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**THE MARITIME LANDSCAPES OF MALTA
FROM THE ROMAN PERIOD TO THE MIDDLE AGES**

VOLUME I

TIMOTHY GAMBIN

*"A dissertation submitted to the University of Bristol in accordance with the
requirements of the degree of PhD in the Faculty of Arts,
Department of Archaeology and Anthropology (March 2005)".*

SEVENTY TWO THOUSAND, SEVEN HUNDRED AND EIGHTY SEVEN WORDS

Abstract

This thesis is about the history of Malta and the surrounding sea. The fluid borders of an island are essential for connecting it to other parts of the world that lie 'overseas'. The sea brought people, goods and ideas, which in turn combined to influence how the island evolved, both physically and culturally.

In order to study the link between people, the sea and the island, I have deemed it necessary to explore the landscapes that provide an integral part of this dynamic relationship. This is a thesis of two parts. Following an overview of the theory, methodology and sources used for this work, I proceed to discuss the natural environment of Malta with special emphasis on various factors that cause landscape and coastal changes through time.

The second part of the thesis focuses on how people, both local inhabitants and visiting seafarers, used and perceived the island through time. In order to achieve this I used a multi-disciplinary approach aimed at studying recurrent themes. The purpose of such an approach is for the reader to gauge the varying degree of changes and continuity in the economy, culture, politics and contacts of the island during the chronological periods covered in this thesis.

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I would like to start by thanking my family, Belinda and my sons Jamie and Taran. The boys aptly adapted the proverbial question: “are we there yet?” to the completion of this work! Over the past four years they have been very patient with the ups and downs experienced during the course of my research. This work is dedicated to them. Second on my list come my supervisors: Dr A.J. Parker, under who this research was started and Dr T. Hodos, under whose efficient hand the thesis was completed. Their support over the past years has been invaluable. Credit is also due to Professor R. Harrison who helped steer the course in turbulent times.

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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the Regulations of the University of Bristol. The work is original except where indicated by special reference in the text and no part of the dissertation has been submitted for any other degree.

Any views expressed in the dissertation are those of the author and in no way represent those of the University of Bristol.

The dissertation has not been presented to any other University for examination either in the United Kingdom or overseas.

SIGNED:

DATE: *July 2005*

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Chapter I

Introduction, Theory, Method and Sources

'Although Tangier, Port-Mahon and Malta have now settled back into a more local frame of political reference, the divisions of Cyprus, the contested status of the Rock of Gibraltar, and the importance during the final years of the Cold War of military enclaves such as the American naval base at Cretan Soudha can still remind us of the more distant past. Since the advent of new maritime technologies in the nineteenth century, and above all since the advent of air travel and intercontinental ballistics [...] reflections of Mediterranean unity can no longer be seen as the product of the totality of water-borne interactions between microregions. But they offer a potent reminder of how significant that totality has been'. (Horden and Purcell 2000: 135).

1.1 The Tasks of the Present Work

This thesis is a study of Malta's maritime landscapes from the Roman period to the end of the Middle Ages. It has been written with two main objectives in mind: a) to understand the influence of the sea on various aspects of the islands' inhabitants use and/or perception of the landscape; and b) to identify the maritime role of Malta and how seafarers perceived the island in the past. Surprisingly, this is a study that has not been attempted before. Though the chronological parameters may seem ambitious, I have found that the prospect of studying the long-term relationship between humans and the surrounding landscape warrants such a timescale. I have not started from the preceding periods of Malta's long history for a combination of reasons. The late Neolithic period is subject of a PhD dissertation being undertaken by Reuben Grima (2005) (to be defended in the near future) and which covers similar aspects to those discussed recurrently in chapters three to seven of the present work. Furthermore, the

quality of the archaeology for the Bronze Age and other periods preceding the Roman conquest of the island is poor and does not permit the detailed study of the various themes discussed below. I have chosen to start with the Roman period, because in the context of Maltese history the definite conquest of the islands by the Romans provides a coherent point of departure from which one can gauge cultural, political and economic change. Given that the Romanisation of the island happened some time during the first century BC, 50BC has been used as an indicative date for this change. The exact date for the transition to Byzantine rule is unclear and is discussed in more detail in the relevant chapter. The start of the Arab period is taken to coincide with their victory over the Byzantine occupants of Malta. In local historiography, the arrival of the Order of St. John in 1530 marks the end of the Middle Ages and the onset of the Early Modern period. The temporal divisions of the thesis are as follows:

From	To	Period	Historic Events on Malta
218 BC	50 BC	Punico-Roman	Roman capture of Malta: 218 BC
50 BC	535AD	Roman	Shipwreck of St Paul: 60 AD Vandal and/or Ostrogoth capture of Malta: early 6 th c (?)
535 AD	870	Byzantine	Byzantine capture of Malta: 553 AD
871	1091	Arab	Arab siege and capture of Malta: 871 Byzantine siege of Malta: 1053-54
1091	1530	Latin	Norman invasion of Malta: 1091 Major Hafsids attack on Malta: 1429 Arrival of the Knights of St John: 1530

Table 1.1 Chronological divisions of periods

1.2 Defining the term Landscape

‘The landscape itself is very complex – a series of interconnecting systems with people at the centre.’ (Aston 1985: 20)

Gosden and Head (1994) state that ‘landscape [is] a usefully ambiguous term [...] which both invites and defies definition’, a term that may be used to describe a type of painting. But it can also be used to designate physical areas in the countryside as in a rural landscape as well as built up areas as in urban landscape. Landscape is

also used to denote function as in agricultural or productive landscape. In part, a landscape defies definition because it is, whether inhabited or not, dynamic and ever changing. Furthermore, a landscape is also difficult to define because put any two people in front of a 'landscape', ask them what they see and rest assure that the answers will not agree. The reality is that landscape means different things to different people. Such diversity of opinions is propounded in a series of articles carried at the end of a journal entitled *Landscapes* whereby scholars from a variety of disciplines are invited to write about 'What Landscape means to me' (Welfare 2001; Wickham-Jones 2004). The complexity of pinpointing a definition for the term landscape is therefore accentuated by human perception, a perception that may be from within (inhabitants) or without (the heritage manager). However, it is this notion of perception that plays a fundamental role in landscape studies. To see and perceive the landscape as did its past inhabitants and users is crucial. One cannot eliminate the human factor from the landscape for it is people who use it and likewise it is people (both past and present) that perceive it.

1.3 Maritime [cultural?] Landscapes

A quick glance at the meaning of maritime as listed in the *Oxford Concise Dictionary* reveals the following meanings: 1) connected with the sea or seafaring; 2) living or found near the sea. The first part of the first definition is open to interpretation and makes the term maritime more inclusive than may be initially apparent. Is it necessary for the connection with the sea to be a direct one? As shall be discussed below, the degree (and nature) of 'maritimity' can vary immensely but it cannot be limited only to seafarers or those living by the sea.

If the term landscape is hard to define then the same can be said for maritime landscape. It has been suggested that landscape studies 'fall within the scope of several disciplines' demanding 'the integration of many types of evidence' (Roberts 1987: 80). The maritime element would therefore necessitate the inclusion of further disciplines and the new bodies of evidence that these provide. However, before proceeding it is opportune to clarify what the term 'maritime landscape' actually refers to.

Westerdahl coined the term 'maritime cultural landscape' out of the need for 'a scientific term for the unity of remnants of maritime culture on land as well as underwater' (Westerdahl (1992: 5). It comprises 'the whole network of sailing routes, old as well as new, with ports and harbours along the coast, and its related constructions and remains of human activity, underwater as well as terrestrial' (Westerdahl 1992: 6). Westerdahl constructs this notion of landscape around what he refers to as 'maritime culture', a concept he uses as a name for 'all those modes of thinking, customs, artefacts, and patterns of acting directly connected with a life at sea and dependant on the sea and its resources in a wide meaning (Westerdahl 2003: 19). There can be little doubt of the strong maritime elements amongst those whose lives are intricately linked to the sea especially in areas where there is a concentration of seafaring activity (maritime enclaves) such as ports (Parker 2001: 25). However, it is more realistic to argue for maritime specialisation within a broader community because 'although many cultures have maritime components, it would be difficult to find one which was entirely maritime other than in folklore' (Hunter 1994: 262).

Therefore, if a maritime culture is difficult to identify can one therefore use the term 'maritime cultural landscape'? I believe not. Should the notion of a maritime cultural landscape be only identifiable by (or with) a maritime culture it excludes too broad a group of people that are, in one way or another, linked to the sea (but are non-seafarers). The latter may include travellers, wreckers, salt-harvesters and other inhabitants of islands and coastal areas. The significance and influence of the sea on those who lived in close proximity to the sea can be reflected not in their occupations but in their myths and folklore and Malta is no exception (Cassar Pullicino 1992: 154). Likewise, a 'hinterland population that supplied a port's subsistence requirements [...] have to be considered within a maritime framework' (Hunter 1994: 262). The sea extends a varying degree of influence to coastal and other settlements situated inland that offered part-time services to the maritime world when required. Ease of communication and travel (through the landscape) to and from the sea is likely to increase its influence.

Influence and hence perception of the sea could be both positive and negative. Although Linder referred to an 'ambiguity in attitudes towards, relationships with and reactions to the sea' (1996: 15) I feel that the notion of duality is more reflective of

the situation. This is well illustrated in Malta from the sixteenth to the eighteenth centuries. Many inhabitants of rural Malta during this period were bond and equity holders in corsairing activities, some paying for shares in kind. For example, the village carpenter would turn part-time shipwright and the seamstress to sail repairing. Thus, 'apart from merchants, ship owners and underwriters from Valletta and the neighbouring towns, these included men and women from all over the island, as well as priests making investments on behalf of their parishioners' (Earle 1970: 129). These investments brought wealth to the same villages that were, in the summer months, under constant threat from Barbary corsairs who often landed on the island to raid the rural areas. The sea both provided and negated.

The notion of maritime landscapes as propounded by Parker (2001) may be considered as being more flexible and more inclusive. This is necessary due to the variety of features that the notion encapsulates. On the one hand, there are the tangible (and more obvious) remains related to maritime activity such as quays, wharves, lighthouses and breakwaters. However, one must also include features (both natural and manmade) that came to assume a maritime function. The continued use of features (such as distinct buildings) by seafarers as navigational markers is clearly illustrated in modern pilot books (**Figure 1.1**). To understand how such features were perceived from out at sea in the past is an important element within the study of maritime landscapes (Parker 2001: 32-37). Due to its importance for navigators (through the use of tallow on sounding leads) and fishermen (identifying rich fishing grounds) the underwater topography also forms part of the maritime landscape (Parker 2001: 33).

For a small island like Malta, most, if not all, of its landscape (or islandscapes) may be considered as maritime. Broodbank (2000: 21-22) proposes an approach to islands and their landscapes that embraces not only the 'physical properties of islands such as size, location, configuration and topography' but also how these were shaped and defined in multiple ways by their inhabitants. Understanding an island's interaction with the outside world (its seaborne contacts) is essential for the study of an island's history. One of Broodbank's proposals for broadening the horizons of island archaeology is for an archaeology of the sea to complement that of the land (Broodbank 2000: 34). However, this does not mean maritime archaeology that deals

with specifics such as shipwrecks and cargoes, although these do provide essential information. He suggests that ‘models need to be built for how the sea was used, by whom, for what objectives, over what distance, at what cost and how often [...] to what degree, and where, were people, raw materials, objects, styles and symbols moving across the water? Can the sea-paths along which these moved be discerned? What does our understanding of life on the land in a given context suggest about the necessity and frequency of sea-crossings for various kinds of people?’

In his suggestion for a ‘new’ archaeology of the sea Broodbank has combined the rhythms of both land and sea. This is a notion that links various land-based activities (such as agriculture and mining) with the sea. It is, in my opinion, necessary to look at the degree of influence of the sea on a variety of aspects that are, at a glance, not maritime in the strict sense of the word including settlement patterns, agricultural practices terrestrial transport. Here one may suggest an interdependence of land and sea rather than dependence of one on the other for what do freighters carry if not the produce of the land?

1.4 New Perspectives

Theoretical ripples from Horden and Purcell’s *The Corrupting Sea* have hit many who are involved in the study of Mediterranean history and I am no exception (Horden and Purcell 2000). This book propounds some of the most recent theories relative to the study of maritime landscapes. Themes such as ‘The Religion of Mobility’, ‘Connectivity’ and ‘Dispersed Hinterlands’ offer fertile ground for the discussion of new ideas and perspectives for the interpretation (or reinterpretation) of evidence, be it archaeological or otherwise that comes to bear on the interaction of humans and the sea. Also of importance for this thesis is that the proposed theories are set within a Mediterranean context.

Connectivity is the term conceived by Horden and Purcell to describe the ‘various ways in which microregions within the Mediterranean cohere, both internally and also with one another – in aggregates that may range in size from small clusters to something approaching the entire Mediterranean’ (Horden and Purcell 2000: 123). Although accepting the importance of the ‘relation of the traveller to immediate

physical setting' they consider this of secondary importance when compared to the 'connectivity within and between microenvironments' (Horden and Purcell 2000: 124). There is no doubt as to the significance of the sea to such interaction within the region as a whole where the sea 'unites the Mediterranean conceptually as well as topographically. It is no barrier to communications, but the medium of all human intercourse from one region to another' (Horden and Purcell 2000: 133). Connectivity must also be understood as the interaction of smaller geographical units, such as islands like Malta, with other areas in the Mediterranean. Such interaction could involve the exchange of goods, people and ideas including various facets of culture such as religion.

The movement of goods between regions leads to another theme proposed in *The Corrupting Sea*: the role of the hinterland. The term hinterland is understood as the geographic area directly served by a port. Karmon clearly explained the complex concept of the hinterland: 'that region which provides the port with exports...while receiving through the port all the goods it may need. The area of a hinterland may range from a small island, to the port city itself together with its surroundings, up to a whole region including faraway landlocked countries' (Karmon 1985: 2). The crucial factor for Karmon is that ports are gateways for inland routes.

The notion of a dispersed hinterland as suggested by Horden and Purcell retains the association between the port and the surrounding land with the difference that the ports may lie at considerable distances from the areas with which they are linked. Imperial Rome is an example of a dispersed hinterland, dependant as it was on the production of a variety of regions both within and beyond the Mediterranean. However, large centres of consumption such as ancient Rome and medieval Constantinople must not be considered as out of the ordinary for even the 'smallest human places of production and consumption' were all part of the 'intricate and often far-flung engagement with a wider, kaleidoscopic, world' (Horden and Purcell 2000: 121-22). It is important to understand what role, if any, an island like Malta could play in the movement of goods from dispersed hinterlands towards urban centres. Can shifting trends in production and consumption (through time) be detected in the archaeology of an offshore island?

However, connectivity was not limited solely to economic factors. Places of worship were used as navigational aids throughout the Mediterranean, and Strabo is but one of the ancient sources to point out the placing of temples in places of navigational importance (Taylor 1956: 63). For Canaanite and Phoenician seafarers coastal sanctuaries 'renewed the seafarers' link to their sacred protectors while away from the port, and had the more profane function of serving as landmarks for taking bearings from sea and for marking dangerous straits' (Brody 1998: 61). From an archaeological perspective various sites have contributed to the understanding of this notion not only through their location in the landscape but also through ex voto offerings linked to seafaring (Frost 2001 and 2002: 65). A study of such sites in a broader Mediterranean context was carried out in the early twentieth century by Ellen Churchill Semple who wrote about coastal temples and tombs and their relationship to the sea. She described these sites in terms of their location and distribution, their typology (forms), relevant climatic and oceanographic conditions as well as the possible significance of these sites to mariners (Semple 1927).

More recently, Jamie Morton's study on ancient Greek seafaring has, in part, focused on the 'religious associations of headlands, islands and straits' (Morton 2001 310-313). It would be difficult to understand why the ancients placed so-called 'maritime sanctuaries' at such locations without taking into consideration a number of other related aspects such as oceanographic and sailing conditions. Like Westerdahl (1994), Morton draws upon multiple sources from disciplines as diverse as ancient history, geography and oceanography.

What therefore, can be considered novel in the approach of Horden and Purcell to the subject being discussed? Horden and Purcell have managed to fit the notion of the maritime perspective into a much broader spectrum:

'The transactions of production and the relationships which go with them are 'anchored' in a landscape whose interstices are frequently the object of cult. In just the same way, the extension of those processes by navigation, which is so essential a component of Mediterranean life, is also paralleled in a cultic topography. Particular features of the sea voyage are marked as sacred, especially those coastal havens, springs or landmarks that are most significant to the business of navigation' (Horden and Purcell 2000: 439-40).

The placing of sacred buildings in such a context provides the potential for the re-examination and subsequent reinterpretation of such sites within a maritime

landscape that sheds light on sea routes and connectivity. In the case of the Maltese Islands, for example, this applies to the position of various ancient sanctuaries on the island as well as for the islands' geographical location along contemporary trade routes and shipping lanes. The question to ask here is whether the recognition of the maritime significance of such sanctuaries is present in the archaeology?

Another interesting notion proposed by Horden and Purcell is that of 'lines of sound and lines of sight' (Horden and Purcell 2000: 124-134) (**Figure 1.2**). This concept embraces local, close knit points such as the 'lines of intercommunicating watch towers' or the placing of villages on hilltops with good visibility of the horizon. In a broader context: 'the mariner's lines of sight express the greater unity of what lies beyond the bounds of perceptibility...[these] lines of visibility across the Mediterranean Sea create a distinctive maritime milieu – a milieu that dominates pockets of the land with which it comes in contact' (Horden and Purcell 2000: 133). Thus, the importance of such a concept for islands and their communities is varied:

- a) The visibility of an island gives it relevance as a landfall along sea routes;
- b) Approaching ships must be observed so as preparations, be it for trade or defence, could be made;
- c) And where lines of sight are not possible, the communication between communities via the use of sound, for example church bells.

In the light of the above discussions I hereby suggest that the study of maritime landscapes should be aimed at two major objectives:

- 1) To understand how the sea and coasts were perceived by seafarers, fishermen and inhabitants of coastal areas and islands.
- 2) To determine the degree of influence of the sea and maritime activity on the landscape and its inhabitants.

The methodologies and sources used to study these objectives are discussed below.

1.5 Methodology

The focus of this thesis is on Malta, the largest island of the Maltese archipelago that is situated in the central Mediterranean (**Figures 1.3, 1.4, 1.5 and 1.6**). I have consciously chosen to write the history of a singular island within an island group. Besides providing a structural model for the thesis, the theoretical notion relative to the research of maritime landscapes proposed in the second chapter is usable for the study of separate islands as well as other geographical areas. Chapter two consists of a brief description of Malta, its natural environment and the prevailing maritime conditions around the island. This chapter also contains an overview of the various factors that influence coastal changes in the Mediterranean. These contribute to a better understanding of the island's dynamic topography. It is also essential to establish the configuration of past coastlines for an accurate study of humankind's relationship with the sea. Given that the coastal area of Malta is conducive to change, I have set out to study the degree to which the topography of the coastline has evolved. The methodologies and data from my fieldwork are laid out in **Appendix A** and their implications are discussed in the relevant chronological chapters. **Appendix B** provides a description of all the harbours and anchorages of Malta. This will contribute to a better understanding of the type of shelter offered to vessels calling at Malta as well as a indication as to their function.

The subsequent five chapters cover the maritime landscapes of Malta as per the above-mentioned chronological divisions. In order to consider the two objectives listed at the end of the previous section the five chapters are sub-divided into a number of recurrent analytical categories. This has been done to enable the comparison and understanding of these salient topics through time. The six themes are:

- Settlement patterns
- Roads and terrestrial transport
- Population figures
- Productivity and consumption
- The harbours
- Connectivity

1.6 Settlement Patterns

How and why people settled where they did say much about their intentions and also shed light on the surrounding landscape. Were they farmers? Did the availability of fresh water determine their choice? Did their choice stimulate or impede contact with the outside world? To what extent did the new settlers alter their surroundings? And how, if at all, did the sea influence such choices. In order to address these questions, it is therefore imperative to establish where the inhabitants of the island chose to live.

For the Punico-Roman and Roman periods, archaeology provides a variety of evidence including urban remains, farmsteads and burials, which together contribute to the establishment of settlement patterns. The plotting of these on a map enables a better understanding of the sites and their relationship with the surrounding landscape. Factors considered include access to farmland and the sea. Archaeological evidence for early medieval rural settlements is sparse and information for later periods is available primarily through other sources, mainly place names and historical evidence.

The plotting of various settlements over time enables the study of changes, adaptation and/or continuity in the inhabitants' use of and attitudes towards the landscape. By studying settlement patterns and the relationship between the islanders and the sea, the extent to which the latter influenced settlement patterns will be clarified.

1.7 Roads and Terrestrial Transport

Following the establishment of past settlements, it is essential to look at how these were linked in order to understand how people and goods moved through the landscape. This is true for communications on land between settlements themselves and for access points to the sea whereby people and goods could continue their movement over water. For most of the periods discussed, there is no archaeological evidence available for roads. This is mainly due to continuous urban development around the island. However, a series of informed assumptions can be made based on

the location of the settlements themselves and the topography of the surrounding areas.

1.8 Population Figures

Knowledge of how many people inhabited the island in the past is difficult but necessary, even if one can only arrive at approximate figures because: ‘whether the population is rising or falling, and at what rate, and what the demographic structure is at any one time are all fundamental to the impact of people on the landscape’ (Aston 1985: 149). More people put extra pressure on agricultural land whereas fewer may lead to the abandonment of settlements and even rural areas. Methodologies used for the calculation of population figures are explained in the respective chapters.

1.9 Productivity and Consumption

To establish what was produced and in what quantities is essential because ‘the primary production of food can legitimately claim to be a basic human activity’ (Horden and Purcell 2000: 175) and survival often depended on the effective use of land (Aston 1985: 103). Studying variations in agricultural practices and related landscape modification is also necessary in order to understand land erosion and sediment deposition. Archaeological remains shed light on the agricultural production in antiquity whereas for the Middle Ages, documents and place names provide almost all the evidence.

The above-mentioned population figures for the various periods will also help establish the subsistence needs of the inhabitants and their surpluses and/or deficiencies. How much did the island have to import? Alternatively, did it produce anything for export? Answering such questions will lead to a better understanding of whether Malta and its inhabitants were either isolated, self-sufficient or whether the exploitation of shipping routes enabled agricultural intensification aimed at export.

1.10 The Harbours

For islands and their inhabitants, harbours and anchorages provide access to water transport and act as essential junctions to the super highways of the sea. Whether large manmade complexes or small natural harbours, the availability of shelter for boats and ships is vital for both local and visiting ships. Whether seeking shelter 'or for any other reason, it was important for sailors to be able quickly to locate an area that could provide a safe haven' (Morton 2001: 105). The calling of such vessels into the havens of Malta provides a scenario for increased interaction between the inhabitants and visitors.

It is therefore important to explore a possible link between the harbours and anchorages to the settlement patterns of the island. To what extent did maritime interaction (whether positive or negative) influence the inhabitants? The identification of Malta's harbours through time and their suitability for contemporary vessels will help shed light on who called at the island and why. Archaeological remains from land and underwater together with historic documents and environmental data all contribute to understanding the use and evolution of the harbours through time.

Finally, the investment in large manmade structures is a reflection of an area's importance to its ruling class as well as to its commercial potential. The identification of such structures, their size and techniques used for harbour construction would help identify the extent of Malta's maritime role within the wider Mediterranean world.

1.11 Connectivity

The themes discussed above would be pointless if explained in isolation. Production, consumption and access to the sea take on different dimensions if seen in a broader context. 'It is not that island niches are usually more productive in themselves than similar environments on the mainland. It is rather that they have the simple advantage of being located on an island' (Horden and Purcell 2000: 227). Positioned out at sea between two continents, Malta had the opportunity to take advantage of its 'all-round' connectivity. However, was this exploitation achievable by Malta at all times?

A number of sources enable the establishment of Malta's connectivity. One of the first to spring to mind is imported objects. When studying and plotting the origin of such objects one must keep in mind the transshipment and redistribution of goods. Drawing direct lines between place of origin and place of discovery may be misleading. Broader relationships on political, economic and cultural levels between Mediterranean zones are critical. For example, the main suppliers and consumers of grain often dictated where ships sailed. Interludes from the wider Mediterranean world are not always self-imposed:

'Some accidental change of ruler or of fortune may bring to the island's shores an entirely different civilization and way of life... 'Isolation' is a relative phenomenon. That the sea surrounds the islands and cuts them off from the rest of the world more effectively than any other environment is certainly true whenever they are really situated outside the normal sea routes. But when they are integrated into shipping routes, and for one reason or another become one of the links in a chain, they are on the contrary actively involved in the dealings of the outside world' (Braudel 1972: 150).

Understanding the natural environment is also critical, for it plays an important role in sailing conditions and the availability of shelter. An in-depth look at the prevailing oceanographic conditions in the central Mediterranean and Malta's harbours combine to provide a better idea of what the island had to offer to ships and seafarers in the past.

1.12 Sources

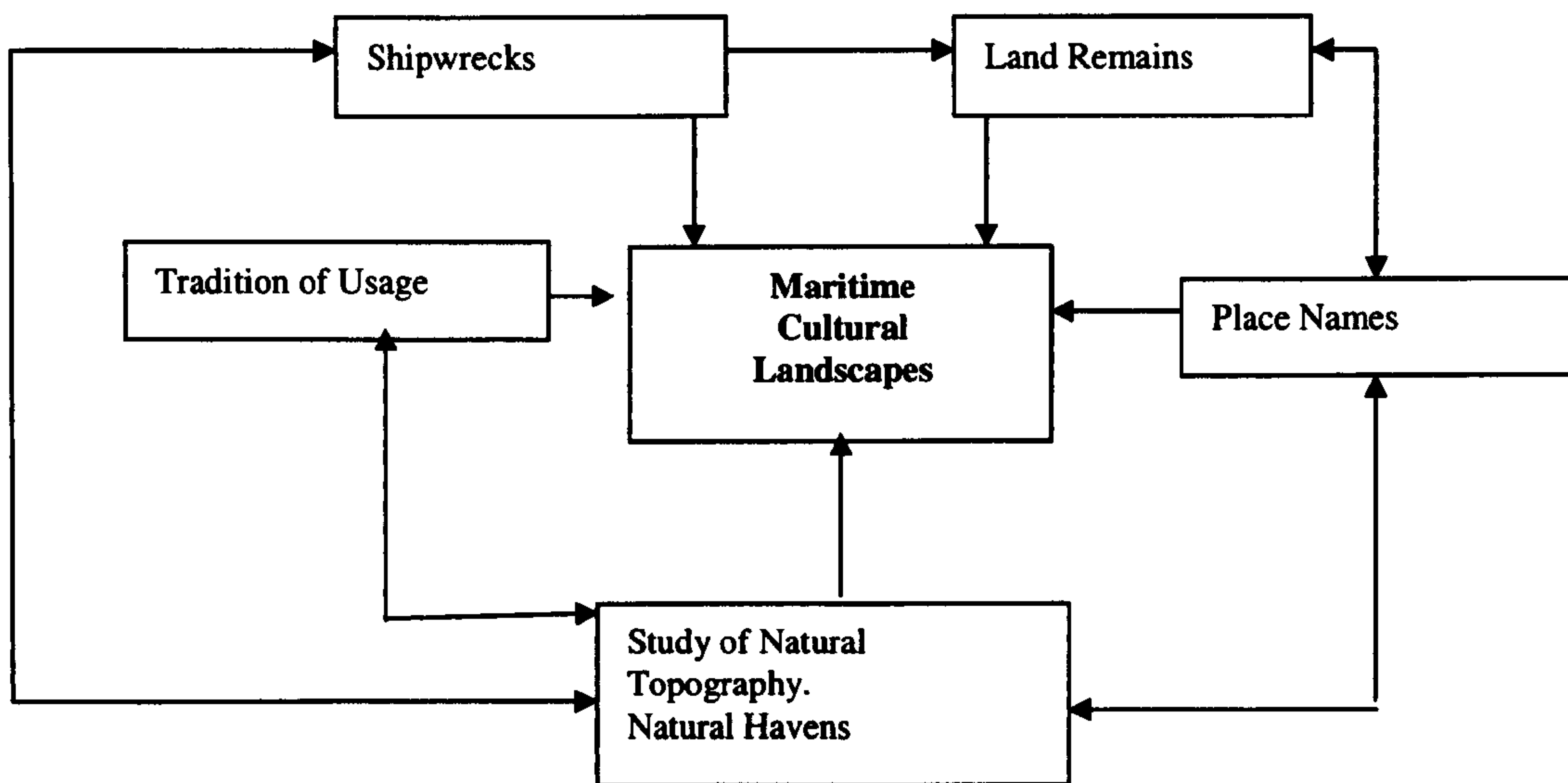
The closest and most comprehensive lists of sources for the study of past landscapes and maritime landscapes and which correlate with the present study are those propounded by Aston (1985) and Westerdahl (1992) (all are discussed in detail in sections 1.9 to 1.16). Aston lists five main sources for the study of landscape archaeology (Aston 1985: 13-20):

- b) Archaeology
- c) Aerial Photographs
- d) Maps
- e) Local History
- f) Other Sources (including environmental studies)

Westerdahl notes a slightly varied list of sources for the specific study of maritime cultural landscapes (Westerdahl 1992: 7-10):

- a) Shipwrecks
- b) Land Remains
- c) Tradition of Usage
- d) The Study of Natural Topography. Natural Havens
- e) Place Names

The sources proposed by Westerdhal for the study of maritime cultural landscapes are all intertwined and each can influence the other. For example, land remains can be reflected in the toponymy of an area. Likewise, the natural topography of a coastal area (if particularly hazardous) may shed light on the possibility of shipwrecks on the seabed. The inter-relationships between these sources is illustrated in the theoretical diagram below:



(after Westerdahl 1992)

Sources used for this dissertation have been fused from those proposed by both Aston and Westerdahl and are listed below:

- a) Archaeology
- b) Aerial Photographs
- c) Maps and Nautical Charts
- d) Historical

- e) Environmental/Topographical
- f) Place Names
- g) Ethnographical

For such an interdisciplinary study ranging over various chronological periods one must also keep in mind that the quality, quantity and availability of evidence will shift. There may be periods that are not so well represented in the archaeological record and one would therefore be more dependant on other sources (such as historical).

1.13 Archaeology

1.13.1 Archaeology in Malta: Pitfalls and Challenges

It is opportune to start this section with a brief discussion of Maltese archaeology and some of its challenges. In the late nineteenth and early twentieth centuries, the undertaking of public works under the British government of the time led to the discovery of the numerous archaeological sites that were amongst the first to be systematically studied. The reasons for this are discernible. The tools used for the excavation of trenches and foundations (during construction works) were the pickaxe and the bucket. Work with these tools is slow but the user is in close contact with the material excavated. The slightest change in layer or a void in the bedrock is easily perceptible.

This phenomenon ceased in the 1960s and 1970s when the government of the time embarked on large projects aimed at improving the island's infrastructure, and the tools used during the last four decades include mechanical diggers and bulldozers. Such tools are not conducive for the survival of archaeological remains. Furthermore, the completion of these projects was often achieved without consideration for both the natural and historic environments. It is not my intention to debate whether the needs of the country at the time justified the means. What is of relevance here is that numerous sites were lost but exactly what and how many are only a matter of speculation.

An increased awareness of the island's heritage led to the signing and ratification of the Valletta Convention,¹ which is aimed to protect and preserve the historic environment. Despite this, the loss of archaeological sites continues. This is mainly due to two factors: a) new machinery, and b) the mentality of some property developers. The new machinery used for cutting rock is very powerful and operators sit in soundproof cabins. This makes modern excavation (for construction purposes) quicker but less sensitive to archaeological deposits. Even if a site is discovered, it is often too late because of the severe damage sustained. Recently enacted laws ensure that archaeologists monitor sites considered as archaeologically important. However, given the lack of resources and communication between government departments, many projects still proceed unmonitored. Concerning the historic environment, the prevailing mentality of the local property developer is to destroy sites in order to avoid costly delays and redesigns to the project. It is therefore not surprising that despite the increase in construction over the past 20 years the number of sites discovered and reported has actually decreased when compared to the first half of the twentieth century.

However, it would be unfair and untrue to pin all the problems related to Maltese archaeology on property developers. Some of the major gaps existing in the archaeological record are related to perceptions of archaeological significance. The focus of early Maltese scholars such as A. A. Caruana and T. Zammit was on the island's Punico-Roman and prehistoric periods respectively. Much of our knowledge and information on many of the island's major sites is down to these individuals and their co-operation with foreign archaeologists such as Thomas Ashby and Albert Mayr (Evans 1971: 3-5). When excavations were undertaken, little notice was given to deposits that superseded the Roman and more recent levels. A perfect example of this is the excavation of the Roman *domus* in Rabat carried out between 1920 and 1925. Contrary to his work on other sites, Zammit somewhat strangely strayed from his meticulous note taking and efficient publishing. The layers over the Roman mosaics contained important late antique and medieval deposits including an Islamic burial site. Brief descriptions appeared in the annual reports of the Museums

¹ Officially known as *The European Convention on the Protection of the Archaeological Heritage* (1992). Article 5 lays down the requirements regarding building developments and the protection of any archaeology that may be present on site.

Department and in one or two specialised journals, but unlike the other sites he investigated; he never published a full report on the burial site. In a recent reassessment of the Islamic cemetery, Cardona established three main reasons for this:

- 1) A lack of time due to other commitments. In this period, Zammit also held the post of rector at the Royal University of Malta.
- 2) The Maltese political scene at the time. The presence of an Islamic burial site on Malta was potential political fodder for the contemporary debate on the ethnology of the Maltese people.
- 3) Zammit's interest in prehistory meant that discoveries from other periods received less attention (Cardona 2002: 54-61).

Although no final publication was forthcoming, a number of photographs, some notes and objects from the Islamic phase have survived. Medieval archaeology is a relatively nascent phenomenon on the island but is still overshadowed by the archaeology of the prehistoric and classical periods. Difficulties related to the study of material remains from the medieval period were noted as early as the 1970s: 'the problems of medieval archaeology are considerable. In such small islands with a largely artificial landscape and a very thin soil covering, traces of settlement have often been largely or totally eliminated by intensive land use or erosion, by carting, quarrying, terracing, manuring and the dumping of inorganic town refuse' (Luttrell 1975: 12). Furthermore, the imposing architecture and large documentary repositories left by the Order of St John provided the main focus of historical research on Malta, resulting in further disdain for the Islamic phase of Malta's past in the island's historiography. This situation has led to a dearth in archaeological remains datable to the Middle Ages.

Finally, a number of ongoing problems continue to beset local archaeology, mainly due to the lack of government resources. Except for two ongoing excavations, both at the site of Tas-Silġ, no planned research is presently carried out within the framework of a national agenda. This limits the amount of new data available to researchers. Most new information stems from a series of rescue excavations such as

those undertaken in Mdina (Cutajar 2001). The lack of a national database means that the location of objects and collections by researchers depends on the memory and willingness of museum personnel. Such a system has obvious and practical implications.

Concerning underwater archaeology in Malta, this sub-discipline has never fully taken off. Over the years, a number of projects were initiated (mainly by foreign institutions) but never followed up. Data from these surveys and excavations rarely reach the local authorities let alone the pages of journals and/or other publications. Some information has, over the years, accumulated in the depository of the National Museum of Archaeology but this is often fragmentary and incomplete. A case in point is the Mortar wreck in Mellieha Bay (partly excavated in one season and published by Honor Frost) (Frost 1969) for which all the original drawings, plans and maps are available at the library of the National Museum of Archaeology but the current whereabouts of the artefacts are unknown.

Proposals put forward by the local authorities over twenty years ago are yet to be taken up (Grima 1995). These proposals included: a) the setting up of a core underwater archaeological unit; b) further training of underwater archaeologists; c) systematic preparation of underwater inventories; and d) the presentation of the underwater heritage to the public. Given the sheer number of extant archaeological and historic remains on land, it comes as no surprise that care for these usurps most available resources. The state does not employ any archaeologists specialising in the maritime field and to date it has no strategy for the research and protection of underwater sites. This situation limits the new information to occasional chance finds.

Furthermore, the underwater topography of much of Malta's coastal waters is not conducive to underwater archaeological research. This is due to a number of reasons: a) the presence of deep silt and mud deposits in the harbours and bays means that objects and shipwrecks would be buried and difficult to locate; b) the vast meadows of *Posidonia Oceanica* mainly found off the eastern coast and the large mattes upon which these meadows thrive also conceal submerged archaeological remains. This can be ascertained when parts of these mattes are destroyed (through natural causes such as bad weather or anthropogenic causes such as dredging),

exposing archaeological deposits. The meadows grow in depths of up to fifty feet, thus covering the main diveable areas;² c) the depth of the sea off the western coast quickly drops beyond 50 metres rendering normal SCUBA diving operations virtually useless. The expense of surveying in deep waters and investigating mud deposits with very specialised equipment creates another obstacle to underwater archaeological research in Malta.

1.13.2 Published Material

Despite these shortcomings, a number of archaeological discoveries and excavations are available for study and the majority of archaeological data used in this thesis originate from formal publications, of which there are several primary local sources. The Museums Department³ or its equivalent has, since the early twentieth century, published brief reports on archaeological excavations and other discoveries in *The Annual Report of Government Departments*, under the heading *Museums Annual Report (MAR)*. Relevant plans and drawings are not always included in the *MAR* but are generally stored in the archives of the Museum of Archaeology (Valletta). In some cases, the relevant information referred to in the reports is missing. The Archaeological Society of Malta publishes the *Malta Archaeological Review*. This journal carries some reports on recent archaeological works and research relative to the Maltese Islands. *Melita Historica* is a journal published by the Historical Society of Malta and was for many years the platform for the dissemination of archaeological research undertaken outside the Museums Department. Finally, significant local archaeological work and research has also been published in book form as well as in international journals.

² Given the lack of resources of the local authorities, the *Posidonia* mattes play an important role by providing natural and efficient protection against looters.

³ The Museums Department of Malta has recently been revamped and the section now responsible for reporting on the island's heritage is the Superintendence of Cultural Heritage.

1.14 Fieldwork

Fieldwork for the purpose of the present study has consisted of field walking in various relevant areas and the gathering of environmental samples. Throughout the course of my fieldwork I have come across some unrecorded sites that are on private property. These sites and artefacts are incorporated into the rest of the data. Concerning loose artefacts, data are used if a credible provenance and location can be verified by speaking to the finder of the object and/or looking at whether other similar finds are officially recorded from the same area. In many cases, this source of information is the only one available. This is especially true in the relatively unexplored field of underwater archaeology. The increase in sports diving has led to a situation whereby private individuals raise numerous objects from the seabed. This is a negative practice that leads to the loss of information and the destruction of the archaeological record.

There exists a fundamental problem with certain aspects of field walking in Malta. The landscape has been carved up into parcels of land that are in turn enclosed by rubble walls (**Figure 1.3**). Most of the islands' agricultural land is in private hands. Persons that work the land are generally conservative but polite. Most are proud of their locality and once you explain the reasons for your presence, they can be co-operative.

Not all, however, are so helpful. The fragmented landscape means that an individual who farms 20 acres has fields consisting of a series of land pockets spread over a wide area. Therefore, chances of meeting the same non-co-operative farmer increase because his property may stretch across the whole area marked out for survey. Farmers in Malta have numerous neighbours with whom they work at close quarters. Throughout my fieldwork, I found that farmers were unwilling to divulge information about archaeological finds on their own property but were quite willing to talk about those on their neighbours'. Such information was divulged on the unspoken condition that the source could not be revealed, as the 'informant' was, understandably, keen to keep a good relationship with his neighbour. This situation would repeat itself from one farmer to the next.

The problem here is twofold. Firstly, how much of this information can be used? In many cases it has been possible to corroborate information by speaking individually to various neighbours of a farmer who may hold some particularly important information. In one particular case a friend of the landowner was given permission to accompany me to the property but the owner did not wish to be there himself. In fact, the 'neighbour' factor can in this case be considered as an advantage due to the network it provided enabling the discovery of the site. However, it is not usual for landowners to divulge such information.

The second problem is an ethical issue. Local law stipulates that anybody discovering archaeological remains is obliged to report these to the local authorities (Cultural Heritage Act, Malta 2002: 43.2). In Malta, a gross misconception about the law exists concerning discovery and reporting of antiquities. Most persons believe that if any remains are found within the boundaries of their property their lands will be confiscated by the state. In reality, should the site prove to be of sufficient importance and the local authorities decide to procure the property, that authority is duty bound to pay the market rate. Less important sites may simply be recorded and their location noted by the authorities. The main reasons behind the unwillingness for sharing information in rural areas are the fear of loss of land and the desire for maintaining privacy. Farmers fear throngs of persons coming to their field to visit a site. This situation impedes both research and, more importantly, the discovery of further sites that may prove to be of greater archaeological significance.

1.15 Aerial Photography

This is as an essential tool for landscape archaeology and 'little real progress can be made without recourse to at least a few pictures' (Aston 1985: 17) For Malta, vertical photography is essential for delineating the extent of floodplains containing silted harbours. Black and white photographs, such as **figures B.7 and B.93** clearly show the extent of a fertile region that stands out from the surrounding terraces and garigues. In the case of coastal reconstruction and the study of ancient silted harbours, the use of aerial photography is one of the first steps towards the location and identification of such sites.

The Malta Environment and Planning Authority (MEPA) manages the main repository of vertical aerial photographs. The most useful of the various collections available is that dating to 1957. These were shot for mapping purposes and therefore provide accurate information. The added advantage to this set of photographs is that when they were taken the island was significantly less developed than it is today. Photographs of the main plains and their environs help identify both natural and manmade features in the general area.

1.16 Maps and Charts

Maps and charts are considered by Aston as the third pillar (together with archaeology and aerial photographs) on which successful landscape studies are built (Aston 1985: 18). In Malta, the first accurate maps produced date to the sixteenth century. These are particularly helpful for reconstructing the topography of late medieval Malta as well as other features such as road systems. The British also produced a series of accurate and detailed maps and charts. One such survey was carried out in the 1860s and covers all government-owned property with features appearing on the land painted in watercolours and buildings laid out in plan.

Old nautical charts provide invaluable information on a variety of aspects, including how the island was perceived from a maritime perspective and on the changing topography of the seabed. There exist an increasing number of charts from the sixteenth century onwards. Some of these are available at the National Library of Malta, at the Admiralty Charts and Publications Library in Taunton (UK) and at the library of the National Maritime Museum in Greenwich (UK). These charts cover the general area around the island with details on the Valletta harbours. In the early 1820s, Captain W. Smyth carried out the first accurate survey of the islands' coasts and surrounding waters for the British colonial government. For this thesis, modern Admiralty charts of the Maltese Islands and the Mediterranean in general have proved useful for plotting nautical journeys and the measuring of relevant distances.

1.17 Historical

Ancient written sources for Malta are not numerous and there exist significant temporal gaps between one reference and another. This therefore poses a problem for the ancient period. Sparse mentions of Malta by Roman geographers and historians lends to the idea that the island may have been somewhat of a backwater during the Roman period: 'throughout the Roman period Malta was a marginally flourishing provincial outpost, frequented by those who were wrecked or exiled there and by pirates' (Luttrell 1975: 15). However, one cannot dismiss the potential of Malta's maritime role in antiquity because, as shall be seen later in this thesis, the archaeological record reflects otherwise.

A similar situation prevails for the early Middle Ages. There are a handful of literary references from the Byzantine period (Brown 1975) and none for the Islamic phase. Arabic texts that describe Muslim Malta were written centuries later (Brincat 1995: 16-17). An increasing number of documents are available for the latter part of the Middle Ages, however. These include chronicles, royal reports and other miscellaneous documents such as wills and contracts.

Documentary material increases again for the late fifteenth century. Notarial deeds and a series of requests and replies to and from royal authorities in Sicily form the bulk of the data. Over the past decade, a project to publish such primary sources has been underway, with the original documents transcribed in their original language (either Latin or old Sicilian) and summarised in English (Wettinger 1993; Fiorini 1999a). These are important because they shed light on many facets of life in medieval Malta, including agriculture, trade/transport and the environment. The documents published hail from a number of repositories including:

1. Archives of the Cathedral, Mdina, Malta
2. Magna Curia Castellania, Mdina, Malta
3. Museum of the Cathedral, Mdina, Malta
4. Notarial Archives, Valletta, Malta
5. State Archives, Palermo, Sicily

Other published primary sources include medieval sailing instructions known as portolans. These provide invaluable descriptions of the islands' topography from a maritime perspective. In 1929, various Italian historians got together and published a journal entitled *Archivo Storico di Malta*. Articles published included transcripts of references to Malta in the Angevin archives at Naples (Laurenza 1936). This particular repository was destroyed by fire during the Second World War. It transpires that these published transcripts are now the primary source for the references. Since the war, however, articles from the journal have often been dismissed because they formed part of a Fascist attempt to bind Malta's past with that of Italy. Without entering into the merits of this debate there can be little doubt on the importance of these particular transcripts to the study of medieval Malta, mainly because information from the Naples archives would otherwise have been lost (Dalli 2002: 4).

As with archaeological research, the Islamic phase of Malta's history poses problems within Maltese historiography. As early as the seventeenth century, this phase of the islands' history was dismissed as an unfortunate glitch during which the locals kept their Christian faith and culture alive despite the suppression by the Arabs that were occupying the island (Abela 1647: 251-269). This disdain towards a period that lasted well over three centuries persists up until the present day. It is a commonly held belief that when Count Roger landed in Malta in 1091 he liberated the island from its Arab occupants, thus preserving the popular perception of Malta having an uninterrupted Christian culture since the arrival of St Paul in 60 AD. Such a perception plays an important role in the identification of Maltese national identity with the Northern Mediterranean rather than the Islamic south (Buhagiar 1999: 5-52).

This situation has had an obvious impact on the study of the Islamic phase, a problem that has only begun to be addressed recently. The local medievalist Godfrey Wettinger has played a crucial role in bringing to light important aspects, such as toponymns, language and nomenclature, that are attributable to the presence of the Arabs on the islands (Wettinger 1973 and 1986). More recent historical works that embrace this new attitude towards Islam in Malta include those by Dalli (2002) and Cutajar (2001).

1.18 Topographical

Under ‘other sources’, Aston lists aspects such as vegetation, geology and geomorphology (Aston 1985: 19). By observing and studying the existing natural topography of an area, one is able to recognise features from the past. Survey maps and aerial photography help highlight the ‘lay of the land’ and point to features such as large stretches of fertile alluvial plains that are relevant to this thesis. In some cases, the land itself provides the information on the past via environmental samples. Details on the environmental samples taken as part of this thesis are discussed in **Appendix A and B**.

1.19 Place Names

Although of utmost importance (Westerdahl 1992: 9), place names are to be treated with a degree of caution (Aston 1985: 19). This because some modern place names do not necessarily reflect the true origins and meanings since these may have been adapted and changed over the centuries. It is essential to search for the oldest usage of a place name for a more accurate interpretation of its original meaning. When studied in a synoptic manner alongside other sources, place names may provide essential information on a variety of aspects including the environment and past uses of an area. They may also point to areas of archaeological potential. The main sources of place names are documents and maps. For Malta, Wettinger’s seminal work lists place names dating back to the 14th century (Wettinger 2000). All entries in this compendium come complete with references and the context in which they are listed.

1.20 Ethnographic

Despite being one of the lesser-used sources ethnography is also important for some aspects of this thesis. Although publications such as the *Mediterranean Pilot* shed light on general conditions of the sea, knowledge of more localised conditions can be gleaned from the expertise of people who are (or used to be) in close contact with particular stretches of the sea. For example, such information can shed light on dangers and/or advantages of certain anchorages, which in turn would explain the presence of numerous anchors. However, extrapolating information gathered in the

present day to interpret the past has its difficulties including reliability and authenticity. One must therefore use these sources with a degree of caution.

1.21 Concluding Remarks

By evaluating the available evidence across the six analytical categories described above, I am proposing a new framework within which to evaluate and interpret the data gathered in the course of my research exercise. It is certainly not intended to revolutionise Maltese history but would be better described as a more structured platform on which to build the story of humans and the sea in and around Malta.

Chapter II

The Natural Environment

2.1 The Geographical Setting of Malta

The Maltese archipelago lies towards the centre of the Mediterranean aligned on a north-west to south-east direction. It is 96 kilometres from the closest point in Sicily, 290 kilometres from the closest point on Northern Africa (that being Tunisia) and 350 kilometres from the coast of Libya. Malta is the largest of the island group known as the Maltese Islands. The other islands in the group, in order of size, are those of Gozo, Comino, St. Paul's Islands, Cominotto, Filfla, and Fungus Rock. The last four are uninhabited and can be considered large rocks. Malta is 27 kilometres long with an area of 245.7 square kilometres (Lanfranco 2002: 2). There are no mountains on the islands and the highest point is the hill where Mdina-Rabat is situated, which is 253 metres above sea-level.

2.2 Maritime Conditions and Climate

The idea behind the inclusion of this section is that information on the prevailing maritime conditions facilitates a better understanding on the various elements that influence the everyday lives of those out at sea. This is also true for people that inhabit coastal areas.

2.2.1 Maritime Conditions in the Mediterranean

This section covers both the general maritime conditions of the Mediterranean and those around the Maltese Islands.

2.2.1.1 Winds

Throughout the year the prevailing winds in the central Mediterranean generally blow from a north-westerly direction, a similar situation to that on the island itself (described below). Gales blow predominantly from the north-east and are most common between the months of October and April (Hydrographic Office 1978: 16). The period extending from May to September is less susceptible to gales and coincides with the sailing season of the ancients (Casson 1995: 270). Another significant wind in the central Mediterranean is the *sirocco*, a term used to describe winds that bring hot air from the Sahara Desert. The significance of this wind in the central Mediterranean is twofold: a) it sometimes causes bad visibility due to the sand particles it carries and to the mist caused by the hot wind meeting the cool sea (Hydrographic Office 1978: 16); b) the *sirocco* blows from a generic southerly direction thus facilitating vessels on a south to north crossing. In the general area of the central Mediterranean, the predominant winds vary not only between localised areas but also between seasons. However, as can be seen in **Figure 2.1**, the prevailing winds are those blowing from 270° to 90° on the compass. Except for variations in strength, this is true for all seasons.

Wind patterns around Malta follow those of the central Mediterranean, meaning the prevailing winds are those blowing from the north-west. However, although not as frequent as the prevailing north-westerly, strong winds and gales from the north-east (*Grigal*) are a serious hazard in Malta. The main harbours are open to the north-east and the winds raise a heavy swell which causes difficulties for vessels. The frequency of *Grigals* exceeding 35 knots is highest in February (Hydrographic Office 1978: 18). These storms also hit the islands as late as April, the latest one recorded on the 17th of April 2003 with winds peaking at 34 knots (Source: Meteorological Office of the Department of Civil Aviation).

There can be no doubt that the island itself is windswept. On average, 92 days out of every hundred experience wind of more than 1.85 kilometres per hour. April to June is the windiest period (95 percent of all days are windy) whereas the least windy period is that between October and December (90 percent of all days are windy). The strongest winds blow in December, January, February, March and April. Strong winds that can blow 65 kilometres per hour (and sometimes more) are most common in February, December and January, blowing on average for 5.6, 5.6 and 5.2 days per month respectively (Lanfranco 2002: 14). The weakest winds blow between July and August.

The prevailing wind is the north-westerly that blows within the compass parameters of 285° and 345°. The wind rose for the period 1958-1987 illustrates the predominance of the north-westerly, accounting for 29 percent of all windy days (Figure 2.2). It also illustrates the frequency with which this wind reaches speeds of 11 knots and over (14 percent of all windy days). The second most common wind is the westerly, accounting for 11.1 percent of all windy days. Together these winds account for one in three windy days in Malta. Another wind of much importance is the north-easterly. Its occurrence is relatively low (4.7 percent of windy days) and it blows in the months of December, January, February, March and occasionally into April. With regard to rough weather at sea, however, it is the most threatening wind of the winter period.

The above are generalisations of the overall patterns and there are exceptions to the rule. For example, it is not uncommon for bad weather to occur in the latter part of August. For a few days, the atmosphere changes and the prevailing weather consists of strong winds, rain and even thunderstorms.

The main implication for navigation around Malta is that the winds favour southbound passages across the central Mediterranean. The opposite is also true. Any vessels sailing in a northerly direction would have to beat its way into a headwind. Although this was difficult for a square-rigged sailing ship it was not impossible and ancient seafarers are known to have sailed against strong winds adjusting their course by tacking and modifying their rig by reefing the sailing and lowering the yard (Casson 1995: 274-275).

2.2.2 General Currents

The major loss of seawater in the Mediterranean Sea is caused by the subsurface outflow of heavy saline water and through evaporation. All the rivers that flow into the Mediterranean make up for approximately one third of seawater lost through the abovementioned causes. It is therefore the 'strong inflow of water at the surface of the Atlantic Ocean into the Mediterranean Sea' that is the main source for replacement waters in the encircled sea (Hydrographic Office 1978: 12).

The general pattern of surface currents in the whole of the Mediterranean Sea is influenced by the aforementioned inflow of water from the Atlantic via the Straits of Gibraltar and by the division of this sea into two basins, that of the East and that of the West. Dividing these two basins are the Sicily Channel and the Messina Straits (Hydrographic Office 1978: 12). It can be said that the general pattern in the Mediterranean is that of an anti-clockwise flow. Currents run eastward along the North African coast, with the exception of the Gulf of Sirte. On the northern coasts of the Mediterranean, currents flow in a westerly direction except for some local variations around the islands of Corsica and Sardinia (Figure 2.3). This current process enables the 'whole body of water' in the Mediterranean to change completely in about 80 years (Arenson 1990: 9).

Overall, the prevailing wind pattern blowing over the Mediterranean Sea supports the general current circulation described above. However, one must consider that winds may vary and this is especially true for the winter season when variations may be substantial. Should these different winds be strong and blow for long enough, local drift currents may form and flow contrary to the main pattern already described. Sometimes, the wind effect may be such as to strengthen the normal circulation (Hydrographic Office 1978: 12).

Except for local peculiarities (such as the Straits of Messina), the currents of the Mediterranean are 'more remarkable for their constancy than strength' (Smyth 1854: 152). The speed of the general currents average at around one knot which, except for the above-mentioned local peculiarities, is of no great consequence to vessels under sail (Casson 1995: 273).

2.2.3 Currents in the Central Mediterranean and Malta

Off the north coast of Tunisia, precisely from Cape Bizerta to the east, the main current diverges from the coast towards the Sicilian Channel. Some currents proceed south between Cape Bon and the island of Pantelleria before continuing eastward where they meet up with the 'anti-clockwise' currents of the Gulf of Sirte. The main current of the Mediterranean Sea flows through the Sicilian and Malta Channels towards North Cyrenaica. The rate of this current averages at between half and three quarters of a knot but can flow up to two knots in winter. Strong localised winds can temporarily reverse the direction of the current in spring and autumn (Hydrographic Office 1978: 13). There is also a southerly current flowing off the eastern coast of Sicily, which is caused by the outflow of water from the Adriatic. (Figure 2.3)

Just off the shores of Malta the main currents are those which flow in the channel between Malta and Gozo. British hydrographers working in the nineteenth century noted that 'the currents are very irregular and no reliable forecast can be made about their direction, sometimes they set against a strong wind. In general their strength is under one knot per hour' (Smyth 1895: 14). Such a current would have been negligible for ancient mariners (Casson 1995: 273). Other more localised currents are those that form near headlands such as Ras ir-Raheb. These are known as nearshore currents and are caused by wave action striking the coast at an angle (Morton 2001: 39). By their very nature, headlands protrude into the sea, interfering with the various nearshore currents as well as providing a surface off which waves can bounce back. It therefore follows that the currents around headlands are often changeable and complicated.

2.2.4 Tides

In general it can be said that tides in the Mediterranean are negligible. With the exception of a few areas, such as around Gibraltar, the tidal range is less than one third of a metre. With regard to the mean sea level, during the months of February, March and April, this may fall as much as half a metre below normal (Hydrographic Office 1978: 13).

In general, the tide patterns of Malta follow those of the Mediterranean and are almost negligible, although there does exist an oceanographic phenomenon, which occurs from time to time (approximately three times a year) and is known as a *seiche*. During a seiche, sea level may change abruptly, with the maximum-to-minimum levels being reached within ten minutes. The highest recorded seiche in the Grand Harbour of Malta measured 70 centimetres.⁴ In Italy a similar phenomenon known as a *Marubbio* is believed to be caused by 'abrupt changes in the metrological conditions prevailing in the Mediterranean as a whole, and not necessarily with changes in local conditions' (Hydrographic Office 1978: 14).

2.2.5 Sea and Swell

Heavy seas caused by the prevailing westerly and north-westerly winds are witnessed off Cape Bon between October and April. In the Sicily-Malta channel both the north-westerly and the north-easterly winds cause heavy seas, and disturbed conditions may persist for several days between October and April (Hydrographic Office 1978: 13). Of particular note for the shores of Malta is the large north-easterly swell that persists for up to two days after the gale from the same direction has subsided. Finally, the fetch of the waves hitting Malta are longest from the south (North Africa) and the east (Eastern Mediterranean). The impact of the swell on the various harbours of Malta depends on its direction. For example, the above-mentioned swell that builds up after a north-easterly storm would have, prior to the construction of the breakwater, come crashing into the Grand Harbour and other anchorages that were exposed to the *grigal*.

2.2.6 Sea Temperature

The average temperature of the sea surface achieves its lowest in February (15°C) and highest in August (26°C). In winter variations from the mean do not exceed 2°C whereas in the summer variations may be anything up to 4° C. In general the difference between the sea surface temperature and that of the air is of no more than

⁴ Personal comment from Mr. J. Bianco, hydrographer of the Malta Maritime Authority (MMA). The measurement of 70cm was recorded in 1997 on the tide gauge of the MMA situated in the Grand Harbour.

one or two degrees Celsius, although the onset of winds changes this situation, albeit temporarily (Hydrographic Office 1978: 14).

2.2.7 Fog and Visibility

Fog is a rare occurrence over the Mediterranean Sea. When it does occur it is more likely to be found in coastal areas rather than on the open sea. On the other hand, a major cause of 'reduced visibility' is the dust or sand carried by the southerly winds from Africa. If the winds are strong, visibility may be reduced to less than one kilometre. When the warm southerly winds blow over long stretches of sea, they cool, forming a kind of mist of fine dust and moisture, which may persist for a day or two especially around Malta and eastern Sicily (Hydrographic Office 1978: 19).

2.2.8 Climate

This section highlights the characteristics of the climate over the sea in the general region as well as of the island itself. Average pressure throughout the year is approximately 1011 mb. The variations in the temperature on land are reflected in variations in the weather patterns over the sea. Thus, in winter when the land is cold in relation to the sea, the pressure is low in the central part of the sea area, and is higher over land (Hydrographic Office 1978: 14). The opposite is true for the summer season. Characteristic of the winter period are frequent and sometimes large variations from the average pressure for the time. These are caused by depressions in the western Mediterranean that proceed towards the east. Although rare, when such variations occur in summer they are still capable of causing gales, albeit limited with regard to the area they affect (Hydrographic Office 1978: 15).

At the risk of stating the obvious, the island of Malta has often been described as having a Mediterranean climate, which is a hot dry summer with a mild wet winter. This is somewhat of an over-generalisation as the weather in the Mediterranean varies immensely from one region to another (Grove and Rackham 2001: 25). At the two extremes one can place the semi-desert conditions of Tripoli in North Africa and the coast of Southern France at the foot of the *Alpes Maritimes*. Malta enjoys a mean between these two 'extremes'.

2.2.9 Rain

Malta has recently been described as having two seasons, one hot and dry between April/May and September and the other wet between September/October and March/April, within which eighty-five percent of the annual rainfall falls between October and March (see Table 4.1). On average, the island witnesses 530mm of rainfall per year (Schembri 1997: 118). There are, however, significant variations recorded between one year and another. In the period between 1948 and 1999, for example, there were just twelve years that witnessed the average precipitation ($\pm$ 50mm); within the same period there were eleven years that witnessed more than 700mm and nine years that experienced less than 400mm of rain per annum (Lanfranco 2002: 9).

Variances can be noted not just over the period of a year but also within the years themselves. As can be seen in Table 2.1 the average rainfall for October is 87.8mm, but in October 1988 approximately 200mm of rain fell in just two hours (Anderson 1997: 114). Such variations help to highlight the fact that despite the averages listed in Table 2.1 the reality is often different due to the unpredictability of local rain patterns. One can safely say that rather than having constant rainfall throughout the wet season the island is more susceptible to large downpours that are few and far between.

Month	Rainfall (mm)	Max Temp (°C)	Min Temp (°C)	Sunshine (h)
January	86.4	14.9	10.0	5.3
February	57.7	15.2	10.0	6.3
March	41.8	16.6	10.7	7.3
April	23.2	18.5	12.5	8.3
May	10.4	22.7	15.6	10.0
June	2.0	27.0	19.3	11.2
July	1.8	29.9	21.9	12.1
August	4.8	30.1	22.5	11.3
September	29.5	27.7	20.9	8.9
October	87.8	23.9	17.7	7.3
November	91.4	20.0	14.4	6.3
December	104.3	16.7	11.4	5.2

Table 2.1. Mean values of climatic parameters for the Maltese Islands
Source: Meteorological Office of the Department of Civil Aviation,
Government of Malta (After Schembri 1997: 118).

2.3 Landscape Changes

In this section I provide an overview of landscape changes in the Mediterranean with specific focus on the coastal area. This is essential so as to better understand the dynamic relationship between people and the landscape. Rather than relegating the landscape to a backdrop or prop separate from the people that inhabit it, I believe it is necessary to envisage it as an intricate part of human development (see below **section 2.3.1.3**).

2.3.1 Introduction

The coastline of the Mediterranean has, over the past 11,000 years, changed considerably (Grove and Rackham 2001: 43-44). These changes have come about due to a number of causes including: 1) eustatic sea-level rise; 2) regional and/or local tectonic activity; 3) sediment deposition and 4) climatic change. These four natural processes interact to bring about varying degrees of coastal changes throughout the Mediterranean (Kraft et al 1977).

2.3.1.1 Sea-level Rise

The end of the last glacial maximum saw the melting of massive ice caps (between 14,000 to 6000 BC) which caused the sea-level in the Mediterranean to rise from approximately 120 metres below what it is today to approximately 30-35 metres (below present-day sea-level). Following this initial and rapid rise, the sea-level continued to rise at a slower rate until reaching that of the present day approximately 3000 BC. Since then it can be said that sea levels have continued to fluctuate at different rates in different areas (Pethick 1984: 213-33).

2.3.1.2 Tectonic Movements

Over the past 2000 years seismic activity, together with geomorphology, is believed to have brought about the major coastal changes in the Mediterranean (Flemming 1969). Two major tectonic plates meet in the Mediterranean region, the African and Eurasian, as well as other smaller ones such as the Turkish and Aegean plates, which advance at a rate that may vary from 1-10 centimetres per year (Park

1988: 70). The result of this is that various areas in the Mediterranean, such as southern Italy and Sicily and the Aegean are some of the most volcanically and seismically active regions in the world. The 'localised' tectonic activity affecting the area surrounding the Maltese Islands is described below.

2.3.1.3 Sediment Deposition

The occurrence of alluvial deposition and the subsequent silting up of coastal areas has been widespread throughout the Mediterranean. Some of the most telling evidence for coastal change and extension in the Graeco-Roman Mediterranean can be gleaned from famous cities such as Ephesos and Miletos, which were either left landlocked or chose new sites to establish their ports in order to retain links to the sea (Bintliff 2002: 427). Evidence for this form of environmental change is in no way limited to antiquity and later occurrences were also recorded. In the late Middle Ages, for example, the silting up of the Arno in the fifteenth century, meant Pisa was no longer accessible to seagoing ships and had to make use of another harbour, Porto Pisano, to the south of the mouth of the Arno (Pounds 1994: 372).

Considering the extreme and far-reaching transformations brought about by the occurrence of coastal change it comes as no surprise that ancient writers noted such phenomena. Herodotus, writing in the fifth century B.C., concluded 'that the Nile valley and delta were another case of a great inlet of the sea which had been filled with the silts deposited by successive floods' (Horden and Purcell 2000: 312). Ancient writers also studied the causes of such changes and searched for explanations in human interaction with the landscape. Writing in the second century A.D., Pausanias attributed the interruption of alluvial deposits at the mouth of the Achelous river to the expulsion of the Aetolians and subsequent abandonment of the land forming the catchment areas of the river. What is important here is not whether Pausanias was correct in his interpretation but rather his early realisation of the existence of the interaction between humans and the landscape. Later writers continued to propound the belief that land erosion and subsequent siltation were mainly due to anthropogenic causes. Giuseppe Paulini, writing in 1608, claimed that the lagoon of Venice was in danger of silting up due to deforestation in the Alps (Grove and Rackham 2001: 290).

In recent times, Claudio Vita-Finzi, through his book *The Mediterranean Valleys*, inspired new research into the history and nature of recent sedimentation in the Mediterranean (Horden and Purcell 2000: 316). The main thrust of his research focused on the division of alluvial deposition into two phases that he named the 'older and younger fills'. The older valley fill ended between 8000 and 7000 B.C. whereas the younger fill can be traced to between 500 and 1500 A.D (Vita-Finzi 1969: 92-120). His research developed in Tripolitania and was expanded upon after visits to valleys in Italy and Spain (Grove and Rackham 2001: 290-91). Vita-Finzi proposed that the timescale of the younger fill found in the various valleys throughout the Mediterranean was 'synchronous'. It therefore followed that humans could not have been responsible for this universal occurrence, thus 'the only possible explanation remaining was a general change in the climate, which he [Vita-Finzi] took as the most likely explanation for the Older fill too' (Horden & Purcell 2000: 316). Contrary to Pausanias and Paulini, who attributed siltation to human activity, Vita-Finzi proposed that climate was the all-important agent of change with regard to land erosion and sediment deposition.

There are two main reasons why sediments should be studied: to enquire about the effect of these deposits on the economy and society of the locality and to investigate the causes of deposition and both Horden and Purcell and Grove and Rackham dedicate extensive discussions to the interaction of alluvial deposits and siltation with human activity (Horden and Purcell 2000: 298-341; Grove and Rackham 2001: 288-311 and 328-350). Horden and Purcell criticise Vita-Finzi's original hypothesis because research has shown that through changes in agricultural practices and other landscape modifications humans did play a role in land erosion and subsequent alluvial deposits as, for example, in the hinterland of Carthage (Horden and Purcell 2000: 319). Recent research in the south of France has focused on the silting of harbours such as Marseille where it was 'found that factors determining the evolution of the shoreline were directly connected with the history of human settlement and urbanization from the initial Bronze Age village to Greek and Roman urban development' (Morhange, Vella, Provonsal, Hesnard, and Laborel 1999: 148).

Horden and Purcell acknowledge that Vita-Finzi's theory opened up a debate that is of 'continuing importance' and advocate further investigation of what causes land erosion and sediment deposition. They state that if humans activity can be deemed to influence such natural processes then it is, if possible, essential to try and establish the nature of this activity (Horden and Purcell 2000: 320). Despite their move away from the climatic determinism and highlighting the significance of human activity in alluvial and siltation processes, Horden and Purcell accept that: 'the extreme form of anthropogene determinism appears implausible [because] the erosion of the land, the expansion of human agriculture, the post-glacial rise in sea-level, the instability of the deep structures of Mediterranean geology [...] interact cumulatively' (Horden and Purcell 2000: 327).

Whilst acknowledging that humans could influence erosion, Grove and Rackham play down the effect of human activity on the overall process. They cite examples of alluviations that occurred at periods of little human activity and others that continued despite phases of increased and decreased human activity. In their view 'the weight is against human activity as the principal cause, and towards an explanation in terms of weather so it is difficult to resist the conclusion that the primary cause was climate or weather' (Grove and Rackham 2001: 307-311). Although similar to Vita-Finzi's original proposal, Grove and Rackham offer an alternative explanation with regard to patterns in time and space. Rather than an all-encompassing deposition of the younger fill within a given timeframe and geographic area (Vita-Finzi 1969: 101), Grove and Rackham explore the possibility of local variations. Deluges may differ in frequency and in density, whereas local topography is another variable that must be kept in mind: 'soft collapsing Basilicata is very different from hard, cliff-bound Crete' (Grove and Rackham 2001: 311). Both sets of authors agree that it is a combination of factors that cause erosion and subsequent depositions, however the former lean towards human activity and the latter towards climate and the weather.

As Bintliff's recently indicated: 'instead of having to decide on climate or anthropogenic causation as monocausal alternatives, it would perhaps be wiser to investigate the many ways in which natural and human impacts interact to encourage or inhibit erosion [...in] the Mediterranean' (Bintliff 2002: 420-21). His second

proposal propounds the necessity to underline 'that the consequences of such alluviation, however stimulated, can be negative, neutral or positive for human settlement and land use' (Bintliff 2002: 428). The various consequences of sediment deposition in Malta will be considered throughout this thesis.

2.4 Coastal Changes in Malta

This section covers various aspects related to the natural processes that combine to bring about coastal changes in Malta.

2.4.1 Local Geology and Tectonics

The island lies close to what are referred to as the Pantelleria rifts (Pedley, Hughes Clarke and Galea 2002: 26-27). The above-mentioned inter-plate (Afro-Eurasian) compression occurring in Sicily pushes these rifts apart and causes seismic activity in the central Mediterranean. However, Malta is distant enough from the Afro-Eurasian plate boundary (Pedley, Hughes Clarke and Galea 2002: 33) so as not to experience massive earthquakes and sudden landscape changes such as those brought about by volcanic activity in neighbouring Sicily (Castagnino 1994).

Malta lies on what is referred to as the Hyblean Platform, an area that 'links the Hyblean Plateau of south-eastern Sicily to similar aged rocks in Malta' (Pedley, Hughes Clarke and Galea 2002: 14). The rock in Malta is entirely made up of sedimentary deposits including crushed rock, flora and fauna and various chemicals (Pedley, Hughes Clarke and Galea 2002: 41-64). The stratification of the geological layers on Malta is relatively simple and consists of (starting with the oldest layer): Lower Coralline Limestone, Globigerina Limestone, Blue Clay, Greensand and Upper Coralline Limestone (**Figure 2.4**). Of these, the Globigerina layer consists of a thick bed of soft, easily quarried rock which provides the main building material on the island. This is a simplified explanation of the island's geological stratification. There are variations within the strata, such as reef and foraminiferal limestones (Pedley, Hughes Clarke and Galea 2002: 44-45). In some areas, the more recent layers may have disappeared through erosion, while others, such as that of Greensand, may not have formed at all (Lanfranco 2002: 20). One of the most conspicuous geological

features is the 'Great Fault' running from the west in a north-easterly direction, trending from Fomm ir-Riĥ to Madliena and dividing the island in two (**Figure 2.5**).

The shifting of the Pantelleria rifts below the geological layers that form the Maltese Islands contribute to landscape changes. The whole Maltese archipelago is in fact tilted 'being highest in the south-west and lowest in the north-east' (Pedley, Hughes Clarke and Galea 2002: 85-86) (**Figure 2.6**). Evidence for, as well as the calculation of, a rate for this subsidence has recently been proposed. The method used for this exercise largely involved the plotting of archaeological sites found around Birżebbuga against changes in sea level through time. The results of this investigation are still pending and the exact rate of subsidence is still unknown (Abela and Schembri 2002).

There are two major occurrences (created by this phenomenon) that are relative to the formation of Malta's harbours:

- 1) The drainage for surface water runs towards from the south-west to the north-east. As shall be discussed below, the flow of water and debris helped cut deep river-valleys in periods when sea-levels were significantly lower than they are today.
- 2) The tilting of the island exposes the softer layers of Malta's geology to the sea thus causing faster coastal erosion (through wind and wave action). Areas where the underlying deposits of clay are exposed and thus are more susceptible to land subsidence. This is particularly true for areas where clay lies close to or at sea level such as in the north-west of Malta (Pedley, Hughes Clarke and Galea 2002: 83).

2.4.2 Soils

There are four main soil types that have been identified in Malta (Lanfranco 2002: 34-35):

- a) Terra Soil: mainly made from the erosion of the coralline limestone layers and is therefore more common in areas where this layer has been exposed. The calcium carbonate of this soil is of between 2 and 15 percent and originates

from the rock it was derived from. It is rich in iron and has a organic content of 4.5 percent. This type of soil mainly develops on karts land.

- b) Xerorendzina: A light brown soil that probably originated from the globigerina rock as well as valley deposits. The material content of this soil is between 1.7 and 6 percent and its calcium carbonate matter varies between 55 and 80 percent. The latter indicates that this is a young soil.
- c) Carbonate Raw Soil: This soil is mainly derived from the layer of blue clay and is more commonly found close to areas where this layer is exposed. It is light yellow in colour and its calcium carbonate content is of between 30 and 90 percent, whereas its organic content is of between 1 and 2 percent.
- d) Complex: This type of soil is mainly the result of the movement of soils from one area to another resulting in mixed varieties. The reasons for this movement are both natural and anthropogenic, however one can safely say that man was the main agent of change.⁵ It is not only soils that are found in these mixes but also rocks and stones, a practice aimed at improving the drainage of the fields as well as the prevention of soil erosion.

2.4.3 The Island's Geomorphology

Siltation is one of the major factors that contributes to coastal changes in Malta. Trump recently described the deposition of soil on the plains as one of the three major surface changes to have happened in Malta (Trump 2002: 14). These depositions have remained one of the least studied aspects of the island's past. In a recent publication on the river valleys of Malta, the authors dedicate little space to the plains that drain the various wadis throughout the islands, with the focuses being on the 'rivers' themselves and on their flora (Haslam and Borg, 1998).⁶ Likewise, the recent publication on the geology of the Maltese Islands dedicates no more than a few lines to the phenomenon of sediment movement and alluvial fans (Pedley, Hughes Clarke and Galea 2002: 95). It is surprising how such a feature, important as it is for a variety of reasons such as agriculture, coastal dynamics and hydrology, has not been

⁵ The creation of terraced fields is just one example of how soils were moved around by humans.

⁶ Valley in Maltese is *wied* from the Arabic *wadi*. The latter term has recently been assimilated into the English language. Its definition in *The Oxford Dictionary*: 'In certain Arabic-speaking countries, a ravine or valley which in the rainy season becomes a watercourse; the stream or torrent running through such a ravine.'

given its due importance. There are two main agents that have influenced the geomorphology of the island: a) tectonic movement; and b) erosion. The dynamics of tectonic movements in Malta are discussed above. Rain, storm-water, wind, the sun and the sea all contribute to erosion on the island. In turn, these processes create particles that when transported in various ways (mainly waterborne via the river valleys described below) contribute to increased erosion of the rock. The geological strata mentioned above erode at different rates (Lanfranco 2002: 27), which explains the diversity of features within the landscape present on the island.

2.4.4 Coastal Changes

There exist various agents of coastal change in the Maltese Islands. These include land subsidence, coastal erosion by the forces of the sea and siltation. Wave action erodes softer elements of the island's geology such as exposed layers of blue clay. This process causes the collapse of overlaying strata of rock forming a dynamic coastline made up of large semi-submerged boulders. Finally, the deposition and accumulation of large amounts of silt and sediment at the head of numerous bays in Malta has caused the progradation of the coastline. The consequences of this phenomenon is described and discussed in detail in **Appendix B**.

2.4.5 The River Valleys of Malta

The river valleys of Malta were transformed into their present outline during the last glacial maximum when the sea level dropped and the: 89-91) (**Figure 2.7**). Phases of low sea level coincided with weather that was ‘highly corrosive, being very wet or with low, rock-shattering temperatures’ which led to an increase in sediment and rocks being transported which in turn helped to cut a steep gradient for the valleys (Delano Smith 1979: 319). Following the end of the last ice age (circa 11,000 years ago), sea levels in the Mediterranean gradually rose until reaching present day levels⁷ (Lambeck and Bard 2000). In Malta, this would have resulted in the flooding of the large river valleys and the formation of fjord-like deepwater inlets. Watercourses cut deep and precipitous valleys (Pedley, Hughes Clarke and Galea 2002). Deltas that were previously laid down during the last glaciation were, after the above-mentioned rise in sea level, now about 100 metres under the sea (Grove and Rackham 2001: 329). One must consider that the newly formed bays. Thus, it can be said that the dynamics of recent alluvial deposition on present-day floodplains is the result of the formation of new deltas.

In the near-tideless Mediterranean, most of the sediment comes not from coastal erosion, but from inland erosion via rivers or torrents flowing down dry valleys. This sediment originates from the catchment areas of the main valley and its tributaries but does not necessarily consist of soils eroded from these same areas. A substantial amount of sediment does not reach the sea but is stored in alluvial fans, floodplains and river terraces. On the mainland, deltas have ‘straightened’ out the coast, forming beaches to either one side or other of the river mouth. Conversely, on islands, the coastal changes were slower and are often not complete (Grove and Rackham 2001: 328-330). This is definitely the case in Malta where the storage of the sediments occurs mainly in the alluvial fans and floodplains that in turn form at the head of the bays. One of the main reasons why the floodplains have not extended to the mouth of the bays is the great depth of the original valleys. One tributary (Dockyard Creek) feeding the valley of what is today the Grand Harbour measures at its deepest to just over forty metres from present-day sea level to bedrock (**Figure 2.8**).

⁷ Approximately 7000 years before present.

2.5 Coastal and Riverine Reconstruction

It is important for archaeologists and historians to have an understanding of the past environments. Brown cites two important factors that can be deduced from the reconstruction of past environments: a) the influence of the environment on human activity and b) the impact of past peoples on their landscape. He states that 'it is the manipulation of natural resources that changes human environments and creates landscapes'. Alongside land, plants, animals, soils and minerals, Brown also lists water as an important resource for drinking, irrigation and fishing (Brown 1999: 45-54). However, access to navigable waters and sheltered must also be considered as an asset. The study of coastal changes is therefore essential as it enables us to understand why certain sites were used for anchoring and settlements for example and how these uses changed through time.

The investigation of the ancient coastline of Malta is necessary because the harbours and anchorages of the Maltese Islands have been, and continue to be considered as one of their prime assets. In ancient times, writers such as Diodorus Siculus referred to the excellent harbours of Malta and Gozo. He also described the commercial benefits that originated from maritime activity and that were reaped by the islands' inhabitants (Diodorus Siculus v, 12, 1-4). If any significant changes in the coastline could be proved this would help determine the exact nature of these 'assets', an important step towards understanding how Malta's inhabitants exploited these in the past. Significant changes in the coastline could also lead to a reinterpretation of various archaeological sites that are situated in the surrounding landscape. The association between such sites and the sea can only be fully understood if a realistic spatial dimension is defined. Finally, just as exposure to winds and sunlight determine the habitability of caves (Renfrew and Bahn 2000: 256), likewise, aspects such as topography and geographical orientation are essential to understanding the suitability of harbours.

The first published mention of silted harbours in Malta is that by Scicluna, an antiquarian and amateur diver, in a map of underwater sites published in the 1960s (*Missione Archeologica Italiana* 1965). Scicluna highlights five silted harbours: Mellieħa, St. Paul's Bay, Salina/Burmarrad, Marsa and Marsascala. Scicluna's ideas

were based solely on topographic observations and not on scientific investigation. This prevented the identification of the nature specific aspects of the marine environment that existed within the ancient harbours such as the depth and nature of the seabed. Despite such shortcomings, Scicluna provided the initial pointer for future research.

The investigation of the silted harbours of Malta must also be considered as the first step towards a better understanding of the evolving maritime role of these areas and how this role has changed due to variations in topography. If the bays did change then it is imperative to understand the impact of these changes on the local population as well as maritime activity in the area. To determine the causes of siltation in the harbours, I shall be looking at both cultural and natural factors that may have contributed to this phenomenon. Given that this study transcends various periods of the Malta's history, it enables the observation of causes and effects through time.

Scicluna omitted to recognise other silted ports such as those at Msida, Pieta', Mistra, Birżebbuga, Marsaxlokk, Little Marsa, and Gżira (**Figure 2.9**). This could be because some of these areas have been heavily urbanised over the past two centuries and therefore topographic changes are not immediately noticeable. The primary focus of the present study falls on three areas, Burmarrad, Marsa and Marsascala. The reason behind the choice of these sites is that one may consider them, based on size, location and topography, more than simple open bays. If coastal changes have occurred, the ancient layout and size of these three harbours would be significantly different, affecting factors such as the number of vessels able to call into them and the quality of shelter offered. Most of the openings of Malta's harbours face north-east and although sheltered from the prevailing north-westerly winds, many harbours and anchorages are vulnerable to the *grigal*, the notorious north-easterly gales that threaten the islands between the months of December and February. It therefore follows that all-weather anchorages had to be sheltered from this threat. Today, one may observe that none of the harbours enjoy full protection from the *grigal*. Therefore, the reconstruction of the ancient coastline within these harbours will help define whether vessels would have been protected over the winter period.

Another reason for singling out these sites is their relatively well-preserved state. In the areas chosen, especially Burmarrad, the 'natural' environment is somewhat still intact, thus facilitating primary research. In other areas, such as Msida and Gzira urban developments such as the construction of buildings and roads is widespread. This makes the logistics of fieldwork, such as coring, more difficult and less feasible if not outright impossible. There exist numerous river valleys and floodplains in Malta, but due to both time and budgetary constraints, environmental sampling for the present dissertation was only carried out in Burmarrad. The reasons for this are twofold: a) a team of scientists is working on a core sample from Marsa and b) Burmarrad has a larger number of archaeological sites (than Marsascala) in its environs, which contribute to making such research more complete. The place names Marsa and Marsascala are used in the present day for both the coastal area and the bay.⁸ Burmarrad, on the other hand, is the place name used today for the hamlet and the floodplain that it overlooks. The bay itself is known as Salina Bay due to the sixteenth century saltpans situated there. However, up until the late nineteenth century the bay was referred to as both Salina Bay and Bhuarrat (Smyth 1895: 12), the latter being an Anglicised spelling of Binwerrad⁹ from which Burmarrad was eventually derived. I have opted to use Burmarrad, as it is more representative of the general area under study.

For Burmarrad a variety of techniques were used for the reconstruction of the ancient coastline. The main technique used was the retrieval of samples for analysis through coring. I discuss the various methodologies used for the retrieval of core samples and subsequent laboratory analyses in **Appendix A**. Also listed in this appendix are the results of the analyses of all core samples. Aerial photographs, old maps and documentary sources complemented information obtained from the main technique. Due to time constraints and insufficient funds, no core samples were taken from other floodplains. Other sources, including aerial photographs, place names and topographic observations, contributed to the study of some of the other floodplains.

⁸ Marsa is the Semitic term for harbour/anchorage. Place names of other harbours are sometimes a combination of two terms. Marsaxlokk, for example: Marsa and Xlokk, the latter word being a Maltese adaptation of scirocco. Therefore, the place name means 'the harbour of the south east'.

⁹ Binwerrad originates from the term Bin Werrad (Arabic: *Ibn Werrad*): son of Werrad, possibly denoting the name of a landowner in the area.

Conclusions for the remaining floodplains are reached by inference. The implications of the studies on the floodplains are described in **Appendix B**.

2.6 The Natural Environment of the Harbours and Anchorages of Malta

For an island that measures 24 by 12 kilometres, it is safe to state that Malta possesses numerous natural bays and inlets that are advantageous to seafarers (see **Figure 1.6**). The Maltese coast is also quite varied. It includes drowned valleys (**Figure 2.10**), precipitous cliffs (**Figure 2.11**), particularly on the western and southern coast of the island, as well as open bays that were created through land erosion by the sea (**Figure 2.12**). The type and extent of coastal erosion depend on the type of rock exposed along a particular stretch of the coast as well as exposure to prevailing winds and wind action. Sandy beaches are quite rare and account for only 2.4 percent of the coast in the Maltese islands (Lanfranco 2002: 33). The variety in the topography of these bays makes it necessary to list and categorise them individually (see **Appendix B**). This will shed light on the type of shelter offered and to their suitability for various maritime functions.

To describe the harbours and anchorages accurately I have used criteria proposed by Blue (1997) alongside the environmental observations discussed above and in **Appendix A**. Blue suggests a topographical typology ‘to encompass the major types of anchorages around the shores of the eastern Mediterranean’ (Blue 1997: 31-32). The typologies are the following:

A) Anchorages on high-energy, cliff-lined coasts:

1. Natural bay
2. Almost enclosed bay
3. Bays either side of an “anvil-shaped” headland
4. Lee of a promontory
5. Sheltered valley
6. Offshore island or reef

B) Anchorages on low energy, low-lying coasts:

1. Riverine (River mouth/Upriver)

2. Inland lake upriver
3. Natural embayment
4. Deltaic
5. Lagoonal

In the ambit of this thesis, these typologies have been adapted to suit conditions prevailing in Malta. The term high-energy zone is taken to mean a stretch of coast directly exposed to prevailing winds, waves and currents. Malta's entire coast, whether cliff-lined or low-lying, is high-energy. The differentiation made is between high-energy cliff-lined coasts and high-energy, low-lying coasts. Three types listed by Blue for Cyprus have been omitted: a) riverine b) inland lake up river, and c) delta. The reason for their omission is the lack of rivers on the island. This topographical classification is supplemented by information on aspects such as exposure to winds, access to the hinterland and dangers to shipping. In turn, this contributes to the understanding of the kind of shelter offered to visiting vessels and thus to the suitability, or non-suitability, of these bays to various kinds of maritime activity.

Although some of the bays described may seem too small to accommodate ships at all, one can confirm their maritime potential by working with data available from the early modern period. The positions of coastal defences built by the Order of St John from the sixteenth to the eighteenth centuries give a clear indication of the places deemed suitable for the anchoring and/or launching of a landing party. In some cases, one must consider the option of larger vessels waiting outside and sending men in on small boats. In addition, the Barbary corsairs preferred vessels propelled by both sail and oars (Earle 1970: 47-71), and hence a shallower draught than vessels powered solely by sail. Many of the bays described below were also significantly deeper than now (over two metres deeper in some cases). This was due to either the lack of *Posidonia* meadows or the relatively young and hence low mattes.

The large number of harbours and anchorages provide numerous and regular access points to and from the sea. The main exception to this situation is the cliff-lined coast to the west that runs for approximately sixteen kilometres from Wied iż-Żurrieq to Fomm ir-riħ. Along this stretch of coast, one only reach the sea via two small landing places: Ras il-Ħamrija and Għar Lapsi. However, these are not suitable

for the loading and unloading of goods because access to the hinterland is difficult. One may therefore consider the Rabat plateau as being ‘isolated’ from the sea, making it dependant on all-weather harbours located at some distance away. All the harbours and anchorages are described individually in **Appendix B**.

2.7 Function

It is now opportune to briefly touch upon the various functions for which these natural harbours and anchorages may have been used. In a maritime context, this is where man and the landscape meet. The varying practical exigencies of those at sea influence the function assumed by a harbour or anchorage (McGrail 1987: 311-12). The seafarer looks for a safe and easily recognisable approach to a harbour coupled with protection from the winds and wave patterns prevailing in the area. On the other hand, the merchant seeks out the best possible points where contact can be established with local inhabitants so as goods may be exchanged. The role of the political authorities would have been to regularise such trade so as to maximise revenue from taxes and ports dues. Therefore, these authorities would have preferred a ‘well-defined, possibly defended site [...] where traders can be segregated, protected and supervised’ (McGrail 1987: 312).

The function of ports and anchorages cannot be fully understood without considering the notion of duality described below. Interaction with the sea could, for both seafarers and inhabitants, be positive as well as negative. The various areas of such interaction are presented in **Table 2.2** below:

FOREIGN		LOCAL	
Positive	Negative	Positive	Negative
Destination Shelter Services Trade Rest News Opportunity	Natural dangers Ambush Hostility	Food source Trade News Connectivity	Natural dangers Raids Plague

Table 2.2 Perception of the sea by those approaching and living near harbours.

In the ambit of this discussion, the term foreign points to an individual (or group of individuals) who were: a) either approaching a place other than their homeland and immediate coastal surroundings; and b) accustomed to approaching harbours or anchorages in a given place. The approach to a particular site may be intentional or, if the vessel was blown off route, unintentional. People on board may not necessarily have been seafarers but also travellers such as pilgrims and merchants. The term local refers to people native to the area and whose lives are directly affected by the close proximity of a harbour or anchorage. Such people would also have a degree of ‘inherited’ knowledge and familiarity with a particular stretch of coast, its inlets and the surrounding sea. The notions presented in **Table 2.2** are briefly defined below.

Foreign Positive

Destination: The arrival of a vessel in the confines of a harbour or anchorage may signify the journey’s end and hence the probable successful completion of a crossing.

Shelter: A harbour or anchorage may offer temporary shelter to vessels sailing in adverse weather conditions.

Services: Victuals, water and various services (such as ship repairs) may be obtained at harbours and anchorages.

Trade: Harbours and anchorages may provide the meeting point where goods can be exchanged between those on board and those on land.

Rest: A harbour or anchorage may be used simply to rest the crew after a hard and arduous leg of a journey.

News: Harbours were hubs for the exchange of news carried by passing ships.

Foreign Negative

Natural Dangers: Approaches to harbours and anchorages may be punctuated by unmarked hazards such as reefs. These could be detrimental to vessels approaching with an inexperienced master and/or pilot on board.

Ambush: On entering a large harbour or anchorage a vessel may be ambushed by an enemy ship lying in waiting in the concealed conditions of an inlet.

Hostility: The source of danger may also originate from the shore. Hostile tribes and/or unknown illnesses may cause havoc amongst crew members of a visiting vessel.

Local Positive

Food Source: Harbours and anchorages may provide access points to fishing grounds from both land and sea. For example, inhabitants of coastal areas may use these sites as a base for their fishing with varying functions varying including the mooring of vessels, landing of catches and repairs of nets and other fishing implements.

Trade: Just as trade benefits merchants on board visiting ships it also has positive repercussions for the local inhabitants that are served by a harbour or anchorage. This is especially true for both harbours and ports serving large urban communities dependent on imported items such as foodstuffs as well as for anchorages serving remote settlements that may have been reliant on overseas supplies.

News: Mariners, travellers and merchants would bring news on a variety of aspects (business, politics and family) from across the seas.

Connectivity: Harbours and anchorages provided access points from where people and goods could be transported overseas.

Local Negative

Natural dangers: Just as the sea provides (as in food sources) it also destroys.

Severe bad weather can destroy boats at their moorings inside harbours and anchorages as well as sweep people out to sea. In extreme cases an event such as a tsunami may cause long-term destruction of communities based around harbours and anchorages.

Raids: Harbours and anchorages may be used as landing places for enemy forces. Corsairs and/or enemy troops may be landed at such places in order to conduct raids on the local population and surrounding hinterland.

Plague: Visiting ships may unknowingly bring plague to areas where contact is made between the ship and land, either directly (person to person) or indirectly (the landing of a rat). In the light of this, some harbours or anchorages may be used as areas for quarantine.

2.8 Concluding Comments

It is not just duality that be ought to be considered as there exist more complex degrees and levels of function for harbours and anchorages. Given the various (and

changing) functions of Malta's harbours and anchorages through time these will be studied and described in an analytical category specifically dedicated to the subject. This will enable the comparative study of how the functions evolved and changed in the various chronological periods discussed in this thesis.

Chapter III

The Maritime Landscapes of Punico-Roman Malta

(218 to circa 50 BC)

3.1 Introduction

Although the chronological period covered in this thesis starts with the arrival of the Romans on Malta in 218 BC, I believed it is necessary to introduce this chapter with a brief overview of the centuries that preceded the arrival of Roman rule on the island. This will provide a better context for the subsequent sections discussed in the rest of the chapter. However, this first section covers over five millennia and must be considered as nothing more than an overview of maritime activity during that period.

3.2 Before the Romans

Evidence for the earliest human settlement on Malta can be traced back to the early Neolithic period, approximately 5000 BC, and is in the form of a C-14 date from the site of Skorba. The sample was taken from a deposit alongside a 'substantial wall [...] that does not look like the work of pioneer colonists but of a well established farming community' (Trump 2002: 23). They probably came from Sicily, only 90 kilometres away. Sicily is sometimes visible to the naked eye from Malta and vice-versa. The Sicilian origins of the earliest inhabitants can be deduced from the pottery discovered at the site of Għar Dalam (c.5000 BC), which is very close to the Stentinello ware from south-east Sicily (Trump 2002: 46).

During the middle to late Neolithic period (5000-2500 BC), in an age referred to locally as the Temple Period, the inhabitants of Malta developed a notable culture that is best known for the building of large megalithic temples across the island (**Figure 3.1**). Many of these monuments are highly decorated and are located in prominent positions that overlook harbours and anchorages with commanding views over the sea. This site distribution has recently been the subject of a detailed study that points to the importance given by the islanders to access points leading to and from the sea (Grima 2004).

Imported goods attest that people did make it across various channels in the central Mediterranean during the Temple Period. Evidence for connectivity with various other parts of the central Mediterranean can be deduced from a variety of imported objects and raw materials. For example, obsidian from both Lipari and Pantelleria is present in the archaeological record of this time as are red ochre, flint and pumice, all of which are not available locally. Miniature axes found in Malta are made from a variety of metamorphic rocks originating from Calabria and in southern Italy and Mount Etna on Sicily (Trump 2002a: 38-41). However, it is difficult to establish whether these were imported ready-made or whether they were worked locally. The presence of a few exotic ceramic sherds confirms trade/exchange of finished goods originating from Sicily, most likely from Serraferlicchio (Trump 2002a: 211). Boat graffiti on two orthostats at the Tarxien temples give us a glimpse of the types of seagoing vessels used by the persons calling at the islands during the

Temple Period (Figure 3.2) To those who did navigate in sight of Malta during the middle-late Neolithic, the island may have been perceived as a somewhat mystical distant place, out in the open sea.

The Bronze Age period in Malta has often been used to conveniently fill the gap between the Neolithic and the Iron Age (the latter is referred to locally as the Phoenician period). The people that occupied the island in the Bronze Age did so after the collapse of the temple culture in approximately 2500 BC: ‘despite careful search, no single element of their [Bronze Age inhabitants] culture can be traced to their predecessors. Improbable though it may seem, it is as if the islands were abandoned utterly and stood as empty as when the first intrepid seafarers came ashore 2,500 years earlier’ (Trump 2002: 245). The ‘new’ inhabitants took over some spaces that were previously utilised in the Temple Period. For example, one such site is that at Borg in-Nadur, a major fortified Bronze Age village built over the remains of a late Neolithic temple. Situated on a promontory between two small bays, the location of this village in close proximity to the sea suggests that the latter must have been important to its inhabitants (Figure 3.3).

Other substantial evidence for the Bronze Age from the settlements of Baħrija, Il-Qolla and Il-Qarraba reflect similar patterns. All are situated on strategic high ground with access to the sea from the bays of Fomm ir-Riħ, Burmarrad and Gnejna respectively (Figure 3.4). Besides similar topographic locations, all three sites have numerous rock-cut pits in common, presumably used to store grain (Trump 2002a: 253; MAR 1946-47). It would seem that the production and storage of agricultural produce was essential for the islanders as was their need to settle in close proximity to the sea.

What was the nature of the islanders interaction with the sea? Although there is no direct evidence, one may safely assume that the inhabitants exploited the marine resources present in the nearby bays, by fishing and/or the collection of molluscs. Overseas exchange also seems to be a feature of Bronze Age Malta. Copper tools and weapons were excavated from Bronze Age levels at Tarxien, pointing to connectivity with distant places (Evans 1971: 163-4). However, exactly where these objects originated from and whether these were transported directly to Malta from their place

of origin is as yet unknown. Local pottery forms are similar to contemporary ones in Sicily and Lipari. Contact with other places in the central Mediterranean is confirmed by the presence of Maltese pots in tombs at Thapsos, Sicily (Trump 2002a: 293). On a smaller scale, two fragments of Mycenaean pottery, one found at Borg in-Nadur and the other at Tas-Silġ, probably made their way to Malta via Sicily (Vidal González 1999: 26).

During the Middle Bronze Age of the Mediterranean, not all interaction with the sea was positive. Raids by aggressive seafarers based in the central Mediterranean may have been taking place in the general area, forcing the inhabitants of Malta to fortify their settlements. The robust walls of Borg in-Nadur, for example, suggest that its inhabitants faced a threat in the form of seaborne raids. The location of the other sites on the crests of naturally protected high hills also alludes to security being an important factor that influenced the choice of site.

Ceramic evidence points to the first utilisation of the plateau around Mdina to be during the Bronze Age, when it was probably occupied for residential and agricultural purposes (MAR 1938-39: 12). Standing today on the sixteenth century ramparts of the walled city it is easy to understand the strategic importance of this site and why it went on to evolve into the island's major settlement. From its elevated position of 200 metres above sea level, one can observe a long stretch of the horizon and the approach to the island's main harbours (**Figures 3.5 and 3.6**). This visibility was important on two counts: a) to keep a look-out against raiding ships and b) to monitor harbour activity. A visiting ship could be spotted on the horizon, giving ample time to the inhabitants of the settlement to make their way down to the harbour to greet and trade with the visitors. Furthermore, the importance of this hill is enhanced because it makes an impressive and significant landfall for those approaching by boat from the north.

Towards the beginning of the first millennium BC, one of the emerging maritime powers of the eastern Mediterranean started to make inroads in the central and western parts of this sea. The Phoenicians expanded and set up colonies to meet two requirements: trade and shipping (Aubet 2001: 159). The earliest data from Malta for Phoenician presence on the island is from the sanctuary of Tas-Silġ, overlooking

the harbour of Marsaxlokk that is 14 kilometres away from Mdina-Rabat: *l'uso dell'area con funzione santuariale da parte dei Fenici può considerarsi iniziata nell'ultima parte dell'VIII secolo a.C. per confronto con materiali ceramici ritrovati a Cartagine (e abbastanza precisamente datati in quella città da ceramiche greche in contesto)* (Ciasca 1999: 24).

What can be assumed on the available evidence is that the Phoenicians found in Marsaxlokk a convenient stop-over on an east-west crossing of the Mediterranean as propounded by Aubet (2001: 189). Marsaxlokk would have been the first available harbour after the crossing from the Aegean. Malta's significance increases in the light of Greek dominance of the eastern coast of Sicily towards the seventh century BC. Robbed of anchorages on the east coast of Sicily, Phoenician ships used Malta as a stop-over whilst sailing in the central Mediterranean. To date, there is no evidence for the definitive use of any of the island's other harbours.

Malta gradually came under the political and economic influence of Carthage as this city expanded its political and military power during the sixth century BC (Aubet 2001: 226). Eastern influences in Malta dwindle whereas those from North Africa increase substantially (Vidal González 1999: 28). From the sixth and fifth century BC pottery types from burial contexts on Malta reflect a strong Punic culture on the island (Sagona 2002: 54-55). The sanctuary of Tas-Silġ enters a rather grand phase during the Punic period, with many votive offerings deposited there (Frendo and Bonanno 1997: 10).

Exactly what part Malta played in the Punic Wars is not yet fully known, although ancient sources do shed limited light on some aspects. A text by Naevius (*Bellum Poenicum* IV.37) describes a raid on the island by Roman troops that probably took place during the First Punic War (264 to 241 BC). That the Romans saw fit to attack the island hints at the use of Malta as an advanced naval base during this conflict. A passage from Livy (XXI, 51) describes an event from the Second Punic War (219 to 202 BC), whereby the island, together with its 2000 Carthaginian soldiers under the command of Hamilcar, son of Gisgo, is surrendered to the Romans. The number of soldiers points to a certain degree of will and effort on behalf of the Carthaginians to protect the island. The latter part of this text highlights the strategic

importance of Malta with regard to the defence of the eastern coast of Sicily: after describing the conquest of Malta, Livy writes 'enough now seemed to have been done to secure the eastern parts of Sicily' (XXI). It is clear that once Malta was conquered, the Romans felt that the Sicily channel was safe. This lends to the idea that the Carthaginian threat from Malta had been eradicated and/or the establishment of the Romans on the island permitted a better defence of Sicily.

3.3 The Punico-Roman Period (218 BC to circa 50 BC)

The capture of Malta by Sempronius in 218 BC provides a convenient date to mark the start of the Roman period on the island, which the Romans called Melite. Fragments of evidence gleaned from ancient written sources, together with archaeological evidence, point towards an island society well attuned to maritime activities, especially the routes to and from North Africa. Punic influence on the inhabitants of Melite was to remain very strong and one cannot exclude ongoing commercial ties with Carthage until its destruction by the Romans in 147 BC. The fallout of the destruction of Carthage is reflected in the archaeological record of Malta. There is a noticeable drop in imports from North Africa, which is offset by an increased presence of imports from the northern parts of the Mediterranean, especially from the Adriatic and Tyrrhenian areas (see section 6.8). I believe that the study of Melite's maritime landscapes in the early Roman period should be seen in the light of this shift: from an island economy intricately linked to a city-state (Carthage) in the southern Mediterranean towards another expanding in the north (Rome). It is during this period that Melite forged new ties with the newly established province of Sicily and 'was destined to share for centuries the same fate with the larger island' (Bonanno 1992: 13).

Despite these new ties with the Roman world, there do not seem to be any sudden changes to life on Malta. The survival of Punic culture on the island is attested through the continuity of burial practices and pottery styles (Sagona 2002: chapter 5). The writing on the obverse of a coin from 160 BC (and other numismatic evidence from Republican Malta) is Greek but the iconography is Punic, depicting Astarte's head on the reverse (Coleiro 1976-77: 382). This points to a fusion of two cultures during the latter half of the second century BC and the emergence of Greek as a newly

introduced language (supporting the view that influence in this period originated from Sicily). With regard to official administration, Punic and Greek existed side by side up until 75 BC. The process of Romanisation stemmed from Sicily thus explaining why Greek and not Latin was the 'new' official language of Malta.

Further evidence of Greek influence from Sicily can be gleaned from a pair of bronze tablets found in Rome in 1549 (Ashby 1915: 24). Written in Greek and datable to the first century BC, they contain a copy of a decree passed in honour of a Demetrius of Syracuse by the senate and assembly of Melite. This shift is also corroborated by the evidence provided by coins minted in Malta in 35 BC that bear the name of the contemporary ruler in Sicily (Ashby 1915: 24). Through the forthcoming sections I intend to explore the degree of continuity of Punic culture in other aspects of life on Melite and whether any other influences of Roman culture can be detected.

3.4 Settlement Patterns in the Punico-Roman Period

In Malta, the presence of tombs provides the major evidence for the occupation of spaces within the landscape. A closer look at these can help to shed light on the continuity of settlement patterns from late Punic to Roman times. As already mentioned, the main settlement was towards the centre of the island on the site of present day Mdina-Rabat. Like the island itself, the town was called Melite. Numerous Punico-Roman tombs are located around the ancient town of Melite, specifically at Rabat and Mtarfa. However, numerous other tombs from this period are also found all over the island, implying the presence of settlements away from the main urban centre.

Said-Zammit suggests that in Punic times the second largest nucleated settlement after that of Melite was that of Paola-Marsa, in the Grand Harbour area (Said-Zammit 1997: 43-44). However, from a closer look at the tombs from the Punic and Punico-Roman periods it is highly probable that three settlements existed in the Grand Harbour area, one at Qormi, one at Marsa and the other at Paola (**Figure 3.7**). Before the silting up of the innermost part of the harbour, one of these three settlements (Qormi) would have been situated at the head of the ancient harbour

complex. The dates of the burial sites in Qormi, based on the various typologies of the tombs themselves and the ceramics discovered inside them, range from circa 750 BC to circa 200 AD (Sagona 2002: 947-952). However, the main concentration of tombs in this area covers the period between 500 and 100 BC, a period that includes the arrival of the Romans in Malta. These data provide a clear indication of the location of a centre of habitation around the largest harbour of the island.

Further north at present day Marsa a number of tombs from the Punico-Roman period have also been recorded. Pottery typologies from these burial sites clearly show that the tombs were in use between 500 and 100 BC thus pointing to another centre of habitation on the shores of the Marsa harbour. To the north-east of the Grand Harbour there are two sets of tombs in close proximity: one at Paola and the other at Ghajn Dwieli. Together, these point to a settlement at Paola that was contemporary with those at Qormi and Marsa. Those residing in Paola enjoyed access to the sea from at least two areas from either side of the Kordin promontory, namely Little Marsa and French Creek (**Figure 3.8**). This is a clear indication that at least three settlements were flourishing simultaneously around the inner harbour.

Away from the Grand Harbour area, other coastal settlements from the Punico-Roman period correspond to some of the most important harbours and anchorages around the island. Once again, evidence for these settlements comes from the presence of tombs in the surrounding areas. Although one cannot calculate the exact size of these centres of habitation solely on the basis of surviving tombs they do give a clear indication on the degree of human activity in the immediate area. It would seem that places like San Pawl, Ghajn Tuffieħa, Marsascala, San Ġiljan, and Msida were all witness to human activity and even permanent settlement in this period. Even some of the smaller anchorages such as Qalet Marku have the odd tomb in their vicinity.

The absence of tombs does not necessarily correspond to low occupation levels for a particular area. Over the past years, many coastal sites have been heavily developed, resulting in the loss of archaeological sites. In the area around San Ġorg (north), for instance, I have been informed by employees of a construction company that an entire burial complex was destroyed when underground garages were being

built in the area. These were unrecorded tombs, which, like many others before them, have been completely wiped off the archaeological record. However, this situation should not discourage an attempt to try and describe settlement patterns, albeit with fragmented information.

A substantial settlement existed on or near the crest of the hill overlooking the Sliema Creek and the Bays of Spinola and San Ġiljan (**Figure 3.9**). The presence of a tomb datable to circa 750-600 BC in the area hints at an early establishment of this settlement. Many of the other tombs and their contents have not survived but the fragmented information on tomb typologies from old descriptions indicates the presence of a settlement during the period under discussion (Sagona 2002: 1094-1096). This settlement would have been well situated for access to three harbours, those of San Ġiljan/Spinola, Sliema and Lazaretto. The location not only overlooks these harbours but also enjoys access to a fertile hinterland.

In the San Pawl area there exist a number of tombs that point towards some form of human activity around this area. Again, some of the tombs are no longer extant but pottery and glass finds, specifically *unguentaria*, from one of the tombs clearly put its use during the Punico-Roman period. Furthermore, a number of tombs on the hill to the north of San Pawl are located in a strategic place overlooking the harbour. Other tombs were found towards the limits of what is today known as Bugibba, indicating that the inhabitants of the general area were not just focused around one restricted space (Sagona 2002 1096-1097). Anyone inhabiting the area around the latter two tombs would have enjoyed access to the sea from both San Pawl and Burmarrad.

Tombs from the Punico-Roman period around Burmarrad are not numerous. At least one tomb that has been catalogued under the district of San Pawl is actually situated to the north-west of Burmarrad harbour in the area known as L-Erbgħa Mwiezeb (Sagona 2002: 1096-1097). However, the near-total absence of tombs does not mean that this area was devoid of human activity during the period under discussion. The two main hills overlooking Burmarrad are those of Bidnija and Wardija (**Figure 3.10**). The latter is the more strategic of the two as from it one can access both San Pawl and Burmarrad via valleys. Tombs from the Punico-Roman

period are present on the crest of both these hills, implying that the main settlement areas around the Burmarrad harbour were on the surrounding highlands. The general area here is very fertile, enabling the inhabitants to exploit both the rural and maritime potential. A series of farms datable to this period is scattered around the landscape and is indicative of the intensive agricultural activity in the area (see below section 6.6).

On the north-west coast of the island a series of tombs was found in the area of Ġhajn Tuffieħa (Sagona 2002: 813-818). This group of tombs is spread over a wide area, pointing to a dispersed settlement, possibly a number of small farmsteads. Access to the sea for these communities was via the bays of Ġhajn Tuffieħa and Mixquqa. Close to Ġhajn Tuffieħa several tombs are recorded spread across the area of Mgarr (Sagona 2002: 853-855) and Zebbiegħ (Sagona 2002: 1131-1134). Tombs in the former area were disturbed when discovered and do not shed much light on dates but ceramic types from those at Zebbiegħ confirm that these were in use during the period under discussion. The economic activity of people inhabiting this area must have been intricately linked to the surrounding fertile land. They would have also been able to access the sea via the bay of Ġnejna.

In the south of the island, the dates attributed to the various tombs recorded around the villages of Żurrieq and Qrendi indicate that these burial sites were in use during the Punico-Roman period. The material evidence from these sites includes mainly glass and ceramic objects datable to this period (Sagona 2002: 952-960 and 1145-1149). At over 100 metres above sea-level farmsteads and/or concentrated rural settlements in the area would have enjoyed a commanding view over the sea as well as access via the anchorage of Wied iz-Żurrieq. To the south-east of Żurrieq and Qrendi many tombs were found around the area of Hal Far (Sagona 2002: 833-837), which at 60 metres above sea level enjoys commanding views over wide expanses of open sea. Once again the settlement plan seems to be one where the inhabitants chose to live in strategic places but yet with easy access to the sea via Pretty Bay, which they would have reached via one or more of the valleys leading down to the coast.

Approximately 3 km to the north-east of Hal Far one finds the town of Zejtun, which bears evidence of a settlement over a long period of time, attested by the many

tombs found in the general area (Sagona 2002: 1136-1145). A substantial number of these tombs are datable from ceramic types to the Punico-Roman period, indicating a high degree of human activity in the area. Here, the settlement would have enjoyed a commanding view over the surrounding landscape as well as over some bays and the open sea. From the Zejtun area the inhabitants could gain access to the sea at various harbours and anchorages, namely Marsaxlokk, San Tumas and Marsascala.

Solitary tombs are found in and around coastal areas such as Msida (Sagona 2002: 873) and Xemxija (Vella et al 2001). There are various reasons as to why these tombs are solitary. Besides the afore-mentioned destruction of sites, it could be that others belonging to an associated settlement have not been found or are as yet unrecorded. On the other hand, single tombs may represent the burial site of a marginal farmstead or remote settlement. Besides the main urban settlement of Melite and the ones described above, other clusters of tombs imply the presence of large rural communities. These include those around Bingemma, Dingli and Mosta, with smaller ones at Attard, Birkirkara and Luqa. Some of these communities were clearly flourishing during the Punico-Roman period.

3.5 Roads and Terrestrial Transport

With regard to communication on land I have focused on the travel of Malta's inhabitants to and from access points to the sea. Ancient roads are totally absent from the archaeological record, making any study of internal communications on the island no more than educated guesswork. Sagona has built a hypothetical picture of the road system for Punic and early Roman Malta based on the assumption that tombs were sited close to causeways (Sagona 269-270). Her findings, possibly also influenced by modern road networks, are plotted on a map that illustrates many 'roads' leading to the sea via valleys (Figure 3.11).

A survey of Malta carried out by the British in 1802 sheds light on the road system originally developed by the Order of St John. Here, one must consider that although the coast influenced the creation of these roads, the exigencies of the Order were different to those of the Punico-Roman period. The Knights were interested in getting to and from the complex coastal fortifications that they had constructed during

their stay on the island. Their primary need was to reach the fortifications as quickly as possible from various centres of habitation and therefore their roads did not always follow the natural contours of the island. Having said this, there are some roads that do follow the valley bottoms (**Figure 3.12**). It is therefore not unreasonable to assume that the ancient inhabitants of the island also made use of the valleys to move to and from the sea.

Such a system is definitely acceptable for persons on foot and/or pack animals such as donkeys and mules. However, a substantial amount of goods had to be transported inland to the main urban centre of Melite. Whereas some valleys are wide, spacious and conducive to travel (on foot and by donkey or mule) others are less accessible (**Figure 3.13**). Furthermore, some Maltese valleys have very steep sides that would have been insurmountable barriers when it came to hauling large objects. A reasonable assumption is that if bulky transport, such as horse-drawn carts, was used on the island, alternative routes may have been chosen, even if this meant added distance to the journey. Alternatives may have included other valleys with a more gentle topography that was conducive to wheeled transport methods. Finally, some roads may have been constructed on the crest of valleys, following their sinuous lines inland.

3.6 Population Figures

In the absence of written data, such as censuses or parish records, the calculation of ancient populations is prone to errors and also subjective. However, for pre-census times it is material culture that provides the only source with which one can attempt to reconstruct past populations (Stoddart 1999: 129). It is essential to highlight that the quantities arrived at are not definite but taken as indicative.

As has already been noted, the one set of archaeological remains for the Punico-Roman period that has survived more than any other type in Malta is burial sites. However, basing one's calculations solely on the number of known tombs is not without its difficulties. Firstly, there is the factor of sites that may have been demolished or as yet are undiscovered. Secondly, not all known tombs were discovered intact meaning that it is not always possible to arrive at accurate dates and

estimates on the exact number of people buried in such a site. Therefore, for Punico-Roman Malta I have opted to use the De Angelis method (2000). A similar method had already been propounded for Malta by Said-Zammit who used two notions as basic data: a) an area of 5.4 hectares per 'farm-holding' to cover the subsistence of a family and b) that 60 per cent of the land in Malta was cultivable (Said-Zammit 1997: 36). To calculate population figures he then proceeds to divide the amount of cultivable land by 5.4 (hectares) and subsequently multiplies this by five (members in a family). These are similar to figures used by De Angelis (3-4 hectares of land are needed to support 5 people) for his estimation of the agricultural base of Greek Sicily (De Angelis 2000: 125).¹⁰ Said-Zammit subsequently uses various percentages of cultivable land to arrive at 'a series of potential population figures' (Said-Zammit 1997: 41).

The difficulties identified with such an approach are twofold: a) archaeological evidence suggests that part of Malta's agriculture was specifically geared towards production of cash crops (see below **section 3.7**); and b) the 60 per cent figure of cultivable land available is a modern figure arrived at in the early 1970s (Ransley 1974: 22). On the basis of the various deposits present in the floodplains, as well as those within the seabed, one can safely say that a considerable amount of this sediment originated from the surrounding landscape. There is no evidence for the rate of erosion/deposit build-up but it is safe to assume that during the ancient period Malta enjoyed a better and more widespread soil cover than the present day.

So where does this leave us with regard to population estimates for the Punico-Roman period? Said-Zammit arrives at figures that range from a minimum of 3,511 persons with 20% land-use, to a maximum of 17,555 with 100% land-use. These figures would give a mean of 10,533 for both Malta and Gozo. Sagona assumes that the population of Punic Malta is not likely to have exceeded 12,000 people but admits that 'the limited data available and the variables involved preclude realistic population estimates for Malta at this stage' (Sagona 2002: 279-280).

¹⁰ Neither Said-Zammit nor De Angelis explain how the family numbers and family-to-land ratios were reached.

At this point it is important to state that the methodology used in the next chapter to calculate the population of Roman Malta (see **chapter 4.4**) cannot be used for the Punico-Roman period because: a) we cannot be sure that Roman urban/rural ratios were similar to those for the early Punico-Roman period; and b) the boundary of the town of Melite during this period is not as clear as for later centuries.

3.7 Productivity and Consumption

Agricultural production during this period must have been focused on two primary objectives: a) satisfying at least part of the local dietary requirements and b) growing raw materials for contemporary industrial activity on the island. Literary texts from both Cicero and Diodorus Siculus shed significant light on what was produced on Melite in the last centuries BC (see below). On the other hand, archaeological evidence has often been overlooked, leading to an over-reliance on written sources. There has been a renewed interest in the use of the various ancient silo pits/vats that are located in Malta, especially those situated at Birżebbuga between Wied Dalam and San Ġorġ (**Figure 3.14**). In her article, Sagona argues that these structures were used for the dyeing of textiles based on the exploitation of the marine shells *Murex brandaris* and *Murex trunculus*. She argues that these were vats and that they pre-date the Bronze Age because they are situated outside the fortified settlement of Borġ in-Nadur. This leads her to conclude that there was an established textile dyeing industry that predated the arrival of the Phoenicians and was in turn exploited by the latter (Sagona 1999: 53). If this were the case then the textile industry in Punico-Roman Melite would have been a long-established tradition. However, there are some difficulties with this theory. Firstly, only a few *Murex* shells have ever been found (at Tas-Silġ and various burial sites) and none in an industrial context. Secondly, large shell middens that could be associated with intense industrial use are missing from the archaeological record.

On the basis of unfavourable soil and climatic conditions Sagona also excludes the possibility that these vats could have ever been used for the retting of flax, which is an integral part of the fabrication of linen (Sagona 1999: 53). However, it is here that one can offer an alternative explanation as to the possible use of these and other vats in the area. In some areas within the Mediterranean, the production of

flax in antiquity was, as in Damietta and Tinnis, situated in and around deltas and floodplains where 'the deep soil, of sandy alluvium, always moist, is ideal for flax' (Horden and Purcell 2000: 363). Some of the innermost floodplains of Melite may have provided the right conditions for the cultivation of flax.

Another important factor that must be considered when discussing these areas of cultivation is the availability of fresh water from the lagoons for the retting process of the fibres. Place names and documents shed light on this practice in a variety of locations on Medieval Malta. During the Middle Ages, the cultivation and processing of flax on Malta was partly concentrated in areas somewhat similar to Birżebbuga such as Ghajn Selmet near Burmarrad and Misede, present day Msida. Wettinger suggests that 'with Malta's then very imperfect drainage system for storm water one can easily understand the existence in such places of stagnant water, especially at the head of the numerous ports, bays and inlets' (Wettinger 1982: 30). Given the incidence of progradation, the areas used for these purposes in ancient times would have been situated further inland. Also of interest is the medieval place name for an area between Marsaxlokk and Birżebbuga: San Gorg tal-Ghadir, which translates as St George of the [stagnant] pool. Wettinger describes this as a place 'where there was a fountain used for the retting of flax' (Wettinger 2000: 493). This particular place is found close to the above-mentioned vats, suggesting that, at least in the Middle Ages, the growth and retting of flax were indeed carried out in the area.

Other evidence supports the production of linen in the Punico-Roman period. Diodorus Siculus describes a group of the islands' inhabitants as 'skilled in every manner of craft, the most important being those who weave linen, which is remarkably sheer and soft' (v, 12, 1-4). It is reasonable to assume that at least part of the linen woven in local workshops was grown on the island. Cicero twice mentions Maltese textiles, firstly as part of the booty taken by Verres from the island (*Verrines* II, 2, 183) and subsequently in his description of how Verres used the islands' workshops to produce ladies' garments for his personal gain (*Verrines* II, 4, 103-104). These quasi-contemporary literary references to the production of fine textiles of the island, point to a widespread practice of this industrial activity during the Punico-Roman period.

Two Roman farms have so far been excavated on Malta: one at Ta' Kaccatura (Ashby 1915) and the other at Tas-Silġ (*MAIR*). Both these sites are built on top of earlier structures that seem to be related to some form of industrial production. That these sites were witness to human activity before their Romanisation can also be deduced from the ceramic deposits that were found in the pre-Roman layers at San Pawl Milqi (Bruno 1999: Table 41). Until recently these features have been somewhat of an enigma (**Figure 3.15**). They consist of a series of interconnected chambers that are rounded at the bottom. Given that the retting of flax consists of passing the fibres through a series of chambers/vats, it is not unreasonable to assume that these consisted of part of an industrial plant related to this process. Dyeing may also have been carried out in these chambers, but again no evidence of shell remains were discovered in either of the sites. However, it could well be that industrial waste was periodically cleared, especially prior to the adaptation of the site for different agricultural purposes. In the area surrounding the unexcavated Roman site in Bidnija, one finds ceramic sherds that are clearly Punic in date, indicating that this site was also used prior to being Romanised. On the basis of this information one can safely state that a number of agricultural sites datable to the Roman period were utilised before then.

At San Pawl Milqi, the 'Roman' building was built some time between the end of the second century and early first century BC (Locatelli 2001: 74). The various walls of the new structure were laid over the features described in the paragraph above, indicating that the new layout had been thought of with a new 'product' in mind, most probably olive oil (see section below on amphorae). The fortification of the site during this period is probably linked to ongoing hostilities with Carthage and the threat of sea-borne attacks.

Another example of the reutilisation of occupied spaces can be deduced from another site half a kilometre to the north of San Pawl Milqi that is situated on the edge of the Burmarrad harbour (Locatelli 2001). The exact extent of this site is unknown and difficult to establish due its partial destruction by recent development in the area. A series of channels and two silos (**Figure 3.16**) were excavated and these lay under later stratigraphic layers and architectural features that are clearly datable to the later Roman period (**Figure 3.17**). However, there are two earlier phases of occupation and

although accurate dates for these transitions remain unclear, this site was in use during the Punico-Roman period (Borg and Stroud 2003: 13). The nature of the features uncovered suggests that the channels and silos formed part of an industrial complex.

3.7.1 Staples

Given that not all the island was suitable for the cultivation of flax it is reasonable to assume that some of the land was used for the growing of staples. The latter would have been used for the feeding of the inhabitants whereas the textiles produced on the island provided a product for export. This situation is not dissimilar to that of the later Middle Ages when cotton was the cash crop for export and the island produced a variety of cereals for its own consumption. During the Middle Ages this balance could be kept as long as the island was self-sufficient in the production of cereals or was able to import an alternative supply. With a population of 10,000 and over, this was not achievable on Medieval Malta (see **chapter 7.6**). It remains to be seen whether during the Punico-Roman period the island and its inhabitants were able to enjoy both agricultural self-sufficiency as well as the benefits of cash crops.

Given that no clear population figures were arrived at in the previous section, the amount of grain needed to feed the population of Punico-Roman Malta is presented against a variety of figures. Garnsey estimates that, in the ancient world, an average of 547g of grain were consumed per person per day, or 200 kg per person per annum (Garnsey 1983: 118).

Estimated Population	Daily Consumption of cereals	Annual Consumption of cereals	Area of land needed for cultivation
5,000	2,735 kg	988 tonnes	156 sq. km
8,500	4,649 kg	1,697 tonnes	266 sq. km
12,000	6,564 kg	2,395 tonnes	378 sq. km

Table 3.1 The quantity of cereal needed (including land left fallow for two-field system) by the inhabitants of the island and the amount of land needed for its cultivation.

According to ancient sources, between 4 and 5 *modii* of wheat could be produced per *iugerum* of land (approximately 30kg per 2644 square metres)

(Humphrey et al 1998: 103). Therefore, the area of land needed to cultivate sufficient quantities of wheat for a maximum population of 12,000 would have been of 189 sq. km. Even if one assumes that 70 per cent of Malta's total land surface (172.2 sq. km) was available for agriculture, this would mean that Malta's agricultural land would not have been sufficient to satisfy the annual demand of such a large population. Also, if one considers a two-year field system, whereby land would be left fallow for a year after harvest (Percival 1976: 107-108), this would double the amount of land needed to produce such quantities (344.4 sq. km). This figure is not even attainable if all the land surface of the Maltese Islands were dedicated to the growing of cereals.

Such a calculation leads to various potential conclusions:

- a) That the population was significantly less than 12,000: there is no evidence to the contrary and must therefore be considered as a possibility. However, even with a population of 5,000 persons, at least 90 per cent of Malta's land (see **table 3.1**) would have had to be dedicated to the growing of staples. This leads to point B. Despite this, Mediterranean islands are known for supporting higher and denser populations than their so-called 'carrying capacity' (Horden and Purcell 2000: 381).
- b) No cash crops were grown in order to dedicate all available land to growing staples so as to sustain the inhabitants: the archaeology from the excavated farmsteads, however, together with references to textiles from the ancient written sources indicate that cash crops were indeed grown and worked. This partly dispels the notion that the entire island's land was given up to the cultivation of grains.
- c) Some essential crops such as grains were imported: it is possible that some of Melite's grain was imported from elsewhere. This hypothesis is especially supported by the influx of other imported foodstuffs such as wine and olive oil from elsewhere in the central Mediterranean (see **section 3.9.2 - table 3.2**). The evidence for importation of foodstuffs increases the notion of a small island like Malta sustaining a large population.

3.7.2 Amphorae

Amphorae provide evidence for both economic activity and maritime exchange. A discussion on local amphora production will help shed light on economic activity on Malta as well as on maritime exchange with places overseas. However, one encounters a number of difficulties in the study of local amphora production including: a) a complete lack of kilns in the archaeological record; b) the limited resources of fuel for the firing of the kilns; and c) the identification of a local amphora type.

The lack of kilns in the archaeological record of Malta is a problem that has been so far overlooked and to date, no kilns have been recorded in Malta. Various reasons come to mind: a) they have been destroyed by construction works; b) they have been discovered but wrongly recorded (as tombs for example); and c) intensive field terracing may have destroyed kilns associated with rural settlements.

The absence of industrial waste from kilns, usually consisting of large quantities of ceramic fragments, is easier to explain. One possibility may have been a waterproofing technique that was used locally throughout the early modern period up until the mid-twentieth century known locally as *deffun*. This technique requires the breaking up of ceramics into a powdery substance that is subsequently used in the 'concrete' mix for the waterproofing of roofs. It is quite clear that ancient ceramics were preferred over more recent types: "Broken potsherds, ancient if possible, but modern in default of better, are used for making roofs [...] the makers of this type of concrete say that ancient sherds are much better than the modern" (Dudley Buxton and Hort 1921: 131). The main reason behind this preference is that the poor firing of ancient pottery contributed to the achievement of the desired consistency of the waterproof layer. The preference of ancient ceramics is also attested in the annual reports covering the discovery of antiquities on the Maltese Islands. For example, in 1931 a large deposit of ceramics was discovered on Comino: "heaps of potsherds of common Roman type, mostly fragments of amphorae and dishes were being collected to be pounded into dust known as *deffun*. As nothing peculiar could be observed in the sherds they were allowed to be destroyed" (MAR 1931-32: 4). Given that such a practice was being carried out on Comino goes to show how important such deposits

were to these persons who saw no problem in crossing to this small island in order to obtain this resource.

I believe that the above-mentioned building tradition goes a long way in explaining the absence of large deposits of ceramics that would be attributable to production on an industrial level. The fact that until relatively recently (1930s) workmen were being permitted to destroy large deposits leads one to believe that such a practice was widespread and that it had been in existence for some time. If people were willing to travel to Comino to obtain the resource, it would not be unreasonable to assume that rural areas throughout Malta would also have been considered. The point is that, should they have ever existed, some of the best sites for the ‘harvesting’ of this resource would have been the deposits of industrial waste created by ceramic production. Up until the 1950s people would walk across fields to collect ceramic pieces exposed by ploughing.

If kilns did exist on Malta, then what fuel was used to fire them? The answer to this question lies in the recently suggested “intrinsic link between agricultural practices and pottery production” (Smith 1998: 199). Residues from agricultural production, such as wood from annual pruning sessions, would have supplied some of the fuel needed to fire the kilns. This is especially true for the period after the introduction of the olive in Malta (see chapter seven). However, one must also consider the usage of firewood for other purposes such as cooking and heating. The collection of brushwood, leaves and twigs must have been an important activity that contributed to the provision of some fuel. Finally, one cannot exclude the possibility of some timber and firewood being shipped to Malta for domestic and industrial purposes.

The answer to the third problem suggested above (i.e. the identification of a local type) is slightly more problematic. The presence of badly fired amphorae in many Punico-Roman tombs¹¹ suggests the local production of these amphora types in styles that were similar to contemporary Punic types, specifically Mañá form B (Figure 3.18). Locally, this type of amphora continually evolved and remained in use

¹¹ Reuben Grima, Curator World Heritage Sites (Malta): Pers. comm.

and has also been found in later contexts (**Figures 3.19 and 3.20**) (Sagona 2002: 88-93). The diffusion of this type of Maltese amphora seems to be limited to a few sites in Sicily (Camarina and Marsala), Ibiza, Carthage and perhaps at Pantelleria (Bruno 1999: 103). The limited diffusion can be attributed to two factors: a) due to its similarity to other Punic forms the Maltese amphorae may not have been distinguished as a separate form; b) Given that the main agricultural product were textiles, it comes as no surprise that produce transported in amphorae, such as wine and/or oil, would have been secondary exports from the island during this period.

Amphorae of a wreck of uncertain date off the island of Gozo¹² (**Fig. 3.21**) have been interpreted as an export cargo that sank on its way out of the island (Bruno 1999: 103).¹³ This deepwater site has witnessed several shipwrecks whose dates span more than five centuries (Parker 1992: 453). Objects from the various wrecks are intermingled on the seabed and short reconnaissance surveys have been made using a submarine in 1993 (Bonanno 1995) and a remote operated vehicle in 2001 (Atauz 2002). There can be little doubt as to the similarity of the samples retrieved from Xlendi and the 'Maltese' type amphora. However, only the scientific identification of the fabric from the Xlendi amphorae will give a secure location of the clay's provenance (and hence the probable origin of the amphorae themselves).

Bruno has recently claimed the identification of a second 'Maltese' amphora type datable to this period (Bruno 1999: 104). The shape and size of this amphora is very similar to the 'Ancient Tripoli' type that was widespread throughout Libya in the second and first centuries BC and was used to transport oil (**Figure 3.22**) (Scialliano and Sibella 1991: 78). The type named Malta 1 by Bruno also bears some similarity to a type of amphora that was used in late Republican and early Imperial times for the transport of wine from Taormina (Wilson 1990: 263). This suggests that this local form was in line with forms being produced elsewhere in the central Mediterranean. Besides fragments from San Pawl Milqi, Bruno also studied three complete examples from the Xlendi site off Gozo (**Figure 3.23**). One of the conclusions reached is that

¹² Xlendi is a multiple wreck site off the neighbouring island of Gozo. Over the years, many objects have been retrieved from the seabed in ambit of numerous projects mainly aimed at artefact retrieval.

¹³ B. Bruno was, in the 1990s, a member of the Italian Archaeological Mission in Malta. For her doctoral thesis she studied the amphorae from the two sites excavated by this mission since the 1960s: 1) Tas-Silġ and 2) San Pawl Milqi. This pioneering work has provided important data for many facets of this thesis.

the fabric of the Malta 1 type is similar to that of other Punico-Maltese amphorae (Bruno 2004: 87). The production of this type of amphora during the latter part of the Punico-Roman period suggests the end of the older forms based on Punic types.

The Malta type 1 is significantly more numerous at San Pawl Milqi than it is at Tas-Silġ (49.4% and 5.5% of total amphorae for this period respectively) (Bruno 1999: 104). The presence of many more Malta 1 amphorae at San Pawl Milqi may be indicative that these were indeed local and were used for the transport of the goods produced at this site. Given the chronology of the Ancient Tripoli amphorae and the presence of local adaptations of this type found at the farmstead of San Pawl Milqi, it would seem that olive oil production may have seen its introduction during the late Punico-Roman period (olive oil production is discussed in chapter 7.6). Once again, the similarity of this amphora to other types, especially Ancient Tripoli and Dressel 26, may have led to the Maltese variations being overlooked on other sites in the Mediterranean. Such a situation would lead to a misconception as to how widespread the Maltese amphorae actually were.

3.8 The Harbours of Punico-Roman Malta

3.8.1 Approaches to Malta

The approach to Malta is essentially different from all four directions. The island of Gozo dominates the approach from the north-west. Ships approaching from the direction of Pantelleria would have sailed with the prevailing winds of the area behind them: by keeping the Monte Grande on the poop and the bow towards the rising sun, a pilot would have been able to set his course towards the Maltese Islands. Once out of sight of Pantelleria's mountain the ship would enter an 'open-sea' zone, out of sight of land for approximately 65 nautical miles, depending on visibility. The approach to the Maltese Islands is marked by the sighting of the high cliffs on the north-west coast of Gozo. The importance of this landfall in antiquity can be deduced from the presence of what is essentially a maritime sanctuary par excellence, the temple on Ras il-Wardija (Gambin 2002-03). If heading directly to Malta from the same direction, the best option is to keep Gozo to port and head through the channel

towards the eastern coast of Malta. Alternatively, if a ship were heading towards the southern harbours one would keep the western cliffs of Malta to port (**Figure 3.24**).

This latter route was also marked by another coastal sanctuary, this time at Ras ir-Raheb, which was probably 'a landfall and departure shrine, possibly with a beacon, connected with sea passages from and to Carthage. This is not perhaps so obvious from the site looking out over the sea, but sailing to and from Carthage would have been ideally placed both as a focus of a back bearing and landfall on arrival, being in an elevated position in the middle of a relatively small land mass' (de Bono 1997: 4) (**Figure 3.25**). A recent reassessment of Ptolemy's co-ordinates for a second sanctuary on Malta, based on the 'perception and conceptualisation of space in Antiquity and the Renaissance', points to them coinciding with Ras ir-Raheb (Vella 2002: 83). Furthermore, although the archaeology is somewhat fragmented, the votive figurines from the site strongly support the notion that this sanctuary was dedicated to Melqart/Hercules (Vella 2002: 90).

Ships sailing towards Malta from present-day Libya would have had to work hard against the prevailing winds and currents of the area. As already mentioned, the temple of Melqart/Hercules offered a vital landfall for vessels approaching Malta from the south. The sea on this side of the island is very deep and the 100-fathom contour is just 1.3 nautical miles off the coast. Thus, the sounding lead would have been rendered practically useless and mariners on board would have had to depend on their sight to navigate safely towards the island. Besides a prominent landfall, the sanctuary at Ras ir-Raheb would have also provided spiritual reassurance to those nearing the end of their journey.

Added to this, birds would also indicate that ships were approaching the cliff-lined coast of southern Malta. Cory Shearwaters nest on these cliffs and fly many miles out to sea, providing another sign to the pilot that one was nearing land. Upon arrival vessels in urgent need of anchoring could, unless a north-west wind was blowing, stop at the anchorage of Fomm ir-Riĥ Bay under the watchful eye of the sanctuary's deity. From here vessels could proceed on their journey elsewhere or to another harbour on the island.

The south-east approach is difficult for a variety of reasons. Firstly, any ships sailing westwards across the open sea from the eastern Mediterranean would more than likely be sailing into the prevailing wind and currents. Also, ships heading for Sicily and/or Italy would be pushed by these same winds and currents southwards towards the North African coast. To vessels pushed off course and not wishing to proceed any further south, Malta was therefore an important landfall and stopover where one could wait for better weather conditions before proceeding. Another difficulty lies in the fact that the south-east part of the island is its narrowest, so there was the added danger of missing the island altogether. An east-west journey across the Mediterranean entails the crossing of one of its largest tracts of open sea, therefore multiplying the importance of this landfall (**Figures 3.26 and 3.27**). It comes as no surprise that a large and important sanctuary originally dedicated to Astarte and subsequently to Juno, marked the first available harbour for vessels approaching from this direction. The sea on this approach is shallow enough for the effective use of the lead line, thus facilitating the process of navigation.

Ships sailing towards Malta from the north approached the island from one of its broadest and hence more visible stretches of coast. The northern approach to Malta is characterised by relatively shallow sea that could easily be navigated with the use of a sounding lead. In contrast to the high cliffs to the west, this is a low-lying coast, but hills in the background help make the island quite visible from far out at sea. On one of these hills sits the ancient town of Melite, which must have provided an important landfall for those approaching from this direction. This is attested in an early nineteenth century pilot book: 'the old city of Malta [Melite] is on a hill about two leagues within the city, which is seen before the new city [Valletta] when you come from the sea' (Serres 1801: 107). Distinctive natural features in the coastline marked out the various harbours and anchorages available along this coast. For example, the eastern entrance to San Giljan is recognisable by a distinct outcrop of yellow limestone. Additionally, from the open sea the island is often distinguished by the development of orographic cloud cover that gives a clear indication of land prior to it being visible (**Figure 3.28**).

3.8.2 The Harbours

The physical layout and topographic features of the Punico-Roman harbours could not have been very different to those available to the Carthaginians. The few pottery sherds contained within the deposits seem to indicate that the erosion of the surrounding landscape happened after the Punico-Roman and Roman periods. The difference in shape and layout of Malta's ancient harbours leads one to reconsider not just nautical aspects such as shelter from the elements, but also their broader maritime function. By this I mean how the surrounding communities made use of these bays and anchorages. One of the more obvious effects of the topographic layout of places like Burmarrad is that sites such as those at San Pawl Milqi and Bidnija must have been situated significantly closer to the sea. There can be little doubt that access to the sea played a pivotal role in the choice of these sites.

The importance attributed to the island by its Carthaginian rulers can be deduced from the large garrison left on Malta during the Second Punic War. One can only assume that the reason was the island's strategic position in the central Mediterranean. Livy described how Sempronius sailed to the island looking for the Carthaginian fleet, implying that Malta would have been an obvious and known place to look. The Roman fleet spent a few days in Malta (*The War with Hannibal* XXI: 51), **suggesting** that the islands' harbours were capable of sheltering and catering for sizeable naval fleets. Malta's harbours were indeed large enough to accommodate large numbers of vessels; naval fleets would have used the harbour located in the inner Marsa area, for instance, as it offered all weather/season protection and was secure from any surprise sea-borne attack.

Large structures on the Kortin promontory were discovered in 1766-1768 (Barbaro 1794). The finds consisted of rows of rectangular chambers, opening on vaulted corridors that were described as warehouses similar to those at Ostia (Ashby 1915: 28-29). Although possibly built over earlier structures, the buildings as discovered in the eighteenth century are more likely datable to the Roman period and are discussed in more detail in the next chapter (see **chapter 4.6.3**). Numerous tombs were discovered over the last two centuries but except for a later burial complex, none of the smaller ones are datable. This is due to a lack of information on the typology of

the tombs and any objects contained within them (Sagona 2002: 847-50). Various other large structures were discovered at Marsa between the 1930s and 1950s (MAR 1946-47: 3; 1955-56: 7; 1959-60: 5). These were situated further inland on what would have been the coast of the inner harbour at Marsa. Associated small finds included large amounts of ceramics, some glass and a few coins. Coins from one of the buildings range in date from the 4th and 3rd century BC to the 10th century AD (MAR 1955-56: 8). Unfortunately, no other details for these objects are available but the presence of early coins suggests that the harbour complex at Marsa was already developed during the Punico-Maltese period. To precisely what degree, is a matter of conjecture. All harbour structures are discussed in more detail in chapter seven.

Everyday life of the main Punico-Roman settlements in the areas of Qormi and Marsa must have been intricately linked to the maritime activity of this large harbour. Other than serving as a port, Marsa's importance must also be seen in the light of various other communities that settled in the area, such as those at Hamrun and Luqa. It also served the rural communities that worked its fertile hinterland. For example, an excavation carried out in 1888 at Tad-Dawl near Luqa, brought to light various remains including a large cistern and objects related to agricultural production (Caruana 1888). The architectural features of the cistern are similar to those found at Ta' Kaccatura suggesting a Punic or Punico-Roman date for this site.

There is no direct evidence for how the other creeks within the Grand Harbour complex were utilised during the Punico-Roman period. However, indirect evidence may help shed light on some of their functions. Those situated away from settlements, such as Rinella and Kalkara, for example, may have served as anchorages. It would have been convenient for vessels in need of temporary shelter to use these creeks and avoid sailing all the way into the Marsa. On the other hand, the settlement situated at Paola may have made use of French Creek and the Little Marsa. The inhabitants enjoyed a commanding view over both of these creeks as well as quick and easy access. Although construction of modern dry docks in the late nineteenth century changed the landscape beyond recognition, an early photograph does provide a clear idea of what the area was like (Figure 3.29). Whereas larger vessels could have been moored safely in the middle of the bay, a small sandy beach would have provided the ideal place to beach smaller boats. What cannot be determined on the evidence that is

presently available is whether this community was involved in a specific maritime activity such as fishing. The Paola settlement would also have enjoyed access to a second port at Marsa that was separate from the large inner harbour. This harbour consists of a small but well protected creek to the east of the main harbour at Marsa.

Evidence for the use of the Marsamxett complex during the Punico-Roman period is fragmented; nevertheless one can piece together a picture of the maritime activity in this area. As has already been discussed, some of the creeks within this harbour complex served as outlets to the sea for those inhabiting the areas around St Julian's, Msida and San Gwann. For the latter, a recent investigation of a site in use between the third and first centuries BC brought to light a series of inter-connected, shallow rock-cut basins. The excavator concluded, 'the nature of these features leaves no doubt as to the productive and non-domestic nature of this site. However, the exact nature of the productive activity (or activities) carried out at this site is still unclear' (Cutajar 2000: 4). Also present in this area are the remains of a tower with a cistern datable to the Punico-Roman period (De Gaetano 2002: 29). From such a dominant position in the landscape people on the tower would have had a commanding view of both the landscape as well as the harbours below (see Figure 3.9).

Archaeological evidence from an underwater context also points to the use of this harbour complex during the period under discussion. Despite extensive dredging that was carried out in the area during the early twentieth century (Figure 3.30) ancient remains are still being brought to light. During an archaeological survey carried out in 2000 by the Institute of Nautical Archaeology, the neck of a Lamboglia 2 amphora was retrieved from the seabed of Lazaretto Creek, together with the base of another ceramic container (Atauz and McManamon 2001) (Figures 3.31 and 3.32). The context of these finds needs to be seen in the light of both human and geomorphologic activities witnessed by this bay. In all probability, modern processes such as an anchor ploughing the seabed disturbed these finds and contributed to their recent exposure. Other ceramics that can be datable to this period are often found by divers who work in areas of the seabed that are located close to the quay on the south coast of Manoel Island. Ceramics are inadvertently found after modern pleasure craft disturb the seabed with their prop wash. The lack of excessive marine growth on these

sherds points to a lack of sunlight and indicates that these were covered up relatively quickly by sediment deposits.

Another of the important harbours of the Punico-Roman phase was that of **Marsaxlokk**. Cicero describes the temple overlooking this bay as one that was universally respected and contained substantial riches (*Verrines*: II, 4, 103-104). In the same passage, the author also recounts how various enemy fleets participating in the Punic wars never looted the site and neither did pirates who allegedly used to winter in the harbour. A degree of caution is called for, however, since it has recently been suggested, that the 'non-action' of visiting fleets was exaggerated so as to show Verres in an even more negative light. This may also been done to illustrate the contrast between what Verres should have done, 'as a Roman magistrate' and what he actually did with regard to piracy and piratical acts (de Souza 1999: 153-154).

What is certain is that **Marsaxlokk is not an all-weather harbour**. Although sheltered from the prevailing winter gales from the north-east it is particularly vulnerable to winds from the south-east. Today, despite a massive breakwater across the mouth of the Marsaxlokk harbour complex, the rough seas caused by a strong south-easterly wind make mooring in the open bay impossible. For this reason a small 'enclosed' harbour refuge was built for fishermen in the late 1950s. This harbour was excavated from old fishponds datable to the eighteenth century. These ponds are built in the inner-reaches of Marsaxlokk Bay just under the sanctuary of Tas-Silġ. A local fisherman recently informed me that after severe storms, large stones underlying the smaller and more recent masonry of the fishponds are sometimes exposed just off the present day shoreline.¹⁴ The same aerial photograph from 1957 clearly shows a long dark feature running parallel to the modern coastline (**Figure 3.33**). This position is ideal for a breakwater to protect vessels from adverse weather conditions although **at this stage one cannot ascertain whether a manmade structure once existed**.

Whatever the diverse opinions that emerge from the interpretation of literary sources, the archaeological record from the Punico-Roman period at the sanctuary of Tas-Silġ points to changes in the architectural make-up of the building (Bruno 1999:

¹⁴ Since obtaining this information in October 2004 there have been no severe storms from the south-east and therefore I have not had the opportunity to see the stones.

78). There can be no doubt that from a maritime perspective this place of worship must have played an important role as a navigational aid. Any vessel entering Marsaxlokk bay could have used the temple, perched as it was on a hill just above the main harbour of this complex, as a waypoint (Figure 3.34). Although no hard evidence exists, one cannot exclude the possible presence of a sacred fire that would have guided vessels by night. In the ancient Mediterranean, the offering of sacrifices and/or sacred objects in a maritime context was commonplace (Kapitän 1985). It would not be unreasonable to assume that offerings were made at Marsaxlokk in thanksgiving for a completed safe journey or in supplication for one about to be undertaken. However, the evolution of the seabed in this bay through sediment deposition, the growth of *Posidonia* meadows and intense dredging in some areas precludes one from sustaining such arguments with physical evidence.

At the south-west entrance of the bay, precisely on the promontory of **Benghisa**, were 'the remains of another wall in good *opus quadratum*, 26 feet long, of which only two courses are preserved, attributed by Mayr to a **tower or bastion**' (Ashby 1915: 51). As these remains no longer exist one can only speculate on the use and function of this site. The remains were located on a site presently occupied by a nineteenth century fort that dominates the south-west entrance to Marsaxlokk (Figure 3.35). This structure may have been a look-out tower that, in the context of the ongoing Punic Wars, dominated the entrance to Marsaxlokk. It may also have been used as a signalling station and/or a lighthouse indicating the entrance to this important harbour. Such structures were common at places that were considered of navigational importance to the Carthaginians (Medas 2000: 19). Given the allegedly peaceful takeover of Malta by the Romans in 218 BC and the continued use of the Marsaxlokk harbour complex in the Punico-Roman period, it would seem that such a structure would have been reutilised by the newly established rulers.

The importance of Burmarrad can be viewed from a variety of perspectives. Firstly, the all-weather/season protection that this harbour provided would have made it one of the more attractive harbours for both short- and long-term anchoring. Secondly, the **harbour of Burmarrad** would have served the large farms that were situated in the surrounding landscape: products from San Pawl Milqi, Bidnija and Wardija would all have been exported directly from this harbour. The opposite is also

true: any supplies that may have been required by the operators of these farms must have been unloaded directly from visiting ships. Amphora studies from **San Pawl Milqi** indicate that during the Punico-Roman period the occupants of this site consumed a variety of imported goods, especially wine (Bruno 1999: Tables 42 and 43). The mortar from the Republican phase of construction at San Pawl Milqi contains black particles that are of volcanic origin.¹⁵ The volcanic dust was imported from Sicily and would have reached the island as ballast or as cargo in its own right.

In addition to the main harbours mentioned above, the anchorages around the coast would have served various settlements and farmsteads of the island. Places like Mistra, Marsascala, Birżebbuga, and Mellieha amongst others, would have provided excellent offering points of contact, sheltered places for small vessels to anchor and trade with local inhabitants. Moreover, the inner-reaches of bays like Mistra and Marsascala would have offered the opportunity for vessels to winter, either in or out of the water. Ceramic deposits and the identification of Mistra as a potential ancient anchorage were mentioned in the report of a survey carried out in 1989: '**Mistra Bay has obviously been a small anchorage over a long period of time [and] the presence of an abundant amount of pottery is not surprising**' (Special Archaeological Systems 1990: 25) The recent installation of a fish farm in the bay disturbed the *Posidonia* meadows and the archaeological deposits within and numerous ceramic sherds of various dates are periodically washed onto the shore, probably part of an accumulated harbour deposit.

Therefore, for small-scale unofficial trade it would not be unreasonable to assume that the various settlements and farmsteads enjoyed the use of satellite harbours from where they could enjoy a two-way interaction with the sea. Locals may have fished out of these bays. Roman mosaics from North Africa illustrate men on small boats fishing for a variety of fish that also inhabit the seas around Malta (**Figure 3.36**). On the other hand, the bays also offered opportunities to passing ships to anchor and wait for a favourable wind and/or to trade with the local communities. Besides shelter, the availability of fresh water at many of the anchorages must have acted as another attraction for passing ships.

¹⁵ D. Locatelli pers com. Tests have confirmed the volcanic origins of these inclusions. Their study forms part of Mr. Locatelli's ongoing doctoral thesis on the archaeology of San Pawl Milqi.

3.9 Connectivity

3.9.1 Mediterranean Trade in the Last Two Centuries BC

To grasp Melite's role in the shipping routes of this newly established 'world order', it is essential to discuss the role of the Italian peninsula in the supply of goods to the recently conquered provinces (Parker 1992: 8). Initially it was the Romans who were the main exporters of goods. The wreck of the Madrague de Giens provides an example of Italian exports, mainly wine, going in the direction of Gaul. Wine, oil and other items, such as pottery from Campania, were travelling out of Italy during this period. Other products, especially grain for the expanding capital, moved in the opposite direction (Rickman 2003: 136). The rapid growth of the Roman Empire brought about by the Second and Third Punic Wars and the expansion into Gaul and Spain brought about an increase in shipping that is reflected in the archaeological record. A graph illustrating the total number of Roman shipwrecks discovered to date clearly highlights a marked increase of wrecks during the period in question (**Figure 3.37**). One may argue that not all sites have yet been discovered. This is true for certain areas in the Mediterranean, especially in North Africa, where underwater research has yet to fully develop. On the other hand I believe that there can be no doubt that Parker's graph helps illustrate the upsurge of pan-Mediterranean shipping brought about by the expansion of the Roman Empire.

In the light of the above-mentioned increase in shipping, it is interesting to note that for the first time the Mediterranean was becoming increasingly less fragmented. Victory in the Punic Wars brought about a form of unity in the central Mediterranean that had previously been divided between the Greeks and the Carthaginians. Although Romanisation was gradual and occurring at different rates throughout the new provinces, the notion of *Mare Nostrum* was formulated during this period (Rickman 1996: 1). On a smaller scale, the successful campaigns of Pompey in the last century BC against various pirate bases in the Mediterranean helped transform the open sea into a safer place, thus helping to give impetus to widespread commercial maritime activity (de Souza 1999: 128-178).

When studying the main maritime functions of Malta during this period, one must consider this new political and economic order. By 74 BC the situation was such that the island now found itself strategically placed between major provinces of the Roman Empire, provinces with thriving urban centres that were to become increasingly economically interdependent (Fulford 1987). These provenances included Cyrenaica, Tripolitania and Africa Proconsularis to the south and Sicily to the north.

Ceramic evidence from various locations in North Africa points to goods from the northern Mediterranean making their way south. The Lamboglia 2 type amphora was used to transport olive oil and perhaps wine and garum from the Adriatic to various parts of the Mediterranean, including Carthage (Peacock and Williams 1986: 100). Other Italian amphorae from this period, including Dressel 1 and Dressel 2-4, are present in the archaeological record of Carthage (Fulford and Peacock 1994: 43). Further evidence for Italian exports, this time amphorae containing Falernian wine, may be gleaned from various *tituli picti* on amphora sherds from Byrsa in Carthage (Panella 1980: 255). Increasing Roman influence in North Africa is not only reflected in the imports but also in more permanent features such as the early phases of the post-Punic harbour side buildings in Carthage (Hurst and Gibson 1994: 55).

3.9.2 Melite’s Imports

Studies on amphorae from the Punico-Roman period discovered at the sites of San Pawl Milqi and Tas-Silġ suggest a gradual decrease in imports from North Africa offset by an increase of goods manufactured and produced in the northern Mediterranean, especially the Adriatic and Tyrrhenian areas:

Date	Number of samples studied	North Africa	Adriatic	Spain	Graeco-Eastern Mediterranean	Sicily & Southern Italy	Tyrrhenian
400-250BC	<u>111</u> 75:36	39.6%	0%	1.4%	21.5%	36.2%	1.4%
250-100BC	<u>106</u> 85:21	34.3%	0%	0%	1.2%	0%	64.5%
100-1BC	<u>1092</u> 1013:79	5.9%	45.6%	0%	0%	0%	48.5%

Table 3.2 Values given as percentages of amphorae studied from Tas-Silġ and San Pawl Milqi. Ratio illustrates quantities of samples from both sites (after Bruno 1999).

This evidence is also substantiated by amphora finds from other sites on Malta. One extraordinary find came to light during the excavation of a Roman domus in Saqqajja Square, Rabat. The foundation layer contained a large number of amphorae placed there for protection against rising damp and humidity. The majority of these were Dressel 1 and are datable to the first century BC (MAR 1965) (Fig. 3.38). Such a discovery reflects a degree of consumption that permitted the use of discarded amphorae for construction purposes.

Despite this shift towards the importation of Italian goods, one must refrain from the over-simplification of drawing a direct line between areas of production and consumption. Alternative routes for the origins of goods must not be overlooked. In Malta's case, one may consider the island's geographical position in relation to vessels sailing from Italy to North Africa and back. Merchants at various ports en route would have been able to take advantage of passing ships to exchange goods.

3.9.3 Transhipment in the Ancient Mediterranean

In his seminal work on cabotage and redistribution in antiquity, Nieto (1997) bases his work on both epigraphic and archaeological evidence. He argues in favour of ports that served to tranship goods from a broader area of economic activity to a major port in another. Subsequently, the goods would be transhipped to various secondary ports, harbours and anchorages (Figure 3.39). Within a theoretical pattern such as that proposed by Nieto, an island like Malta, with a small population and a relatively low consumption, was ideally located to receive goods transhipped at some of the main harbours in Sicily (see below).

The process of redistribution in the Mediterranean was not a Roman invention but had been going on for many centuries. It has been shown that millstones from the mid-fourth century BC wreck at El Sec off the Balearics originated from a number of places, including Sardinia, Pantelleria and Nisyros in the Aegean. Rather than sailing to each of these areas, it is far more plausible that the millstones on board this vessel were purchased by merchants from a central dealer (Parker 1996: 99). The wreck, of Punta Braccetto (late fifth century BC) off the southern coast of Sicily, was found to have a mixed cargo that included amphorae from no less than six places of origin. The

majority of amphorae were from Corinth, although others were from North Africa, Etruria, Lesbos and Marseille. The geographical range of the various amphorae strongly suggests that these were not picked up from the original place of manufacture (Di Stefano 1993-94: 119).

3.9.4 Malta and the Central Mediterranean

It would be interesting to note what role, if any, Malta played in the transshipment of goods during the Punico-Roman period. Basing her study on the large amounts and varieties of imported amphorae, Bruno suggests that the sanctuary at Tas-Silġ could have taken on a role as a centre of exchange for the *negotiatores* of the southern areas of Malta (Bruno 1999: 78-79). Cicero's description of the temple of Juno as richly decorated and well known implies that some profits from commercial activities in the area were finding their way back to the sanctuary (*Verrines* II, 4: 103-104). However, the exact nature of these activities remains elusive.

Archaeological evidence points to a degree of exchange between Italy and North Africa during this period. Let us take trade between Italy and North Africa as an example. During this period, products from the eastern part of the Italian peninsula were making their way to North Africa. For example, Lamboglia 2 amphorae are present in the archaeological record of Carthage (Peacock and Williams 1986: 100). Likewise, contemporary North African amphorae, such as the Mañá type C from Tunisia, were making their way to Italy. A map indicating the location of wrecks with Punic amphora cargoes points to a shipping route that passed via the western coast of Sicily (Jurisic 2000: 103).

In Malta, both Lamboglia 2 and Mañá C amphorae are relatively well represented and are found in both terrestrial and underwater contexts. There are two possibilities of how Malta could have fitted into this exchange of goods in the central Mediterranean. Firstly, cargoes could have been received directly from the areas of production with vessels using the island as a stopover. Vessels could stop to seek shelter from adverse weather conditions and/or to trade with the local inhabitants. Alternatively, Malta could have received goods that were transhipped in Sicily and sent to Malta and probably even beyond (**Figure 3.40**). There is absolutely no way of

knowing whether this shipping was in the hands of Maltese *navicularii*. As shall be seen in the following section, it is however possible to build a picture of the degree of contact extant between Malta and Sicily.

3.9.5 The Malta-Sicily Connection

As has been discussed, there was increased interaction between Malta and Sicily during the Punico-Roman period that brought about cultural and economic influences. These are reflected in the bilingualism, coins and economic ties that developed during this period. The increased connectivity between the two islands can also be deduced from a passage in Cicero's *Verrines* (II, 4, 36-42). In this passage the author accuses Verres of trying to get his hands on two silver cups that were the work of Mentor's, a renowned silversmith. These belonged to a certain Diodorus of Malta (*Melitensis Diodorus*), who had left the island to settle in Lilybeum. Upon being informed by Diodorus that the cups were still in Malta, Verres sent his men to retrieve them. In the meantime, Diodorus wrote to his contacts on Malta instructing them that, when questioned, they should inform Verres' men that the cups had been sent to Lilybeum a few days earlier. The passage is interesting as it sheds light on a number of details. Firstly, that a noble person like Melitensis Diodorus once resided on Malta suggests that the island was not considered as some backwater. The fashionable cups mentioned in the passage also point to the fact that Malta was not bypassed when it came to contemporary fashion and tastes in luxurious items. Of interest is the ease with which both Verres and Diodorus were able to send people and/or letters between Sicily and Malta, indicating the existence of regular crossings between the two islands. The passage also sheds light on the existence of contact networks.

The close relationship with Sicily highlighted above can also be considered from a geographic perspective. Malta, situated just over 90 kilometres away from Capo Passero, may be considered as an offshore harbour for Sicily. A voyage from a city such as Syracuse to Malta must have been perceived as no more perilous than a voyage to any other Sicilian port.

Given the large quantities of cereals exported by Sicily during this period (Wilson 1990: 189), it would come as no surprise if the inhabitants of Malta

occasionally imported Sicilian grain. Droughts continue to be common occurrences in the Mediterranean (Grove and Rackham 2001; 126), resulting in bad harvests; in Greece, for example, these tend to occur in two out of every seventeen years (Fulford 1987: 58).¹⁶ In ancient times, as today, large centres of consumption or areas affected by bad harvests would have had to rely on imported grain in order to survive. Coastal cities were particularly advantaged over areas situated inland; their proximity to the sea facilitated both the importation of whatever foodstuffs they required as well as the export of any surplus and manufactured goods (Fulford 1987: 58). Because of its position in relation to one of the largest exporters of cereals in the area, it could well be that Malta imported at least some of its grain requirements from Sicily.

The connectivity during of the two islands is also reflected in the transportation of building materials from Sicily to Malta. During the late Punico-Roman period, volcanic dust was exported to Malta and was used in the construction of buildings such as the farmstead at San Pawl Milqi. Whether this was a regular occurrence or a one-off shipment is difficult to establish because fabric studies on building materials of various other Roman structural remains have yet to be concluded.

3.10 Concluding Remarks

Given the increase in maritime traffic and the growing links between the new provinces, the navigational role of Malta must also be considered. Ancient navigators more often than not considered islands that were situated along open-sea crossings important enough 'to merit a detour in order to rest, shelter and replenish supplies' (Morton 2001: 178). Moreover, ancient mariners broke down sea journeys into stretches that coincided with a series of landfalls that may have consisted of headlands and/or islands along the route. Distances between these topographical features would have been engrained in the memory of the experienced pilot (Morton 2001: 180). This navigational technique is highlighted in the works of ancient geographers, such as Strabo's *Geography*, where many of the sailing distances are measured between

¹⁶ In Malta, periods of 30 days without rain occur every summer. However, since 1975 Joe Meilak, one of Malta's leading weather enthusiasts, has kept private records and has noted one period of 180 days without rain, one severe drought in 29 years. I thank Joe Meilak for this information.

prominent topographic features (Arnaud 1998). Malta could well have been used as a stop-over and/or waypoint for north-south journeys between the coasts of north Africa and Sicily.

The navigational importance of Malta was also reflected in the 'cultic topography' of the island during the Punico-Roman period. As has already been discussed, maritime sanctuaries that served both the practical and spiritual needs for those at sea marked the main approaches to the island. Horden and Purcell state that some 'sanctuaries of the protectors of seafarers might be situated with apparent perversity not in the centres of communication or the indispensable landfalls of the island-hopper, but in places famed for being hard to reach and unimportant to communications' (Horden and Purcell 2000: 442). Although Malta seems to have been important to communications, it was, as we have seen, hard to reach, especially from certain approaches and in certain sailing conditions. It is also true that Malta is situated out in the open sea and should it be missed, a ship may find it difficult to proceed with its intended journey. It is therefore in this light that the coastal/maritime sanctuaries of the island (discussed in 6.7.1) have to be observed.

The maritime role of Malta during this period is neatly summed up by Diodorus Siculus in his account: 'three islands lie out to sea, and each of them possesses a city and harbours which can offer safety to ships which are in stress of weather. The first one is that called Melite which lies around 800 *stades* from Syracuse, and it possesses many harbours which offer exceptional advantages' (V.12.2-3). The passage goes on to mention the way in which the inhabitants took advantage of visiting merchants to better their standard of living. Some of the points highlighted by Diodorus are confirmed in the archaeology. The environmental samples from Burmarrad confirmed that in ancient times the island did indeed possess a large number of harbours that were well sheltered. Moreover, the limited but highly indicative ceramic deposits originating from the seabed confirm that ships made good use of these harbours. The distance given from Syracuse confirms the close links that Malta enjoyed with this city during the Punico-Roman period, a link confirmed by the bilingual (Greek-Punic) culture that existed on the island.

Chapter IV

The Maritime Landscapes of Roman Malta

(circa 50BC to circa 550AD)

4.1 Introduction

The chronological limits chosen for this chapter are framed between two important phases of the island's history. As has already been discussed in the previous chapter, during the first century BC the island and its inhabitants had retained varying degrees of Punic culture but at the same time the archaeology reflects an increased 'Romanisation' of the island and its inhabitants. Following a prolonged period of relative stability, the island passed, together with the rest of the western Mediterranean, through a phase of upheaval in late antiquity (Cameron 1993: 33-56 passim). The conquest of the Maltese Islands by the Byzantines in the mid-sixth century AD provides a convenient date to mark the end of antiquity and the start of the medieval period. The extent of the changes brought about by this transition will be discussed in **chapter 5**.

During the early part of this period the political situation on Malta also evolved. In the latter part of the first century BC, Malta still formed part of the province of Sicily whereas a later imperial inscription "records one Chrestion, *Aug(usti)*, *Lib(ertus)*, *proc(urator) insularum Melit. Et Gaul.* who restored a temple to

Proserpine” (Ashby 1915: 26). While this inscription points to the presence of a governor on the island, the precise dynamics of the island’s administration and when it was introduced are not known. The evolving relationship with Sicily and the North African coast, together with the changing political and economic climate within the Mediterranean would have an effect on a variety of aspects including settlement patterns, agricultural production and Malta’s role in the connectivity of the central Mediterranean. This chapter will cover the changes that occurred in the various recurring topics that were discussed in the chapter six.

4.2 Settlement Patterns in the Roman Period

At a glance it would seem that the core patterns of human settlement on the Maltese Islands did not change dramatically during the period in question. The main town remained that of Melite, safely situated on high land in the centre of the island. During the first century BC at least some of the houses within the town were either newly constructed or rebuilt in a Roman style. The so-called Roman *domus* in present day Rabat contains mosaics that have strong similarities to those found in Pompeii and have been dated to the first century BC (Caselli 2002: 68). This exceptional example of a Roman *domus* was by no means the only fine building to have existed in the town. Over the centuries a series of mosaics, statues and marble columns have been discovered around Mdina and Rabat. Unfortunately, the exact location of these finds was hardly ever recorded and many important pieces have either been destroyed, reutilised or are located in private collections (Buhagiar and Fiorini 1996: 14).

However, too little is known about the urban fabric of Roman Melite to attempt a comprehensive study of the changes that occurred in the town between the Punic and Roman periods. Material remains suggest that cosmetic changes were gradually introduced in reutilised buildings. The reuse of domestic spaces in Malta was not an uncommon feature throughout the various periods of the island’s history. Continued use of the area in and around Rabat and Mdina up until the modern era makes it difficult to study precisely how the ancient city of Melite evolved. Recent excavations in Mdina have confirmed the difficulty of interpreting the numerous phases of occupation of this site (Cutajar 2001a: 81-82). With regard to the size of the city during the period under discussion there is indirect evidence that gives some

indication as to its extent. Given that Roman burials mainly occurred outside city walls, the numerous catacombs in Rabat provide an indication of Melite's delineation to the south-west. To the north the limits of the ancient city are marked by walls of present day Mdina,¹⁷ whereas to the south-east and east the natural topography seems to have provided the boundaries for these sides of the city: over the years, various discoveries around Rabat have brought to light ancient fortifications that adhere to the ridge surrounding the town on this side (Buhagiar and Fiorini 1996: 8-9). The plotting of these and other archaeological features and remains indicates the extent of the ancient town (**Figure 4.1**).

Around the main harbour at Marsa, the location of the surviving tombs shed light on possible changes in settlement pattern, although such a hypothesis cannot be corroborated through the study of the settlements themselves as these have long been destroyed by urban development in the area. The latest tombs around the Ghajn Dwieli area date to circa 100 BC (Sagona 2002: 906-909), offering a possible date for the abandonment of this site. On the other hand, the site slightly further up the hill at Paola has at least two tombs that date to the period 100 BC to 50 AD (Sagona 2002: 904-905), pointing to some degree of continuity of use for this site up until and during the Roman period.

The settlement situated under the present day town of Marsa seems to have remained relatively unchanged from the Punico-Roman period until the first century AD. The tombs recorded in this area date from circa 500 BC to 50 AD and perhaps also slightly later. A large Roman burial complex was discovered in 1874 on the side of Jesuit's Hill and is datable to the second and third centuries AD. The presence of such catacombs confirms the continued occupation of a site in close proximity to the Marsa Harbour (**Figure 4.2**) (MTUSG September 1874). In Qormi, only one burial from this period has been recorded (circa 100BC-50AD), pointing to a probable abandonment of the third harbour settlement.

Other settlements across the island continued to flourish throughout the Roman period. Although the locations of some of these seem to have remained largely

¹⁷ The present-day walls were built between the 16th and 18th centuries and follow the natural contours of the plateau. The topography of the area provides a natural delineation for the town in this direction.

unchanged, certain variations can be detected. The main body of evidence is from tombs and their contents. Numerous tombs around Bingemma of Punic and Punico-Roman date, with evidence for reuse in the Roman period, attest a large settlement at this site during this time. Confirmation of this can be deduced from Roman pottery found in some of the undisturbed tombs discovered in the late eighteenth and early twentieth centuries, which were cut in an earlier Punic style (Sagona 2002: 764-776).

Contemporarily, an interesting development takes place around one of the other main harbours of the island, that of Burmarrad. Whereas the inhabitants of the Punic-Roman period seemed to have chosen the hills of Wardija and Bidnija for the location of their settlements, burials from later periods (circa first to third centuries AD) indicate some form of site migration away from the hills and down towards the bay itself. This is not dissimilar, albeit smaller in scale, to what was happening in various parts of Sicily during the centuries that followed the Roman conquest of this island (Wilson 1990: 155). Evidence of this shift comes in the form of hypogea that are found on the north-east side of Burmarrad bay. The first was initially reported in 1772 and subsequently excavated in the 1930s (Grima 2000: 59), with the first comprehensive survey published some 50 years later (Buhagiar 1984). These tombs are commonly referred to as the Salina Hypogea (**Figure 4.3**). Due to the disturbances of this site, chronology sequences for the pottery lifted from the site were deemed ‘dubious’ “but the bone deposits in Hypogeum ‘2’ and in the 1721 tomb suggest an early phase and a subsequent utilisation as ossuaries [sic]” (Buhagiar 1984: 12).

The second site was recently re-discovered during one of my field walking sessions. Graffiti close to its entrance (**Figure 4.4**) give an indication of when this site was partly destroyed, probably at a time when the area was quarried for soft limestone. I have found no official record of this site and no published references have so far come to light. Before its partial destruction, this site would have consisted of a medium-sized catacomb complex with a series of chambers, each containing a varying number of tombs (**Figure 4.5**). Details from the best-preserved tomb indicate that the site was modified and reutilised. New tombs were excavated into decorative arch-like features of the east-facing wall (**Figure 4.6**). To the best of my knowledge, no pottery has been recovered from this site but it seems that the earliest date that can

be attributed to these tombs is second-third century AD.¹⁸ Together, these two sites indicate the presence of some form of settlement in close proximity to Burmarrad bay (**Figure 4.7**). However, the exact location of the settlement itself cannot as yet be identified.

In the north-west of the island, the area around Mġarr and Zebbiegh was witness to continued human activity. Some of the earlier tombs in both these areas have clear signs of re-utilisation between 100BC and 50AD (Sagona 2000: 854 and 1133). Three burial sites of a later date have recently been discovered in the general area. No human remains and/or ceramics were found at these sites but they seem to have been in use between the first and sixth centuries AD (Buhagiar 2000: 23). Modest centres of habitation and/or farmsteads in the area must have existed alongside rural luxury villas such as the one close to Għajn Tuffieħa, which also had a bath complex. It was equipped with heating and was decorated with pleasant and varied geometric mosaics. Further evidence of the quality of this villa can be gleaned from the lead pipes, glass and plaster that were used throughout the building (Bonanno 1992: 28). The mosaics have been tentatively dated to the second century AD and their styles bear strong similarities to works that were being produced at Paphos on Cyprus (Caselli 2002: 68). To the south of the island, the remains of a superior Roman edifice, complete with bath complex, were discovered (MAR 1931-32). It was deplete of any industrial remains and its situation in a prominent position overlooking the entrance to Marsaxlokk Bay suggests that it may be a 'villa marittima' (**Figures 4.8 and Figure 4.9**).

The areas around Qrendi and Żurrieq in the south were witness to continued human activity during the period under discussion, and again it is mainly tombs that shed light on settlement patterns. The catacomb complex at Xarolla in Żurrieq reached its apex during the III and IV Century AD (Camilleri and Cutajar 1999: 37). In Zejtun, continued use of the area is also attested by the presence of tombs that can be assigned to the period under discussion. One of the tombs in Zejtun was re-used over a period that spanned from circa 400 BC to the third century AD (Sagona 2002: 1142). Further Roman human activity in Zejtun can be deduced from the presence of

¹⁸ This was established following a visit to the site with Mr A. Pace, the Superintendent of Cultural Heritage, who was responsible for the excavation of a similar site at Tal-Barrani, Zejtun.

a rustic villa from where a scatter of coins found on this site were datable to the third and fourth centuries AD (Bonanno 1992: 27).

The period under discussion is witness to some important changes in settlement patterns. This is especially true for the harbour areas of Marsa and Burmarrad. In the case of the former there seems to have been movement away from the inner reaches of the harbour at Marsa, whereas in the case of the latter the presence of catacombs so far away from Bidnija and Wardija points to the establishment of a settlement that was closer to the coast than in previous centuries. On the other hand, except for cosmetic improvements at the main centre of habitation, the city of Melite remained more or less the same. This is also true for the pattern of the main rural settlements throughout the island, where a degree of continuity can be deduced from the burial sites although the actual centres of habitation have not yet been identified.

4.3 Roads and Terrestrial Transport

There is no reason to suggest that any internal communication system that may have been in place during the Punico-Roman period was changed during the centuries being discussed in this section. I reiterate the fact that one of the more vital factors to the inhabitants of the island would have been access to and from the sea. Once again, the valleys would have provided the main 'thoroughfares.' It has been suggested that until the middle of the seventeenth century there still existed the remnants of a Roman road that connected Melite with the harbour area (Buhagiar and Fiorini 1996: 40). Given the importance of Marsa to the economy of the island, the existence a road between port and town makes sense. However, the lack of evidence makes it impossible to establish whether such a road was Punic in origin or whether it was newly constructed by the Romans.

4.4 Population Figures

Once again, it will prove difficult to establish precise figures for Malta's population during the Roman period, but nonetheless such a calculation, even if approximate, is, as already stated, desirable. The large catacomb complexes that are

found in Rabat point to the presence of a thriving town, but the reuse of these sites and the incomplete archaeological record makes the calculation of the exact number of its inhabitants difficult. A recent proposal for the calculation of the population of Roman Sicily sets the urban density for this island as 100 persons per hectare. This has been calculated on the assumption that 20 percent of Sicily's population lived in urban areas; although in Italy it was 30 percent (Wilson 1990: 171). The model is based on archaeological investigations of dwelling spaces in various parts of Sicily, an opportunity that has not yet presented itself in Malta. Despite the obvious disparities between Sicily and Malta, such as in the size and agricultural productivity of the islands, it seems to me that, in the absence of any other data, this is an acceptable model to follow.¹⁹

I have hereby used the realistic outline of ancient Melite proposed by Buhagiar and Fiorini (1996: 8-9) and based on various archaeological sites including the catacombs, which one assumes to have been situated outside the city wall. Using this outline, the area of ancient Melite is calculated to have consisted of approximately 28.78 hectares (as in **Figure 4.1**). Based on Wilson's proportion, this area would give us a population of 2878 persons for the city. If we consider that 20% of the island's population were situated in this urban centre this would mean that the extra-urban population (including the harbour settlements) of the island, or 80%, would have been of 11,512. These figures result in a total population of 14,390. This seems to be a rather high figure and in the next section I shall argue whether it was possible for Roman Malta to sustain such a large population.

4.5 Productivity and Consumption

4.5.1 The Production of Olive Oil on Roman Malta

It was during the early part of the Roman period that an important change was to take place in the type of agriculture practised on ancient Malta: the introduction of olive oil production. In essence, the change from the cultivation of flax and the production of linen to the cultivation of the olive and the production of olive oil can be considered as part of the process of the 'Romanisation' of the island. As has

¹⁹ The reasons for not using the same methodology as in chapter six were discussed in section 6.5.

already been mentioned in chapter six, the structure of the farm at San Pawl Milqi changed during the second and first centuries BC and was subsequently reorganised throughout the first and second centuries AD. At Ta' Kaccatura, the Roman phase also supersedes earlier structures, leading one to conclude that some of the farms from the Punico-Roman period were converted to produce olive oil.

For other sites, structural evidence for preceding buildings²⁰ is not available, but we do have evidence for the production of olive oil. The unexcavated farm at Bidnija has visible signs that it was used for olive oil production (**Figure 4.10**) and is probably comparable in size to the building at San Pawl Milqi. In 1888, a section of an olive oil producing farm was discovered at Tad-Dawl. It was partially excavated and recorded. The vats and *trapetum* discovered within its walls left the person who studied the site in no doubt as to the function of the site (**Figure 4.11**) (Caruana 1888). This site has since been destroyed, but on the basis of the late nineteenth century plans one can safely attribute it to the Roman period. In the 1970s another oil producing site was excavated, this time in Zejtun (Bonanno 1977). Photographs from the excavation show this complex as covering quite a large area. Direct evidence for other oil producing sites is limited but over the years a few have been discovered and mentioned and/or recorded, albeit in a limited manner.

The widespread introduction of the olive tree entailed a certain degree of landscape modification. Fields and stretches of land previously dedicated to the cultivation of flax and other crops were adapted in order to accommodate young olive trees. Whether this transformation rendered the landscape unstable and how much erosion this process induced is difficult to quantify. Although an accurate date for the establishment of olive oil production on Malta cannot be ascertained, it would not be unreasonable to assume that the process witnessed in Malta was not dissimilar to the processes that were contemporaneous in North Africa. In Tripolitania, for example, the Romans introduced olive cultivation and most of the olive oil producing farms were in operation by the second century AD (Mattingly 1998: 35). In his seminal work on the distribution of Roman villas in Malta, Bonanno listed a number of sites he believed to be linked to the production and exportation of olive oil (Bonanno

²⁰ In the case of Bidnija, however, Punico-Roman pottery scattered around the site points to an earlier use of the site (see chapter six).

1977). Below is a table showing the various sites based on Bonanno’s original list but with some modifications derived from my research:

No	Site	Excavated (Year)	Size	Evidence
1	San Pawl Milqi	Yes (1960s)	Large	<i>Trapetum</i> ; counterweight blocks; press bed; vats
2	Ta’ Kaccatura	Yes (completed 1915)	Medium	Counterweight blocks;
3	Tad-Dawl	Yes (1888)	Medium	Press bed; trapetum
4	Bidnija	No	Large	Vats
5	Wardija	No	?	Remains described as being similar to those in Bidnija (Caruana 1888: 91)
6	Mosta	Accidental discovery	Medium (?)	Oil press
7	Birkirkara Hill	Accidental discovery	Medium (?)	Counterweight block
8	Żejtun	Yes (1976)	Medium	Counterweight block; vats; <i>trapetum</i>
9	Ghajn Tuffieħa		Small	<i>Trapetum</i> ; vats
10	Għarghur	Accidental discovery	?	Oil presses?
11	Marsaxlokk	No	?	<i>Trapetum</i>
12	Rabat	No	?	<i>Trapetum</i>
13	Hal Far	No	?	<i>Trapetum</i>
14	Hal Millieri	No	?	<i>Trapetum</i>
15	Mgarr	No	?	<i>Trapetum</i>
16	Ta’ Baldu	No	?	<i>Trapetum</i> (reutilised as trough)
17	Misraħ Miel	No	?	<i>Trapetum</i>

Table 4.1: A list of sites where objects and/or buildings related to the production of olive oil in the Roman period have been discovered. (Figure 4.12)

The similarity of the agricultural implements discovered suggests that these were used contemporaneously, although there is little additional data to compare sites with. One cannot exclude the existence of other olive oil producing farms, the remains of which have either been destroyed or are yet to be discovered.

I shall now proceed to calculate the production of olive oil on Roman Malta. Resultant figures would help establish how much oil would have been available for local consumption and how much was available for export. Many Roman farms, such

as San Pawl Milqi, Bidnija, Wardija, Tad-Dawl and Ta'Kaccatura, enjoyed easy access to harbours and bays, which as has been discussed in chapter four, were significantly larger than they are today. This strongly suggests that the oil produced in these and other farms was destined to be loaded onto to ships for export (Figure 4.13).

Due to the presence of numerous oil presses discovered on the island, one can safely assume that a substantial part of the island's agriculture during the Roman period was dedicated to the cultivation of the olive. From the location of the majority of the sites listed in the table it is clear that an olive-growing belt existed during the Roman period. It could well be that land with access to the sea was preferred for the cultivation of a cash crop that could be exported, leaving the centre of the island for crops that were intended exclusively for local consumption. In fact, only two place names and two sets of remains related to olives and/or oil production are found in close proximity to the cliffs on the west of the island.

The starting point for the calculation of olive oil for the whole of Malta would be with the output of a standardised Roman olive grove. The extent of the remains at San Pawl Milqi point to the farm as having been of the standard size as described by Cato (*On Agriculture* 10-11); that is with a grove of 240 *iugera* or 634,560 square metres (63.5 hectares). The number of people needed to work a grove of this size is 13: one overseer, one housekeeper, five labourers, three ploughmen, one donkey driver, one swineherd and one shepherd. Animals on the grove consisted of: three pairs of oxen, three donkeys fitted with packsaddles to carry manure, one donkey for the mill and 100 sheep. To date, there is no evidence for animal husbandry at the San Pawl Milqi and Ta' Kaccatura, although there can be little doubt that animals were kept locally.

According to White (1970: 226) the spacing of the olive trees in ancient times was that of 30 feet between each tree. Therefore, an orchard of this size would have contained approximately 8,883 olive trees (141 trees per hectare by 63). Alternatively, should corn have been grown in the rows between the trees then the number of trees is reduced (by approximately two thirds, or 2961 trees) due to the increased spacing between the threes. Close to the villa at Bidnija some very old olive trees are still

standing (Figures 4.14 and 4.15). Although one cannot confirm that these trees date to the Roman period, their layout suggests that they sprouted from or were replanted in a configuration conducive to spacing that averages 30 feet between each tree.

Before proceeding to calculate the potential oil production of the villa at San Pawl Milqi I shall dwell a little on some important facts that are relevant to both the cultivation of the olive tree and to the production of olive oil on the island. Two local olive farmers, Joe Borg of Fawwara and Sammy Cremona of Wardija, have cultivated their orchards without any artificial fertilisers. A conservative estimated yield for the more established trees would be of 40kg of olives per tree; this is similar to the amount estimated by Mattingly for Sahel in Tunisia (Mattingly 1994). However, it is not unknown for some of the larger trees on the island to yield over 100kg of olives per tree! Due to what seems to be an ideal climate, no frost as in Italy and no desert temperatures as in North Africa, the oil yield from local olives also seems high at 20-25% fruit-to-oil ratio. Although Mattingly suggests that ancient presses were capable of delivering such yields (1988b: 182), I have used a conservative ratio of 15% for Roman Malta. Given the ideal weather and the fact that local varieties of the olive tree are not susceptible to the olive fly (*Bactrocera (Dacus) Oleae*), it is reasonable to assume that olive yields in Malta were relatively stable.

If one uses a conservative yield of 30kg per tree yield, using the natural method of cultivation as the yardstick for that reaped by the ancients, this means that a farm such as that at San Pawl Milqi would have produced 266,490kg (8883 trees by 30kg) of olives. Taking the conservative yield of 15% oil from fruit this would give us 39,973kg of oil. Given that one kilo of oil is the equivalent of 1.1 litres, this would then give us 43,970 litres of olive oil. If one considers that the Tripolitanian amphorae, used in the first centuries AD, had a carrying capacity of approximately 55 litres (Peacock and Williams 1986: 52), then the total number of amphorae of such a type needed for the San Pawl Milqi site would have been somewhere in the region of 800.

There are some other factors that corroborate the above calculations. Firstly, this amount ties in with the storage requirements suggested by Cato for the 63-hectare farm, that of 100 storage jars or dolia. Considering that these containers had a

capacity that varied between 500-1000 litres, the amount of oil being produced at San Pawl Milqi would have been easily stored in such containers. (Mattingly 1988b: 184; Humphrey et al 1998: 84). There also exists the possibility that during bumper years, oil may have been placed into amphorae quite soon after production thus eliminating the need to store large quantities of oil before 'bottling'. In his work on the production capacities for Tripolitanian oil presses, Mattingly calculated that these could press up to 10,000 kg of oil per year (Mattingly 1988: 193). If all four presses at San Pawl Milqi were operated simultaneously, this would give a total output of 40,000kg of oil per year. This quantity fits in comfortably with the figure of 39,973kg of oil reached in the above calculations. However, even if one juggles with olive and/or oil yields, the variations obtained are never cause for concern.

Following the above calculation for oil production at San Pawl Milqi, I shall now proceed to calculate oil production for the whole of the island. In order to achieve this, place names that are relative to olives and/or oil have been plotted on a map of Malta (Figure 4.16). This has been done to try and discern a pattern as to where, on the island, was/is suitable to the cultivation of the olive. Żebbuġ is the Maltese word for olive and forms part of a series of place names including:

- a) Haż-Żebbuġ: village of the olives
- b) Ta' Żebbuġa: of the olive tree
- c) Ta' Żebbuġiet: of the olive trees
- d) Taz-Żebbuġija: of the olive trees
- e) Birzebbuġa: well of the olives

One must also add other place names related to olives and/or olive oil:

- f) Żejtun: place name related to oil (żejt) and/or a type of olive
- g) Ġhajn Żejtuna: the spring of oil or type of olive
- h) Bidni and Bidnija: type of olive

On another map, I have also plotted the remains listed above in table 4.1 (Figure 4.17). There exists a significant correspondence between the olive tree and olive oil place names with the presence of Roman remains related to the production of olive oil. In no way am I suggesting that these place names reflect some form of continuity

in olive cultivation and/or oil production from antiquity to more recent times. What I am suggesting, rather, is that the areas highlighted through place name evidence coupled with the archaeological remains give a clear indication of where on Malta is suitable and/or favourable for olive cultivation and where is not.

On the basis of the above map, I have assumed that a general area on Malta that would have been suitable for the cultivation of the olive. Again, I have taken a conservative percentage of the available land that was dedicated to the cultivation of the olive, that of 2,500 hectares. Such an area would mean a total of 40 farms with the same production capacity of San Pawl Milqi or a mixture of large, medium and small productive units. Today, we know of 17 sites that bear direct evidence of olive oil production, although others surely existed. Some seem to be larger than others, so a straight division of the land available by the 63-hectare marker would give an unrealistic reflection. In my opinion the archaeological evidence points to farms of various sizes and hence of varied production capabilities. Therefore, with an average production 698 litres of oil per hectare the total amount of oil produced annually on Melite would have been 1,745,000 litres of oil (or 31,727 amphorae of 55 litres).

4.5.2 Grain Cultivation and General Consumption on Roman Malta

If a large proportion of the remainder of all cultivable land (125 sq kilometres)²¹ was dedicated to the production of grain, then the island would have been in a position to produce the following amount of grain (**Table 4.2**):

Measure	Modii	Kilos	Tons
Production of grain	118,192	791,887	792

Table 4.2 Proposed annual production of grain on Roman Malta.

Based on the population figure of 14,000, consumption of grain for 14,000 persons would have been as follows (**Table 4.3**):

²¹ One would have to halve this area as the land had to lie fallow for one year. I have set aside 20 square kilometres of land as pastures, walled gardens for the growing of fruits etc.

Population	Daily Consumption	Annual Consumption
14,000	7,658 kg	2,810 tonnes

Table 4.3 Proposed annual consumption of grain on Roman Malta.

Consumption for oil, on the other hand, would be the following (**Table 4.4**):

Oil per person (per annum in litres)	20
Population	14,000
Total Consumption (in litres)	280,000
In amphorae	5,091

Table 4.4 Proposed annual consumption of olive oil on Roman Malta.

The above calculations give the following surpluses and deficits (**Table 4.5**):

Grain	Oil
Deficit of 2,018 tons	Surplus of 1,465,000 litres or 26,636 amphorae of 55 litres.

Table 4.5 Deficit and surplus of grain and olive oil production on Roman Malta

The above figures shed important light on the potential nature of agricultural and economic activity during the Roman period. It is quite surprising to observe that even with a modest amount of land reserved for olive cultivation it would seem that there existed a substantial amount of oil left for the export market. On the other hand, the deficit in grain requirements would not have been satisfied, even if all the land that was dedicated to the olive was converted to the cultivation of grain. The implications of these calculations are discussed in section 4.8.

4.5.3 Amphorae

Bruno has identified a second type of Maltese amphora, which she calls Malta 2 and dates to the early Imperial period (Bruno 1999: 105) (Figure 4.18). Malta 2 amphorae have been excavated at San Pawl Milqi and were found in the same stratigraphical context as ceramics of North African origin that can be dated to the first and second centuries AD (Bruno 1999: 106). This type of amphora has also been found in contemporary burial complexes, although we do not know whether these were misfired samples (Caruana 1899: pl. 3.21) (Figure 4.19).

Although this has been identified as a Maltese type, the fabric of many contains material not local to Malta such as quartz and volcanic dust. The aforementioned trade in volcanic dust seems to have continued, and perhaps increased during the Roman period, as suggested by its presence in other contexts including tiles, pipes and in the mortar used for various buildings constructed during this period (Bruno 1999: 110). In all probability, volcanic dust was transported to the islands in the form of ballast and/or dunnage. Given that the occurrence of 'foreign' materials is so common in the archaeological record, the presence of such materials in local amphora types ceases to be a potential argument against local production.

A further problem to be tackled with regard to local amphorae is their distribution away from the island's shores. The recent identification of the Malta 2 type means that we can only now start to investigate its distribution patterns, although early attempts to study and locate Malta 2 amphorae away from the shores of Malta have so far proved unsuccessful (Bruno 1999: 113).

The introduction of olive cultivation to the island would have provided an added fuel source for kilns. Olive trees need to be pruned every year, and when dried, the branches, twigs and leaves removed from the trees would have provided a substantial amount of fuel. Furthermore, one of the by-products of olive oil production consists of the stones and other bits of the fruit that are not turned into oil. Today, local producers of olive oil turn this mulch into briquettes, which in turn are used as fuel for fires. For ancient North Africa, where the need for alternative fuels must also have been a priority, such a practice is attested in the archaeological record:

“dumps of spent fuel from pottery kilns [and] both ash layers proved to be exclusively made up of carbonised olive stones” (Smith 1998: 193). In Tunisia today, potters still use olive pressings to make charcoal.

4.6 The Harbours of Roman Malta

The Roman period was witness to some significant changes with regard to use of the ports and harbours of Malta. This is especially true for the port at Marsa, which was to undergo a number of manmade improvements and perhaps also some degree of natural transformation. Other harbours and anchorages played a modest role in the changing trade routes of the central Mediterranean. As shall be discussed below, this activity is reflected in the archaeological record of the seabed of various harbours and anchorages.

4.6.1 Approaches to Malta

The natural conditions prevailing at the main four approaches discussed previously remained, of course, unchanged. What also remained unchanged during the Roman period was the use of the coastal sanctuaries. However, a factor that did change was the dedication of these same sanctuaries. To date, we do not know the deities worshipped at the sanctuary on the promontory of Ras il-Wardija on Gozo. What we do know is that the site remained in use during the Roman period. At Tas-Silġ, the dedication evolved from the Punic Astarte to the Roman Juno, a transformation that may have taken place some time in first century BC, and that would have coincided with the restructuring of the sanctuary’s layout (Bruno 1999: 62). In fact, Cicero’s reference to the temple of Juno (*Verrines* 2.4: 103-104) provides an idea of the rate of ‘Romanisation’ at the site (1st century BC). As for Ras ir-Raġeb, one can only assume a similar date for the ‘transition’ in its dedication from Melkart to Hercules (Vella 2002). The continued use of these sacred spaces suggests that they continued to play a navigational role during the Roman period, although it is not known whether any changes to rituals onboard approaching vessels would have occurred due to the changes in dedications of the coastal sanctuaries.

4.6.2 The Harbours

The absence of a tight sequence of dates from the cores taken for the present study precludes the establishment of a chronology for the siltation process over short periods of time; however there are factors from other archaeological sources that point to some environmental changes that may have been taking place during the period under discussion. Firstly, around the **inner Marsa harbour**, the move away from the Qormi settlement may in part be due to the environmental transformation of the area. This site migration is reflected in the pattern of burial sites that are situated around the Marsa plain (see **Figure 3.7**). The **siltation** process may have contributed to the formation of a marsh that would have made the area unsuitable for habitation. Coupled with this would have been the reduced accessibility of the sea and the disruption of industrial activities that may have been practised in the area. Further evidence can be gleaned from the decision by the Romans to situate their port towards the outer reaches of the Marsa harbour (see below).

Continued human activity around the harbour of Burmarrad during this period is reflected in the archaeological record of the area. The above-mentioned burial complexes and farms point to this being an important harbour during the Roman period. Due to the large *Posidonia* meadows that thrive on the seabed of **Salina Bay**, underwater visual surveys that I undertook proved unsuccessful. The only archaeological objects that were observed during the survey were a number of loose sherds that had been trapped in vortexes caused by mooring blocks on the seabed. The objects observed in these spaces were worn indicating that these have been dislodged from their original location and moved along the seabed by currents. There can be no doubt that the main archaeological deposits in the bay are located under the various layers of *Posidonia* mattes. A wreck from the Roman period discovered in **Mellieħa Bay** (see below) lay under four metres of *Posidonia* mattes (**Figure 4.20**).

Despite this cover of *Posidonia*, a number of archaeological objects have been retrieved and/or recorded in the area. Since the late 1950s sports divers have been responsible for the recovery of the majority of these objects. In 1960, for example, three scatters of sherds of probable Roman date were located in shallow water in **Salina Bay** (MAR 1960). More recently, a survey in the area had identified a **ballast**

heap (Grima 2000). Recent surveyors of the site concluded that the majority of the stones in the heap are tufa with some marble inclusions. The stones are uneven in both size and shape and a few ceramic sherds were also present among the stones (Atauz and McManamon 2001: 25). One of the ceramic objects is a neck of what could be a Keay XXXV amphora. However, one cannot be certain as to whether the objects formed part of the wreck or whether they are intrusions. To date, no structural remains of the vessel have been identified.

Lead anchors and ceramic objects have, over the years, been lifted from the seabed of the bay as well as from the approaches to the mouth of the bay. The approach to the south-east of the entrance to the harbour of Burmarrad is dangerous with rocks stretching out to the sea that are barely awash. From the bay itself, recent finds by a sports diver include some amphora necks from the late Roman or early Byzantine periods. These include: a) Keay LVII (4th – 7th century); b) Late Roman 1 (5th – early 7th century); c) and Late Roman 2 (5th – 7th century).²² It has not been established whether these objects form part of a wreck or a harbour deposit.

Other harbours around the island also remained in use during the period under discussion. The above-mentioned wreck in Mellieha illustrates the use of this place as an anchorage or perhaps as an outlet for salt works that may have existed at the head of the bay. These salt works were definitely in use during the Middle Ages and were still visible in the early twentieth century when Sir Thomas Ashby remarked on the possible ancient origin of these structures (Ashby 1915: 49). Once again, the large *Posidonia* meadows impede any visual survey of the seabed and to date we have been reliant on chance finds brought up by divers. The fact that two wrecks have so far been discovered is not just an indication of the use of this bay but also of the dangerous reef that is situated in its centre (one of these wrecks is discussed in more detail in the section on connectivity below).

Marsamxett, Marsascalea, Mistra and Marsaxlokk all remained in use throughout this period. Human activity around these harbours is attested by the presence of various villas, tombs and sanctuaries that continued to be used. For

²² These were exposed due to the destruction of the *Posidonia* meadows by a mooring block. The objects were reportedly still in situ when discovered.

evidence from the seabed, which can be directly related to maritime activity, one is again dependent on sporadic loose finds that have been brought up over the years. These finds mainly consist of amphorae that range in date from the Punic to the late Roman periods.

Of all the harbours in Malta it would seem, for reasons that will be highlighted below, that the port of Marsa was the most important during the Roman period. The numerous port structures that have been discovered over the ages deserve a detailed account so that one may understand the function and role of this port. I shall now proceed with the compilation and analysis of the information available about this site.

4.6.3 The Port Structures

Given that few, if any, of the remains of port structures discovered in Malta have been archaeologically surveyed in detail, we have, as yet, no definite chronology for the construction of these buildings. Although the role of Marsa during the Punic period has already been discussed in chapter six, I must reiterate that despite a lack of evidence for naval facilities such as ship sheds it could well be that such structures from the Punic period still lie undiscovered under the sediment deposits on the edges of the large plain. What we do have, however, are reports from later periods on a series of ancient port structures. The first clue that large manmade structures of some form existed in the environs of the Grand Harbour can be inferred from a written description of the island penned by a Knight of Malta during a visit to the island around the 1520s and subsequently published in 1536 (Vella 1980). Its author, Jean Quintin D'Autun, describes two ancient temples that were still extant and visible in the first decades of the sixteenth century, one at the southern harbour (Tas-Silġ at Marsaxlokk) and the other described as being between the castle and the town:

'The foundations can be seen in many places: stones of stupendous height and width. I think that the temple of Juno, as one can see from the remains which still exist, could be considered not only as one among the great, but also among the magnificent temples of antiquity; it is situated about halfway between the town and the castle. The ruins lie scattered through many acres of land; the foundations of the temple cover a large part of the harbour, even far out into the sea, built there on a hilltop, on a plain, and sheltered from winds on all sides by very steep slopes. The name of this place is very difficult to pronounce except by the local Maltese tongue. On the hilltop there is a shrine dedicated to the Blessed Virgin, called "Ta' Qort" (Tal-Qortin)' (Vella 1980: 23).

This description has, since its inception, been taken to mean that the remains described by Quintinus lay between the castle of St Angelo and its suburb Birgu. There are, however, a number of difficulties with the placing of these remains in this area. Firstly, the author describes the remains as lying half way between the castle and the town; in early modern times only Mdina was referred to as a town whereas the very place name Birgu originates from the medieval term for suburb: '*burgi insule Meliveti* (1357); *in contrata burgii prope castrum maris* (1420); *suburbia castri maris* (1466)' (Wettinger 2000: 54). On the other hand, the very meaning of the term Mdina (from Medina) is 'town' (Wettinger 2000: 367). Added to this one must here consider that on a peninsula as narrow as that of Birgu there probably did not exist many acres of space between the castle and its suburb. Also, the sea and mud in the area are not conducive to supporting large structural remains as described; the bedrock drops dramatically towards the centre of the submerged valley that is today known as Dockyard Creek (see figure 4.3).

It is much more likely that Quintin D'Autun was referring to an area that coincides with Marsa. There is a series of archaeological remains in the area that fit his description, while other factors, such as place name evidence, also point to Marsa as being the area described in the passage. On the plain of Kordin to the south-east of the Grand Harbour there still exist a number of prehistoric remains that, when they were observed in the early 1500s, must have been similar to other substantial Neolithic monuments elsewhere on the island. It therefore comes as no surprise that the author of the passage describes the stones as being of 'stupendous height and width.' The remains that have been somewhat enigmatic are those referred to as 'lying far out to sea'. However, maps and nautical charts from the nineteenth century show this area as being muddy rather than awash (**Figure 4.21**) (Hydrographic office 1871). This seems to indicate that the process of siltation was not yet complete and may have been even less so in the early sixteenth century, when the account was penned.

Proof of the existence of structures at the foot of Kordin Hill was uncovered in the second half of the nineteenth century when dredging machines working in the area brought to light a number of architectural remains of which only two (partial) marble columns (**Figure 4.22**) and the torso of a small marble statue were retained (**Figure 4.23**). One column measures approximately 165 cm in height and the other measures

approximately 105 cm in height and 52 cm in width. A contemporary newspaper reports the discovery of the torso originally thought to be that of a statue originally of the Goddess Diana (MTUSG: 21.12.1865). In November 1877 during construction works that were taking place in the same area, a whole pillar of identical material to the afore-mentioned pieces was uncovered from 'under six feet of earth' (Caruana 1882: 90). This column is kept in a private collection and is unavailable for study. Although one cannot define the exact nature of the structure that once stood at the foot of this hill there can be no doubt that the discovery of these columns in this area point to the presence of a substantial building at a prominent place that dominates the entrance to the harbour at Marsa.

With regard to remains that can be specifically linked to port structures at Marsa, Commendatore Abela published the first available reference in 1647. He describes a: '*molo di grossissime pietre edificato su la sponda del mare per un tratto di mille, e cinquecento passi fatto in tempo de' Romani*' (Abela 1647: 16). It would seem that the author reached this conclusion based on a fragment of a marble plaque that read: '*in statione...mille...quincent pass* [sic]'. He goes on to explain that only some of the mole was extant at the time that he was writing: '*E n'appare fin'oggi qualche vestigio delle pietre nella punta del Cortino*' (Abela 1647: 17). It is not exactly clear as to how large Abela thought the mole to be, as 1500 *passus* would mean a mole of over two kilometres!²³ Even if one included the quay, a structure of this size would simply not fit in the area. However, some form of structure must have existed because during the nineteenth century worked stone blocks were excavated from the mud in the area. These had traces of pozzolana, pointing to a probable Roman origin of these structures (MTUSG: 8.11.1866).

It was not until over a century after Abela's publication that further port structures were to be discovered in Malta. Count Barbaro unearthed these on the Kortin promontory in the year 1768 during major restructuring works that were being carried out in the area. Despite his self-confessed shortcomings ('*che da persona poco, o nulla versate nell'antiquaria*'), he proceeded to publish an accurate and

²³ 125 *passus* = 1 *stadium* (180m).

detailed account of his findings 26 years later in what remains our only first-hand information on the site (**Figure 4.24**) (Barbaro 1794).

This site was discovered in relatively good condition with the arched roof still surviving in parts of the main building. The **main edifice** was spread over a large area and consisted of a central chamber with corridors on each side. In turn, these corridors provided access to a series of chambers, precisely five on either side (Caruana 1882: 96). These chambers had roofs that were supported by three arches, and each room measured approximately nine by four metres or 36 square metres. A vaulted portico measuring just over three metres in width distinguished the entrance to the main chamber; it was oriented to the south-west and was located approximately 35 metres from the shore of the 'inner-harbour'. Attached to this large complex was a substantial structure that seems to have been in a lesser state of repair and was described simply as '*rovine di fabbrica*' (Barbaro 1794: 4). Its dimensions were larger than those of the afore-mentioned lateral rooms, measuring approximately 14 metres in length and eight metres in width. The roof of this room seems to have been supported by a series of five central columns (or pillars) and one also notes the remains of a smaller room.

The last two rooms and the north-east portico were built over excavated chambers, which at the time of their discovery were filled with fresh water. Apertures for the retrieval of water were situated in the corridors of the main buildings. The ceilings of these two chambers differed: one was vaulted (*fatta a testuggine*) and the other consisted of a series of arches built from large stones (*pietre enormi*) (Barbaro 1794: 7). The second building of the complex also had an excavated chamber under one of the rooms that was dry at the time of the discovery and contained a significant number of amphorae in good condition. These amphorae were Byzantine and will be tackled in chapter eight. The third large underground chamber was situated under the above-mentioned '*rovine di fabbrica*' attached to the large building. Among some of the explanations (with regard to its function) given by Barbaro is the possibility of this area being a reutilised tomb (Barbaro 1794: 9).

From the opposite extremity of the main chamber ran a large passage measuring approximately three metres wide and forty-three metres long that was oriented to east-

north-east. Its entrance faced the 'open-harbour' and lay circa nineteen metres (from its end) in the same direction. A second complex was situated off this passage, although no direct entrance from the latter can be identified in Barbaro's plan. The entrance to this second complex enjoyed the same orientation of the above-mentioned passage. Access to the five rooms would have been via a large vestibule measuring twenty by three metres, with each room measuring approximately three by fourteen metres. To the north of these rooms are two narrow corridors that were also accessible from the vestibule, whereas to the south are a series of four rooms that are drawn by Barbaro as incomplete. This would indicate that these were probably in a state of ruin when the discovery was made. The narrowest of these rooms measured two and a half metres whereas the widest measured approximately five metres across.

A third complex of buildings, separate from both the afore-mentioned structures, lay to the south of the main complex. The entrance to this building was through a vestibule that measured eight by two and a half metres. From here one could access the three chambers that measured approximately nine by four metres. The dividing walls contained pillars rather than columns and these were made from large stones placed one over another. Large building blocks were used for the rest of the structure and the simple architecture of this particular building led Barbaro to conclude that this highlighted the antiquity of the building: '*manifesta la rimota antichita' dell'edifizio*' (Barbaro 1794: 6).

It was not until the great harbour extension of the 1860s that further port structures were discovered in the area. Whilst dredging in the area, the contractor entrusted with the removal of mud from the area consistently complained that he had to remove large stone blocks from beneath the seabed. It is not known what structure these blocks belonged to, but contemporary reports state that many of these blocks had considerable traces of pozzolana on them. One of the earliest and most accurate hydrographic surveys in the area of Marsa was carried out in the second decade of the 1800s by Captain W.H. Smyth and subsequently published in 1823. It shows a series of 'objects' that fouled the seabed in the area (Smyth 1823) (Figure 4.25). A subsequent hydrographic survey of Marsa, this time carried out by Captains Graves and Spratt and published in 1861, shows this area as clear of these objects (Figure 4.26). This could only mean that dredging works that were ongoing at the time

removed these 'obstacles'. It would not be unreasonable to assume that at least some of the obstacles noted by Smyth consisted of the worked blocks described by the dredging contractor. Should this be the case it would follow that the mole described by Abela as being '*1500 passi*' in length may have extended into the entrance of the harbour. Such a structure would have offered extra protection from incoming waves and large swells that are known to build up in the Grand Harbour complex.

Nearly a century after the great harbour extension, other work on the island's infrastructure contributed to the discovery of further structures that were probably part of the harbour complex. In April 1939, 'during the excavation of a trench for the laying of foundations in a field at Race Course Road, Marsa, at a depth of about ten feet from the surface, remains of a Roman building were uncovered' (MAR 1946-47: 3). The limited information available contains a description of a floor covered with clay tiles and of rectangular pits covered with plaster and cut into the bedrock. The area contained a large quantity of Roman potsherds as well as loose tiles and plaster. It is not possible to precisely define the use of the building but it seems to be related more to industrial activity rather than to storage facilities.

In the mid 1950s further remains were unearthed in Marsa. During the laying of foundations for a new school workmen uncovered a building that 'covered an area of at least 170 feet [51 metres] in length and 100 feet [30 metres] in width and consist of the lower courses of walls in *opus quadratum*. The walls uncovered so far appear to belong to large rectangular rooms or enclosures and the quality and workmanship of the Globigerina limestone blocks with which the walls are constructed show that the building originally constructed on this site must have been of some importance' (MAR 1955-56: 7). Very large quantities of pottery, including 'amphoras, flagons and storage jars' were retrieved from this site. What is of interest here is that some of the pottery from this site showed signs of being water-worn and were encrusted with marine growth (MAR 1955-56: 7). This is interesting because such remains would indicate that these structures were once submerged. One can look at two possible explanations: a) that the land on which these structures were built subsided over the centuries and lay for a period (until the silting up of the area) below sea level; and/or b) some of the ceramic material from this site originated from the great harbour works mentioned above from which 'numerous pieces of earthen amphorae, urns and water

jars, were also being continually brought up from the deep' (MTUSG 8.11.1866). The mud was dumped in a variety of places in and around the area, so it could well be that some the ceramics discovered in this site originated from the spoil of the harbour dredging in the 1860s. Despite the uncertainty regarding the origin of the ceramic deposits from this site, I believe that there can be little doubt that the structures described in the brief report constituted the remains of *horrea*. It may consist of a warehouse complex similar in dimensions to the *horrea* at Myra except that the latter is slightly larger (Rickman 1971: 139). Based on the similar dimensions I have attempted a hypothetical reconstruction of those described above (Figure 4.27). On the other hand, on the basis of distinct marks that are discernible from an aerial photograph of the area, it could well be that only a small section of a much larger complex was discovered. The long rectangular features that are clearly visible in the photograph correspond to the dimensions described in the 1950s and the remains seem to extend to the south and east would (Figure 4.28). Over the past forty years, construction works have totally destroyed this site.

Further ancient buildings were discovered in the area in 1959 when 'during building operations along the north side of Racecourse Street, Marsa...several lengths of heavy masonry, buried in levels containing nothing but Roman sherds, came to light...they seem to represent the remains of massive warehouses' (MAR 1959-60: 5). Although the brief report states that 'detailed plans and drawings were taken for record purposes' these have since been lost and thus at this point in time it is difficult to comment further on the nature of these remains.

Throughout the ages a series of baths and fishponds were also discovered around Marsa. On Kortin hill the remnants of what were thought to be bath complexes were discovered but no detailed description of these has reached us. A bath complex had been discovered in 1729, this time opposite Kortin Hill under what is today Floriana. This, too, was decorated with a series of mosaics depicting '*diverse figure di pesci, di draghi, e d'altri simili animali di ben inteso lavoro*' (Barbaro 1794: 10).

Other evidence pointing to intense human activity in the area includes a series of fishponds discovered around Kortin Hill. In 1865, the government at the time 'was informed that Mr. Gabrielli [the contractor working on the great harbour extension]

has lately met with some further obstructions in his operations of dredging in the shape of two ancient fish ponds, and that he is, in consequence, about to put in a further claim of £2,000 or £3,000 to defray the extra expense of removing the masonry' (MTUSG 16.3.1865). The contractor may have inflated the sum requested but nonetheless it does represent a rather large amount of money for the time, which may reflect the substantial nature of the structures discovered.

4.7 Connectivity

'Islands are uniquely accessible to the prime medium of communication and redistribution' (Horden and Purcell 2000: 225).

The style of the buildings discovered in the Marsa area points towards a Roman origin. Although one can safely say that the area must have already been in use as a harbour complex during the Punic period no substantial evidence, except perhaps for the third building of the Kortin Hill complex, has yet been unearthed that can be definitely attributed to this period. Small objects, such as coins, that pre-date the arrival of the Romans have been found in the area but their contexts are not clear. Some coins dating to the 4th and 3rd centuries BC were found at one of the Marsa harbour buildings discovered in the 1950s (MAR 1955-56: 8). Despite this 'gap' in our knowledge, it can be safely stated that at some point the Romans contributed towards the economic development and activity in the area. This can be deduced from the style of building so common in ports around the Empire, the *horrea* (Rickman 1971: 135). The construction of *horrea* in Malta can also be seen in the context of increased export of various products from North Africa to Italy (Fulford: 1989; Mattingly 1988). The growth in North African exports brought about an increase in shipping between Tripolitania and various areas in the Mediterranean, and Malta would have been caught in the crosscurrents of this exchange.

The lack of any excavations on these sites prevents us from investigating whether the Romans expanded existing reutilised buildings or whether altogether new structures were constructed. Despite this, there can be no doubt that the total area available for storage of goods around the Marsa harbour must have been quite high. At this stage the question that needs to be asked is: 'what were these stores used for?'

If the population of Roman Malta consisted of circa 14,000 persons, as has been stated above, then it would seem that the amount of warehouse space available was on the high side and I believe that the sizes of the *horrea* described above are slightly disproportionate to the needs of a small island. It is calculated that grain was stored with a ratio of 12,000 kg per square metre. Therefore, if all the surplus grain needed (1,603 tons) was stored at the Marsa *horrea*, this would have meant that approximately 1600 square metres of space would have been required. Over and above the space required for grain one may also add the storage needs for imported wine and olive oil. A conservative calculation of the area of the warehouses discovered in Marsa in the 1950s is of 1170 square metres. As has already been discussed this complex was only partially uncovered and was at least three times as big. The other storage complexes such as those at Kortin Hill and at Racecourse Street would have been totally superfluous with regard to the storage of grain and other products for local consumption.

I also state this on the basis of comparisons with *horrea* elsewhere in the Roman Empire. The storage space available in the various *horrea* situated on Kortin Hill are approximately equivalent to that on the east mole at Leptis Magna (Rickman 1971: 135). The latter had numerous other *horrea* around the harbour and one must also consider the size and wealth of this city as well as the vast hinterland that it served (Mattingly 1988a). Marsa too had other substantial buildings that formed part of its harbour complex but the similarities stop there, for Marsa did not serve vast expanses of agricultural land and the town of Melite was incomparable in size and wealth to the city of Leptis Magna. I believe that it would have been more convenient to have storage facilities built close to the main centre of habitation, that of Melite. Furthermore, despite not having the facilities enjoyed by Marsa, the harbour of Burmarrad (which is situated further north) would have provided a shorter route to the town. The two harbours may not have been exclusive but Burmarrad was large enough to accommodate ships of any size, and although no port structures have yet been discovered, I believe that the potential for such discoveries remains high. On the basis of the above, I believe that the warehouses situated around the Marsa harbour were not exclusively for the storage of goods destined for the local market but were also used to store goods for transshipment.

Returning to the Marsa port structures, it is not certain how many quays were available for the mooring of ships at this port. However, the complex on the Kortin promontory seems to have enjoyed access to sea from two sides: a) the inner side that faced south-west and b) an outer quay that faced the north-east (Figure 4.29). This can be deduced from the fact that the inner side had the so-called '*molo*' described by Abela and is the natural place for the location of a quay, protected from the winter gales of the north-east. On the other hand, the road leading away from the complex of warehouses situated on the Kortin promontory points to the existence of an outer quay, remains of which were discovered during excavations in 1993 (Bruno and Cutajar 2002). Such a quay would have been ideal during the summer months, as it would have been protected from the prevailing winds of the season. It could well be that this quay was used for vessels needing to stop for short periods of time, either for water from one of the many cisterns available at Kortin and/or for the quick transshipment of goods. Other quays may have been situated alongside the various other warehouses situated around the Marsa harbour. The size of the inner harbour at Marsa would have permitted large numbers of vessels to anchor and moor safely for long periods of time.

In the light of the above, there are two hypotheses that deserve attention, and one does not necessarily exclude the other. The first is that the buildings may have been used to store grain for ships that were wintering in Malta. The safe limit of moisture in stored grain is usually between 10 and 15% (Rickman 1971: 1). Therefore, any ships involved in the transport of this essential commodity and spending the winter months in the safety of a Maltese harbour would have the facility of unloading its cargo of grain to keep it dry. Once the winter months were over and the sea 'reopened' the grain would have been subsequently reloaded onto the ship that would have then proceeded on its journey north. One such ship of Alexandria carried St Paul to Rome via Syracuse after wintering in Malta (Acts of the Apostles XXVIII, 1-11). The harbour at Marsa would have been both large and deep enough to accommodate several grain ships of any size. The discovery of a large Roman anchor stock measuring over four metres in length and weighing over one ton provides further evidence supporting this suggestion (MAR 1963: 7) (Figure 4.30). Malta would therefore have formed part of Rome's '*façade maritime*', one of a series of

interrelated ports throughout the Mediterranean that served Rome and the Roman world (Purcell 1996).

The role of Roman Malta in the supply of grain to Rome is similar to that of the island of Tenedos (a small island in front of the Hellespont) in relation to the supply of grain to Constantinople in the sixth century:

‘in case of adverse wind, the ships could not pass the straits of the Dardanelles and had to wait for a favourable wind. To avoid deterioration of the grain, Justinian had built on the island a granary for the ships of Egypt before 542. The ships were unloaded there and then could return to Egypt to make a second or third trip’ (Sirks 2003: 217).

The estimated surface of the Tenedos granaries is of 2000 square metres, considerably less than those situated around the Marsa harbour.

The second hypothesis is based on Nieto’s theoretical model discussed in chapter 6.8 (Nieto 1997). Malta’s geographic location in the Sicilian channel makes it an ideal offshore location where ships could not only seek refuge from foul weather but also where various products could be purchased for redistribution elsewhere, a form of modest entrepôt. What evidence exists to support such a hypotheses? The presence and size of the *horrea* themselves present the physical evidence. As has been suggested above, these seem to be disproportionate to the size and requirements of the island. Most of the olive oil producing Roman farmsteads were located within easy access to bays and anchorages where amphorae could be directly loaded onto waiting ships and/or boats. This situation presented two options to local farms: either to send their produce to one central storage area (Marsa) for redistribution; or b) to load their produce directly on to visiting ships in the nearby harbours. One practice does not exclude the other.

That Malta was an important stopover for ships sailing in the central Mediterranean can be gleaned not only from the various shipwrecks that have so far been identified around its coasts but also through the above-mentioned loose finds that have been discovered and studied in the past decade. The latter point to the use of many harbours and anchorages throughout the Roman period. Malta is ideally situated for the redistribution of goods on both the east-west and north-south axis. In practical

nautical terms, the use of Malta as a redistribution centre could potentially trim the length of journeys for ships. This is especially significant when one considers the treacherous reputation enjoyed by the Sirte Gulf in antiquity (Preece 2000: 29). Should any vessels sailing south from Italy miss Malta they risked getting lost in the relatively large expanse of water to the south-east of the island. Thus, by shipping to and from Malta, vessels would have shortened and safer sea journeys.

The wreck discovered and excavated at Mellieha Bay, datable to circa 200-250 AD, provides further evidence of the type of cargo carried by vessels calling at the island. The main cargo of this ship consisted of large mortaria that probably came from southern Italy together with a supplementary cargo of Kapitän 1 amphorae from Greece and glass frit from Egypt (Frost 1969).²⁴ Such a varied cargo does not necessarily mean that the vessel picked up the objects at the original sources but at an entrepot somewhere in southern Italy and/or Sicily, subsequently calling at Malta to deliver some of these goods to its inhabitants whilst negotiating the purchase of local produce. Alternatively, whilst on its way to Africa, the vessel may have simply called in to seek refuge from bad weather, hitting the reef as it approached the inner reaches of the bay.

On a local level, the lack of knowledge with regard to the ownership of the Maltese estates precludes one from knowing the exact nature of the island's trade. Whether the island's products formed part of the *annona*²⁵ or whether local merchants took advantage of the various ships using Malta's harbours simply to shift their goods is, at this stage, very difficult to establish. Although the olive oil produced by Malta, amounting to approximately 27,000 55-litre amphorae, was a drop in the ocean of North Africa's oil production, it nonetheless played an important role in the island's economy. I believe that the amphorae exported from Malta must have formed part of a trading network that was practiced by private dealers active during this period (Casson 1980: 29). A *navicularius* was a ship owner who could have been either a private merchant himself, contracted by another merchant to carry his goods, or was contracted by the state to carry grain and/or oil on its behalf. Whatever the case, cargoes hardly ever belonged exclusively to one person and "a more flexible pattern

²⁴ I thank Dr Jennifer Price for the identification of the glass from the Melleha Bay wreck.

²⁵ The state-organised food supply of Rome.

therefore evolved where a *navicularius* might have within his ship perhaps cargo belonging to himself, but also goods belonging to a variety of other people to whom he was responsible for their shipment” (Rickman 1980a: 125).

Whatever the case, the import and export of agricultural produce must have played a significant role in the economy of Roman Malta. Whether the surplus quantities of olive oil were shipped out as an exclusive cargo on board a vessel or whether as ‘shared’ cargo is, I believe, directly related to the importation of grain to the island. The amount of grain needed to sustain the island’s population of 14,000 could not be grown locally. In my opinion the solution to this problem was the purchase of grain from vessels that called into Malta on their way to Rome. This suggestion can only be supported by indirect evidence: the good deepwater harbours, reference to the Alexandrian grain ship in the *Acts of the Apostles*, and the large anchor found on the seabed off Qawra all point to Malta being used as a haven for the grain ships sailing between Alexandria and Rome. Vessels wintering in Malta would have unloaded their grain into the large warehouses available at Marsa in order to keep it away from the humid conditions present in a ship’s hold. Local merchants may have opted to buy some of this grain, especially if a private merchant was carrying this with no obligations to the state. The 1,600 tons required by the islanders would have meant slightly less than the contents of one of the largest Roman ships (Parker 1992: 26-27). However, these were mainly contracted to carry grain for the state and it would have been quite unlikely that such important shipments would have been permitted to be sold elsewhere. It is more likely that several loads of grain from a variety of ships would have been purchased locally in exchange for local olive oil or other goods stored for transshipment. A perhaps oversimplified ratio would entail ten medium sized ships (75-200 tons/2000-3000 amphorae) offloading their grain and in turn shipping out the local amphorae with surplus oil. Alternatively, an ‘empty’ ship could have set sail directly for Alexandria from Malta, increasing the possibility of fitting in a lucrative second journey to the east.

Other trends in the patterns of connectivity of Malta during the Roman period can also be deduced from the imported amphorae that have been excavated at the sites of Tas-Silġ and San Pawl Milqi.

Date	Number of Samples	North Africa	Adriatic	Spain	Graeco-Eastern Mediterranean	Sicily & Southern Italy	Tyrrhenian
100 - 1 BC	1092 1013:79	5.9%	45.6%	0%	0%	0%	48.5%
1BC-200 AD	428 329:99	38.4%	3.4%	4.3%	21.4%	19.6%	13%
200 - 399AD	173 159:14	98.1%	0%	0.6%	1.3%	0%	0%
399-550AD	49 (Only Tas-Silg)	36.7%	0%	0%	6.1%	57.1%	0%

Table 4.6 The amphorae from Tas-Silg and San Pawl Milqi as percentages from total studied. Ratios illustrate quantities of amphorae from Tas-Silg against those from San Pawl Milqi (after Bruno 1999).

The notion of transshipment that has been discussed above prevents the drawing up of simplistic conclusions. Once again, I must reiterate that goods originating from one 'economic zone' are not necessarily shipped directly to their destination. However, in the above table there are a number of observations that deserve expansion (**Table 4.6**). The most striking information to emerge from this table is the decline in number of imported amphorae found on these sites. Because no other Roman sites have been studied in such detail it is difficult to establish whether such a decline is reflected elsewhere on the island. One plausible explanation is that the port of Marsaxlokk and the sanctuary of Tas-Silg went into decline as a result of changing maritime routes and trading patterns. With better facilities, the deeper and larger port at Marsa was better suited for vessels involved in the grain trade that flourished between North Africa, Egypt and Rome during the first centuries AD.

In the first two centuries of the period under discussion (1BC-199AD), the noticeable move away from the importation of goods from Italy is accompanied by a shift towards goods originating in North Africa and the eastern Mediterranean. This situation seems to fit into the broader context of contemporary Mediterranean trade. Mattingly suggests that "the Carthage-Rome route became one of the most important in the Roman world in the 1st century AD" due to the large grain shipments that were being sent north (Mattingly 1988: 53). Although most ships on this route would have travelled via the shorter northern route, I believe that some of these vessels must have

travelled via the islands, or the southern route (Figure 4.31). The rise in imports from the eastern Mediterranean can also be related to the export of grain to Rome. As has been already discussed, grain ships using Malta as a stopover, not only took advantage of the islands' sheltered deepwater harbours but also used the stopover as an opportunity to trade with locals.

Further evidence for Malta's integration into the Roman world can be gleaned from the surviving marble statues in the collection of Heritage Malta. Most of these were found during the excavation of the Roman *domus* in Rabat and consist of imperial portrait sculptures in Procennesian marble datable to the first centuries AD (Bonanno 1992: 23). Many of the pieces are of high stylistic quality, indicating that those commissioning the statue were 'in the know' with regard to contemporary fashion related to sculpture (Figure 4.32). It cannot be ascertained whether the marble was brought over directly from distant quarries or whether the statues were delivered in a finished or semi-finished state. A recently discovered and partially studied wreck off the coast of Gozo consists of un-worked blocks of Procennesian marble.²⁶ This wreck, together with the statues from Rabat, strongly suggests that Malta was receiving marble from the eastern Mediterranean, either directly or via secondary ports in Sicily.

The emergence of Tripolitania as a political and commercial power during the first centuries AD must have had a significant impact on maritime traffic in Malta. Due to its geographical position on the north-south axis between the Libyan coast and Sicily, Malta was ideally situated to take advantage of the south-north route between Libya and Rome. The island could be used as a simple stopover for vessels travelling to and from places such as Leptis Magna and Sabratha. Furthermore, goods from Tripolitanian ports could be unloaded in Malta so as to be transhipped elsewhere in the Mediterranean.

For the subsequent period (200-399 AD), one cannot fail to notice an absolute dominance of North African goods over those from any other region in the

²⁶ Pers. comm. from Reuben Grima who was then (2002) responsible for the management of Malta's submerged cultural heritage and conducted a survey of the site. He also commissioned the analysis of a marble sample removed from the wreck.

Mediterranean. This situation is reflective of the continuing political and economic expansion of North Africa, particularly that of Tripolitania. The peak of this process “was the elevation of *Septimus Severus* as the first African Emperor in AD 193” (Mattingly 1988a: 21). The reign of this emperor brought increased wealth to the area and although the murder of his sons in 217 AD had a devastating effect on the wealth of the local aristocracy, it did not seem to influence the level of production in Tripolitania.

The final period in the table above (399-550 AD) coincides with a period of instability in the Mediterranean. It was during this period that the Vandals conquered Carthage, precisely in 439 AD, with three attempts to ‘dislodge the Vandals from their base in Africa’ all proving unsuccessful (Rubin 1986: 26). The amphorae from Tas-Silġ indicate a move away from North African goods towards imports from Sicily. We cannot be certain whether this increase reflects the redistribution of goods plundered by Vandal during their raids on Sicily (Rubin 1986: 27). Such a hypothesis is also strengthened by the fact that Geiseric, king of the Vandals, settled for an annual tribute to keep him from raiding Sicilian shores (Wilson 1990: 331). Given the liberty with which the Vandals raided Sicily it would not surprise me if Malta were used as some form of advanced base for the launching of these attacks.

Further evidence for the decline of trade and economic instability in the late fourth and fifth centuries AD can be gleaned from a recent survey of the Roman coins found in the collection of the National Museum of Archaeology of Malta (Reece 1999). There are a total of 3,787 coins from the Roman period and they range in date from the first to the fifth century AD (Table 4.7). This particular collection is not without its difficulties. Firstly, the provenance of some of the coins is unknown and there is no way of knowing whether a few of them are specimens that may have been imported by collectors. Secondly, the variation of coin values within the chronological divisions is also unknown. Therefore, one cannot read too much into statistics provided. However, there is one aspect that is of interest and that is a marked and constant decline in numbers starting in the last quarter of the fourth century.

Roman Coins		
Years	Amount	%
to AD 41	189	4.99
41-54	57	1.51
54-69	62	1.64
69-96	205	5.41
96-117	156	4.12
117-138	186	4.91
138-161	174	4.59
161-180	172	4.54
180-193	67	1.77
193-222	133	3.51
222-238	225	5.94
238-260	328	8.66
260-295	505	13.34
295-317	301	7.95
317-330	237	6.26
330-348	314	8.29
348-364	259	6.84
364-378	90	2.38
378-388	56	1.48
388-402	51	1.35
402-425	13	0.34
425-455	4	0.11
455-494	3	0.08
Total	3787	

Table 4.7 Quantities of Roman coins from the collection of the National Museum of Archaeology of Malta (after Reece 1999: 345)

Despite this phase of instability, connectivity with North Africa was maintained. There are two Keay XXV (circa fifth century) amphorae on display at the Gozo archaeological museum (**Figure 4.33**). These originate from the multiple wreck site at Xlendi. The presence of a wreck at Xlendi with North African goods on board alludes to the use of the ancient route from Tunisia to Malta and beyond via the island of Pantelleria. One Keay XXV (VII in **Figure 4.34**) is also illustrated in the Barbaro description of the harbour complex, as is a spatheion (V in **Figure 4.34**). Furthermore, some time in the nineteenth century a spatheion was brought up from the seabed of the Grand Harbour (**Figure 7.35**).

4.8 Concluding Remarks

During this period, there is a marked shift away from the cultural and economic traits of the Punico-Roman period. The introduction of olive oil production replaced past agricultural activities and it also made available a new local produce for commercial exchange. Furthermore, Rome's grain requirements and the official trade in North African grain helped define Malta's maritime role during the period under discussion. In turn, this new role had a direct bearing on the evolution of the large port at Marsa.

This integration into a Mediterranean-wide trade network had a direct bearing on the prosperity of the island and its inhabitants, as attested by the highly decorated buildings discovered both in Rabat and elsewhere (at the baths of Ghajn Tuffieħa for example). If a population of 14,000 did indeed inhabit the island, there can be little doubt that the maritime transport of sufficient grain, other foodstuffs and raw materials played a vital role for their survival and well-being. This could only be achieved if the island was fully integrated in the Roman world.

Chapter V

The Maritime Landscapes of Byzantine Malta (circa 535AD to 871AD)

5.1 Introduction

‘Archaeology has not, so far, contributed much to our knowledge of Byzantine Malta which, in the almost complete absence of documentary source material, remains an essentially obscure period’ (Buhagiar 1994: 77).

Until recently, the key works on Malta during the Byzantine period were based mainly on written sources (Brown 1975 and Pertusi 1977). Recently, Bruno and Cutajar (2002) published an overview of available material evidence for this period highlighting the potential contribution of archaeology to our understanding of the Byzantine phase. To date, the final reports of recent excavations relative to Byzantine archaeology have not been published.²⁷ Subsequently, the bulk of the material awaits final analysis and publication by the excavators. Fortunately, snippets of information have become available via a limited number of review articles that have appeared in the last decade (Cutajar and Molinari 1999 and Cutajar 2001).

²⁷ Publication of the final reports that are pending (name of site followed by the year of excavation): a) Xatt il-Qwabar Marsa (1993); b) Tomb at Tal-Barrani (1993); c) Underwater site at Marsascala (1993); d) Mdina (1998-2001); e) Tal-Gharghar (1992).

After the fall of the Roman Empire in the west, the Maltese Islands may have been occupied by Vandals and Ostrogoths (Bonanno 1992: 17). Although not attested archaeologically, this supposition is based on what was going on elsewhere in the central Mediterranean. Around the year 455, 'the Vandals of North Africa invaded Sicily and other *insulas maximas* which they eventually handed over to the Herulian Odovacer in return for tribute' (Buhagiar 1994: 98). It is plausible to consider Malta as one of the islands that formed part of the above-mentioned 'diplomatic' deal.

Also hazy is the transition to Byzantine rule. Procopius, writing in the sixth century, tells us that the fleet under the command of the Byzantine general Belisarius called into the harbours of Malta and Gozo in 533AD. The Greek general was on his way to re-take Carthage, which was then under Vandal rule:

But when the servant had come before him and told him the whole story, Belisarius rejoiced greatly, he heaped praise upon Procopius and gave orders for the departure to be signalled by trumpets. Having set sail quickly, they touched at the islands of Gozo and Malta, which separate the Adriatic and Tyrrhenian Seas. There a strong east wind arose for them and carried the ships the following day to that part of the African coast which the Romans call in their own tongue 'Head of the Shallows' (Proc., *Bel. Vand.* I,14,16).

The Byzantines used the islands to wait for the right wind conditions in order to proceed with their journey. It is not clear whether after his stop at Malta Belisarius retained a permanent garrison on the island. It certainly would have made strategic sense to rob the Vandals of a potential (temporary) naval base from where they could harass Greek ships and shipping in the central Mediterranean. Also of interest is Procopius' reference to Malta and Gozo as dividing the Adriatic and Tyrrhenian seas. This gives an indication of how the islands were perceived by the Greek historian, possibly as lying on an invisible maritime boundary that divided Byzantine and Vandal naval powers found respectively to the east and west of this border.

Although the date for the conquest of Malta by the Byzantines is taken to coincide with their conquest of Sicily in 535, this assumption has evolved by default on the basis that Malta has always followed Sicily's destiny (Buhagiar 1994: 99). The fall of Malta into Byzantine hands must be observed within the context of Byzantine

expansion under Justinian (reigned 527-565). Procopius suggests that following the Berber attacks on Libya in 544, many Libyans fled from the devastation to Sicily 'and other islands', probably including Malta and Gozo (Proc., *Bel. Vand.* II, 23). More suggestive is Procopius' reference to the voyage of Artabanes of Cephalaria in 550 (*Bel. Goth.* III, 40, 17). On his way to Sicily, where he was to take up his post as military commander, Artabanes' ship lost its mast and fortuitously made its way to Malta. Given that there is no mention of Artabanes falling into enemy hands, it is safe to assume that Malta was under Byzantine rule by 550.

By the year 606, both Malta and Gozo were mentioned in the list of Byzantine cities compiled by George of Cyprus. The mention of both islands by name has recently been interpreted to mean that the islands were not only part of the Sicilian *eparchia*,²⁸ but were places of some importance in their own right (Bruno and Cutajar 2002: 111). The Byzantine period lasted for over two centuries and came to a violent end in 871 when the islands were conquered by the Arabs.

5.2 Settlement Patterns in the Byzantine Period

The spatial contexts of archaeological remains for the Byzantine period have been subdivided into: a) urban; b) inland; and c) coastal (or near the coast) (Bruno and Cutajar: 2002: 114). Substantial archaeological remains point to the continued use of the main urban centres in both Malta and Gozo and have even led to the tenable idea of continuity from the Roman and late Roman periods (Cutajar 2001a: 83). A series of recent excavations have brought to light some remains that are datable to the period under discussion. At Mdina, still the main urban centre, changes carried out between the eighth and ninth centuries saw urban spaces taken over for fortification purposes (Cutajar 2001a: 83).

The Byzantine period of Malta's history can be divided into two sections: a) an initial phase that lasted until some time in the seventh century with a degree of continuity from the Roman period; and b) a subsequent phase, with evidence of population and economic contraction, lasting until the conquest of the island by the

²⁸ The region subject to a prefect.

Arabs in 870. Inhabitants of early Byzantine Malta also retained Marsa as their main port complete with the Roman structures on Kortin Hill (described in chapter seven). Considering the continued activity in this area, it is reasonable to assume that the hypogea discovered near these port structures were also used for burials during the early Byzantine period. The lives of Marsa's inhabitants were inevitably linked to maritime activity around the harbour. Given that remains of the Marsa settlement and its burial sites do not exist, it is second-hand information on the port structures that provide a date for the abandonment of this site (c. early 7th century) (harbour remains are discussed in **section 5.6.2** below).

Many of the burial complexes in rural and coastal areas utilised during the Roman periods were abandoned some time in the sixth and seventh centuries. Recently surveyed tombs around Mgarr, for example, were in use from the Roman to the early Byzantine periods, based upon local tomb typologies (Buhagiar 2000: 23). Similar chronological patterns are also evident at the Salina hypogeum, where decorative and iconographic evidence suggest a late date. For example, the chi-rho monogram in Hypogeum 15 and the baldacchino-tombs in Hypogea 1, 3 and 5 all point to a post 4th century date. A gold coin of Phocas (602-610) provides the latest datable object from this site.

An excavation of an undisturbed tomb undertaken in 1993 at a site known as Tal-Barrani brought to light material that indicates it was utilised throughout the imperial period and late antiquity with the most recent objects being amphorae of the types Late Roman 1 and Late Roman 2, which are datable to the sixth and seventh centuries (Bruno and Cutajar: 2002: 119). No burials were found over the levels containing late Roman and Byzantine material, confirming the above-mentioned dates for the last burials at this site.

Despite the cultural, political and economic turmoil brought about by the fall of the Roman Empire in the west, settlement patterns in Malta during this transitional period were mainly unchanged. In late antiquity and even later, some of the Roman burials, as in the case of Salina, continue to be used. However, an emerging pattern of tomb abandonment is datable to the late sixth and early seventh centuries, which leads to the consideration of two possibilities that are not mutually exclusive. Firstly, burial

practices underwent changes including a move away from rock-cut hypogea towards interment in graves dug in earth. To date, there is no archaeological evidence supporting this view. A more convincing argument is that this abandonment reflects a diminishing socio-economic fabric of the island. The fact that activity at larger rural sites such as that at San Pawl Milqi is much reduced strengthens the latter hypothesis.

During the first century of the Byzantine period (circa 550-650 AD), the islands' inhabitants continued to occupy most of the same urban and rural sites as they had done in late antiquity, as attested by both the re-utilisation of rock-cut tombs and pottery evidence from a variety of sites. Some time during the late seventh century, there is a detectable move away from smaller rural and coastal sites such as those at Hal-Millieri (see below), Mgarr and Salina. Walled defences of larger sites such as Tas-Silg offered protection explaining their continued use in the latter part of the Byzantine period. The afore-mentioned restructuring of Mdina carried out during this period is linked to the strengthening of fortifications around the urban centre (Cutajar 2001a). Available evidence points to a population moving away from open, unprotected sites to enclosed spaces that offered some form of protection. The probable cause of this is Arab expansion along the North African coast and in the central Mediterranean (this is discussed in more detail in **section 5.7**).

In the later part of the Byzantine period, the island underwent important changes in settlement patterns. The lack of rural burial sites away from the main urban centre of Melite from the late seventh, eighth and ninth centuries suggests a nucleation of the population in the main urban centre and renders the study of rural settlement patterns all the more challenging. Data from an excavation at Hal-Millieri clearly indicate the abandonment of this site some time in the sixth to seventh centuries. Pottery datable to these periods was found under later medieval layers, providing evidence for abandonment and eventual reoccupation of this site at a much later date (Blagg et al 1990: 43-44). Remains from San Pawl Milqi and Tas-Silg confirm a certain degree of activity at these sites. Material evidence from the former site sheds light on much reduced consumption (see **table 5.1** below) (Bruno 1999: 100). On the other hand, following a marked reduction in activity during the fifth and early sixth centuries AD, ceramic percentages indicate the regeneration of Tas-Silg from the second half of the sixth century all the way to ninth century (Bruno 1999: 100). This suggests some kind

of a revival, followed by a decline that probably coincides with the Islamic invasion of the island. Given that both the villa and sanctuary were surrounded by earlier defensive structures, it is not surprising that these sites continued to exist during this period.

Site	Objects from: 400-550 AD	Objects from: 550-699 AD	Objects from: 699-899 AD
San Pawl Milqi (of 491 objects)	0.7%	2.9%	1.4%
Tas-Silġ (of 2722 objects)	2.1%	14.3%	7%

Table 5.1 Percentages of amphorae at San Pawl Milqi and Tas-Silġ for the Byzantine period (after Bruno 2004: 112; 132)

5.3 Roads and Terrestrial Transport

Given that the main harbour and urban settlement remained unchanged during the first century of Byzantine rule, it is reasonable to assume that the extant road network continued to be used during the initial part of this period. This is especially true for coastal areas, where harbours previously used by the Romans were still witness to maritime activity. Despite the lack of evidence for the ancient infrastructure, the existence of roads connecting the main urban centre to the harbour areas is plausible. For the rural areas, access to the sea would have been via paths and secondary roads that probably followed the valleys to the sea. The lack of detailed information as to the rural settlement patterns during the late seventh, eighth and ninth centuries renders it difficult to reach concrete conclusions with regard to the evolution or gradual collapse of the ancient road system.

5.4 Population Figures

In his seminal work on the Byzantine period of the Maltese islands, Brown (1975) is silent about population estimates, as is the most recent publication on the period: *‘nessun elemento permette di valutare la consistenza demografica nel corso*

dell'età imperiale e in età bizantina' (Bruno 2004: 53). The difficulty for the Byzantine period is compounded by the above-mentioned uncertainty regarding the settlement patterns of rural areas and the layout of the main urban centre. In the absence of rural burial sites that can be dated to the late seventh, eighth and ninth centuries one can assume that the rural population of the islands contracted and relocated to smaller fortified nuclei such as at San Pawl Milqi and Tas-Silġ (Bruno 1994: 170). From such centres, the inhabitants could work and exploit the surrounding countryside.

5.5 Productivity and Consumption

Concerning San Pawl Milqi, data from the Byzantine period are conspicuous by their absence. The stratigraphical layer overlying the oil producing area shows clear signs that a large fire destroyed the industrial part of this site. However, material from this site is being studied and so far, a definite date for the final abandonment of the oil producing area remains elusive (D. Locatelli: pers. comm.). Ceramic evidence from the villa points to a serious decline in occupation levels at the site, suggesting that the Byzantine occupants of the villa were not exploiting the site's full economic potential. Parallel information from other coastal sites, mainly at Tas-Silġ, points to a period of destruction, abandonment and/or contraction that occurred some time during the seventh century. The relative proportions of ceramic remains from San Pawl Milqi reflect reduced consumption during this phase of occupation (see **Table 5.1** above). Based on available evidence, it is likely that the large-scale production of olive oil had ceased by the seventh century. Agricultural production was probably limited to subsistence farming and the exploitation of the surrounding countryside, with marine resources from the nearby bay supplementing the diet of the inhabitants.

5.6 The Harbours of Byzantine Malta

As with Roman times, the Byzantine period was witness to some significant changes with regard to use of the ports and harbours of Malta. This is especially true for the port at Marsa. Following the manmade improvements carried out during the Imperial period, this harbour was to witness a serious decline during the centuries under discussion. In the early Byzantine period, other harbours and anchorages played

a modest role in the changing trade routes of the central Mediterranean. However, these also faced decline in subsequent centuries. The archaeological record present within the seabed of various harbours and anchorages reflects a varying degree of maritime activity and is discussed below.

5.6.1 Approaches to Malta

Once again, oceanographic and other natural features on the four main approaches discussed in previous chapters remained unchanged. What did change, however, was the significance of the coastal sanctuaries. Both Ras ir-Raheb on Malta and Ras il-Wardiġa on Gozo were abandoned some time in the fourth century AD (Buhagiar 1988: 71 and 77). On the other hand, the sanctuary at Tas-Silġ appears to have remained in use although the sacred spaces within the site were modified to accommodate an early Christian place of worship. This place may have been of some importance during the Byzantine period since the ceramic deposits so far excavated at this site support the hypothesis of intensive activity (Buhagiar 1996). Imported amphorae (mainly from Sicily and North Africa) from the middle sixth to the seventh century point to some degree of interaction with the outside world (Bruno 1999: 83). It is difficult to establish what, if any, was the navigational role of the remodified sanctuary.

5.6.2 The Harbours and Port Structures

Material evidence from the so-called Barbaro complex points to the continued use of the main Marsa harbour during the first centuries of the Byzantine period, indicated by the eighteenth century descriptions, complete with illustrations, of the site's amphorae by Count Barbaro (**Figure 5.1**) (Barbaro 1794: 13). Analysis of the amphora illustrations²⁹ from the Marsa warehouses indicates that the bulk of these are Late Roman 2 amphorae similar to those from the Yassi Ada shipwreck excavated off the coast of Turkey (**Figure 5.2**) (Bass and van Doorninck 1982). The ship and cargo are securely datable to the first decades of the seventh century AD. The meanings of some graffiti found on various amphorae from both sites are also similar. The Yassi

²⁹ The present location of the Barbaro amphorae is unknown.

Ada graffiti and some of those from Marsa indicate contents, capacity and Christian symbols (**Figures 5.3** and **Figures 5.4a** and **5.4b**). This parallel provides an approximate date for the abandonment of the Barbaro complex at Marsa. The question to ask here is: what caused this abandonment? Environmental factors, such as sediment deposition, certainly played their part although dates for these occurrences are not available. The destruction of both archaeological and environmental evidence by the nineteenth century harbour extension has limited the possibilities for future acquisition of data needed to establish a chronological sequence for the siltation of the inner harbour.

Archaeological investigations carried out in 1993 uncovered evidence for the utilisation of part of the promontory, specifically at the foot of Kortin Hill (Xatt il-Qwabar) (**Figure 5.5**). These discoveries prompted some to conclude that this site formed part of the larger Barbaro complex (Bruno and Cutajar 2002: 122). Given the high probability that the Marsa port had an outer quay suitable for the summer months (see chapter 7.6.3), it is highly plausible that some of the structures uncovered in 1993 originally formed part of the Roman harbour complex. On the other hand, the hypothesis that both sites were abandoned some time between eighth and the early ninth century AD, also propounded by Bruno and Cutajar, is less tenable:

la ceramica fornisce un termine di datazione per l'ultima frequentazione e l'abbandono delle strutture: la sigillata Africana H. 109 suggerisce la fine del VII sec., mentre la presenza delle anfore <<globulari bizantine>> l'VIII-inizio IX sec. (?) (Bruno and Cutajar 2002: 122).

Despite the tentative ninth century date assigned to the 'globular' amphorae from Xatt il-Qwabar (**Figure 5.6**), the presence of sigillata Africana H. 109 in the same stratum suggests this may not have been an accurate dating since the latter is generally dated to the seventh century. Amphorae from the Barbaro complex together with the sigillata Africana (Hayes 109) found in the 1993 excavation, strongly suggest abandonment of the site some time in the seventh century. This conclusion is based on the limited information available to date and, upon the publication of all the material from Xatt il- Qwabar, it may be modified.

A problem exists with both dates suggested for the abandonment of Marsa. The first reference for a ‘new’ harbour is from much later and dates to the early thirteenth century (Wettinger 1993: 33). It is difficult to establish whether another site evolved elsewhere in the Grand Harbour. There can be little doubt that, despite the abandonment of the large Roman complex, the Kortin promontory was still used by some ships. This hypothesis is strengthened by references to this area in late medieval sailing instructions (discussed in section 10.6). Investigating the continued use of the Marsa area is beset by difficulties and compounded by the following three factors: a) the destruction of the archaeological record by urban development around the harbour area; b) the disturbance of the seabed by dredging and other industrial activities; and c) the lack of systematic research in the field of underwater archaeology.

5.6.3 Other Harbours

Burial sites datable to the early years of the Byzantine period in places such as Salina point to the continued use of secondary harbours. Archaeological finds from an underwater context at Marsascala confirm maritime activities in other harbours during the first phase of the Byzantine period. A recent analysis of material from the underwater excavation at Marsascala (**Table 5.2**) shows that the majority of finds belong to the amphora types Late Roman 1 and 2, which the excavators concluded belonged to a form that was predominant in the sixth century (Azzopardi 2002: 31-32):

Type	Bases	Handles-necks-shoulders	Other sherds	Total
African	2	2	33	37 = 33.9%
Late Roman 1		4	28	32 = 29.3%
Late Roman 2	1	1	11	13 = 11.0%
Late Roman 4		1		1 = 0.9%
Unidentified Oriental		4	22	26 = 23.8%
Total	3	12	94	109

Table 5.2 Objects from underwater excavation at Marsascala (after Azzopardi 2002: 31)

Type	Total number of sherds	Date
Late Roman 1 amphorae	32 = 28%	5 th – early 7 th century
Late Roman 2 amphorae	13 = 11.4%	5 th – early 7 th century
Late Roman 4 amphorae	1 = 0.8%	4 th – end 6 th century
Unidentified Oriental Amphorae	24 = 21%	6 th century (tentative)
African Sigillata	2 = 1.7%	2 nd half of the 6 th century
African amphorae	35 = 30.7%	5 th to 6 th century
<u>Total from 6th century</u>	<u>107 = 93.8%</u>	
African Sigillata	2 = 1.7%	1 st half of the fifth century
Common ware	1 = 0.8%	4 th century
African amphorae	2 = 1.7%	End of 4 th - mid 5 th century
Unidentified Oriental Amphorae	2 = 1.7%	3 rd – 4 th century
<u>Total 3rd – 5th century</u>	<u>7 = 6.1%</u>	
<u>Total overall</u>	<u>114 = 100%</u>	<u>3rd – 6th centuries</u>

Table 5.3 Detail of objects found in Marsascala excavation (after Azzopardi 2002: 32).

The relative homogeneity of the deposit led the excavators to consider the presence of a wreck containing oriental amphorae lying in close proximity to other objects that, due to the varied chronology, were highly likely to be harbour debris (Azzopardi 2002: 32). The table above (5.3) illustrates the disparity between objects from the sixth century and earlier ones. These results are tentative as ‘only a small part of the deposit has been excavated and it is probable that this excavated area lies outside the boundaries of the main site’ (Azzopardi 2002: 33). What the data do confirm is the use of the bay during the early Byzantine period.

The use of Malta’s other harbours during the Byzantine period is also attested by ceramic deposits found on the seabed of various other bays and anchorages around

the island. An excavation carried out in Ta' Xbiex Creek, within the Marsamxett harbour complex, brought to light a number of sherds dated to the period under discussion (Azzopardi 2002: 33-35). These deposits were disturbed due to dredging and other human activity. The table below lists objects tentatively dated to the Byzantine period (Table 5.4):³⁰

Period	Description	Artefact number	Figure ref.
Byzantine	Rim and Handle	QH 375	5.7
Byzantine	Cooking pot	QH 376	5.8
Late Antique/Byzantine	Rim	QH 387	5.9
Roman/Byzantine	Rim and 2 sherds	QH 414	5.10
Late Antique/Byzantine	Rim	QH 034	5.9
Late Roman	Amphora sherds	QH 147	No figure
Late Byzantine	Cooking pot sherds	QH 370	No figure
Byzantine	Cooking pot	QH 114	No figure

Table 5.4 Byzantine objects from the 2001 excavation at Marsamxett harbour (after Azzopardi 2002: 36).

In Sliema Creek, on the north side of Manoel Island (Figure 5.11), divers occasionally retrieve ceramic sherds (including a partial amphora) from the seabed. Some of these sherds date to the early Byzantine period (Figures 5.12; 5.13 and 5.14). Maritime activity in the harbour complex of Marsamxett has recently been linked to a nearby site known as L-Għargħar (Figure 5.11) (Bruno and Cutajar 2002: 123). Part of the architectural complex at this site is dated to the fourth to seventh centuries AD 'by means of ceramic fragments – such as ribbed amphorae shards – as well as by a comparison with building techniques used on similarly dated buildings' (Cutajar 2000: 5). A number of 'ribbed' ceramic sherds from Mistra Bay are probably datable to the early Byzantine period (Figure 5.15). As with the underwater remains from Marsascalea, it is unclear whether these ceramics form part of the cargo of a

³⁰ Dates are based on a preliminary study of the objects by N. Cutajar as listed in the database of the excavation.

wreck and/or part of a harbour deposit. To date we have no evidence for any Byzantine sites around Mistra Bay and its hinterland.

Although the archaeological record from the seabed of these bays is fragmented, one can safely assume that ships made use of Malta and its harbours during the initial part of the Byzantine period. Increased maritime traffic linked to grain shipments from North Africa to the eastern Mediterranean enhances the likelihood of vessels having to call at the island. Evidence for large-scale maritime activity and exchange in the eighth and ninth centuries is lacking from data reviewed in this section.

5.7 Connectivity

At Marsa, the continued use of the main Roman harbour complex also alludes to uninterrupted use of the site until some time in the seventh century. The use of Marsa and other harbours such as Marsascala point to the island’s connectivity within the Byzantine world. One way of gauging this connectivity is to look at some of the amphora evidence for this period. Early Byzantine amphorae discovered in Malta originate from a variety of regions (Table 5.5):

Type	Found	Origin	Date
Late Roman 1	Marsascala; Marsa; Rabat	Eastern Mediterranean	c. 5 th to 6 th century
Late Roman 2	Marsascala; Tas-Silġ	Aegean	c. 5 th to early 7 th century
Late Roman 4	Marsascala	Middle East	c. 5 th to 6 th century
Small Spatheion	Grand Harbour;	Sicily (?)	c. 4 th to end 6 th century
Keay XXV	Marsa; Mdina; Tas-Silġ ; Rabat	North Africa	c. late 3 rd to 5 th century
Keay LII	Tas-Silġ; Rabat (?) San Pawl Milqi	Sicily	4 th to 6 th century

Table 5.5 The various amphorae found in Malta that are datable to the Byzantine period.

The presence of 'oriental' amphorae does not necessarily mean that Malta received all these objects via a direct maritime link with the eastern Mediterranean. Some goods may have also reached the island after transshipment at secondary ports in the Adriatic and/or Sicily. What is certain is that the delivery of oriental goods to Malta is attested in the archaeological deposits of various ports and anchorages. Oriental goods from terrestrial sites such as Tas-Silġ and Rabat suggest the existence of trade links with the east. During the mid- to late sixth century, amphorae from the Aegean and other areas in the eastern Mediterranean are present at Carthage. Fulford correlates the Byzantine occupation of Tunisia with increased contact between the east and Carthage' (Fulford 1984: 260). Malta's connectivity with the eastern Mediterranean must be studied within this context.

There is enough evidence available to argue in favour of Malta as an important stopover in the maritime route from the Aegean to Carthage during the sixth and early seventh centuries. Archaeological evidence confirms that oriental amphorae were reaching the island. The harbour complex at Marsa, complete with its large warehouses, was in use. The intact Late Roman 2 amphorae discovered in the Barbaro complex confirm that Marsa was receiving goods from the east. From a nautical perspective, a ship's captain had three routes to choose from: a) to sail south across the central Mediterranean; b) to sail from the Aegean to Sicily and on to the North African coast via the central Mediterranean islands and c) to sail via the southern coast Sicily (**Figures: 5.16; 5.17 and 5.18**). Malta's geographical position was especially important for the first two routes. For the southerly route, the island must have provided an essential waypoint and/or stopover for vessels arriving from the expanse of open sea in the east. Sighting Malta must have been essential so as to avoid drifting further south towards the Gulf of Sirtes. For the island route, vessels could stop at various ports and islands including Syracuse, Malta and Pantelleria where they could wait for the right sailing conditions as well as engage in some commercial activity.

Although the majority of imports for this period originate from the eastern Mediterranean, some North African amphorae are also attested in the archaeological record (see **tables 5.2 and 5.5** above). The above-mentioned revitalisation of the sanctuary at Tas-Silġ coincides with an increase of North African imports in the sixth

and seventh centuries. Amphorae from Tas-Silġ include Keay XXXVB, Keay VIIIB and Keay LXIIQ (fifth to sixth century) (Bruno 1999: 128). The presence of these objects indicates that maritime routes with North Africa were operational in both directions. The west-east trade route during the sixth century served the large shipments of grain sent from the North African territories captured from the Vandals and Ostrogoths back to Constantinople (Treadgold 1997: 275).

Some time in the seventh century, all this seems to change. Hypogea throughout the island are no longer utilised and yet no alternative burial sites have been discovered. Many rural and coastal sites either were abandoned or were witness to minimal human activity. At Burmarrad harbour, for example, the hypogea were no longer in use after the first half of the seventh century, and San Pawl Milqi shows signs of further decline (see **table 5.1** above). There is no evidence for human activity at the rural site at Hal-Millieri after the seventh century until the site was reoccupied nearly 500 years later (Blagg et al 1990: 43-44). Based on ceramic evidence (see **table 5.1** above), Tas-Silġ is the only site away from Mdina-Rabat that continues to witness a significant degree of activity, albeit much reduced. The economic decline in Malta coincides with a decline in Carthage, where it is suggested ‘that the mid 7th century is about the time when trade contact, already low, declines to a level that is almost archaeologically invisible’ (Fulford 1984: 261).

Economic decline in the central Mediterranean also corresponds with a shift in Mediterranean naval power away from the Byzantine Empire:

‘A successful raid on the island [of Cyprus] was made in 649 [...] in 655, less than twenty years after the Arabs had descended on the shores of the eastern Mediterranean, an Arab fleet gained the big naval victory of Dhat al-Sawari, “the battle of the masts” off the Lycian coast near Phoenix. Before many years had passed the Arabs were raiding Sicily and threatening Constantinople itself with their fleet’ (Hourani 1995: 56).

The newly constructed Arab fleet raided the islands of Crete, Rhodes and Sicily between 652 and 654, and the above-mentioned annihilation of the Byzantine fleet by the Arabs delivered ‘the first hammer blow to the integrity of the Mediterranean’ (Pryor 2003: 159). Arab expansion was no longer restricted to areas surrounding the Arabian Peninsula, and their establishment in various other parts of the Mediterranean was beginning to take shape. By 670, the Arabs were settled in Tunisia and on the

coast of modern day Libya, although the city of Carthage remained in Byzantine hands till 698 (Montgomery Watt and Cachia 1965: 8).

This new territorial division, coupled with increased Arab naval activity, placed Malta in a precarious position, a situation hardly conducive to the flourishing of small, unprotected rural and coastal communities. It is not surprising, therefore, that the inhabitants chose, or were perhaps forced, to abandon their unprotected farmsteads in preference for more protected zones such as Mdina. The aforementioned modification and fortification of the urban centre adds substance to this hypothesis. One obvious consequence to this new threat would have been an abandonment of existing agricultural plantations.

By finding itself in the centre of a newly fragmented Mediterranean, Malta also lost out on its role as a base for the transiting of ships and their cargoes. This is especially true for the route linking the Aegean to the North African coast. By losing North Africa to the Arabs, the Byzantines also lost a fundamental supply of grain (Özveren 2003: 234). The seventh century date for the abandonment of the main port at Marsa points to a dire situation that coincides with the Arab raids and the new, less favourable economic situation. In various phases of the island's history, Malta's geographical position had served to the economic benefit of its inhabitants. The new political, cultural and economic landscape of the seventh century Mediterranean greatly reduced the island's potential for the transshipment of goods and as a centre of auxiliary maritime services.

Following the abandonment and/or destruction of the port complex at Marsa, there does not seem to be any effort made towards its reconstruction and regeneration. Elsewhere in the Mediterranean, such as at Ostia, for example, there was also neither the political will nor, more importantly, the economic stimulation to reconstruct the old port complex or relocate the commercial centre to a new site (Coccia 1996).

From a few fragmented written sources, namely the *notitae episcopatum* of the late eighth and early ninth centuries, it can be deduced that Malta formed part of the province of Sicily. At some stage during this time, Malta is mentioned as one of the bishoprics under the metropolitan of Syracuse (Brown 1975: 80). This information points to a link between Malta and Sicily, a link that probably went beyond the realm

of the Church, extending to social and political ties. During the Byzantine period, Malta was used as a somewhat infamous destination for exiled persons. In 637, a conspiracy against the emperor Heraclius (610-641) was uncovered, and the emperor punished the perpetrators by banishing them to different islands. One of the rebels, Theodorus, was sent to '*Gaudomelete*' (translated as Gozo and Malta) where the *dux* of the place was ordered to amputate one of his (Theodorus) feet on his arrival. The Maltese Islands were considered as being remote, a place where potentially dangerous rebels could be kept out of harm's way. The reference to a *dux* implies that Malta was governed by a regime of military officers similar to that of Italy and Sicily at the time (Brown 1975: 76). This idea is substantiated by the discovery of a seal, which is datable to the eighth century, bearing the name of Nicetas, and identifying him as *droungarios* and *archon* of Malta.³¹

The presence of such an official on the island suggests that it may have been the base for a naval fleet (Busutil 1971: 307). Despite there being no further direct evidence to substantiate such a claim, the suggestion deserves further attention. The Byzantine Empire faced an increasing threat from Arab expansion and it would have made strategic sense to maintain a naval fleet on Malta. Such a fleet would have had the potential to act as a first line of defence against Arab attacks in the central Mediterranean.

An increasingly militarised role for the island within the context of a Byzantine Empire under attack may have contributed to the retraction of the economy in the eighth and ninth centuries. Reference to a fortress destroyed by the Arabs in 870 alludes to a strong military presence on Malta (Brincat 1995: 11). Recent research on the medieval keep of Mdina points to a Byzantine origin for the fort, 'where the Byzantine garrison, under increasing Arab pressure could have been compelled to rationalise the defence of the large town' (Spiteri 2000: 18). The late Byzantine period in Malta exemplifies how events away from its shores can influence various aspects of life on the island. These aspects include settlement patterns, economic activity, maritime traffic and the possible evolution of the island into a fortified base. The following chapter will highlight subsequent changes brought about by the Arab invasion of the island.

³¹ This seal was purchased by a Maltese antiquarian in Tunis in the late 1800s. Its exact whereabouts are currently unknown (Brown 1976: 77).

Chapter VI

The Maritime Landscapes of Arab Malta (870 - 1091)

6.1 The Arab Conquest of Malta

Just over two centuries after the Byzantines established themselves in Malta, the Arabs ousted them from the island. In the years preceding the main attack in 870, it is plausible to assume that the island suffered some form of Arab attacks. The island could not have existed in a vacuum, unaffected by what was going on elsewhere in the central Mediterranean. This is especially true about Sicily, with which Malta had strong economic, political and cultural ties. The Byzantines, for example, lost and recaptured Pantelleria on various occasions during the eighth and ninth centuries. On Sicily, the Arabs conducted a long and protracted campaign before finally driving away the last Byzantines. In 827, the Islamic invasion of this island began when a rebel Byzantine naval commander offered suzerainty to Ziyadat-Allah, the then Aghlabid Emir of Ifriqiya. Palermo fell in 831, with the next major cities to fall being Messina (and thus the straits) in 843, Syracuse in 878, and finally Taormina, where the last Greeks held out until 902 (Pryor 2003: 168-172).

A passage written by Al-Himyari³² in the fourteenth century has recently shaken the traditional historical version of the transition from Byzantine to Arab rule (Brincat 1995).³³ The previously held and unchallenged idea in Maltese historical narrative was that, immediately after their victory over the Greeks, the Arabs established themselves permanently on the island.

According to Al-Himyari, following the Arab raid on the island in 870 AD it:

‘remained an uninhabited ruin, but it was visited by shipbuilders, because the wood in it is of the strongest kind, by the fishermen, because of the abundance and tastiness of the fish around its shores, and by those who collect honey, because that is the most common thing there’ (Brincat 1995: 11).

Al-Himyari wrote over four centuries after the event and was therefore dependant on other sources for his information. Despite this, he is reasonably accurate on the geographic details related to the island, probably drawing on works of earlier Arab geographers. Brincat (1995) scrutinised this passage and confirms that the late medieval author is accurate in his references to the various Arab rulers mentioned in the text. This chapter explores the limited archaeological data available alongside the Al Himyari text and other historical sources.

6.2 Settlement Patterns in the Arab Period

The description of Malta by Al-Himyari as an ‘unpopulated ruin’ suggests that no people remained on the island after the Arab attack. Archaeological evidence for the ninth and tenth centuries is not abundant, although this can be partly explained by a disdain with which the Arab/Islamic phase of Malta’s history was looked upon in the past (discussed in chapter 1). Recent excavations in the town of Mdina have brought to light fragments of Islamic wares from the late tenth century that partly contradict Al Himyari’s account (Cutajar 2001a), for these finds provide evidence of human activity at a time when, according to the Al Himyari, the island should have been uninhabited. One of the conclusions contained in a preliminary report on the

³² Al-Himyari was a fourteenth century jurisconsult and notary from the Maghreb. His book, *Kitab ar Rawd al-miar* chronicles the history of the Arabs in the Mediterranean during the Middle Ages.

³³ Whilst the works of Al-Himyari have been known, in the context of local historiography the passage on Malta is a relatively recent discovery (1990). See Brincat 1995.

excavations was that 'there is so far little in the archaeological evidence to justify the idea that the town lost its former population in a rapid and violent manner' (Cutajar 2001: 82). However, a closer look at the Islamic pieces from the Mdina excavations that have so far been published indicate that these date to the late tenth and eleventh centuries (Molinari and Cutajar 1999 and Cutajar 2001). In all probability, the island was depopulated as a result of the Arab invasion. However, the transition period from Byzantine to Arab rule remains unclear in the archaeological record.

As for the later phase of the Byzantine period, there exists little or no evidence for the widespread occupation of rural areas. Explanations for this phenomenon may include: a reduction of the population as a result of war and invasion, and the choice of the people to remain in or around fortified areas. There is a complete lack of burial sites situated at a significant distance away from the main urban centre of Mdina-Rabat.³⁴ Tas-Silġ does provide some evidence that small communities did survive, probably in fortified settlements. The main body of archaeological evidence for the early Islamic period of this site is once again dependent on the ceramic deposits, particularly the amphorae (Bruno 1999: 85). The percentage of amphorae for this period is the lowest for the entire period studied, suggesting some form of setback during the ninth century. Further activity is attested in the rural stretch just north-west of the urban centre, at a site named San Ċir, which has a variety of ceramics also datable to the tenth and eleventh centuries (Figure 6.1) (Molinari and Cutajar 1999: 11 and 14).

Archaeological evidence from another rural site, that at Hal-Millieri (Figure 6.1), is indicative of an interruption in the occupation of the area. The layer over those with Roman and early Byzantine ceramics contained two coins from the twelfth century and ceramics from later dates (Blagg et al 1990: 69). At San Pawl Milqi, an even bigger drop in activity marks the years following the Arab attack, as ceramic evidence for the ninth and tenth centuries is barely identifiable (Bruno 1999: 101).

The rebuilding of the island following the Arab invasion and the return to a degree of demographic stability would have been a gradual process. According to Al-

³⁴ Given that the ancient town of Melite came to be known as Mdina and Rabat some time during the Arab period, it is now opportune to refer to this urban centre by its medieval toponym.

Himyari this situation changed ‘after the year 440 A.H. [1048-49 AD] when the Muslims peopled it and they built its city, and then it became a finer place than it was before’ (Brincat 1995: 11). This reference follows on from the author’s previous portrayal of the island as being uninhabited. Given that the archaeological evidence disproves this source, one must read into what Al-Himyari was alluding to. By ‘peopling’, the author probably meant that there was a concerted effort to regenerate the island by increasing its population with settlers from overseas and improving its urban centre. The colonists may have viewed the island as a vacuum ready to be filled. Archaeological evidence substantiates Al-Himyari’s account with regard to the later Arab period, with evidence for a flourishing Islamic community in the eleventh century. However, it is not yet clear where the new settlers hailed from.

A number of Muslim coins discovered in Malta over the centuries provide one of the main bodies of evidence related to the Arab period. H.W. Brown surveyed these coins and the results show that most are datable to the eleventh century (Table 6.1). This supports the hypothesis for a gradual recovery culminating in the mid-eleventh century. The comparison of ‘Maltese’³⁵ Muslim coins with those from a published collection in Sicily shows a similar pattern in both islands ‘giving support to the conclusion that the picture that emerged from the Malta [coin] survey was not seriously distorted by chance factors’ (Brown 1992: 4).

Dynasty	Approximate Date-Range of Coins	Malta	Sicily
Umayyad, pre-reform	c.	6	-
Post-reform	c. 700-750	17	20
Abbasid, before c.815	c. 750-815	5	30
Abbasid, after c. 815	c. 815-c.925	1	13
Aghlabid	c. 865-905	14	104
Fatimid	c. 1000-1110	48	209

³⁵ The term Maltese denotes coins found in Malta and does not imply that coins were minted on the island (Brown 1988).

Dynasty	Approximate Date-Range of Coins	Malta	Sicily
Murabit	1085-1126	2	1
Umayyads of Spain	c. 965-975	1	1
Ghaznavid	c. 976-997	1	-
Muwahhid	?1130-1245	10	4
Hafsid	1228-1277	2	76
Ayyubid	c. 1170-1250	2	76
Bahri Mamluke	c. 1250-1380	3	9

Table 6.1 Arab coins in Malta (after Brown 1992: 4).

There are a surprisingly high number of coins datable to the pre-Arab period. There can be two explanations for this phenomenon, neither of which excludes the other: a) that the Byzantines interacted with the Arabs in previous centuries, but whether such interaction was through war or trade (or both) is, at this stage, difficult to ascertain; b) during the Arab period, the inhabitants hoarded coins from previous dynasties.

A clear pattern that does emerge from the comparison listed above is that the presence of Muslim coins increases substantially during the Aghlabid period. Alongside the other fragments of archaeological evidence discussed earlier, this information adds consistency to the idea of some form of human occupation during the years that followed the Arab invasion of 870. The coins from the Fatimid period are the most numerous and are from the same chronological phase as the ‘repopulation’ of Malta. For the two periods, the percentages from the total coins found in Malta and Sicily are as follows (**Table 6.2**):

Dynasty	Malta	Percentage	Sicily	Percentage
Aghlabid c. 865-905	14	23%	104	33%
Fatimid c. 1000-1110	48	77%	209	67%

Table 6.2 Percentages of Aghlabid and Fatimid in Malta and a Sicilian collection.³⁶

³⁶ The Sicily coins listed are mostly from old family collections from the same island and published in B. Lagumina’s *Catalogo delle Monete Arabe esistenti nella Biblioteca Comunale di Palermo* (Palermo, 1892)]; the total number is of course greater and relatively more of them are gold and silver denominations, but dynasty by dynasty the pattern is similar to that of the Malta coins, giving support

The difference in ratio is not overly different but the above comparisons have serious limitations. The future discovery of a small number of coins will have a significant effect on the percentages. Added to this, the exact dates of when the coins were minted during the listed dynasties are unknown, thus precluding a more accurate analysis of when these coins were circulating on the islands, but they do however, serve as *terminus post quem*.

The hypothesis of repopulation in the mid-tenth century is interesting as it coincides with two potential demographic movements: one away from Sicily and the other from North Africa. Between 1038 and 1040, the Byzantines successfully attacked various parts of Sicily, possibly forcing the Muslim population to seek lands elsewhere. In North Africa, the attacks and massacres by the Sunnis of the Shiites culminated in the latter recognising Abbasid domination in 1049 (Dalli 2002: 31). Malta may have been the destination for some Shiites attempting to escape persecution.

During the excavation of the Roman *domus* in Rabat, a large Islamic burial site was discovered overlying the classical remains. A recent analysis of the inscriptions from the tombstones concludes that these are datable to the eleventh and twelfth centuries (Cardona 2002: 83-86). Opulent burials and grave goods are not normally associated with Islamic burials and the ones in Malta are no different. However, the ornate tombstones from the site point to a society that enjoyed the means to decorate these stones with intricate funerary inscriptions (Figure 6.2). The majority of these are prismatic in shape, which belongs to a type known as *mqabriyyah*, of probable Maghrebi origin (Cardona 2002: 83). Of interest is that these burials lay directly above late Roman levels, indicating that this particular site remained unused during the Byzantine period. In addition, the discovery of these tombs outside the walls of present day Mdina gives a definite insight into the western boundaries of the fortified urban centre during this period.

to the conclusion that the picture that emerged from the Malta survey was not seriously distorted by chance factors (Brown 1992: 4).

6.3 Roads and Terrestrial Transport

Given that the island's rural fabric had sustained decay, it is not unreasonable to assume that many of the ancient roads also deteriorated during the early Arab period. The degree of interaction that existed between the town and 'distant' rural settlements such as that at Tas-Silġ is unknown. Situated close to the harbour of Marsaxlokk and surrounded by fertile land, a community at Tas-Silġ could have, if desired, existed self-sufficiently, minimising the need for contacts with Mdina. Little is known of the harbours that were in use during the early Arab period. Communities living in close proximity to the sea, such as that at Tas-Silġ, would have made use of small paths to gain access to the sea. Small roads must have also connected rural settlements, such as that at San Ċir, to the urban centre close by.

6.4 Population Figures

Population figures for the early Arab period would be, at best, very approximate. This is mainly due to the absence of adequate archaeological data and to the demographic upheaval witnessed by the island. For the post 1048-49 population of the island we are once again reliant on the same reference from Al Himyari, which sheds important light on the demography of the time:

'In the year 445 [1053-54] the Byzantines attacked it [Malta] with many ships and in great numbers, and they besieged the Muslims in the city and the siege became unbearable to them and they were hoping to take them. And the Muslims asked them for clemency, and they refused it except for women and belongings. And the Muslims reckoned the number of combatants among themselves and they found them to be about 400; they then counted their slaves and found that they were more numerous than themselves' (Brincat 1995: 11-12).

Brincat adds elderly men, women and children to the 400 men of fighting age and obtains a figure of 2,000 inhabitants, excluding slaves (Brincat 1995: 20). Given that they outnumbered the local inhabitants, the added men, women and children of the slave community would, when taken into account, swell the island's population to approximately 5,000 persons. Also of interest is the second desperate measure adopted by the local Muslims:

'If you are loyal to us in our struggle against our enemy, and you go as far as we go, and end up where we do, you shall be free men, we shall raise you to our level and we shall give you our daughters in marriage, and we shall make you partners in our riches' (Brincat 1995: 12).

Brincat deems 5,000 people a reasonable figure for the whole of the island (Brincat 1995: 20) but fails to mention that all would have had to seek refuge inside Mdina. Given the small dimensions of the walled town, this may be why the Muslims were willing to discuss desperate measures such as the granting of equal rights to the slave community. This part of the passage indicates that after the siege of 1053-54 the local population may have experienced not just an increase in numbers but also an ethnic mix that must have had some degree of influence on the shaping of future generations of Malta's inhabitants.

6.5 Productivity and Consumption

'Population is one of the principal variables in the highly mutable landscape against which intensification and abatement must be viewed: labour resources and the number of mouths to feed are in more than one sense vital elements in the choice of strategy' (Horden and Purcell 2000: 267).

As has been discussed, the archaeological evidence for the early Arab period points to a sparsely populated island. The reduced number of inhabitants would have placed less pressure on the island's resources from within. Given that people supposedly visited the islands to make use of available wood, the pressure on local resources originated from overseas. The mention by Al Himyari of shipbuilders 'visiting' the island presents an aspect that deserves further explanation. In recent times, Malta has not been renowned for its tree cover and lush vegetation. However, in chapter seven I have argued that for the Roman period archaeological evidence points to the widespread presence of olive trees around the island. These numerous ancient groves may well have remained abandoned, or at least partly so, during decades of sea borne raids. Once neglected, the landscape might have regenerated with the flourishing of indigenous trees such as the juniper and (Aleppo) pine. Therefore, the reference to an abundance of trees would coincide with a regeneration of the landscape with the presence of bees and honey during the early Arab phase attributable to the natural state of the environment.

To date, there is no archaeological evidence for any type of large-scale agricultural activity. Admittedly, new types of agriculture that may have been adapted

during the early Islamic phase are presently difficult to detect in the archaeological record. The majority of the evidence, however, points to a slow down in rural activity, and it seems more realistic that the early Arab inhabitants practiced small-scale agricultural production. It is reasonable to assume that agriculturally self-sufficient communities may have supplemented their diet with fish, marine molluscs, birds and other natural resources.

The repopulation of the island in the latter half of the eleventh century would have brought with it significant changes. A larger population requires a more organised and intensive agricultural system in order to guarantee the minimum amount of food needed for the inhabitants. Changes within agricultural practices would have evolved in parallel with a phenomenon that was spreading throughout the Mediterranean. The expansion of Islam into the Mediterranean region brought with it an influx of agricultural innovations including new crops such as cotton and sugar cane: 'the crops were transmitted still further west: across the Maghrib, into Spain and Sicily, and from one Mediterranean island to another' (Watson 1983: 80). No direct evidence exists for the exact date of the arrival of these new crops into Malta. However, a chronology is available for other areas in the central Mediterranean. In the decades before the 'repopulation' of Malta, the tenth century Arab geographer Ibn Hawqal and other travellers 'noted cotton growing in Tripolitania, around Tunis and Carthage, on the island of Pantelleria and near several towns in present-day Algeria' (Watson 1983: 40). During Islamic times, cotton was grown in Sicily and Spain and the earliest mention of its cultivation is by sources of the ninth-tenth centuries (Watson 1983: 40). Although none of the Arab sources mention cotton in Malta, its documented presence in the central Mediterranean leads one to believe that it could have been introduced some time in the late Arab period.

A document dated to 1164 contains the first concrete evidence for Maltese cotton. This document consists of an inventory belonging to the late Genoese merchant Giovanni Scriba who had traded with Sicily and other overseas regions (Abulafia 1975: 106). The date may initially seem late when compared to the above-mentioned references to cotton in the central Mediterranean. However, given that the merchant was dead when the document was written, it is plausible to push the date

further back than 1164. A date some time in the late eleventh or early twelfth century is realistic and would partly coincide with the late Arab period.

The presence of numerous slaves on Malta, as described by Al Himyari, points to a relatively prosperous society in the late Arab period. The proposed sharing of 'riches' with the slave community also alludes to a certain degree of prosperity. The alleged presence of large numbers of slaves and relative affluence (also attested by the large number of coins) were possibly linked due to the following reasons:

- a) Slaves were brought over specifically to work the land for the introduction of new cash crops such as cotton.
- b) Successful newly established agricultural enterprises and/or piracy facilitated the purchase of numerous slaves.
- c) Malta had some form of slave market.
- d) The newly arrived Arabs had enslaved the existing population (Dalli 2002: 32).

If the 'new' inhabitants did indeed plan an intensification of agriculture, the subsequent manipulation of the landscape and introduction of new crops would have necessitated a large labour force, and slavery would have provided the ideal source for such labour.

The hypothesis of a presence of slaves serving a wealthy society is substantiated by a large number of coins found in 1698 in Mdina (Brown 1992). These were discovered in a metal pot during the construction of the new cathedral. After much deliberation, the coins were divided between the Bishop and the Grand Master. The former subsequently melted and re-minted his share with the proceeds used to fund a substantial part of the cathedral project (Luttrell 1992).

The total number of coins found is unknown but their total weight was of just over 11kg. A calculation for an approximate number of coins is however possible. The standard dinar weight was circa 4.25 gm meaning that the coins must have totalled around 2,600. The seventeenth century description of the coins lists three sizes and alludes to the presence of smaller denominations (such as the quarter dinar). This would raise the amount of coins to circa 5,000 (Brown 1992: 7). From the contemporary translation of the coin inscriptions, Brown was able to identify the

provenance and date of some of the coins. The majority of the inscriptions were identifiable to the reign of al-Mustansir, the eighth Fatimid Caliph and are datable to 1038-1064. One was identified as a coin from the Almoravid Dynasty of North Africa and Spain of circa 1058-1087.

We do not know whether these coins formed part of a collective 'treasure' or part of an individual's wealth. Whichever the case, they represent a substantial amount of wealth. At some point somebody hid this large amount of coins. The relative homogeneity of the hoard and the latest identifiable date (c. 1038-1087) lead the author of the survey to suggest a link between 'the burial of the hoard with the upheaval caused by the Norman attack by Count Roger in the year 1091' (Brown 1992: 13).

6.6 The Harbours of Arab Malta

The exact use of the ports and harbours of Malta in the Arab period is unclear. On land, the archaeological record is patchy at some sites and totally absent in others. Documentary sources provide most of the information for this period with minimal material evidence to substantiate them. This 'darkness' extends over the Grand Harbour and to the various other harbours and anchorages around the island. Circumstantial, historical and environmental evidence are used below to rebuild as clear a picture as possible of human activity in the ports.

6.6.1 The Harbours and Port Structures

'The sediments are there, and it is vital to enquire what effect their arrival had on the economy and society of the locality' (Horden and Purcell 2000: 320).

The point of departure for this section is the natural state of Malta's ports and harbours during the Arab period. Marsa and its port complex were totally abandoned in the ninth centuries. Traces of fire, uncovered during the 1993 excavation, point to a violent end to the use of the structures on the outer-part of the Kordin promontory (Bruno and Cutajar 2002: 122). The above-mentioned retraction of the island's

population and reduced contact with other lands would point to the reduced use of the ports and harbours by the local inhabitants.

As with most of the early Arab phase, the starting point for this section of the discussion is Al Himyari. In his passage on the Arab conquest of the island, Al-Himyari states that shipbuilders visited Malta for its wood, as did fishermen for 'the abundance and tastiness of the fish around its shores'. The building of a ship from scratch requires a substantial human effort and a large quantity of timber. The passage refers to the island as having an abundance of trees, specifically pine, juniper and olive (Brincat 1995: 11). Of these trees, Aleppo pine is suitable for the construction of various parts of a ship including the keel, planking (Guibal and Pomey 2003: 36).³⁷ On the other hand, none of the three species mentioned were preferred for building the larger parts of a ship such as floor-timbers and futtocks (Guibal and Pomey 2003: 39). The olive, for example, is better suited for smaller parts of a ship such as treenails and knees (Guibal and Pomey 2003: 41). A number of Ballut (oak) place names present in various parts of the island point to the presence of oak trees. However, one it is not certain whether the place names refer to singular or multiple trees.

One cannot exclude the possibility of the occasional small ship built on the island during this period but such activity would be very difficult to trace in the archaeological record, mainly due to the non-permanent nature of a makeshift shipyard. Seafarers may also have stopped on the island for repairs, spending the winter months in a sheltered place and in close proximity to the supply of timber needed for the repair of their ships. Trees would also have been cut to provide material for the building of temporary shelters and firewood.

This is a very interesting notion, which is more than likely linked to the disappearance of the ancient groves and to the siltation of the harbours. All the ancient trees and groves had disappeared by the later Middle Ages (see chapter 10 section 5 below), with the 'deforestation' of the island's landscape rendering it unstable and more prone to erosion. The use of trees for shipbuilding and repairs

³⁷ The research project 'Dendrochronology and Dendromorphology of Ancient Mediterranean Shipwrecks' (Guibal and Pomey 2003) does not cover the tenth century and one must assume that, according to availability, shipbuilders retained the same preferences through time (Guibal and Pomey 2003: 41).

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evidence, in the form of coins from the ninth and tenth centuries, sustains the idea of interaction with overseas.

A facet of connectivity alluded to in Al Himyari is the phenomenon of 'nomadic' fishermen, known in the Mediterranean until relatively recent times. Men seeking more fertile fishing grounds and/or seasonal migrations of fish would leave their home port and establish themselves on some distant land. By doing so they would take advantage of better catches elsewhere. Throughout the Middle Ages and until the early twentieth century, fishermen from the village of Komiza on the Adriatic island of Viz left for fishing grounds off the uninhabited island of Palagruza. They would remain there in the summer months catching and salting fish, returning before the weather turned to the worse (Bozanic 2003). This is not an uncommon practice in the Mediterranean, and Al-Himyari's description of this practice is certainly plausible. It would not have been difficult for Sicilian fishermen to cross to the shores of Malta and take advantage of plentiful fish stocks found around its shores. Other resources, such as natural salt (that accumulates in the numerous rock pools along the coast) would have been available for the salting of the fish. The nomadic nature of this activity would make it difficult to discern in the archaeological record.

There is some evidence for a degree of activity between Malta and the outside world. For the Arab period, this is especially evident within the urban centre of Mdina and Rabat. However, to date there is not enough evidence to substantiate claims that Malta was 'fully integrated into the prosperous economic situation enjoyed by the Maghreb and by Sicily under the Kalbid Dynasty's rule' (Molinari and Cutajar 1999: 12). I believe that this claim was penned as a reaction to those who believed Malta was unpopulated during most of the Arab period. The truth is probably somewhere between the two.

It is now opportune to observe the connectivity that existed elsewhere in the Mediterranean during the period under study. In his seminal work on Mediterranean society in the Middle Ages, Goitein deals exclusively with the 'economic foundations' of contemporary Arab networks (Goitein 1967). The main sources for his research are the letters discovered in the Cairo Geniza, which were written by

Jewish merchants operating in the Arab world from the tenth to the thirteenth centuries. Large sections of his first volume deal specifically with trade routes, seafaring, piracy and other maritime aspects. In the numerous letters used and published, Malta is conspicuous by its absence. The island is not listed as a destination or as a stopover and there is no mention of Malta in the volume's section on piracy (Goitein 1967 Vol.1: 325-26). Even Goitein's unpublished note cards contain no reference to the island.⁴⁰ This may be a reflection of various things: a) confirmation of Al-Himyari's account regarding low levels of human activity and connectivity; b) any Geniza documents with references to Malta are as yet undiscovered in the large collections that are not yet fully studied; and c) the trade described in the Geniza documents may have differed from the shipping visiting and/or emanating from Malta.

There have been subsequent interpretations of Mediterranean trade routes in the High Middle Ages as described in the Geniza documents. Historian Abraham Udovitch studied a significant number of 'new' documents and published what he believed to be the main Alexandria-Palermo route (**Figure 6.5**) (Udovitch 1978). The route does not differ significantly from that proposed by Goitein and again there is no mention of Malta. The Alexandria-Palermo route as upheld by Udovitch is contrary to the oceanographic, climatic and sailing conditions of the area.

A recent appraisal of this route by maritime archaeologist Ruthi Gertwagen considers practical nautical aspects such as climatic and oceanographic conditions of the central Mediterranean. This indirect evidence leads her to argue in favour of a Tripoli-Malta-Sicily route in the tenth and eleventh centuries (Gertwagen 1996). Her idea that this route would have been preferable is plausible; especially when one considers aspects such as sailing conditions, time saved and safety at sea (**Figure 6.6**). Imported ceramics from the late eleventh century together with Muslim coins from the same period may be indicative of objects carried by vessels calling at Malta whilst crossing between the northern and southern shores of the central Mediterranean. This may be an important first step towards fully understanding Malta's role in the world of medieval Jewish merchants. The absence of more substantial evidence could be

⁴⁰ I am indebted to Prof. M.R. Cohen, Director, Princeton Geniza Project at Princeton University, for checking Goitein's unpublished note cards on geographical places.

due to the lack of intensive research of the islands' harbours, anchorages and territorial waters. Chapter ten contains a discussion for the post-Arab period and Malta's Jewish community activity in the pan-Mediterranean network of merchants.

Towards the end of the eleventh century, Arab domination of the central Mediterranean was ending, breaking up a generic cultural, political and economic unity present in the area. The following chapter covers the last centuries of the Middle Ages, a period that coincides with a pronounced division between various powers in the Mediterranean.

Chapter VII

The Maritime Landscapes of Late Medieval Malta (1091-1530)

7.1 Introduction

Archaeological evidence for the final centuries of this period is, as for the rest of the Middle Ages, not abundant. In part, an increase in documentary sources compensates the absence of archaeological material. This is especially true for the fourteenth and fifteenth centuries. Due to the many political changes and interludes occurring during this period, I have deemed it necessary to include a lengthy section on the historical background of the late Medieval period of Malta.

7.2 Historical Background

The event often taken to mark the end of Islam and the dawn of the Latin period of Malta is the Norman raid on the island in 1091. However, the origins of this can be traced to the writings of the early modern historian G.F. Abela who used this episode to argue in favour of the Christian and Latin roots of the Maltese people (Buhagiar 1999). The raid ought to be studied in the context of Norman expansion in the southern and central Mediterranean whereby the growing naval power of some Italian city-states gradually tipped the balance in favour of the Latin north.

In 1087, other islands and cities of the central Mediterranean, such as Pantelleria and Mahdia, had been attacked and sacked by Genoese and Pisan forces. The ability to launch such attacks reflects the increasing naval capabilities of some Italian cities and their expansion into various strategic outposts; these would contribute to their commercial development. The eradication of the pirate base on Mahdia weakened Arab shipping and naval capability, creating the possibility for attacks on other Arab outposts, such as that on Malta by the Normans (Luttrell 1975: 30). Count Roger's chronicler Malaterra is the main historical source for the 1091 raid. Due to the chivalric nature of the text, a degree of caution is warranted (Buhagiar 1999: 48). Following the attack on Mdina and the surrender of Malta's Islamic rulers, Count Roger sailed back to Sicily with all freed Christian slaves, who returned to their homelands, probably in the eastern Mediterranean. A large booty seized from Malta was also carried away. Towards the end of the eleventh century, the island may have hosted a pirate base or, alternatively, a market for goods and slaves that originated from piracy, which was often an inseparable part of Mediterranean trade and exchange. The fact that the Normans left the island points towards this attack being more of a raid than an all-out attempt at conquering and occupying the island.

In 1123, the Normans again attacked Pantelleria and Mahdia, albeit with negative results. Notwithstanding the earlier attacks of 1087, the Normans were forced to launch attacks against places that had been ransacked less than half a century earlier (Dalli 2002: 42). Despite the abovementioned raids, there must have been some form of renaissance in Arab maritime activity, including piracy, necessitating a Norman attack and eradication of Arab naval bases. Malta was ideally situated for use as an advanced base for the Arabs to launch attacks against Christian shipping in the central Mediterranean. The Normans felt compelled to return to Malta in 1127 and this time their presence on the island was to be of a more permanent nature.

With the establishment of the Normans, the Maltese islands took on a new role as a friendly port for Latin ships operating between the northern and southern Mediterranean. In 1184, 'a Pisan captain seized a Tunisian ship at Malta with the goods onboard it, and threw the crew into the sea' (Luttrell 1975: 31). This incident sheds light on the frequenting of Malta's harbours by both Muslim and Christian

ships, albeit not always with peaceful results. Besides mentioning the island's harbour, the Muslim geographer Idrisi (1099-1166) writes that 'shipping reached Scicli in Sicily from Calabria, Africa, Malta and many other places' (Luttrell 1975: 32). Another reference from the twelfth century describes Malta as inhabited by Saracens. This description from 1175, by the Bishop of Strasbourg, refers to the Islamic religion still prevailing amongst the majority of the population.

The history of Malta during this period is intricately linked to various political currents elsewhere in the Mediterranean, especially those on the neighbouring island of Sicily. When the latter passed from Norman to German rule (via marriage and war) in the early thirteenth century, Malta also found itself under Hohenstaufen rule. Frederick II (1194-1250) gradually asserted royal power over his Mediterranean kingdom, including Malta (Abulafia 1997: 16). Italian city-states such as Pisa and Genoa used this confused period of transition to their political and commercial advantage, specifically by gaining access to harbours in the central Mediterranean. The Hohenstaufen dynasty found it convenient to pass Malta on to individuals who would not simply protect the island but also exploit its position in the centre of the Sicilian Channel (McManamon 2003: 37). In the late twelfth century, the renowned pirate Margarito of Brindisi became a Sicilian royal commander and acquired the title of Count of Malta (Luttrell 1975: 35). All the successive counts of Malta were Genoese, the first of which was Guglielmo Grasso. By having a 'local' ruling the island, Genoa managed to secure the central Mediterranean routes that led to the Levant (Luttrell 1975: 35). The Genoese exploited the island and its harbours as a convenient stopover, compelling other maritime powers to give Malta and Gozo a wide berth to avoid being attacked and/or captured.

The most notable of these Genoese counts was Henry '*il Pescatore*'. From Malta, he attacked Pisan and Venetian shipping in the central Mediterranean and beyond. In 1204 and 1205 he set sail with comrades and attacked the Pisans in Syracuse thus marking 'the culmination of a series of violent attacks on Pisan shipping in and near Sicilian waters' (Abulafia 1975: 111). His exploits took him as far east as Tripoli in Lebanon where his 'deputies' made an alliance with Bohemond IV of Antioch-Tripoli, a deal which allowed Henry and the Genoese in general 'the freedom to trade within his [Bohemond's] domain' (Abulafia 1975: 112). Henry's

most audacious expedition was to Crete when in 1206 he sailed there, promptly capturing Candia and establishing a series of forts on the island. The Venetians saw this as a threat to their shipping routes in the eastern Mediterranean and responded by sending a fleet to attack the newly established Genoese interests on the island. By 1212, Henry Pescatore was ousted from Crete but not before securing a large pay-off from the Venetians. Frederick II eventually made Henry admiral of the royal fleet and allowed him to keep Malta as his fief.

Henry, as Count of Malta, was able to arm vessels and muster the manpower needed to carry out attacks in various places throughout the Mediterranean. There can be little doubt that due to Henry's status as both Count of Malta and of admiral of the royal fleet, Malta must have been geared towards providing a variety of maritime services such as repairs and victualling for his ships. Malta's population also contributed to the count's forces: in some of his expeditions up to 300 Maltese men sailed with Henry (Dalli 2002: 46). Although other Genoese retained the title of count, the rulers of Sicily made sure that the *Castrum Maris* (the castle at the tip of the Birgu promontory) remained under royal command, limiting the autonomy of the Maltese counts (Fiorini 1999: 359).

Thirteenth-century records draw attention to the existence of Maltese exports and include a document from 1248 that sheds light on the sale in Genoa of a Muslim Maltese slave girl called Maimona (Lopez and Raymond 1990: 116). It is not known whether this was part of an active slave trade on the island or whether this was a one-off sale. The sale of a Maltese Muslim on the slave market could be related to the gradual expulsion and/or conversion of the Muslims from the island in the first half of the 1300s. Cotton, too, was traded during this period and again it was Genoese merchants who played a leading role. During Angevin rule in the latter half of the thirteenth century, Genoese captains still used the main port of Malta but their presence was not always welcome. In January 1273, of the four Genoese vessels present in the harbour, two were captured and the goods on board seized (Wettinger 1993: 34-35).

From a political perspective, the thirteenth century was one of evolution and change and Malta passed from the Hohenstaufens to the Angevins and finally to the

Aragonese who ruled the island from the late thirteenth century to 1530. The passage of the island from German to French to Spanish rule was not without its difficulties, including a large naval battle fought between their opposing navies. In 1283, an Angevin fleet was moored inside Dockyard Creek under the walls of the *Castrum Maris* (Pryor 1983). The Aragonese ships interlocked their oars, thus trapping their enemy within the creek. A desperate attempt by the French to break out of the harbour ended in a comprehensive victory for the Spaniards. Despite this loss, the French retained the castle, highlighting its importance as the key to maritime communications for the island. Following the capitulation of the *Castrum Maris*, the Aragonese retained direct control of the fortified site throughout their reign in Malta. This ensured that all ships calling into and leaving the main harbour would be under the watchful eye of the ruling power, enabling the latter to control aspects such as port taxes.

An increasing number of documents help shed light on the maritime activity in and around the Maltese islands during the thirteenth century. Although they formed part of the kingdom of Sicily, the inclusion of the islands within the broader framework of Spanish power in the Mediterranean had a direct bearing on the nature of their economy and connectivity:

‘The urban patriciates of Catalunya, with their ports and industries, were responsible for the emergence of a single and strategic unit, a Western Mediterranean common market in which the merchants of Valencia, Barcelona and Perpignan could buy and sell in the Balearics, Sardinia and Sicily, while at the same time controlling in those islands the safe harbours they needed along their routes to lucrative markets in North Africa and the Levant’ (Luttrell 1975: 44).

Malta’s role within this network of commerce and exchange was that of a maritime base; but what exactly did the Maltese islands have to offer to this ‘common market’ of the western Mediterranean? The simple answer is harbours. Besides the main port at Birgu, protected as it was by the castle, its secondary ports such as those at Burmarrad and Marsaxlokk were also ideal havens and anchorages. Malta also provided the ideal stepping-stone for vessels sailing between Sicily and various other ports in North Africa and/or in the Levant. Vessels could stop to replenish their water supplies, take on victuals or simply wait for the right wind in order to proceed on their

journey. Finally, there was also the lure of purchasing local products to supplement the cargo of passing vessels.

The increased maritime and economic activity around the Maltese islands in this period must have been one of the pull factors attracting pirates to the islands and their surrounding seas. By the end of the fourteenth century, attacks on both Malta and Gozo had begun and would increase in the fifteenth. In 1389, a Hafsid fleet led a punitive attack on the Maltese Islands aimed at avenging Manfredi Chiaramonte's seizure of Djerba a year earlier (Luttrell 1975: 46). By the first years of the fifteenth century, the situation had degenerated to the extent that Muslim pirates were wintering on the island of Comino, harassing shipping between Malta and Gozo. In 1418, faced with the continuing menace of Barbary corsairs stationed on Comino, Malta's inhabitants petitioned their sovereign, King Alfonso V, for the construction of a tower on Comino. Owing to financial difficulties, it was not until two centuries later that a tower was built on this site (Samut-Tagliaferro 1993: 127).

Increased activities of North African corsair vessels around the Maltese islands were paralleled by an increase in similar activity by Christians. The latter attacked mainly, but not exclusively, Islamic shipping. In the fifteenth century, Malta evolved into a centre for corsairing and piratical activities. The islands of Sicily and Malta were ideally situated to dominate the passage of vessels crossing the Sicilian channel. Evidence for corsairing and other aggressive maritime activities can be traced throughout the Middle Ages; during the thirteenth century, Henry Pescatore was a case in point. In 1366, Malta was enfeoffed by Frederick IV to Manfredi Chiaramonte, then Admiral of Sicily (Luttrell 1975: 45). The exact reason for the Genoese attack of 1372 remains unclear although it is widely accepted they sought to avenge piratical activity by ships sailing out of Malta. Given that Chiaramonte had commercial interests in Malta and close links with the Genoese, he, along with Frederick IV, supported the attack aimed at removing the royal Captain of Malta, Giacomo de Pellegrino. The latter was probably responsible for the piratical activity originating from Malta (Bresc 1986: 95). This case illustrates the tension and conflict between those who on the one hand had 'legitimate' commercial interests on the island and those who on the other hand sought to use Malta as a base for corsairing (see section 10.6). There existed discord between the local nobles established in

Mdina and the castellan of the *Castrum Maris* with the latter enjoying autonomy from the Maltese authorities. 'This [discord] seems to have started as the result of privileges which the castle authorities and inhabitants began to accumulate at least as early as 1408' (Wettinger 1993: 45).

The Middle Ages were to come to an end when the Maltese islands, together with Tripoli in present-day Libya, were handed over to the Order of St John by Charles V, King of Spain. The intention of the latter was to turn Malta 'into a frontier post that would contain the Turkish thrust into his empire' (Mallia Milanese 1992: 25).

7.3 Settlement Patterns in the Latin Period

As discussed in chapter nine, the late Arab period was marked by increased human activity, but the lack of burial sites and evidence for settlements away from Mdina precludes the possibility for widespread reoccupation of rural spaces. By the Latin period, however, the archaeological record of some sites points to a certain degree of movement towards the country. Documentary sources, including militia lists and Royal reports, provide the main body of evidence for studies on medieval villages and settlement patterns for the latter dates (Wettinger 1975).

There is some material evidence datable to the twelfth and thirteenth centuries for a small number of sites. Besides the urban centre at Mdina, there are some archaeological remains from Tas-Silġ, San Pawl Milqi, Tal-Għargħar, Hal-Millieri and the Xatt il-Qwabar. Again, the ceramics provide the main body of evidence. In 1999, Molinari and Cutajar published the collection of medieval ceramics from the collection of the National Museum of Archaeology. The results are listed below by site (**Tables 7.1-7.5**):

Xatt il-Qwabar			
<i>Ceramic type</i>	<i>Date</i>	<i>Quantity</i>	<i>Provenance</i>
<i>Dipinta sotto vetrina</i>	Late 11 th -12 th c.	Single sherd	
<i>Invetriata Campana</i>	12 th c.	Single sherd	
<i>Cobalta & Manganese</i>	Late 12 th -late 13 th c.	Single sherd	
<i>Ingobbiata Sotto Vetrina</i>	12 th -early 13 th c.	Multiple sherds	Eastern Mediterranean
Marsala ware	12 th -13 th c.	Multiple sherds	Sicily
Gela ware and co-related productions	13 th c.	Single sherd	Gela (Sicily)

Table 7.1 Medieval ceramic types from Xatt il-Qwabar (after Cutajar and Molinari 1999)

Mdina-Rabat			
<i>Ceramic type</i>	<i>Date</i>	<i>Quantity</i>	<i>Provenance</i>
<i>Vasi con filtro acromi</i>	11 th -12 th c.	Multiple sherds	
<i>Dipinta sotto vetrina</i>	Late 11 th -12 th c.	Single sherd	
<i>Invetriata monocroma</i>	11 th -12 th c.	Two sherds	
<i>Solcata sotto vetrina verde</i>	12 th -early 13 th c.	Single sherd	
<i>Cobalta & Manganese</i>	Late 12 th -late 13 th c.	Multiple sherds	
Spiral ware	Late 12 th -early 13 th c.	Two sherds	
Gela ware and co-related productions	13 th c.	Multiple sherds	Gela (Sicily)
<i>Maiolica Siciliana decorata in bruno</i>	Late 13 th -14 th c.	Multiple sherds	Sicily
<i>Dipinta sotto vetrina</i>	Late 13 th -14 th c.	Single sherd	
<i>Graffita Arcaica Savona</i>	13 th -14 th c.	Single sherd	Northern Italy (?)
<i>Ingobbiata e dipinta in verde, bruno e rosso sotto vetrina</i>	14 th c.	Multiple sherds	Calabria (?)

Mdina-Rabat (continued)			
<i>Ceramic type</i>	<i>Date</i>	<i>Quantity</i>	<i>Provenance</i>
<i>Maiolica monocroma bianca</i>	14 th -15 th c.	Multiple sherds	Sicily (?)
Spanish luster ware 'tipo pula'	14 th c.	Two sherds	Spain
Late Spanish luster ware	Early 15 th c.	Multiple sherds	Valencia
<i>Loza Azul</i>	Early 15 th c.	Single sherd	Spain

Table 7.2 Medieval ceramic types from Mdina-Rabat (after Cutajar and Molinari 1999)

San Pawl Milqi			
<i>Ceramic type</i>	<i>Date</i>	<i>Quantity</i>	<i>Provenance</i>
<i>Dipinta sotto vetrina</i>	Late 11 th -12 th c.	Multiple sherds	
<i>Invetriata monocroma</i>	11 th -12 th c.	Multiple sherds	

Table 7.3 Medieval ceramic types from San Pawl Milqi (after Cutajar and Molinari 1999)

Tal-Gharghar			
<i>Ceramic type</i>	<i>Date</i>	<i>Quantity</i>	<i>Provenance</i>
<i>Dipinta sotto vetrina</i>	Late 11 th -12 th c.	Single sherd	

Table 7.4 Medieval ceramic types from Tal-Gharghar (after Cutajar and Molinari 1999)

Tas-Silġ			
<i>Ceramic type</i>	<i>Date</i>	<i>Quantity</i>	<i>Provenance</i>
<i>Dipinta sotto vetrina</i>	Late 11 th -12 th c.	Multiple sherds	
<i>Invetriata monocroma</i>	11 th -12 th c.	Multiple sherds	
<i>Cobalta & Manganese</i>	Late 12 th -late 13 th c.	Multiple sherds	
<i>Dipinto sotto vetrina</i>	Late 12 th -late 13 th c.	Single sherd	
<i>Ingobbiata Sotto Vetrina</i>	12 th -early 13 th c.	Single sherd	Eastern Mediterranean
Gela ware and co-related productions	13 th c.	Multiple sherds	Gela (Sicily)

<i>Maiolica Siciliana decorata in bruno</i>	Late 13 th -14 th c.	Multiple sherds	Sicily
<i>Protomaiolica or dipinta sotto vetrina</i>	13 th -14 th c.	Multiple sherds	Southern Puglia
Late Spanish luster ware	Early 15 th c.	Multiple sherds	Valencia

Table 7.5 Medieval ceramic types from Tas-Silġ (after Cutajar and Molinari 1999)

The analysis on which these tables are based does not include specified quantities of the ceramic pieces from the sites. Therefore, multiple sherds could mean anything from two ceramic pieces upwards. This precludes the quantification and precise spatial/chronological comparisons. During the early part of this period Mdina-Rabat remains the focus for human activity on the island. In rural areas, the inhabitants seem to be grouped in small nuclei, often on reoccupied sites such as Hal-Millieri, or at others that witnessed continuous occupation, such as Tas-Silġ.

The situation changes over the course of the fourteenth century. For the latter part of the Latin period there is evidence for widespread occupation and utilisation of rural spaces. For example, early fifteenth century documents contain numerous references to occupied sites, and a militia list datable to 1419-20 mentions no less than 35 hamlets and villages (**Figure 7.1**). The smallest, Capurat, could muster eight men of fighting age while the largest, Qormi and Żebbug, provided 102 and 103 respectively (Wettinger 1969: 82-83). Although this list dates to the second decade of the fifteenth century, it is reasonable to assume that the origin of many hamlets and villages was earlier.

On the other hand, there also exist records for the abandonment of another 42 hamlets before 1419. However, due to a number of factors the confirmation of these places as actual hamlets is difficult (Wettinger 1975: 188-9). Firstly, these places of habitation are identified solely on the prefix Hal derived from the Semitic Rhal. This term originally meant ‘way station’ but evolved locally into *raħal*, meaning village. Wettinger admitted that ‘place name evidence alone is unable to determine how many of these [Hal] places had developed into hamlets or villages before eventual decay and disappearance’ (Wettinger 1975: 188-9.). This might mean it was precisely these at so-called way stations that gradually evolved into hamlets and/or villages.

To date, there is little archaeological evidence confirming a widespread establishment of hamlets around the island but this could be more due to a lack of research in this field. As illustrated in tables 10.1, 10.3, 10.4 and 10.5, only a handful of rural sites are 'visible' in the archaeological record. Documents and material evidence do not seem to correspond. It is therefore opportune to list the various kinds of material evidence that may be associated with these villages. The first would be chapels. For example, the chapel of Hal-Pessa (limits of Naxxar) still stands today but the hamlet was abandoned at the end of the sixteenth century. The militia list of 1425 confirms the existence of this hamlet in the fifteenth century and its contribution of eight young men to watch duties (Fiorini 2000: 74). This is one case whereby the existence of a chapel can provide the archaeological/architectural proof of a hamlet's existence and whereabouts. However, it does not necessarily follow that all chapels served a medieval hamlet. In 1575, the papal representative Duzzina surveyed over 450 chapels across Malta (Ferris 1866: 69). Some of these are securely datable to the sixteenth and seventh centuries. Others were constructed away from any settlements in fulfilment of a vow. To determine whether a particular chapel served a settlement, it is necessary to explore a mixture of documentary and other bodies of evidence.

Various sources combine to provide a detailed picture of a 'lost' village:

- a) Documents (such as the militia lists) provide details on the population size of a hamlet.
- b) Place name evidence sheds light on its geographical location.
- c) The existence of one or more chapels confirms the location and provides architectural evidence from building styles and techniques.
- d) Archaeological excavation may provide details of life in the hamlet and the material culture of its inhabitants.

An example of this merging of evidence is the excavation of a rural chapel at Hal Millieri. Ceramics from the medieval layers of this site include glazed wares (probably Italian Majolica) from the thirteenth to fifteenth centuries. Other pottery types from the same period include red and brown burnished ware and red painted ware (Blagg 1990: 69-76). The majority of the 48 coins found are late medieval, datable to the fifteenth century (1402-1479).

The archaeological evidence from Hal Millieri points to the establishment of a settlement in the thirteenth century and it is not unreasonable to assume that other medieval villages/hamlets originated in this period. Although it is difficult to establish exactly which of the 'new' hamlets evolved during this period and were subsequently abandoned in the fourteenth/fifteenth centuries, a pattern for both the establishment and the disappearance of the hamlets and villages is discernable. The move to rural areas is linked to an influx in agricultural production coupled with an increased demand for local produce. Potential economic gain attracted people away from the urban centre and into open country.

Other factors must be kept in mind when researching the demographic movement of the late Middle Ages. The expulsion and/or the conversion of the island's indigenous Muslims may have vacated parcels of land subsequently redistributed among the Christian population. Also of importance is the origin of Maltese parishes in the early fifteenth century. Bishop de Mello set up the first eight parishes in 1436 (Ferris 1876: 70). A number of *casali* (villages) made up each of these eight 'parochial centres'. In turn, the villages covered a specific geographic area containing a number of hamlets and/or solitary chapels. For example, Birkirkara was made up of four villages with 42 churches within its boundaries: fourteen in Birkirkara itself, nine in Lija, four in Balzan, one in Bordi, four in Manna and a further ten dispersed within the limits of these villages (Ferris 1876: 314).

Over time, some of the original medieval settlements integrated and formed larger and more permanent social and economic structures. Strength in numbers was useful for more than just market requirements but also helped against the threat posed by corsairs. The larger villages usurped some of the smaller hamlets within their boundaries. Typical examples of this are the districts of Hal-Muxi and Hal-Mula, within the village of Żebbug. These were originally villages in their own right but were gradually absorbed by the expansion of Żebbug and are today 'districts' within its limits.

Given that there was a definite break in the occupation of ancient/late antique rural sites, the gradual development of larger sites exactly on, or very near to places occupied in Roman times is a phenomenon that deserves further attention. The small dimensions of the island increase the likelihood for such coincidences. However,

there are some Roman sites, such as Mgarr and Paola, which remained unoccupied until relatively recently. Large villages with medieval origins, including Żurrieq, Zejtun and Mosta for example, were all ancient settlements that had previously fell into disuse around the seventh century (Figure 7.2).

Besides Birgu, no long lasting centres of habitation were established by the sea. The previously inhabited areas of Marsa and Burmarrad remained without settlements and people settled at a safe distance from the bays. The easiest explanation and the most often cited is that of piracy: 'the seas were doubly dangerous in those days...people feared the coast' (Wettinger 1975). Although some of the abandoned sites are on the coast, piracy is not the sole explanation for this phenomenon. Nature also played its role in shaping the inhabitants' perception of the coast and their choice of site location within the landscape. By the Middle Ages large marshes existed in many of the bays (Blouet 1964: 201). Malaria posed a serious health hazard to the inhabitants who found it safer to live away from the coast (see below).

What drew the new rural settlers to old settlements? One hypothesis could be the availability of worked stones from ancient structures that provided convenient building material for the new occupants. This could partly explain the lack of remains of more ancient hamlets or villages. A second hypothesis is that the medieval inhabitants gravitated towards the same resources that suited the ancients. Access to fertile land and access to the sea remained essential. Many 'new' villages developed a connection to a satellite bay or harbour nearby. Inhabitants from the village would use the bays on a 'part-time' basis, to trade, fish and gather other resources from the sea whilst able to return to the safety of their village. They were also used by the local authorities to guard the bay and adjacent stretches of coastline. This relationship can be deduced from the militia lists and the various towers manned by villagers

For the later Middle Ages we know of 24 look-out posts around the island (Figure 7.3). The organisation of guard duties for these posts was in the hands of the town authorities that assigned the responsibility to an individual. In 1375, for example, Philippo de Marino was given the position for life (Wettinger 1979: 26). Militia forces made up of men from specific villages were assigned posts on the coast.

Therefore, the male inhabitants would regularly make their way to the coast. Only a few of the look-out posts had towers (discussed below), none of which survive. We only know of these towers from documentary references, for example: *‘Benuarat, Figlio del erede[sic] detto anticamente Venerant. Cala o porto dove sono le Saline nouve [sic]. In questo luogo appaiono alcuni vestigi anthichi di una torre di guardia, che v’era, e di cui si fa mentione nelle scritture della citta’, ch’era in piedi prima dell’anno 1494’* (Abela 1647: 26). Besides the above-mentioned militia lists, the only available evidence for some of the look-out posts to date can be deduced from place names. The Wardija place names find their origin in the Italian word *guardia*, meaning guard. The table below lists the known posts and the villages (main suppliers underlined) that supplied the guards (Table 7.6). Figure 7.4 illustrates the look-out posts in relation to the main medieval villages.

Look-out post	Modern place name	Origin of militia
Blihat Moze	Fomm ir-Rih (?)	<u>Rabat</u>
Mijarru	Mġarr /Lippija	Dragu; Pessa; Dimeg and Naxxar
Hayn Tufaha	Għajn Tuffieħa	<u>Mosta</u> ; Dragu; Rabat; Naxxar
Razun	Għajn Razul at Tal-Veċċa/St Paul’s Bay	<u>Naxxar</u> ; Gharghur
Santu Paulu	St. Paul’s Bay	<u>Naxxar</u>
Bu Jubbe	Buġibba	<u>Gharghur</u> ; Naxxar; Mann; Bordi; Lija
Bn Rata	Burmarrad/Salina	<u>Naxxar</u> ; Lija;
Bir ilbahar	Bir il-Baħar at Għallis (?)	<u>Gharghur</u> ; Sammut; Pessa; Dimeg; Lija; Attard; Balzan; Birkirkara
Climenti	Qalet Marku (?)	<u>Birkirkara</u> ; Sammut; Pessa; Dimeg; Lija; Attard; Balzan
Nadur Callel	Site of Madliena Tower	<u>Birkirkara</u>
Bir Bitut	St George’s Bay	<u>Birkirkara</u> ; Qormi
Ginen Feris	Site of St Julian’s Tower	<u>Qormi</u>
Curtin labiad	Qortin l-Abjad/Tigné	<u>Qormi</u> ;
Santu Eramu	St Elmo	<u>Qormi</u> ; Saflieni; Luqa/Farruġ; Capurat; Żebbug
Zenac	East of Xaghjra (?)	<u>Zabbar</u> ; Tarxien; Saflieni; Pascualinu
Zuncul	Ras Żonqor	<u>Bizbud</u> ; Tmin; Pascualinu; Zabbar
Marnisi	Marnisi	<u>Għaxaq</u> ;; Tmin
Gadir	Għadir at St George’s Bay (south) (?)	<u>Gudja</u> ; Kirkop; Għaxaq; Bizbud
Ras Juliana	Birżebbuġa	<u>Safi</u> ; Mqabba; Millieri
Minahc	Meneq/Kalafrana	<u>Żurrieq</u> ; Millieri; Bubagra
Nadur Kelbe	Nadur Kelba/Benghisa	<u>Żurrieq</u> ; Gudja
Cabar Garib	Qabar Għarib near Għar Hasan	<u>Siggiewi</u> ; Lew; Qrendi; Żurrieq; Lew
Xutu	Wied iz-Żurrieq	<u>Siggiewi</u> ; Lew; Qrendi; Lew
Petra Negra	Hagra s-Sewda/Mnajdra	<u>Siggiewi</u> ; Lew; Qrendi; Kbir; Tabuni; Qdieri

Table 7.6 The look-out posts of the late Middle Ages (After Mifsud 1920; Wettinger 1979: 28-29)

The lookout posts situated along the Maltese coastline were connected by a series of signals, mainly flags, fire and/or smoke. For example, if corsairs were sighted off the north-western coast of Malta by men manning the look-out posts of Ghajn Tuffieħa and/or Lippija, signals would be sent to the towers at Nadur and Falka that would in turn relay the message back to Mdina. The ringing of the cathedral bells would notify the nearby villages and the process would be repeated until the entire island was aware of the approaching corsairs (Mifsud 1920: 17). This system encapsulates Horden and Purcell's concept 'lines of sound lines of sight' (Figure 7.5).

A demographic phenomenon datable to the Latin period was the development of a new and large settlement by the sea. The Normans must have been quick to realise the importance of fortifying a good harbour, which could be used as the main nodal point for the island. Due to the partial silting up of the Marsa harbour and the loss of its harbour facilities, some form of site migration took place and a new settlement developed elsewhere in the Grand harbour (Figure 7.6). Documentary references to ships in the port of Malta date back to 1184 and most probably refer to Dockyard Creek (Luttrell 1975: 31). This hypothesis is supported by the first known reference to the *Castrum Maris* in Dockyard Creek, which is datable to 1223 (Wettinger 1993a). It is likely that the Normans built the castle during the twelfth century as an aftermath of their second invasion. The choice of Dockyard Creek over the adjacent French Creek deserves further attention and is discussed below in section 10.6.

Activity in the *Castrum Maris* spilled out on to the rest of the peninsula and a suburb, Birgu, also evolved. The place name Birgu has two possible origins: a) from the Italian term Borgo (Burgh) meaning suburb; or b) from the Greek *πύργος* meaning tower or castle (Wettinger 2000: 55). The latter meaning sheds light on a potential contemporary origin for the fortification in the area. Further assumptions on the possibility of a Byzantine harbour in the area would be based on place name and circumstantial evidence and are therefore highly tentative. The important aspect is that, following the abandonment of the main complex at Marsa in the Byzantine period, a town by a harbour is attested in the late Middle Ages.

7.4 Roads and Terrestrial Transport

The reoccupation of rural spaces coupled with the establishment of a new port must have given impetus to the development of a road (or track) system. The use of donkeys and mules was widespread on the island but references to carts are few. No archaeological evidence is available for the study of roads on medieval Malta but details from early maps that date to the mid-sixteenth century shed light on important aspects. Printed after the arrival of the Knights, these maps provide clues as to the road system of the later Middle Ages, although one has to keep in mind improvements brought about by the presence of the Order. The first map dates to 1536 and is clearly devoid of any links between the depicted settlements although this does not necessarily reflect the real situation as inter-settlement communication is likely (see figure 9.3). A slightly later map (from 1551) is based on an early survey of the island (Agius-Vadala' and Ganado 1996: 7). It depicts a complex road system that joins all the medieval centres of habitation to each other as well as to other significant features such as towers and bays (**Figure 7.7**). One can safely assume that even if the Knights developed this system, its foundations can be traced to the link between the villages and lookout posts and are therefore datable to the late Middle Ages. Of interest is the 'main road' linking the town of Mdina to the harbour area that stops on the edge of the Marsa plain. This could follow the original Roman road linking Melite to the port complex at Marsa.

7.5 Population Figures

Based on the conclusions reached for the population of the late Arab period, it would be reasonable to assume that in 1091 the population remained approximately 5000 (see chapter 9.4). If one adds the extra slaves mentioned by Malaterra, this number could have been a little higher. Count Roger took the non-Muslim slaves with him back to Sicily and southern Italy, slightly reducing the number of people left on Malta. Following the second raid on the island in 1127 there was an effort by the Normans to 'introduce' Latin inhabitants. The first document relative to the population of the island is datable to about 1241 and consists of a royal report on taxable families and lists the following numbers (**Table 7.7**):

Families	Christians	Muslims	Jews	Total
Malta	47	681	25	753
Gozo	203	155	8	366
Total	250	836	33	1119

Table 7.7 Family count of the Maltese Islands from 1241 (after Luttrell 1975: 38)

Using a ratio of five persons per family would mean 5,595 persons accounted for. Medievalist Charles Dalli has recently reappraised the document and concluded that it is a count of *villain Curie* (tax-paying serfs) (Dalli 2002a). Given that this report was commissioned to cover Royal interests on the islands, the cultural/religious division of the headcount was important because distinct groups paid different tax rates. Of note are the majority of Muslim families still prevalent after over a century of Latin rule. We know that the figures do not represent all the Christians on the island because the report itself refers to 70 *servientes* who worked in the *Castrum Maris* and who all had wives. Therefore, the discrepancy between Christian and Muslim families meant that fewer of the latter cultural/religious group had paid to release themselves from their villanal conditions (Dalli 2002a: 53).

To arrive at a population count for the thirteenth century, Dalli used figures for the fifteenth century (originally calculated by Wettinger) and the Royal tax that was payable during the same period. Wettinger based his calculations on fifteenth century militia lists to provide an accurate count of the male population. From these lists, he arrived at a figure of 10,000 persons (Wettinger 1969: 83). Dalli proposed that if the tax to population ratio was 10,000 persons to 500 *uncie* in the fifteenth century, then the same ratio must apply for the previous two centuries. Given that 500 *uncie* (in cash and in kind) were collected in the thirteenth century then we can assume that the population was 10,000 (Dalli 2002: 54).

7.6 Productivity and Consumption

The various types of agriculture practised in the Middle Ages are not visible in the archaeological record (except perhaps through pollen analysis). Unlike the large industrial plants needed for the processing of oil, the production of cotton was a

cottage industry by comparison. To date, documentary sources and place names provide the main body of evidence for the study of Maltese agriculture in the Middle Ages. Some examples include (Table 7.8):

Place Name	Meaning
Tal-Qoton	The cotton field
Għalqet il-Qoton	The cotton field
Habel ta' Wied il-Qoton	The field at Cotton Valley
Roqgħa ta' Wied il-Qoton	Small field at Cotton Valley
Wied il-Qoton	Cotton Valley

Table 7.8 Cotton place names on Malta (After Wettinger 2000)

The increase of cotton exports in the late Middle Ages consisted of a revival of Maltese cotton rather than an introduction of this crop into the international market. It never completely disappeared in the preceding centuries. A Genoese merchant's inventory datable to 1164 is the earliest written record (Abulafia 1975: 105). A century later, a Genoese privateer captured a ship from Syracuse in the Sicilian channel and amongst the goods on board was a substantial quantity of Maltese cotton (Wettinger 1975: 16). McManamon recently suggested it was in the fourteenth century that the island turned to the cultivation of cotton for export (2003: 40). Although few and far in between, the above references illustrate that the production and export of cotton from Malta did not cease in the twelfth and thirteenth centuries. The dearth of information for earlier periods is more likely due to the absence of documents and lack of research in the field of environmental archaeology, including the study and dating of pollen samples.

The official acting on behalf of the Sicilian monarchy received some of the royal tax in kind. By the late fourteenth century, the amount of cotton paid (in kind) towards this tax was 400kg. Cotton production increased through the fourteenth and fifteenth centuries and continued to do so until the end of the Middle Ages. The largest amount of cotton exported from medieval Malta was of 1000 *cantara* or approximately 80 tons (Wettinger 1986: 18).⁴¹ This is a substantial amount and reflects the importance of the crop to the island's economy.

⁴¹ 1 *cantar* or *quintale* = approximately 80kg.

A geographical peculiarity marked Maltese medieval agriculture. Suitable irrigation was imperative for cotton cultivation and land with abundant water supply was classified for this purpose (Wettinger 1986: 18). Such land was concentrated in the south and the area took off as the cotton-producing centre of the island. The added advantage of this was that the main crop (cotton) was cultivated closer to the villages. On the other hand, lands dedicated to cereal growing were essentially located in the north-west of the island (Bresc 1975: 131). Land also existed that could sustain two crops: 'a winter crop of wheat and barley and a summer crop of cotton [which] naturally fetched an appreciably higher price' (Fiorini 1993: 174).

With large tracts of land dedicated to cotton, the cultivation of other agricultural produce such as grain, evolved into one of secondary importance. Due to Malta's proximity to Sicily, the island's inhabitants could afford not to grow staple foodstuff. Given that the Maltese islands formed part of the kingdom of Sicily, Maltese nobles successfully argued that export taxes between the two islands should be lifted (Bresc 1975: 133). High-quality grain imported from Sicily arrived at prices that were significantly lower than the actual export price. Although such a single-crop system was vulnerable to various factors such as pirate raids, drought and fluctuations in market prices, the gains were large enough to induce farmers, merchants and shippers to fully embrace the cotton-grain exchange. In turn, this exchange permitted the evolution of an economy that was relatively prosperous, as attested by the imported ceramics that are present in the archaeological record of Mdina (Cutajar and Molinari 1999: 11-12).

Malta exported other agricultural products, including cumin and flax, with the former second in importance only to cotton (Wettinger 1986: 21). Flax was not only cultivated, albeit in small quantities, but it was also still retted in various places throughout the island. Pools of water were needed for the retting and place names clearly indicate areas that were utilised for this process. However, from 1519 onwards the retting process was understood to be the cause of malaria and 'the retting ponds were consequently progressively legislated out of existence' (Wettinger 1986: 30). The link between malaria and retting ponds was not misguided as many of the latter were situated close to marshes formed at the head of partially silted harbours. Stagnant pools provided the right environment for this unpleasant (mainly due to

odours) activity, as at Msida and Burmarrad. The utilisation of the marshy areas is a small example of how Malta's inhabitants adapted to the changing environment within the harbours.

The remainder of agricultural production was geared towards the provision of staple goods such as fruit, vegetables and wine and has been referred to as 'garden agriculture' (Wettinger 1986: 28). Various *gonna* and *gnien* (gardens and garden) place names attest the widespread existence of such holdings with no less than 131 listed in Wettinger's compendium (Wettinger 2000: 149-164). Except for grapes, the types of fruit and vegetables grown were similar to those grown in late Medieval Italy and included figs, oranges, lemons, eggplant, onions and spinach (Vella 1980: 33). The production of local wine did not satisfy demand as the bulk of this commodity was imported from nearby Sicily (Fiorini 1993: 175).⁴²

7.7 The Harbours of Latin Malta

The 'Quintinus map,' published by Gryphius in 1536, is described as 'a primitive map derived perhaps from a nautical chart, but fairly accurate in depicting the island's main characteristics' (see **Figure 6.3**) (Agius Vadala' and Ganado 1986: 1). Although some details are missing, of utmost importance are a number of features marked at the head of some bays:

'Beaches are clearly and accurately shown at Menqa Basin (Marsa), the S.E. extension of Marsa, French Creek, Marsaxlokk, Salina and Mistra Bays. This depiction might well have a socio-economic connection with the maritime practice then prevailing of frequently hauling up vessels on the beaches and tarring their bottom (*spalmare*)' (Agius Vadala' and Ganado 1986: 1).

If these dotted areas do in fact depict a specific feature, these refer to marshes (as in Fig. 9.4). For unknown reasons, two harbours with similar alluvial patterns, Marsascala and St Paul's Bay, are not marked on this map. Four major sandy beaches are also not marked on the map. Parts of all six harbours mentioned in the quote are known to have silted up. Environmental evidence confirms the existence of marshes in Burmarrad (sample BUR03/14). Old descriptions of the Qormi/Marsa area mention the effects of the stagnant water: '*Ella e situata in quella valle, che conduce alla*

⁴² Sicilian wine was also in demand because of its superior quality.

Marsa, per ciò era anticamente d'aria cattiva, per la quale erano resi gl'habitanti scoloriti e deformi' (Abela 1647: 92). Although all marshes in Malta had a reputation for malaria, Marsa was the most notorious (Blouet 1964: 200). The Quintinus map provides a clear picture of Malta's harbours in late medieval times. The indications are that the inner reaches filled in and the bays were now smaller and shallower, placing some limitations as to the potential use of these sites.

A significant event of this period was the migration of the main harbour from Marsa to Birgu. Besides the abandonment of the port complex, the main impetus for a change of location came from two things: a) the partial silting up of Marsa; and b) the emerging military and naval landscape in the Mediterranean. The use of the Marsa area as a temporary anchorage well into the fifteenth century (see below 7.6) points to other factors that induced a change of site. The reduction of the harbour's size coupled with an unhealthy environment made it a less desirable place. The location chosen for the new port was Dockyard Creek, over a kilometre further north in the Grand Harbour (**Figure 7.6**).

The choice of this site over French Creek deserves further attention. In practical nautical terms, the latter provides better year-round shelter than the former, especially from the prevailing north-easterly storms that occur in the winter months. Despite the presence of the modern breakwater across the mouth of the Grand Harbour (**Figure 7.8**), winter gales still cause problems to vessels moored in Dockyard Creek. So why did the inhabitants choose this site? The natural landscape of the various peninsulas situated in the main harbour played a crucial role in this decision. In its natural state, the rocky promontory at the tip of the Birgu peninsula must have been a substantial topographic feature dominating the entrance of the Grand Harbour and Dockyard Creek. From here, the new occupants of the site were able to control traffic sailing in and out of the main harbour complex (**Figure 7.8**). The changing political, cultural and economic climate of the Mediterranean in the high Middle Ages (Balard 2003: 183) influenced the choice of site. The inhabitants chose strategic priorities over nautical practicality.

Birgu developed into a typical medieval port complete with a quay, warehouses, churches and other maritime facilities. Details of the harbour at Birgu can be gleaned from a fifteenth century portolan⁴³:

E le navi da li prodexi a tera a ogni parte e no passa la gliexia de San Lorenzo, che e foura del Bolgo zercha prodexe uno, perche intro si e secho fondi e le barche sta longhe lo Borcho pope in terra (after Cassola 1992: 49).

Vessels moored stern-to the whole length of Birgu but could not proceed further inland than the church of San Lawrenz (**Figure 7.9**). This was due to the shallow waters at the head of the bay, probably due to the siltation process. The description of the church as lying outside Birgu is a clear indication that the town was smaller than it is today.

The quay at Birgu was wide enough for two stevedores and their donkeys to pass in opposite directions (NLM Univ 12, fol 192: 4 September 1518).⁴⁴ Subsequent interventions on the waterfront by the Knights, British and Maltese governments have covered all traces of the medieval quay. During a recent construction project, a trench excavated along the modern quay only uncovered features from the British period (**Figure 7.10**). There are no archaeological remains of medieval warehouses in the town. The medieval urban fabric of Birgu underwent constant changes during the Knights period and subsequently suffered widespread destruction during the Second World War. However, references in documents such as notarial contracts shed light on the existence of medieval warehouses (Fiorini 1993: 322).

In 1273, the royal galley of Malta sailed to Sicily 'to be handed to the officials in charge of the repair and construction of ships' (Wettinger 1993: 35). It is uncertain whether this implies the complete absence of dockyard facilities or, as is more likely, those in Sicily were better suited for large-scale works. Certain works were carried

⁴³ Produced as aids to seafarers, it was imperative that the details contained in portolans were accurate. Because their authors were not restricted by space, as were the early map makers, these sailing directions were far more detailed than the first nautical charts that were to appear soon after (Campbell 1987: 382). The portolani used in the text are the following: *Lo Compasso de Navegare* (*Lo Compasso*) of 1296; *Chomphasso de tuta la starea marina* (*La starea marina*) of the mid-fifteenth century; and Rizo Portolan (Rizo) of the late-fifteenth century. All passages referring to Malta are taken from Cassola (1992).

⁴⁴ I am indebted to C. Dalli for passing on this reference.

out locally and it was the Maltese men manning the galley who were entrusted with the vessel's general maintenance (Wettinger 1993: 34). By the fourteenth century, the situation changed and in 1374 there is mention of an old ship kept in a dockyard (Wettinger 1993: 66). By the late fifteenth century, vessels were built locally from scratch and quickly, too. A contract signed on the 22nd October 1494 binds four partners to start the construction of a vessel the next day. By February 1495, the owners were already recruiting crew to man the ship (Notary G. Zabbara documents 19, 79, 83 and 88, from Fiorini 1999a). Timber for such construction work was imported from various parts of the Mediterranean, including Dubrovnik (Luttrell 1969).

The shipyard was located near the *Castrum Maris* and in 1478 the place is referred to as *loco di darsanali in buca di portu* (Fiorini 1993: 177). The author uses the Italian word for shipyard (*arsenale*) in its plural form (*arsenali*), pointing to the existence of a yard with more than one shed at the 'mouth of the harbour'. During recent (2001) demolition works of buildings in the area, it is possible that parts of the original shipyards were exposed but quickly destroyed by the developers (Figure 7.11).

Lo Compasso de Navegare describes two ports, one on either side of the castle: *Lo dicto castello e bono porto ver lo silocco. E potete acqui sorgere e stare a sporgitore. Enter lo capo ver lo Greco e lo castello a una gala che se clama Gala Iudea e potete bene stare acchi* (after Cassola 1992: 48). Two centuries later, another portolan also describes two harbours for the castle: *In l'isola de Molta al cavo de ver levante ala faza de griego si e lo Chastelo de Molta, la che e due boni porti, l'un de ver griego, che intra per sirocho ver ostro plu de uno mio, nome Chala de Zudei* (after Cassola 1992: 49). The two ports mentioned are Dockyard Creek and Kalkara, and one of the two is referred to as the 'port of the Jews'. Until their expulsion in 1492, 'Birgu had its own small and self contained Jewish community with its own synagogue' (Wettinger 1993: 64). Published in 1296, information gathered throughout the thirteenth century forms the basis of *Lo Compasso*.⁴⁵ This pushes the establishment of a Jewish community in Birgu back to at least the mid-thirteenth

⁴⁵ Modern pilot books are also based on old information that is updated periodically.

century. Contrary to Mdina-Rabat, the size of this community is unknown because no Jews from Birgu are included in the militia lists. A plausible explanation for this exemption and the use of a specific port is that these concessions were originally granted to stimulate trade and exchange financed by the Jewish community. This certainly happened later, when, for example, in 1403, a royal request was made for a loan of ‘40 uncie destinate all’armamento di una geleotta.’ In return for this loan the Maltese Jews were offered exclusive trading rights between Malta and the ports of Girgenti and Licata in Sicily (Valentini 1936: 411).

7.7.1 Other Ports and Anchorages

Agricultural systems created to support large-scale cotton cultivation involved landscape modification including terracing to facilitate the retention of soil. The transformation for the introduction and accommodation of new crops was a phenomenon witnessed throughout the Islamic world (Watson 1993: 103). In the long term, the terracing of fields and subsequent soil retention would have contributed to the slowing down of the siltation process in the harbours. Thus, the newly built walls and terraces came to play a vital role in the diminution of further landscape erosion. Despite this slowdown in erosion, other ports around Malta had already changed and in many cases were smaller and shallower.

Medieval portolans provide a very clear idea as to which ports in Malta, besides those in the Grand Harbour, were in use during the late Middle Ages (Tables 7.9, 7.10 and 7.11):

<i>Lo Compasso de Navegare 1296</i>	
Harbour	Modern place name
Marsa siloco	Marsaxlokk
Marsa Mosecto	Marsamxett
Gala Iudea	Kalkara (?)

Table 7.9 Harbours and anchorages listed in *Lo Compasso de Navegare* (after Cassola 1992)

<i>Chompasso de tuta la starea marina (15th Century)</i>	
Harbour	Modern place name
Chala de Zudei	Kalkara (?)
Bolgo	Dockyard Creek
Marsachibir	Marsa
Cala de Conili	Little Marsa (?)
Marsamuso	Marsamxett
Cavo de Larara	Sliema or Ta' Xbiex Creek
Cavo Binarato	Burmarrad
Cavo del Bazar	Located within Burmarrad
Colfo de Pramacho	St. Paul's Bay
Cavo de la splazola	Rdum -Abjad
Lamista	Mistra
Milach	Mellieħa
Nitifax	Għajn Tuffieħa and/or Gnejna
Marsasirocho	Marsaxlokk
Caleta	Marsascala

Table 7.10 Harbours and anchorages listed in the *Chompasso de tuta la starea marina* (after Cassola 1992)

<i>The ‘Rizo Portulan 1490</i>	
Harbour	Modern place name
Marza Muxeta	Marsamxett
Marza	Marsa

Table 7.11 Harbours and anchorages listed in the *Rizo Portulan* (after Cassola 1992)

Portolans also included other details such as numerous measured distances given in mia or millara, a relatively unknown unit that probably varied between Mediterranean regions (Campbell 1987: 389). Below is a table comparing measured distances between various points on Malta (**Table 7.12**):

<i>Chompasso de tuta la starea marina (15th Century)</i>				
From	To	Millara (?m)	Miles (1600 m)	Nautical Miles (1852 m)
Castrum Maris	Burmarrad	6	9	7.8
Marsaxlokk	Marsascale	5	8	6.9
Burmarrad	St. Paul's Island	6	3.5	3
St. Paul's Bay	Mdina-Rabat	3	4.4	N/A

Table 7.12 Distances between various points on Malta (after Cassola 1992)

The four sets of measurements are used because of the securely identifiable places. Measurements in the last two columns contain nautical considerations, such as avoidance of reefs and rounding of peninsulas. When at sea, the actual distance between two points is highly variable and depends on the wind and current of the day. This is not the case for the last ‘landlocked’ measurement, which was taken as the crow flies. Even if one cannot pinpoint the spatial accuracy of the medieval portolans, it is reasonable to assume that these were of an acceptable level. The portolans also contain essential information about the usability of the ports and references to the contemporary topography and thus deserve further attention.

There are various ‘Marsa’ place names in Malta including, besides Marsa itself, Marsamxett, Marsascale and Marsaxlokk. The Marsa prefix, the Semitic term for harbour or anchorage (Wettinger 2000: 364), is datable to at least the thirteenth century (Cassola 1992). The survival of this Semitic term points to these being in use in the late Arab period.

It is interesting to note a detailed reference to Marsa in *La Starea Marina*. Marsachibir, literally translated as ‘the big harbour/anchorage,’ is the name assigned to the anchorage just behind the Kordin promontory. Recent maps use an Italian version of the same name: *Marsa Grande* (Figure 7.12). The author of the *Starea Marina* instructs ships not to proceed further inland than the church of St George because of the shallow sea: *e quando tu vederà' la gliexiade Marsachibir de San Zorzi, no passar la Ponta plu avanti la gliexia de ver levante, che dentro si e basso fondi* (Cassola 1992: 49). There is also mention of a canal in the area through which

small boats could proceed. The church referred to is the old chapel (*semplice cappella*) of St George situated just behind Kortin Hill (Aquilina 2003: 106) (Figure 7.13). Marsa was the anchorage where a vessel could wait until conditions were suitable to enter the harbours around the castle. This is a clear indication of the extent of the silted area in the fifteenth century.

In *Lo Compasso*, Marsamxett is described as a port where vessels could seek shelter between Manoel Island and the mainland. One harbour within the Marsamxett complex, either Sliema Creek or Ta' Xbiex Creek, is listed in relation to the hill of L-Għargħar, a natural feature used as a bearing. Should conditions be unfavourable for entry into the Grand Harbour, vessels were instructed to proceed to Marsamxett to wait for a favourable wind. It was also an alternative port in periods when the town of Birgu suffered outbreaks of plague (Wettinger 1993: 68). In all three portolans, there is no mention of the two other creeks in the Marsamxett complex: Pieta and Msida. No mention is made at all of the anchorages of St Julians, Spinola and St George's Bay.

Burmarrad is given a lot of prominence in the fifteenth century *Starea Marina: Binarato si e un cala per barche*. The port of Burmarrad contains two specific zones where vessels can stop: a) cavo del Bazar; and b) 'under a church.' The first is to the east and is marked on a map illustrated on figure 7.14. Given the reference to a *gliexia*, the second must be in the proximity of San Pawl Milqi, which existed in the fifteenth century. This is an interesting detail that sheds light on the extent of the harbour at the end of the Middle Ages. Also of interest is a reference to two 'small islands' within the harbour: *si e una isoleta negra plana, de ver maestro zercha mio uno si e una altra isoleta mazior* (Cassola 1992: 49). To date, no other references to islands have been found; the mention of flat and black islands suggests the presence of mud flats in the areas. This hypothesis is substantiated by the presence of large percentages of mud present in the upper levels of BUR03/14 (see Appendix A). Laboratory analysis of the shallower sections of this sample showed that the environment in the area was partly lacustrine.

By the fourteenth century, Burmarrad harbour had a watchtower and those in charge of the tower received royal privileges in return, the first record of this practice

dates back to 1397-8 (Cancellaria 34, ff. 191). In 1494, the *Universitas* asked permission to rebuild it (Fiorini 2000: 84), suggesting that it was dilapidated and/or not suitable for contemporary military purposes. To date, no remains related to this tower have been found.

In the same portolan, St Paul's Bay is referred to as: *colfo de Pramacho, incolfado plu de mia II*. The size described suggests the bay was slightly larger than the present day. A church dedicated to St Paul situated on a white stretch of coast denotes an area suitable for anchoring. A seventeenth century etching of the area confirms the presence of an anchorage under a chapel (Figure 7.15). This is a typical example of how both manmade and natural features combine to inform the mariner of his location. The town of Mdina is also used as a reference point, accurately described as visible to the south of the bay. Reference is made to the village of Gibilmarchitach, or Marikatu, that existed on Wardija hill within close proximity of the bay (Figure 7.16). This mention in *La Starea Marina* helps identify the document as earlier than the Rizo portolan of 1490, because the village was abandoned before the 1480s (Wettinger 1975: 186). Within St Paul's Bay, there is only one place that is recommended for anchoring in a variety of winds: *ver garbin al cavo de la spalzola vedera' una Ponta che fa quasi chala, che e bon stacioquasi per tucti venti*; this is probably Daħlet il-Fekruna. Mistra, named as a separate harbour, is another place recommended for vessels not being able to enter the Grand Harbour. Mellieħa is listed not so much as a port or anchorage but as the location of the saltpans: *e la si e Saline*. A round tower built of small stones and overlooking the bay guarded this vital resource (Cassola 1993: 50). To date, no material remains of this tower have been found and its exact location remains unknown.

In none of the three texts is there mention of the small anchorages on the north of the island. Ample references to anchorages on the neighbouring islet of Comino point to these being a preferred option to the exposed bays of northern Malta. Rounding Malta's north-west point, the next place recommended by *La Starea Marina* is Nitifax, probably the bays of Ghajn Tuffieħa and Gnejna. The area is described as lying *intro due montagne* (Ras il-Wahx and Ras il-Warraba see figure B.2) and as having a freshwater spring; the latter is confirmed by the Ghajn place name.

Passing the cliffs on the south coast, Marsaxlokk is listed as a harbour for all winds except for the south-east and the distinct white cliffs of the Delimara peninsula are used to guide vessels towards the harbour. The next port mentioned in *Starea Marina* is that of Caleta, or Marsascala. Here, too, tell-tale signs from the topographic description point to a bay that has undergone substantial alluvial deposition. In the bay was a *plana intro due aque e si e foni asperie*. A 'plain' between two waters and shallow sea suggests the presence of a mud island similar to that described at Burmarrad. By the fifteenth century the bay still extended further inland than the present layout but the presence of mud flats suggests that it was drying up.

Archaeological evidence for the use of Malta's harbours during this period is not abundant. An underwater excavation carried out on the seabed of Dockyard Creek in 2002 shed light on the stratification of the archaeology within the harbour sediments. Due to the constant occurrence of backfill, the maximum depth (of the trench) reached was of 1700mm in sediments measuring over three metres.⁴⁶ The objects from the lower levels are datable to the mid-sixteenth century (Gambin 2003a). We do not know what archaeological deposits, if any, lay below the levels reached in 2002.

Two identified objects from elsewhere on the island are: a) an unglazed Islamic vase (eleventh to thirteenth century) from Salina Bay; and b) a 'footed bowl' from Marsaxlokk Bay. Other pieces (from the National Museum of Archaeology collection) probably datable to the Middle Ages, were brought up from the seabed around the island (exact location unknown). These include: a) the neck of an amphora or decorated flagon complete with two 'double handles'; b) a decorated amphora, possibly oriental and/or Islamic; and c) late-medieval coarse ware jug (Figures 7.17; 7.18; 7.19).

The lack of substantial archaeological information contradicts the ample references contained in the medieval portolans and other documents that confirm the use of the main harbour at Birgu and others around the island. Many documents refer

⁴⁶ The depth of the sediment is known from a sub-bottom-profile survey carried out in the harbour.

to vessels sailing to and from Birgu (Wettinger 1993) but the absence of port books precludes an accurate estimate.

Reasons hindering archaeological research for this period are not dissimilar to those mentioned earlier:

- a) The presence of large *Posidonia* meadows (on thick mattes) within the bays.
- b) The presence of deep sediments within the main medieval harbour of Birgu.
- c) Some of the harbours mentioned in the text are now floodplains.
- d) The lack of a systematic research programme over the past decades.

In Malta, underwater finds for the Middle Ages are less numerous when compared to the Roman period. However, this reflects the general situation throughout the Mediterranean where there are significantly more wrecks datable to the first one hundred and fifty years AD than there are for the period 650-1500 (Parker 1992: Figures 3 & 4). This situation is reflected in Maltese waters where the underwater remains for the Roman period are more abundant.

7.8 Connectivity

The *Starea Marina* and the ‘*Rizo*’ portolans contain distances given from various points in Malta and Gozo to other places in the central Mediterranean. These distances give a clear indication as to the connectivity of the Maltese islands during the later Middle Ages. Listed below are some crossings mentioned in the text (Table 7.13):

From	To	Distance (mia)
Castle (Birgu Harbour)	Capo Passero	75
Marsaxlokk	Tripoli (Libya)	260
Marsaxlokk	Tunis	500
Marsaxlokk	Modon	530
Marsaxlokk	Cephalonia	480
Gozo/Malta Channel	Lampedusa	100
Gozo	Pantelleria	140

Table 7.13 Distances from various localities in Malta to destinations elsewhere in the Mediterranean (after Cassola 1993) (see figures 7.20 and 7.21).

These distances do not confirm the existence of direct routes between Malta and the other destinations. Rather than being the 'final port' itself, ships occasionally used the island as a waypoint or for a brief stopover. For specific crossings, the closest point on the island provides the place of departure to various ports in the Mediterranean. A typical example is the harbour of Marsaxlokk listed in conjunction with ports in the eastern Mediterranean. Malta was not just a destination but also a place of relative navigational importance. Ships often stopped in Malta when en route to the Northern Mediterranean from the south or vice versa. The capture of two out of four Genoese ships recorded in Malta in 1273 highlights the use of the island's harbours by 'foreign' ships. Merchants occasionally used Malta's position on the frontier between the north and south Mediterranean to 'connect' the two zones. For example, in the late fifteenth century a Siracusan captain of a ship moored in Burmarrad chartered his vessel to another Sicilian. The contract stipulated that the ship would depart from Malta laden with 'victuals and other merchandise'⁴⁷ to North Africa whence it would return to Syracuse, possibly via Malta (Notary G. Zabbara document 115 from Fiorini 1999a). This type of activity is practically invisible in the archaeological record, especially if the goods on board were all perishable. Were it not for written records, such activity would not be detectable.

Corsairing came to play a vital role in the Mediterranean conflict between the Christian north and Islamic south. Part of the local nobility worried that such activity would have a negative impact on their contacts with the Barbary coast (Wettinger 1982: 13). Despite the risks involved, many men were attracted to the prospect of the potential earnings of this activity. Confirmation of the popularity of this activity can be gleaned from a decree of 1440, which forbade local men from joining corsairing expeditions so as not to deplete the land of manual labour, badly needed for the cultivation of cotton (McManamon 2003: 42).

Despite such protestations, corsairing activity evolved into a significant economic activity rivalled only by agricultural production. In the period 1400-1440, of the eight known ports in the northern part of the central Mediterranean where corsair vessels were armed, Malta 'hosted' two of the 24 vessels for which such

⁴⁷ The origin of produce is not known.

information is known. This compares with no vessels for the period 1290-1400. After 1440, specifically for the period 1440-1460, one notes a significant increase in the number of corsairs using Malta to organise their expeditions. Seven out of the 37 ships with a known '*port d'arm*'⁴⁸ used Malta as their base, second only to Syracuse, which had eight. Other vessels also utilised the island to redistribute goods captured on their expeditions (see **tables 7.14** and **7.15**). It is also evident that the Maltese Islands evolved into one of the preferred hunting grounds of the central Mediterranean. During the same period, corsairs operating off Malta and Gozo captured seven out of the 52 ships recorded.⁴⁹ These figures are based on documentary evidence but due to the very nature of this activity, much exchange related to medieval corsairing would have been unrecorded. It is therefore difficult to gauge the exact extent of corsairing activity that went on in the Maltese islands and indeed anywhere else in the Mediterranean.

	Maltese Ships	Port D'Arm	Receiving ⁵⁰
1290-1350	0	0	0
1350-1400	0	0	0
1400-1440	0	2	0
1440-1460	7	7	3

Table 7.14 Vessels of Maltese origin and/or those using Malta as a base for corsairing activities (after Bresc 1986: 104)

	Maltese Ships ⁵¹	Port D'Arm ⁵²	Place ⁵³
1290-1350	0	0	0
1350-1400	0	0	1
1400-1440	1	0	0
1440-1460	5	2	5

Table 7.15 Malta and Maltese ships in late medieval corsairing activities (after Bresc 1986: 104)

⁴⁸ Foreign ships using Malta as a base.
⁴⁹ These figures were compiled by Henri Bresc from references to documents in the archives of Barcelona and Palermo (Bresc 1986)
⁵⁰ Refers to Malta as a place where goods were sold by corsairs.
⁵¹ Refers to Maltese ships (not necessarily corsairing vessels) captured by corsairs.
⁵² Refers to the base of a captured ship.
⁵³ Refers to place where a ship was captured.

Despite being portrayed as lying outside the main trade routes of the late Middle Ages (**Figure 7.22**), Malta was definitely linked to the wider Mediterranean via 'secondary' ports in Sicily. To the west, Trapani and Marsala provided stepping-stones for the journey to Sardinia (**Figure 7.23**). In the course of the fifteenth century, Syracuse came to play a dominant role in the transshipment of Maltese goods (McManamon 2003: 40). Minor ports along the southern coast of Sicily such as Girgenti, Licata and Scicli, provided links from where grain and other foodstuffs were purchased and shipped to Malta.

The previously mentioned export of Maltese cotton gave impetus to local ship owners to transport the product to Syracuse in Sicily. From there, it would be transhipped as far a field as Barcelona where, along with Sicilian cotton, it formed the bulk of imports. The Malta-Syracuse cotton trade and the processing of the plant were mainly in the hands of Jews resident on either side of the Sicily channel (Bresc 1975: 131). Maltese ships did venture beyond Sicily. In 1380, for example, Maltese Jews and ships were trading with Dubrovnik (Luttrell 1969). Later, in the latter part of the fourteenth century, Maltese merchants established themselves in Sardinia, selling local cotton and slaves whilst taking cloth in return (Galoppini 1988: 16). This exchange went beyond a simple reciprocal and direct Malta-Sardinia-Malta route. It also involved shipping between ports found en route, especially Trapani and Marsala on the western coast of Sicily. Sicilian products such as fish, oranges, capers and wine were shipped to Sardinia from Trapani with return cargoes made up of wool cloth, cheese and horses. References to merchants, who were active within these ports, highlight links between Sicilian Jews and Maltese ship owners (Galoppini 1988: 17).

The archaeology of Mdina-Rabat reflects the connectivity of the island during this period. The rural setting of the town did not mean that maritime activity and exchange bypassed its inhabitants. **Table 7.2** sheds light on the variety of imported ceramics reaching the island in the late Middle Ages. The majority originate from Sicily, confirming the importance of this island to Malta's trade (Cutajar and Molinari 1999: 11). Some pieces of lusterware from Spain were probably transhipped to Malta via Sardinia and/or Sicily. Cutajar and Molinari state that the visible drop in imports in the late fifteenth century reflects a 'period of radical economic change' (Cutajar and Molinari 1999: 12). The archaeological record for the period is not complete as

material evidence from the town of Birgu and the castle is missing.⁵⁴ The availability of such data would help explore the disparities (if any) of the economy and connectivity of Mdina and Birgu.

7.9 The ‘cultic topography’ of Medieval Malta

‘The identity of a place or a region within the Christian or Islamic world is established by the character of its distinctive assemblage of cult places’
(Horden and Purcell 2000: 457).

Throughout the period under discussion, an invisible border divided the central Mediterranean, marking not just a political/military boundary but cultural and sometimes economic ones too (**Figure 7.24**). Due to the cultic landscape of the island, with its coastal chapels and churches, persons sailing off Malta and/or entering its ports were left in no doubt as to the spiritual and cultural allegiance of the island’s inhabitants. This must have been significant for a Latin and Christian ‘frontier’ island situated further south than some Islamic territories in North Africa. Whilst at sea in the central Mediterranean, Malta, Pantelleria and Lampedusa are the last landfalls before approaching the North African coast

A variety of sources shed light on the numerous chapels and churches built around the island, with over four hundred listed in the mid-sixteenth century by the papal delegate Duzina. Some of the chapels on Duzina’s list were built in the late Middle Ages. The portolans mention a number of churches that dot the maritime landscape of the island. Early modern maps portray some coastal chapels that are medieval in origin (**Figure 7.25**).

In his publication on the churches of the Maltese Islands, Ferris refers to a number of chapels situated around the coast (Ferris 1866). Only a few of the medieval chapels still exist, but through the above-mentioned references, it is possible to create a map illustrating their location on the island (**Figure 7.26**).

⁵⁴ To date, no excavations have been carried out in these areas.

The exact reasons for the construction of individual chapels have been lost, although the following proposals can be considered as acceptable: a) to serve the spiritual needs of communities; b) as a fulfilment of a vow (ex-voto); and/or c) to establish the cultural identity of the landowner. These are not mutually exclusive. In the fourteenth and fifteenth centuries, the island's Islamic past continued to manifest itself in the language, place names and customs of the inhabitants. In order to dissociate itself from the 'Muslim infidel,' the Maltese of the late Middle Ages engaged in a process of religious building, culminating in the seventeenth and eighteenth centuries with the construction of huge baroque churches. Similar patterns of 'constructed piety' are discernable in other areas in the Mediterranean, such as Spain and Sicily, with both having a significant Islamic chapter previously in their history.

The chapels were not built as navigational aids, but over time their presence in the landscape assumed a nautical role. In the case of San Lawrenz in Birgu and St George in Marsa, the churches provided the delineation between deep and shallow waters. By combining the description of the chapels at Burmarrad and San Pawl with details of natural coastal features, the authors of the portolans helped mariners identify specific ports of call. Chapels could also be used to demarcate fishing grounds. Besides their practical use by visiting seafarers, the chapels also fulfilled the spiritual needs of persons on board. Chapels and their saints were the focus of specific rituals and prayers in thanksgiving of a safe journey just completed or alternatively, in supplication of safety before departing.

Examples from Early Modern Malta of physical manifestations of thanksgiving are ex-voto paintings, offered to the deities in exchange for deliverance from a difficult situation (Prins 1989: 5). People without the financial means to commission a painting, often etched ship graffiti on church walls instead. Maritime graffiti are found on the exterior walls of numerous chapels around the island but the majority of these are datable to the early modern period (Muscat 2002). The reconstruction and/or demolition of many medieval chapels may explain the near total absence of medieval graffiti. Exceptions are the churches of San Girgor in Zejtun and San Pawl Milqi, both of which contain ship graffiti believed to be medieval in origin (Muscat 2002: 55; 106). A maritime chapel par excellence was that built in 1343 on

the small island of Filfla by fishermen who had sought refuge on the island from a storm. Built in a cave and dedicated to *Stella Maris* ('Mary, Star of the Sea') (Ferris 1866: 395), locals stocked the chapel with supplies of wine and oil and introduced rabbits to provide food for anybody stranded on the island.

Chapter VIII

Conclusions

8.1 Introduction

Just over three and a half years ago I felt both apprehensive and confident about writing this thesis. Apprehensive because a similar work had not been attempted before and I therefore had no pre-determined road to fall back on, thus running the risk of getting lost on the way. Although much of the evidence used in this work is 'old' it has been used to explore 'new' aspects of Malta's past. It was this possibility of exploring that gave me the confidence throughout the journey because what was being found was both interesting and relevant to the study of an island, its inhabitants and their relationship with the sea. I therefore close with a summary of various points that I have tried to make and others that, as the thesis progressed, surfaced naturally.

8.2 A 'New' Archaeology for the Sea?

In chapter one I referred to Broodbank's proposal for an archaeology of the sea to complement that of the land (see **chapter 1.3**). In the course of my research it became apparent that most of the archaeological evidence available for Malta is very much land based. It may therefore be said that whilst exploring this material from the land I was also constantly looking out to sea. This maritime perspective was essential

when probing and interpreting material remains. However, I believe that the interdisciplinary approach proposed and used throughout this thesis highlights the fact that one cannot afford to work exclusively with a single body of evidence. This is true not just for the sub-division of maritime and terrestrial archaeology. If any shred of evidence is there, be it archaeological, historical, iconographic or otherwise, it should be used and combined for a more comprehensive story to be told. Not to do so runs the risk of losing out on information that may contribute to a more complete representation of the facts. This is especially true for diachronic studies whereby various periods may be less represented in the archaeological record. Under-representation may be due to a variety of reasons including political (at the time of archaeological discoveries and excavations as discussed in **chapter 1.15.1**) or because particular anthropogenic practices that prevailed (such as the production of cotton in medieval Malta) are archaeologically invisible (see **chapter 7.6**).

8.3 Are Maritime Cultures Identifiable?

There can be little doubt that there did exist people whose 'modes of thinking, customs, artefacts, and patterns of acting' were directly linked with a life at sea and/or dependant on the sea and its resources (Westerdahl 2003: 19). However, there are two crucial questions to be asked here: a) can such people be considered as belonging to a group that had a distinct cultural identity); and b) if so, can such a group be identified in the archaeological/historical record?

Archaeology and history both shed light on intensive maritime activity during various periods of Malta's history. Admittedly, we do not have material remains from places of habitation of these 'maritime people' and the information from port remains at places such as Marsa is fragmented preventing a thorough investigation of the everyday lives of the people that worked there. Regrettably, existing evidence such as the burial sites at Marsa, do not shed light on specific maritime (or other) roles of the people buried there. However, many of the burial sites in the area were already looted when discovered and recorded by archaeologists and/or antiquarians this destroying evidence that may have shed light on this important question.

During the later Middle Ages the maritime activities of significant segments of the local population are only perceptible because of written sources. These same sources do not shed light on any specialised rituals, affiliations or habits that would have set them apart from the rest of the population. Taking the medieval period as an example, on an island as small as Malta those engaged to work on board vessels would have originated not just from Birgu, the island's only coastal town, but also rural areas. This is confirmed by the edict that prohibits the employment of Maltese men on board corsairing vessels (**chapter 7.8**). The reason for this ban was not out of fear for their well-being but due to concerns of depleting a much-needed agricultural workforce. To date, there is no evidence that allows us to reconstruct the lives of individuals that did go to sea, possibly returning with kudos and a newly found social status within society.

However, there can be little doubt that islanders returning from journeys out to sea brought with them stories, knowledge and even perhaps artefacts. As they do today, so-called people of the sea (mainly fishermen and sailors) would meet and exchange experiences and know-how or memories of faraway places and particular incidents such as surviving a storm. Furthermore, it was not only people of the sea that had this intricate link with the sea. The operators of the olive farms in the Roman period, cotton growers in the Middle Ages and those who had vested interests (be they financial or family) in corsairing activities were all linked, in some form or other, to the sea. Though it is not identifiable in the archaeological and/or historical record this, I believe, is very much part of a maritime culture. On an island the size of Malta it is in fact very difficult to distinguish and clearly separate the maritime and non-maritime elements of the population. The sea around Malta must therefore be likened not to a moat that kept people out but rather as the bridge that allowed ships, people, objects and ideas to reach the island.

8.4 No Culture No Landscape?

Does the absence (in the archaeological record) of a maritime culture mean that no such notion as a maritime landscape existed? As stated in **chapter 1.3** one must constantly keep in mind the variety of people that used and/or came into contact with the sea including seafarers, farmers, soldiers, travellers and so on. On the other

hand, one must also keep in mind not just the wide scope of (both natural and manmade) features in a landscape but also the differing perceptions of those observing them. Therefore, the medieval watchtowers constructed in some of the bays around Malta meant one thing to its inhabitants and another to corsairs planning an attack. Likewise, a shallow reef may provide good fishing opportunities for those on small boats but it may prove fatal to anybody approaching on a large vessel with a deep draft.

The notion of duality can be extended to certain features that are perceived and used by both people on land and those at sea. Manmade port structures such as breakwaters, quays, lighthouses and other navigational markers are immediately identifiable as forming part of a maritime landscape. On the other hand, manmade features that have a totally different function on land, such as tombs and places of worship (see below) may come to assume a maritime function such as markers for rich fishing grounds. To what extent the maritime/terrestrial divide (of function) was perceptible in the past is admittedly hard to establish. Ethnographic parallels confirm that such a divide does indeed exist. For example, when at sea Maltese and Gozitan fishermen use different place names (for natural features) than those used on land (and listed on official maps). This provides impetus to search for parallels in the archaeological/historical records.

8.5 A Maritime Cultic Topography

In **chapter 1.5**, I discussed the 'religion of mobility' as proposed by Horden and Purcell (2001: 438-449), a notion that transcends time throughout the Mediterranean. An ideal example is ancient Greece where places of navigational importance, such as headlands, were marked by coastal sanctuaries (Morton 2001 310-313). Is such a cultic topography related to the sea and maritime activity identifiable in the archaeological/historical record of Malta? I have identified three sanctuaries (Ras ir-Raheb, Marsa and Tas-Silg) situated on the main approaches to the islands (**chapter 4.6.1**). However, their link with the sea is only perceivable through indirect evidence such as their location in prominent places in the coastal landscape, through their links with particular harbours such as Marsaxlokk and Marsa and through parallels with similar sites elsewhere in the Roman world. Just a few

architectural features from the Marsa sanctuary have been unearthed and the evidence from Ras ir-Raheb is fragmentary. It is therefore only from the archaeology at Tas-Silg that we can try and gauge some form of relationship between the sanctuary and maritime activity in the harbour below. Possible maritime functions for this sanctuary discussed in **chapter 3.8** and **3.9.2** include the use of the structure as a waypoint for those entering and/or leaving the harbour of Marsaxlokk and the existence of a maritime-related economy within the sanctuary itself. To date, only its position in the landscape alludes to its ‘maritimity’ and no direct material (in the form of ex-voto anchors or ship models) is available to confirm the presence of some form of maritime cult linked to the sanctuary.

For the late Middle Ages, the use of coastal chapels for nautical functions, such as markers for shallows and safe anchorages, is amply testified in contemporary sailing instructions (**chapter 7.9**). The exact origin of these chapels is unknown and it is therefore difficult to establish whether they were built with a specific maritime function in mind. Except for that dedicated to *Stella Maris* on the islet of Filfla (**chapter 7.9**), no evidence has yet been found to link the construction (and/or maintenance) of coastal chapels to those involved in maritime activities (such as sailors or fishermen). The deities of the coastal chapels are not noticeably maritime. Only the above-mentioned chapel of *Stella Maris* may be considered as a ‘maritime deity’. Those dedicated to St Paul, in Burmarrad and St Paul’s Bay, are reflective of the Pauline cult among the islanders and are more likely linkable to the legend surrounding the establishment of Christianity on the island. Other celebrated deities around the coast include St George at Marsa and St Lawrence in Birgu, both without any direct link to the maritime world (as would be dedications to St Nicholas for example). Despite written evidence pointing to the importance of these chapels when observed from out at sea we are still in the dark with regard to rituals related to sea journeys and/or coastal fishing. Another function of these chapels is discussed below (see **8.6** below).

8.6 Islands Don’t Move (but ships do...1)

Except when subject to geological events usually over huge timescales islands do not move and their geographical position remains unchanged through time.

However, what does change are the political, cultural and economic situations evolving overseas. Therefore, the rhythms of an island are shaped not just by the limitations of its physical (terrestrial) borders but also by what goes on in surrounding areas. The degree to which a Mediterranean island is culturally, economically and politically influenced strongly depends on the prevailing economic trends and shipping lanes of the time. Therefore, in the Roman period when massive quantities of staples such as grain and oil were being transported from the dispersed hinterland of North Africa to Rome, Malta found itself on a maritime 'highway' being used to move these goods (**chapter 4.7**). This new role for the island saw its major harbour transformed into a port specifically designed to cater for the storage and redistribution of grain and other goods. Such a transformation is visible in the archaeological record of Marsa, which amply testifies the investments made in the maritime infrastructure of that harbour (**chapter 4.6**).

But what exactly was the function of the main Roman port of Malta? The island's location in the central Mediterranean between North Africa and southern Italy together with its natural harbours provided an offshore port of call for numerous sailing in the central Mediterranean. The potential of developing the role for such an offshore port gave impetus to the ruling elite (the Romans) to invest in such a maritime infrastructure. Should the island have been in a different geographical location and/or without its sheltered and deep harbours (such as Lampedusa for example) it is highly probable that the port at Marsa would not have evolved on such a grand scale in the Roman period. The offshore port came to be used by vessels carrying food and other items to Rome from North Africa. Vessels used the quays and warehouses to unload and safely store grain in winter when the sailing season was closed. Therefore, the port at Marsa must be understood as part of Rome's 'façade maritime', one of a number of ports throughout the Mediterranean whose function it was to help in the maritime transport of massive quantities of not just with staples but also with luxury consumables and building materials to Rome.

Can such a notion be tested for other periods of Malta's history? Byzantine rule on the island more or less kept the status quo except that goods previously destined for Rome were now being shipped to Constantinople (**chapter 5.7**). The destination changed but the role of the island and of the port at Marsa did not. It was

now an offshore port used by ships operating between various areas in the Byzantine Empire. However, the Byzantine period provides an excellent opportunity to explore whether the end of political, cultural and economic unity in the Mediterranean brings about any changes in the maritime function of an island like Malta. The answer is a simple yes. The end of east-west-east routes that existed between Tunisia and Constantinople brought about the end of Malta's role as a stepping-stone for ships. This is amply attested by the abandonment (in the early seventh century) of the very structures built to sustain such a role (**chapter 5.6.2**). The hypothesis that Arab raiding parties destroyed the port is highly plausible and the fact that the structures were never repaired or rebuilt confirms that there was little use for them at a time that was characterised by war rather than trade.

Is this true for all periods of fragmentation in Mediterranean history? The late Middle Ages provide the perfect backdrop for answering this question. During this period Malta found itself on an invisible border that ran along the centre of the Mediterranean with Islam to the south and Christendom to the North. Although the large-scale trade that characterized the Roman period had long since been absent from the area, there existed small-scale trade and exchange between the northern and southern shores of the Mediterranean. Although Malta was, by the late thirteenth century, very much in the orbit of Latin Christendom, it nonetheless came to play a maritime role for vessels and merchants operating in the central Mediterranean. A typical example highlighting such activity is that of the Sicilian captain anchored at Burmarrad who was contracted by another Sicilian to carry goods of unknown provenance to North Africa before returning to Syracuse (**chapter 7.8**). This otherwise (archaeologically) imperceptible activity illustrates how the island, situated as it was half way between North Africa and Southern Europe, was used by vessels not only for shelter but also as a stepping-stone where they could obtain goods for trans-shipment and/or a commission from merchants operating in the area. This movement of goods and people across cross-cultural (and political) borders also gave added significance to the above-mentioned coastal chapels, which now formed part not just of the cultic topography of the island itself but also of the broader central Mediterranean. By this I mean that anybody on board vessels sailing in close vicinity of Malta would, upon sighting these structures, be in no doubt as to the religious, cultural and political affinity of its inhabitants.

8.7 Islands Don't Move (but ships do...2)

The notions discussed above remove Malta from a vacuum and place it within the broader (contemporary) contexts of the Mediterranean. However, the island's inhabitants and their activities are conspicuous by their absence from the discussions. It is therefore imperative to study and deduce patterns of human activity on Malta and how these responded to political, cultural and economic changes elsewhere in the Mediterranean.

One such activity is not unrelated to the maritime function of the island. Agricultural production was, during various parts of Malta's history, greatly influenced by the connectivity of the island. Therefore, the (relatively) large-scale production of olive oil on Malta during the Roman period was not aimed solely at the local consumption. Ships calling at the island provided the necessary link for the transport of local produce to markets elsewhere in the Mediterranean (**chapter 4.5**). These same ships provided further impetus for this activity because the arrival of grain from North Africa also provided the opportunity for the local population to dedicate agricultural land to the production of cash crops rather than of staples. There can be little doubt therefore that maritime activity during the Roman period greatly influenced agricultural production on the island.

It is interesting to note that in the late Byzantine and Arab periods there is no evidence that denotes agricultural activities aimed at the exportation of local produce (**chapters 5.5 and 6.5**). Periods of instability and fragmentation that punctuated these centuries are reflected in the decline of economic activity on the island. However, there does exist one major exception to this rule that impedes one from using such a generic statement without a degree of caution.

For the late Middle Ages I explored the large-scale production of cotton on the island (**chapter 7.6**). Although there was no massive movement of goods across the Mediterranean comparable to that of the Roman period, the inhabitants of Malta devised an ingenious strategy that allowed them to develop levels of economic activity that would have otherwise been impossible to achieve. By obtaining tax-free grain from neighbouring Sicily the inhabitants were able to dedicate large portions of

agricultural land on Malta to the growing of high-quality cotton destined for awaiting export markets. Thus a situation was created that was uncannily similar to that which prevailed in the Roman period with the sea and ships once again providing the link between the island and its dispersed hinterlands.

8.8 Islands Don't Move (but people do)

There is a third link in this chain of actions and reactions, that of settlement patterns. There are two main sequences that may be deduced from the evidence discussed throughout this thesis:

- a) The sea (and ships) ↔ agricultural activity ↔ settlement patterns.
- b) The sea (and ships) ↔ settlement patterns ↔ agricultural activity.

The first sequence is reflective of the situation that prevailed in the Roman and late medieval periods whereby the nature of agricultural activity would influence where people chose to live and establish centres of production. The numerous rural settlements of the Roman period bear witness to widespread agricultural activity. This notion is substantiated by the discovery of the oil producing farms throughout Malta. The synergy of agricultural production and sea routes during this period can be deduced from the location of these farms in close proximity to the sea. Bonanno's (1977) intuitive observations on the proximity of Roman farms to the sea and the potential for exporting of surpluses remained, until this thesis, largely unexplored and the calculation of realistic figures (presented in **chapter 4**) of olive oil production and surplus provided information on the maritime activity linked to these agricultural sites. Ships could call directly to various bays and anchorages from where they could collect a cargo of local produce and/or offload commodities and raw materials (such as lava dust) required by the coastal farms.

The second sequence can be linked to periods when threats from the outside such as sea-borne raids limited the scope for rural activity. This is reflected in the archaeology of the late Byzantine and early Arab periods (**chapters 5.2 and 6.2**) when the rural areas of Malta were abandoned with the inhabitants choosing to live in more protected and fortified areas. It was therefore the threat from the sea that came to

influence settlement patterns during these periods. However, in the later Middle Ages the threat from the sea was still present with increased Hafsid raids and corsairs even wintering on Comino (**chapter 7.2**). Therefore why did the inhabitants choose to ignore this threat and resettle the countryside? The answer is simple. The potential profits obtainable from the growing and exporting cotton made the risk worthwhile. Furthermore, the risk was reduced by the implementation of a series of look-out posts and towers that maintained 'line of sight' that stretched from the horizon at sea to the villages in land (**chapter 7.3**).

8.9 Islands Don't Move (but sediments do)

This final section dedicated to movements on and around islands discusses the transportation of sediments from catchment areas and their deposition in bays. Sediment deposition in the Mediterranean area is a well-documented fact discussed in **chapter 2.3.1**. The study of sediment deposition in Malta is relatively new and sheds light on this process within the context of a small Mediterranean island. A massive hinterland is not needed for the progradation of the coastline to occur. Geographical, climatic and anthropogenic conditions combine to erode the land and bring about natural changes that in turn come to influence the maritime landscape.

By studying the changes of a coastline through time one may also observe the influence of these changes on the maritime landscape of an area. One of the major changes brought about by land progradation is the navigability of certain harbours and anchorages. Inhabitants may adapt to these changes by moving away from the heads of newly dried up bays so as to avoid natural predicaments such as marshes and/or to relocate, as in the case of Qormi and Marsa (**chapters 3.4 and 4.2**), so as to retain access to the sea. The changing topography within the harbours meant that areas that previously offered a safe and secure anchorage were no longer navigable, forcing vessels to anchor in different locations within the same bay and/or seek an altogether new harbour as in the case of the site migration from Marsa to Birgu (**chapter 7.7 and 7.8**).

Sediment deposition on Malta also had a direct influence on the evolving topography of the seabed within its harbours and anchorages. The most visible of

these changes is the migration of *posidonia oceanica* meadows to areas that provided the optimum conditions for its growth (water depth and availability of sediments as nutrients). Over the centuries the meadows thrived and continued to grow, fed by the continuous supply of sediments being deposited in the bays. There are three effects of *posidonia* that are of relevance to this study: a) *posidonia* offers different (inferior when compared to sand or mud) holding capabilities for ships anchors; b) the growth of the *posidonia* mattes together with sediment accumulation would have made some parts of the bay shallower than they would have previously been, placing limitations on the use of shallower areas by vessels with a large draft; c) the growth of *posidonia* mattes obscures the true picture of the island's submerged archaeological record thus limiting its value as a complimentary source.

Finally, the movement of sediments from hinterland to coast may also be linked to certain human activities on the island. Although no direct proof is yet available, the changes in agricultural practices from flax to olives to cotton (with a possible period of abandonment between the latter two) strongly suggest a degree of landscape modifications. In turn, it is likely that such changes of the local landscape would have influenced the rate and nature of land erosion and sediment deposition. I believe that on an island the size of Malta, the fallout of drastic changes to the island's landscape would be felt over a shorter time span when compared to larger geographical units. Admittedly, this remains a working hypothesis but by no means an unrealistic one.

8.10 What Next and Where To?

The study of the Malta's maritime landscapes can and indeed must be expanded diachronically. It has not been done for the present work due to restraints of time and words. It is my intention to attempt stretching this work so as to include even the most recent periods of the Malta's history. Likewise, I will work on obtaining more environmental data from other bays on the island in order to have data from a more representative group of sites. This will enable me to construct a more complete history of the island's landscape changes and the effect of these on maritime activity.

This work is very much focused on Malta and by writing it I ran the conscious risk of being typecast as a mono-dimensional researcher! However, in the light of the

conclusions discussed above I can safely state that it has turned out to be a short-term risk in order to achieve long-term gains. What exactly are the gains? The methodology proposed and adhered to makes it possible to approach other islands and/or areas with a degree of confidence. If applied with flexibility (taking into account area-specific considerations) then it will not matter whether one researches Malta or whether I attempt a similar study of an island in the Pacific. The multi-disciplinary approach and use of various sources also facilitates this. In the context of Mediterranean archaeology, this work will provide data that may be used for the comparative study of other islands through time, possibly obtaining 'island-patterns' for periods in history that are less well studied.

Appendix A

A.1 Methodology

Samples were retrieved over two fieldwork sessions in October 2002 and April 2003. Initial discussions with local landowners made it clear that the alluvial deposits on the plain are very deep in some areas. Such inaccessible deposits are best sampled by coring (Dincauze 2000: 275) and an *Eijkelkamp* manual auger was used to retrieve the first samples (Cores 1 to 8). However, it became apparent that the manual auger could not always reach the necessary depths, an industrial drilling rig was used for the remaining cores (9 to 12 and 14). Core number thirteen was retrieved by kind permission of the landowner from a borehole that was being excavated. Where possible, samples were taken approximately every metre. Samples were bagged after being assigned a code number and were subsequently left to 'slow-dry' indoors for seven days.

Following the promising results obtained from core three, samples were then taken from the edges of the plain as well as from its centre. This would help establish both the width and the depth of the bay in the past. The choice of sites was also determined by two other factors: a) the accessibility of the area for the industrial coring machine and b) by the willingness of the landowner to allow cores to be extracted from his property. With the mechanical rig, sampling was slightly less manageable, mainly due to the method used (compressed air) for the extraction of samples from the casing.

All samples were then taken to the laboratory where they were treated with the *Grillas* method: samples were removed from the bags, individually weighed and put into beakers. 1% solution of hydrogen peroxide was added together with 5g per litre sodium metaphosphate. This treatment facilitates the oxidation of modern organic matter. After the solution is applied, the remaining larger pieces are broken up using a glass rod. All samples were subsequently covered with foil and left to oxidise for 24 hours.

After the 24-hour period of oxidation samples were sieved using 2mm and 120µm size sieves. Larger objects such as molluscs and gravel retrieved from the 2mm sieves were put into dishes and left to air dry; finer sediments were dried in beakers for one hour at 70 degrees Celsius. Subsequently, the finer sediments from the first set of samples (BUR02/1 – BUR02/05) were placed on doubled-sided tape mounted onto index cards (this was done to facilitate analysis under the microscope). However, because the sediments could not be moved, this system was found to impede detailed inspection of individual fragments contained within the sample. Subsequently, fine sediments were stored loose in Petri dishes.

Sub-samples from the second group: BUR03/6 to BUR03/14 (except for BUR03/13),⁵⁵ were analysed with a different and more accurate method and was carried out in a laboratory. The study consisted of granulometric (for all samples) and microscopic analysis on a selected number of samples. For the granulometric analysis, the dried samples were thoroughly mixed and 25g sub-samples were weighed out for granulometric analysis. Granulometry was determined according to the method given in Buchanan (1984) using nested 4mm, 2mm, 1mm, 500µm, 250µm, 125µm and 64µm Endecott test-sieves on a mechanical sieve-shaker for 15 minutes, at moderate amplitude. The sediment passing through the 64µm sieve constitutes the mud fraction, which was not analysed further (Borg 2003: 1). Sub-samples, taken from a batch of 15 sediment samples, were examined under a stereomicroscope, using X20/X40 magnifications.

⁵⁵ This sample consisted mainly of molluscs.

A.2 Sediment Flattening and Roundness

The flattening and roundness of the deposits help indicate the mode of transport as well as distance travelled. The following is the formula used to determine the index of flattening (IOF) for the larger sediments of samples:

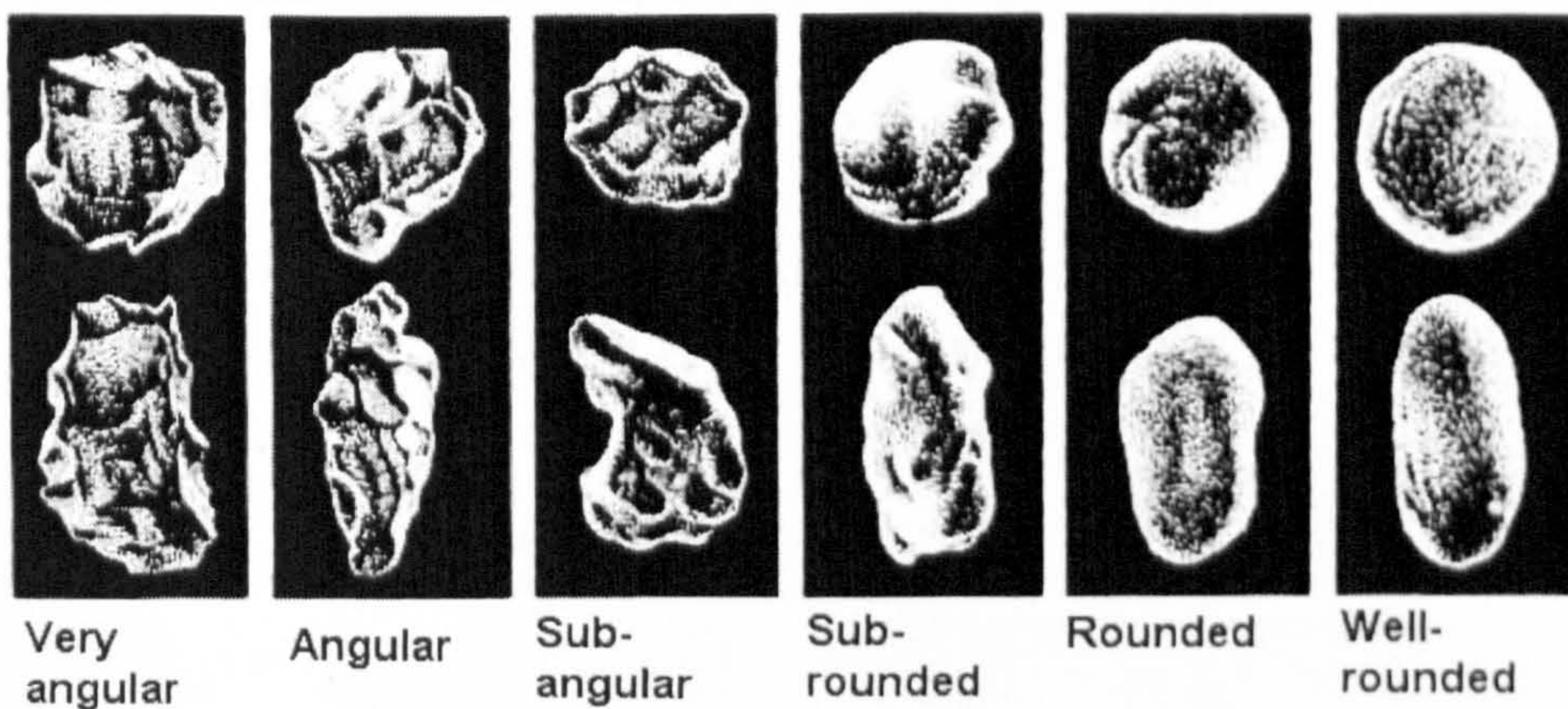
$$F = c/a \times 100$$

Less than 50%: Sliding dominant.

Between 50% and 60%: Sliding and rolling

More than 60%: Rolling dominant.

Another facet of the larger sediments noted is the roundness. By observing how the individual pieces have been worn, one may deduce whether these were transported over long distances. The roundness of the gravel inclusions was calculated using the profiles in the diagram below as guidance:



(After Powers 1953: 118)

Classification of clastic sedimentation process and the sediments

Process	Sediment type
High-energy transport	
Ice	Till or boulder clay (=diamicton)
Water	Rounded, bedded gravel
Gravity	Angular scree
Sub-aerial	Coombe rock and rock streams
 <i>Moderate-energy transport</i>	
Water	Rounded, bedded sand
Wind	Subangular to rounded, bedded gravel
Sub-aerial	Loamy, stony colluvium weakly bedded, poorly sorted
 <i>Low-energy transport</i>	
Water	Silts and clays
Wind	Silt (=loess)

Note: gravel consolidates to conglomerate, scree and coombe rock to breccia

(After Evans and O'Connor 2001: 38)

Clastic Sediments

Composition

Environment

a) Moderately to well sorted

Gravel, >2.0mm, rounded; consolidated as conglomerate	Glacial outwash, sea storm beach, fast-flowing river
Scree, >2.0mm, angular, consolidated as breccia	Cold Climates, primary ditch fills
Sand, 2.0-0.06/0.05mm; consolidated as sandrock	Aeolian = coversand, water-lain as sea beach or river deposits
Silt, 0.06-0.05-0.002mm (=60-2µm); consolidated as siltstone	Usually Aeolian = loess
Clay, <2.0µm; consolidated as claystone	Still and/or deep water, eg lakes and oceans

b) Poorly sorted

Till or boulder clay	Ice-sheet or glacier
Solifluxion/ gelifluxion	Cold climate slope deposits
Stony, humic loam	Slopewash eg under cultivation by rill erosion (=colluvium)

c) Volcanic deposits

eg tephra, acids, pyroclasts, lava	Various volcanic environments

(After Evans and O’Connor 2001: 42)

A.3 Sample Catalogue

BUR02/1/1:

Depth: 1000mm

Sediment type: Topsoil

IOF: NA: No gravel was retrieved in sample.

Roundness: NA

Marine molluscs: None

Terrestrial molluscs: *Ceriuella caruanae*

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: NA

Comments: This consisted of a trial sample.

BUR02/1/2:

Depth: 1500mm

Sediment type: Topsoil

IOF: NA: No gravel was retrieved in sample.

Roundness: NA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: NA

Comments: Following this sample it would seem that the auger reached bedrock, large stones washed down by flooding or masonry. However, judging from the lay of the land it would seem more than likely that the hard layer found is bedrock.

BUR02/2/1:

Depth: 1800mm

Sediment type: Loam

IOF: 75%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: *Cochlicella acuta*; *Cernuella caruanae*

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Pottery: Sherd: Soft fabric. 0.7 cm thickness. Burnished on the inside. Brown fabric and fired evenly throughout. Very friable fabric, easily broken. Core is a much darker brown colour, small amount of medium sized white grits.

Smaller sherd: 0.4 cm thickness. Undiagnostic small sherd; red clay fired evenly throughout.

Other: None

Comments: The clastic sediments seem to have been transported to the site by flowing water over a relatively short distance explaining the non-rounded state of the sediments. Molluscs indicate a terrestrial environment. Pottery found in the sample is not datable but indicates the presence of past human activity in the catchment area.

BUR02/2/1b:

Depth: 1800mm.

Sediment type: Loam

IOF: 64%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: The clastic sediments seem to have been transported to the site by flowing water over a relatively short distance explaining the non-rounded state of the sediments.

BUR02/2/2: (6m from edge).

Depth: 1800mm

Sediment type: Loam

IOF: 69%

Roundness: SA-SR: The clastic sediments seem to have been transported to the site by flowing water over a relatively short distance. This would explain why the sediments are not fully rounded.

Marine molluscs: None

Terrestrial molluscs: *Cochlicella acuta*; *Pomatias sulcatus*; *Trochoidea spratti*;
Cernuella caruanae; *Oxychilus draparnaudi*; *Theba pisana*; *Carocollina lenticula*

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: Thickness 0.6cm. Extremely well levigated clay that is fired a dark red throughout. Slipped and burnished on both surfaces. Sherd too small to date but definitely much later than Punic. Small amount of small black grits visible to the naked eye. These are much more numerous when observed under a microscope. It would seem that the black grit is not a local material.

Other: None

Comments: Sediment and mollusc type indicate a terrestrial environment. The lack of rounding in the sediments indicates a catchment area not too distant from the site. The presence of pottery in the sample points towards a relatively recent (post-Punic) deposition.

BUR02/2/3:

Depth: 1200mm

Sediment type: Loam

IOF: NA: No gravel was retrieved in sample.

Roundness: NA

Marine molluscs: None

Terrestrial molluscs: *Cochlicella acuta*; *Trochoidea spratti*; *Carocollina lenticula*;
Papillifera papillaris; *Cernuella caruanae*

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: Molluscs are indicative of a terrestrial environment.

BUR02/3/1:

Depth: 3000mm

Sediment type: Clay.

IOF: NA: No gravel retrieved in sample.

Roundness: NA.

Marine molluscs: None

Terrestrial molluscs: *Cochlicella acuta*; *Lauria cylindricea*

Brackish water molluscs: *Ovatella myosotis*

Freshwater molluscs: None

Pottery: None

Other: None

Comments: Fine sediments are the last to be deposited mainly due to them being lighter and thus easier to transport than gravel and other heavier material. The deposit, in this case clay, consolidates easily often preventing larger sediments from penetrating. Molluscs indicate an environment where brackish water is predominant. There is also evidence of terrestrial snails, which is indicative of a change in environment.

BUR02/3/2:

Depth: 3400mm

Sediment type: Clay

IOF: No gravel retrieved in sample.

Roundness: NA

Marine molluscs: None

Terrestrial molluscs: *Cochlicella acuta*;

Brackish water molluscs: *Ovatella myosotis*

Freshwater molluscs: None

Pottery: None

Other: Numerous plant fibres that have yet to be identified.

Comments: Sediments and molluscs indicate an environment where brackish water is predominant. However, the presence of land snails points towards environmental change and/or objects being transported onto the site from the surrounding catchment area.

BUR02/3/3:

Depth: 3700mm

Sediment type: Clay

IOF: No gravel retrieved in sample.

Roundness: NA

Marine molluscs: None

Terrestrial molluscs: *Cochlicella acuta*; *Pomatias sulcatus*

Brackish water molluscs: *Ovatella myosotis*

Freshwater molluscs: None

Pottery: None

Other: Numerous plant fibres (probably reeds)

Comments: Sediments and molluscs indicate an environment where brackish water is predominant. However, the presence of land snails points towards environmental change and/or objects being transported onto the site from the surrounding catchment area.

BUR02/3/4:

Depth: 4700mm

Sediment type: Clay

IOF: No gravel retrieved in sample.

Roundness: NA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: Numerous plant fibres that have yet to be identified (possibly *Posedonia oceanica*).

Comments: Sediments and molluscs indicate an environment where brackish water is predominant. However, the presence of land snails points towards environmental

change and/or objects being transported onto the site from the surrounding catchment area.

BUR02/3/5:

Depth: 6130mm

Sediment type: Clay

IOF: No gravel retrieved in sample.

Roundness: NA

Marine molluscs: *Cerithium vulgatum Bruguière*; *Abra segmentum*; *Cerastoderma glaucum*; *Pirinella conica*

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: Numerous plant fibres that have yet to be identified (possibly *Posedonia oceanica*).

Comments: Following this sample it would seem that the auger reached bedrock, or large stones washed down by flooding or masonry. However, judging from the lay of the topography in the area it would seem more than likely that the hard layer found is bedrock. Molluscs point to an environment that is predominantly marine. There is also evidence for estuarine conditions with brackish waters.

BUR02/3a/1:

Depth: 300mm

Sediment type: Topsoil

IOF: 74%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: This sample was taken from the current topsoil.

BUR02/3a/2:

Depth: 600mm

Sediment type: Loam

IOF: 68%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: It would seem that due to the lack of roundness of the gravel within this section the alluvial deposit originated from a relatively close catchment area.

BUR02/3a/3: (from section of second ditch).

Depth: 1650mm

Sediment type: Loam

IOF: NA

Roundness: NA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: These cores represent layers above sample BUR02/3. It would seem that this alluvial deposit originated from a relatively close catchment area.

BUR02/4/1:

Depth: 250mm

Sediment type: Topsoil

IOF: 82%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: Taken from exposed section in topsoil. It would seem that due to the lack of roundness of the gravel within this section the alluvial deposit originated from a relatively close catchment area.

BUR02/4/2:

Depth: 1000mm

Sediment type: Loam (quite well sorted).

IOF: 71%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: *Trochoidea spratti*; *Rumina decollata*; *Cochlicella acuta*;
Ceriuella caruanae

Brackish water molluscs: None

Freshwater molluscs: None

Pottery:

I) Hard fired piece of clay, 2.8 cm thick, even thickness. Well-levigated clay, with small black grits on the surface. One side has an edge, possible part of a lozenge shaped tile.

II) Body sherd: red clay, with a dark grey core. Surface is fairly worn. Medium amount of medium sized grits on inner and outer surfaces. No idea re date. Thickness 1cm, even.

III) Diagnostic Sherd: part of a rim. Inside is amply encrusted, the outside has a smaller amount of encrustation. Thickness: 0.4cm, even. Quite well levigated, looks burnt. No idea re date.

Other: Seed of *Damasonium bourgaei*, a rare plant that grows in rainwater pools in garigue areas. (Sultana and Falzon 1996: 76).

Comments: Same location as above but taken from beneath surface. It would seem that due to the lack of roundness of the gravel within this section the alluvial deposit originated from a relatively close catchment area. Judging from the pottery the

surrounding area must have been witness to some form of human activity. Molluscs found point to a terrestrial environment. The *Damasonium* seed may indicate that the area, now covered in loamy soil, may have once been garigue. However, it is more plausible that the seed was transported to the site from a garigue in the area.

BUR02/4/3:

Depth: 1600mm

Sediment type: Loam (not well sorted).

IOF: 78%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: *Cochlicella acuta*; *Trochoidea spratti*; *Pomatias sulcatus*;

Papillifera papillaris; *Cernuella caruanae*

Brackish water molluscs: None

Freshwater molluscs: None

Pottery:

I). The larger fragment is a well levigated sherd, red clay, fired evenly throughout. Thickness: 0.45cm and even. Wheel made. Thin slip, fired a light red, on outer surface only. Fairly large amount of small black grits, mostly concentrated on the inner and outer surfaces. This sherd could very well be Punic crisp ware. Hard surface.

II) Small sherd, made of red clay, fired evenly throughout. Well levigated clay. Very thin, light red slip, possibly self slip. Thickness 0.6cm, even.

Other: None

Comments: It would seem that due to the lack of roundness of the gravel within this section the alluvial deposit originated from a relatively close catchment area. Judging from the pottery the surrounding area must have been witness to some form of human activity.

BUR02/5/1:

Depth: 630mm

Sediment type: Topsoil.

IOF: No gravel retrieved in this sample.

Roundness: NA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery:

Other:

Comments: This core was made further towards the valley but also within property of Green Suppliers Ltd. 200mm where removed from the surface as this consisted of recent compost added by the present owners.

BUR02/5/2:

Depth: 1280mm

Sediment type: Sandy loam

IOF: 69%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: Judging from the lack of roundness it would seem that the deposits were transported from relatively nearby.

BUR02/5/3:

Depth: 2000mm

Sediment type: Sandy loam

IOF: 69%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: Judging from the lack of roundness it would seem that the deposits were transported from relatively nearby.

BUR02/5/4:

Depth: 2200mm

Sediment type: Sandy loam

IOF: 71%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: Judging from the lack of roundness it would seem that the deposits were transported from relatively nearby.

BUR02/5/5:

Depth: 3000mm

Sediment type: Sandy loam

IOF: No gravel was retrieved in this sample.

Roundness: NA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: Judging from the lack of roundness it would seem that the deposits were transported from relatively nearby.

BUR02/5/6:

Depth: 3700mm

Sediment type: Sandy loam

IOF: No gravel was retrieved in this sample.

Roundness: NA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: Judging from the lack of roundness it would seem that the deposits were transported from relatively nearby.

BUR02/5/7:

Depth: 3980mm

Sediment type: Sandy loam

IOF: 75%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: Judging from the lack of roundness it would seem that the deposits were transported from relatively nearby. Due to inclement weather this and subsequent samples in zone five had to be taken four days after the previous ones. Samples seven, eight, nine and ten seemed to be contaminated with a rich red soil usually associated with the surface. This could well have been surface material washed into the hole by the rains.

BUR02/5/8:

Depth: 4320mm

Sediment type: Sandy loam

IOF: 65%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: Judging from the lack of roundness it would seem that the deposits were transported from relatively nearby.

BUR02/5/9:

Depth: 4600mm

Sediment type: Sandy loam

IOF: 73%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: Judging from the lack of roundness it would seem that the deposits were transported from relatively nearby.

BUR02/5/10:

Depth: 4840mm

Sediment type:

IOF: 68%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Pottery: None

Other: None

Comments: Judging from the lack of roundness it would seem that the deposits were transported from relatively nearby.

BUR03/6/1:

Depth: 850mm

Sediment type: Slightly gravelly sandy mud.

IOF: 67%

Roundness: SA

Mean grain size: 0.072mm

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Other: NA

Comments: None

BUR03/6/2:

Depth: 1270mm

Sediment type: Sandy mud

IOF: 81%

Roundness: SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.058mm

Pottery: None

Other: NA

Comments: None

BUR03/6/3:

Depth: 1540mm

Sediment type: Sandy mud

IOF: 72%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.085mm

Pottery: None

Other: NA

Comments: None

BUR03/6/4:

Depth: 1950mm

Sediment type: Gravelly mud

IOF: 68%

Roundness: SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.117mm

Pottery: None

Other: NA

Comments: None

BUR03/6/5:

Depth: 2570mm

Sediment type: Slightly gravelly sandy mud

IOF: 66%

Roundness: SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.079mm

Pottery: None

Other: NA

Comments: Dark-fawn coloured medium to fine sediment with some coralline limestone inclusions. Biogenic inclusions consisted of foraminifera and molluscan shell fragments. Probably marine and terrigenous.

BUR03/6/6:

Depth: 2800mm

Sediment type: Slightly gravelly sandy mud

IOF: 72%

Roundness: SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.081mm

Pottery: None

Other: NA

Comments: None

BUR03/6/7:

Depth: 2850mm

Sediment type: Slightly gravelly sandy mud

IOF: 77%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.124mm

Pottery: None
Other: NA
Comments: None

BUR03/7/1:
Depth: 1400mm
Sediment type: Slightly gravelly sandy mud
IOF: 69%
Roundness: SR
Marine molluscs: None
Terrestrial molluscs: None
Brackish water molluscs: None
Freshwater molluscs: None Pottery: None
Mean grain size: 0.077mm
Other: NA
Comments: None

BUR03/7/2:
Depth: 2380mm
Sediment type: Slightly gravelly sandy mud
IOF: 73%
Roundness: SA-SR
Marine molluscs: None
Terrestrial molluscs: None
Brackish water molluscs: None
Freshwater molluscs: None Pottery: None
Mean grain size: 0.073mm
Pottery: None
Other: NA
Comments: None

BUR03/8/1:
Depth: 2400mm
Sediment type: Gravelly mud

IOF: 70%
Roundness: SR
Marine molluscs: None
Terrestrial molluscs: None
Brackish water molluscs: None
Freshwater molluscs: None Pottery: None
Mean grain size: 0.113mm
Pottery: None
Other: NA
Comments: None

BUR03/8/2a:
Depth: 2870mm
Sediment type: Slightly gravelly sandy mud
IOF: 65%
Roundness: SR
Marine molluscs: None
Terrestrial molluscs: None
Brackish water molluscs: None
Freshwater molluscs: None Pottery: None
Mean grain size: 0.068mm
Pottery: None
Other: NA
Comments: None

BUR03/8/2b:
Depth: 2870mm
Sediment type: Muddy gravel
IOF: 69%
Roundness: SA-SR
Marine molluscs: None
Terrestrial molluscs: None
Brackish water molluscs: None
Freshwater molluscs: None Pottery: None

Mean grain size: 0.370mm

Pottery: None

Other: NA

Comments: None

BUR03/9/1a:

Depth: 3000mm

Sediment type: Slightly gravelly sandy mud

IOF: 74%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.058mm

Pottery: None

Other: NA

Comments: None

BUR03/9/1b:

Depth: 3360mm

Sediment type: Gravelly mud

IOF: 64%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.125mm

Pottery: None

Other: NA

Comments: Dark-fawn coloured coarse to medium sediment with some coralline limestone inclusions. Biogenic inclusions consisted of foraminifera (some fossil),

echinoid spines and molluscan shell fragments (including of terrestrial species).
Probably marine and terrigenous.

BUR03/9/1c:

Depth: 3950mm

Sediment type: Slightly gravelly sandy mud

IOF: 68%

Roundness: SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.080mm

Pottery: None

Other: NA

Comments:

BUR03/9/2a:

Depth: 5954mm

Sediment type: Slightly gravelly sandy mud

IOF: 74%

Roundness: SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.063mm

Pottery: None

Other: NA

Comments: Dark-fawn coloured medium to fine sediment with some coralline limestone inclusions. Biogenic inclusions were sparse but included some foraminifers, some molluscan shell fragments, mainly of terrestrial species. More terrigenous than marine.

BUR03/9/2b:

Depth: 6500mm

Sediment type: Slightly gravelly sandy mud

IOF: 79%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.071mm

Pottery: None

Other: NA

Comments: Dark-fawn coloured medium to fine sediment with some coralline limestone inclusions. Biogenic inclusions were sparse but included some foraminifera, and some molluscan shell fragments, mainly of terrestrial species. More terrigenous than marine.

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BUR03/10/1:

Depth: 7000mm

Sediment type: Slightly gravelly sandy mud

IOF: 63%

Roundness: R

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.071mm

Pottery: None

Other: NA

Comments: Due to deteriorating weather only one sample was taken from this zone. It was decided to retrieve this from the deepest possible layers so as to obtain data to compare with those from other zones. Light-brown coloured medium to fine sediment with many coralline limestone inclusions. Biogenic inclusions consisted of sparse

foraminifera but many molluscan shell fragments, mostly of terrestrial species. Mostly terrigenous?

BUR03/11/1:

Depth: 4600mm

Sediment type: Slightly gravelly sandy mud

IOF: 81%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.093mm

Pottery: None

Other: NA

Comments:

BUR03/11/2a:

Depth: 6000mm

Sediment type: Gravelly mud

IOF: 75%

Roundness: SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.100mm

Pottery: None

Other: NA

Comments: Light-coloured coarse sediment with many coralline limestone inclusions.

Biogenic inclusions included foraminifera, echinoid spines and molluscan shell fragments. Probably predominantly of marine origin.

BUR03/11/2b:

Depth: 6193mm

Sediment type: Gravelly mud

IOF: 72%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.266mm

Pottery: None

Other: NA

Comments: Light-coloured coarse sediment with many coralline limestone inclusions.

Biogenic inclusions included foraminifera, echinoid spines and molluscan shell fragments. Probably predominantly of marine origin.

BUR03/11/2c:

Depth: 6350mm

Sediment type: Slightly gravelly sandy mud

IOF: 68%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.123mm

Pottery: None

Other: NA

Comments: Light-coloured coarse sediment with many coralline limestone inclusions.

Biogenic inclusions included foraminifera, echinoid spines and molluscan shell fragments. Probably predominantly of marine origin.

BUR03/11/2d:

Depth: 6750mm

Sediment type: Gravelly mud

IOF: 77%

Roundness: SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.218mm

Pottery: None

Other: NA

Comments: Light-coloured coarse sediment with many coralline limestone inclusions.

Biogenic inclusions included foraminifera, echinoid spines and molluscan shell fragments. Probably predominantly of marine origin.

BUR03/11/2e:

Depth: 6960mm

Sediment type: Gravelly mud

IOF: 73%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.234mm

Pottery: None

Other: NA

Comments: Light-coloured coarse sediment with many coralline limestone inclusions.

Biogenic inclusions included foraminifera, echinoid spines and molluscan shell fragments. Probably predominantly of marine origin.

BUR03/11/3:

Depth: 7350mm

Sediment type: Gravelly mud

IOF: 68%

Roundness: SA-SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.127mm

Pottery: None

Other: NA

Comments: Dark-fawn coloured coarse to medium sediment with coralline limestone inclusions. Biogenic inclusions included foraminifera (some fossil), echinoid spines and molluscan shell fragments. Probably marine and terrigenous.

BUR03/12/1:

Depth: 4750mm

Sediment type: Sandy mud

IOF: 66%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None Pottery: None

Mean grain size: 0.049mm

Pottery: None

Other: NA

Comments: None.

BUR03/12/2a:

Depth: 8000mm

Sediment type: Slightly gravelly sandy mud

IOF: 68%

Roundness: SA

Marine molluscs: *Cerithium vulgatum Bruguière*; *Loripes lacteus*; *Cerastoderma glaucum*; *Abra segmentum*; *Bittium reticulatum*; *Pirinella conica*

Terrestrial molluscs: *Oxychilus draparnaudi*; *Cochlicella acuta*; *Clausilia species*; *Trochoidea spratti*; *Rumina decollata*; *Papillifera papillaris*; *Cernuella caruanae*

Brackish water molluscs: *Hydrobia acuta*; *Ovatella myosotis*

Freshwater molluscs: None Pottery: None

Mean grain size: 0.074mm

Pottery: None

Other: NA

Comments: None.

BUR03/12/2b:

Depth: 8300mm

Sediment type: Slightly gravelly mud

IOF: 72%

Roundness: SA

Marine molluscs: *Cerastoderma glaucum*; *Cerithium vulgatum*;

Terrestrial molluscs: *Pomatias sulcatus*; *Cochlicella acuta*; *Clausilia species*; *Oxychilus draparnaudi*; *Cernuella caruanae*

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.047mm

Pottery: None

Other: NA

Comments: None.

BUR03/12/2c:

Depth: 8495mm

Sediment type: Slightly gravelly sandy mud

IOF: 67%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.051mm

Pottery: None

Other: NA

Comments: None.

BUR03/12/3:

Depth: 12000mm

Sediment type: Slightly gravelly sandy mud

IOF: 69%

Roundness: SR

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.053mm

Pottery: None

Other: NA

Comments: Light-coloured fine sediment. Very few biogenic inclusions which mainly consisted of some foraminifers and some terrestrial molluscan shell fragments
Mostly terrigenous.

BUR03/13/1:

Depth: 14000mm

Sediment type: Gravelly mud

IOF: NA

Roundness: NA

Marine molluscs: *Cerithium vulgatum Bruguière*; *Loripes lacteus*; *Cerastoderma glaucum*; *Abra segmentum*; *Bittium reticulatum*; *Pirinella conica*; *Nassarius cuvierii*; *Rissoa auriformis Pallary*; *Rissoa radiata*; *Turbonilla pusilla*; *Hexaplex trunculus*
Terrestrial molluscs: *Cochlicella acuta*; *Trochoidea spratti*; *Truncatella subcylindrica*; *Clausilia* species
Brackish water molluscs: *Hydrobia acuta*; *Ovatella myosotis*

Freshwater molluscs: *Mercuria similes*; *Lymnaea cf. peregra*

Mean grain size: 0.138mm

Pottery: None

Other: NA

Comments:

BUR03/14/1a:

Depth: 3200mm

Sediment type: Slightly gravelly mud

IOF: 71%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.049mm

Pottery: None

Other: NA

Comments: Sediment is blue-green in colour with a claylike texture. It also quite sterile.

BUR03/14/1b:

Depth: 3800mm

Sediment type: Slightly gravelly sandy mud

IOF: 68%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.060mm

Pottery: None

Other: NA

Comments: Sediment is blue-green in colour with a claylike texture. It also quite sterile.

BUR03/14/1c:

Depth: 4200mm

Sediment type: Slightly gravelly sandy mud

IOF: 73%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.053mm

Pottery: None

Other: NA

Comments: Sediment is blue-green in colour with a claylike texture. It also quite sterile.

BUR03/14/2a:

Depth: 6250mm

Sediment type: Slightly gravelly sandy mud

IOF: 64%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: None

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.058mm

Pottery: None

Other: NA

Comments: Grey medium to fine sediment. Many biogenic inclusions mostly fragments of terrestrial molluscan shells and woody plant material. Terrestrial or lacustrine.

BUR03/14/2b:

Depth: 6500mm

Sediment type: Gravelly mud

IOF: 70%

Roundness: SA

Marine molluscs: None

Terrestrial molluscs: *Trochoidea spratti*; *Cochlicella acuta*; *Cernuella caruanae*

Brackish water molluscs: *Ovatella myosotis*

Freshwater molluscs: None

Mean grain size: 0.115mm

Pottery: None

Other: NA

Comments: Grey medium to fine sediment. Many biogenic inclusions mostly fragments of terrestrial molluscan shells and woody plant material. Terrestrial or lacustrine.

BUR03/14/2c:

Depth: 6900mm

Sediment type: Slightly sandy gravelly mud

IOF: 72%

Roundness: SA

Marine molluscs: *Cerastoderma glaucum*

Terrestrial molluscs: *Trochoidea spratti*; *Cernuella caruanae*

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.064mm

Pottery: None

Other: NA

Comments: Grey fine to very fine sediment. Very few biogenic inclusions mostly fragments of marine and terrestrial molluscan shells and some woody plant material. Lacustrine (?).

BUR03/14/3:

Depth: 9000mm

Sediment type: Slightly sandy gravelly mud

IOF: 67%

Roundness: SA

Marine molluscs: *Pecten* species (probably a reworked fossil).

Terrestrial molluscs: *Cochlicella acuta*; *Trochoidea spratti*; *Cernuella caruanae*

Brackish water molluscs: None

Freshwater molluscs: None

Mean grain size: 0.081mm

Pottery: None

Other: NA

Comments: Sediment black in colour.

Sample	% class			Total fine earth %
	Gravel	Sand	Mud	Fine earth
6/1	1.16	27.74	71.10	98.84
6/2	0.00	20.80	79.20	100.00
6/3	0.00	39.76	60.24	100.00
6/4	10.17	28.53	61.31	89.83
6/5	1.79	31.42	66.79	98.21
6/6	1.19	34.84	63.97	98.81
6/7	9.86	30.74	59.40	90.14
7/1	0.58	39.70	59.72	99.42
7/2	1.19	35.61	63.20	98.81
8/1	7.46	31.54	61.00	92.54
8/2a	0.34	30.34	69.32	99.66
8/2b	35.86	21.11	43.03	64.14
8/2a	3.28	9.17	87.55	96.72
9/1a	0.63	16.70	82.67	99.37
9/1b	5.09	36.28	58.63	94.91
9/1c	1.67	31.05	67.28	98.33
9/2a	2.48	18.30	79.22	97.52
9/2c	1.15	25.64	73.21	98.85
10/1	1.78	25.49	72.72	98.22
10/1	5.14	25.73	69.13	94.86
11/1	3.18	32.84	63.99	96.82
11/2a	8.83	48.37	42.80	91.17
11/2b	18.18	35.82	46.00	81.82
11/2c	2.68	47.72	49.60	97.32
11/2d	17.24	41.23	41.53	82.76
11/2e	7.44	26.11	66.45	92.56
11/3a	6.09	36.60	57.31	93.91
11/3a+b	8.15	26.39	65.46	91.85
11/3b	8.79	21.74	69.47	91.21
12/?	0.11	20.36	79.53	99.89
12/1a	0.00	10.49	89.51	100.00
12/2a	1.71	24.33	73.95	98.29
12/2b	0.30	3.66	96.03	99.70
12/2c	0.71	10.51	88.78	99.29
12/3b	0.43	16.40	83.18	99.57
12/3c	0.46	7.86	91.68	99.54
13/1	13.76	24.02	62.21	86.24
14/1a	0.31	7.51	92.18	99.69
14/1b	3.25	11.18	85.57	96.75
14/1c	0.97	12.08	86.95	99.03
14/2a	3.17	10.68	86.14	96.83
14/2b	8.12	26.64	65.24	91.88
14/2c	3.18	19.95	76.87	96.82
14/3	4.07	23.40	72.53	95.93

Table A.1. Percentage of sediments within samples.

	Moment measures (Phi units)				
Sample	Moment mean	Moment sorting	Moment skewness	Moment kurtosis	Classification
6/1	3.79196	1.32882	-2.16151	7.45983	Slightly gravelly sandy mud
6/2	4.11706	0.80916	-2.383	8.49209	Sandy mud
6/3	3.56187	1.32911	-1.20452	3.20607	Sandy mud
6/4	3.10034	2.18776	-1.4433	3.70401	Gravelly mud
6/5	3.66052	1.45628	-1.92331	6.03679	Slightly gravelly sandy mud
6/6	3.63062	1.41069	-1.83575	6.16245	Slightly gravelly sandy mud
6/7	3.0093	2.23721	-1.33136	3.36282	Gravelly mud
7/1	3.6975	1.17207	-1.65032	5.71995	Slightly gravelly sandy mud
7/2	3.77361	1.19398	-2.18883	8.45765	Slightly gravelly sandy mud
8/1	3.14406	2.09657	-1.47173	3.94919	Gravelly mud
8/2a	3.8705	1.09463	-1.9353	6.51145	Slightly gravelly sandy mud
8/2b	1.43252	3.11353	-0.24897	1.23682	Muddy gravel
8/2a	4.11368	1.31585	-4.22664	20.30611	Slightly gravelly mud
9/1a	4.10597	1.02255	-3.32043	14.40616	Slightly gravelly sandy mud
9/1b	2.99564	2.11001	-1.10323	2.79556	Gravelly mud
9/1c	3.64074	1.5025	-1.91004	5.94238	Slightly gravelly sandy mud
9/2a	3.99349	1.27955	-3.38505	14.77066	Slightly gravelly sandy mud
9/2c	3.81537	1.31351	-2.16826	7.49627	Slightly gravelly sandy mud
10/1	3.81385	1.37152	-2.30661	7.6644	Slightly gravelly sandy mud
10/1	3.55261	1.79105	-2.11219	6.58483	Gravelly mud
11/1	3.42823	1.72521	-1.59409	4.51597	Slightly gravelly sandy mud
11/2a	2.09704	2.30067	-0.20787	1.5075	Gravelly muddy sand
11/2b	2.20015	2.61986	-0.70445	1.97598	Gravelly mud
11/2c	3.02167	1.75059	-0.95034	3.07615	Slightly gravelly sandy mud
11/2d	1.9083	2.49418	-0.20327	1.37937	Gravelly mud
11/2e	3.31895	2.00783	-1.65151	4.48043	Gravelly mud
11/3a	2.97296	2.08049	-1.08232	2.84016	Gravelly mud
11/3a+b	3.2185	2.13696	-1.58667	4.21929	Gravelly mud
11/3b	3.36769	2.10999	-1.86935	5.13369	Gravelly mud
12/?	4.06524	0.85368	-1.90681	6.52219	Slightly gravelly sandy mud
12/1a	4.36107	0.38044	-3.48771	16.69845	Sandy mud
12/2a	3.7601	1.47247	-2.10106	6.39201	Slightly gravelly sandy mud
12/2b	4.40965	0.47007	-9.20696	101.0038	Slightly gravelly mud
12/2c	4.29168	0.73637	-6.17659	48.8584	Slightly gravelly sandy mud
12/3b	4.22632	0.73483	-4.4892	28.47757	Slightly gravelly sandy mud
12/3c	4.34712	0.59316	-6.72611	57.33173	Slightly gravelly mud
13/1	2.85227	2.40824	-1.03091	2.32702	Gravelly mud
14/1a	4.34525	0.60264	-6.26993	49.41512	Slightly gravelly mud
14/1b	4.0677	1.3544	-3.9611	18.37496	Slightly gravelly sandy mud
14/1c	4.23139	0.84683	-4.69493	27.82463	Slightly gravelly sandy mud
14/2a	4.11074	1.28928	-4.25548	20.723	Slightly gravelly sandy mud
14/2b	3.11783	2.16355	-1.28474	3.13953	Gravelly mud
14/2c	3.97535	1.28774	-3.228	12.97707	Slightly gravelly sandy mud
14/3	3.62377	1.72616	-2.07467	6.22496	Slightly gravelly sandy mud

Table A.2 Values of estimated Moment measures (based on Phi) and overall classification of sediments.

A.4 Dates

As has been discussed above (section 2.4.5), the origin of these bays is traceable to the early Holocene. Due to a lack of financial resources, only one carbon date was obtained from the samples retrieved. From this sample however, the earliest presence of a marine environment is securely datable to 6413 ± 144 BC, obtained from a C-14 test carried out on marine molluscs (*Cerithium vulgatum*) from BUR03/12/2b⁵⁶ (Figure A.1). Details on the C-14 date are given in Appendix C. The existence of well-preserved organic material in the sediment deposits of the floodplain is to be expected. On the bottom of flooded river valleys, anaerobic conditions form quickly because newly deposited sediments settle on the existing seabed. The deeper the buried levels the more oxygen-depleted they become (Azzopardi 2002: 50-51). However, due to the turbation of sediment deposits, samples may contain materials of a variety of ages and origins (Evans and O'Connor 2001: 82). Furthermore, the absence of a sequence of dates from the cores precludes the study of the formation of seabed and floodplain levels through time.

Therefore, the study of dates for changes in this area requires the use of other evidence apart from the environmental samples. Archaeological and historical sources provide the main bodies of evidence. Written descriptions by early modern historians give clear indications as to the environment in recent history. The presence of various archaeological sites around the plains discussed suggests that these were built on the periphery of a bay (see Figure B.12).

Archaeological objects retrieved from the construction site at Marsa range from the Ggantija phase of Maltese prehistory (3500 BC) to the Middle Ages. The main deposits are mainly from the Roman period. These ceramics were embedded in marine deposits indicating that when deposited, the area consisted of a marine environment (Figure A.2). In Burmarrad, sections in the alluvial deposits contain ceramic fragments datable to the Punico-Roman period (Figure A.3). Similar sections in the alluvial deposits of Marsascala also contain archaeological material. Although the deposition of sediments on the seabed began soon after the formation of the

⁵⁶ See Appendix B for the full details on the C-14 test.

flooded valleys, the presence of human-made objects within the alluvium strongly suggests that the main episodes of deposition happened in the post-classical periods.

Possible causes of an increase in sediment deposition include: a) deforestation; b) field abandonment and/or changes in agricultural practices; c) climatic changes; and d) normal erosion and deposition through time. The island's tree cover was entirely destroyed by the Bronze Age (Trump 2002: 14), creating a first phase of instability in the surrounding landscape. Subsequent changes in agricultural practices, from flax to olives in the Roman period and to cotton in the Islamic period, may also have affected sediment deposition and will be discussed in more detail in the relevant chapters.

The processes of land erosion and sediment deposition highlighted through the research presented here are reflective of a wider phenomenon witnessed elsewhere in the western Mediterranean. Other areas went through periods of intense alluvial deposition in the post-classical period, specifically from the Late Roman to early Medieval period, c. AD 300-1500 (Brown 2001: 239). In Sicily, the port at San Leone near Agrigento silted up some time between the end of antiquity and the early Middle Ages (Wilson 1990: 16). In Italy, the Pisa region and its rivers has been subject to various studies that have shown massive progradation of the land. By the Middle Ages, it had become increasingly difficult for vessels to travel and navigate up the Arno (Pasquinucci and Rossetti 1988: 143). A recent study of the human impact on some ports in southern France cites three periods of substantial erosion of the surrounding landscapes, one of which is the period of transition from classical antiquity to the medieval period (Morhange, Vella, Provonsal, Hesnard, and Laborel 1999: 146). Finally, research on the Mediterranean coast of Spain, specifically at the Phoenician site of Toscanos, has demonstrated the progradation of the land through time (Arteaga and Schulz 1997).

APPENDIX B

A Compendium of the Harbours and Anchorages of Malta

Introduction

The harbours and anchorages described below are described as per criteria discussed in **chapter 2**. The descriptions also include the results of the environmental sampling carried out in the ambit of my research for this thesis.

Anchorage on high-energy, cliff-lined coasts:⁵⁷

Wied iz-Zurrieq:

A sheltered valley situated on the south-west coast of Malta with its entrance oriented in the same direction (**Figure B.1**). It is exposed to all southerly winds and from the prevailing north-west, which creates dangerous conditions inside the creek. This is a small bay with freshwater available. Due to a lack of space for manoeuvring, it could only provide shelter to a single small vessel in ideal weather conditions.⁵⁸ Alternatively, vessels could anchor outside and send in smaller boats. Situated along a cliff-lined coast, this creek provided one of the only access points to the sea for inhabitants of settlements in the surrounding area. The sinuous valley provides the route to and from the hinterland.

Fomm ir-Riħ

A natural bay situated on the western coast of the island with its entrance oriented to the north-west (**Figure B.2**). The south side consists of steep cliffs that extend towards the headland of Ras ir-Raħeb, which is a high (approximately 60 metres) and precipitous cape. Large boulders make up the north-east coastline of the bay. The topography of Fomm ir-Riħ would not have changed much since antiquity. The mouth of this bay faces north-west, making it particularly susceptible to the

⁵⁷ Anchorages and harbours are described as per topographic criteria in a clockwise order starting from Wied iz-Zurrieq.

⁵⁸ The sizes of ships described in this appendix are generic: a) small: up to 75 tons or a capacity of 1500 amphora; b) medium: 75-100 tons or a capacity of 2000-3000 amphoras; and c) large: over 250 tons or over 6000 amphoras (Parker 1992: 26).

island's prevailing wind. This is suggested in its place name, which translated literally means 'in the wind's mouth'. However, its size and deep waters could provide large vessels temporary shelter from other winds such those from the north-east and east. The bottom is sandy. Landing is possible via the pebble beach at its head and the presence of small springs in the area provided a potential freshwater supply for visiting vessels. A short steep climb up the hill provided a somewhat difficult access route to the hinterland. This would have made it an unlikely location for the inhabitants to use as an access point to the sea.

Ras id-Dawwara

A natural bay situated on the western coast of the island with its entrance oriented to the north-west (**Figure B.3**). It is small but deep enough to offer temporary shelter from certain winds such as the north-easterly. Sheer cliffs line this bay thus offering no fresh water and no access to the hinterland. The topography of this bay remains unchanged since antiquity would have impeded it from being used as an access point to and from the sea.

Ġnejna and Ghajn Tuffieħa

Two natural bays on either side of an 'anvil-shaped' headland (Ras il-Qarraba) situated on the western coast of the island with their entrances oriented to the north-west (**Figure B.2**). Temporary anchorage is afforded to medium and small ships in Ġnejna and to larger vessels in the middle of Ghajn Tuffieħa. The seabed of these bays is sandy and would have offered good holding. From Ġnejna the hinterland can be reached via the valley, whereas in the case of Ghajn Tuffieħa one has to climb a short and steep rocky slope. The word Ghajn is Maltese for spring, implying the availability of freshwater at one time. These bays offered visiting seafarers the possibility of replenishing freshwater supplies. Access to the hinterland also meant that in ancient times seafarers and inhabitants of the area around Ghajn Tuffieħa were able to use the bays for trade and other forms of interaction.

Ramla ta-Mixquqa

A natural bay on the western coast of Malta just north of Ghajn Tuffieħa with its entrance oriented to the north-west (**Figure B.2**). In fact, one would not be mistaken in considering these (Ghajn Tuffieħa and Ir-Ramla ta-Mixquqa) as one large

bay. However, access to the hinterland is easier from Mixquqa. This bay would have served similar functions as those of Ġnejna and Ġhajn Tuffieħa.

Il-Prajjet

A small rocky cove with its entrance oriented to the west (**Figure B.4**). The south side is lined with steep cliffs whereas the north side is lined by a hill marked by large boulders. At the head of this bay is a small sandy beach that can be reached by small craft. It offers limited and temporary protection for small vessels in a variety of winds excluding those from the west, north-west and south-west. The seabed bay has a mainly sandy bottom offering good anchorage. Access to the hinterland would have been via a steep climb up a rocky slope. This bay is distant from ancient and medieval settlements and therefore the larger bays of Ġnejna, Ġhajn Tuffieħa and Mixquqa, would have overshadowed its function as an access point to and from the sea.

Ġirkewwa

A natural embayment on the most northern coast of the island with its entrance oriented to the north-west (**Figure B.4**). It is mainly surrounded by cliffs, making access to the hinterland quite difficult. Its sandy bottom offers good anchorage to small and medium-sized ships in most winds and a beach offers good landing possibilities. However, difficult access to the hinterland and its distance from settlements in both antiquity and the Middle Ages meant that it would not have been frequented for the purposes of trade and/or an access point for locals.

Mellieħa

A large natural bay with its entrance oriented to the north-east (**Figure B.4**). On its north side are low cliffs and boulders, whereas on the south are a series of steep slopes divided by valleys. At its head is a large sandy beach that is good for landing. A reef in the centre of the bay poses a danger to vessels approaching the inner-reaches. Otherwise, it offers good anchorage in offshore winds to vessels of all sizes. Here, vessels could wait for a favourable wind before proceeding on its journey elsewhere. The topography and contours of the seabed must also have changed, as attested by the presence of large *Posidonia* meadows and mattes in the bay (see **Figure 4.7**). Furthermore, it may be possible that Mellieħa provides one of the only cases on Malta where the sea is eroding a sandy beach but this hypothesis is yet to be

confirmed scientifically. Its distance from settlements in both antiquity and the Middle Ages meant that it would not have been frequented for the purposes of trade and/or an access point for locals. However, the presence of saltpans at the head of Mellieħa Bay in the Middle Ages points to a degree of interaction between the operators of this complex and with seagoing vessels (Ganado 2002).

Anchorage on high energy, low-lying coasts:

Ramla tal-Bir

A small natural embayment on the most northern coast of the island with its entrance oriented to the north-west (**Figure B.4**). This bay is sheltered by the islands of Gozo and Comino, thus offering good temporary anchorage to small vessels in most winds except those from the north and north-west. A small beach facilitates landing and a small valley offers good access to the hinterland. The *bir*⁵⁹ place name alludes to the presence of a well in the area and thus to a possible supply of freshwater for visiting mariners. Its distance from settlements in both antiquity and the Middle Ages meant that it would not have been frequented for the purposes of trade and/or an access point for locals.

Ramla tal-Qortin

A small natural embayment on the most northern coast of the island with its entrance oriented to the north-west (**Figure B.4**). This bay is also sheltered by the islands of Gozo and Comino, thus offering good temporary anchorage to small vessels in most winds except those from the north and north-west. A small sandy beach similarly facilitates landing and a small, short valley offers good access to the hinterland. This bay lacks a constant supply of freshwater. Furthermore, its distance from settlements in both antiquity and the Middle Ages meant that it would not have been frequented for the purposes of trade and/or an access point for locals.

Ramla tal-Armier

A small natural embayment on the most northern coast of the island with its entrance oriented to the north-west (**Figure B.4**). This bay is sheltered by the islands of Gozo and Comino thus offering good temporary anchorage to small vessels in most

⁵⁹ Bir is Maltese for well.

winds except those from the north and north-west. A small sandy beach facilitates landing and a small valley offers good access to the hinterland. However, its distance from settlements in both antiquity and the Middle Ages meant that it would not have been frequented for the purposes of trade and/or an access point for locals. This bay also lacks a constant supply of freshwater.

Ramla tat-Torri

A small natural embayment on the most northern coast of the island with its entrance oriented to the north-west (**Figure B.4**). This bay is sheltered by the islands of Gozo and Comino, thus offering good anchorage to small vessels in most winds except those from the north and north-west. A small sandy beach facilitates landing and a small valley offers good access to the hinterland. This bay lacks a constant supply of freshwater.

Il-Gzejjer

An anchorage sheltered from the north-west wind by the two small islands of St Paul but exposed to the north-easterly (**Figure B.5**). The sea in this area is deep and the seabed offers good holding ground. This anchorage offers the opportunity for vessels to shelter temporarily from the north-west wind without having to sail farther into San Pawl il-Baħar. Due to the rocky nature of the coast, landing in the immediate area would prove difficult; one would have to take a small boat to Mistra Bay in order to facilitate landing on the mainland in order to take on freshwater supplies. This anchorage would not have been used for trade.

San Pawl il-Baħar

A large natural embayment on the north-east coast of the island with its entrance oriented to the north-east (**Figure B.5**). In the past, the bay stretched significantly further inland than it does today. The silted area of the harbour is now a floodplain, which is clearly visible on the aerial photograph (**Figure B.6**). It drains the large Pwales river valley as well as a series of smaller valleys running at right angles to Pwales, which combine to extend the catchment area. Marshes formed at the head of the bay and, in 1650 approximately 20 acres of marshlands were drained to create agricultural land (Blouet 1964: 201). Some marshy areas still exist today. Despite the change in size, the basic shape of the bay would not have been radically different. The

coast prograded over the centuries because of sediment deposition. The latter also came to affect the seabed that changed due to the growth of *Posidonia* mattes which thrive on sediment deposition. This bay offers ample deepwater anchorage space for vessels of any size as well as good shelter from the north-west winds. However, it is very exposed to the north-east winds and thus cannot be considered as an all-weather/season anchorage. A beach at the head of the bay would have facilitated the landing of small boats, and freshwater is from a spring. Various parts of the hinterland are accessible from the beach as well as from numerous other landing places. These could have been used by visiting ships for interaction with the inhabitants of the surrounding area in both antiquity and the Middle Ages. Likewise, it would have been possible as an access point to the sea for various maritime related activities by the inhabitants of the surrounding areas.

Mistra

A small harbour in a sheltered valley (**Figure B.5**). In antiquity, the bay would have been larger and different in its layout than can be observed today. The area that was previously witness to a marine environment is today a floodplain, which is visible in an aerial photograph (**Figure B.7**). This floodplain receives the run-off from the north part of Xemxija hill and the south of Selmun. Although not an overly large catchment area, a substantial part of the old bay was eventually silted up. Its entrance, oriented to the south-east, is found within the larger St Paul's Bay. The north side of the bay is protected by a steep hill, whereas low cliffs line it to the south. Mistra affords safe anchorage in all weather/seasons for medium-size ships. To this day, local boatmen leave their craft in the water all through winter. The protection offered by this bay and the topography of its inner reaches would have facilitated the beaching of vessels for maintenance work. Besides the siltation of the inner reaches of the bay, environmental changes witnessed here include the progradation of the seabed due to *Posidonia* meadows and mattes. Landing would have been possible via a beach at the head of the bay, and access to the hinterland would have been possible through the valley, where freshwater is available from a stream. In antiquity, inhabitants from the surrounding area would have used this bay to interact with visiting ships as well as an access point for various maritime related activities.

Burmarrad

As discussed in **chapter 2**, the main environmental fieldwork was carried out on the floodplain of Burmarrad. To date, there have been no scientific studies on sediments and/or environmental samples from the Burmarrad plain. The core samples were taken and analysed with three objectives in mind:

- a) To determine past environmental conditions south of the saltpans.
- b) To determine the presence and extent of the ancient bay.
- c) To establish dates for the deposition sequence of the alluvium.

The Burmarrad floodplain is situated at the head of what is today known as Salina Bay and is fed by a series of valleys that in turn are fed by a smaller valleys and tributaries. This system feeds the second largest catchment area of fresh water after Marsa (**Figures B.8 and B.9**). Flash floods still carry significant amounts of sediments as well as cause damage to walls that are specifically built to retain the soil. In September 2003, floods covered the floodplain with a thick layer of mud in a matter of hours (**Figure B.10**).

When the Knights of St John reclaimed marshes in the area in the late sixteenth century for the construction of a system of saltpans, the storm watercourse was diverted via two channels on either side of the saltpans (Clarke and Agius-Vadalà 1957). These channels were also navigable by small boats but are very prone to silting up and must be cleaned regularly. In recent times the seabed just outside the saltpans has risen at a relatively rapid rate. The first accurate hydrographic survey carried out in the bay during the early nineteenth century indicates a depth of 2.7 metres (Smyth 1823) whereas the charts today indicate a depth of 1 metre in the same area, thus giving a rate of just under one centimetre rise in seabed per year. This is mainly due to interaction between sediment deposits and the growth of sea grass known as *Posidonia Oceanica*. The latter grows on beds formed by a mixture of shed layers of dead *Posidonia* with sand and/or sediment (Micallef 1996: 76). The presence of a second-century A.D. wreck at Mellieha Bay discovered on bedrock and sand under approximately four metres of *Posedonia* mattes implies that, at least in this bay, the mattes developed since antiquity (**Figure B.11**) (Frost 1969).

In the late Middle Ages, Burmarrad was known for stagnant pools that were present in the area and these are attested by Ghadira (pool) place names in areas that are today dry. In medieval documents Burmarrad is referred to as both a 'fief and port', which has been placed by Wettinger south of Salina Bay (2000: 35). Other late medieval place name evidence that points towards the possibility of a port in the area stem from names Hirbit l-Imriekeb (ruins/remains of sailing vessels), Bir l-Imriekeb (well of the sailing vessels) and Habel l-Imriekeb (field of the sailing vessels) (Wettinger 2000: 35-36).

Numerous archaeological sites ranging in date from the Neolithic to the Middle Ages are found around the floodplain and these help delineate the potential maximum sea level through time. In conjunction with the topography of the area, these sites form a sort of boundary around what was potentially a large lagoon-like bay (**Figure B.12**).

The most visible body of evidence that can be used as environmental indicators are the various molluscs including marine types from a number of samples, namely BUR02/3/5, BUR03/12/2a, BUR03/12/2b, BUR03/13/1 and BUR03/14/2c (**Figure B.13**).⁶⁰ There is a variety of species of molluscs present in the samples, which prove the existence of a marine environment in the area. Therefore, one can safely say that the Burmarrad floodplain was once an enclosed bay. The presence of *Cerithium vulgatum* (common cerith) in cores 3, 12 and 13 suggest a sandy and/or muddy environment on the seabed within this ancient bay. This species lives at a maximum depth of 12 metres, which gives an indication of the depth of the sea. Other species, such as the *Cerastoderma glaucum* (edible cockle) live in mud and at maximum depth of eight metres. The second and less obvious body of evidence pointing to the presence of a marine environment is the presence of marine sediments and other microscopic inclusions including foraminifera, echinoid spines and molluscan shell fragments. These are present in samples from, amongst others, cores 6, 9 and 11.

Samples BUR02/3/1, BUR02/3/2, BUR02/3/2, BUR03/12/2a and BUR03/14/2b contain molluscs, such as *Ovatella Myosotis* (mouse-eared snail), that live in a

⁶⁰ Reference number is broken down as follows: BUR=Burmarrad/02= year taken/3=core number/2=sample number.

predominantly lacustrine environment with shallow water. BUR/02/3/3 and BUR03/14/2c contain plant fibres identified as the remains of a semi-submerged plant such as reeds. Finally, the sediments from BUR02/14/2b and 2c are also indicative of a lacustrine environment.

Some samples (BUR03/12/2a; BUR03/12/2b; BUR03/13/1 and BUR03/14/2c) contain both marine and terrestrial molluscs whereas others (BUR03/6/5; BUR/9/1b and BUR11/3a) contain a mixture of marine and terrestrial sediments. This evidence suggests an interface between these two environments. The presence of terrestrial molluscs may be indicative of one of two things: a) they consist of species that lived and died on the floodplain and/or b) they consist of species that lived in the surrounding landscape and were transported into the bay/floodplain. The variety of the terrestrial molluscs indicates that these originate from a variety of habitats including coastal (*Cochlicella Acuta*; *Pomatias sulcatus*), valleys (*Laurea cylindricea*), rocky (*Cernuella caruanae*) and species that thrive in diverse conditions including cultivated areas (*Rumina decollata*; *Theba pisana*). The hypothesis that molluscs from a variety of habitats mixed during sediment deposition is confirmed by the presence of different terrestrial snails in a number of samples including BUR02/2/2, BUR02/4/3, BUR/12/2a and BUR/13/1.

The species *Lymnea peregra* (water snail) and *Mercuria similis* found in BUR03/13/1 live in freshwater pools. In Malta, the last time that anybody recorded a *Lymnea peregra* as a living species was over 130 years ago at the Chadwick Lakes near Rabat. We cannot be certain whether this specimen found its way to Burmarrad from the Rabat area (situated over six kilometres away) or whether it originated from a freshwater pool in the surrounding area. The relatively good condition of the shell suggests the latter.

It is now opportune to explore the origin of the above-mentioned sediments and other deposits. As already mentioned, a complex valley system feeds the Burmarrad floodplain. In turn, these valleys drain a large and fertile catchment area stretching beyond Rabat. The three main materials contained in the samples examined are gravel, sand and mud with the majority of the content being the fine sediments (the various percentages are listed in table one of Appendix A). Samples containing sub-

rounded gravel and fine sediments suggest deposits transported to the floodplain in water and over relatively long distances from anywhere within its catchment area. On the other hand, sub-angular gravels in some samples point to transport by water over short distances, implying that these probably originate from the landscape immediately surrounding the plain. The presence of land snails that inhabit coastal areas (especially *Cochlicella acuta*) substantiates this hypothesis.

It is important to note that in general 'no context contains an [environmental] assemblage of life on the spot, and clastic sediments, especially, contain materials of a variety of ages and origins' (Evans and O'Connor 1999: 82). Sediments can intermingle and merge in a variety of ways including:

- a) During deposition. **Figure B.14** illustrates fine (terrestrial) sediments transported out to sea before settling on the seabed. The smaller the sediments the further out to sea these travel. Smaller deposits may well include small species of land snails and/or shell fragments. The presence of two and sometimes three distinct environments contemporaneously in Burmarrad compounds the difficulty of studying the deposits. Larger terrestrial sediments would have been deposited close to the coast in the area of Burmarrad with the finer particles drifting to the mouth of the bay. This could explain why, within some samples, terrestrial and marine molluscs are found in close proximity. When lacustrine conditions began to form around the perimeter of the bay this added another potential 'contributor' to the sediment deposits in the area. Rainwater running through the marshes washed flora and fauna out of their habitat and into the sea nearby, resulting in a deposit with evidence for all three environments within the same sediment deposit (as in Bur03/13/1).
- b) In-situ disturbance (that can be post-depositional). Once settled, both bio- and physicalurbation of the sediments can occur (Evans and O'Connor 1999: 82). Bioturbation on the seabed can be brought about by the burrowing activities of marine flora and fauna. For example, whereas the crustacean *Calocaris macandreae* (mud-shrimp) burrows just a few centimetres into the seabed, the *Cepola rubescens* (red-band fish) can burrow up to a metre (Ferrari and Dean 1992: 51). Wave and current action are the main causes of physicalurbation

of underwater sediments. Finally, in a bay that is witness to intense maritime activity, anthropogenic actions such as anchoring and dredging may also contribute to turbation. On land, burrowing flora and fauna such as pigs, rabbits and the roots of plants and trees cause bioturbation. The main cause of physical turbation on dry land is gullying with channels subsequently refilled with more recent deposits, only to be reworked by later episodes of gullying.

Some conclusions may be drawn from available data. Firstly, after the rise in sea level that followed the end of the last glaciation, a predominantly marine environment existed in the Burmarrad area. Over the millennia, this gradually changed, mainly due to large-scale deposition of sediments originating from both immediate and distant surroundings. The environment in some areas gradually evolved into one that was lacustrine, whilst in others the land prograded to form a terrestrial environment. There must have been times when all three environments co-existed. Further sediment deposition dried up the marshes and with the right conditions, marshes formed elsewhere. Today, salt marshes are still present in the zone where the sea meets the floodplain.

With regard to practical nautical terms, the entrance to the bay faces north-east and dangerous low-lying rocks pose a danger to vessels approaching the bay from this same direction. On the northern side of its entrance is Qawra Point, a small and low promontory that extends as an underwater spit. The small embayment to the south of Qawra Point offers medium sized vessels shelter from moderate north-west winds. After sailing past Qawra Point, vessels would have manoeuvred through a narrow channel before entering a large lagoonal harbour. Parts of this harbour would have afforded all-weather/season shelter to ships of all sizes. The presence of marine sands in the environmental samples indicates that there must have been sandy beaches in the area that in turn would have facilitated the landing of small boats. However, one cannot exclude the possibility of man-made structures and facilities in this area. The main reason behind this assumption is the high concentration of industrial activity witnessed here in antiquity (discussed in **chapters 3 and 4**). The topography of the surrounding landscape facilitates travel to various parts of the island, including the main urban settlement in antiquity. Freshwater is available at various points around the harbour. The evidence discussed in **chapters 3 to 6** points to the intensive use of .

Burmarrad as a harbour in the Punico-Roman and Roman periods when it would have served the various settlements and agricultural sites in the surrounding area. During the Middle Ages, Burmarrad maintained a degree of importance as a port of call. The all-weather protection afforded by Burmarrad meant that vessels could use the bay to winter.

Qalet Marku

A small, natural embayment on the north-eastern coast of the island with its entrance oriented to the north-west, thus exposing it to winds from this direction (**Figure B.15**). The small floodplain and the general topography of the area indicate that this bay was probably marginally bigger in ancient times but with no significant changes in its basic shape. To the west, the rocks rise out of the water to form a small hill, and to the east of the bay is a low-lying promontory. Landing would have been by small boat on a sandy beach, and limited freshwater is available. Access to the hinterland and nearby fertile plain is via a small valley. This bay had two functions: as a temporary shelter for passing ships and/or as an access point to the sea for various maritime related activities by those living in its environs.

Baħar ic-Cagħaq

A natural embayment, but when seen in conjunction with Qalet Marku these two can be considered as bays on either side of an 'anvil-shaped' headland (**Figure B.15**). The orientation of the entrance to this bay is north, thus offering limited shelter from the north-west winds. To the west of the bay is the same low-lying promontory mentioned above, and to the east is a small rocky outcrop. Landing would have been by small boat on a pebble beach, and freshwater is available. Access to the hinterland was via the small valley but, more importantly, people could also penetrate past the 'great fault' via a deep valley nearby. This bay had two functions: as a temporary shelter for passing ships and/or as an access point to the sea for various maritime related activities by those living in its environs.

San Ġorġ (north)

A part-sheltered valley and part natural embayment with its entrance oriented to the north-east (**Figure B.16**). The small floodplain and the general topography of the area indicate that this bay was probably marginally bigger in ancient times but

with no significant changes in its basic shape. A hill on the west side of the bay offers shelter from the north-west winds. Only small and perhaps medium-sized ships could seek shelter here. A sandy beach at the head of the bay would have facilitated landing via small boats. A permanent freshwater supply is available from a large cave located under the above-mentioned hill. Access to the hinterland was possible via a number of valleys present in the area. This bay had two functions: as a temporary shelter for passing ships where freshwater could be taken on board and/or as an access point to the sea for various maritime related activities by those living in its environs.

San Ġiljan

A large natural embayment with a north-east oriented entrance that offers protection from north-west winds to ships of all sizes (**Figure B.16**). The approach can be dangerous due to the presence of the Merkanti reef, which is awash, to the north-west of the bay's entrance. Low hills surround this anchorage and freshwater is to be found at various parts of the bay. The bottom today consists mainly of *Posidonia* meadows and mattes, but in the past, it would have been made up of sand and/or mud. Landing would have been facilitated by the presence of beaches in the area, and access to the hinterland for interaction with the inhabitants would have been possible via the valleys present in the area. This bay had two functions: as a temporary shelter for passing ships where freshwater could be brought on board and/or as an access point to the sea for various maritime related activities by those living in its environs.

Spinola

This may be classified as a sheltered valley (**Figure B.16**). Its entrance is found at the north-west side of San Ġiljan oriented to the south-west. This bay is a small all weather/season anchorage, which was larger in antiquity than it is today. Sediment deposition gradually silted up the inner-reaches of this bay. Today, the sea in this bay is shallow, a fact that can also be attributed to silt deposition. Due to its narrowness, only small- and medium-sized ships would have been able to seek refuge here but vessels would also have been able to use the throughout the winter. Landing would not have been difficult and access to the hinterland for interaction with the inhabitants would have been possible via the valley. Spinola may also have been used as an access point to the sea for various maritime related activities by the inhabitants of the surrounding areas.

Marsamxett Harbour Complex

A system of drowned valleys that have created a series of bays and creeks that form this large harbour complex (**Figure B.17**). It is difficult to enter and/or leave under sail in a variety of strong winds including that from the north-west. Letters of complaint written by various officers of the Royal Navy in the nineteenth century attest the difficulty and dangers involved in sailing out of this harbour because certain wind conditions would push vessels onto the rocky promontories that dominate its entrance (Azzopardi 2001: 98-110). Its entrance is oriented to the north-east. To facilitate a more detailed understanding of this important harbour complex, each bay has been described separately below.

Sliema Creek

A large natural embayment with a hill to the north and a small island to the south (**Figure B.17**). Its entrance is oriented to the south-east but despite this it is still exposed to the north-east storms since the heavy seas hit the northern tip of Manoel Island and bounce back into Sliema Creek. This creek could have accommodated ships of all sizes. When surveyed in the early nineteenth century, the head of Sliema Creek was marshy. It would not be unreasonable to assume that prior to the formation of the marsh a sandy beach existed in its stead (**Figure B.18**). This would have facilitated landing via small boats. The bottom of the bay consists of very deep layers of marine mud and other fine sediments deposited over the years. This can be deduced from similar deposits in other creeks such as at Lazaretto (see below). Before the deposition of these sediments, the creek's depth was greater than that of the present day. Access to the hinterland for interaction with the inhabitants of the surrounding areas would have been via the small valley in the area. The main functions of Sliema Creek would have been as a temporary anchorage during the summer months and as an access point to the sea for various maritime related activities for the inhabitants in the area.

Lazaretto Creek

This is a natural embayment to the south of Manoel Island with its entrance oriented to the south-east (**Figure B.17**). Despite the similar orientation to Sliema Creek, Lazaretto Creek is sheltered from the north-east storms due to the protection

offered by both Manoel Island and the Valletta peninsula. The main function of Lazaretto Creek was, in both antiquity and the Middle Ages, as an all weather/season harbour for small- and-medium-sized ships. Today, the yacht marina located in this creek does not have a breakwater although freak north-east storms do occasionally cause damage to the boats wintering there. In the past, the depth of the bay must have been greater throughout. Large deposits of marine mud and fine sediments make up the present day seabed. Despite past dredging activities (see **Figure 3.30**), sediment deposits of up to nine metres are still extant (**Figure B.19**). The above-mentioned marshes were also present at the head of Sliema Creek, indicating that the beach would have extended to form at the head of Lazaretto. Judging from Smyth's chart of 1821, it would seem that in ancient times both creeks extended slightly further inland. Access to the hinterland for interaction with the inhabitants could be obtained via the same valley as that used for Sliema Creek. This valley would also have provided the source of the freshwater supply to those moored and/or anchored in this harbour. When observed together, Sliema and Lazaretto Creeks can be considered as two bays on either side of an anvil-shaped headland. In this case, the separating land mass is Manoel Island. Due to the protection afforded, this harbour would have provided an ideal access point for various maritime related activities for the inhabitants in the surrounding areas.

Msida Creek

A sheltered valley with a south-east-oriented entrance (**Figure B.17**). In antiquity the bay would have extended further inland that can be observed at present. Sediment deposition contributed to the gradual silting up its inner-reaches forming a medium-sized floodplain fed by the Msida valley. The urban development and road system precludes the study of the area's natural topography. Documentary references from the medieval period point to stagnant pools forming at the head of the bay (Wettinger 1982: 30). The marshes at Msida still existed in the late eighteenth century before being drained some years later. To the north of this valley is a low rocky promontory, and a small hill lies to the south. The seabed consists of marine mud, and its innermost reaches would have offered shelter in all weather and seasons to small- and medium-sized ships. An early modern account tells us of a permanent source of freshwater (Abela 1647: 91) that could be taken on board visiting vessels. Landing of people and goods by small boats was possible and access to the hinterland would have

been via the valley of Msida. Inhabitants may have used Msida as an access point for various maritime related activities.

Pietà Creek

A sheltered valley that forms the innermost reaches of Marsamxett harbour to the south (**Figure B.17**). Its entrance is oriented to the north-east and this creek is exposed to storms from that direction. To the west of the bay is a small rocky promontory and to the east is a large steep hill. This creek would have been slightly larger in ancient times. Over time sediment deposition silted up its inner-reaches. Due to its size, shelter could only have been offered to small ships. The seabed consists of marine mud and must have been deeper in antiquity. Freshwater would have been carried down the small valley in the area. Access to the hinterland was via this same valley. One must note that the Grand Harbour complex is easily accessible on foot from the head of Pietà Creek. During the siege of 1565, the Ottoman forces used this stretch of land as a portage, transporting their small boats across this small stretch of land to the Grand Harbour (**Figure B.20**).

Grand Harbour Complex

This harbour complex is the largest in Malta and is made up of a series of drowned valleys (**Figure B.21**). Its entrance is oriented to the north-east and is formed by the point of the Valletta peninsula to the west and Ricasoli point to the east. The main body of water, or channel, in this harbour is flanked to the west by the peninsula, which is steep and high. To the east are a series of creeks that are all protected from the north-west wind by this peninsula. These creeks will be treated separately. The water in the channel is very deep and the seabed consists of very deep marine mud that was gradually deposited over the centuries.

Rinella

A small natural embayment with its entrance oriented to the north-west (**Figure B.21**). On the north side of bay is a low rocky promontory and to the south is the high rocky promontory of Bighi. There is a sandy beach at the head of the bay that was either larger or was slightly further inland than it is today. The seabed is sandy, offering good holding ground for small-and medium-sized ships in all weather conditions except storms from the north-east. This is because waves from the north-

east storms hit the northern part of the Sciberras peninsula, creating a large and dangerous swell in this bay as well as in other creeks within the Grand Harbour complex. Access to the hinterland would have been via the valley situated at the head of the bay. This same valley would have also provided the source of freshwater, which could be taken on board visiting vessels. The main function of this bay would have been as a temporary shelter where ships could wait for the right weather conditions to proceed on their journey or to make their way deeper into the Grand Harbour complex.

Kalkara Creek

A sheltered valley with its entrance oriented to the north-west and situated between the promontory of Bighi to the north, and that of Birgu to the south (**Figure B.21**). Despite the heavily modified landscape, based on the existing topography of Rinella one can safely assume that a sandy beach once existed at the head of the bay. The seabed consists of marine mud offering good holding ground for small and medium-sized ships in all weather conditions except storms from the north-east (See O1). Access to the hinterland would have been via the valley situated at the head of the bay. This same valley would have also provided the source of freshwater which could be taken on board visiting vessels. The main function of this bay would have been as a temporary shelter where ships could wait for the right weather conditions to proceed on their journey or to make their way deeper into the Grand Harbour complex. In the Middle Ages its function would have changed due to its proximity to the new coastal settlement at Birgu (see **chapter 7.7**).

Dockyard Creek

A sheltered valley with its entrance oriented to the north-west, with an entrance dominated by a steep and high rocky outcrop situated on the north side (**Figure B.21**). The promontories of Birgu and Senglea are to the north and south respectively. The landscape has been heavily modified and there probably existed a small beach at the head of the bay, similar to that at Marsamxett. This deep-water anchorage can, except for its innermost reaches, accommodate ships of all sizes in all weather conditions although large a large swell does develop during storms from the north-east (see n.1). The seabed consists of marine mud that is extremely deep (see **Figure B.22**), providing good holding. Access to the hinterland would have been via

the valley situated at the head of the bay. This same valley would have also provided the source of freshwater which could be taken on board visiting vessels. The main function of this bay would have been as an all-weather harbour where ships could even spend the entire winter. In the Middle Ages its function would have changed, and its importance increased, due to its proximity to the new coastal settlement at Birgu (see **chapter 7.7**).

French Creek

A sheltered valley with its entrance oriented to the north-west and situated between the promontories of Senglea to the north and Kordin Hill to the south (**Figure B.21**). The landscape has been heavily modified but old photographs show a sandy beach at the head of the bay that in ancient times may have been farther inland. This deep-water creek offers the best all weather anchorage to vessels of all sizes within the Grand Harbour complex (apart from Marsa). Swell and waves created by north-east storms are less dangerous by the time they reach this creek. The seabed consists of deep layers of marine mud, providing good holding. Access to the hinterland and to the ancient settlement at Paola would have been via the valley situated at the head of the bay. The main function of this bay would have been as an all-weather harbour where ships could even spend the entire winter. It probably also served the community at ancient Paola. In the Middle Ages its function would have changed, and its importance decreased, due to the abandonment of Paola and the establishment of the new coastal settlement at Birgu (see **chapter 7.7**).

Marsa

The Marsa floodplain is Malta's largest catchment area of fresh water (Anderson 1997: 113) (see **figure B.8**). As the place name suggests it also has a maritime connotation and is located at the head of the Grand Harbour, over one kilometre from the mouth. This area has, over the past centuries, witnessed a vast amount of manmade modifications including land reclamation, dredging and the extension of large quays (Bonnici and Cassar 1994).

During the Middle Ages ample references can be found to the fief of Marsa, which was parcelled out as a royal estate (Fiorini 1993: 143). These references give a clear indication that at least part of the area was suitable for farming. Although early

sixteenth century maps show gardens in the area of the Marsa there are also written descriptions of the brackish waters in the area. Such descriptions indicate that the process of siltation was far from complete. In fact, in 1534, the body of Grand Master L'Isle Adam was transported by boat from the chapel of Ta' Ċeppuna all the way to fort St Angelo in Birgu:

'Et il corpo fu nell'aurora della seguente notte portato nella Chiesetta del Giardino della Marsa; e quindi con la barca della Carracca, tutta coperta di panni neri, fu con molte torcie sbarcato alla marina del Borgo' (Bosio 1630: Book 7: 134).

This chapel still exists and is located towards the centre of the floodplain just under one kilometre from the sea (**Figure B.23**). The sailing of the funerary boat from Marsa to St Angelo points to the presence of a navigable channel in historic times. The boat mentioned in the quotation above had a draught of approximately one metre giving an indication of the minimum depth of the channel at the time. Remnants of this channel are still illustrated in maps and surveys published in the early part of the 19th century (Smyth 1823). Aerial photographs clearly illustrate the fertile alluvial plain (**Figure B.24**).

Although no coring works were carried out in Marsa for the present study, some environmental samples were retrieved from a building site in the area marked 1 on **figure B.23** (**Figure B.25**). An inspection of the material lifted from boreholes that were excavated for construction purposes revealed marine molluscs as well as cultural material with marine growth and encrustations. Although this sample is out of context, it provides some interesting insights into the past environment of the area.

The sample contains a variety of marine molluscs (for the full list see **Appendix A**) as well as one non-marine mollusc (*Cochlicella acuta*) and one species that thrives in brackish water (*Hydrobia acuta*). The molluscs from this area are reflective of a variety of marine environments including:

- a) Shallow waters with sand/mud on seabed (*Loripes lacteus* or Lucine shell)
- b) Sand/mud in waters up to 12m deep (*Cerithium vulgatum*)
- c) Seaweeds in shallow and/or deep water (*Haminoea hydatis* or Green Bubble shell)

An ongoing research project is aimed at investigating 'the nature of Malta's environment prior to the arrival of the first settlers and to assess the magnitude of the impact human activity has had'.⁶¹ The data for this study are gathered from two continuous cores retrieved from the Marsa floodplain. Although this research is in an embryonic stage, the preliminary results are nonetheless relevant to this discussion. Only general distinctions of the molluscs (marine; brackish water; freshwater and land) were presented and no details on species are given. The authors state that 'the changes within and between land and marine deposits visibly reflect the changing environmental history of the Maltese Islands'. The presence of numerous marine molluscs within the cores leaves little doubt as to the presence of a marine environment in the area. To date, the researchers working on this project have not suggested any dates for the environmental changes occurring in the bay.

Data from a variety of sources used to reconstruct Marsa's ancient coastline lead to a number of conclusions. Like Burmarrad, at some stage the present floodplain would have been a large enclosed lagoon-like bay deep enough for navigation. Evidence from the analysis of the aforementioned molluscs from the Marsa site indicates depths of water that were at least up to 8-12 metres deep. The deposition of material into the lagoon would have gradually changed the environment, evolving from one that was predominantly marine to one that was a mixture of marine and lacustrine/marshy. A storm water channel would have maintained one or more navigable channels (such as that from Ta' Ċeppuna) linking the lagoon to the main harbour. The continuous deposition of sediments in the area resulted in the total drying up of the bay/lagoon.

The entrance to this harbour is oriented to the north-east and is dominated by a promontory known as Kortin (**Figure B.21**). To the north and south Marsa is surrounded by small hills, whereas to the west a series of valleys drained into the harbour. In 1821, the area was already silted up and a large marsh around Kortin formed the innermost limit of the Grand Harbour. It would not be unreasonable to assume that a marsh once existed much farther inland and that it advanced gradually

⁶¹ References to this research are taken from a detailed poster presentation at the conference: "Exploring the Maltese Prehistoric Temple Culture (Malta 2003).entitled *The Past Environment of the Maltese Islands: The Marsa Cores* by Carroll, F.A., Fenech, K., Bonanno, A., Hunt, C., Jones, A.M. and Schembri, P.J.

over the centuries. Marshes and/or beaches at various parts of the bay would have facilitated landing via small boats. The limited environmental data available points to a bay that was deep enough for vessels of all sizes to anchor in all weather/seasons, because the north-east storms would reach this area with reduced force and also because Kortin acts as a natural breakwater. Access to the hinterland would have been via the above-mentioned valleys. Up until the seventeenth century, ships called at the outer part of Marsa to take on fresh water (Abela 1647: 93). In antiquity its main function would have been to serve as the main harbour (for ships of any size) of the island. The silting up of its inner-reaches contributed to its decline to the extent that by the Middle Ages it was used only as a temporary anchorage.

Little Marsa

This small creek is situated on the site where the modern Malta Shipbuilding Company is situated today, in the inner reaches of the Grand Harbour. During the planning phase of the shipbuilding complex in the late 1970s, a series of cores were taken. This was done to establish the nature of the extent and shape of the silted valley prior to the start of any construction works. The results from these cores were listed and drawn accurately. The written information sheds important light on the past environment that existed in the area. Many boreholes contain clear references to marine deposits. For example, borehole number two contains four distinct layers with evidence for a marine environment: 1) blue-grey silt with traces of sand and marine deposits; 2) black silt with sea shells; 3) black and grey clayey silt with sand and sea shells; and 4) black and grey silty clay, sand, sea shells and small boulders.⁶²

Unfortunately, I was unable to trace the laboratory reports referred to in the drawings. It is therefore difficult to establish exactly what kind of marine environment existed in the past. However, the deepest marine deposit was reached at just over fifteen metres below present sea level, giving a clear indication as to the depth present at the mouth of the creek. The varying colours of the silt are also indicative of a changing marine environment in the area. As these samples were gathered for engineering purposes, there is no mention of any manmade objects present in the deposits.

⁶² Ministry of Development, Marsa Shipyard Project, Site Investigation: sections through boreholes, drawing number D – 1103.

The entrance to this creek is oriented to the north and it probably would have had a beach and/or small marsh at its head, providing easy landing from small craft (**Figure B.21**). The depth of the sea in the middle of the creek would have been over seven metres, offering shelter to small- and medium-sized ships in all weather conditions. The seabed consisted mainly of silt and mud deposits. As it forms part of a valley, fresh water would have been permanently available and access to the hinterland would have been via the same valley.

Marsascala

Marsascala Bay lies in the south-east of the island of Malta and today serves as a minor port for the fishing community of the town (also named Marsascala) as well as for recreational craft. No environmental sampling has been carried out in the area; the present study is based on aerial photographs, topographic observations, place names and parallel evidence from other areas, namely Burmarrad and Marsa. It is clear from the aerial photograph (**Figure B.26**) that Marsascala is a fertile alluvial plain. Although not quite as large as Burmarrad and Marsa it is still quite significant, owing to the way it snakes inland. The importance of the topography from a maritime point of view is that in the past the inner reaches of the bay must have offered more protection to vessels than they receive today. Place name evidence from the area of Marsascala indicates the presence of stagnant pools up until medieval times (such as Wied Ghadir: valley of the pool) (Wettinger 2000: 365). Today, a saline marsh still survives in the area and extends inland from the head of the bay. This marsh is known as is Il-Maghluq tal-Baħar⁶³ and is still home to salt-tolerant flora and fauna. (**Figure B.27**).

It is a sheltered valley with its entrance oriented to the east and with a small reef at the northern part of its entrance (**Figure B.28**). The depth of this bay has been affected by sediment deposition and the growth of *Posidonia* meadows and mattes. In the past the seabed would have consisted of sand and/or mud, offering good anchorage to medium and small ships in most weather conditions except any winds originating from between the east and south-east. Its inner-reaches may have been protected from the north-east storms. The Maltese toponym for this area translates as

⁶³ Literally translated: 'the enclosure of the sea'.

‘valley of the spring’ indicating a source of freshwater. Three hills surround the bay and access to the hinterland would have been via the valley at the head of the bay. Its main functions would have been: an all-weather harbour and an access point for maritime activities used by inhabitants and/or agricultural sites of the surrounding areas.

San Tumas

A natural embayment with its entrance oriented to the north-east (**Figure B.28**). The Munxar reef, which is awash, dominates the southern approach to this bay. The seabed within the bay is now predominantly formed of *Posidonia* meadows and mattes, indicating that the bay would have been deeper in antiquity with sand and/or mud at the bottom, offering good holding ground to vessels of all sizes. This bay is exposed to the north-east winds as well as to those from the east and south-east. The sandy beach located at the head of the bay would have facilitated the landing of small boats. Freshwater may have been procured by visiting ships from the valley at the southern end of the bay and access to the hinterland would have been via this same valley. The main function of this bay would have been as temporary anchorage.

Xrobb l-Ghagin

Two bays on either side of an anvil-shaped headland with their entrance oriented to the south-east (**Figure B.29**). They are exposed to the north-east winds as well as those from the east, south-east, and south. The seabed offers good holding ground and anchorage for small- and medium-sized vessels. There are high white cliffs at the head of these bays and both landing and access to the hinterland would have been difficult. There is no freshwater supply at this bay. The main function of these bays would have been as temporary anchorage.

Marsaxlokk Harbour Complex

A very large natural embayment with its entrance oriented to the south-east (**Figure B.29**). The bay’s entrance is formed by Delimara Point to the north and Bnghisa Point to the south. The toponym Marsaxlokk translates into ‘harbour of the south-east’ but in reality this ‘harbour’ is made up of a series of harbours and anchorages that are described separately below:

Marsaxlokk Bay

Situated at the south east of the island this bay is fed by a valley that drains the Marnisi and Ginwi areas. The floodplain is one of the smaller ones on Malta. Today, a small marsh is located at the head of the bay, indicating that the bay may have been larger in the past and gradually silted up since antiquity. The temple at Tas-Silġ that overlooks the harbour of Marsaxlokk attests the importance of this site in antiquity. Although there are no documentary references from the medieval and early modern period to marshes in the area, today a marshy environment survives at the head of the fishing harbour (**Figure B.30**).

It is a large natural embayment forming the north-eastern part of the larger harbour complex (**Figure B.29**). Its entrance is oriented to the south, exposing the bay to winds from the south-east to the south-west. Recent sediment deposition has made the bay much shallower than it was in ancient times. Vessels of all sizes could have sought shelter here. A sandy beach would have provided a landing place for small boats. A freshwater supply is available from the valley that exists between two of the three hills that dominate this bay to the north-east, north and north-west. Access to the hinterland would have been via this same valley. In its natural state this bay could only have been used as a temporary anchorage but a sea wall would have enabled the area to be used as an all-weather harbour. In antiquity, its main function would have been to serve agricultural sites in the surrounding area. It may also have enjoyed links with the sanctuary overlooking the bay.

Wied Dalam

At Birżebbuga, two smaller silted bays are situated on either side of a rocky promontory. The Dalam valley feeds one of these whereas both the Qoton and Has-Saptan valleys feed the other (San Ġorg south). The two small floodplains are clearly visible in the aerial photograph (**Figure B.31**). The rocky promontory separating the two was an important location that attracted humans to settle it. Numerous archaeological remains confirm the importance of this site: a Neolithic temple datable to 2500 BC, a Bronze Age fortified village (Trump 2002: 288) and a farm datable to the Punic and Roman periods. In antiquity the bay would have been larger than it is today but sediment deposition has contributed to the gradual silting up of its inner-reaches. Throughout the Middle Ages, stagnant pools in the area were used for the

retting of flax, an indication that the siltation process was underway (Wettinger 2000: 373). By the seventeenth century the bays had become marshy and despite being associated with malaria, retting was still practised (Blouet 1964: 200).

Wied Dalam is a small sheltered valley with its entrance oriented to the south-east (**Figure B.29**). It is sheltered from the prevailing northerly winds but exposed to winds from the south-east to the south-west, although severe gales from the north-east have been known to affect the area. Bordering this bay are a hill to the north and a promontory to the south. Only small- and perhaps medium-sized vessels would have been able to seek shelter here. A beach would have provided a landing place for small boats. Freshwater would have been available for visiting ships from the valley that flows into this bay. Access to the hinterland would have been via this same valley. Its main functions would have been: as a temporary anchorage; and as an access point for various maritime activities conducted by the inhabitants in the surrounding areas.

San Ġorġ (south)

A natural embayment and sheltered valley with its entrance oriented to the south-east and situated to the south of the Kaċċa promontory (**Figure B.29**). In antiquity it would have been larger than it is today but sediment deposition has contributed to the gradual silting up of its inner-reaches. It is sheltered from the prevailing northerly winds but exposed to winds from the south-east to the south-west although severe gales from the north-east also affect the area. Only small- and medium-sized vessels would have been able to seek shelter here. A beach and/or marsh would have provided a landing place for small boats. Freshwater would have been available for visiting ships from the valley that flows into this bay. Access to the hinterland would have been via this same valley. Its main function would have been Its main functions would have been: as a temporary anchorage; and as an access point for various maritime activities conducted by the inhabitants in the surrounding areas.

Pretty Bay

A natural embayment situated at the south-west part of the Marsaxlokk harbour complex with its entrance oriented to the north-east (**Figure B.29**). It is protected from the prevailing northerly winds but is exposed to winds from the south-east to the south-west, although severe gales from the north-east also affect the area.

The bottom is sandy and both small- and medium-sized vessels could have sought shelter here. A beach at the head of the bay would have facilitated landing by small boats and freshwater for visiting ships would have been available from the valley that flows into the bay. This same valley would have provided access to the hinterland. Its main function would have been: as a temporary anchorage; and as an access point for various maritime activities conducted by the inhabitants in the surrounding areas.

Concluding Remarks

There are various implications that can be deduced from this analysis of all the harbours and anchorages of Malta. Not all of the island's harbours and anchorages offered year-round protection from the prevailing winds. Those situated on the western coast, such as Fomm ir-riĥ, Ramla ta-Mixquqa and Ghajn Tuffieħa, are exposed to the prevailing north-westerly, a wind that can blow at any time of the year. However, in winter they offered temporary protection from the north-easterly gales. Therefore, these may be considered temporary anchorages that were mainly usable in ideal weather conditions. The eastern stretch of coast of the island is low-lying and, mainly due to the valley formations, more indented than that on the western side. In summer, all harbours and anchorages on the eastern coast provide excellent shelter. During the winter, many of these same places are exposed to the north-easterly gales and only a handful of places provide all-weather shelter. These are Mistra, Burmarrad, Lazaretto Creek, French Creek, Marsa and the inner-reaches of Marsascalea.

Appendix C

**C-14 test carried out at the Centre de Datation Par le Radiocarbone
Université Claude Bernard Lyon 1, Centre des Sciences de la Terre**

Resultat d'analyse par le Radiocarbone

Identification de l'échantillon:

16499

Nom du site: BURMARRAD
Commune/ Pays: /MALTE
Niveau / Couche: BUR03/12/2
Nature de l'échantillon: COQUILLES

Age attendu

Par l'expéditeur: XVe

Observations

Sur le traitement

Effectué au laboratoire: R.A.S

Résultat de l'analysé:

Activité ^{14}C par rapport

Au standard international: $40,47\% \pm 0,53$

Rapport isotopique

$^{13}\text{C} / ^{12}\text{C} (\text{‰}) : -1,85$

Age ^{14}C BP : -7265 ± 105 Age Calibré : de -5990 a -5590 av. J.-C

Observations sur ce résultat :

Calibration marine

AVERTISSEMENTS

SUIVANT LES CONVENTIONS INTERNATIONALES

- La date donnée au verso est exprimée en années radiocarbone B.P.
(Before Present → Avant 1950)
- La marge statistique indiquée est la déviation standard (1 sigma), c'est à dire qu'elle définit un intervalle dans lequel l'âge radiocarbone exact a deux chances sur trois de se trouver, pour avoir une quasi-certitude (environ 95%), il faut doubler cette marge statistique.

- Le résultat tient compte des éventuels fractionnements isotopiques.

CONVERSION DES DATES RADIOCARBONE B.P. EN ANNEES REELLES

- Le calcul des intervalles des dates exprimées en années réelles est assuré par un logiciel dit «de calibration» et développé au centre de datation de Lyon par Philippe Galet.

Ce logiciel qui utilise un algorithme classique de distribution de probabilités, s'appuie sur la dernière courbe de calibration connue (Stuiver & al., 1998), diffusée par le Quaternary Isotope Laboratory de l'université de Washington.

La courbe couvre de 0 à 20265 années B.P. par pas de 10 ans; une interpolation linéaire permet d'obtenir une valeur par année.

- pour les matériaux marins, un âge apparent de l'eau de mer de 400 ± 0 ans a été choisi (soit un $\Delta R = 0$) et une courbe de calibration "Marine" (couvrant de 460 à 20760 ans B.P.) est utilisée pour convertir les dates radiocarbone en années réelles.

List of Abbreviations

AA	<i>Antiquities Africaines</i>
ABSA	<i>Annual of the British School at Athens</i>
ANES	<i>Ancient Near Eastern Studies</i>
AC	<i>Archeologia Classica</i>
AJA	<i>American Journal of Archaeology</i>
AM	<i>Archeologia Medievale</i>
AP	<i>Archaeological Prospection</i>
ARA	<i>Annual Review of Anthropology</i>
AS	<i>L'Archeologo Subacqueo</i>
BAR	<i>British Archaeological Reports, International Series</i>
CAH	<i>Cambridge Ancient History</i>
CAJ	<i>Cambridge Archaeological Journal</i>
CR	<i>Classical Review</i>
CW	<i>Classical World</i>
EA	<i>Environmental Archaeology</i>
GR	<i>Greece and Rome</i>
IJMH	<i>International Journal of Maritime History</i>
IJNA	<i>International Journal of Nautical Archaeology</i>
JAS	<i>Journal of Archaeological Science</i>
JAT	<i>Journal of Ancient Topography</i>
JEA	<i>Journal of European Archaeology</i>
JFA	<i>Journal of the Faculty of Arts (University of Malta)</i>
JMA	<i>Journal of Mediterranean Archaeology</i>
JMH	<i>Journal of Medieval History</i>
JMS	<i>Journal of Mediterranean Studies</i>
JRA	<i>Journal of Roman Archaeology</i>
JRS	<i>Journal of Roman Studies</i>
LS	<i>Libyan Studies</i>
MARCHR	<i>Malta Archaeological Review</i>
MAR	<i>Museum Annual Report</i>

MAIR	<i>Missione Archeologiche Italiane Reports</i>
MEFRA	<i>Melanges de l'Ecole Francais de Rome (Antiquite')</i>
MHR	<i>Mediterranean Historical Review</i>
MH	<i>Melita Historica</i>
MTUSG	<i>Malta Times and United Service Gazette</i>
OJA	<i>Oxford Journal of Archaeology</i>
PBSR	<i>Papers of the British School at Rome</i>
REA	<i>Revue des Etudes Anciennes</i>
SS	<i>Settimane di Studio del Centro Italiano di Studi sull'Alto Medioevo, Spoleto</i>
TOM	<i>Treasures of Malta</i>
WA	<i>World Archaeology</i>

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