University of Southampton

Humanities

Archaeology

The Changing Maritime Landscape of the Akrotiri Peninsula (1650 BC – AD 650)

By

Annabel Crawford

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Abstract

The purpose of this study is to assess the changes in the geomorphology and archaeology of the Akrotiri peninsula during antiquity. By pulling together results from relevant investigations, I was able to assess the current state of knowledge, produce new hypotheses and offer recommendations for future research. This is the first time the geology and archaeology of the entire peninsula has been considered at all, let alone together, but the current interdisciplinary approach at Dreamer's Bay and other locations across Cyprus paves the way for similar investigations at sites on the peninsula. Before that can happen, a summary of knowledge must be created from which to move forward.

Research determined that interdisciplinary approaches had rarely been taken, although geological and archaeological material did exist separately, and in some cases overlapped with each other. The visibility of maritime activity increased throughout the study period, reflecting the general increase in the activity itself. A shift from the archaeologically ephemeral proto-harbours to engineered harbours occurred, although these proto-harbours still likely existed in areas of localised or smaller-scale activity. The settlements around which maritime activity and culture existed also grew across the periods despite occasional troughs, such as that which occurred at the end of the Late Cypriot period. The geological changes during this period were determined not to be as straightforward as the formation of the peninsula. The peninsula experienced subsidence, erosion and large amounts of sediment transport which although is not completely understood, certainly affected the ancient maritime landscape.

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Declaration of Authorship

I, Annabel Crawford

declare that this dissertation and the work presented in it are my own and has been generated by me as the result of my own original research.

The Changing Maritime Landscape of the Akrotiri Peninsula

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7. None of this work has been published before submission:

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Date: 19/09/2016

Acknowledgements

Despite the small and independent nature of this project, there are a number of people who must be thanked for their help in its execution. My supervisor, Dr Lucy Blue, has found time in her busy schedule and large number of supervisees to give me advice and deal with the odd existential crisis. The staff at Anthony's Garden House in Episkopi made my stay comfortable and ensured I always had a glass of cold fruit juice while I worked in the courtyard. Volunteers and staff at the museums in Cyprus were friendly and informative, particularly Eleni …. At Kourion Archaeological Museum in Episkopi, the Limassol Archaeological Museum – who leant me books and reports, and allowed me to work in there – and the archaeological student (whose name I did not note) at Amathus who gave me some information on the current excavations. All the Department of Antiquity attractions – Kolossi Castle, Limassol Castle, Choirokoitia– permitted me to enter for free due to my student status and were happy to chat about my project. Unpublished reports and data were kindly provided by those I pestered, namely Dr Lucy Blue, Dr Stella Demesticha, Dr Simon James and Arthur De Graauw. Funding was provided by the University of Southampton, without whom I would not have been able to travel to Cyprus. Closer to home, I was able to have valuable discussions with course mates, friends and family that helped me work through my ideas and gave me support. In particular, thanks go to James Brown, who gave me advice about geological features and geomorphological processes, while Richard Strathie helped me look at the archaeology in ways I had not considered. My family and staff at the University – particularly my tutor, Julian Whitewright and Lucy Blue - have been patient and understanding through the health issues that have – at times – affected my ability to conduct this project. The completion of this dissertation is a testament to their support.

Using this Volume

Acronyms

AD	Anno Domini
ASL	Above Sea Level
BC	Before Christ
BP	Before Present
c.	Circa
CA	Cypro-Archaic
cal. BP	Calibrated years before present
CC	Cypro-Classical
CG	Cypro-Geometric
EC	Early Cypriot
GPS	Global Positioning System
km	Kilometres
LC	Late Cypriot
LR	Late Roman
m	Metres
MC	Middle Cypriot
m.y.a.	Million years ago
MSL	Mean Sea Level
RSL	Relative Sea Level
WSBA	Western Sovereign Base Area
WSBAAS	Western Sovereign Base Area Archaeological Society

Italics

Italics are used throughout to distinguish between modern settlements and archaeological sites within them. The non-italicised word denotes the modern name, while the italicised word is the ascribed or ancient name for the site. For example, Episkopi-*Bamboula* and Episkopi-*Phaneromeni* are both located in the village of Episkopi, but have been excavated as two separate, archaeological sites.

Glossary

Aeolian	Relating to the wind, i.e. aeolian erosion or aeolian deposition.
Alluvial fan	The fan-shape created by the hydrological processes at work when sediments are carried to the mouth of a river.
Alluvium	Unconsolidated sediments that have been transported and deposited down-river e.g. clay, sand.
Athalassa Formation	A formation of Plio-Pleistocene sedimentary rocks, composed of **calcarenites** and layers of sandy **marls**.
Aquifer	A layer of permeable rock, in which groundwater can be held or circulated.
Bedrock	The layer of rock that forms the earth's surface. It can lie exposed or hidden beneath deposits of unconsolidated sediments.
Bluff	A promontory or ridge with steep cliffs.

Calcarenite	A clastic limestone, dominated by carbonate grains that have been transported and consolidated.
Coastal regression/ Marine transgression	The movement of the coastline – due to changes in sea level or the land surface – inland.
Coastal progradation/ Marine regression	The movement of the coastline – due to changes in sea level or the land surface out to sea.
Colluvium	Unconsolidated sediments that have collected at the base of a hill. Caused by processes such as downslope creep and sheet erosion.
Drainage basin	An area in which water from the watershed collects, usually feeding into a river or another waterbody.
Eustasy	A global change in the volume of water in the oceans, caused by the melting and formation of glaciers.
Geoarchaeology	The use of earth sciences to help form archaeological interpretations.
Geomorphology	The study of processes that change the geographical features of the earth.

High cliffs	A repetitive process in which high, coastal cliffs of strong bedrock are eroded by **sub-aerial erosion**, then collapse.
Intended coast	A repetitive process in which low-lying coast composed of soft bedrock is undercut by wave erosion, causing the rock to collapse and form coves.
Longshore drift	The transportation and deposition of sediments along the shoreline.
Marine terrace	The geological remains of an ancient beach that has been raised above sea level due to a drop in sea level or tectonic **uplift.**
Marl	A lime-rich (carbonate) mudstone.
Ophiolite	A sub-marine, igneous rock which formed part of the oceanic crust, before it was raised above the water. It is the source of copper on Cyprus.
Pakhna Formation	A formation of Miocene sedimentary rocks, composed of chalks, **marls** and **calcarenites.**
Palaeo-	A prefix denoting an ancient version of the subject noun. E.g. Palaeochannel, palaeocoastline, palaeogeography.

Pillow lava	The lowest units of **ophiolite**. The pillow-shaped rocks form when lava escapes through gaps in the crust and cools in the water.
Proto-harbour	A place in which harbour activity – e.g. anchoring, unloading goods, repairs – takes place, yet there are no built structures such as piers or jetties.
River terrace	The geological remains of an ancient river that has been raised above the modern river due to downcutting.
Sabkha	A coastal flat that accumulates sediment due to a process of flooding and evaporation.
Salt-lake	A layer of salt left behind following the evaporation of water in a salt-water body.
Sediment starvation	When sediment is no longer deposited in an area, changing the balance of hydrogeological processes.
Sediment yield	The amount of sediment gathered, i.e. in a dam
Sub-aerial erosion	A general term for the weathering of rock**,** including **aeolian** and wave erosion
Subsidence	The lowering of the land surface due to **tectonic** activity

Tectonic	Relating to the earth's crust and its morphology
Terminus Post Quem	The latest date possible for an event, usually determined in archaeology by the dating of an artefact
Terminus Ante Quem	The earliest possible date for an event, usually determined in archaeology by the dating of an artefact
Tombolo	A spit that connects an island to the mainland
Uplift	The raising of the land surface due to tectonic activity
Vertical displacement	A general term for the vertical tectonic movement of the crust. See **subsidence** and **uplift**

A note on maps

I was not able to produce the number of maps relating the geomorphology to the archaeology that I had hoped. On one hand, this is a shame, as they would have supported my arguments. On the other hand, I have saved myself from severe criticism regarding the lack of data and large amount of guess work used. The maps that I have produced do not accurately depict data, but were deemed necessary to visualise my interpretations. All maps were drawn using ArcMap 10.3.1 using basemap data from ESRI and additional layers from the INSPIRE portal (see more below) and other sources. It was not possible to edit the symbology in the INSPIRE layers, so I have had to accept their chosen colour schemes. All ArcMap figures have credits on the satellite imagery itself, while additional sources are credited in the caption below.

Chronology

Chronology is difficult in Cyprus and has evolved its own terms. I have chosen to use a combination of chronologies that best suit the date range of my study, separating periods of focus into sub-periods where appropriate[1]. Chronology should be only used to make the amount of data manageable and distinguishable, not to define any period as its title. The boundaries should be considered modern impositions and blurry at that, it is not a purpose of this dissertation to dispute chronology and their labels.

Epipalaeolithic/Akrotiri Phase	10,900 BC – 9000 BC
Neolithic	9000 BC – 3900 BC
Chalcolithic	3900 BC – 2500 BC
Bronze Age	
Early-Cypriot	2500 BC – 1900 BC
Middle-Cypriot	1900 BC – 1650 BC
Late-Cypriot	1650 BC – 1050 BC
Iron Age	
Cypro-Geometric	1050 BC – 700 BC
Cypro-Archaic	700 BC – 475 BC
Cypro-Classical	475 BC – 325 BC
Hellenistic	325 BC – 58 BC
Roman	58 BC – AD 300
Late Roman/Early Byzantine	AD 300 – AD 650
Byzantine	AD 650 – AD 1191

[1] Chronology taken primarily from the Keily (2016), Leonard (2005) and Sollars (2005). See specific texts for their respective sources.

Medieval	AD 1191 – AD 1571
Ottoman	AD 1571 – AD 1878
Modern	AD 1878 - Present

The following geological eras, periods and epochs are relevant to this dissertation. The chronology was derived from the British Geological Society (2016), rounding to whole numbers above 10 m.y.a, one decimal place above 1 m.y.a and allowing four decimal places for the Holocene.

Cenozoic		
	Quaternary	
		Holocene 0.0117 m.y.a
		Pleistocene 2.6 m.y.a
	Neogene	
		Pliocene 5.3 m.y.a
		Miocene 23 m.y.a
	Palaeogene	
		Oligocene 34 m.y.a
		Eocene 59 m.y.a
		Palaeocene 65 m.y.a
Mesozoic		
	Cretaceous	145 m.y.a
	Jurassic	199 m.y.a
	Triassic	251 m.y.a

1: Introduction

1: The location of Cyprus (circled) in the Eastern Mediterranean

The first rocks of Cyprus broke the surface of the Mediterranean Sea c.20 million years ago, where they have remained separate from the continental mainland ever since[2]. All visitors to the island – including animals - until the advent of the aeroplane had to travel there by crossing the sea from the continent, a journey still taken by many today. Its position in the Eastern Mediterranean (fig.1) - particularly its proximity to the Middle East - has been exploited by settlers, refugees and invaders for at least 12,000 years, most recently by the British who retain two Sovereign Base Areas on the island[3]. The cosmopolitan make-up of Cyprus – today epitomised by road signs in Greek, English, Arabic and Russian – is a result of its island nature and a long, rich maritime culture.

[2] Geological Survey Department (2016a)
[3] One on the Akrotiri peninsula and another at Dhekelia. More information available at: http://www.sbaadministration.org/

2: The study area in Cyprus

The earliest – albeit, indirect - evidence we have of this culture was discovered on a southern cliff of the Akrotiri peninsula, named *Aetokremnos* or "Eagle-cliff" (fig.3). The peninsula (fig.2) is one of the most recognisable features of Cyprus, being the only peninsula of its size in the south west of the island. It is a low-lying area of ground, ranging from -2m below sea level (BSL) in the interior to 58m above sea level (ASL) in the south [4]. These points represent the two geological features that dominate the peninsula: the salt-lake and the Akrotiri rise. It is on the latter that evidence of burning was discovered in the 1980s, demonstrating that humans had sailed to Cyprus from the mainland at some point before. At this time however, *Aetokremnos* would not have been a highly-eroded, coastal cliff, but a cave nearly 1km from the southern coastline, with sand dunes and a low-lying beach in-between[5]. Millennia of vertical displacement and changes in Eustatic sea level have since submerged this palaeolandscape, while erosion has caused the collapse of the cliff and rock-shelter[6]. This site is a fitting example of how geomorphology can influence our interpretations of the site, just as the palaeogeography would have influenced contemporary human activity. The work at *Aetokremnos* was not revolutionary in recognising the geomorphology of the Akrotiri peninsula, but it was one of the earliest studies to appreciate the impact such an understanding would have on archaeological interpretations.

[4] James and Score (2015), 4-5. Wessex Archaeology (2002), 16. ESRI world topographic map data via ArcGIS 10.3.1
[5] Ammerman and Noller (2005). Simmons and Mandel (2007). Simmons (2013)
[6] Ammerman and Noller (2005), 539 fig.1

Despite this, our understanding of the peninsula's geomorphology and its relationship to- and interpretations of human activity is still lacking and very often only site-specific[7]. It is these issues that this project will address, aiming to pull together existing knowledge to produce a comprehensive analysis of the geomorphology of the peninsula and the changes to the maritime landscape. A number of introductory sections (Chapters 1-3) were deemed necessary to provide sufficient context for the reader. The assessment of evidence is separated chronologically, moving through time from the Late Cypriot (Chapter 4), Cypro-Geometric, Cypro-Archaic and Cypro-Classical (Chapter 5) and Hellenistic-Roman periods (Chapter 6). This was determined (by trial and error during the writing process) to be the best method of managing and presenting the information, because it would lead the reader through the developments of all the sites and aspects of the maritime landscape chronologically and split the evidence into manageable and appropriately grouped periods of time. Conclusions are provided at the end of these chapters to draw focus back to the study area as a single, fluid sphere of activity, rather than a collection of isolated sites. See Chapter 2 for further discussion of the ephemeral nature of the maritime landscape.

Archaeological Summary

The earliest human activity in the study area has been recorded at Akrotiri-*Aetokremnos* on the southern coast of the peninsula. The evidence gathered from the collapsed rock shelter dates demonstrates human activity during the 10th millennium BC, the earliest for the entire island. Evidence for occupation following this has been found at Trakhoni-*Vounaro* and lithic scatters around the peninsula, but there was to be nothing south of the lake – then a lagoon open to the sea on its eastern edge - until the Cypro-Archaic (CA)[8]. A single, Chalcolithic settlement existed at Erimi-*Pamboula*, but during the Bronze Age there were numerous sites, located along the Kouris (the Erimi and Episkopi settlements), by the lagoon (Asomatos-*Phasouri*) and the coast of modern-day Limassol (numerous burials). This period saw trade connections flourish with Greece and the Levant, largely driven by the mining of copper on

[7] See Chapter 3 for my definition of the term "Landscape" and Chapter 2 for an assessment of the existing literature on the topic.
[8] Anchors at Dreamer's Bay have been tentatively dated to the Bronze Age, but that is the extent of the evidence (see Chapter 4).

the island. When sites were abandoned island-wide at the end of the Late-Cypriot (LC), the same phenomenon affected the study area, although there is a small amount of evidence indicating human presence at Erimi, Kaloriziki and Limassol during the Cypro-Geometric (CG). Maritime communications with the Aegean increased during the Iron Age, visible in the artefacts found on and around the bluff of Kourion, which had grown to become a powerful city and the seat of the King of Kourion by the Cypro-Classical (CC)[9]. There is no material on the peninsula's main body during this period, besides scatterings of pottery on the sea floor at Cape Zevgari[10]. The island experienced foreign dominance from powers to the north, south and east during the Iron Age, and only when Ptolemy emerged as Alexander the Great's heir and took control of Cyprus at the end of the 4th century BC, did human activity return to the peninsula. It is as yet unclear whether this shift was related to the political activity of the time or not (see Chapter Seven), but archaeological evidence has been found on land and under the sea on all sides of the peninsula, including the salt-lake. Kourion was spared Ptolemy's wrath and continued to prosper as a city throughout the Roman period. The first evidence of substantial activity occurring in Limassol dates to the Late Roman period and it appears as the Bishopric of Neapolis in a 6th century text[11]. The southern end of the peninsula also flourished, with the building of a number of settlements and a harbour, all of which were in use until the 3rd century tectonic activity and Arab raids that began in the 6th century AD, a phase of activity which led to another period of decline across the island and the study area.

Excavations in the Study Area

Locals, travellers and antiquaries had discovered a number of the sites in the study area long before the development of modern (i.e. scientific and systematic) archaeology in the 19th century. The bluff of Kourion and the sites along the Kouris River have been studied by antiquaries and archaeologists alike, most recently as part of the Kouris River Valley Project. Although the structural remains of Kourion are no earlier than the 7th century BC, artefactual evidence indicates that the bluff was occupied long before. The sites of the Kouris River

[9] H. Swiny (1982), 89
[10] Leidwanger (2005), 135
[11] Alpe (2015), 51

Valley project – of which Erimi and Episkopi are in our study area - demonstrate continuous occupation in the area from the Neolithic, although most structural remains date to the Bronze Age. The harbour wall of Kourion was subject to a short survey by Leonard during the 1990s as part of his larger PhD project (Leonard, 2005). Four core samples – with inconclusive results[12] - were taken, but otherwise the geoarchaeology was not investigated. In contrast to Kourion and the Kouris River, Limassol and its river bodies have received very little archaeological attention. This is largely due to the rapid development of the city following the Turkish invasion of 1974, since which archaeological activity has been limited to rescue excavations. Although this is not the manner in which archaeologists would have liked to conduct their investigations of the city, structures and artefacts have been discovered dating from the Bronze Age onwards.

On the peninsula proper, the first and most significant was Last's investigation of the peninsula in 1954, commissioned by the British Army who were to build a base there and did not want to build upon archaeological remains. He identified 18 sites that demonstrated occupation of the peninsula since at least the Hellenistic period, although excavations in the following decades would widen that date range. LBA burials were discovered by the lake-side village of Asomatos in 1962, Aceramic Neolithic artefacts were noted nearby at Trakhoni-*Vounaro* in 1980, and a Late Epipaleolithic (c. 12,000 cal. BP) site on the southern coast – Akrotiri-*Aetokremnos* – has been studied since the 1980s[13]. Most of the evidence however, continued to be concentrated during the Hellenistic and Roman periods, and it is these periods with which most projects on the peninsula are concerned with. Following a period of inactivity, the Department of Antiquities and partner institutions have resumed excavations on the peninsula. In 2002, Wessex Archaeology undertook an archaeological assessment on the western portion of the salt-lake highlighted geological and archaeological features of interests, particularly a previously unknown harbour wall at Tarratsos and the mole at Dreamer's Bay, which had been first spotted in aerial photography during the 1980s but did not receive much attention until the 21st century[14]. It also drew attention to the observations made by the Western Sovereign Base Area Archaeological Society (WSBAAS), such as the remains of lake-side structures, which were further investigated by Sollars (2005).

[12] Leonard (2005), 559
[13] Simmons (1988, 1991, 1999, 2004, 2013)
[14] James and Score (2015), 5.

Work of the US/Canadian project driven by Leonard and Demesticha's investigations of the early 2000s was limited due to unfortunate circumstances and did not undertake any excavation. However, they were able to clean and record a number of features, conduct some (limited) geophysics and commence survey of the underwater remains from Dreamer's Bay, around Cape Zevgari and along Episkopi Bay (Leidwanger, 2005). Following a gap of 5 years, the University of Leicester returned in 2015 for the first season of fieldwork for the Ancient Akrotiri Project. A partnership with the University of Southampton ensured that for the first time, the archaeological approach could be accompanied by geoarchaeological analysis.

Literature Review

The purpose of this literature review is to provide the reader with context of the study and the gap in research that shall be addressed. This approach was favoured over the creation of a detailed summary of work, which would not provide as useful a foundation for the reader, due to the unique approach of this project. A brief summary of investigations will be included at the end of this chapter, but the primary focus will be on the literature relevant to this project. Although this study aimed to use the best sources available, the nature of research on the Akrotiri peninsula means that some topics have not been revisited since the 1950s.

The maritime landscape of Cyprus exists within the larger context of the Mediterranean. Blackman wrote an overview of the ancient harbours in 1982, although the quantity of investigations undertaken since then make these volumes dated. In 2011, De Graauw created a database of ancient ports and harbours in the Mediterranean with relevant data and an associated online portal in which one can use an interactive map to visualise and investigate sites[15]. The connections Cyprus had with ports in the Mediterranean – particularly the eastern part - has been explored in period-specific articles[16], in addition to larger scale studies

[15] De Graauw (2016). Access via: http://www.ancientportsantiques.com/
[16] Knapp (1990b, 2007, 2010, 2012, 2016) is a key author for the connections of Bronze Age Cyprus and the Mediterranean. Broodbank (2006) offers a summary of the earliest seafaring in the Mediterranean.

by Ammerman (2012), Swiny et al., (1997), Karageorghis and Michaelides (1995) and the Pierides Foundation[17]. Frost's engagement in maritime archaeology of the Eastern Mediterranean, especially her work on proto-harbours (1972, 1995) is particularly valuable for periods of maritime activity when built harbour structures were not used. Blue (1997) and Zomeni (2012a) and Leidwanger (2013) are among a number of academics who use this concept to approach Cyprus and the Mediterranean during the Bronze Age.

No single text provides comprehensive analysis of the changing maritime landscape of either the Mediterranean or Cyprus, most likely because it is a gargantuan task that requires much more understanding than we currently possess. Our understanding of how to approach archaeology of the maritime landscape has improved with the increasing amounts of underwater survey and geological understanding within archaeology. Marriner and Morhange (2006, 2007 with Carayon) have written articles – one of which sets out guidelines – about the use of geosciences in maritime archaeology of the Mediterranean. Butzer and Harris (2007) analyse the use of geoarchaeological techniques in creating an environmental history of Cyprus, although this does not have a maritime focus.

There has been sufficient investigation to understand Cyprus' place in the geological framework of the Mediterranean (i.e. Krasheninnikov et al. 2005) and the specific geology of Cyprus is reasonably well understood and published by its Department of Land and Surveys[18] and Geological Survey Department[19]. The former created the Inspire portal, with 142 spacial resources including aquifers and bedrock geology[20]. However, Flemming's work on the vertical displacement of the island[21] - now nearly 40 years old – is still used as a basic source of figures for geologists and archaeologists.

Analysis of the maritime landscape in Cyprus has generally been limited to a single site/region or period of time (i.e. Roman, Bronze Age) and even then there are temporal and

[17] "Crossings: Movements of People and Movement of Cultures: Changes in the Mediterranean from Ancient to Modern Times". More information via: http://www.pieridesfoundation.com.cy/main/default.aspx?tabid=56
[18] Access via: http://portal.dls.moi.gov.cy/
[19] Access via: http://www.moa.gov.cy/moa/gsd/gsd.nsf
[20] Access via: http://inspire.cyprus.moi.gov.cy/geocatalog/
[21] Flemming (1978)

spacial gaps. The University of Cyprus' M.A.R.E Lab is currently working to address these with its project "Sailing in Cyprus through the Ages", in which it will take the multi/interdisciplinary approach that archaeology in Cyprus needs[22]. Our understanding of the maritime landscape in Cyprus is heavily biased towards the Hellenistic and Roman periods, largely because of the extant remains of shipwrecks and built harbour structures. Leonard (1995, 2004 [with Demesticha], 2005) and Leidwanger (2013) have addressed this period, with Leidwanger delving deeper into the theoretical aspects of the maritime landscape. However, a lack of direct evidence has not entirely dissuaded archaeologists from engaging with other periods and topics; prehistoric - particularly Bronze Age – seafaring in Cyprus has been considered by Knapp (2010) and Georgiou (1997), while Mayer et al. (2015) and Murray (1995) have conducted investigations on ancient winds and sailing routes. As yet, there is no comprehensive text on the geology, maritime archaeology or the development of these on the Akrotiri peninsula, although Deckers took "an alluvial geo-archaeological approach" in his PhD thesis concerning the archaeology of Western Cyprus[23]. Archaeological summaries of the area have been written by Heywood (1982), the Western Sovereign Base Area Archaeology Society (WSBAAS) (1995) and Sollars (2005) and attempts have been made to explain the geology most recently by Wessex Archaeology (2002) Ammerman and Noller (2005) and Salomon (2015). The use of the word "attempts" is not to insult the investigations of those above, but to portray the lack of data and knowledge we have about the formation of this geological feature and the rivers that bookend it.

[22] Access via: https://www.ucy.ac.cy/marelab/en/research/sailing-in-cyprus-through-the-ages

[23] Quotation taking from the title of Deckers (2002). His research covered a broader time period and laboratory-based analysis of alluvial sediments.

Project Objectives and Limits

There are three main research questions fundamental to this study:

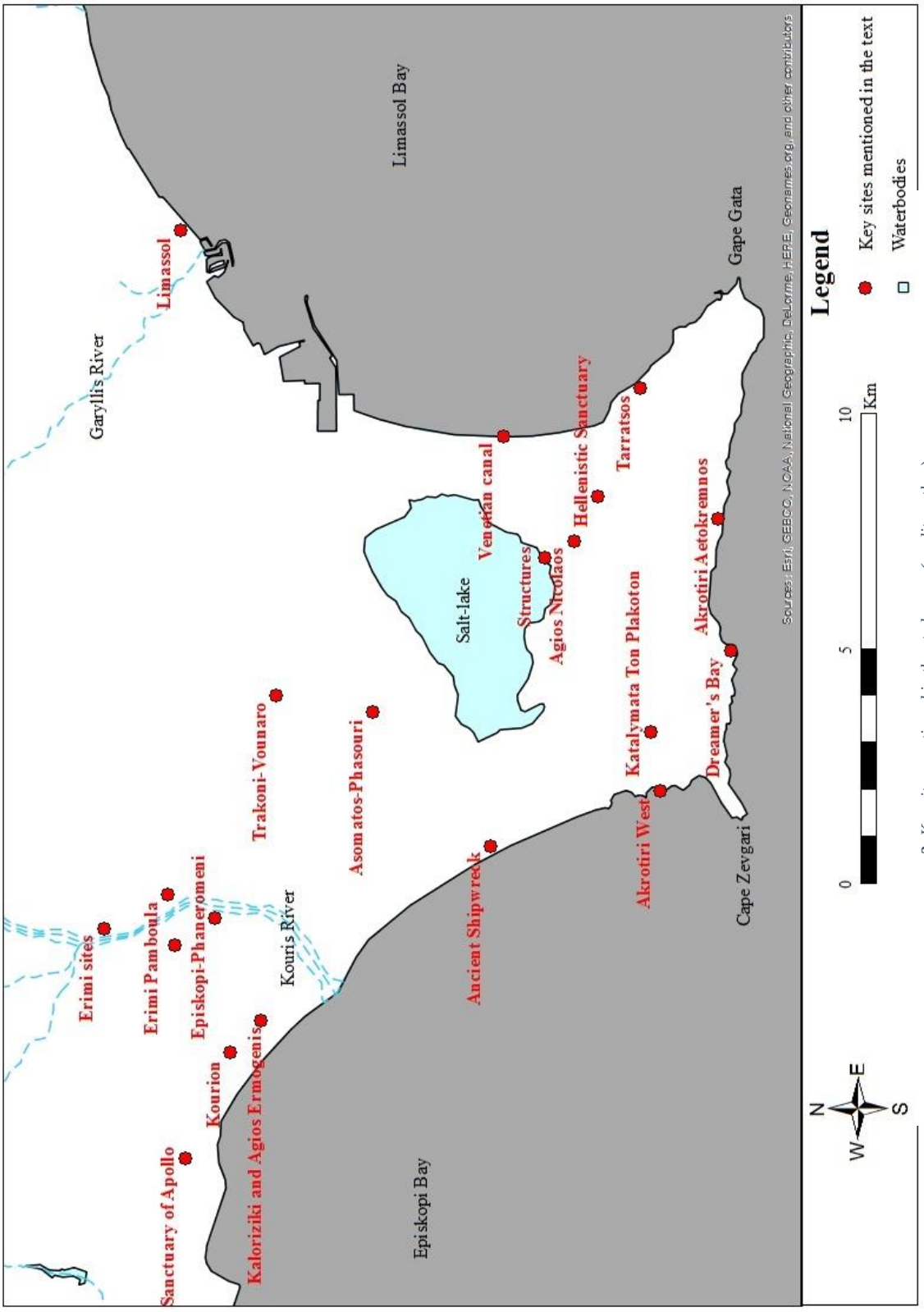
1. How did the maritime activity change?

2. How did the physical environment change?

3. How did these combine to create a fluid, dynamic, maritime landscape?

To answer these questions in sufficient detail, it was essential to determine temporal, spacial and theoretical limits, the latter of which will be explained in the following chapter. Temporally, I set the date range as the Late Cypriot (1650 BC) to the Late Roman (AD 650). Originally the time range extended from the Early Cypriot through the whole of the Bronze Age until the Late Roman, but this was too ambitious for a Masters dissertation. The reduced range of 2000 years allowed me to cover periods of rapid geological, technological and social change.

The spatial limits of the study were also reduced from their original boundaries, which had been defined by the City-Kingdoms of Amathus and Kourion. Amathus' physical distance from the peninsula removed it from the significant changes in the maritime landscape, both physical and cultural, so I determined to concentrate the focus on the geological boundaries of the peninsula (fig.3). This brought to light two key geographical and archaeological boundaries; the Kouris River and Kourion to the west of the peninsula and the Garyllis and Limassol to the east (figs.3 and 4). These pairs mirror each other by occupying the curves of land where the peninsula grows from the coastline, fed by the sediments of the rivers. They also pose severe juxtapositions, the Kouris River and Kourion being powerful, well-studied entities, while the Garyllis River is smaller in size and flow, as little studied for its significance in societies past as Limassol, largely due to the immense development that has taken place in the area since the invasion of Turkey in 1974. There are other watercourses in the area, but due to the limitations of this study I decided to focus on the two major ones.



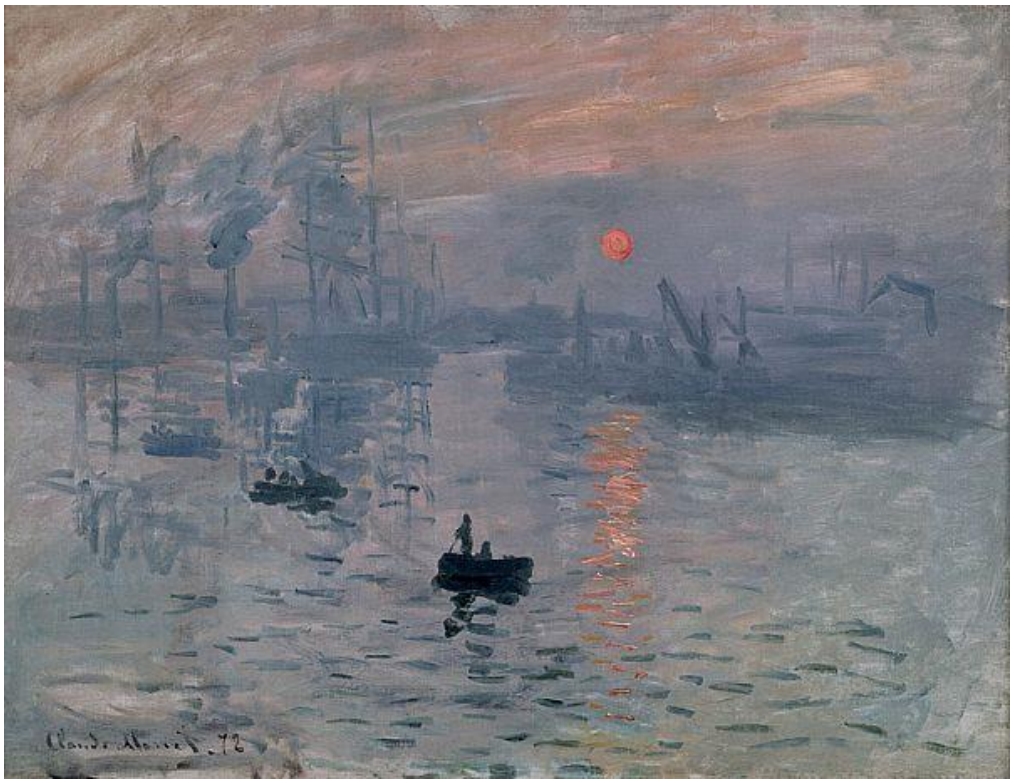
3: Key sites mentioned in the study area (credit: author)

4: The mouth of the Kouris River (top) is wide and surrounded by agricultural land. The Garyllis River is narrower and has been severely impacted by the urban development of Limassol.

2: Theory and Methodology

What is a Maritime Landscape?

Clarification of this dissertation's research question is essential to understanding the approach that I have taken, as the interpretations in the following chapters are built upon the theoretical conclusions presented below. I shall define and analyse the phrase and associated theoretical approaches, and what role they have played in this project. Although maritime and landscape are etymologically at odds – the stems *mare* and *land* demarcating contrasting geographic entities, there is an accepted amount of overlap between the two. Maritime climates such as Britain's extend hundreds of kilometres inland and landscape paintings do not omit the sea (fig.5)[24]. An open approach such as this allows the entities to blend, defining a maritime landscape - in its most basic sense – as the perceivable (e.g. visible, audible, tangible) features in a space where activity linked to the sea takes place.



5: Claude Monet's famous painting of a the harbour landscape of Le Havre, France (1872). Held a: Musée Marmottan Monet, Paris.

[24] Met Office (2012). A Google Image search of "Landscape" (accessed: 14/09/2016) returns a gallery in which the sea and other water bodies are present in the majority of images.

Archaeological Theory and the Landscape

This interpretation becomes problematic when applied to archaeological theory, due to the abstract nature of "landscape". As a landscape is an ephemeral network created by- and existing in the human mind, it cannot exist independently in a quantitative form. Whereas land is "quantitative and homogeneous" and can be marked on a map, landscape is "qualitative and heterogeneous"[25] and exists without physical boundaries that can be marked. Conducting research within this unquantifiable entity is therefore impossible, unless one resolves to look at the landscape that exists **within** a space, rather than treating landscape **as** a space.

This interpretation of landscape undermines the use of "seascape", which sometime used instead of landscape when discussing maritime activity[26]. Although seascape might be more appropriate when used in the context of the open sea, the very act of separating the physical entities of land and sea into "scapes" conflicts with the very essence of landscape, in which boundaries are created by the human consciousness, not physical features.

Cobb and Ransley (2016) question the use of both "seascape" and "landscape"[27]. They argue that it is a "modern, Western need to atomise and categorise people's experience of the world" that creates boundaries where there are not[28]. Although I agree with their argument, my interpretation of landscape is not exclusive to physical boundaries such as land and sea, which is the case with those they criticise. As landscape does give the impression of activity solely on or near land, I should perhaps use another term, such as "coastscape". However, I find this even more limiting, as even though it bridges the gap between land and sea, it ignores activity away from the coast in both directions, whereas landscape ignores only one. Rather than be bogged down in semantics, I have chosen to use my interpretation of landscape, which is so loose that it might one day easily be replaces by a more suitable word.

[25] Ingold (1993), 154
[26] Cooney (2003) and Brown (2011)
[27] Cobb and Ransley (2016), 6
[28] Cobb and Ransley (2016), 1

Maritime Culture and Landscapes

A "maritime culture" is a culture – the ideas, customs and social behaviour of a group of people or a society – which grows from maritime activity. This includes sailing routes, traditions, knowledge and technology, harbour infrastructure on land and sea, fishing ships and their cargo[29]. Notably, it comprises the abstract and physical, features man-made and natural, at sea or on land[30]. However, just as "landscape" has no physical boundaries and "maritime" entities and activity can be found inland, "culture" cannot be assigned a permanent location. The features that make up a culture, from people to knowledge, goods to traditions, can move far away from their place of origin, particularly if they travel hundreds of kilometres across the lands or sea. At what point do they no longer represent maritime culture? To solve this issue, I shall impose physical boundaries in which I can look at the culture, focussing on the "transit points" along the coast, where land, sea and culture met[31].

Cognitive Landscapes and Maritime

In Westerdahl's words, a "cognitive landscape" is:

> "the mapping and imprinting of the functional aspects of
> the surroundings in the human mind.
> Man in landscape. Landscape in man." [32]

This is a useful theory for understanding mariners, who must remember the daily and seasonal conditions of a route in order to pass through safely, or where the nearest or safest point of anchorage is located[33]. Cognitive landscapes will change not merely by the hour, day or month, but generationally, as geomorphological processes require new ones to be formed. Notably, this definition focuses on that which is concrete in the mariner's landscape, not the cultural. My interpretation of cognitive landscapes extends to the mariner's knowledge about

[29] Derived from Westerdahl (1992), 6
[30] Cobb and Ransley (2016), 3
[31] Westerdahl (1992), 6
[32] Westerdahl (1992), 5. Making reference to Lofgren (1981)
[33] Frake (1985), 255

which port will be best for trading their cargo, which settlement has the best beer, and where on the route they risk meeting pirates.

Why I Went to Cyprus: Phenomenology, Cognition and Research techniques

Another theoretical issue I was confronted with at the beginning of the project was raised when I was considering the benefits of visiting the Akrotiri peninsula to conduct research. Phenomenology – the study of how humans experience their surroundings - was my first port of call to determine the worth of such a trip. As explained above, a landscape does not exist in maps but the minds of those who perceive it, so to understand the landscape I would have to experience it. Contour maps and 3D walk-throughs can simulate a visual landscape, but is not comprehensive enough – particularly in relation to the senses – for an archaeologist to appreciate the full extent of it. Therefore, I determined that my best hope of understanding the landscape – albeit a modern version of it – was to take a phenomenological approach and immerse myself in it. In this manner I could also interpret the cognitive maritime landscape. Geography, charts and other manners of understanding the topography and environment of an area were helpful sources during my research, however, they were limited in what I could learn. Experiences such as swimming in the sea, climbing the acropoleis and merely taking in the landscape with all my senses, enabled me to take archaeological and geological data off the page and into the real world, thus moving from a view of space to a view of the landscape and an appreciation of it was translated into a cognitive landscape.

Conversations with local archaeologists, and fisherman, in addition to “going for a wander” led me to archaeological and geological areas of interest that I would not have known about or found otherwise. The physical data collected during this trip consisted of photographs, videos, written observations and precise locations of sites or features visited. I used a Sony NEX-5R Digital Single-Lens Reflex (DSLR) camera for terrestrial photography and a FUJIFILM FinePix XP80 underwater camera for underwater videos and photos. Some photos were also taken on my iPhone 6s, as were all GPS coordinates and Google Maps locations. Key features to document at sites were (fig.6):

- Structural features e.g. walls and harbour moles (including ruins of rubble or ashlar blocks)
- Pottery scatter
- Worked stone e.g. Anchors, millstones
- Evidence of the exploitation of natural features e.g. quarries, tool marks
- The natural environment and human processes that might influence it
- Indicators of ancient geology i.e. shells, stratigraphic layers
- Location (either via Google Maps or exact GPS co-ordinates). Altitude was taken with the iPhone app EasyGPS v2.2.1

In addition to complimenting my research, this data was considered an important update of the existing catalogue. The quality of photography and videography – not only underwater – has improved greatly since a number of the excavations and surveys took place. I plan to update the visual record with colour and high-quality photographs and videos, which will all be made open access via various online platforms.

Conclusion

A number of theories relating to this dissertation have been explained and analysed, yet the reader will observe from the title that the simple phrase of "maritime landscape" has been chosen. As explained above, auxiliary terms can narrow focus, create imaginary boundaries and very real research restrictions, all of which I would like to avoid. Although some boundaries were required to make this research manageable, adding to "maritime landscape" would have been unnecessarily restrictive. This "maritime landscape" should be understood– for the purposes of this dissertation – as a network of abstract and physical entities related to the sea, perceivable by humans, but existing due to their cognitive tendencies.

6: Examples of the features I recorded: a geological feature near Episkopi (top) and the masonary of the Venetian canal, Lady's Mile (bottom). Credit: author

3: Geology and Geomorphology

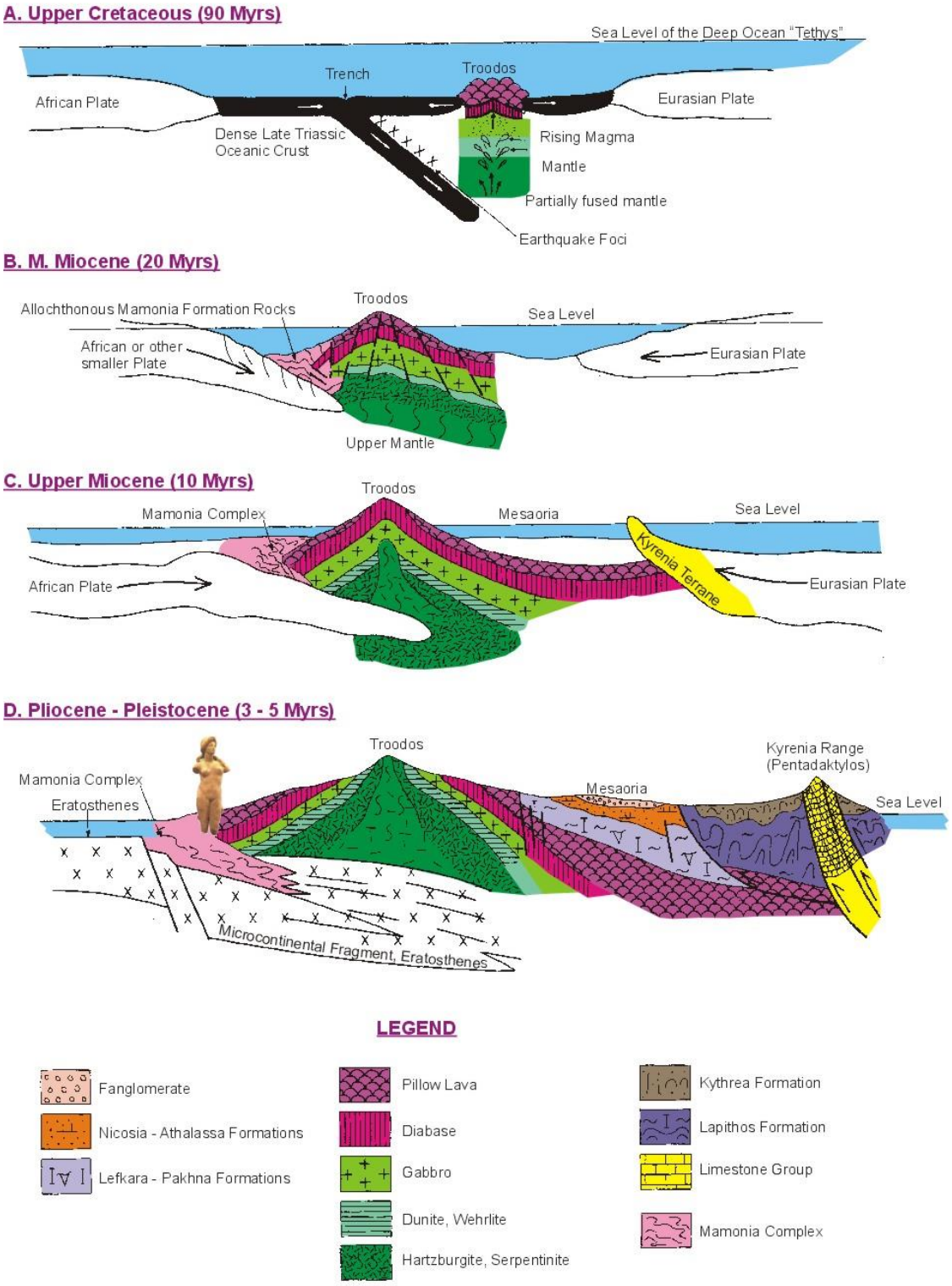
When writing this dissertation, it became clear that a specific section would be required outlining the geology and geomorphology of the study area and the processes involved (fig.8). This section will not assess the changes in detail as such an investigation will form part of the geoarchaeological argument in the following chapter. Instead, it aims to provide the reader with a foundation of knowledge for the discussion to come.

The Geomorphology of Cyprus

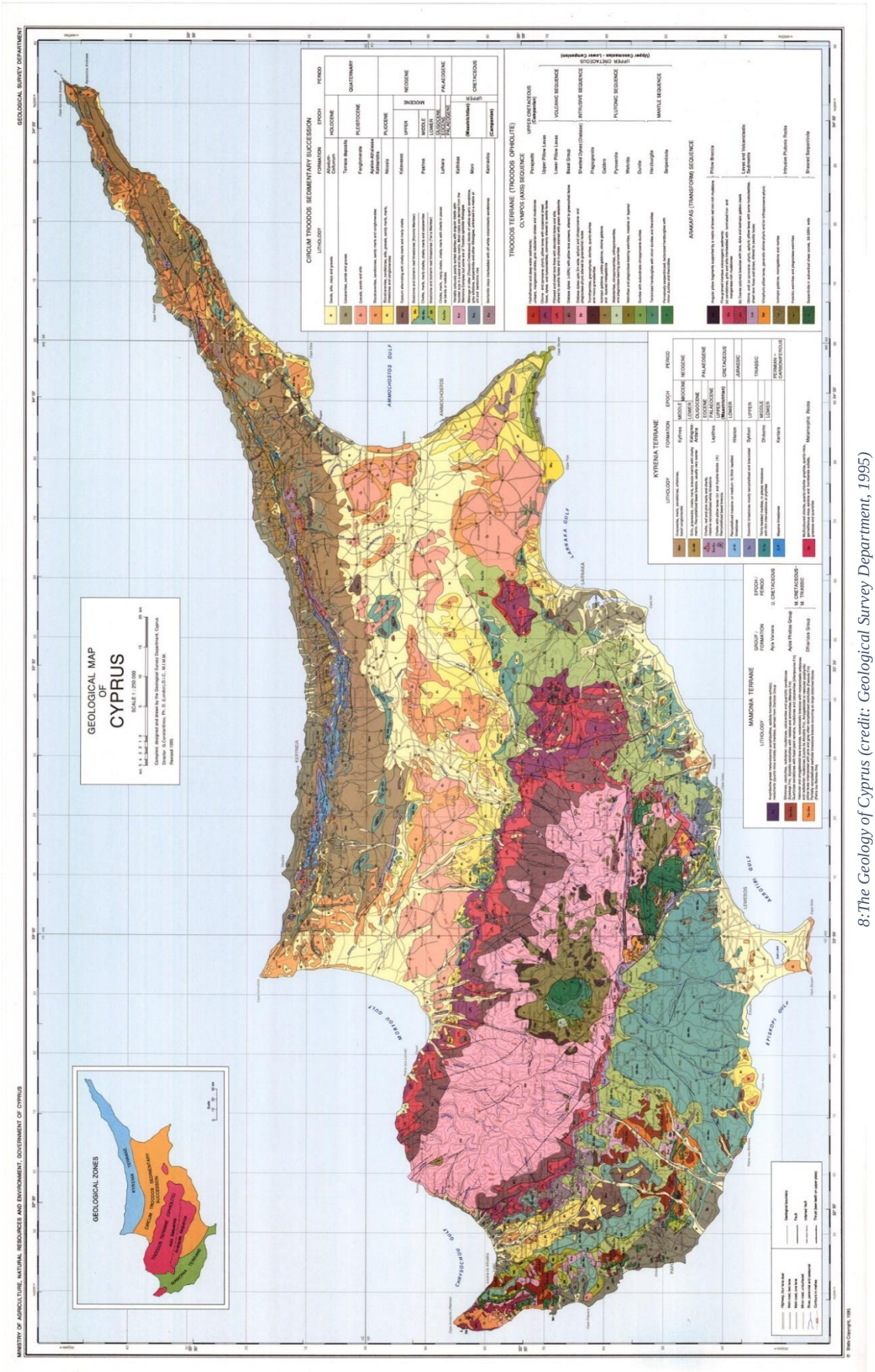
The formation of Cyprus was a very recent and complicated process in geological history, and is still yet to be fully understood by geologists. The first part of the island was an Ophiolite, a section of oceanic crust driven upwards (uplift) by the collision of the African and European plates during the Triassic, eventually breaking the surface of the Mediterranean 20 million years ago (fig.7)[34]. As the plates continued to move together, the Kyrenia Range and other formations were uplifted and formed an island recognisable today as Cyprus by the Plio-Pleistocene (3-5 million years ago)[35]. The island is still affected by the movement of the continental plates, but in contrast to the rates of uplift experienced millions of years ago, the southern half of the island is sinking (subsiding)[36]. However, the repartition of the planar fractures (faults) on the island mean that this subsidence is not uniform, and that in some parts of the south, Holocene uplift has been observed[37].

[34] Geological Survey Department, Cyprus (2016a). S. Swiny (1982), 1
[35] Geological Survey Department, Cyprus (2016a). S. Swiny (1982), 1
[36] Poole and Robertson (1991), 919. Leidwanger (2005), 11
[37] Salomon et al. (2015), 5. See also Devillers (2005).

Schematic presentation of the genesis of the Troodos Ophiolite (A) and the evolution of the Island of Cyprus (B-D)

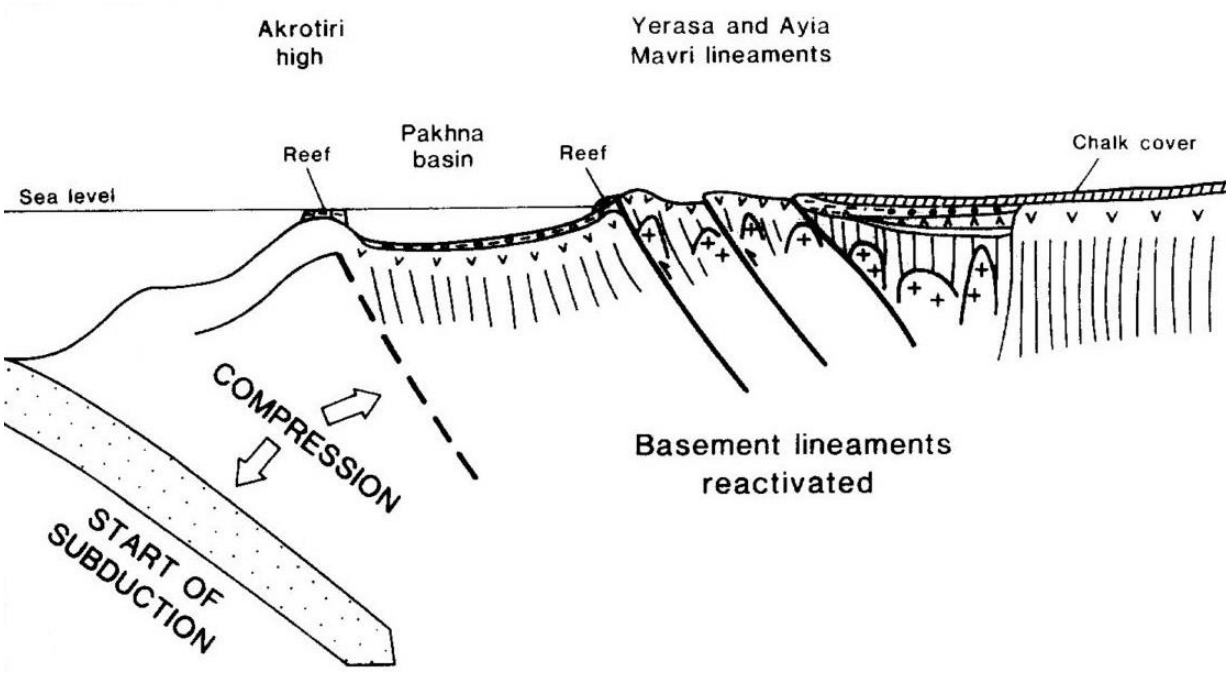


7:Geological evolution of Cyprus (credit: Geological Survey Department)



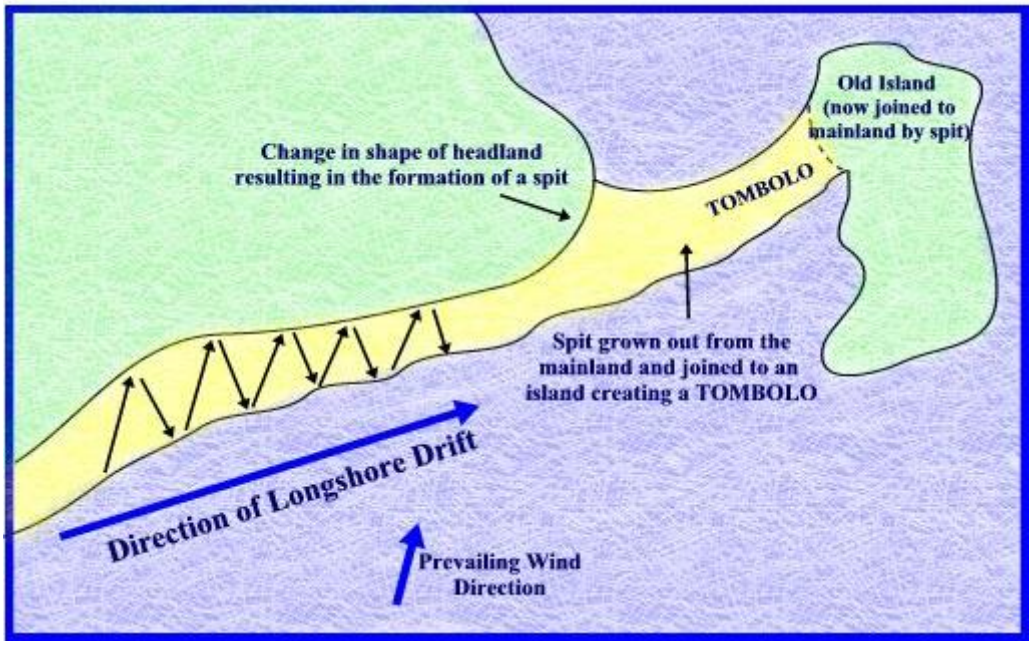
8:The Geology of Cyprus (credit: Geological Survey Department, 1995)

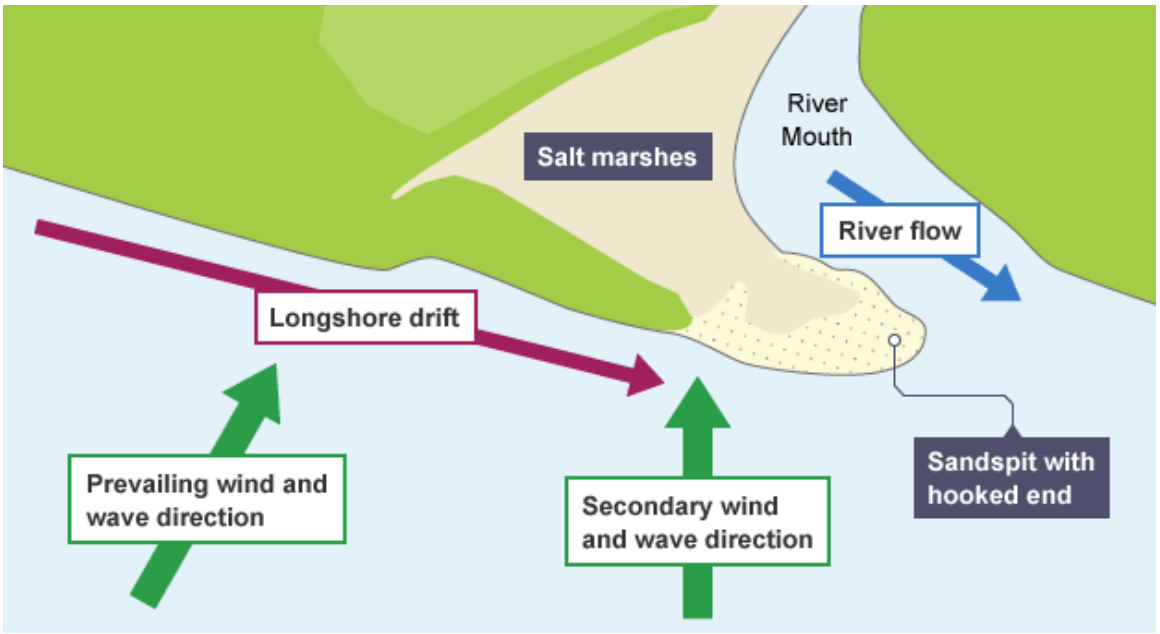
However, at this time, the area we know as the Akrotiri peninsula was very different. Between the Kouris and Garyllis rivers there was no landform extending to the south, only a coastline and an island lying several kilometres out to sea on a separate tectonic massif (fig.9)[38]. During the Holocene, the sediment transported down the Kouris River has been deposited along the coast with a tendency to move southwards with the eastern-moving longshore drift[39]. Longshore drift is the process in which sediments such as sand are carried by the waves along the shore, due to the angle in which they meet it. This process contributed to the formation of the western tombolo, connecting the island to the mainland (fig.10)[40]. By separating the water between from the open sea, the area experienced a build-up of sediments that couldn't escape (sedimentation) and caused it to seal on its eastern side too[41].



9: A cross section diagram of southern Cyprus during the Micoene. We can see the dip in the Pakhna basin and the reef above the Akrotiri lineament that will be raised during the Miocene and lead to the development of the salt lake and Akrotiri High respectively (credit: Eaton and Robertson, 1993).

[38] Ammerman and Noller (2005), 538. Zomeni (2012b), 43
[39] Leidwanger (2005), 6. Zomeni (2012b), 31. Blue (1997), 36
[40] Wessex Archaeology (2002), 16. Toumazis et al. (2008), 183
[41] Wessex Archaeology (2002), 16





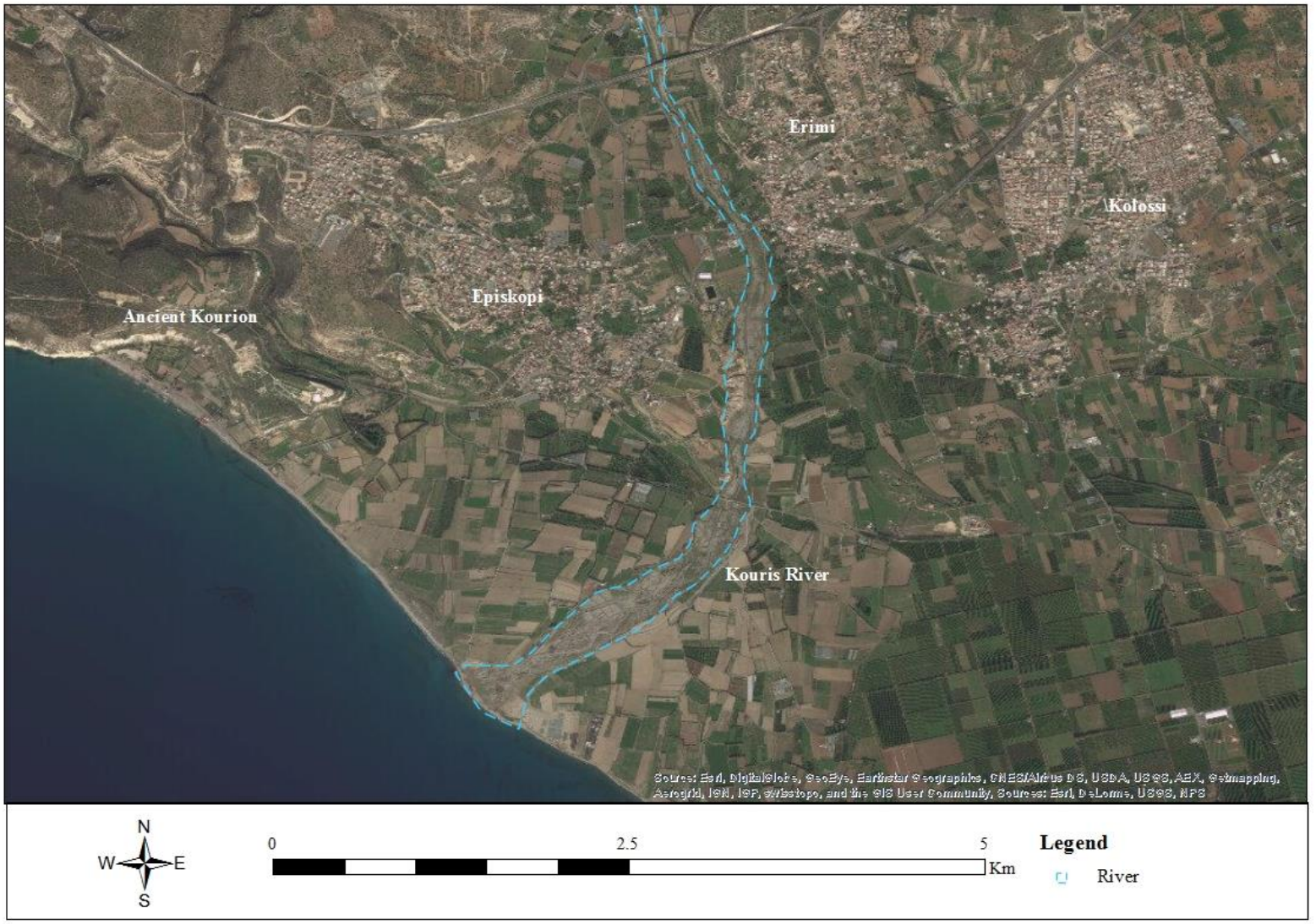
10: Two simple diagrams demonstrating longshore drift. The bottom image best demonstrates my hypotheses for the formation of the Akrotiri peninsula (see below). Credit Ace Geography (top) and BBC Bitesize (bottom):

Kourion and the Kouris River

11:An aerial photograph of the Kouris River (credit: Leidwanger, 2005)

The Kouris River – now dammed and dry (fig.11) – was once perennial and powerful. It begins in the Troodos mountains to the north, and runs through deeply-incised, valleys that it eroded downwards during the Pleistocene, to meet the Mediterranean east of Kourion[42]. North of the dam, it captures two other rivers that run down from the Troodos: the Limnatis and the Kryos. The past strength of this river is evident in the size of ophiolite and limestone that it has transported, some of which are 0.5m in diameter[43]. The deposition of this sediment over thousands of years has created a bedrock of alluvial fan in the Limassol district, most recently forming a link between the mainland and the Miocene outcrop (the Akrotiri High) that now forms the southern point of the Akrotiri peninsula[44].

[42] Poole and Robertson (1991), 913 and 918
[43] Zomeni (2012a), 265
[44] West (2015). Geological Survey Department (2015a). Leidwanger (2005), 17-20.



12:A satellite image of the Kouris River and Kourion area

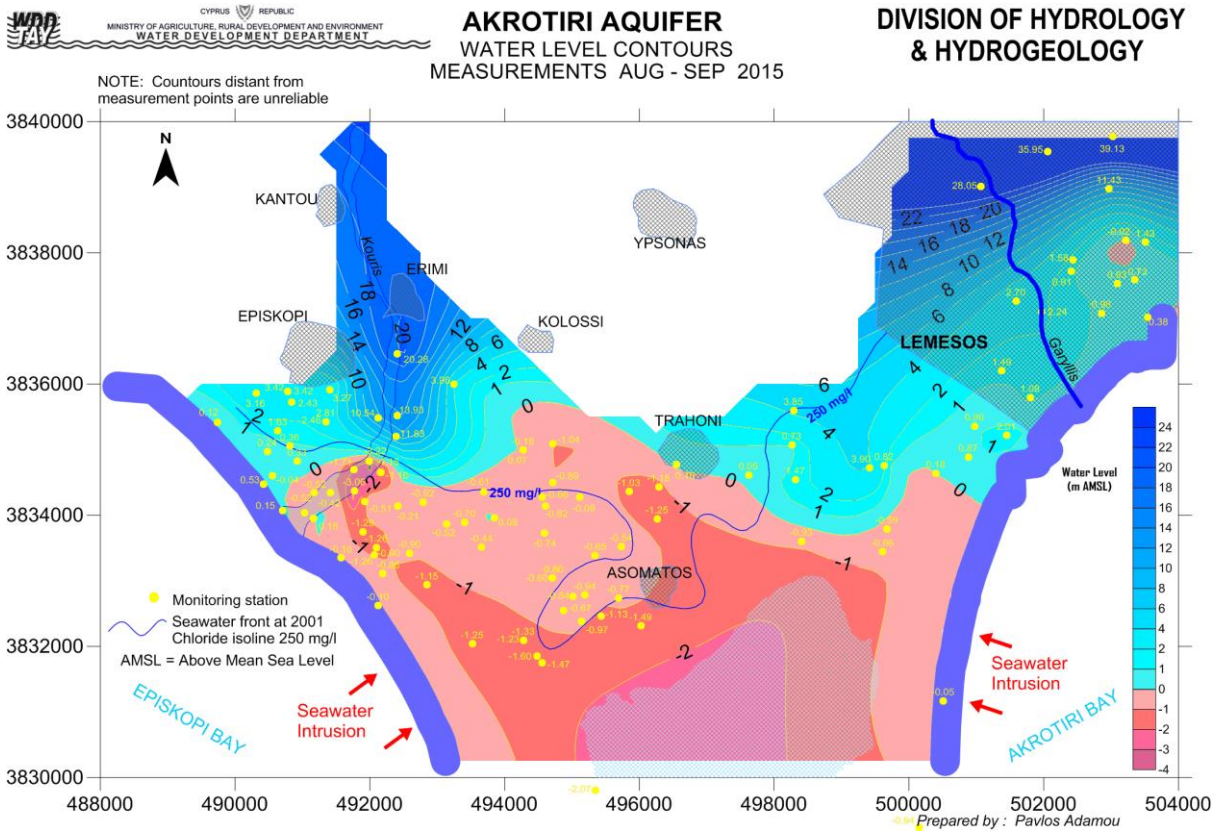
13: A photograph taken from the mouth of the Kouris, looking south-east over the adjacent farmland towards the sea (credit: author)

14: The tombolo barrier at the mouth of the Kouris River, looking south towards the Akrotiri peninsula. It reaches over 1m above sea level and the river bed (credit: author)

This bridge of sediment - known as a "tombolo" - acted as a barrier, trapping sediment that accumulated behind it and eventually consolidated to form a new land surface[45]. The damming of the river has caused the build-up of sediment at the tombolo, as the river no longer as the power to carry sediment through or over it[46]. This sediment has filled the riverbed, raising it to the same level as the plains around it[47].

[45] Salomon (2015), 19. Leidwanger (2005), 232-233. Toumazis et al. 183
[46] Personal observation, July 2016
[47] Personal observation, July 2016

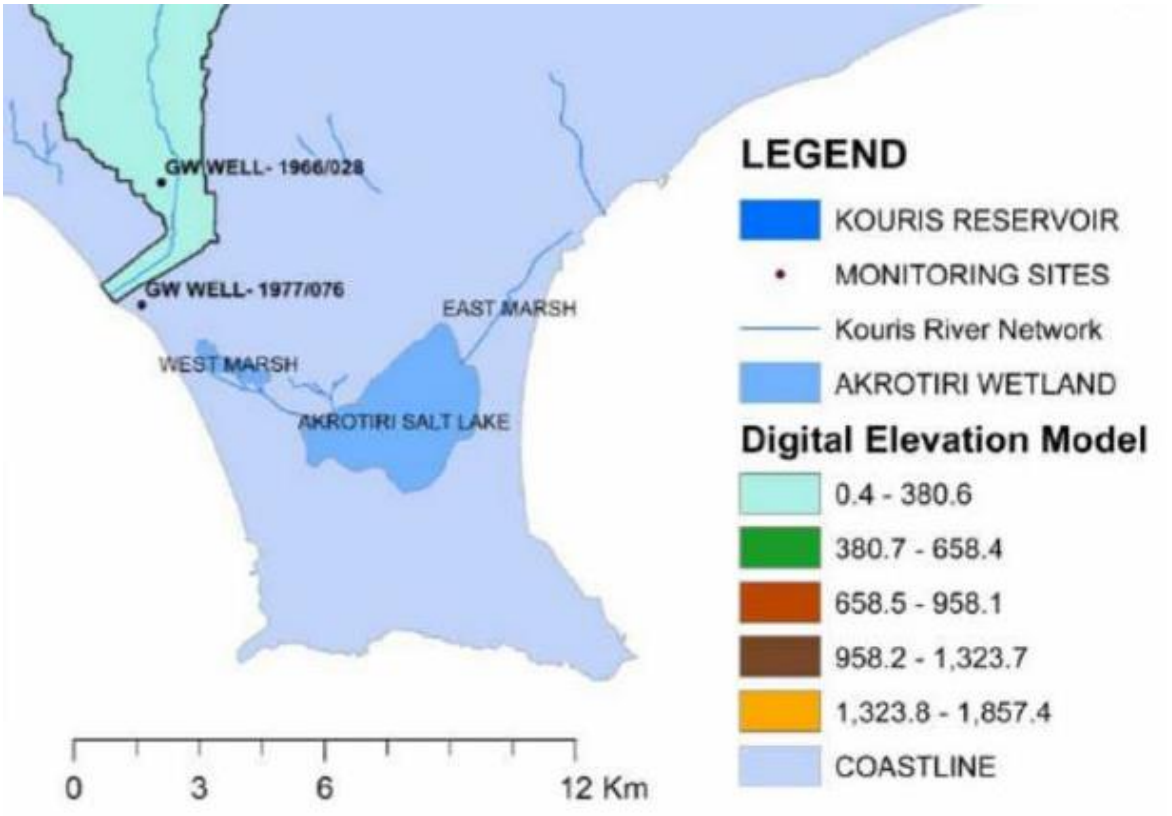
Geological evidence suggests that the Kouris River mouth was once deltaic and fed into the area that is now the Akrotiri salt-lake (figs.15-16)[48]. Between the mouth of the Kouris and the depression of the Akrotiri salt-lake is a salt-marsh (fig.16). It lies on top of an aquifer - a layer of permeable rock in which water is held and transmitted – which suggests that it was once a body of water[49]. This hypothesis was confirmed at the beginning of the 21st century when evidence collected during the drilling of the aquifer identified it as a "coastal deltaic alluvial aquifer", a layer of permeable rock in which water from a coastal delta collects[50]. Currently, little is known about the characteristics of this delta, but it did exist at some point during the Holocene[51].



15: The Akrotiri aquifer, which supplies the study area.The contours demonstrate how much of the area lies below sea level and how the hydrology influences it (credit: Water Development Department, Cyprus)

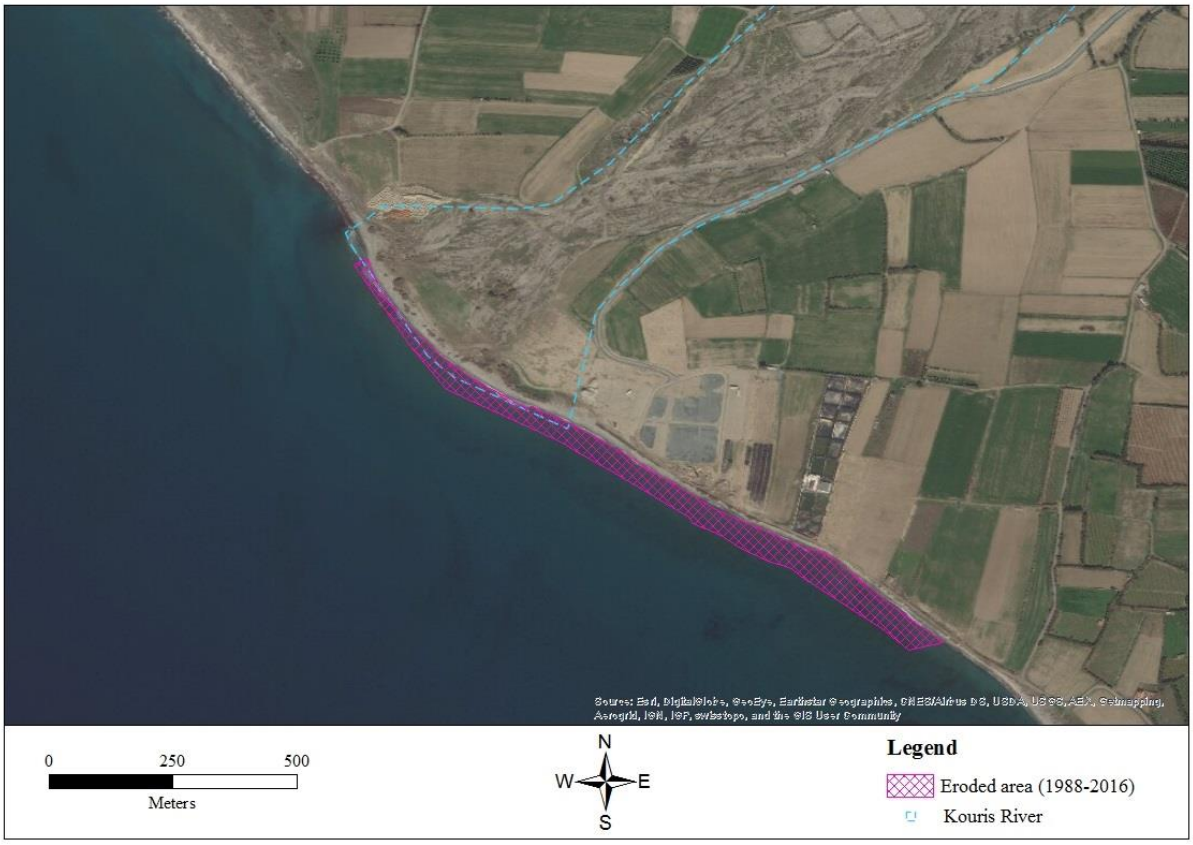
[48] Ministry of Agriculture, Natural Resources and the Environment (2002)
[49] Ministry of Agriculture, Natural Resources and the Environment (2002), 71
[50] Ministry of Agriculture, Natural Resources and the Environment (2002), 71
[51] Ministry of Agriculture, Natural Resources and the Environment (2002), 71

In addition to the delta, a distributary of the Kouris River once fed into the salt-water body near the village of Asomatos (Fig.16). This distributary has been documented since the medieval period, but ignored in geological investigations of the tombolo formation, with credit going entirely to the main body of the Kouris River[52]. However, the manner in which the tombolo formed **(**Fig.10) indicates that the feeding of sediment from the interior would have created the shape that it takes today, and explains why the central depression of the salt-lake still maintained a body of water. If both the Kouris River and its distributary were feeding sediment south, they might have pushed up against each other to form the barrier. It could also have contributed to the formation of the eastern tombolo, feeding sediment into the salt-water body which could not escape the closed depression due to the waves which drove against it. As the tide pushed against the water fed in by the distributary, the sediments would have been deposited where the two met, creating the tombolo. This might also explain why the sediments east of the western tombolo are finer, compared to the large pebbles of the western tombolo itself. The smaller, less powerful distributary might not have been able to transport such large pebbles, filling the area west of the tombolo with finer sediment instead.



16: The current extent of the Kouris River network in the study area. From this we can gather information about the palaeohydrology (credit: Zvoraki et al., 2014)

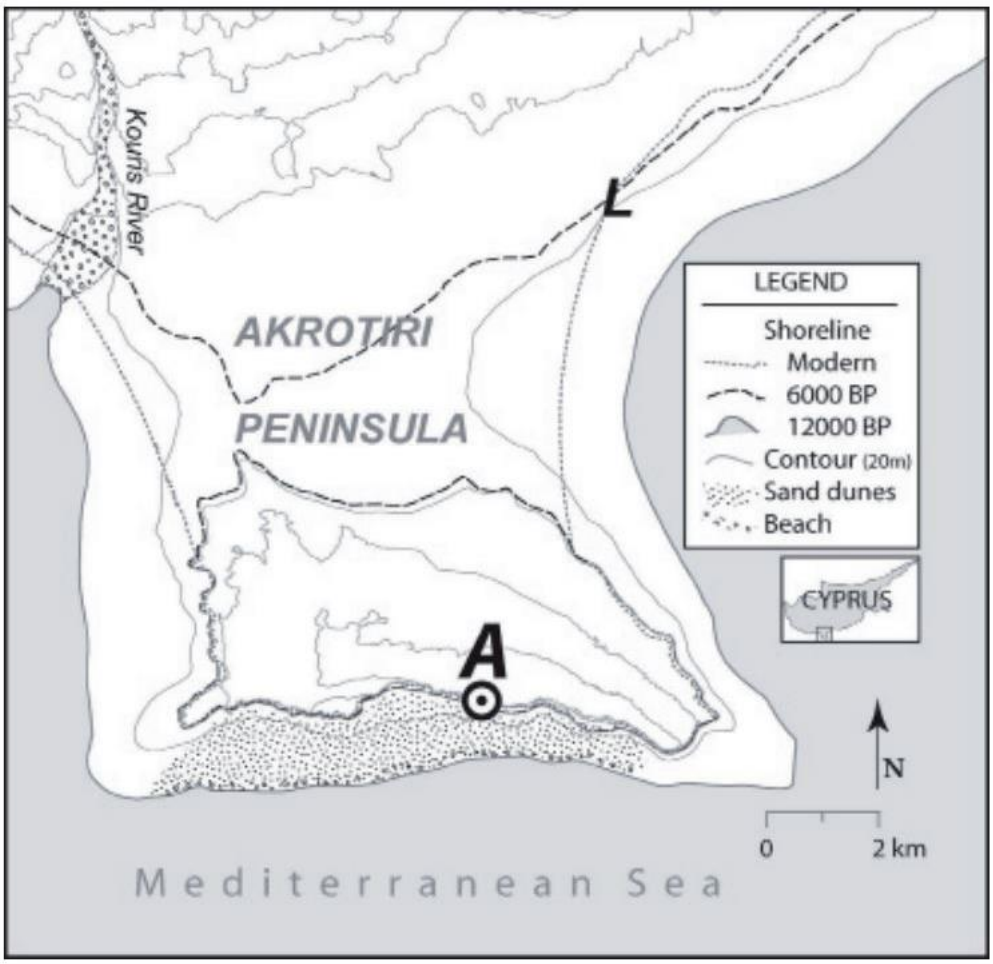
[52] Visit http://cyprussite.com/map/history-all.html for historic maps of Cyprus



17: Eorsion of the Kouris River mouth recorded since 1988 (credit: the author, using data from Toumazis et al., 2008)

Since the large-scale damming of Cypriot rivers began in the 20th century, the geomorphology of the coast has been affected. In 2008, a sediment yield of 280,280 m3/yr. was noted at the Kouris dam, indicating the large amount of sediment that was once carried downriver but is no longer transported past the dam[53]. As such, the alluvial fan that has been fed by the river for millennia is now starved of sediment and eroding rather than growing, although this is currently only an observation as it has yet to be quantified[54]. Toumazis at al. have estimated that since the damming of the river in 1988, the mouth of the Kouris River and adjacent coastline has eroded up to 70m in some places (fig.17)[55]. For reference, the Chrysochous River (Paphos district) had eroded 50m from 1973-1993, while some river mouths in urban areas – such as the Germasogeia - have been protected with breakwaters to mitigate the damage to the roads and buildings on the coast[56].

[53] Toumazis et al. (2008), 183
[54] Toumazis et al. (2008), 184 fig.5. Zomeni (2012b) also discusses the problems that damming has caused in the study area.
[55] Toumazis et al. (2008), 184 fig.5
[56] Toumazis et al. (2008), 183-4 figs. 5 & 6.



18: Map of the study area depicting a hypothetical shorelines for 12,000 BP, 6,000 BP and modern times (credit: Ammerman and Noller, 2005)

Site-specific analysis of the ancient stratigraphy has been carried out in the area, at Kourion, Episkopi and Erimi[57], but there has been no large-scale project to determine the paleo-coastline of the peninsula. I have yet to find any data from the Kouris River Valley Project that might indicate its ancient course, although Ammerman and Noller have produced a figure displaying a reconstructed coastline of the study area in 12,000 BP, 6,000 BP and today (fig.18)[58] . In particular, this demonstrates that the mouth of the Kouris River and the surrounding coast moved seaward (prograded) by c.1km since the end of the Neolithic.

[57] Coring at Kourion conducted by Leonard (2005), 558-559. Stratigraphic analysis undertaken by excavations at Episkopi (see Butzer and Harris, 2007: 1947-8 and S. Swiny, 1986) and Erimi sites (see Vassiliou and Sylianou 2004; Belgiorno 2004).
[58] Ammerman and Noller (2005), 539 fig.1

However, the manner in which Ammerman and Noller established this palaeocoastline is unclear; they only state the use of contour lines, sea level estimates and the removal of

19: Kourion Bay from within the bay looking West (top) and above the bay looking East (bottom) (credit: author)

20: An example of erosion on the cliffs of the Kourion bluff (credit: author)

Holocene sediments[59]. Therefore, until we can ascertain the accuracy of this map, it should be used with caution. To the west, the alluvial fan of the Kouris River meets the limestone bluff of Kourion Bay which reaches over 100m ASL (fig.19)[60]. The bluff is attributed to the Pakhna formation and was created by the consolidation of Miocene calcareous limestones, sandstones and marls[61]. It has high cliffs on its northern, southern and western sides, shaped by both anthropogenic and natural processes[62]. The cliffs were faceted, quarried and had tombs carved into them, while agricultural work and human structures have distorted the

[59] Ammerman and Noller (2005), 538-9 fig.1
[60] Department of Lands and Surveys (2015b)
[61] Geological Survey Department (1995)
[62] Leonard (2005), 547

plain below (fig.21)[63]. They were also severely damaged by sub-aerial erosion on the southern faces of the cliff, where softer sediments have been eroded by wind and sea at a faster rate than harder layers (fig.20)[64]. The erosion of this sediment has destroyed both geological and archaeological features such as a set of ancient, rock-cut stairs, and in the bay this unconsolidated sediment has created a sloping surface at the foot of the cliff which reaches over 25m ASL (fig.19)[65]. East of the bluff, there are high levels of deposited sedimentation (6m since the Roman period) above the underlying bedrock. This might have been created by the erosion of the nearby cliffs and aeolian transport, or erosion of the plain itself[66]. Winter floods affect this area and a small stream which feeds around the base of the bluff from the drainage basin to the north might also have contributed to sedimentation[67].

21: The bluff as seen from the Episkopi road to the East. Facetting can be observed on the cliff face to the right of the image (credit: author)

[63] H. Swiny (1982), 88. He believed that the faceting had a defensive or aesthetic purpose. Benson (1982), 50.
[64] Personal observation
[65] Leonard (2005), 558. Altitude taken by the author using GPS application on mobile phone.
[66] Erosion was noted during the University of Pennsylvania excavations, Benson (1973), 19
[67] Benson (1973), 17 quoting Daniel (1937), 56

At present, there is no specific data determining how much the area might have moved vertically due to tectonic activity. The distance between the top of the harbour blocks in Kourion Bay is on average c.1m[68], indicating subsidence of at least 1m, although the erosion and movement of the blocks and the sediment upon which they sit are also crucial to calculations which at present, there is not sufficient data to make. The sedimentation of the Kourion area – on land and at sea – might not have been caused only by gradual processes such as these, but from catastrophic tectonic activity[69]. The earthquake of AD 365 might have caused the large-scale deposition of colluvium (weathered rock) in the area in landslide events, either on the adjacent cliffs or those upriver, from where sediments could have been transported down the small stream that curves around the bluff. There is no evidence to suggest that a tsunami and subsequent sediment deposition was caused by this earthquake[70].

[68] Personal observation, July 2016.
[69] Dadson et al. (2004)
[70] Zomeni (2012b), 1.5.7

The Western Tombolo to Cape Zevgari

22: View south from one of the bays of West Akrotiri, towards Cape Zevgari (credit: author).

The southern end of the tombolo meets a small, sandstone headland at Monument Point, which prevents the pebbles from travelling further south (fig.23)[71]. Here, the tombolo has a high proportion of igneous pebbles, in comparison to the large amount of limestone pebbles at Kourion Bay[72]. This might indicate the age of the formation of the tombolo, with older layers of rock – i.e. ophiolite – being eroded, transported and deposited after the upper layers – i.e. limestone. However, this hypothesis would require expert analysis to confirm. Reefs of beach rock are visible in the shallow coastal waters, to which some parts of the tombolo are cemented[73]. These reefs - which are particularly visible in the bays south of Monument Point (fig.22) – demonstrate the marine transgression that has occurred during the Holocene. Behind the tombolo are large, sand dunes – some of which have cemented (eolianite) - that owe their grey colour to eroded ophiolite[74]. South of the tombolo, the geology of the coastline

[71] West (2015)
[72] West (2015)
[73] West (2015). Personal observation.
[74] West (2015)

23: Satellite imagery extending from the mouth of the Kouris River in the North, to Cape Zevgari in the South.

becomes remarkably different. Cliffs of weak, Athalassa sandstone form highly eroded bays (known as West Akrotiri) and the protruding Cape Zevgari, at which a long reef of cemented beach rock lies under the surface[75]. This stretch of coastline is particularly dangerous for seafarers due to the prevailing westerlies and hidden reefs, demonstrated by the two modern wrecks that sit rusting in the shallows (fig.24)[76].

24: Concreted beach deposits and the wreck of a modern vessel (credit: West, 2015)

[75] West (2015). Greensmith (1994), 65. Leidwanger (2005), 129. Personal observation.
[76] West (2015). Greensmith (1994), 64.Leidwanger (2005), 129. Personal observation.

Dreamer's Bay and the South Coast

25: Aerial photograph looking south towards the salt-lake and RAF Akrotiri. To the left is the Eastern tombolo and Cape Gata, on the right is the Western tombolo and Cape Zevgari (credit: Fergus Murray)

The raised landform at the southern end of the Akrotiri peninsula – known hereafter as the "Akrotiri High" - is composed of Miocene sediments of the Pakhna formation, raised during tectonic activity of the Pleistocene (fig.25)[77]. Above this formation, lie Plio-Pleistocene beach sediments of the Athalassa formation[78]. The geological feature is 9.6km across its widest point (Cape Zevgari to Cape Gata) and 3.5km N-S, reaching a maximum altitude of 58m ASL (fig.26)[79]. The coastline is subject to subaerial erosion that has led to the existence of two different morphologies: high cliffs and an intended coast[80]. The high cliffs are composed of bedrock which is undercut by the waves and winds that batter the coastline[81]. The undercutting and erosion weakens the cliff, which collapses; the erosion continues and causes the process to repeat (fig.27) [82]. An intended coast is created in areas of softer rock; waves undercut

[77] Wessex Archaeology (2002), 15
[78] West (2015)
[79] James and Score (2015), 4-5. ESRI world topographic map data via ArcGIS 10.3.1.
[80] Salomon et al. (2015), 6
[81] Salomon et al. (2015), 6
[82] Salomon et al. (2015), 6

26: Satellite imagery of the southern area of the Akrotiri peninsula. Dreamer's Bay is an isolated area of intended coast surrounded by high cliffs.

the bedrock and create caves, which then collapse to form coves (fig.27)[83]. Although this area experienced tectonic uplift before the Holocene, there is evidence that localised subsidence of up to 1.1m/millennium has occurred during the intervening period[84]. Poole and Robertson (1991) argue that such figures for subsidence are not justified[85], however, Salomon's project will provide a more complex geomorphology of the bay and hopefully provide resolution for this debate[86].

27: Examples of an intended coast (top left and right) and an eroded stretch of high cliffs (bottom). (Credit: Salomon et al., 2015)

[83] Salomon et al. (2015), 6
[84] Leidwanger (2005), 11. Flemming (1978) 416 [Table 1]. West (2015).
[85] Poole and Robertson (1991), 918-919
[86] Salomon et al. (2015)

The Eastern Tombolo

28: Aerial photograph of Lady's Mile (the eastern tombolo) looking south, with the edge of the salt-lake visible on the right (credit: West, 2015)

North-east of the Miocene landmass, stretches the second barrier beach of the Akrotiri peninsula, known as Lady's Mile (figs.28 and 29). It is composed of low, prograding sand ridges which are often flooded, causing sabkhas to form between them (figs.28-30). These sand ridges can be observed under the water as well, where the sandy beach slopes for over 75m before it exceeds a depth of 2m[87]. The geology is very different to the western tombolo, as there is little wave fetch and consequently, erosion, allowing the sand to accumulate[88]. The difference between this tombolo and the western one indicates that it was not formed in a similar manner. This was argued from a different viewpoint by Blue (1997), who pointed out that the sediment transported down the Garyllis – which is small and intermittent – would have been deposited east of the river rather than south, due to the easterly direction of the longshore drift[89]. As argued in the section above, I believe this tombolo was created predominantly with sediment from the distributary of the Kouris River.

[87] Author's personal observation, 07/07/2016.
[88] West (2015)
[89] Blue (1997), 36. This process is now widely accepted (see Leidwanger, 2005: 6 and Zomeni, 2012b: 31) yet some still credit the formation of the eastern tombolo wholly with sediment transported south by the Garyllis River (Toumazis, 2008: 183).

29: The eastern side of the peninsula

***30**: Lady's Mile beach looking North (top) and South (bottom) (credit: Mike James)*

The Interior of the Peninsula

31: The salt-lake during the dry season. Tyre tracks are visible on the salt-crust (credit: author, July 2016)

The central part of the peninsula is dominated by the Akrotiri salt-lake, a shallow body of water which evaporates during the dry season and leaves behind a salt crust (figs.31-32). The depression reaches 2m BSL and is filled with Holocene lacustrine sediments such as sandy and/or silty loams and clays[90]. Less than a meter beneath these lie gravelly sediments interpreted as beach deposits and evidence of marine transgressions, similar to those at Lady's Beach[91]. I was not able to access the locations for the cores to make specific interpretations; however, I did find a table of core descriptions (see Appendix 1)[92]. Beneath the salt-lake is the Akrotiri aquifer, which contributes to marshy land around the lake, particularly to the north-west and north-east. The lake is smaller than it once was, due to a mix of natural and anthropogenic activity reclaiming the lake and adjacent marshy areas[93]. There are no natural waterways running into or out of the lake today, although there are man-made drainages[94].

[90] Wessex Archaeology (2002), 17
[91] Wessex Archaeology (2002), 17
[92] Wessex Archaeology (2002), 17
[93] Wessex Archaeology (2002), 13 & 20
[94] Wessex Archaeology (2002), 17

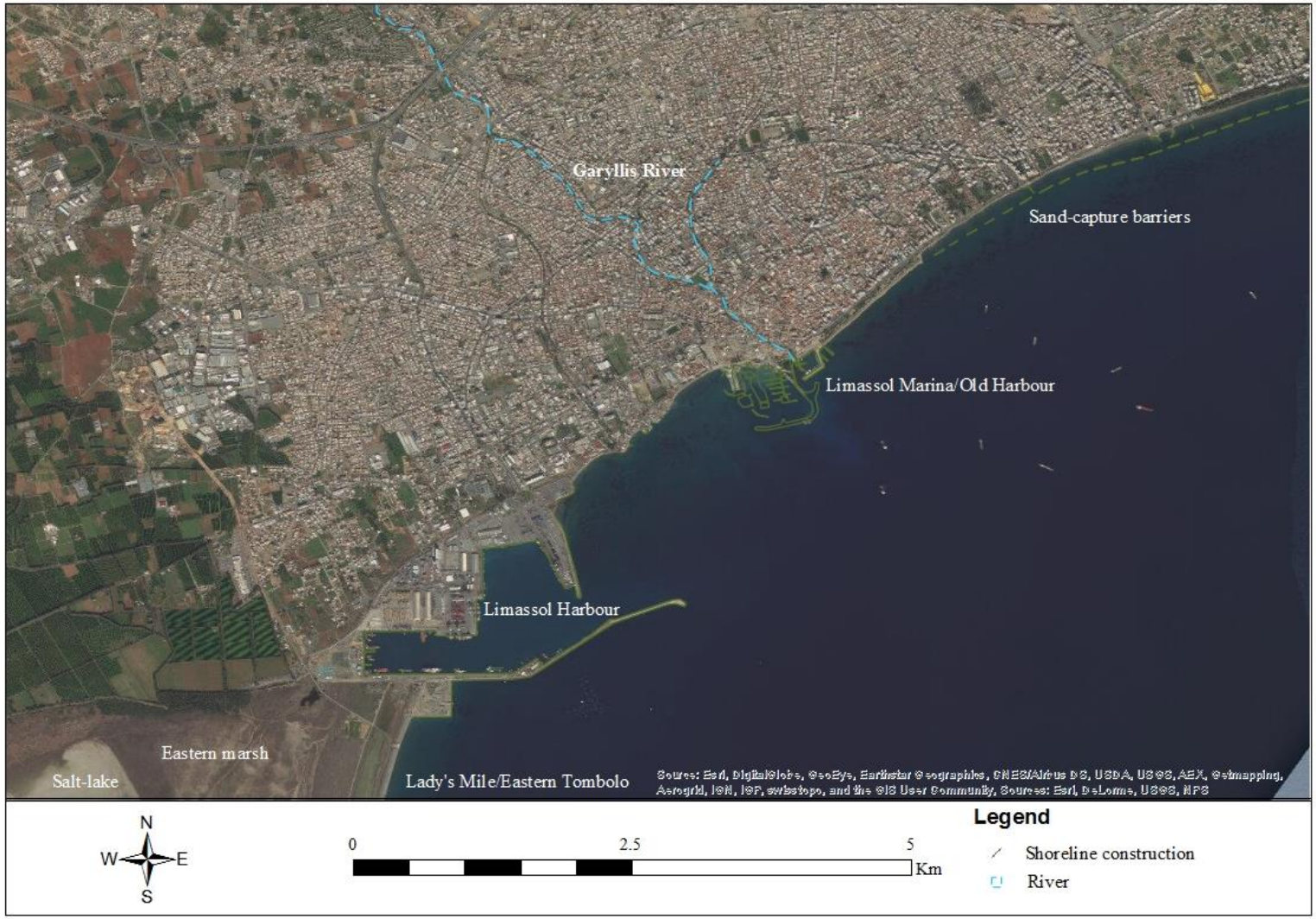
32: Satellite image showing the geography of the peninsula's interior

Limassol and the Garyllis River

Limassol is a city of rapid development, which dominates its topography (fig.34). It sits upon a coastal alluvial aquifer - a natural continuation of the Akrotiri aquifer – and has several small streams running through it[95]. Pleistocene marine terraces dominate the city's Pleistocene geography, which is overlain by Holocene alluvial sediments[96]. Holocene marine terraces occupy a stretch of the coastline where the current port and marina of Limassol have been built, demonstrating the distance the beach has prograded during the past 11,500 years. A fluviomarine terrace c.66 hectares in area is also visible in the sediments around the mouth of the largest river in the city - the intermittent, Garyllis River (fig.33) - and newly developed marine facilities. Although there is no targeted geological evidence to date or confirm the existence of an embayment at the mouth of the Garyllis, it is a Holocene feature that might well have existed during the chronological range of this study. Zomeni identifies this – and two other areas - as potential sites of harbours or proto-harbours (fig.35)[97]. They are located 0.5km and 4km north-east of the potential embayment, in what Zomeni has interpreted as bays of the palaeocoastline, now filled by beach and dune deposits[98].

33: The Garyllis river as it runs through Limassol today, looking South, towards the mouth (credit: author, July 2016)

[95] Ministry of Agriculture, Natural Resources and the Environment (2002), 105
[96] Zomeni (2012a), 264
[97] Zomeni (2012a), 266 fig.3
[98] Zomeni (2012a), 266 fig.3

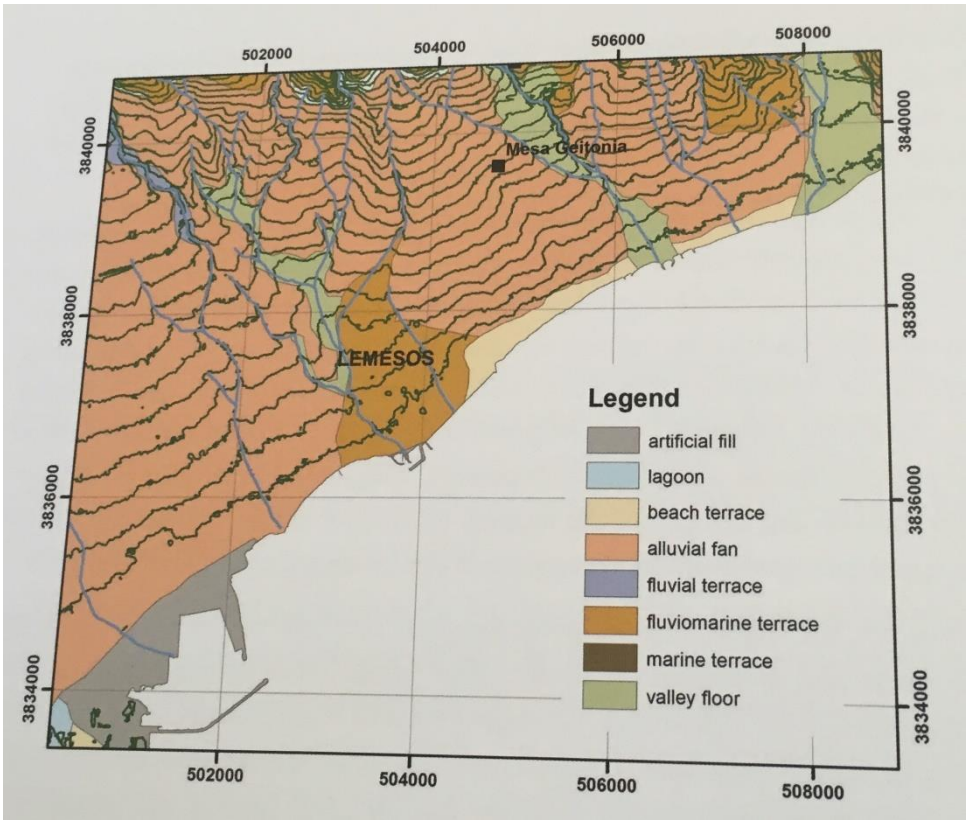


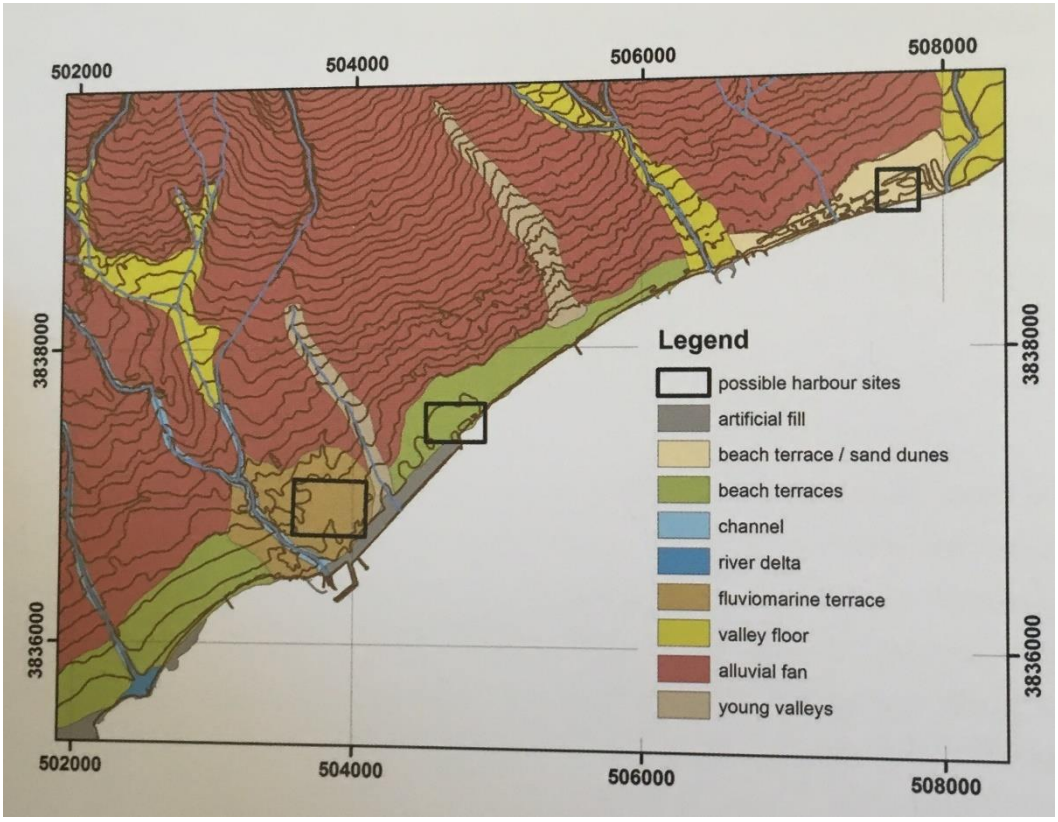
34: The Limassol study area and its coastal developments

Modern, anthropogenic activity has made finding and interpreting the palaeogeography of Limassol difficult[99]. The greatest drivers of this problem are the three harbours that have been built in Limassol in modern times: Limassol Old Port was constructed in 1956; its replacement, the industrial Port of Limassol was built to the south-west and opened in 1974; and the Old Port was redeveloped to become a marina and leisure destination in 2015[100]. Evidence that could have confirmed Zomeni's hypotheses has likely been destroyed by the processes involved in the construction of these harbours, as well as the development of a promenade and coastal defences[101]. Hard engineering has also been used to manage the intermittent and now-dammed water bodies that run through the city, particularly the Garyllis which now meets the sea through pipes that empty into the modern marina. Surviving evidence might still exist beneath the artificial fill used in these developments, as well as the sediments transported by natural processes such as longshore drift, but without access to them, only the most basic of interpretations can be made of the palaeogeography.

Although the chronology of Limassol's coastal geomorphology is far from being fully understood, the bay would have been sheltered from the prevailing winds, with calm water and low, sandy beaches of Holocene sediments that are utilised by the modern marina and industrial port[102]. As explained above, any interpretations of the palaeocoastline must also take into account the modern processes caused by the damming of the Garyllis river, which has caused sediment starvation since the 1960s[103].

[99] Zomeni (2012a), 264
[100] Limassol Chamber of Commerce and Industry (2016)
[101] Zomeni (2012a), 264
[102] See Zomeni (2012a), 266 fig.3
[103] Toumazis et al. (2008), 184

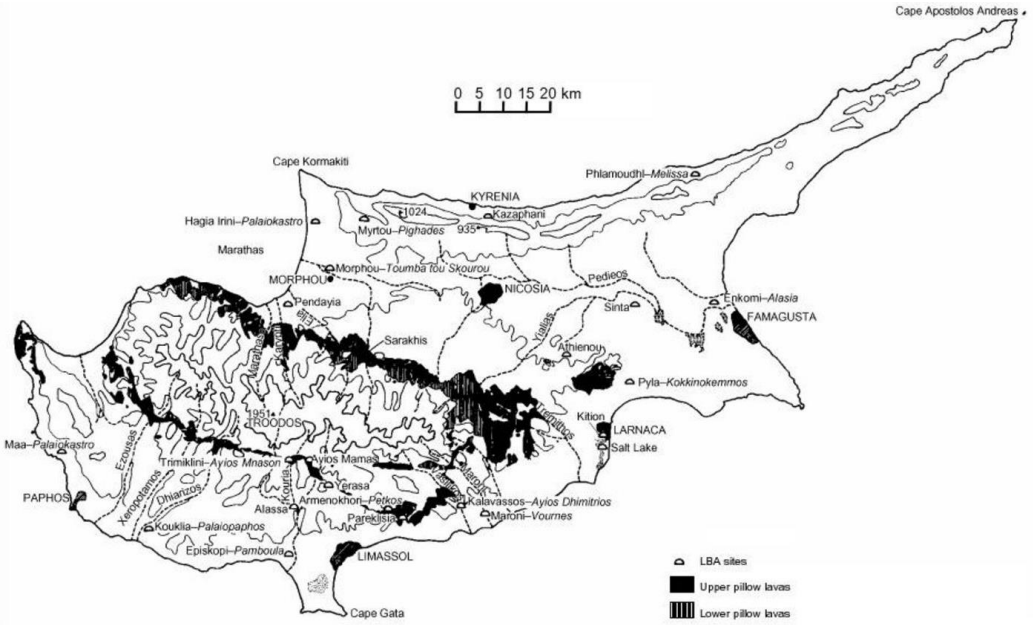




35: Zomeni's (2012a) geomorphological maps of Limassol;Quaternary deposits (top); Holocene geomorphological units and potential harbour sites (bottom). Unfortunately I was unable to take scans of these images and was required to take photographs instead.

4: Late Cypriot

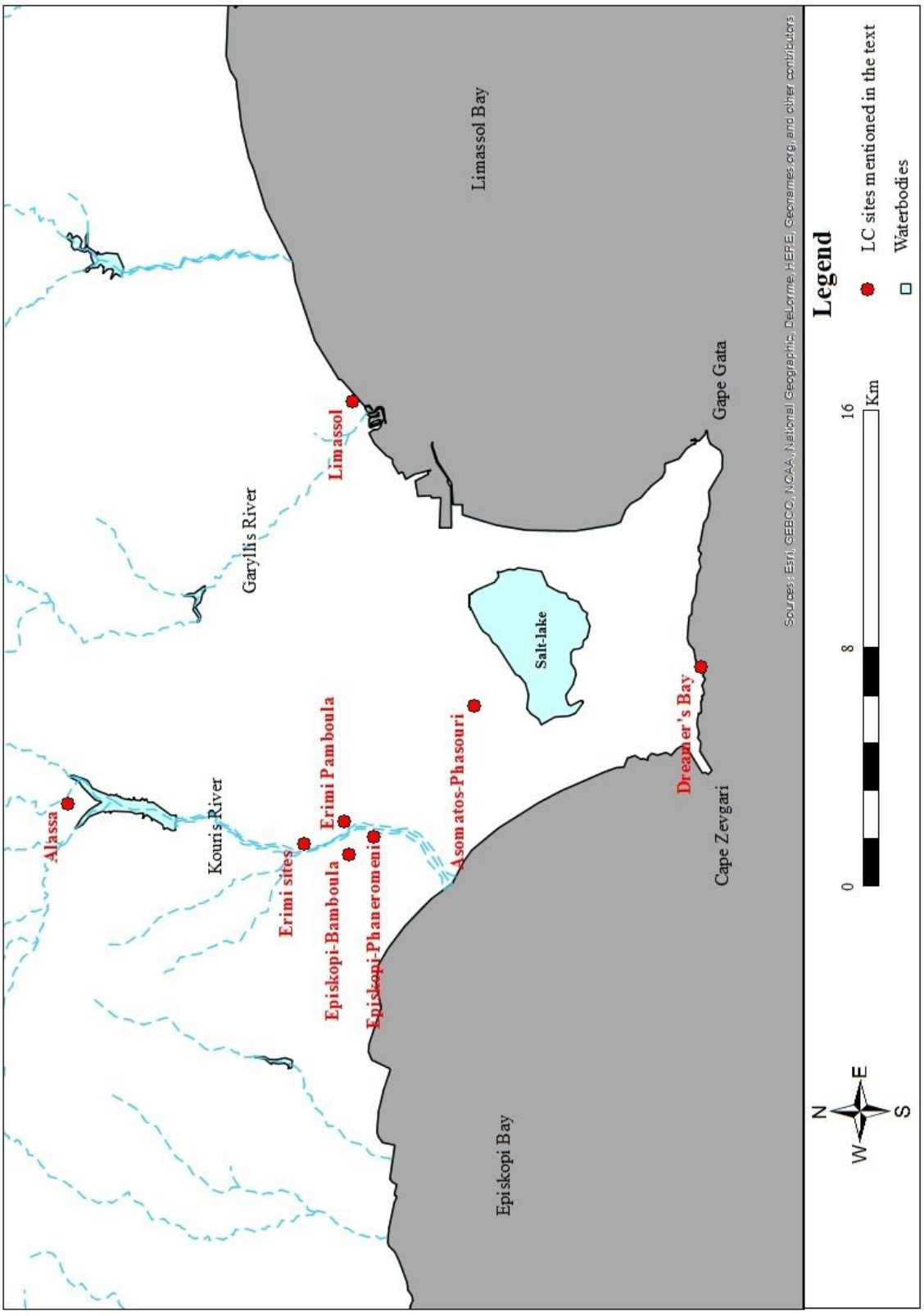
The Late Cypriot period in Cyprus and the study area is defined by the trade of copper and increasing relations with Greece and the East. As this trade must have involved maritime activity, we can deduce – even without direct evidence – that a prosperous maritime culture existed on the island. The movement of people, ideas and goods are perhaps not as revealing as shipwrecks such as the Uluburun, by the Turkish coast[104], but they are far more common.



36: Sources of copper extraction in LC Cyprus (credit: Hadjisavvas, 2011). Note: The major cities marked – Nicosia, Paphos, Limassol, Famagousta, Larnaca – are not sat upon upper pillow lavas. The digital edition of this paper was displayed in monochrome, causing confusion with the legend.

Although the stores of copper in the pillow lavas of the Troodos were concentrated in the northern regions of the range, there were sources accessible to those in the south (fig.36)[105]. Copper processing occurred at sites such as Alassa-*Pano Mandilaris* after which it is believed that it was transported to the coast by the Kouris River and distributed by sea in the form of ox hide ingots[106]. This is the essence of Catling's tripartite model for the copper trade, which comprised of mining centres (for extraction and/or processing), agricultural centres (from which produce was collected and distributed) and coastal centres (which functioned as a trading post for copper)[107]. Evidence of these coastal centres and their maritime connections to Cyprus and beyond will be discussed in the following sections[108].

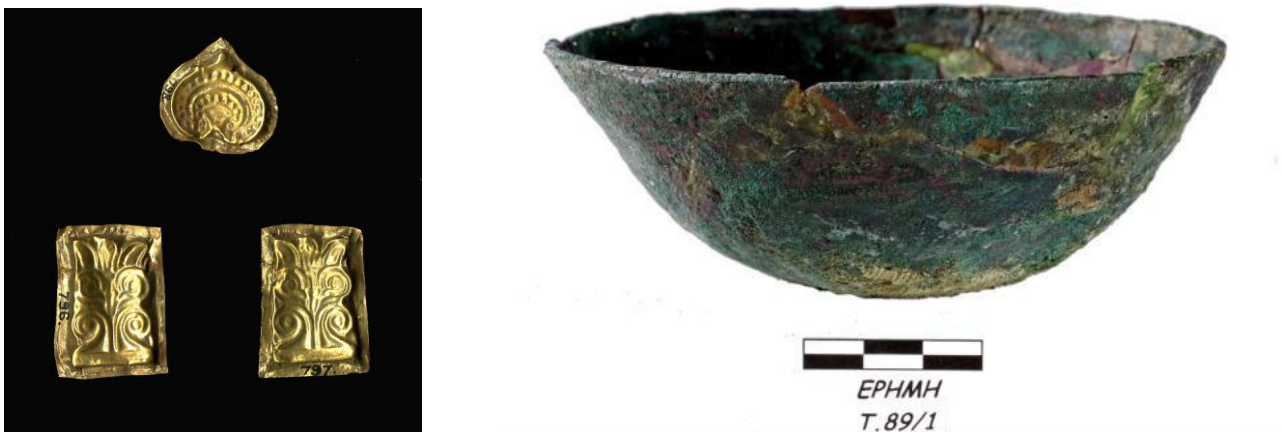
[104] Bass, 1991
[105] Boronia et al. (2003),142 fig.12
[106] Jasink (2010), 3
[107] Catling (1962). Jasink (2010), 3.
[108] Knapp (1990a, 1990b, 2008, 2012) provides useful context for this activity.



37: Late Cypriot sites mentioned in the text

The Kourion Area

The banks of the Kouris River have been continuously occupied from prehistory, with settlements flourishing during the Bronze Age[109]. The closest to the coast were the settlements at Episkopi – *Phaneromeni* (EC-LC) and *Bamboula* (LC) – and Erimi – *Kafkalla* (EC-LC) and *Pitharka* (LC). These were all excavated as distinct sites, but in hindsight, their proximity to one another and overlapping chronologies does not necessarily warrant such a division[110].



38: Gold dress attachments from Episkopi-Bamboula (left, credit: Trustess of the British Muesum) and a bronze bowl from Erimi-Pitharka (right, credit: Department of Antiquities, Cyprus)

Finds of shells and crab claws at *Phaneromeni* indicate that people here exploited the sea's resources, yet an absence of foreign ceramics and goods demonstrate that during its early LC occupancy – it did not seem to have overseas trade connections[111]. When settlement moved northward to *Bamboula* during the 16th century BC, a change in maritime culture also occurred. The presence of luxury goods in gold, faience and ivory as well as Cypro-Minoan script shows that they had a culture of foreign maritime trade, functioning as a meeting point for cultures in the Eastern Mediterranean (fig.38)[112]. The LC sites at Erimi – investigated as part of rescue excavations and the Kouris River Valley Project – have produced far less pottery and luxury goods than *Bamboula*, but much more in the way of tools and equipment

[109] Jasink (2010) and other Kouris River Valley publications.
[110] Bombardieri (2010), 37. British Museum (2016). The dates of occupation vary between each of the sites, but they have all yielded LC evidence. *Bamboula* and the Erimi area show evidence of activity in later periods, while the Erimi sites also contain Chalcolithic archaeology related to the occupation of Erimi-*Pamboula*.
[111] Swiny (1982), 34-35
[112] Fuller (2012). Benson (1982), 44. Kassianidou (2013), 42. Knapp (1990). See Kiely (2010) for detailed discussion of the luxury goods at *Bamboula*.

used in farming, pottery making and metal working, which was largely concentrated on the ancient river terrace (fig.38)[113]. At present, not enough has been published about the archaeological material that indicates the maritime connections the inhabitants of Erimi might have had, however, the very movement from the Chalcolithic site of *Pamboula* to the riverside areas of *Kafkalla* and *Pitharka*, indicates that access to the water had become increasingly important to their culture. Belgiorno (2005) has suggested that this move towards the river allowed the settlement to cultivate maritime communications, participate in the copper trade and exploit the powerful water source for manufacturing[114]. Although a number of other factors such as geomorphology and politics might have been involved, it would be interesting to pursue the idea that the Episkopi and Erimi settlements were not necessarily competitors, but partners. There is also the possibility that relations between the two were not amicable, and they were embroiled in conflict at some point during their existence. Evidence of unrest and violent clashes has been identified across the island during the mid-16th century BC[115]. It has been proposed that *Phaneromeni* was looted, its buildings burned and pulled down, although no mass graves or weapons burials – discovered at other sites of such conflicts – were found during excavations[116].

39: An excavated portion of the Eastern defences of Episkopi-Bamboula, looking North (credit: author)

[113] Belgiorno (2005), 226-228. Jasink and Bombardieri (2010), VII and 2
[114] Belgiorno (2005), 225-226
[115] Carpenter (1982), 34
[116] Carpenter (1982), 34

Benson (1982) proposed that this was the cause of the move from *Phaneromeni* to *Bamboula*, the latter of which he claims suffered its own "disaster" during the late 14th/early 13th century BC, although he does not provide any evidence to support this[117]. Regardless, there is currently no way of determining whether these events were accidents or attacks from Erimi or places further afield. It is highly likely that even if these threats did not exist, they could still have been perceived, their maritime connections opening the settlements up to more than just trade. At *Bamboula* and *Pitharka*, large defensive walls and structures have been excavated, indicating their perceived vulnerability (fig.39)[118]. Although these settlements suffered from severe population decline in the following century, the archaeological evidence suggests that it was a gradual process of abandonment rather than a single or series of attacks[119].

The archaeological evidence presented above suggests that the Erimi and Episkopi sites functioned as centres of maritime trade, despite being located over 2km upriver from the current mouth of the Kouris River. However, our understanding of the geomorphology of the river and the coastline changes this perception dramatically. No set comphrensive data or reconstruction of the palaeogeography of the LC for the area exists, although processes such as sediment transportation, erosion and vertical displacement are acknowledged to have occurred[120]. Until such a project takes place, hypotheses must be created using the available data and understanding of the general geomorphology.

The amount of sediment carried by the Kouris River has caused coastal prodgradation since the LC, although coastal regression has occurred since the damming of the river in the 1980s (Chapter 2)[121]. This would mean that the sites at Episkopi and Erimi would have been located far closer to the coastline. Secondly, the transportation of copper down the river indicates that it was navigable. If sedimentation has made the river bed of a similar altitude to the banks, then likely the river was deeper during the LC as it had not experienced this process. Less than one kilometre south of Phaneromeni, a wide embayment can be seen in satellite imagery of the dry Kouris riverbed. It expands from 130m in width, to over 400m, forming an

[117] Benson (1982), 41
[118] Benson (1982), 40. Bombardieri (2009), 283
[119] Benson (1982), 41
[120] Toumazis et al. (2008), 184
[121] Toumazis et al. (2008), 184

embayment which occupies a total area of over 700,000 m². It then narrows to c.200m before expanding rapidly to form the mouth and meet the sea with a width of 650m. Once again, targeted geological investigation would be required to confirm the size, depth and conditions of this embayment, but it is plausible that the area could have been used for maritime activity such as fishing and provided a natural shelter for mariners. There is no evidence of subsidence or uplift that would indicate that relative sea level would have been noticeably different[122], however the low altitude of the Kouris River floodplains would not require much of a change in sea level to flood. The uplift experienced since antiquity at Larnaka, on the eastern side of the island, drove coastal prodgradation; draining the lagoon to the south of the city (now a salt-lake) and raising the Roman ruins of ancient Kition's port to 4m above current sea-level[123]. This hypothesis – expanding the Kouris River mouth or the navigable area adjacent to it – leads onto a final geomorphological possibility. As explained in Chapter 3, it is likely that the mouth of the Kouris River and its distributary provided connections to the salt-water body in the peninsula. If the delta and distributary were navigable during this period, then ships would not need to sail around the peninsula, but could take this short cut. In addition, ships on the Kouris itself might have been able to access the salt-water body directly through the distributary, bypassing Episkopi and Erimi. These hypotheses – if proven – would situate the Episkopi and Erimi sites in a position better accessed from the coast. This would have made the sites transit points, which connected activity on land and sea, as well as that further upstream[124].

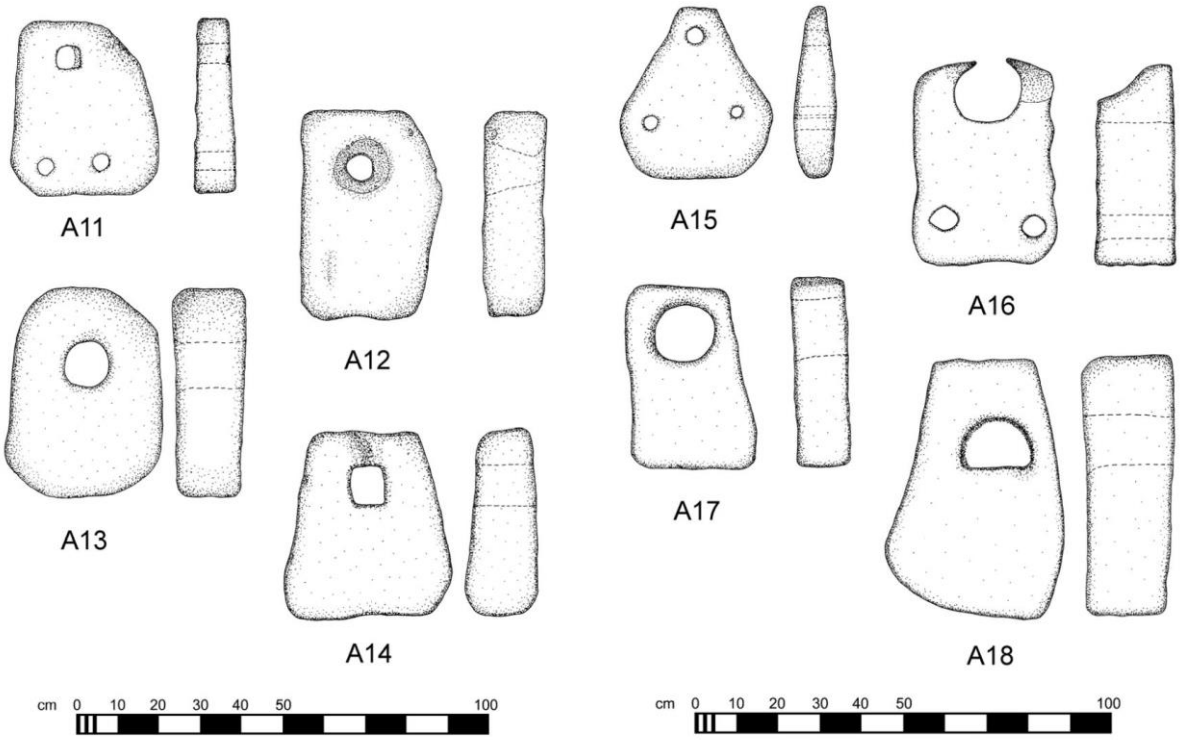
[122] Eaton and Robertson (1993), 292. Flemming (1978) 416 [Table 1]. There is no data in the table for Episkopi.
[123] Zomeni (2012b), 125. Also see Morhange et al. (2000) and Marriner and Morhange (2007).
[124] Westerdahl (1992), 6

Asomatos-*Phasouri*

East of the Kouris River, on the northern edge of the Akrotiri salt-lake lies the modern village of Asomatos. In the 1960s, a Swedish Cyprus Expedition found a series of LC tombs 1km west of the village, although they were not able to conduct anything more than preliminary investigations. Unfortunately, the relevant publication is now out of print and the I was unable to source a copy. The physical landscape around the LC tombs east of Asomatos is very different today than it was during their creation. They are located over 4km from the coast on both the east and west and 1km north of the closed depression of the salt-lake, cut into consolidated alluvial sediments produced by the Kouris River during the Quaternary period[125]. Core samples taken during Wessex Archaeology's archaeological assessment of the salt-lake indicate that the eastern tombolo was not fully formed at this time, allowing the sea and any vessels access to the salt-water body[126]. If the distributary of the Kouris River which is believed to have fed into the lagoon (see above) was navigable at this time, then ships taking that route would sail past the tombs at Asomatos-*Phasouri* and any related settlement[127]. Although there is currently no archaeological evidence to confirm this hypothesis, the sheltered waters of the lagoon would have been suitable for anchoring, sailing and fishing, even if this route did not exist[128].

[125] Blue (1997), 36 and 41
[126] Wessex Archaeology (2002), 2
[127] Blue (1995), 170
[128] Blue (1995), 170. Blue (1997), 36 and 41

Dreamer's Bay



40: The Dreamer's Bay anchors dated to the Bronze Age (credit: Leidwanger, 2005)

South of Asomatos, no Bronze Age archaeology has been uncovered besides some tentatively dated stone anchors east of Dreamer's Bay on the southern coast of the peninsula (fig.40)[129]. Ancient stone anchors are dated by a recognised chronology of types, which has been constructed by dating the associated archaeology/context than the anchors themselves[130]. As the age of the stone would not determine when it was cut – unless it had only consolidated in recent times and could therefore provide a terminus post quem – and is a difficult task in itself, dating is best achieved in this way, although it can only establish when the anchor was lost[131]. These anchors were found without any other archaeological evidence in the immediate vicinity therefore making a date impossible to establish. Hellenistic and Roman pottery was found in the water at Dreamer's Bay, but archaeologists have chosen to trust typology over context in this case[132]. Leidwanger rationalises this by arguing that the depth at which these anchors were found confirms their Bronze Age origins[133]. Eight of the nine

[129] Leidwanger (2005), 8. These anchors were dated using Frost's chronology. Frost (1970), 381, pl. I A
[130] Tóth (2002), 85. Leidwanger (2005), 125
[131] Tóth (2002), 85
[132] Leidwanger (2005), Chapter III: Dreamer's Bay.
[133] Leidwanger (2005)

anchors were found in a dense concentration away from the Hellenistic and Roman archaeology, at depths of 9-10m BSL[134]. Taking into account the suggested amount of subsidence that would have occurred between the Bronze Age and the Roman period, these anchors can be (crudely) estimated as being 5.5m-6.5m BSL during the LC and 7.5m-8.5m by the Late Roman period[135]. Leidwanger reports that anchors at Avdimou – 20km north-west of Dreamer's Bay - were used in water as shallow as 3-4m in depth, suggesting that the Dreamer's Bay anchors would have been suitably deep enough for use during the Bronze Age[136]. However, these estimations do not take into account other processes such as erosion and sediment movement or accumulation, which must be considered in our calculations. During the Bronze Age the coastline might have been further out to sea that its present location, having yet to undergo millennia of erosion and subduction[137]. The small coves that dominate the bay today are a result of wave erosion, which has undercut the rock and caused it to collapse: destroying areas of land that had been used during antiquity[138]. Some of this data might have survived under the sea, while indicators of Bronze Age activity could still be found on land, however, we shall have to wait for the results of the projects currently underway in the bay before we can answer these questions with any hard data.

[134] Leidwanger (2005), 53
[135] Leidwanger (2005), 122-3. Leonard (2005), 353 table 4.1. Flemming (1978), 415 table 1
[136] Leidwanger (2005), 125. Leidwanger (2013), 230
[137] Salomon et al. (2015). James and Score (2015), 25
[138] Salomon et al. (2015), 6

Limassol

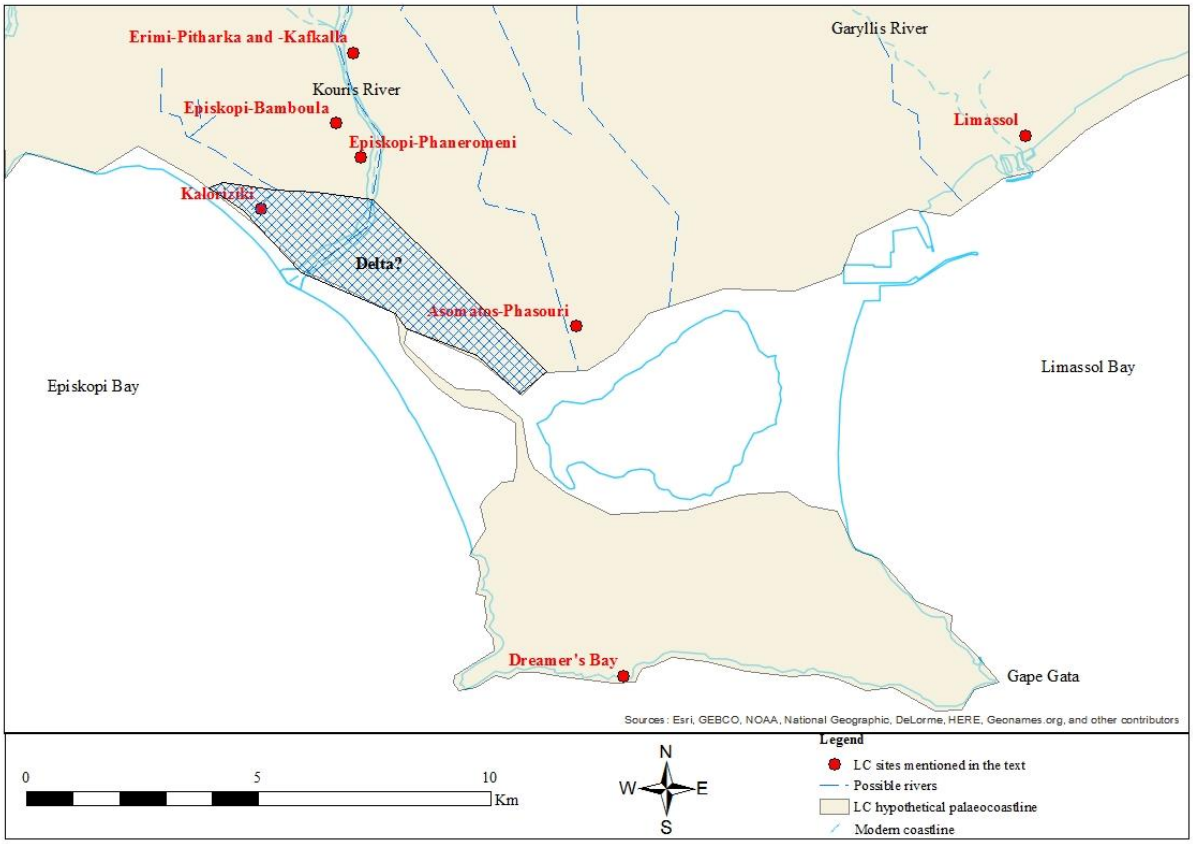
As explained in the Geological Introduction, the calm waters around Limassol would likely have been a suitable place for maritime activity during the LC. Zomeni has identified three bays that would have existed at some point during the Holocene, although she has not established specific dates. The location of the LC tombs identified by rescue excavations does not deny their existence either, as they are located on what would have been the edge of the features at their maximum extent. This would fit a trend for coastal tombs during this period, evident at Asomatos and the sites on the Kouris too. This extends into the later periods, and although it would make an interesting study, it is tangential to this discussion[139].

Even though the mouths of both the Kouris and Garyllis have evidence of human activity during the LC, it does not seem that the Garyllis was an integral part of the copper trade in the area. This is reflected not merely by a lack of evidence, but the geological makeup around the river, in which there are no copper sources[140]. It is unclear how this scattering of LC burials fit into the maritime landscape of the study area, but the small quantity of geological and archaeological evidence we have indicates that further investigation might reveal its true place.

[139] See Parks (1999), Sollars (2005), Karageorghis et al. (2012), James and Score (2015) and University of Glasgow (2016) for information on the coastal tombs in the study area.
[140] Kassianidou (2013), 36 fig.1

Conclusion

The lack of evidence makes it very difficult to reconstruct the maritime landscape of the LC period (fig.41), however, there are a number of geological and archaeological indicators that hint at its form. Natural harbours were likely exploited at Episkopi, Asomatos, Limassol and Dreamer's Bay, although only the latter yields any physical evidence of use – itself inconclusive. As the period progressed, maritime connections grew, bringing goods, people and ideas to the maritime landscape. Even so, it was their local connections – especially those of the Kouris' settlements – which truly dominated and advanced the cultural and physical LC maritime landscape.

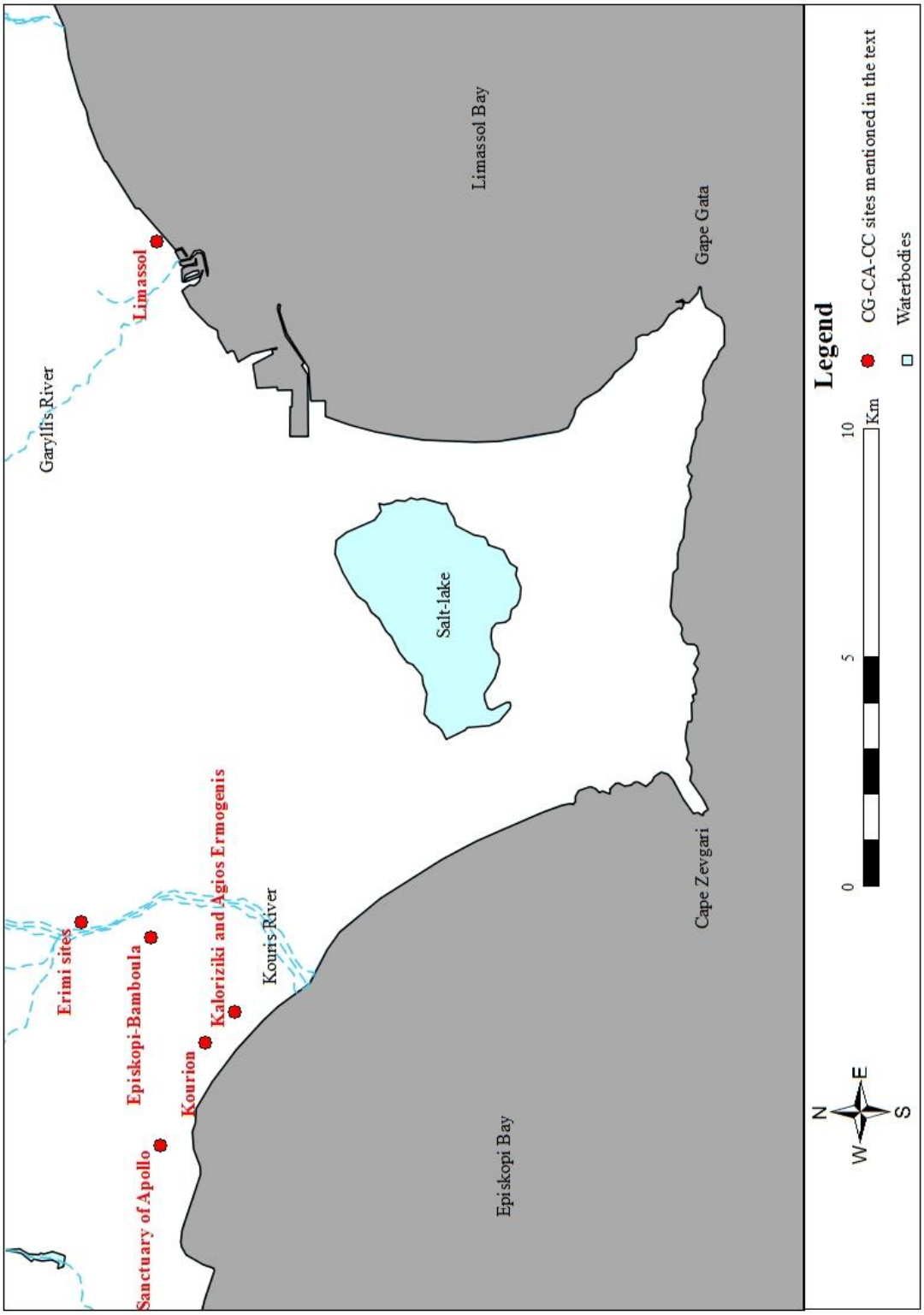


41: A hypothetical reconstruction of the study area during the LC

5: Cypro-Geometric to Cypro-Classical

Rarely does a scholar studying this era in Cyprus use the term "Iron Age" to describe the period between the Bronze Age and the Classical period. Instead, this period is named and defined by the pottery styles brought and driven by the migration of Greeks - "neither colonists nor conquerors"[141] - following the collapse of the Mycenaean civilisation. There was also a physical change in terms of settlement, as following the decline of Bronze Age settlements such as *Bamboula* and a period of archaeological silence during the Cypro-Geometric, large, urban centres were established on the coastline during the Cypro-Archaic. However, there is evidence of continuity of settlement at Erimi[142]. Inland centres like Alassa declined and disappeared at the end of the Bronze Age, but when settlement became visible again in the archaeology, it did not reappear at such sites. The tripartite system of the copper industry does not appear in the archaeology as it did in the Bronze Age. Instead, settlement shifted to acropoleis on the coast, where the City Kingdoms were established and dominated the landscape (fig.41).

[141] Voskos and Knapp (2008), 659
[142] Flourentzos (2010), 10



42: Locations of CG, CA and CC sites mentioned in the text

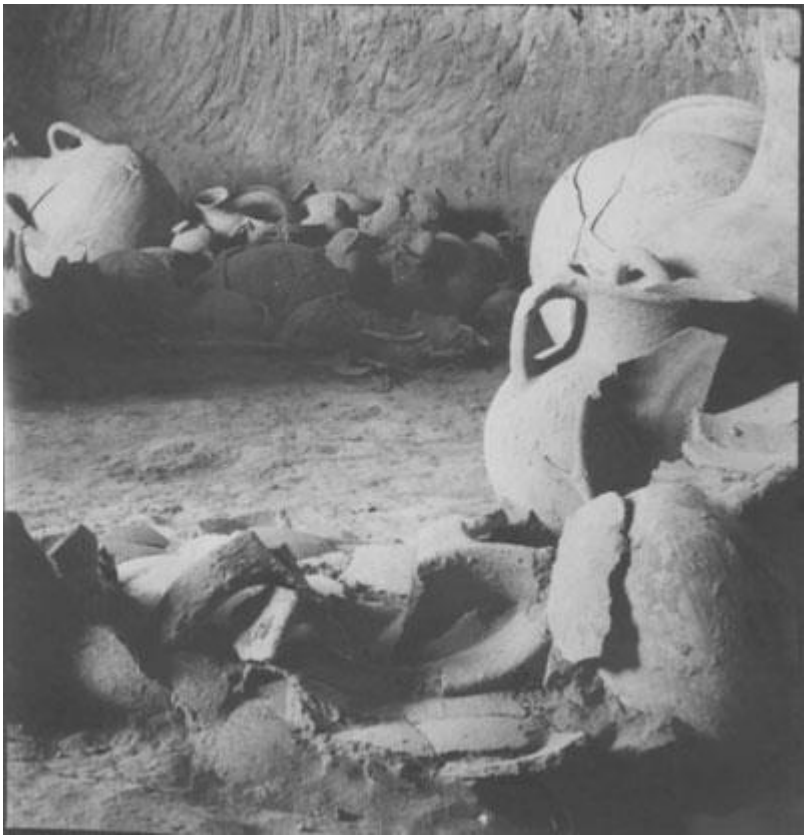
The Kourion area

43: The view of the Kourion bluff from a rise on the plain to the east. Kaloriziki and Agios Ermogenis are located out of shot, to the left of the photograph. A stream lies in the area of trees in the middle of the photograph (credit: author)

Although there is little evidence of settlement in the area of the Kourion bluff until the Cypro-Archaic period, the tombs of Kaloriziki and Agios Ermogenis demonstrate the presence of humans and their maritime connections prior to this. The altitude of the 6th century basilica indicates the level of deposition in that particular area during construction, suggesting a similar level for the rest of the area – although this is little more than a rough estimate. A more rigorous set of cores would be required to establish the true geography of the area during the periods examined, particularly to separate the marine from terrestrial. In the bay, archaeological material pertinent to this study is likely hidden under metres of sedimentation, as are the conditions of any proto-harbour. However, I propose that this bay was a part of the maritime landscape of the Iron Age. The plain is low-lying and located next to an inconspicuous stream which lies between the cemetery and Kourion (fig.42). The height of the land relative to sea level would likely have been very different at this time, indicated by the high levels of aeolian and alluvial sediments above the Agios Ermogenis tombs which were in use between the CG and Roman period. There are 1.8km from the current bed of the Kouris and 600m from the modern coastline. Up to 6m of this sediment was recorded overlying the tombs at Agios Ermogenis, which were believed to have been cut into the rock at ground level[143]. This can only have been a post-Roman occurrence, considering that the tombs were cut into the bed rock, not the unconsolidated sediment.

[143] Oliver (1982), 141

The use of the area for agriculture led to the bulldozing of the area in the 20th century, which cut into the tombs and stratigraphy, the latter of which had not been chronicled in detail during the excavations of the 1930s (Daniel, 1937). Plans of the tombs from the excavations did demonstrate that less than a metre of sediment lay on top of the rock-cut tombs, but more detail would have helped establish the palaeogeography[144]. On the contrary, there is evidence of erosion instead – particularly on a rise in the ground – although it is still minor, particularly in comparison with that experienced at *Bamboula*[145]. The area to the west of the stream (around Agios Ermogenis) seems more alike the bay of Kourion, than the Kaloriziki cemetery.



44: A photograph from the 1930s excavations of the Kaloriziki tombs (credit: Penn Museum)

[144] Benson (1973), Plates
[145] Benson (1973), 19. Erosion of the rock-cut tombs is particularly severe on the northern slope of the hill.

Kaloriziki (fig.41) provides evidence of continued occupation of the Kourion area, being in use from the 11th century BC until the early 5th century BC. It is situated on a fertile plain east of the Kourion bluff, 1.6km south-west of Episkopi-*Bamboula*. It was in use before *Bamboula* had been abandoned although it does not appear to have functioned as a cemetery for that site[146]. There is a trend for settlements of this period to appear in new, unoccupied areas[147]. Unlike the settlements of the Bronze Age, the tombs of Kaloriziki are located 1.5km from the Kouris river. No associated settlement has been found, although archaeologists believe it is either on the Kourion bluff or down on the plains beside the necropolis[148]. Excavation of the area has been concentrated around the known tombs, so until further investigation can take place and the deeper stratigraphy of Kourion can be penetrated, we can only guess. Some proto-geometric sherds were discovered in a deep trench on the bluff, but this is not enough to indicate settlement[149]. The site represents the period's movement towards the coast, although unlike the Bronze Age settlements in the area, it is not particularly near the (modern) Kouris river. This may, of course, have been different during that time, although geological investigation would be required.

45: A view from the Kourion bluff looking south-east over the plain towards the Kouris River and the peninsula. The sea would have been further inland during the 1st millennium BC. (Credit: P. Herritier)

[146] Benson (1973), 15
[147] Steel (1996), 287. Iacovou (1994), 149.
[148] Daniel (1937). Benson (1973). Benson (1982), 51
[149] Benson (1973), 18. Steel (1996), 290. Young and Young (1955), 224.

Although this area was clearly not submerged due to its use in the Iron Age, the quantity of sediment could have caused coastal prodgradation further towards the coast, pushing Kaloriziki and Agios Ermogenis further back from the sea to the position they are today (fig.44). If a marine embayment, lagoon or sheltered river mouth existed here, it would have offered greater protection for ships than the adjacent bay of Kourion, which is battered by the prevailing westerlies.

In 1996, a total of four geological cores were taken by Leonard and Dunn to the east of the bay, penetrating a depth of 15m at distances along the perpendicular track to the beach[150]. One was taken as far back as the point of the track as it skirts the cliff base[151]. All results consisted of sand alone, prompting Dunn to conclude that the coast had prograded at least 25m since the Roman period and would have consisted of the same, sandy makeup as it does today[152]. This will be discussed further with regards to the Roman period in Chapter 6, but for now, let us consider what this might suggest for the time that Kaloriziki and Agios Ermogenis were in use. The proximity of these cemeteries to the coastline indicates that themselves and any associated settlement – be it on the plains of the bluff – was a part of the physical maritime landscape. To determine whether they were a part of the cultural maritime landscape, one must consider the archaeological evidence. There is debate over Benson's view of the levels of occupation – Steel believes there are gaps – but this is not of any great significance for studying the maritime cultural landscape at this scale[153]. Regardless, the artefacts – of both foreign origin and influence – and the Mycenaean style in which the tombs were constructed demonstrate the maritime connections of the people who used Kaloriziki. Near East and Aegean imports dominate the earlier tombs, while a shift can be seen toward Cretan and Rhodian goods, reflecting the demise of the Mycenaean civilisation. As helpful as this evidence is for understanding the connections and culture of this coastal site, the absence of a settlement limits our understanding of the maritime landscape.

[150] Leonard (2005), 558-9. The first (KO 01) was 41.5m from the MSL (as it was in 1996). The second (KO 02) was 68.15m from KO 01, the third (KO 03) was 65.5m from KO 02. The fourth (KO 04) was 165 m southeast of KO 02 and 93.8 m inland from MSL (as it was in 1996)
[151] Leonard (2005), 558-9
[152] Leonard (2005), 559
[153] Steel (1996), 291

Although (slightly questionable) literary evidence for the Kingdom exists from the 7th century BC exists, the first archaeological evidence begins centuries later. Evidence for occupation on the acropolis of Kourion has to be dated prior to the 5th century BC, however this could in part be due to the layers of occupation that grew over it until the 5th century AD. The Sanctuary of Apollo (7th century BC at least) is two miles west of the acropolis and the earliest built evidence we have for activity on the limestone bluff. Geological evidence does not suggest that the mouth of the Kouris was any closer to Kouris during the CG or CA but maritime activity might have taken place in the bay beneath the bluff. Geologically, the tombolo would have been forming at this time, and there may have been natural harbours within the features created by this process. This would of course, need to be verified by geological investigation.

Cape Zevgari

A scattering of pottery – likely lost from ships - dated to the CA-CC was found underwater at Cape Zevgari, indicating the use of this route during the period[154]. This supports the geological evidence, which shows that despite the subsidence that has occurred since, this area would have still been submerged and navigable at the time[155]. The rock around which some of the pottery was found is particularly dangerous, the sea bed shallow too, suggesting that although the Cape was navigated, it was not always navigated successfully.

The Interior of the Peninsula

There is no evidence indicating that the area around Asomatos was settled following its abandonment at the end of the LC. This island-wide dark age abandonment is likely the reason for Asomatos' demise, rather than the sedimentation of the lagoon. However, it is likely that the conditions at Asomatos were changing, and might indicate why the area was not resettled.

[154] Leidwanger (2005), 129-130
[155] Leidwanger (2005), 129

Limassol and the Garyllis

The sole evidence for this period – maritime or otherwise - lies with a geometric necropolis in the modern city centre, for which no associated settlement has yet been found. It is currently situated 735m from the sea and 1km from the Garyllis river, although its distance from these bodies of water were likely different during the CG period. If the bay at the mouth of the Garyllis existed during this time, the necropolis would have sat on the water's edge, yet subsidence would have pushed the coastline further south-east[156]. Establishing the coastline would not be as simple as reducing relative sea level (RSL), as sedimentation of the bay must also be taken into account, as this will have prompted coastal prodgradation. Regardless, the settlement related to the burials might have been closer to the river and/or coast, and had a relationship with it.

Conclusion

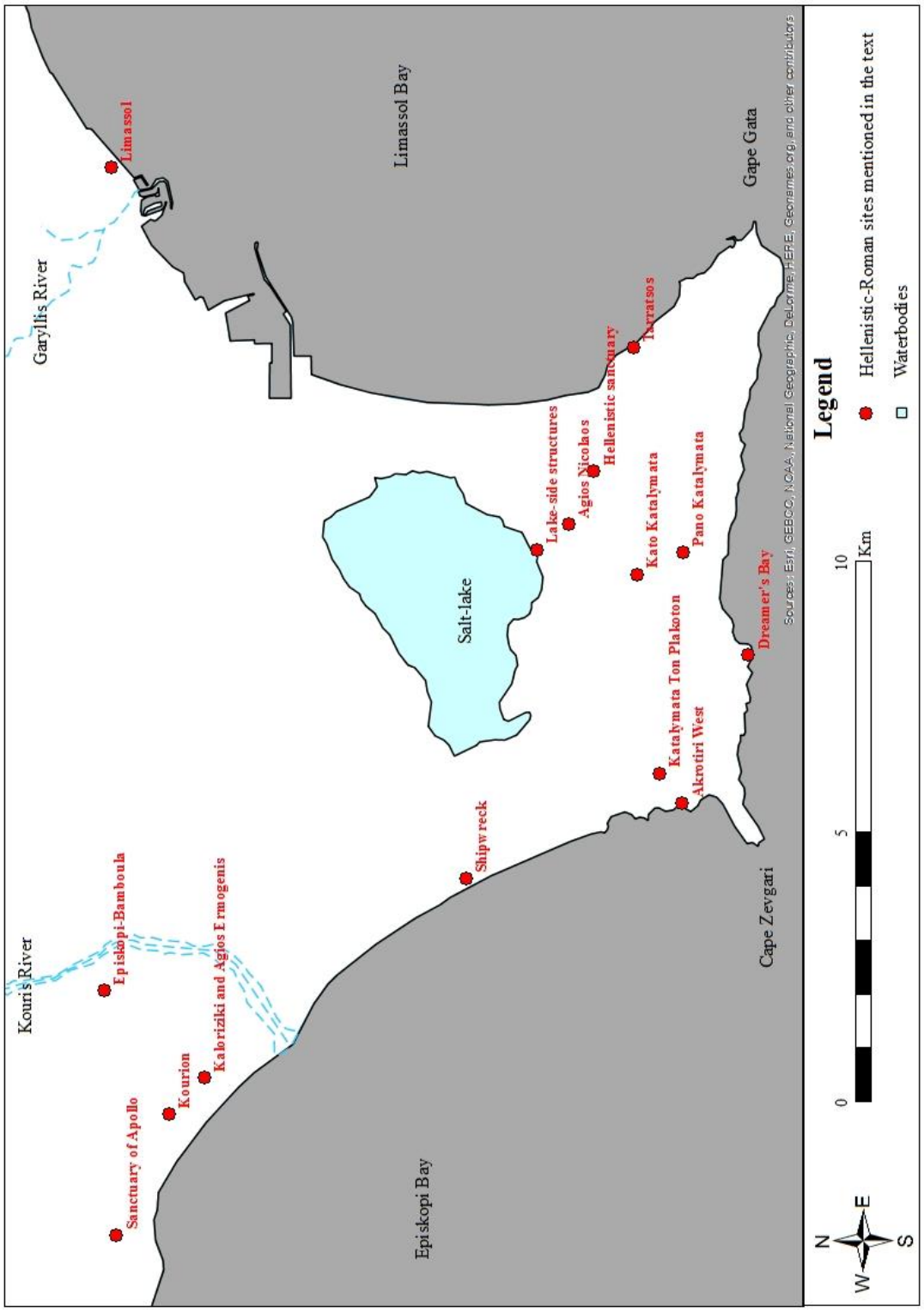
The state maritime landscape for this period is not clear, largely due to the lack of archaeological data, particularly with regards to settlement. Maritime activity was certainly taking place at Kourion, where ships connected to the East via Cape Zevgari and the peninsula, but the physical features of Kourion bay and any clues to the maritime facilities are likely hidden beneath metres of sand.

[156] Flemming (1978), 415 table 1

6: The Hellenistic and Roman Periods

The maritime landscape of Akrotiri is represented better in the archaeology of the Hellenistic and Roman periods than any time before or after (fig.45), however, the dating of some archaeological and geological features is not yet period-specific. Therefore, the following chapter will assess the maritime landscape of both periods together, making note of dating issues when they arise. Following the death of Alexander and succession of Ptolemy, the island and peninsula enjoyed political stability and economic prosperity throughout the Hellenistic period and the into the Roman. The first built harbours were constructed across the island including three in the study area, at Kourion, Dreamer's Bay and Tarratsos. The western arm of the peninsula was now a substantial size (although it may have still been prone to flooding) and the eastern arm was still open, the lagoon navigable[157].

[157] Wessex Archaeology (2002) 2



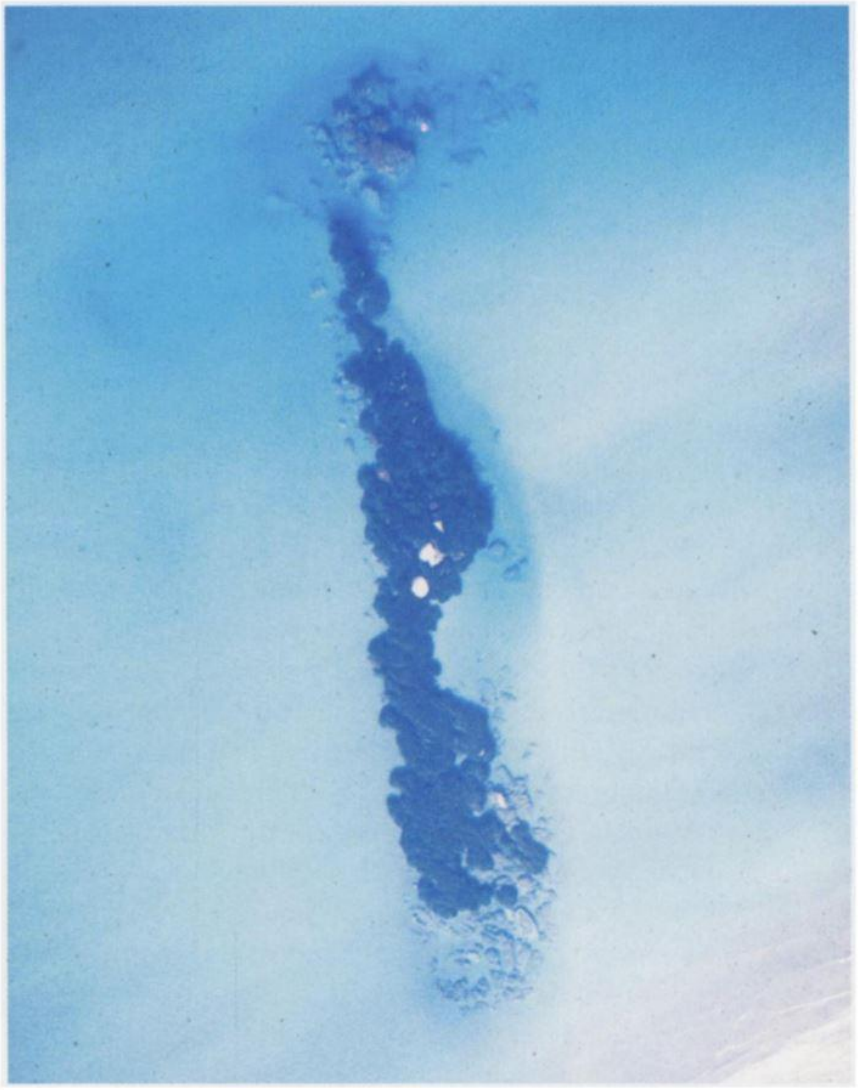
46: The Hellenistic-Roman sites discussed in the text

The Kourion area

As explained in previous chapters, the superficial geology of the Kourion bay was very different during the Hellenistic and Roman periods. In 1996, four core samples were taken by Leonard and Dunn at a depth of 15m, spaced at inconsistent intervals along a track to the east of the bay[158]. There samples contained nought but sand, leading Dunn to suggest that the coast had prograded at least 25m since the Roman period[159]. The 6th century basilica and the structure identified by Leonard and Dunn in the NW of the bay – perhaps a Classical warehouse for the port – act as a terminus ante quem for the consolidation of the sediments here. There must have been a firm surface on which to build these structures or else they would not have stood, least of all for so long. The Agios Ermogenis tombs indicate a terminus post quem for the sedimentation above the tombs, which must have occurred following the last burial in the 2nd century AD. We also have a much lower altitude for the area during this time, due to the 6m of sediments, although this could have been eroded from the bedrock itself. There are no observations or datasets which demonstrate vertical displacement in the specific Kourion area, even Flemming did not gather data at Kourion, fitting it into a general subsidence contour of 0.75m/millennium[160]. The extension of the harbour wall beneath the tombolo indicates that the enclosed harbour area continued further towards land. Leonard's analysis of harbour terminology suggests that the harbour was circular in shape[161], but neither geological nor archaeological data has been taken to test this theory. All this evidence indicates that the bay which had existed before these period was still there, although the amount of sediment deposited since suggests it was gradually filling in.

Although there might have been a proto-harbour in the area of Agios Ermogenis (Chapter 5), we know that the bay itself was used for maritime activity due to the existence of a harbour wall recorded first by Haggerty and then Leonard (fig.46)[162]. It has revealed Roman material, indicating that the structure was likely in use during that period, with a set of rock-carved stairs – now lost to erosion – connecting the harbour with the city on the bluff[163]. However,

[158] Leonard (2005), 558-9. See footnote 116 for locations of the cores.
[159] Leonard (2005), 559
[160] Poole and Robertson (1991), 919. Flemming (1978), Fig.6
[161] Leonard (2005), 164
[162] Leonard (2005), 555
[163] Leonard (2005), 164



47: An aerial photograph of the Kourion harbour mole. The landward end is the bottom of the photo. (Credit: F. Haggerty)

Kourion supported Alexander at the naval battle at Tyre in 332 BC, so it is likely the city had sufficient facilities for harbouring if not building vessels capable for war. The extant portion of the wall is 68m long and 12m wide, running NE to SW from the shore, with a second wall (30m in length) of rubble forming a corner[164]. On the opposite side of the peninsula, a trapezoid harbour was built at Amathus around the same time (315 BC), with harbour walls and extra breakwaters to combat the power of the westerlies. The harbour wall and bay at Kourion is battered by these winds and waves today, making survey of the wall difficult and use of the area as an anchorage unfavourable – a makeshift harbour has been set up in Bay Number 3, to the immediate west of Kourion. Conditions are estimated to have been similar

[164] Leonard (2005), 556

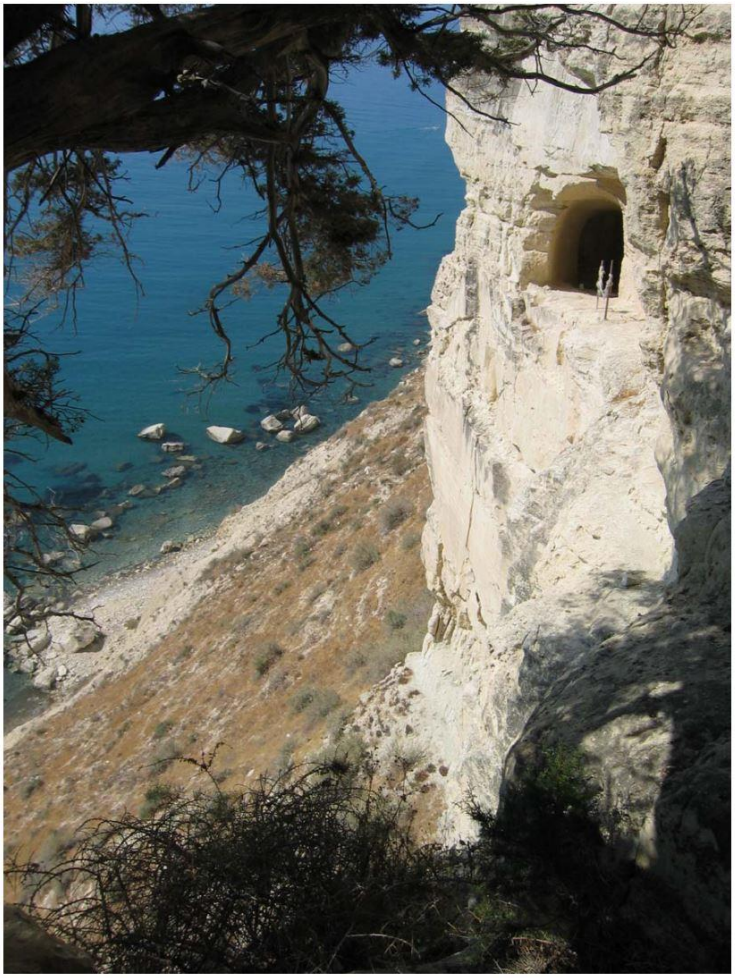
48: (Top) Looking south-east from the bluff at the sandy bay which has changed markedly since the Roman period, although we do not yet know specific details. (Bottom) The early-Christian basilica in the bay beneath the Kourion bluff (credit: author)

during this period, which would make Kourion's harbour an impracticable facility – particularly for unloading goods – unless it had additional walls and features to protect against the winds[165]. As mentioned in Chapter 3, I estimated that the tops of the blocks were located c.1m beneath the surface, indicating that the area had experienced subsidence and the movement of supporting sediments since antiquity[166]. Calculations have not yet been made to determine how much sediment has built up inside of the harbour wall since antiquity, but it is clear that a large amount has been deposited, as the tops of blocks can be covered and uncovered by the waves or the fanning of an archaeologist's hand[167]. Similar geomorphological processes have occurred in the harbours at Paphos and Amathus, where lower water depths now render parts of the harbour basins inaccessible to vessels[168].

During these periods, the buildings of the city would have been visible from near the coast and further out to sea, just as the ruins – particularly that of Eustolios and the basilica - are today (fig.47). It would also have provided a clear lookout along the coast towards Paphos in the west and along the Akrotiri peninsula to Cape Zevgari and the lagoon in the south-east. The discovery of a wall to the east of the bay might indicate the presence of a warehouse, or some other building likely associated with the port. The 6th century basilica has also been associated with the port, which would indicate that the bay – or at least some part of it – was still used during this period. Basilica's have been similarly associated with ports – as guardians – in Paphos and Amathus[169].

[165] Leonard (2005), 163-4
[166] Observations were made during both rough and calm conditions on a number of afternoons in July 2016.
[167] Leonard (2005), 557. The author made these observations during both rough and calm conditions on a number of afternoons in July 2016.
[168] Paphos: Leonard et al. (1998). Amathus: Empereur (1987). The investigations in the outer harbour of Amathus have been renewed this year (2016) with funding from the Honor Frost Foundation (http://honorfrostfoundation.org/dr-jean-yves-empereur-the-underwater-excavation-of-the-ancient-port-of-amathus)
[169] Leonard (2005), 508. Aupert et al (1996), 162 and 164. Christou (1995), 834-5. Christou (1996), 1069. Christou (1997) 904-5. Hadjisavvas (1998), 672

It is worth noting that there might have been use of the bay to the east of Kourion, christened "Number Three Bay" by Leidwanger[170] and the "Apollo Anchorage" by Leonard[171]. The (reported) presence of anchors and a tunnel connecting the bay to Kourion Bay – marked with (tentatively dated) Late Roman graffiti - are counterbalanced by the lack of any other material such as pottery (fig.49)[172]. The lack of evidence might well owe to the erosion of the cliff face, which has also destroyed the path which led down to the bay from the cliff, which connected to sanctuary of Apollo inland[173]. At present, no geoarchaeological analysis has been done within the bay, although observations have been made of sediment deposition from the eroding cliff and Kouris fan[174], indicating that the bay has likely changed since the period. There is a possibility it could have been used during earlier periods, but as yet there is no evidence for this.



49: The tunnel through the cliffs between Kourion Bay and the Apollo Anchorage (credit: Leidwanger, 2005)

[170] Leidwanger (2004), 15
[171] Leonard (2005), 560
[172] Leidwanger 2013), 223
[173] Leidwanger (2013), 223 footnote 7
[174] Leidwanger (2013), 223 footnote 7

The Western Tombolo to Cape Zevgari

Geological and archaeological evidence indicates that the bridge between the Akrotiri High and mainland could have been over 1km wide during this period[175]. The discovery of a Hellenistic (or Roman) shipwreck in the gravel beds between the salt-lake and the western coastline (150m from) suggests that this area was still navigable during this period. However, this assumption works on the belief that this assemblage was from a shipwreck. If it was not a shipwreck[176], then this could be a marker for the minimum extent of the land rather than the sea. However, the presence of goods such as transport amphora and marble indicate, plus the arrangement of the artefacts suggests it was a shipwreck[177]. This assemblage was discovered in 1977 and reported in the Bulletin de Correspondance Hellénique (1978), but little else other than the artefacts were described. In 1998, Earthmetrix Geotechnical and Materials Engineers of Nicosia took 7 samples up to depths of 15m at locations west of the modern boundaries of the salt-lake[178]. All displayed similar results, indicating that there were beach deposits up to 1.2m beneath the surface, with later coring by Wessex Archaeology indicating fine gravel deposits up to 0.8m below the surface[179]. The build-up of sands along this western coast also indicates the amount of sediment deposited by sea and wind – Late Roman pottery was uncovered 9m below the surface and gravel beds west of the salt-lake reach 10m in depth[180]. The amount of accumulation demonstrates how much the landscape has changed since then, although further investigation would be required to determine its exact characteristics. In the interim, we can suppose that sailing routes and potential anchorages would have been very different, now hidden beneath metres of sediment. The subsidence experienced by this area – still disputed but most convincingly estimated by Flemming at 1.1m/millennium[181] – would have also changed these routes, perhaps even pushing them further out to see than the sediment deposition would indicate.

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[175] Karageorghis (1978), 884. The phrase "A environ mille mètres au large de la côte" has been taken to refer to the coast of the salt-lake rather than the sea (Leidwanger, 2005, 7).
[176] Leidwanger (2005), 8. Parker (1992), 49. No remains of the vessel itself were discovered.
[177] Sollars (2005), 87.
[178] No specific locations or analysis of the Earthmetrix boreholes were presented by Wessex Archaeology in their 2002 report, and the images of the report were not made accessible to the author due to the military associations with the project. However, the report did include a table of descriptions for the cores (Table 1, p.17).
[179] Wessex Archaeology (2002), 18
[180] Leidwanger (2005), 7
[181] Flemming (1978), 415 table 1

50: There was a dense pottery scatter around the bays of West Akrotiri, as well as numerous layers of sherds concreted into the soft sandstone (credit: author)

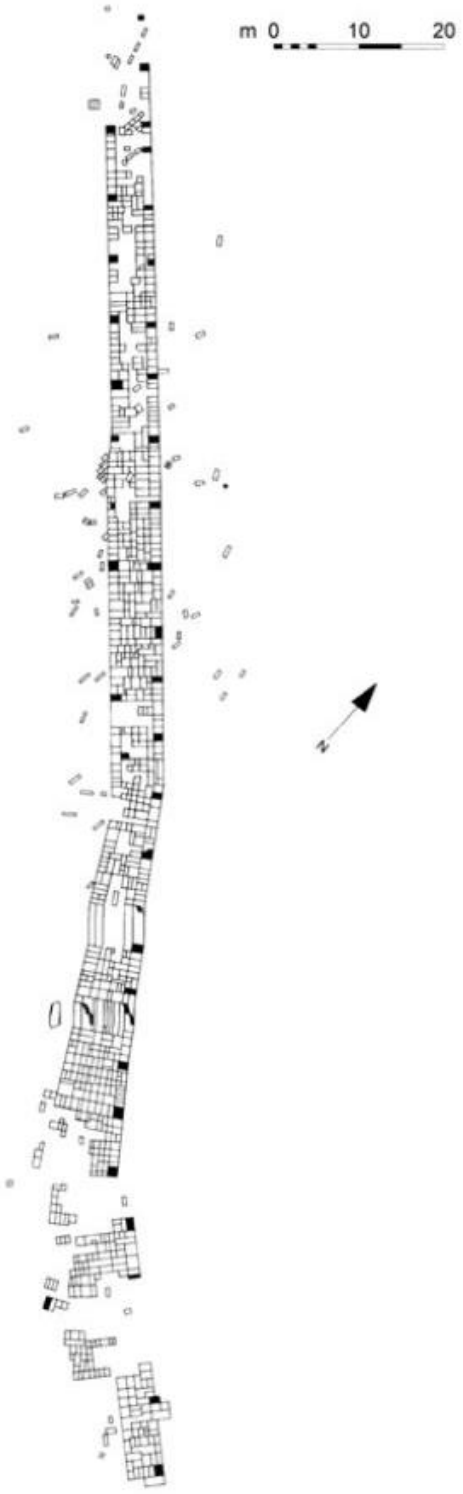
Although the first structural evidence dates to the Roman period, the quantity of Hellenistic material indicates that there was human activity on the peninsula earlier on in the Classical period. The high rate of subsidence in this area (1.1m/millennium[182]) also means that the sailing routes could have been very different, much further out to see than they would be today. The three bays of West Akrotiri are particularly shallow, which means the coast line - particularly the reef extending from Cape Zevgari - would have been quite a bit further out. The material visible on the beaches and concreted into the layers of the cliffs at West Akrotiri could have been from shipwrecks or activity which happened in areas now submerged and much further from the modern coastline (fig.50). The high levels of erosion in this area could also have destroyed even more landforms that could have existed. Therefore, the bays as they are today most likely did not exist in the same form during this period, challenging Leidwanger's theory that it could have served as an anchorage for the Late Roman site of *Katalymata ton Plakoton*[183].

[182] Flemming (1978), 415 table 1
[183] Leidwanger (2005), 133

Dreamer's Bay

The changes to the maritime landscape of Akrotiri are perhaps most visible at Dreamer's Bay. Here, the (tentatively dated) Hellenistic harbour mole lies 150-200m offshore (it is not connected to the shoreline), a minimum of 1m deep, 5m wide and 150m long (fig.51)[184]. Today, the deep, eastern anchorage does not provide good shelter from the winter winds, nor is the water deep enough in the western part to provide shelter from the summer winds, but during the Roman and Hellenistic periods, the bay would have been much different (fig.54). Salomon's work on the Akrotiri peninsula has provisionally suggested that the island opposite the shore to the west would have been connected to the land at this time by a spit, giving the eastern part of the bay protection from the prevailing winds[185]. This arm might have also had buildings atop of it, although it would seem they have been another victim of the eroding coast[186]. The reef of the Vatha rocks to the west are no longer visible above water today, but in antiquity would likely have formed an island if not a headland that would have marked the westernmost extent of the bay (fig.52)[187], creating additional shelter. The concentration of material (anchors and ceramics) to the north and east of the Vatha rocks indicates the popularity of anchoring in this area[188], while the area to the west, south of where the excavations have been concentrated, yielded "hardly any" ceramic debris[189]. The 2m subsidence will also have changed the coastline, with Flemming positing that it was further east, toward the Vatha rocks and creating even greater shelter for the area to the north-east[190]. In contrast to the anchors attributed to the Bronze Age, which were located in a dense concentration in deep water, the Late Roman anchors were concentrated in shallower water to the west where the harbour mole and ceramic evidence were found[191].

[184] Salomon (2015), 10
[185] James and Score (2015), 25. Salomon (2015), 13.
[186] James and Score (2015), 25
[187] Leidwanger (2005), 123
[188] Leidwanger (2005), 123
[189] Leidwanger (2005), 123
[190] Leidwanger (2005), 124
[191] Leidwanger (2005), 125



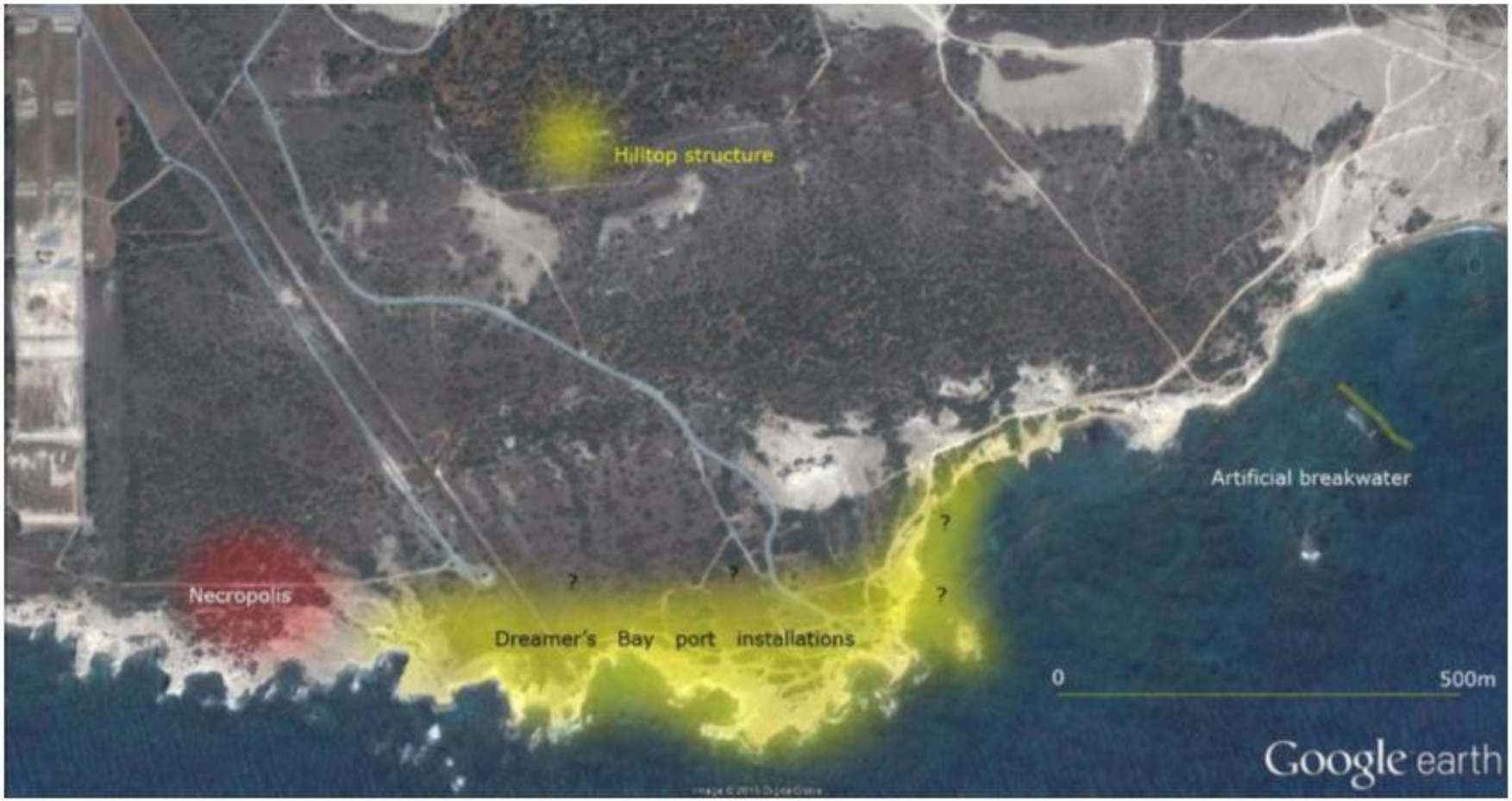
51: A plan of the Dreamer's Bay breakwater (credit: Leonard and Demesticha, 2004)

52: The view from the coast to the Vatha rocks (top, credit: Lucy Blue) and building number 1 (bottom, credit:James and Score, 2015), both shots looking East along the southern coast.

The harbour and associated buildings are probably built from the quarries on top of the cliffs above (fig.53)[192]. Ceramics associated with the structures and the underwater areas (believed to be shipwrecks) are overwhelmingly dated to the Late Roman and Byzantine periods, however there is some material from the Hellenistic and earlier Roman period too[193]. Almost all of the walls surveyed by the University of Leicester team were aligned with one another on the cardinal points, indicating that they might have been organised in a grid system[194]. Such a pattern suggests that these buildings were built as part of a "unified concept"[195] rather than growing up organically from a settlement. However, James and Score also note that there does appear to be two different phases of construction[196]. They would have been part of the maritime landscape, particularly if they were – as supposed – warehouses associated with the port[197]. The team will likely uncover more data in future seasons that will enrich our current understanding of the maritime landscape here.

***53**: Photograph of the coastal quarry from which the structures in the bay were likely built (credit: Lucy Blue)*

[192] James and Score (2015), 5
[193] James and Score (2015), 5-6
[194] James and Score (2015), 26
[195] James and Score (2015), 26
[196] James and Score (2015), 26
[197] James and Score (2015), 26



54: The hypothetical extent of Dreamer's Bay during the Roman period, prior to erosion (credit: James and Score, 2015)

Tarratsos

On the north-eastern edge of the WSBA, at Tarratsos, a submerged, stone structure was discovered and reported by Hyder Environmental (1997) and Wessex Archaeology (2002) in their respective assessments for the British Ministry of Defence's antennae development on the Akrotiri salt-lake. Neither of these reports were published or made publicly available, due to the inherent security issues[198], but I was able to access what little Wessex Archaeology had written about the structure. It was identified as a harbour mole, 5m wide and built with stone blocks in a Hellenistic style, like the mole discovered at Dreamer's Bay[199]. In another similarity to the Dreamer's Bay mole, it produced archaeological material exclusively from the Roman period[200]. Leonard's description of the mole at Kourion is similar, although he uses the pottery and documentary evidence to date the wall to the Roman period[201]. Regardless, the similarities in the structures is worth noting, even though we cannot yet explain their relationships. No corresponding archaeology has been found on land, but the mole at Tarratsos might have had a relationship with the contemporary structures or road by the salt-lake, as well as the other coastal sites in the study area and beyond. There are no existing sources on the geomorphology of the area, which is topographically similar to the southern coast of the peninsula.

[198] Pers.comm (email), Allan Morton
[199] Wessex Archaeology (2002), 8 and 27 (Appendix 1)
[200] Wessex Archaeology (2002), 8
[201] Leonard (2005), 550-551 and 560.

The peninsula: Interior

As the salt-water body of the peninsula was likely navigable during this period (accessible from the east), then the Hellenistic and Roman remains around it would have belonged to the maritime landscape. Although the original monastery of Agios Nicolaos was not established until the Late Roman period – the current building dates to the Ottoman period and utilises some of the Roman columns – there is evidence of earlier activity around the lake[202]. In addition to a prehistoric stone axe of non-local material, Last (1954) discovered numerous terracotta figurine fragments, the torso of a ¼ size limestone statue, evidence of a settlement related to the Agios Nicolaos monastery and a Hellenistic sanctuary[203]. More recently, Sollars (2005) identified the handle of a Hellenistic-Roman period transport amphora in the same area[204]. Sollars and the WSBAAS (1995) both report the possible remains of Roman structures on the very edge of the salt-lake, which might have been warehouses and a jetty related to the maritime activity of the lake and peninsula (fig.55)[205]. I was not able to locate the latter, but did find the ruins noted by Sollars, which are still visible in the topography despite being covered by more wind-blown sediments in the intervening decade[206]. Wessex Archaeology identified a possible Roman road that connected this area to Kourion and the mainland along a similar path as the modern road. This route runs close to the aforementioned sites of Hellenistic and Roman activity, skirting the western side of the salt-lake to meet the ancient Paphos to Limassol road to the north[207]. Scatterings of Hellenistic-Roman period pottery – including pieces of transport amphora – are found along this route, suggesting that the interior of the peninsula was a vibrant part of the maritime landscape during this time[208].

[202] Sollars (2005), 73. Wessex Archaeology (2002), 8 and 26
[203] Sollars (2005), 73. Wessex Archaeology (2002), 8 and 26
[204] Sollars (2005), 73
[205] Sollars (2005), 90
[206] Sollars (2005), 73
[207] Wessex Archaeology (2002), 29 (Appendix 1)
[208] Sollars (2005), 75

55: Possible warehouse structures discovered by Sollars (2005). White lines have been added during processing to better mark the ruins beneath the sediment (credit: author)

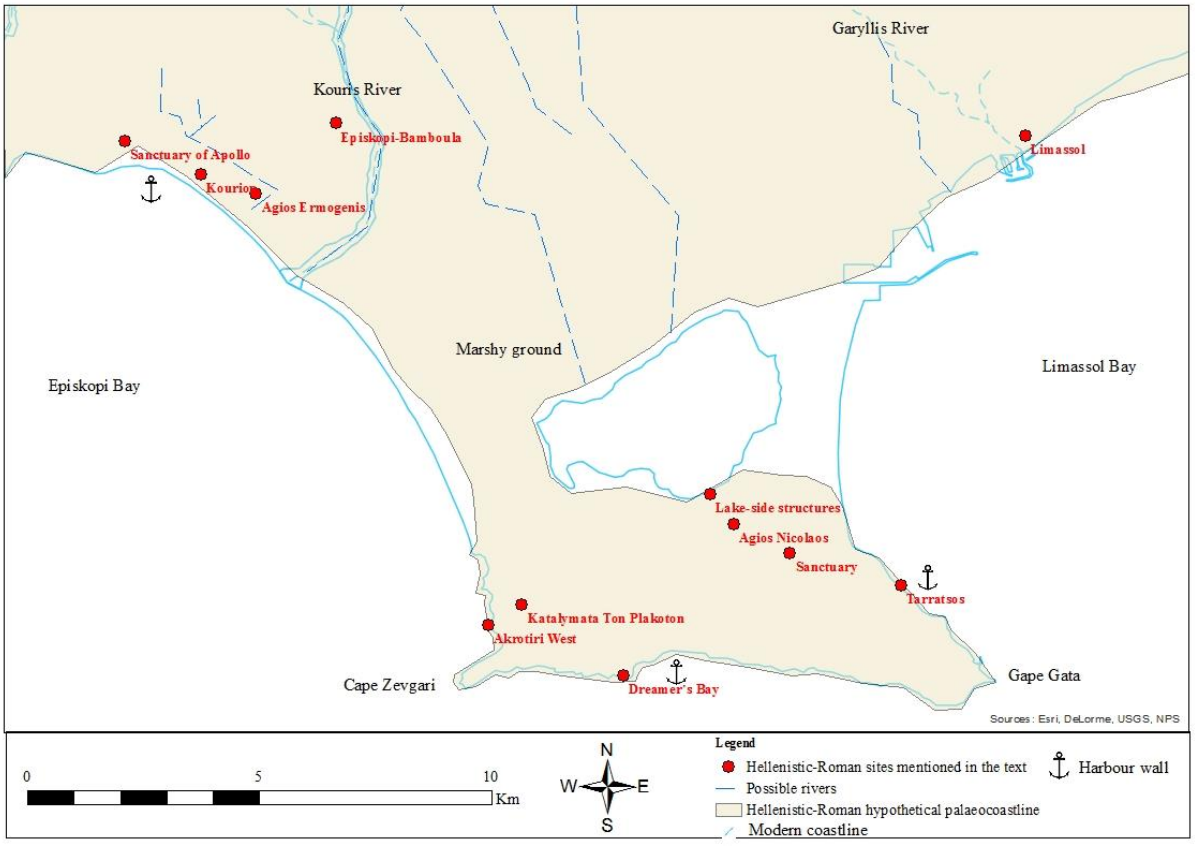
Limassol and the Garyllis

As explained in Chapter 3, there is insufficient geological and archaeological evidence to determine the specifics of the maritime landscape, and there is unlikely to be any of this left undisturbed. However, the general conditions of the bay and indicators of activity in the area suggest that it is likely there was maritime activity taking place here[209]. Unfortunately, I was not able to access any texts regarding finds of this era in Limassol (see Chapter 1), although I did see first-hand the remains of the Late Roman basilica beneath the extant Ottoman era castle. It is difficult to determine the location of the Hellenistic-Roman coastline due to coastal development, particularly dredging for the port, in addition to the natural processes of subsidence and sediment transport (see Chapter 3). There is not enough known about the geomorphology to establish whether the bays identified by Zomeni as possible harbours still existed, or whether they had silted up and/or disappeared under the water due to subsidence. However, considering the agreeable conditions of the bay and the activity evidenced by the archaeology, it is very likely there was harbour infrastructure – if not a mole, then at least structures related to maritime activity – at Limassol.

[209] Alpe (2015), 52

Conclusion

Our understanding of the maritime landscape greatly benefits from the amount of archaeological evidence and the academic attention it has therefore received. The geological analysis taking place at Dreamer's Bay has been incredibly useful and demonstrates how much could be learned from taking a similar approach at Kourion. Archaeologically, maritime infrastructure and shipwrecks are visible for the first time, while artefacts and products of maritime culture continue to demonstrate the activity. This visibility reflects not only developments in maritime technology and culture, but can show us how the geomorphology of the area – such as the formation of the lagoon - was exploited, to become a part of the maritime landscape. However, this visibility also emphasises our blind spots, where geological and/or archaeological information is still lacking.



56: A hypothetical reconstruction of the study area during the Hellenistic and Roman periods

7: Conclusions

The purpose of this study was not to create new geological or archaeological data, but to pull together our current state of knowledge and see what we can learn about the peninsula's development during the time period. By looking at what we already know from a different perspective, in terms of stepping back from the site-specific work and moving towards a broader and more geological viewpoint, I have created new questions and hypotheses to be tested. This volume also works as a foundation for future work and research, a single text that brings together reports and theories that were – in my personal experience – often very difficult to find. Even the bibliography will provide a useful starting point for future research. More than any other project I have seen of the study area, this project has consulted non-archaeological or even geoarchaeological resources, including the INSPIRE portal[210] and hydrological reports. Even though reports on water pollution and bore holes do not at first seem relevant, they have greatly helped my understanding of the natural and anthropogenic processes affecting the study area.

I am fully aware – as should the reader – that my academic background lies not with geology or hydrology but archaeology, and for that reason some of the geological interpretations might be flawed or less-detailed than those of a specialist. Rather than take this as a negative, I choose to see this as an opportunity to learn and encourage further interdisciplinary discussion. My knowledge of such topics has increased tenfold and consequently developed my approach to, and understanding of archaeology.

Another issue that confronted this project was finding relevant data and sources. The high level of security at the Western Sovereign Base Area (WSBA) prevented my access to most of the southern end of the peninsula and a number of relevant publications, although I did achieve success with some of the Dreamer's Bay reports in the closing weeks of my dissertation.

[210] http://inspire.cyprus.moi.gov.cy

8: Recommendations for Future Work

The following recommendations are made for those who wish to answer the questions raised by this dissertation.

Kourion Bay and the Kouris

The small coring programme of Dunn and Leonard completed in the 1990s and observations made by other archaeological projects in the area have not provided us with sufficient data to understand the ancient harbour in Kourion Bay. I propose that a number of core samples be taken across the bay and the plain around the cemeteries of Agios Ermogenis and Kaloriziki to determine the chronology of the bay's sedimentation, looking in particular for marine deposits beneath the 15m of sand Leonard and Dunn found. In addition, it would be useful to dig small pits to determine the extent of the harbour wall underneath the tombolo. Confirmation of an embayment at the mouth of the Kouris could be achieved by geological coring in the dry river bed and the fields around. Samples taken in the sea around its mouth might also indicate that the ancient mouth of the river before any marine transgression caused by subsidence, or erosion since the damning of the river in the 1970s. A simple field walk along the dry river bed could reveal evidence of its use for copper transportation and distribution, while also contributing new data to the Kouris River Valley Project.

The West Coast of the Peninsula

As the formation of the western arm of the peninsula is one of the least understood geomorphological processes discussed in this dissertation, I would recommend additional coring behind the tombolo to determine its chronology. Behind the tombolo, in the marshes, it would be useful to understand the distributary of the Kouris that once ran here, and whether there is any evidence that it was used for maritime activities, particularly to transport copper through the lagoon via Asomatos, rather than rounding the peninsula. More detailed analysis of RSL in the bays south of the tombolo would establish a clearer chronology for the south-

westerly coastline. Erosion and subsidence have caused a marine transgression since the periods of study, and could be hiding evidence of terrestrial activity related to seafaring. It would also help us determine how the submerged material came to be deposited; whether it was the cargo of a shipwreck, or lost when it was being unloaded from a ship that was anchored or beached in the bay.

The South Coast of the Peninsula

The focus of this dissertation rested on Dreamer's Bay due to the inaccessibility of the rest of the south coast today and during antiquity. Even though there is certainly a possibility of finding more shipwreck evidence along this dangerous stretch of coast, at present I believe it would be best to keep focus on Dreamer's Bay itself, which still has so much to reveal. By the time this dissertation is submitted, Salomon and his team from the University of Southampton will have joined the University of Leicester in Cyprus for their second season of work, in which Salomon will continue to conduct geomorphological investigations at Dreamer's Bay. Therefore, I will not make any recommendations for future work at this site, but refer readers to his forthcoming report.

The East Coast of the Peninsula

As mentioned previously, Wessex Archaeology have not published any report on the harbour wall at Tarratsos besides a few sentences in their 2002 archaeological assessment for the British Ministry of Defence. I am unaware of their intentions with the site, but hope in future that they or another institution will return and conduct archaeological and geological research on and offshore. I would also recommend further geological investigation of the Venetian canal and Lady's mile beach, to determine the accuracy of maps and descriptions of the passage into the lake during the medieval period.

The Salt-lake

Wessex Archaeology's analysis of their core samples did not provide a detailed enough chronology for the transformation of the depression from marine to lacustrine. These cores would also help determine whether – among other maritime activity - the Roman lakeside structures and the tombs of Asomatos were accessible by boat during antiquity.

Limassol and the Garyllis

Unfortunately, the development of Limassol and the Garyllis river have made it very difficult to conduct archaeological or geological investigations in the area, so any recommendations made here will like be fruitless. Regardless, it is likely that geological assessments were taken out for the construction of many of the developments of the city, including the marina and port. If pre-construction reports could be found, there might lie useful information about the geology or even archaeology beneath them. Most important would be proving the existence of the marine embayments proposed by Zomeni[211]. Furthermore, access to the PhD theses of Parks and Laurence would help formulate a better picture of both the geology and archaeology of Hellenistic and Roman Limassol.

[211] Zomeni (2012a), 266 fig.3

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Appendix 1: Wessex Archaeology core descriptions

The following table is taken from Wessex Archaeology (2002).

Core	**Depth below surface (cm)**	**Description** (Soil texture class and Munsell Colour chart hue)	**Interpretation**
A	0-30	Sandy clay loam, 5Y7/2 with roots	Lacustrine deposit
A	31-40	Silty clay, 5Y5/2	Lacustrine deposit
A	41-50	Silty sand, 5Y8/4	Lacustrine deposit
A	51-100	Silty clay, 5Y5/2	Lacustrine deposit
B	0-60	Sandy silt loam, 5Y7/2	Lacustrine deposit
B	61-80	Fine to medium gravel, 5Y8/4, 5GY3/2	Marine transgression, or mud flat feature
B	81-120	Silty clay loam, 5Y7/2	Lacustrine deposit
C	0-40	Sandy silt loam, 5Y7/2	Lacustrine deposit
C	41-80	Silt, 5Y7/2	Lacustrine deposit
C	81-120	Fine to medium gravel, 5Y8/4, 5GY3/2	Beach deposit
D	0-20	Medium gravel with shell, 5Y8/4	Marine transgression, or mud flat feature
D	21-80	Sandy silt loam, 5Y7/2	Lacustrine deposit
D	81-100	Fine to medium gravel, 5Y8/4, 5GY3/2	Beach deposit
F	0-20	Silt, 10Y6/2	Lacustrine deposit
F	21-40	Fine to medium gravel, 5Y8/4, 5GY3/2	Marine transgression, or mud flat feature
F	41-100	Sandy silt loam, 5Y7/2	Lacustrine deposit
G	0-20	Sandy silt loam, 5Y5/2	Lacustrine deposit
G	21-90	Loam, 10Y6/2	Lacustrine deposit
G	91-100	Loamy sand, 10Y5/2	Lacustrine deposit
G	101-105	Fine to medium gravel, 5Y8/4, 5GY3/2	Mud flat feature (geophysical anomaly)
G	106-120	Silty clay loam, 5Y7/2	Lacustrine deposit