access as an aqueduct line entered the city. At this point of entry there seems to be a point of local access as well as distribution to other parts of the city. Even in the case of Kourion, where the aqueduct passes most of the city before reaching a number the storage facilities, there is a concentration of storage facilities in the area of the agora.

Most of these large storage facilities are located near a set of baths, however in each case the relationship is slightly different. In Salamis, the baths are the farthest away from the agora compared to the other cities discussed, but they are also the largest baths on the island and might require their own direct line of the aqueduct to readily supply them with water. These baths also have two cisterns adjacent to supply them with water. The public baths in Kourion and Amathus are not as large and thus could still function with a smaller supply of water. The public baths at Kourion, which are much larger than those at Amathus, depend on larger cisterns which are located at a number of different places around the bathing complex. This phenomenon, as seen at the House of Eustolios, allows for the cisterns to fill up at night and the water to be used during the day so there is less of a strain on the overall system. In
the agora of Amathus, the baths are relatively small and thus do not require a lot of storage to supply them. Here the nymphaeum-reservoir is not closely associated with the baths but rather acts as a supplier to the entire agora area, which includes the baths. While there are large storage and distribution facilities in relation to bathing structures, within Salamis, Kourion, and Amathus, these structures function in different ways.

There is no evidence of large storage facilities in or near the agora of Paphos. This section of the city is currently under excavation and these facilities might be revealed in the near future. At Paphos, there is evidence for water storage within domestic contexts that is lacking at the other sites. The Romans in Paphos do not drastically change the Hellenistic urban layout. The Roman houses work within the framework of the Hellenistic grid system, however these houses were built on multiple *insula* in order to increase in size. These houses use existing cisterns for storage and add pools which act as both a storage and decorative feature. These houses also use existing drainage features, which allow waste or used water to flow out of the houses at a number of different points. Both the House of Theseus and the House of Dionysos utilize at least two older cisterns throughout their tenure, and the House of Dionysos also uses two contemporary cisterns and three larger pools. The amount of water storage within this one domestic context suggests that water storage was a concern on both a domestic and urban level.

### III.5 Storage in Religious Contexts

There are a number of water storage features in religious contexts. The Episcopal Basilica at Kourion is one example with numerous water storage features (figure 3.9). In the
pastophory of the Episcopal Basilica, there is a water tank.\textsuperscript{173} It is reaches 3.40 m below the surface and is 3.60 m wide, extending beyond the limits of the pastophory, but has a slightly different orientation than the rest of the basilica. The walls are lined in hydraulic plaster over a pebble floor. The orientation and sherds found within suggest an earlier date, probably Hellenistic, and it is likely that it was not used after the early Roman Period.\textsuperscript{174}

In the South Catechumen there is a basin with hydraulic plaster. On the east wall there is a bench in the northern corner.\textsuperscript{175} Just beyond the outer wall of the South Catechumen is an open water tank lined with hydraulic plaster that extends westward.\textsuperscript{176} The tank measures 10.90 x 3.50 x 2.40 m, and the overall size was reduced over time, originally holding 90 cubic m and later holding 73 cubic m. It probably functioned to supply water to irrigate the rectangular terraced area south of the basilica. The tank is supplied by both rainwater and conduit pipes from the narthex. It remained in use until the abandonment of the second basilica. A stone channel in the northwest corner probably connected the tank to roof catchments.

The southwest cistern is 2.80 m wide and is surrounded by the wall above the court.\textsuperscript{177} It has plaster lined walls and was probably roofed. Water was carried down the face of the wall and across the floor to the center where it connected with a column of spigoted stone pipes, acting as an inverted siphon, bringing water into an ornamental stone basin which would overflow and fill the cistern. The water probably came from the line from the narthex.

\textsuperscript{173} Megaw 2007, 7. A pastophory is an apartment for a priest next to the bema or sanctuary. Eventually the terms refers to a chamber on the side of an apse.
\textsuperscript{174} Megaw 2007, 7.
\textsuperscript{175} Megaw 2007, 14. A Catechumenon is a place where people waiting to be baptized would be instructed.
\textsuperscript{176} Megaw 2007, 45.
\textsuperscript{177} Megaw 2007, 139.
Probably after the mid-6th century, the door leading to the service alley that ran along the southeast corner of the baptistery was blocked in order to make improvements to the water system. A small water tank was installed in the alley with a platform for access. The tank measures 1.75 x 1.25 m with hydraulic plaster lining it. There is a drainage pipe running through the wall which discharges into the alley. The tank has an opening at the foot of the wall which led to a small furnace for heating the water of the font.

In the narthex, there was a basin made of yellowish limestone and measuring 1.12 m in diameter. It was in the northwest section of the north compartment. It dates to the final phases of the basilica and provided an alternate route for the phiale in the atrium when the water supply failed. This suggests that the display of water was still important to the church. The religious sites are also concerned with water storage. The storage features at the Episcopal Basilica are used to supply the fountains and baptismal font. Like at Amathus, there is even later changes to increase the amount of storage in two different areas, suggesting that initial storage was not enough to meet the needs of the church.

III.6 Storage Capacity in Relation to the Near East and North Africa

In her analysis of water storage in the Roman Near East, Zena Kamash compares large-scale urban cisterns in the Roman Near East and Roman North Africa, because of North Africa’s comparable climate to the Near East and because Andrew Wilson’s work on this subject is widely published. This section discusses her findings in relation to Cyprus.

---

178 Megaw 2007, 27.
180 This will be discussed further in the next chapter.
181 Kamash 2013, 102.
The ancient Near East is geographically proximate to Cyprus and has a comparable climate, making it an important place of comparison. Table 3.1, shows the number of urban aqueduct-fed storage installations in Cyprus, the Near East, and North Africa. This chart focuses on the storage facilities found at the end of aqueducts and suggests that the numbers for Cyprus are woefully low, having one such facility at Salamis, when compared to those in the Near East and North Africa. However, fewer sites have been analyzed in Cyprus as compared to the other two areas and the total area in question is much smaller. It is also significant to note that Cyprus’ only example of a large scale urban storage feature falls in the greater than 20,000 cubic m range, of which there are none in the Near East. The terminal reservoir-cisterns found in Cyprus and the Near East tend to be fewer and smaller than those in North Africa. Kamash points out that even though the cisterns are smaller and fewer, this water conservation theory is still applicable.\footnote{Kamash 2013, 103.}

Kamash discusses sites that did not solely depend on aqueducts. The aqueducts previously mentioned in this thesis are all Roman in date, specifically Neronian (54-68 CE) and later, with extensive building occurring in the second century CE. All of the cities in question have a long history of occupation and success before the Roman period, so there must have been some way to obtain water in large quantities before the construction of the aqueducts. Wells are one such way: wells have been found at Kition, Amathus, and Paphos and elsewhere. These wells are not usually discussed in terms of the site’s water supply but rather within the contexts they occur, and their depths and contents are not always reported. In Kition, on the southeastern coast of the island, there are a number of wells coinciding with the Hellenistic and Roman levels.\footnote{Karageorghis 2003 99.} These wells tend to be a little less than 1m in width and
sometimes ringed with stones. They appear in workshops and in conjunction with other bathing installations, cisterns, and water channels. Recently a well was found in the Roman agora of Paphos. This well is in a building of unknown function, and is 7 m deep.\textsuperscript{184} While wells tap directly into a belowground water source, other storage facilities, like the pools in the houses at Paphos, were fed by rainwater, which was another alternative water supply.\textsuperscript{185} At a number of places in the city, the cisterns were filled by rainwater, and while not particularly large, there are a number of them, particularly at Kourion. The presence of wells and rain-fed cisterns suggests a dependence on multiple sources for water supply.

\textbf{III.7 Urban Storage and Constant Off-Take}

The idea of constant off-take means that water is constantly running through a system. As in other parts of the Near East and North Africa, Cyprus’ unpredictable rainfall and dry summers make a constant off-take system impractical.\textsuperscript{186} In a constant off-take system, there is a lack of storage facilities compared to the amount the aqueduct supplies.

Wilson focuses his research on the large cisterns at the terminus of the aqueducts,\textsuperscript{187} however Kamash notes that in the Near East only 18 of 41 aqueducts end in large storage facilities, a much smaller percentage than in North Africa. She argues that lack of storage facilities does not mean that the constant off-take principle is applicable, since many sites did not rely solely on aqueduct supply, while others simply had no aqueduct. Many cities needed complementary sources of water and rarely relied on one source of water based on the

\textsuperscript{184} Papuci-Władyka 2014.
\textsuperscript{185} These will be discussed more thoroughly in the next chapter.
\textsuperscript{186} Kamash 2013, 99.
topographic, geological, and climatological factors of the site.\textsuperscript{188} Not relying fully on aqueduct supply suggests a deviance from the constant off-take system. The restriction of water in comparison to other parts of the Empire shows these concerns were widespread.

I would argue for a more conservative use of water in Cyprus. As on the nearby mainland, Cyprus has few large cistern-reservoirs. There are, many smaller cisterns, especially as the two lines join and enter the Kourion city. There are at least 16 cisterns within the city walls of Kourion. The cisterns occur along the aqueduct line within the city, perhaps acting as access points for the inhabitants, because there is no evidence of local fountains to draw water from. These cisterns allow for water to settle in specific areas while still supplying other areas of the city. In addition, the cistern attached to the House of Eustolios allows for significant storage, especially if it was allowed to fill up overnight, reducing the strain on the water supply during the day. In Paphos, while there is no apparent system of cisterns within the city walls, both of the large elite houses have multiple features for water storage, including pools and cisterns: the House of Dionysos has at least three pools which allow for water catchment, while the House of Theseus has at least four cisterns that were used throughout its tenure. The small amount of precipitation, especially in the hot summer, necessitates the use of storage facilities to conserve water, especially in order to supply the public and private baths and nymphaeum at Kourion.

\textbf{III.8 Conclusion}

This chapter looks at the ways water was distributed in the cities of Kourion and Amathus. Using published plans, a map of each city’s water distribution was created. Shared

\textsuperscript{188} Kamash 2013, 108.
water features include large storage facilities near the agora and the proximate location of baths to these facilities. Specific water storage features, both urban and domestic, show how water was used by different levels of society. These storage features included the large reservoir near the agora and two conical cisterns in a domestic context at Salamis, the reservoir-nymphaeum at Amathus, and the fountain house and House of Eustolios cistern at Kourion. Storage in domestic contexts is also briefly mentioned in relation to the cistern presence in the elite houses of Paphos. Additionally, large storage features in religious contexts are described in order to show how the church was able to store enough water to supply the baptismal fonts and phiale of the basilica complexes. Finally the storage facilities were looked at in relation to the ideas of constant off-take and water conservation in conjunction with large storage features in North Africa and the Near East. The number and size of the water storage features on Cyprus imply that a more conservative view of water consumption was utilized there.
Chapter IV

Use and Display of Water in Cypriot Society

IV.1 Introduction

This chapter analyzes the similarities and differences in urban display and use of water in Cyprus. After the long-distance supply reaches the city, it is dispersed and stored before it arrives at its final destination. These destinations include public fountains, public baths, private baths, and churches. All of these destinations use water in different ways. The public features, like fountains and baths, display the wealth of the donor or the city, creating a visually pleasing setting and offering a way for the public to obtain drinking water or bathe. Churches use water for rituals and cleansing. In drier climates, where water must be conserved, these features become an even greater display of wealth and power.

The displays and uses of water within the cities of Kourion, Amathus, Soli, and Salamis are examined here in relation to other parts of the East Mediterranean region and how they work within the Cypriot environment. The monumental fountains of Soli and Kourion are discussed in their relation to water use and the environment. The baths of Kourion, Amathus, and Salamis are compared and contrasted in relation to each other and baths in nearby Syria, Lycia, and Cilicia. On a domestic level, the pools of the House of Dionysos at Paphos are analyzed in relation to how wealthy residents displayed their wealth. Finally, the Episcopal Basilica in Kourion and Campanopetra in Salamis are explored to show how the increasingly powerful church used water for ritual and for conspicuous public display in the form of fountains.
IV.2 Fountains

There are many ways for water to be displayed in the ancient world. Fountain houses and nymphaeum are two examples. Fountain houses monumentalize a water source and are often in religious settings. Fountains that are situated in prominent locations and elaborately decorated are called nymphaea.\textsuperscript{189} The location of nymphaea in cities is both practical and ideological. As places where the general public would get water for personal use, their location had to be strategic so the people were not carrying their water long distances. Because nymphaea were also large decorative features, they had to be located where as many people could see them as possible. Nymphaea across the empire also have a link to the empire and emperor, or city and local elite.\textsuperscript{190} They were often dedicated in honor of the emperor and contained statues of the emperors and their families. Elite families also dedicated nymphaea to display their wealth and provide public works for the city. This display of statuary and water links the elite and the life-giving waters the nymphaea brought to the people.\textsuperscript{191}

There are two main types of nymphaeum: exedra and façade. Both of these types often feature multiple registers of architectural background with statues displayed in niches. The exedra nymphaeum have a semicircular ground plan.\textsuperscript{192} Hadrian is credited with augmenting the traditional layout of a nymphaeum with curviform elements.\textsuperscript{193} One example of this is the Nymphaeum of Herodes Atticus at Olympia.\textsuperscript{194} This nymphaeum is U-shaped and raised on a high base. Two rows of interior niches cover the surface and contain statues

\textsuperscript{189} Neuerburg 1965, 19-21; Settis 1973, 661-745; Glaser 2000a, 437.
\textsuperscript{190} Kamash 2013, 112.
\textsuperscript{191} Segal 1997, 3; Kamash 2013, 113; Glaser 2000a.
\textsuperscript{192} Neuerburg 1965, 53; des Gagniers et al. 1969, 136-67; Rakob 1969, 284-300; Aupert 1974, 114-25; Bol 1984, 76-82.
\textsuperscript{193} Glaser 2000a, 439.
\textsuperscript{194} Bol 1984.
of the imperial family, including Antoninus Pius and Hadrian, on the lower story. Statues of
the patron Herodus Atticus and his wife and their family occupy the upper story. The U-
shaped fountain pours water into a central semi-circular basin that flows into a lower
rectangular pool, which then pours into another smaller trough where people could draw
water for personal use. The façade nymphaeum are similar except they have a more
rectangular layout, with a flat façade instead of a U-shaped one, much like the *scenae frons*
of a Roman theater. Both types contain a number of statues and often name the donor or
builder. Nymphaea are ways for the rich to demonstrate their wealth. In addition to
nymphaea, there were also smaller fountains, which were located along streets so that the
population of the city had easy access to usable water. These fountains were much smaller
and less elaborate, often consisting of troughs or basins with a decorated water spout.

Roman nymphaea seem to be widely distributed across the Near East, and are especially
apparent in regional capitals or Decapolis cities, where there is a conscientious link to the
Greco-Roman world. The dates of these nymphaea imply that they are a result of Roman
interest in the area. The numbers of nymphaea peak in the second century CE, a period that
also parallels aqueduct building in the region and a general construction boom across the
empire. However these nymphaea are noticeably smaller than those in Asia Minor. Zena
Kamash suggests that this is due to a cultural perception of water, especially because general
architectural display is just as grand and elaborate as it is elsewhere. Also present in the

195 Bol 1984, 54.
196 Neuerburg 1965, 78.
197 Kamash 2013, 117.
198 Kamash 2013, 113.
199 Kamash 2013, 116.
200 Kamash 2013, 116.
Near East, but not elsewhere in the empire, are *kalybe*. These structures resemble nymphaeae but are solely for display and contain no water facilities.

**IV.2.1 Soli**

The fountain at Soli is an example of a large public nymphaeum in Cyprus (figure 4.1). The nymphaeum stood on the south side of the agora, next to the retaining wall of the reservoir, at the center of the site. The nymphaeum is northwest of the basilica and north of the theatre. The nymphaeum was first discovered in the excavations of the agora in 1972 by a team directed by Jean Gagniers of the University of Laval. The nymphaeum was a focus of the excavations until 1974, when the political events interrupted and halted excavations at the site. The results of the nymphaeum are published in *Soli, Dix Camagnes de Fouilles* II. The preserved remains include the east-arm and basin, about half of the central basin, and part of the pedestal behind the east- and central basin.

The retaining wall and nymphaeum help define the southern edge of the agora. The nymphaeum is adjacent to a raised walkway off of the agora. The façade of the nymphaeum is decorated with marble and is in the Corinthian order. The nymphaeum is Π-shaped, with the two arms projecting northwards. The enclosed space is occupied by a large basin with a high front edge. Projecting forward on either leg of the Π are two side basins bordered by a draw-off basin. An inscription on the architrave mentions Emperor M. AUR, which Vassos Karageorghis suggests could be Caracalla or Elagabalus, or more likely, Alexander Severus.

---

201 Ball 2000, 291-2.
202 Karageorghis 1974, 884.
203 Karageorghis 1975, 848.
204 Karageorghis and the excavators refer to the shape as U-Shaped, however I believe the term Π-shaped better reflects the shape of the fountain. Both terms are widely used today.
205 Karageorghis 1974, 885.
206 Karageorghis 1974, 885.
IV.2.2 Kourion

Adjacent to the agora in the city center of Kourion, there is a shell-shaped niche which probably formed part of a fountain or nymphaeum and measures 45 x 15 m and is flanked by the public baths (figure 4.2). A large semicircular niche to the east surrounded by a wall with rectangular niches on either side makes up the nymphaeum. In the early first century CE both the main bath complex and nymphaeum were built along the western side of the forum. These were subsequently altered and enlarged, especially under Nero. Water to these buildings probably came by the west conduit of the aqueducts. Later, Trajan added the baths to the Sanctuary of Apollo. In the rebuilding of the fourth to sixth centuries, there was no building on the acropolis, which was completely rebuilt, and the larger spaces of the baths and nymphaeum were subdivided and used as living quarters.

IV.2.3 The Cypriot Environment and Public Displays of Water

Nymphaea are more lavish than small city fountains found along streets. However in the Near East the nymphaea tend to be less grand than in Asia Minor, which Kamash argues might be a cultural link to conserving water. Perhaps the nymphaea were too lavish because they consumed more water than the public could use. This might be why nymphaea are missing in some places where they are expected in the Near East. Nymphaea in the Near East also did not use as much water as other areas of the Empire. There was a wider variety of supply including small basins and tubs instead of pools. At places like Scythopolis,
bathhouses were fed by rainwater, which constrained use since the supply could not be guaranteed. There are often multiple bath houses in areas of strong Roman influence.

The scarcity of monumental public fountains in Cyprus reinforces Kamash’s arguments that conservation outweighed any interest in large scale presentations of water display. The few examples may reflect an increased Roman presence in those places or a specific emphasis on use. Fountains, including nymphaea, serve both a practical and non-practical function. While there are only a few examples of monumental fountains on the island, their construction would not be considered an entirely lavish use of water. The low number does imply that such a lavish display of water might not have been favorable by the public at this time. As discussed in the previous chapter, water conservation seems to be a general concern on the island. The transformation of the public fountain at Amathus into a reservoir suggests that at least initial ideas and trends towards lavish displays were overruled, at least in smaller, less important cities, by the need to conserve water.

IV.3 Baths

Roman baths embodied a complex system of social and bathing values. The baths were split up into different sections, depending on the function of the room. Numerous activities took place in bathing complexes besides actual bathing. Public baths were places for public lectures, going to the dentist or other specialist, or simply to socialize with friends. The rooms for bathing were further split up depending on the temperature of the water. There was the frigidarium (cold water), the tepidarium (warm water), and caldarium (hot water). The heated baths of the tepidarium and the caldarium required a heating system in order to

---

211 Yegül 1992; Yegül 2010.
raise the temperature of the water. These resulted in the hypocaust system which was an elaborate system of sub-floor heating using brick pillars which often extended into the walls. Roman baths could be both public and private, and thus large enough to serve a city’s population and small enough for a single household and its guests.

**IV.3.1 Kourion**

The House of Eustolios is a large peristyle house on the southeastern part of the urban plateau at Kourion. The House of Eustolios was excavated in 1935 by the University of Pennsylvania. The bath complex, however, was excavated in the later excursions of 1948 and 1950, also by the University of Pennsylvania. Incomplete publication of the material can be found in the University Museum Bulletins of the University of Pennsylvania. The House of Eustolios was originally constructed in the Late Hellenistic period and was re-oriented in the Roman period. The baths date to the 360s CE, however they were rebuilt in early to mid-fifth century after destructive earthquakes (figure 4.3). The baths occupy the northern section of the house. Just north of the baths is a square cistern which supplied water to the baths of the house. There is also a small pool in the House of Eustolios which was probably supplied by excess water coming from the cistern and baths. Again it seems as if storage is a theme at Kourion. Those in charge of the House of Eustolios did not want the water to be wasted.

The Eustolios baths sit at a slightly higher elevation and are accessed by a staircase. The baths are situated around a rectangular hall. The apsidal end of this hall and the central square room to the west are both cold water plunges. A roughly square room to the south of the square plunge is the *apodyterium*. On the opposite side is a rectangular room which is an

---

212 Daniel 1948; Fales 1950, 29.
antechamber for the tepidarium. The tepidarium leads into a heated room, which probably allowed the user to stay warm while transitioning between baths. This room leads into the caldarium. The caldarium is roughly cross-shaped, with one definitively apsidal end on the northern wall. Both the warming room and the caldarium have hypocaust systems under the floor and flues in the walls, and the furnace is adjacent to the caldarium. The piped water at Kourion in domestic contexts, like that at the House of Eustolios, seems to have proceeded in a logical manner. The baths in the House of Eustolios were built after the construction of the second aqueduct line and in conjunction with a cistern which helped supply the baths without detracting from the supply of the rest of the city. Within the house, the management system takes a logical approach allowing excess water from the baths to fill the pool in the center of the house for display purposes. It also allows for the discharge of the baths and pool to run through the latrines on the west side of the house and wash them out. With this system, the water is utilized to its maximum capacity for multiple purposes without wasting the excess.

The baths of the House of Eustolios show a logical progression of rooms from cold to hot. It would be easy for a bather to proceed from changing room to cold bath to warm bath to heated room to hot bath. The hot rooms are also on the western side of the house which would allow for the sun to make the most impact. Even though the baths themselves are on the northern part of the house, they are raised above the rest of the house enough that the rest of the house would not affect the bath’s access to sunlight. These baths were probably used for both private and semi-public users, due to the private and semi-public nature of the house.²¹³

²¹³ The house is adjacent to the public theater which would imply some public natures.
In addition to the baths in the House of Eustolios, there are a set of public baths in the agora of Kourion (figure 4.4). These were excavated in the 1980s by Demos Christou and the Department of Antiquities. Also in the early first century the main bath complex and nymphaeum were built along the western side of the forum.\textsuperscript{214} These were altered and enlarged over time. Water to these buildings probably came by the west conduit of the aqueducts. In the rebuilding of the fourth to sixth centuries, the larger spaces were subdivided and used as living quarters. The public baths at Kourion are two separate but homogeneous complexes which Demos Christou, the excavator, describes as “monumental.”\textsuperscript{215}

The public baths parallel the first three architectural phases of the nymphaeum of Kourion and their use continues until their destruction in the earthquake of 365 CE.\textsuperscript{216} These two structures flank and adjoin the long sides of the nymphaeum. The two bathing sections are roughly symmetrical with an axis running northwest-southeast across the nymphaeum with similar rooms are on either side in a similar order, except for the frigidaria on the eastern side. Along the northeast wall of the nymphaeum there is a row of three hot rooms with semicircular flues in the lower parts of the walls and pilae for hypocausts. The sudatorium is the northernmost room and is connected to the praefurnia. The central room is the caldarium and the southernmost room is the tepidarium. There are two other heated rooms which are much larger than the other three. These are heated by individual praefurnia and Christou identifies them as sudatoria.\textsuperscript{217} These are also connected to one of the frigidarium and a long hall which connects them to the room with the second frigidarium.

\textsuperscript{214} Karageorghis 1986, 868.
\textsuperscript{215} Christou 1996, 47.
\textsuperscript{216} Christou 1996, 50.
\textsuperscript{217} Christou 1996, 48. Christou uses the term “therma” to describe the hot baths. This term is much debated in scholarship (Fagan 1999; Yegül 2010) as to what it actually means. However no one else uses it to reference hot baths. I have chosen to use the terms “hot baths,” “caldarium,” and “tepidarium.”
The frigidarium connected to the sudatoria is small and rectangular, and the other is hexagonal with concave sides. There is a series of rooms to the south and southeast of the hexagonal frigidarium which served as apodyteria.

On the other side of the nymphaeum, in the southwest sector, are six more heated baths and one unheated bath. Three of the heated baths form a row along the exterior wall of the nymphaeum and contain hypocausts. These roughly parallel the three heated rooms on the other side of the nymphaeum. The other three heated rooms on this side are also in a row that is perpendicular to the aforementioned group. The apsidal tepidarium is adjacent to the row of heated baths. The central sudatorium is rectangular and has two basins, one rectangular and one apsidal. The apsidal caldarium is on the other side of the sudatorium and is the largest room of the western set of baths. The frigidarium lies in the southeastern part of this sector.

The public baths at Kourion pose a number of questions. Due to later alteration of the baths into smaller private rooms, the exact size and shape of the bathing rooms is unclear. This might also account for the disproportionate number, shape, and type of rooms which occur on either side of the nymphaeum. Both sets of baths have a set of three rooms adjacent to the exterior walls of the nymphaeum with a series of about three rooms projecting off of them perpendicularly, however these rooms are all slightly different sizes and shapes. The hexagonal frigidarium also creates a sense of being off-balanced, as it only occurs on one side of the baths. Some of the rooms may be misidentified, however the presence of hypocausts and praefurnia in most of the rooms suggests that this is probably not the case. Another suggestion would be different dates for each section, and the difference in size and

---

218 Christou 1996, 49.
shape results from cultural preferences at the time of construction. The high number of heated rooms and lack of unheated ones on the southwestern side suggests a progression between heated and unheated rooms other than the traditional cold to hot, which is characteristic of the fourth to sixth centuries. Unless the nymphaeum was not a public nymphaeum but rather part of the decorative features of the baths, the progression from the two frigidaria in the southeast sector to the hot rooms on the other side of the nymphaeum is illogical. This complex requires further excavation to understand completely.

IV.3.2 Amathus

There are two bath complexes in the agora area of Amathus: a Hellenistic tholos bath and a Roman bath. These structures were excavated in the early 1990s by the French Expedition to Amathus. The Hellenistic baths went out of use during the Roman period and were covered by the construction of a terrace which extended from the South Street to the harbor.

The Roman baths are on the north side of the agora and are a small rectangular complex with multiple rooms (figure 4.5). The baths have a Π-shape plan with the cold rooms on the east side and the warm rooms on the west. The entrance to the apodyterium is on the north side. This is the largest room in the complex and there are benches along the walls. The apodyterium steps down into the frigidarium through a doorway decorated with pilasters. The frigidarium is the largest of the bathing rooms and is made up of a well and two cold pools. The frigidarium opens to a small vaulted tepidarium that has hypocausts and

---

a double wall faced with limestone and marble veneer. This room is indirectly heated by the furnace in the neighboring room. Aupert suggests that this room might be either a *sudatorium* or just a heated passage to the *caldarium*.\footnote{Aupert 2000, 42.} The *caldarium* is an apsidal room with immersion pools. A niche on the east side might have held a basin. There is also a service area adjacent to the *apodyterium* and *caldarium* with a furnace with testudo and boiler on top. There is a double system of pipes supplied water from the reservoir conduit of hollowed out blocks. The *pilae* of the hypocaust are square.

***IV.3.3 Salamis***

Roman Salamis has the largest Bath-Gymnasium complex on the island (figure 4.6). Construction of the gymnasium probably began under the Ptolemies, as attested by deeper Hellenistic foundations.\footnote{Karageorghis 1969, 167.} The Augustan bath comprises a series of structures that run north-south. The building is made of well-dressed sandstone blocks with niches, probably for statues, in the walls. The 50-m long façade includes a Π-shaped colonnade of stone columns in front. There is a large bathing establishment attached which belongs to the second century CE. The Augustan *palaestra* had pebble floors and an open area covered with sand that extended from the portico.\footnote{Karageorghis 1969, 168.} The continued presence of a *palaestra* into later Roman times is unique in the Near East.

The Augustan bath was destroyed in an earthquake in 76/77 CE, and rebuilt under Trajan and Hadrian. This new Bath-Gymnasium was larger than the Augustan building. The Π-shaped colonnade was rebuilt into a four-sided colonnaded portico enclosing an open

---

\footnote{Aupert 2000, 42.} \footnote{Karageorghis 1969, 167.} \footnote{Karageorghis 1969, 168.}
courtyard which measures 52.50 x 39.50 m. The columns are of white limestone and were stuccoed. Two rectangular annexes containing swimming pools were added to the northern and southern extremities of the large east stoa of the *palaestra*. Originally they were elliptical pools and had a small roofed portico around three sides. Niches in the walls suggest they were decorated with statues. Three rooms along the façade of the Augustan Gymnasium are preserved, the large one in the center being a *sudatorium* with two entrances. The walls of the *sudatorium* are faced with marble slabs and stand up to 2 m. There is a hypocaust underneath and two praefurnia 2.50 m below the floor level to the north and south. The central part of the room is hollow and was filled with water to create steam.²²⁴ Bathers would have sat on couches or raised benches.

On either side of the *sudatorium* there is a rectangular room with an octagonal pool and niches in the walls. Karageorghis argues that these two flanking rooms are *frigidaria*.²²⁵ Both rooms have walls dressed with marble and have fountains in the wall niches. A doorway in the middle of the wall led to a narrow corridor connecting with a central *sudatorium*. The passage below the floor is hollow and partly heated. Two openings in the east wall of the *sudatorium* allow access to a rectangular *caldarium*, measuring 29 x 13.70 m in plan. This room was covered by a barrel vault. Three niches in the north wall were decorated with mosaics.²²⁶

To the north and south of the *caldarium* and behind the *praefurnia*, there are two large sudatoria with an apsidal façade facing the east. There are also three openings, which

---
²²⁴ Karageorghis 1969, 186.
²²⁵ Karageorghis 1969, 186.
²²⁶ Karageorghis 1969, 186; Michaelides 1987, 26. However due to their classical imagery they were covered up during Late Antiquity and most of the mosaics are damaged.
might have been windows. These two apsidal rooms along with the *caldarium* create a triple-apsidal façade. The northern *sudatorium* measures 29 x 10.90 m in plan with two openings to the *caldarium*. The southern *sudatorium* has one niche and two arches along the southern wall decorated with mosaics. The niche mosaics might be Artemis and Apollo attacking the Niobids or Hylas at the spring. The arches are decorated with the personification of a river, Evrotas, and Zeus as a swan with Leda.

In the southwest corner of the *palaestra*, there are latrines in a semicircular portico with 44 seats arranged around the back wall. There is a fountain in front of the latrines but separated from the rest of the buildings. The *palaestra* itself is an open courtyard with a circular pool at the center and a floor of packed sand. To the southeast of the baths are two large vaulted water tanks. The water was stored there and conveyed through the baths by means of built channels and clay or lead pipes, often running below pavements or behind walls. Waste water moved to the sea through large masonry sewers.

The gymnasium was destroyed in the earthquakes of 332 and 342 CE and only partially rebuilt later. Some of the smaller rooms were rebuilt on a smaller scale and some were completely filled in. The *frigidaria, suadataria, caldarium*, and hypocausts were rebuilt and extensively repaired. The columns of the *palaestra* were replaced with marble columns, often of different sizes. This is perhaps because they were *spolia* from other parts of the site like the theater. A stepped podium was built over the pool in the *palaestra* and a gray marble Doric column was placed on top.

---

228 Karageorghis 1969, 188; Michaelides 1987, 27.
229 Karageorghis 1969, 190.
**IV.3.4 In Context: Antioch**

The first city to be examined in relation to the baths of Cyprus is Antioch-on-the-Orantes. Cyprus and Antioch lie along one of the major east-west trade routes. Diocletian placed Cyprus under the political rule of Antioch in 293, adding another level of interaction between the two places.

Antioch is located in the Roman province of Syria and lies about 25 km from the Mediterranean coast. Antioch lies on major east-west and north-south crossroads stretching from Ephesus to Jerusalem and the Mediterranean to the Euphrates River.\(^{230}\) It ranked with Rome, Alexandria, and Constantinople as one of the four great cities of the Roman world.\(^{231}\) Pompey the Great brought Antioch under Roman control in 64 BCE but the city still had nominal autonomy and it soon became the capital of the Roman province of Syria. The governor of Syria controlled military resources in Near East and was involved with military campaigns against the adjacent Parthian and Sassanian Empires.

The city of Antioch has access to plentiful water sources. The main springs which fed the city were the Castalia and Pallas, located about 9 km southwest in Daphne.\(^{232}\) These streams were a part of the Sanctuary of Apollo. They were channeled into two aqueduct lines built by Caligula and Trajan/Hadrian, and fed the numerous baths in the city.\(^{233}\) Antioch has seven known bathing complexes, both urban (six examples) and suburban (one example). None of these baths have a *palaestra*.\(^{234}\) These baths also follow the general trend in eastern baths of having a reduced *frigidarium*, both in size and importance.\(^{235}\) The *frigidarium* is no

---

\(^{230}\) Kondoleon 2000, 3.
\(^{231}\) Kondoleon 2000, 3.
\(^{232}\) Yegül 2000, 145.
\(^{233}\) Yegül 2000, 145.
\(^{234}\) Yegül 2000, 146. The lack of a *palaestra* is a common trend in Syria and the Near East. The *palaestra* increasingly disappeared before the rise of Christianity
\(^{235}\) Yegül 2010, 182.
longer a major hall with cold water plunges, but rather a spacious lounge for gathering and entertainment.\textsuperscript{236}

Bath C is the largest and most opulent of the baths (figure 4.7).\textsuperscript{237} It is located adjacent to the stadium and near the imperial palace.\textsuperscript{238} Bath C was excavated in 1932 by the Princeton expedition under the direction of George W. Elderkin and Clarence Fisher. It has a distinctive, imperial-type plan. While it does not have a \textit{palaestra}, it is next to the exercise field near the stadium. It contains 20 rooms grouped symmetrically about a north-south axis and crossed by an east-west axis.\textsuperscript{239} It has two large octagonal halls flanked by small apsidal rooms. The north one is approached from the east/west juncture street and contained a large pool in the middle, a \textit{frigidarium}, and entrance hall. The southern one is at the end of main axis and contains the \textit{caldarium}.\textsuperscript{240} The octagonal shape is isolated and monumentalized, a characteristic of the Roman East.\textsuperscript{241} The first phase of the bath dates to the late first to early second century, and the later phases date to the mid to late-fourth century.

In comparing Bath C, as the largest imperial bath at Antioch, with the Bath-Gymnasium at Salamis, few similarities arise. Firstly, off the portico are the \textit{frigidaria} of both complexes. Salamis has two separate rooms for the \textit{frigidaria} which are on either side of one of the \textit{sudatorium}. These two rooms are much smaller than the \textit{frigidarium} of Bath C, which consists of a central octagonal room with an octagonal pool in the center and adjoining rooms around this central space. However both of the pools of the \textit{frigidaria} of Salamis are octagonal, but one set within a square room and other set within and irregular

\textsuperscript{236} Yegül 2000, 146.
\textsuperscript{237} Yegül 2000, 150. I have chosen to describe Bath C because of its size and elaborateness. This bath also represents the disappearance of the \textit{palaestra} and the decrease in size of the \textit{frigidaria} in Late Roman times.
\textsuperscript{238} Fisher 1934, 19.
\textsuperscript{239} Fisher 1934, 21.
\textsuperscript{240} Fisher 1934, 26.
\textsuperscript{241} Yegül 2000, 150.
almost crenelated circle. The *frigidaria* in Salamis are also significantly smaller than in Bath C.

Bath C also is noticeably regular and symmetrical across the north-south axis. However the Bath-Gymnasium at Salamis is only symmetrical in the *palaestra, frigidaria,* and first *sudatorium* and is only symmetrical in relation to the placement of the rooms, not the shape of the rooms themselves, as the *frigidaria* of the Bath Gymnasium are not exactly the same shape. The latrine off the southwest corner of the Bath-Gymnasium also takes away from the overall symmetry of the complex. In the Bath-Gymnasium, the hot rooms are all different shapes and sizes, the central and northern one apsidal and the southern one rectangular.

Both complexes also have *sudatoria* separating the *frigidaria* from the *caldarium*. In the Bath-Gymnasium, a bather has to enter either of the *frigidaria* in order to proceed to the central *sudatorium* and then to the eastern hot rooms. In Bath C, the bather must walk through one of the *frigidaria* before entering a series of rectangular warm rooms which in turn led to the hot rooms. Both bathing complexes have multiple rooms for *caldaria* with apsidal niches. In the Bath-Gymnasium, the central *sudatorium* and the northern *caldarium* are apsidal in shape but the *caldarium* has two niches along the northern wall. There are also two niches in the southern wall of the rectangular *caldarium*. All of these niches are not the same size, nor do they occur at the same intervals along the walls. In Bath C, the central hot room is octagonal and alternating sides have apsidal niches off of them which serve as the baths themselves. There are two apsidal rooms on either side on this central octagonal room which also have pools in the apses. In terms of context within the site, both baths are adjacent to a stadium.
One of the largest differences between these two structures is the lack of a *palaestra* in Bath C. The Bath-Gymnasium at Salamis has a large *palaestra* adjoining it, while Bath C has no *palaestra*. The *palaestra* of the Salamis bath takes up half of the entire complex. However both complexes have a colonnaded portico with a rectangular room on either side. In Salamis, these two rectangular rooms are used as *natatio*, or swimming pools. In Bath C, their use is uncertain, but they are not *natatio*. The lack of a *palaestra* is a trend in the Late Antique period. Fikret Yegül argues that this is due to a combination of factors including a lack of interest in palaestral sports, that the gymnasia had always occupied a superficial position in the East, or that they were unsuitable for a hot climate.\(^2\) However, the *palaestra* of the Bath-Gymnasium at Salamis remains in use until throughout the tenure of the bath. This might point to lasting influence from the larger Hellenistic tradition of Ptolemaic/Seleucid administration. This gymnasium not only separates Salamis from Antioch, but also from the larger trends of the Near East, including areas of Turkey, Syria, and Israel. The Bath-Gymnasium also has earlier origins than Bath C. The gymnasium at Salamis has its roots in the Hellenistic period, and the bathing additions begin around the early years of the first century CE. Bath C at Antioch is representative of baths in the Near East. Comparing Bath C to the Bath Gymnasium helps to place one of the Cypriot bath traditions within the larger context of the Near East.

**IV.3.5 In Context: Lycia**

Lycia is another region which provides comparative material for the study and understanding of Cypriot baths. Lycia lies about 200 km northwest of Cyprus along the

---

\(^2\) Yegül 2010, 182.
southern coast of Asia Minor. The Roman baths of Lycia are very uniform.\textsuperscript{243} There are at least 34 baths from Lycia during the imperial period that date between 70 CE through the Hadrianic and Antonine periods.\textsuperscript{244} They tend to have a core of three or four adjacent asymmetrical rectangular rooms with longitudinal axes parallel.\textsuperscript{245} The rooms are roughly equal in area, and occasionally one of the rooms is subdivided. Sometimes there is also another room or row of rooms set a right angle behind the main row of rooms. Andrew Farrington, in his architectural study of the Roman baths of Lycia, identifies these as the simple row arrangement and the row arrangement with transverse element.\textsuperscript{246} The use of the apse is apparent but it is not a regular feature. The apses can be a small apse, full apse, or smaller embedded apse. Usually there is only one unheated room in the core of rooms. Lycian bath blocks also tend to be smaller than those in other areas.\textsuperscript{247} Yegül classifies them as being small and medium sized.\textsuperscript{248} In terms of progression through the rooms, Farrington suggests that it is a retractive process, where bathers progress through the rooms and then backtrack, through the same rooms.\textsuperscript{249} Farrington places the origins of the Lycian bath type in the row type of Italy from the second to first century BCE, suggesting that it traveled directly from Italy to Lycia, but was subject to local variations.\textsuperscript{250}

Two examples of the Lycian bath type are the bath from Apollonia and Rhodiapolis. The Apollonia bath is located on the northwest side of the acropolis, north of the theatre and measures approximately 20 m x 15 m.\textsuperscript{251} The Apollonia bath is a series of four main rooms,

\textsuperscript{243} Farrington 1995, 3.  
\textsuperscript{244} Farrington 1995, 3.  
\textsuperscript{245} Yegül 2010, 173.  
\textsuperscript{246} Farrington 1995, 3.  
\textsuperscript{247} Farrington 1995, 7.  
\textsuperscript{248} Yegül 2020, 173.  
\textsuperscript{249} Farrington 1995, 10.  
\textsuperscript{250} Farrington 1995, 47-8.  
\textsuperscript{251} Wuster 1976, 41; Bayburtluoğlu 1983, 55. For a plan of this image see Farrington 1995, fig. 01.
with the fourth appearing as a subdivision from the first room that took up about one-third of
the total room area.\textsuperscript{252} The bather would have entered through the fourth room and
progressed to either the first or second room, and from the second room to the third room,
which had a small projecting apse on the northeastern wall. The Rhodiapolis bath is located
northeast of the theatre near the summit of the acropolis (figure 4.8). It is a rectangular
structure that measures approximately 15 m x 25 m along a north-south axis. The western
rooms are all roughly the same size except for the south-central one that has an apse pointing
east. The eastern side of the building is made up of a narrow hall leading to a rectangular
room on the northern wall. The example from Rhodiapolis is an example with an additional
set of rooms set at right angles. The bather would enter through the long rectangular hall and
have a choice of which rooms to enter next. The rooms in this complex are all rectangular but
all of slightly different sizes.

The public baths at Kourion seem to be a variation on the simple row with transverse
element type. There are two sets of three rooms in a row on both sides of the nymphaeum
and adjacent to its exterior walls. Another set of three or four rooms projects off of these
simple rows perpendicularly. However these rooms do not have near the regularity of those
in Lycia. The rooms of Cypriot baths vary in size and shape both within a specific complex
and across the island. The baths in the agora of Amathus might also display a variation of the
simple row type. The baths there are set up into two rows of rooms, two rooms on one side,
three on the other. The bather would have progressed from one room to the other and then
had to backtrack to the \textit{apodyterium}. Even though so close geographically, none of the
simple row elements have a strong enough presence to be a certain influence on Cypriot

\textsuperscript{252} Farrington 1995, 3.
baths. Because of its geographic proximity, analyzing the baths of Lycia helps to place the baths of Cyprus within the greater eastern Mediterranean context.

IV.3.6 In Context: Cilicia

Cilicia is the closest region of Asia Minor to Cyprus. Along the coast there are a number of sites that contain bathing structures. These baths were catalogued as part of Rosenbaum, Huber, and Onurkan’s survey of coastal sites in western Cilicia. In this survey of five coastal sites, Huber and Onurkan identify six bathing structures at four of the sites surveyed. The baths are located in the center of town and thus public in nature. They are situated next to the water supply and built on a slope with the entrance on the upper-side. In terms of plan, they have small rooms of different sizes, and an apse projecting from the southern façade, with large openings and windows facing south. There is one main hall flanked by rows of smaller rooms and a long entrance hall with an arrangement around an apse whose room is next to a hypocaust and is not directly accessible from the main hall. This means that the bather must progress through at least one other room before entering while still having some choice in bathing order. For example, the extramural baths at Antiochia ad Cragum are situated on the western part of the site and are next to the wadi, a water source. This complex is entered on the eastern side through a long hall from which a

253 Rosenbaum, Huber, and Onurkan 1967.
254 Huber 1987, 1-48; Onurkan 1987, 69-86. These structures are Anamur II 11 B, Anamur III 2 B, Anamur II 7 A, Iotape 5 B, Antiochia I 12 A, Sydera I 1 A.
256 Huber 1967, 47. This list is based off of “Type A” buildings which Huber identifies as baths. The information for this list comes from a survey of the sites of Western Cilicia done in the 1960s by Elisabeth Rosenbaum, Gerhard Huber, and Somay Onurkan. The sites involved in this survey are: Anurmium, Antiochia ad Cragum, Selinus, Iotape, and Sydera.
257 Huber 1967, 26. For a plan of this bath see Huber 1967, fig. 21.
bather could enter a central rectangular room and from there gain access to a number of other rooms, including the apsidal hall which is on the southwest part of the complex and faces south. With the exception perhaps of the apsidal room, the other rooms are fairly regular and small.

The Roman baths found in the western Rough Cilicia region display some distinguishing characteristics from the baths of Cilicia, such as the lack of the long hall. These baths were surveyed by Michael Hoff in the early 2000s. Baths are the most common public architectural type found in western Rough Cilicia.258 Most urban sites contain at least one, and many contain more than one. These baths display a few common features. The rooms are rectangular and usually arranged in a row along a single line of axis. The baths move from cold to hot baths with no way of by-passing any room. They are usually associated with a cistern. For example, the Large Bath at Silenus took advantage of the flat river plain and contained three barrel vaulted rooms in a row.259 The westernmost room is apsidal with one apse taking up the southern wall and a small one on the western wall. The tepidarium in the center is the smallest of the rooms and the frigidarium the longest. A large cistern was added later and a nymphaeum is built in the exterior side of the eastern wall. Another example is Göçük Asari, a smaller site than Silenus (figure 4.9). This bath is also of the row type with three rooms and apses in the central and western room.260 However these apses differ from the other sites because they are rectangular rooms with embedded apses. The warmer rooms are the on the western side of the complex.

258 Hoff 2013, 144.
259 Hoff 2013, 146. Hoff also refers to these baths as the Great Bath. For a plan of this bath see Hoff 2007, fig 12.2
260 Hoff 2013, 154.
Michael Hoff, in his survey on the baths of western Rough Cilicia, marks these baths as an example of regionalism, suggesting that the choice of bath type might be more than style preference. He argues for looking at who is building the baths, and suggests that the builders of these baths were not locals. Like the baths of Lycia, the baths of Cilicia provide a source of comparison for the study of Cypriot baths because of their geographic proximity to Cyprus. Studying the baths of Cilicia helps to place the baths of Cyprus within the context of the larger trends in bath architecture in the eastern Mediterranean.

There are no obvious parallels to either of these types in Cypriot examples mentioned here, but some similarities in the long hall type might be evident. The two sets of baths on either side of the nymphaeum at Kourion might display a variation on this hall type (figure 4.10). The two sets are separate from each other, making a logical progression between their rooms unlikely. However both display what might be a hall-type entrance. The eastern set (figure 4.10, Rooms 8-13) is a variation on the hall type, the hall spans the southern edge of the baths and faces the public area, thus separating the baths from the rest of the site. The frigidarium (Room 14) is separated awkwardly from the rest of the complex. On the other side of the nymphaeum, there is the beginnings of a longer room adjacent to the sudatorium and tepidarium on the southern side. This would be logical for this side because, while it would allow entrance to warm rooms (Rooms 1-3), the caldaria (Rooms 5-6) are still separated enough that passage through the other rooms would be necessary for the bather.

The House of Eustolios might also provide a variation on this theme. The baths in the House of Eustolios are entered by means of a long rectangular hall which provides access to the bathing rooms around it. This long hall takes up the largest room of the bathing complex.

---

261 Hoff 2013, 155.
If these baths are a variation of the long hall type, it would show a variation not present in Cilicia. In Cilicia, the long hall takes up one side of the complex, whereas in the House of Eustolios the long hall is in the middle. However the nature of these long halls serving as entrance halls would be the same. In addition, the long hall type does not seem to be present in a domestic context.

**IV.3.7 Cypriot Baths in Context**

There are few similarities between the Roman baths of Cyprus and those of Lycia and Cilicia. The baths of Cyprus do not seem to follow any one pattern. While the public baths at Kourion and the House of Eustolios might show remnants of row-type baths, it is not evident that they were inspired by the baths of Lycia and Cilicia. The Bath-Gymnasium of Salamis does not closely resemble any of the larger imperial baths of Anatolia, Lycia, or Cilicia. The large *palaestra* might point to the larger Hellenistic tradition of Ptolemaic/Seleucid administration, especially as the city had deep roots and connections to this Greek tradition. However the irregularity of the rooms and projecting apses set it apart from the larger symmetrical complexes. In terms of the simple row or long hall type, the baths of Kourion and Amathus seem to fit these models the best, but with variations. The irregular shape to the rooms and duality of the public baths at Kourion imply that if the builders of these baths were using the ones in Lycia and Cilicia as models, but they were definitely altering the plans. It is difficult to say for sure if the Cypriots were using models from Lycia and Cilicia.

Having looked at the Cypriot baths in an Eastern Mediterranean context, it is now time to examine them in relation to the Cypriot environment, which might have affected the design of the Cypriot baths. With the exception of a very small bath in the House of the
Gladiators, not described previously, there are no baths in an exclusively private setting. The bath at the House of Eustolios was still very public in nature. This might suggest a few notes about the Cypriot opinions of baths. The first might be that the construction of baths was too costly to be part of private houses. It might also imply that accessibility to water was only enough to sustain the smallest and most elite private houses with water for the baths. The Cypriots might have also seen private baths as an unnecessary use of a precious water supply. Most public baths have smaller rooms with basins or small plunges, not the larger swimming pools. This might also be a result of a conscientious use of water and an attitude of conservation. Even in Salamis, while the baths and individual rooms are larger, most of the pools do not take up the entire room. This would imply that the Cypriots took a conservative approach to water use in the baths.

**IV.4 Domestic Display of Water**

The use of water within the house, besides that used for cooking, drinking, washing, etc., was intended to show off a person’s wealth and status. Wealthier houses in different parts of the empire had baths, fountains, and decorative pools, depending on what the owner could afford. In addition to the water display, these areas are usually decorated with statuary or mosaics, which add to their lavishness. In general, the more water used in display, the more expensive it was. Thus, baths and fountains would be considered more lavish than simple pools. Pools serve a dual function of display and storage, making them an attractive feature in more arid climates. The use of pools allows the house owner simultaneously to

---

display their wealth and to store water for practical uses. These pools could be decorated with statuary and mosaics, and would be very visible in the plan of the house, allowing people in various rooms to see them and be reminded of the owner’s wealth.

IV.4.1 Domestic Level

While the small number of known elite houses on Cyprus, especially in Paphos, do not have a private bath, they do often have a number of decorative pools. The House of Dionysos in Paphos has three such pools (figure 4.11). The rooms with the pools make up three large section of the house, with the largest pool in the center of the house and the others on either side, one to the northeast and one to the southwest. Because of their location with atria around them, these pools are very visible to the surrounding rooms, where occupants would have been able to see the water and be constantly reminded of the wealth of the owner of the house.

The largest pool is entirely surrounded by mosaics. Three of the four side panels contain hunting scenes. These scenes depict various figures armed with spears hunting deer, tigers, lions, horses, and boars. There is even local inspiration in the decoration in the form of a moufflon, a mountain goat native to Cyprus. On the fourth (west) side of the atrium, there are four individual scenes from mythology: Apollo and Daphne, Neptune and Amymone, Dionysos and Ikarios, and Pyramos and Thisbe. While there are a number of mosaics in this house, the fact that these frame the impluvium without interruption from walls, allows them

263 There are examples of private houses with baths besides the House of Eustolios, like the House of the Gladiators at Kourion. However this thesis does not allow for a full discussion of all of the baths.
to draw special attention to the pool. The viewer sees the wealth of the patron reflected in the elaborate mosaics as well as the decorative pool.

**IV.4.2 Domestic Display of Water in Relation to the Cypriot Environment**

There is a clear relationship between the availability of sufficient water supply and the presence of baths and fountains within the house. According to Kamash, most houses in southeastern Turkey, Syria, Jordan, Israel, Lebanon, and Iran, depended on cisterns. In general, houses in the East tended to be more private and inward focused. Entrances did not provide sight lines into the house and the few water features within the houses point to this desire for privacy. The number of decorative water features in domestic contexts increases slightly over time. Pools, which were probably not as high status as fountains in domestic contexts, were nevertheless still visible displays of water.

The lack of bathing facilities in two of the most elite houses in the Roman capital city of Paphos and proximate distance to one of the most important religious sites on the island, the Sanctuary of Aphrodite at Palaepaphos, might point to a conservative attitude towards water, especially if the aqueduct could not provide enough water to justify their construction. However in Kourion, a city of less political importance than Paphos, there are both public and private baths, perhaps due to the two aqueduct lines, which suggests that the bathing complexes of Paphos have not been excavated yet, or that the inhabitants of Paphos were more conservative about their water usage, and if there were the resources, they would have had more elaborate water features in their houses.

---

264 Kamash 2013, 120.
265 Kamash 2013, 121.
The pools in the House of Dionysos reflect Kamash’s idea of privacy and use of pools as decorative features. There are no noticeable sight lines from the surrounding streets into the House of Dionysos. Within the house, however, there are numerous sight lines pointing towards the decorative pools. The pools however offer a way for a wealthy Roman to display their wealth while still working within the idea of the conservation of water. These pools, while heavily decorated with mosaics, also allow for water conservation. The roof above these pools was open to the sky and allowed for water to enter, and fill the pool. This water could then be used for other purposes in the daily household life. The northwest pool in the House of Dionysos is next to the kitchens and workshops so perhaps the water from that was used to supplement those activities if necessary. The proximity of the central and southeastern pools to the domestic latrine might also suggest that water from these pools could be used to flush the latrine. Thus these pools, while decorative also serve a utilitarian function within the household, and provide the inhabitants a way to show off their wealth using water.

**IV.5 The Church and Use and Display**

As the numbers of the Christian church grow, both in adherents and physical buildings, so do the wealth and power of the church. The rite of baptism becomes an important way of separating Christians from non-Christians. Baptism is the process by which a hopeful Christian becomes accepted into the church community. However Christianity is not first religion to associate water with purification and new life. Water rituals as a way for purification and celebration of new life have long history in ancient Near East. Judaism also
has an emphasis on washing to rid oneself of impurities. In Christianity, baptism is bridge between individual and community. The ritual of baptism has a regional character which often emerged from controversies over the nature of Christianity’s core values and beliefs. Tertullian wrote one of the earliest known treatises on baptism in which he discusses the centrality of water, which is necessary for baptism, inside the church, which is essential for salvation.

Ancient authors, like Hippolytus and Tertullian, describe the rite of baptism as a long multi-stepped process, which took place over a number of years. In the days leading up to the actual ritual, the candidates would undergo a process of bathing, fasting, and exorcism, all before baptism on Easter Sunday. It was preferred that the water in the baptismal fonts was moving, though the ancient authors say any water available can be used.

The architecture of early baptisteries is variable: differences in shape, size, depth, and their relationship to main church occur. There are even a few freestanding baptisteries. Most are attached to the main church hall, and are generally to one side of the apse or right or left of main entrance at the rear of nave. The baptismal spaces often open directly into side aisles of central nave. The baptismal area was usually a small room that contained baptismal pool often had apse at one end. Many churches had ancillary chambers for different parts of the ritual; these often had apses and separate entrances leading directly to main church hall. The baptismal pools themselves were usually set into the floor of room, with a noted variety of shapes. These usually had two or three steps leading down into the font. Cypriot

266 Chidester 2000, 62.
268 Jensen 2005, 117.
269 Tertullian On Baptism 20; Jensen 2005, 117.
270 Chidester 2000, 63; Hippolytus Apostolic Tradition 19-21; Tertullian On Baptism 20.
271 Chidester 2000, 63.
272 Jensen 2005, 139.
baptisteries are distinctive.\textsuperscript{273} The main chamber of the Cypriot baptisteries is a separate architectural entity from the rest of the building, separated from the rest of the building by curtains.\textsuperscript{274} There is also a certain processional sequence of the baptismal chambers, moving from \textit{apodyterium} to the baptismal font chamber, to the chrismarion. The architecture of the Cypriot baptisteries suggests that the baptism ritual initially followed that of the Antiochene church, especially in the adoption of pre-baptismal chrismation, and later followed that mentioned in the \textit{Catecheses} of Cyril of Jerusalem.\textsuperscript{275}

\textit{IV.5.1 The Episcopal Basilica of Kourion}

The third aspect of water display to be discussed is use and display in religious contexts. The Episcopal Basilica in the city center of Kourion has two fountains and one baptismal font. In the baptistery of the Episcopal Basilica, just north of the basilica proper, is a cruciform font, residing within a wall recess.\textsuperscript{276} The apsidal recess is stone and later lined in marble. It lies 1.17 m below the floor and there are two steps to enter it. According to Megaw, it has the appearance of a theater stage and had a long period of use.\textsuperscript{277} In the masonry of the apse, the wall was cut to fit a water pipe which ran directly above the furnace, which allowed heated water to enter the font.

In the open square of the atrium of the baptistery there is a hexagonal fountain or phiale (figure 4.12).\textsuperscript{278} This features was supplied by the conduit and a curving line of spigoted pipes running northeast to southwest under the tank. The conduit is square in section

\textsuperscript{273} Megaw 2007, 172.
\textsuperscript{274} Megaw 2007, 559.
\textsuperscript{275} Megaw 2007, 559.
\textsuperscript{276} Megaw 2007, 107.
\textsuperscript{277} Megaw 2007, 108.
\textsuperscript{278} Megaw 2007, 125.
externally but with a circular aperture (0.12 m in diameter) in the top.\textsuperscript{279} This feature could be drained for cleaning through a drainage hole at the lowest point of the mosaic floor where is connects to an adjoining drain. Later a new supply was added from another storage tank which also supplied the font in the southwest corner of the baptistery. North of the phiale, just below the surface runs a line of terracotta pipes from the north east which turns sharply southward to pass 2 m west of the phiale, however it is unclear where it runs from there. It is probably part of the same pipeline found under the narthex leading to the south water tank.

Another phiale is present in the southwest court of the Episcopal Basilica (figure 4.13). Water for this phiale probably came from the south water tank to a pipeline running parallel to the tank. A perpendicular line comes across the southwest court into the phiale. This phiale, like the one in the atrium, is hexagonal, except that the exterior sides all have a semicircular niche set concave into it. This alteration to a regular shape gives the phiale a more visually stimulating appearance.

Northeast of the atrium lie several rooms of uncertain function. They lay along the water supply line and the drain seems to originate in these buildings. Hypocausts and flues found within these buildings may be evidence for baths. If it was a bathhouse it would have been integral to the complex and located near one of the entrances. This would match the Campanopetra complex at Salamis in northeast Cyprus.\textsuperscript{280}

\textsuperscript{279} Megaw 2007, 126.
\textsuperscript{280} Megaw 2007, 138; Roux 1998.
Another example of water display in religious contexts is at Campanopetra in the southeastern part of Salamis. Campanopetra is the largest basilica in Cyprus, measuring 152 m in long and dates to the 5th century CE. It was excavated in the 1960s by the University of Lyon under the direction of Jean Pouilloux. In the center of the atrium of Campanopetra is a phiale (figure 4.14). It is an octagonal structure around an octagonal marble pool with a diameter of 2.50 m. There would have been eight columns of white Proconnesian marble with Corinthian capitals surrounding the pool. At the bottom and on the walls of the basin are remains of hydraulic cement. In the center there is a vertical pipe for circulating water. The phiale has terracotta and bronze pipes and faucets.

The phiale has terracotta and bronze pipes and faucets. The overall structure, as reconstructed by Roux, is an octagonal pool with a central basin protruding by means of a column (figure 4.15). From that basin a bronze pinecone rises from the center. Roux argues that water from the pinecone flowed into the basin which overflowed into the octagonal pool. The whole structure was surrounded by an octagonal roofed structure supported by the columns.

Water was brought to the phiale by a terracotta pipe from under the pavement at the central entrance. The water flowed under the phiale and using pressurized pipes, went up the central columns and spewed out from the seeds of the pinecone. The terracotta drain in

---

283 Roux 1998, 56.
284 Roux 1998, 56.
the pool’s floor allows water to flow into the gutter, measuring 0.35 m wide x 0.50 deep, and then through the courtyard to the northeast corner.

IV.5.3 The Growing Power of the Church

Fountains are prominent features in these two ecclesiastical buildings. The Episcopal Basilica at Kourion has two fountains and Campanopetra has a single fountain, which if Roux’s reconstruction is to be followed, is very elaborate. The fountains at these two sites are significantly larger consumers of water than the baptismal fonts themselves, which were actually used in ritual contexts on specific occasions. The water of the phiale is mostly for display but is also used for purification to separate the sacred and profane. The baptismal font at the Episcopal Basilica is small and in a small apsidal projection off the main apse. There is no superstructure, but rather the candidate would step down into the font. At Salamis, the reconstruction of the baptismal font suggests a very elaborate superstructure, with a number of steps leading up to another section that would house the water, the candidate would take a few steps down into the water, rise up again, and then have to descend another larger staircase. Water is not necessary in baptismal fonts in all parts of the year, as baptism only occurred at select points in time, usually around Easter.

The fountain of the Kourion baptistery is even larger than the fountain in the southwest court, suggesting that there was more prominence in the baptistery. They are both hexagonal and are in the center of an open court. At Campanopetra the fountain is off to one side, but has a much larger superstructure than the ones at Kourion. The large very visible fountains of the open courts would suggest that the church wanted to show that it had enough power and resources to decorative fountains in addition to the necessary ritual baptismal
fonts. The fountain at Campanopetra would have definitely drawn the eyes of anyone passing by, and reminded them of the wealth and power of the church. The use of marble in the fountain of Campanopetra also speaks to the wealth of the church at this time. Cyprus does not have any natural marble resources and therefore it must import the marble, an added expense to an already expensive material. Thus only the wealthiest donors and benefactors would have been able to afford and build in marble. This fountain, even though smaller than the public nymphaeia, is just as elaborate. The one at Kourion is made of limestone and the one at Soli does have some marble, but not to the extent of Campanopetra.

Kamash argues that the number of water storage facilities associated with churches suggests that churches could afford to construct and upkeep water facilities. In addition, textual sources note more and more churches taking on the responsibility of rebuilding after natural disasters and responding in other times of crisis, suggesting that they had a growing civic power in addition to their religious duties.\(^\text{286}\) John Malalas describes Ephraim of Antioch, \textit{comes Orientis}, rebuilding the city after an earthquake.\(^\text{287}\) Cyril of Scythopolis describes an archbishop actively looking for water for the townspeople during the drought of 520 CE in Jerusalem.\(^\text{288}\) At Kourion and Salamis, it is unclear the extent to which the churches took on responsibility for the rebuilding of the city after earthquakes.

\section*{IV.6 Conclusion}

This chapter looked at the ways water was used and displayed in the cities of Kourion, Soli, Salamis, and Amathus. Looking at the baths of Cyprus within the larger

\begin{footnotes}
\item[\textsuperscript{286}] Kamash 2013, 110.
\item[\textsuperscript{287}] John Malalas \textit{Chronicle of John Malalas} 17.423-4.
\item[\textsuperscript{288}] Cyril of Scythopolis \textit{Life of Sabas} 54.
\end{footnotes}
Mediterranean context, it seems as if local builders were influenced by buildings in Lycia and Cilicia, with variations on the simple row arrangement and the long hall type. The baths of Cyprus do not adopt these types directly but adjust their sizes, spaces, and arrangements to fit their desires. It is unclear how these types would have reached the island as Lycia and Cilicia do not lie along major routes of communication. Cyprus’ major trade routes run from Antioch and Caesarea in the east to the Aegean, Rome, and Constantinople in the west, and to Alexandria in the south. The Cypriots were either looking specifically to these regions for inspiration or the influence came from an unknown source which has links to all three regions. The Bath-Gymnasium at Salamis does not seem to be looking to nearby locations for its source. The location next to a large palaestra suggests remaining influences from the Hellenistic Greek period. However the quasi-axial arrangement of the rooms suggests a variation on this type of bath complex as well.

Public displays of wealth are more popular than private ones. The private houses, with the exception of the elite House of the Gladiators and the semi-private House of Eustolios in Kourion, do not have large monumental displays of water, rather, displays of water in decorative pools with mosaics are more common. Shallow pools provide maximum display of water with minimal lavish consumption. Even the large public baths of Kourion and Salamis do not have large swimming pools, but rather smaller pools and plunges as well as basins, for bathing.289

In relation to religious contexts, the churches of Cyprus seem to become large consumers of water. The churches needed water for ritual purposes, like baptism, however the more visible displays of water are in the fountains of the atria. The Episcopal Basilica has

289 However, this might also be due to late renovations, as smaller pools are a trend in late antiquity. See Yegül 2010, 178.
two such fountains and Campanopetra has one, but this seems much more elaborate than the
two at Kourion, due to the presence of marble and architectural features like columns
surrounding it. All of these pools have interesting shapes, hexagons and octagons, as well as
the technology to create a visually stimulating way of displaying water, where water would
be flowing, not just stagnant in a basin. This shows that the church on Cyprus had enough
wealth and power to create these non-utilitarian ways of displaying water. The churches,
which date to different periods than initial aqueducts of the city show that even though they
came later they were able to take advantage of the water sources of the area, and that these
water sources were adapted to supply the churches upon their constructions. In all however,
none of these religious displays utilize large amounts of water that would have made them
seem frivolous. The fountains, while larger than the pools in the House of Dionysos, are
much smaller than the public fountains of Kourion and Soli. None of the displays mentioned
in this chapter are so elaborate or private that it suggests a frivolous waste of water for a
small audience. All of this suggests that while the Cypriots utilized traditional Roman ways
of displaying and using water, they still managed to work within the idea of the conservation
of water seen elsewhere in their cities, a trend that Kamash also makes apparent in the
Levant.
Chapter V
Conclusion

V.1 Concluding Observations

The objective of this thesis is to explore the water technologies used on Cyprus during the Roman period, and to discover how these technologies were modified to fit the Cypriot environment. This thesis also explores how the surrounding regions of Lycia, Cilicia, Antioch, and the Near East, were influencing the water technologies found on Cyprus. It examines representative examples of technologies that served the purposes of long-distance supply and management, urban storage and distribution, and public and private use and display, at important sites on the island, including Salamis, Paphos, Kourion, Amathus, and Soli. It interprets this data in order to understand how ideas change and were adapted to different environments in the eastern Roman Empire.

The archaeology of water technologies is important for the understanding of the cultural use of water and how Roman ideas were perceived and received in different areas of the empire. Water consumption is both a necessity for life and a luxury for living. Humans need water to drink and grow crops, but they also choose to use water for activities like bathing, rituals, and displays of power. In areas where the water supply is sparse, the ability to control and display water is a sign of wealth and power.

In the city of Rome, where there are many aqueducts and the water supply is not scarce, more people from different levels of society have the ability to display water in domestic fountains and pools as well as public nymphaea and baths. In places like Cyprus, where the water supply is determined by the winter rains, only the elite can afford to have
such lavish displays of water and there is greater interest on the conservation of water. 

Roman influence on Cyprus brought about a greater cultural demand for water but these technologies could not be transplanted directly from Rome and the surrounding areas. They were adapted to fit the drier climate of Cyprus.

Firstly, aqueducts had to tap sources farther away. Sometimes multiple conduits were used to feed a city and longer, indirect routes were taken to tap multiple sources. The aqueducts of Paphos, Kourion, and Salamis reach back into the foothills of the Troodos and Kyrenia mountains, a distance ranging from 7 km above Kourion to 40 km from Salamis. In the case of Kourion, the need for two aqueducts perhaps reflected a growing use of water for the nymphaeum and public baths. The Sotira conduit, while the source is only 9 km away, stretches for 22 km, suggesting that it either fed other settlements along the way or it might have needed to tap into other sources. Alternatively, it may have been cheaper and easier to follow the terrain closely instead of building arcade bridges or tunnels to move the water in a more direct route.

All of the aqueducts mentioned rely on a water supply from the mountains. Both of the aqueducts of Kourion draw on sources in the foothills of the Troodos Massif. The aqueduct of Salamis originates in the foothills of the Kyrenia Mountains, about 40 km away. The mountains of Cyprus have a higher average rainfall than the lowlands that surround them, making them the most plausible source for water. Another long-distance water technology, qanats, also supplied fields and. The increased use of qanats suggests an adaptation to the Cypriot environment by the Romans. According to Dale Lightfoot, qanats were not used on Cyprus until the Roman period.\textsuperscript{290} Qanats are especially useful in areas

\textsuperscript{290} Lightfoot 2008.
where the evaporation of water is an issue. Accordingly, the use of qanats shows both influence from further east, like the areas of Syria, Jordan, and Iran and an adaptation on the part of the Romans to increase the water supply in areas where aqueducts are not conducive.

Secondly, storage facilities were needed to supply cities with water throughout the year. Limited hydrological resources require conservation. The cities of Cyprus show that the conservation of water relied on small and large cisterns. The city of Kourion has at least 16 intramural cisterns. These occur both along the aqueduct line and in conjunction with large water users, like the public nymphaeum and baths, and smaller water users like the domestic baths in the House of Eustolios. The larger cisterns near these large water features allow for water to be stowed while the features are not being utilized, like at night, so that water can be used the next day and not cause a great strain on the rest of the system when people use more water. In Salamis, there are at least three large water storage features, one in conjunction with the Bath Gymnasium, one adjacent to the forum, and one under what might be a domestic or religious structure. These storage facilities are the largest known on the island and may reflect a continual high population of Salamis, even when it no longer functions as the political capital of the island. The small number of large-scale cisterns or reservoirs parallels the Near Eastern mainland, which has a similar arid climate to Cyprus (Table 3.1). Like in the Near East, the reservoir-cisterns tend to be smaller and fewer than those in North Africa. Also like, the Near East, there is not a sole reliance on aqueduct supply, as qanats, wells, and cisterns also play a major role in water supply and storage.

Houses are equipped with water storage facilities which doubly act as storage and display features. While there are two cases of domestic baths on Cyprus, one in an elite residence and other in a semi-public residence, none of the houses have small nymphaea.
Instead the houses have pools which could catch and storage rainwater, which is a common occurrence in other places, especially Italy. These pools allow for the house owners to display their wealth by showing off their domestic collection of water, while simultaneously storing the water which could be used for practical needs.

Thirdly, there are fewer grand nymphaeae and public baths, including only one known imperial *therma*. There are only two known large public fountains, nymphaea, on Cyprus and neither of these are in Paphos or Salamis, the two political Roman capitals of the island. They are in Kourion and Soli. This might suggest that the water resources of these two cities could supply the needs of the fountains, especially if the nymphaeum of Kourion is as large as Demos Christou suggests, and is not just two fountains in the larger public bath complex. Public fountains like these are a way to display water and supply the people with drinking water. Thus dual purpose allows for a higher consumption of water without as much lavish waste.

There are also very few public baths in Roman Cyprus, and only one large *therma*. Baths are large consumers of water. They might appear in limited numbers on Cyprus because of the dry environment and tendency towards water conservation. The small baths of Amathus have only a single *frigidarium, tepidarium, and caldarium*. The public baths of Kourion are much larger and more complex. They have a roughly symmetrical layout in terms of the axis on either side of the nymphaeum, however the size and shape of the rooms and even the inclusion of apses vary from one side to the other, perhaps reflecting different building periods. The two public bath complexes of Amathus and Kourion somewhat correlate to the baths in Lycia and Cilicia, as they both contain elements of the row- and long-hall type bath like, rooms in rows and at right angles to each other, and an entrance by
means of a long hall. However the irregularity of the rooms and projecting apses show a variety that is not found in Lycia and Cilicia. In addition, Lycia and Cilicia are not on the normal routes of communication with Cyprus, so perhaps these traditions are stemming from a third location, perhaps Italy because these baths somewhat resemble the simple-row type found at Pompeii or someplace like Antioch, which lies on communication routes for all three of these regions. The large *therma* at Salamis include both a gymnasium and latrine. The gymnasium stems from the Greek tradition and many Roman baths have gymnasium, but in the East, the inclusion of the gymnasium dies out, whereas in Salamis it does not.

However, the *therma* of Salamis lack the axial symmetry found in other places of the empire, like Antioch and large complexes of western Asia Minor, like Sardis and Miletus. Therefore it seems as if Cypriot bath builders are getting some ideas for their baths from nearby areas of the empire, but then changing them to fit their own desires.

Finally, the church also becomes a consumer of water, with large storage features and fountains. The Episcopal Basilica at Kourion has numerous water storage facilities to help provide water to their fountains and baptistery. This church sits on the water supply line that runs through the city. These storage facilities suggest that the church is also concerned with water conservation for at least its own uses. The Episcopal Basilica in Kourion and Campanopetra in Salamis also have water fountains in their atria. These atria fountains are not related to any specific religious ritual, like the baptisteries, but rather associated with refreshment and purification as well as to provide a buffer between the sacred and profane worlds.\(^{291}\) These fountains are polygonal and use pressurized pipes to create spouting water. The fountain of Campanopetra is also surrounded by columns which might have supported a

\(^{291}\) Caraher 2003, 95.
roof. This additional decoration creates an added focus which draws the churchgoers’
attention. The ability to display water marks the church as a wealthy factor in the late Roman
Cypriot society.

Therefore, the water technologies in use in Cyprus during the Roman period suggest
both the reception and adaptation of ideas originating elsewhere. The water technologies of
Cyprus take Roman and Near Eastern ideas and adapt them to the Cypriot climate, landscape,
and taste. The long range water supply systems of Roman aqueducts and eastern-inspired
qanats work together to supply settlements and farmland with water. The storage facilities
work with the supply systems to create a conservative control of the water. The number of
water display features, like nymphae and baths, are less in number than the surrounding
areas and Rome, but they are still relatively large and elaborate. The baths also have mixed
influences from Rome, Lycia, Cilicia, and Hellenistic traditions.

V.2 Caveats and Future Avenues of Research

There have been a number of limitations to my research both of which I knew coming
into the topic, and that aroused once I began. The greatest limitation has been in the
availability of publications and excavation reports. In July 1974, the Turkish invasion of
Cyprus reduced excavation and subsequent publication of materials from sites on the
northern third of the island, including large Roman centers, like Soli and Salamis, both of
which are addressed in this thesis. What is published is often fragmented and incomplete for
certain levels of occupation. Another limitation is the lack of publication of some unoccupied
sites, like Kourion, where excavators like Daniel, McFadden, and Last died before anything
beyond preliminary excavation reports were published. One last major limitation is the
absence of complete discussion of certain features, like wells, in publications. Features like wells are necessary for the understanding of water supply and management on a public and private level. Thus if any of this material becomes available, the analysis done in this thesis will need to be updated. A third limitation is that though I have visited many of these sites, I have not seen and experienced all of the monuments that I have discussed. This has made me rely on plans and the images of others to study these monuments. While plans are very helpful, they only allow the viewer to see what is a few feet off the ground and so does not allow for a full analysis of the building.

This thesis concentrates on how the water technologies in use during the Roman period of Cyprus adapt to the Cypriot environment. Other areas of the empire with similar or different climates can be compared as well, like Egypt and Cyrenaica. This would allow for a more comprehensive understanding of how the Romans utilized water technologies and any Empire-wide trends might become apparent. Equally constructive would be to look at water technologies and consumption in other periods on Cyprus to identify if trends change over time. The economic uses of water should also be looked at in depth. This would clarify how water was used and why certain technologies are in use in different places. This would also allow for a greater understanding of life on the island of Cyprus during the Roman period. Decoration of the larger public water display features was also not addressed in this thesis, mostly due to the poor preservation of most of the buildings discussed. Further examination of the decoration of the nymphaea and baths might clarify architectural and decorative influences on Cypriot architecture. One last avenue of future research is looking deeper at domestic contexts, both elite and non-elite to look further how water is being stored and used at a domestic level, furthering the understanding of everyday life in Roman Cyprus.
BIBLIOGRAPHY

Primary Sources


Secondary Sources


FIGURES AND TABLES

Figure 1.1 Plan of Roman Cyprus. Map generated by Gretchen Stricker.

Figure 1.2 Plan of the site of Paphos. After: Balandier 2012, fig. 01.
Figure 1.3 Plan of the site of Kourion. After: Megaw 2007, fig 1.A.

Figure 1.4 Plan of the site of Amathus. After: Aupert 2000, fig. 03.
Figure 1.5 Plan of the site of Soli. After: des Gagniers 1985, plate C.

Figure 1.6 Plan of the site of Salamis. After: Megaw 1986, fig. 03.
Figure 2.1 Map of water features (grey) and aqueduct remains (blue) leading to Nea Paphos. 34°47.09” N and 32°25’51.91” E. Google Earth. October 23, 2013. February 12, 2015.

Figure 2.2 Path of Kourion aqueducts. Split at Triandafilos indicated in yellow. After Last 1975, Map 01.
Figure 2.3 Kourion aqueduct as it passes stadium showing old and new pipeline. Dotted lines are suggested route of aqueduct but there is no archaeological evidence to support this. After Last 1975, fig 08.

Figure 2.4 Map of Salamis aqueduct with the source at Chytroi, preserved remains, and city indicated. Source: 351324N 334056.33E. Google Earth. February 6, 2015. February 12, 2015.

Figure 2.5 Terracotta pipes from the Kourion conduits. After: Last 1975, fig 07.
Figure 2.6 Cross section and Aerial view of a qanat. After Lightfoot 2008, fig 02.

Figure 2.7 Distribution of qanats in Cyprus. Indicated by blue dots. After: Lightfoot 2008, fig 04.
Figure 2.8 Distribution map of qanats in Cyprus (indicated by dots) with average rainfall and elevation. After: Lightfoot 2008, fig 08.

Figure 3.1 Line of Kourion aqueduct (red) within city and water storage features (blue). After: Last, 1975, map. 2, and Megaw 2007, fig. 1.A.
Figure 3.2 Plan of water distribution in Amathus. After: Aupert 2001, plan 1.

Cross Section

Figure 3.3 Plan of reservoir cistern of Salamis. After: Bauer 1989, fig 07 and 09.
Figure 3.4 Plans of Byzantine Cisterns from Salamis. After: Taylor 1933, fig 02.

Figure 3.5 Plan of Nymphaeum Reservoir at Amathus. After: Aupert 2001, plan 01.
Figure 3.6 Plan of Kourion Fountain House. After: Last, 1975, fig. 09.

Figure 3.7 Plan of the House of Eustolios with cistern highlighted in red. After: Swiny 1982, pp. 132.
Figure 3.8 Plan of House of Theseus. Cisterns are indicated in blue. After: Młynarczyk 1990, pp. 169.

Figure 3.9 Plan of Episcopal Basilica, Kourion with water features in blue and pipes in pink. After: Megaw 2007, fig 1.Z
<table>
<thead>
<tr>
<th>Capacity (m³)</th>
<th>Cyprus</th>
<th>Near East</th>
<th>North Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-25</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26-50</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51-75</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>76-100</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>101-125</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>126-150</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>151-175</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>176-200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>201-225</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>226-250</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>251-275</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>276-300</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>301-325</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>326-350</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>351-375</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>376-400</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>401-425</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>426-450</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>451-475</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>476-499</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500-999</td>
<td>6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1000-2499</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2500-4999</td>
<td>4</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>5000-9999</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10 000-19 999</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>20 000+</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

**Table 3.1** Chart of cistern capacities in Cyprus, the Near East, and North Africa. This table does not reflect all of the cisterns from Cyprus, but only those from the cities mentioned in the thesis. Adapted from Kamash 2013 pp. 102.
Figure 4.1 Plan of fountain at Soli. After: Ginouvés 1985, fig. 12.

Figure 4.2 Plan of Kourion fountain. After: Christou 1996, pp. 51.
Figure 4.3 Plan of the baths in the House of Eustolios. After: Christou 1996, pp. 27.

Figure 4.4 Plan of the Kourion public baths. After: Christou 1994, pp. 51.
Figure 4.5 Plan of the Amathus public baths with rooms labeled. After: Aupert 2001, plan 01.

- N Natatio
- F Frigidarium
- S Sudatorium
- C Caldarium

Figure 4.6 Plan of bath gymnasion at Salamis. After: Wright 1992, fig. 150.
Figure 4.7 Plan of Bath C at Antioch. After: Elderkin 1934, plate V.

Figure 4.8 Plan of baths at Rhodiapolis, Lycia. After: Farrington 1995, fig. 09.
Figure 4.9 Plan of baths at Göcük Asari, Cilicia. After: Hoff 2013, fig 12.15.

Figure 4.10 Plan of public baths at Kourion with series of rows highlighted. After: Christou 1994, pp. 51.

Figure 4.11 Impluvium in the House of Dionysos, Paphos with hunt mosaics. After: Kondoleon 1994, fig. 4.
Figure 4.12 Plan of the phiale in the atrium of the Episcopal Basilica at Kourion. After: Megaw 2007, plate 1.X.

Figure 4.13 Plan of the phiale in southwest court of the Episcopal Basilica at Kourion. After: Megaw 2007, fig. 1.N
Figure 4.14 Plan fountain at Campanopetra, Salamis. After: Roux 1998, plan 03.

Figure 4.15 Reconstruction of the fountain at Campanopetra. After: Roux 1998, fig. 65.