# Breaking Boundaries - The Web of Trade in the Roman World: Comparing the trade networks of the Pontine region, the Potenza valley and the Metapontine region during the Roman period using the proportions and distributions of ceramic provenances

Brouwer, Anna de

# **BREAKING BOUNDARIES**
# THE WEB OF TRADE IN THE ROMAN WORLD

*Comparing the trade networks of the Pontine region, the Potenza valley and the Metapontine region during the Roman period using the proportions and distributions of ceramic provenances*

A.F.M. de Brouwer (s2646463)
a.f.m.de.brouwer@umail.leidenuniv.nl
Leiden University, Faculty of Archaeology
Designing Archaeological Research
Thesis supervisors: Dr. T.C.A. de Haas and Drs. M. Wansleeben
1st of November, 2022
Final Version

# Table of Contents

# List of Figures

.

# Abstract

This research aims to study the trade networks of the Roman period in three different Italian regions: the Pontine region, the Potenza valley and the Metapontine region. A database was created previously, consisting of the compiled data on ceramics sherds encountered during three surveys in each respective region. Assessing where these ceramics were produced, and how the different provenances are distributed throughout the landscape, gives insight into how the regions connected to trade routes, and how ceramics imported along these routes were distributed throughout the landscape. To this end, the proportions of ceramic provenances were visualised for each region and subsequently broken down for the Archaic, Republican, Imperial and Late Antique periods.

The patterns observed in provenance proportions and sherd distributions across regions suggest that different regions were affected differently by the changes associated with the increased integration of the Roman economy in the Imperial Period. These changes appear to be reflected in the increased consumption of imported African ceramics. This is in contrast to more locally produced Italian sherds, which maintain a more consistent presence. These trends can be observed to a certain degree in all regions, although the changes are particularly pronounced in the Pontine region. These results lead to the following tentative theory: the Pontine region, as a more centrally located destination, was better connected to more distant trade routes, and thus affected more readily by the large-scale societal and political shifts of the Imperial period. Another notable observation is the increased variance in sherds provenances in the Potenza valley as compared to the Pontine region. This could be potentially explained by the theory that the Potenza valley, as a more isolated and decentral region, relied more on more "off the cuff" trade, while the Pontine region relied more on centrally organised, "streamlined" trade networks. Finally, ceramics imported from outside the Italian peninsula tended to be found at or near the coast in all regions, indicating that ceramics traded along more distant routes were exchanged less in intraregional networks extending further inland.

Despite multiple weaknesses, which were mainly related to the necessary standardisation of the database and the resulting loss of detail, this research has granted new insight into the discussion around the degree of integration in the Roman economy and paints a more nuanced image that differs from region to region.

# Chapter 1 Introduction

## The Roman World

Before the Roman world comprised the vastly expansive Roman Empire, it underwent multiple fundamental developments and upheavals; from a small but ambitious city-state to a dominant kingdom, and from a rapidly expanding republic to an initially stable empire, to be eventually fractured by internal turmoil and foreign invasions (Schwartzwald, 2014).

The integrating influence of the burgeoning power of Rome connected increasingly distant lands, creating an environment where goods could be traded throughout the expanse of Roman territory. These goods could be luxury or staple, could be grain carried in amphorae or mass-produced ceramics from Northern Africa, and could be transported across the sea by boat or along the extensive road networks by wagon (Wilson & Bowman, 2009; Moore, 2014).

It is within this complex and ever-changing world that this thesis attempts to examine how trade manifested itself. It will do so by using the distribution of ceramic sherds, collected during three different regional surveys across the Italian peninsula.

## The Regional Survey

The regional survey approach involves the systematic investigation of a particular region. Different methods can be used for surveying, including fieldwalking, remote sensing and geographic information systems (GIS). These methods serve to locate, document and visualise archaeological evidence on the surface and sub-surface. The functional purpose of the regional survey has varied over time and may vary from research to research (Banning, 2002). Earlier in the history of this approach, the regional survey was mainly used to locate sites of interest in a landscape, subsequently allowing for the excavation of these sites. In this context, the regional survey was relegated to the background, with excavation being the actual goal of the research. Later, the regional survey came to be valued for the direct benefits this method provides. Regional surveying is well-suited for studies aiming to investigate larger areas, how archaeological sites fit into them and which large-scale processes are at work (Dunnell & Dancey, 1983).

## Research Aims

This research will use data from three different surveys compiled into one large or "composite" database to investigate trade networks in three different Italian regions during the Roman period. The evidence that forms the basis of this research is taken from three different regional surveys; the Pontine Region Project (PRP), the Potenza Valley Survey (PVS) and the Metaponto Survey (MS), and concerns ceramic archaeological remains in particular. These surveys were chosen because all three are longstanding projects with intensive research methods and readily available datasets. Furthermore, each of these surveys investigated coastal regions, located relatively far apart in the Italian landscape. This will allow for the comparison of somewhat analogous settings in varying environments. The PRP was performed on the Pontine plain on the Tyrrhenian coast, the PVS in the Potenza valley on the Adriatic coast, and the MS on the coast of the Gulf of Taranto in Southern Italy (Attema *et al.*, 2022; Carter & Prieto, 2011; Vermeulen, 2003).

This research takes advantage of the major strengths of regional surveys, namely the large spatial and temporal scale at which they deliver data. Furthermore, it attempts to tread new ground by combining and integrating the results of multiple surveys – something that is far from common practice in the field of archaeological field surveys. This approach enables comparisons both within and across regions in a "bird's eye" view. Because trade networks span across great distances, connecting far-removed societies, the research approach outlined above would appear to be very suitable to investigate these networks.

The first research aim will be to investigate and explore the existing knowledge of trade networks within the Roman world and the survey regions specifically. The main questions that need to be answered are the following.

- What ideas and models exist regarding trade in the Roman world?
- What are the historical and geographical characteristics of each survey region, and how are they expected to influence intra- and interregional trade networks?

The second aim of this research will be to investigate the trade networks existing in the three different regions. This will be done through the analysis of the amount of fine ware and amphorae sherds present in the different datasets, as well as their respective provenances. In order to meet this aim, the following sub-questions need to be answered first.

- How are the different provenances distributed within each region?

- How do the patterns of distribution change over time and space?
- How do these patterns fit in historical and geographical contexts?
- What can the provenances and their distributions tell us about the trade routes involved?

These aims reflect the two-step approach that characterises this research; first, a foundation is built using literature research, providing context in two main aspects; geographical and historical. The main part of the research involves the visualisation of data on sherd provenances for the three different survey areas, and to see how proportions differ between regions and change over time. Data is visualised using simple charts displaying the different ratios of sherd origins per survey area, in addition to the same data plotted on a base map of various aspects related to geography and topography. These maps will provide clearer insight into how ceramic remains are distributed across the landscape. These maps directly link the geographical context – as established through literature research, with the data from the composite database, providing a firmer foundation for assessing possible patterns. Using the contexts now established, possible explanations for the observed trends will be formulated.

## Reading Guide

To provide the full context within which this research will take place, it is first necessary to outline the important role that ceramics can play in archaeological research, as well as the existing discussion around the integration of the Roman economy. This discussion particularly relates to the political and societal changes that occurred in the Roman world during the Imperial period. This will all be contained in the following chapter on the research background. After the necessary background information is provided, the methods of the research will be detailed. Here, the structure and organisation of the created database will be discussed. The next section of the chapter will focus on the process of visualising the data contained in this database. This will be done through the creation of simple Excel charts, in combination with sherd distributions across the landscapes of the respective region using the GIS application QGIS. The chapter on methods will naturally be followed up by the results obtained through them, sorted per region and time period. Subsequently, the overall differences and similarities will be discussed. Ideas will be put forward to provide potential explanations for the trends observed. This chapter will further highlight the weaknesses and strengths of the research, followed by a concluding summary of the main findings and suggestions for further research aims.

# Chapter 2 Background

## Introduction

This chapter will explore the existing knowledge of trade networks in both the entire Roman world and the survey regions in particular. To this end, it will first outline the results of a literature study on the existing ideas on the Roman economy on a large scale. The second part of this chapter will contain basic information on the three surveys, particularly the research areas and the methods used. The third part will describe the three regions in detail, with special attention to their history and geography. The fourth and final part will pose hypotheses based on the information detailed in this chapter.

## Ceramics in Archaeology

Ceramics are an important source of evidence in archaeological research for several reasons. First of all, ceramics preserve well and thus tend to be significantly present in a range of archaeological sites. Relevant to this research, in particular, is that vessel typology is sensitive to change in response to shifts in preferences throughout time and space. This has aided in the compilation of a large body of knowledge on which vessel types were manufactured at which production centres and during which periods. It is these characteristics that make ceramics especially suitable for studying trade networks in archaeology (Barker & Majewski, 2006).

The two classes of ceramics that are included in this research are amphorae and fine ware (see Figure 2.1). Amphorae are arguably the most recognisable pottery from Antiquity. These large vessels characteristically consist of a larger body with a pointed base, which opens into a narrow neck fitted with two handles (see the left pane of Figure 2.2). The general shape of these vessels was adapted to their function of storing and transporting various foodstuffs such as wine, olive oil or grain (Will, 1977). Fine ware was used in the process of consuming food rather than the transport of it and includes a wide range of shapes such as plates, bowls and cups. The archetype for Roman fine ware is terra sigillata, a ceramic type characterised by an orange to red colour, a glossy finish, and possible decorations (see the right pane of Figure 2.2). Terra sigillata produced outside of Italy is commonly referred to by other names, such as African red slip ware produced in North Africa and Phocaean red slip ware (also known as Late Roman C ware) produced in the Eastern Mediterranean. It is these three types of ceramics – Italian terra sigillata, African red slip (ARS) and Phocaean red slip (PRS) – that are considered fine ware for the purpose of this research. Apart from the general characteristics of

ceramics in archaeological settings, allowing for easy identification of where and when vessels were produced, amphorae and fine ware are particularly suitable within the context of this research for the following reasons. Firstly, because the known production centres of these ceramic types are located outside the surveys region, and can confidently be considered imported ware when they are encountered during the surveys. Secondly, these classes of ceramics were traded and used widely in the Roman world (Sciau *et al.* 2020). These two reasons combined mean that the provenance and the distribution of these ceramics grant insight into how these three regions were connected to the larger trade networks of the Roman world, and how the products exchanged through these larger networks were distributed on a smaller, local level.

***Figure 2.1.*** *Typical representations of transport amphora, of the type Dressel 6A (left) and terra sigillata (right). Note the characteristic glossy, reddish surface of the Arretine crater (Maritan et al. 2019, VIII; British Museum, n.d.).*

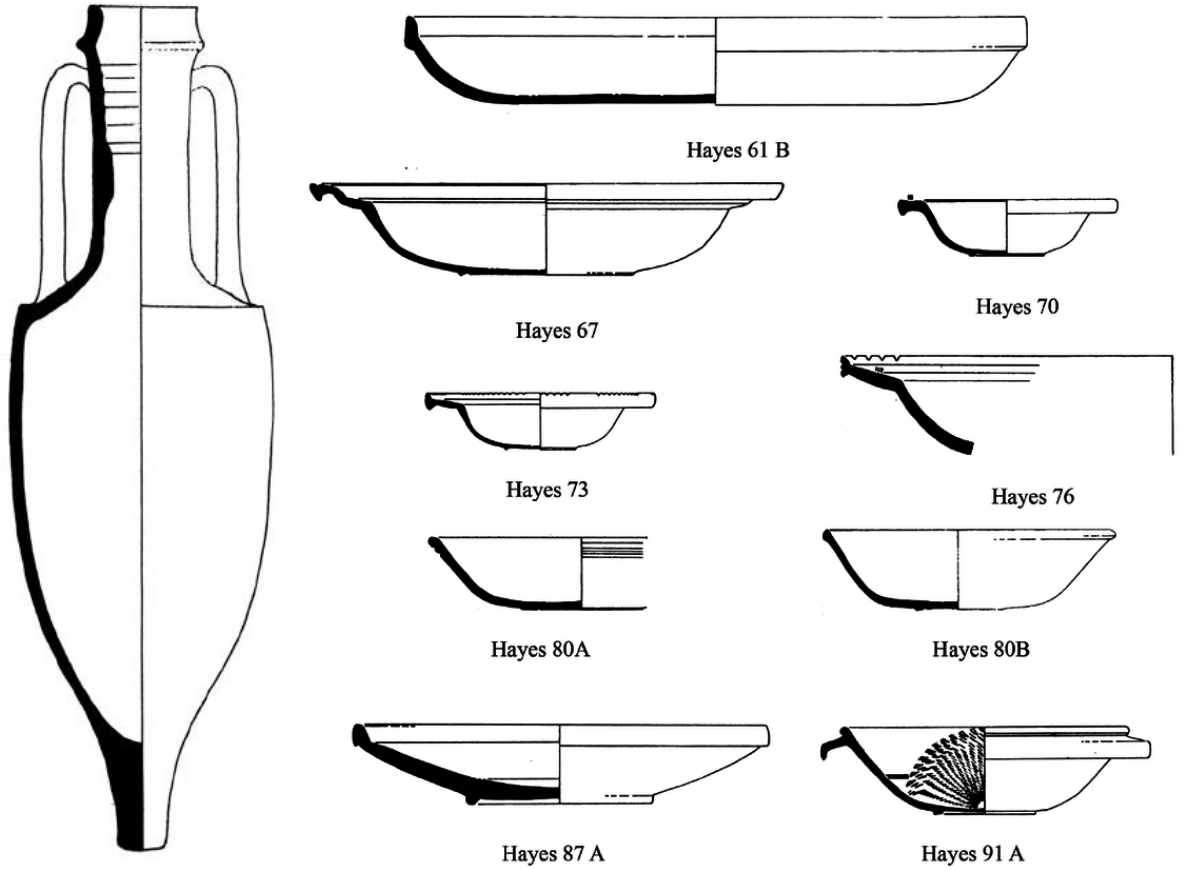


***Figure 2.2.*** *The outlines of a transport amphora, of the type Dressel IB (left) and a range of fine ware shapes, in the form of African red slip (right) (Arobba et al. 2014, 228; García Vargas & Vázquez Paz 2013, 105).*

## Models of Roman Economy

Over the last decades, a consensus has formed regarding the development of the Roman economy. This consensus is described by Wilson and Bowman in their 2017 edited volume *Trade, Commerce, and the State in the Roman World*. Trade increased before Republican times and continued until it reached its zenith during the Imperial period. This high intensity in trade persisted and declined only after the end of the third century AD. The main factor facilitating the increased integration of trade is quoted as the centralised, overarching political influence Rome gained over its expanding territories. The 2009 edited volume *Quantifying the Roman Economy* by the same authors states that this long-distance trade was a regular occurrence within Roman territory. Wilson and Bowman also highlight that, despite the aforementioned consensus, there remains discussion around how this long-distance trade manifested itself. Part of this discussion revolves around the role the state played in the economy, in particular to what extent and how governmental structures controlled trade.

An influential approach to long-distance trade in Roman times was formulated by Greg Woolf in 1992. His article *Imperialism, Empire and the Integration of Roman Economy* is written

within the context of the discussion around two conflicting models of the Roman economy. The discussion centres around the two ends of a spectrum of views. On one end is the idea that long-distance trade was dominated almost exclusively by state entities, which oversaw taxation of the provinces, and funnelled these resources to the capital and the systems it controlled. The proponents of this view claim that this so-called "political economy" was the only overarching system which connected otherwise isolated local economies. On the other end is the idea that, while a political economy certainly existed, it was not the sole unifying power influencing the Roman trade network. Proponents of this idea paint the Roman economy as less partitioned, and much more of an integrated entity, in which trade in things such as land and agricultural products exerted a unifying power as much as the political economy did. Woolf takes a moderate approach in this discussion and proposes that while local economic systems were not entirely isolated and formed larger exchange networks on a regional level, the state-governed economic system remained the sole factor controlling the trade in goods at a large scale. Woolf highlights that there have been periods of increased integration of the Roman economy, and draws a causal relationship between the increase and decrease in integration with the rise and fall of imperial expansion.

## The Surveys

The results from three different Italian regional surveys will form the basis for this research. As mentioned above, these surveys are the Pontine Region Project (PRP), the Potenza Valley Survey (PVS) and the Metaponto Survey (MS).

The Pontine Region Project (PRP) was a longstanding project that had its origins in 1978 when it was set up by the University of Groningen. The scope of this project was large, with an interest in archaeological evidence dating to the vast period between the Palaeolithic and the Middle Ages. The central goal of the project was to assess the impact of settlement within the landscape of the Pontine region. The general methods of the project naturally included field surveys, during which finds were collected and documented. Surveying was combined with geophysical prospection and excavation of identified sites of interest (Leiden University, n.d.). The PRP is a very large project consisting of multiple rounds of fieldwork, during which sites and areas were examined and re-examined multiple times. As such, only particular surveys within the project will be taken into consideration for this research. These surveys are those that took place in Astura and Nettuno in 2003, Norba in 2008 and Sezze – known in the Roman

Period as Setia – in 1994 (Attema *et al*., 2010). The exact areas surveyed can be found in Figure 2.3.

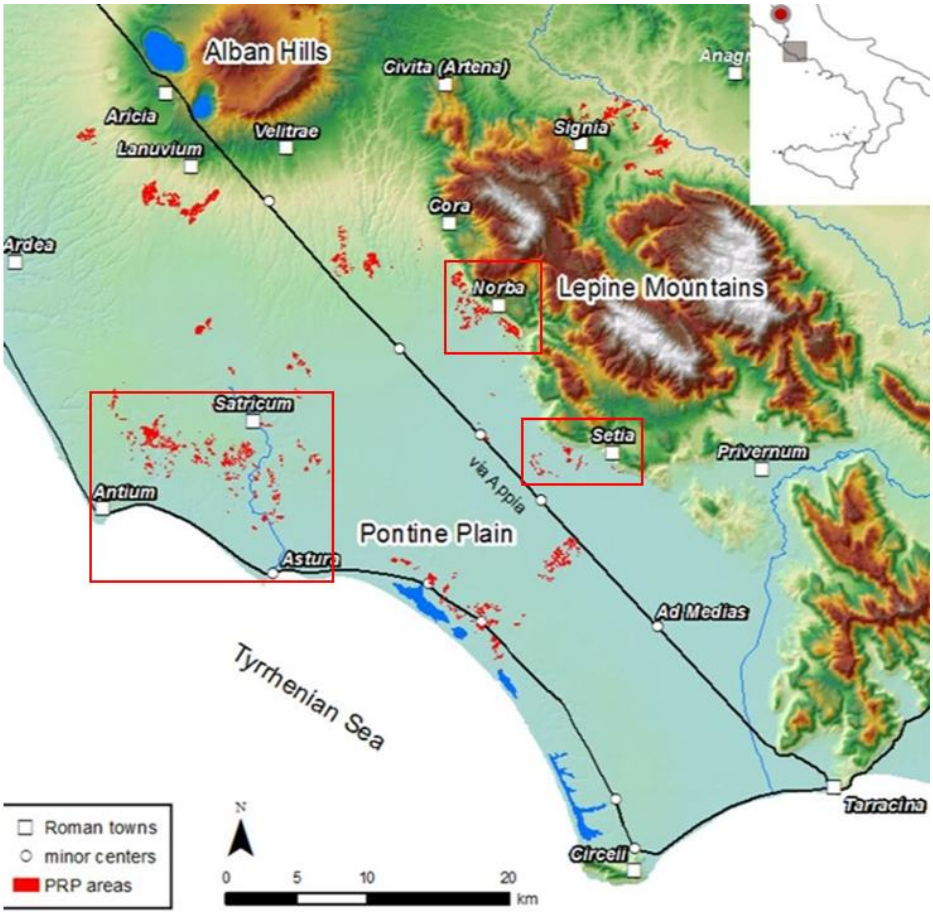


***Figure 2.3.*** *A map of the Pontine Plain, with the main research sites indicated. The areas relevant to this research have been highlighted in red (De Haas and Tol in press, 4).*

The Potenza Valley Survey (PVS) has its origins in 2000. Similar to the PRP, the temporal scope of the project is large; the periods under investigation include protohistory, the Roman Period and the early Middle Ages. The initial phase of the survey involved aerial photography, which identified possible areas of interest, for example through the presence of soil marks or cropmarks. Overall, three areas were selected for subsequent field campaigns. These areas are located in the Upper Middle and Lower Potenza Valley and are focussed around three sites named Camerino, Treia and Porto Recanati respectively. The precise position of these areas within the valley landscape can be found in Figure 2.4 (Vermeulen *et al.* 2003). The field method used involved participants walking in straight lines, separated at regular intervals, and collecting any artefact encountered. Specific sites of interest were later surveyed at will. (Gent University, n.d.).

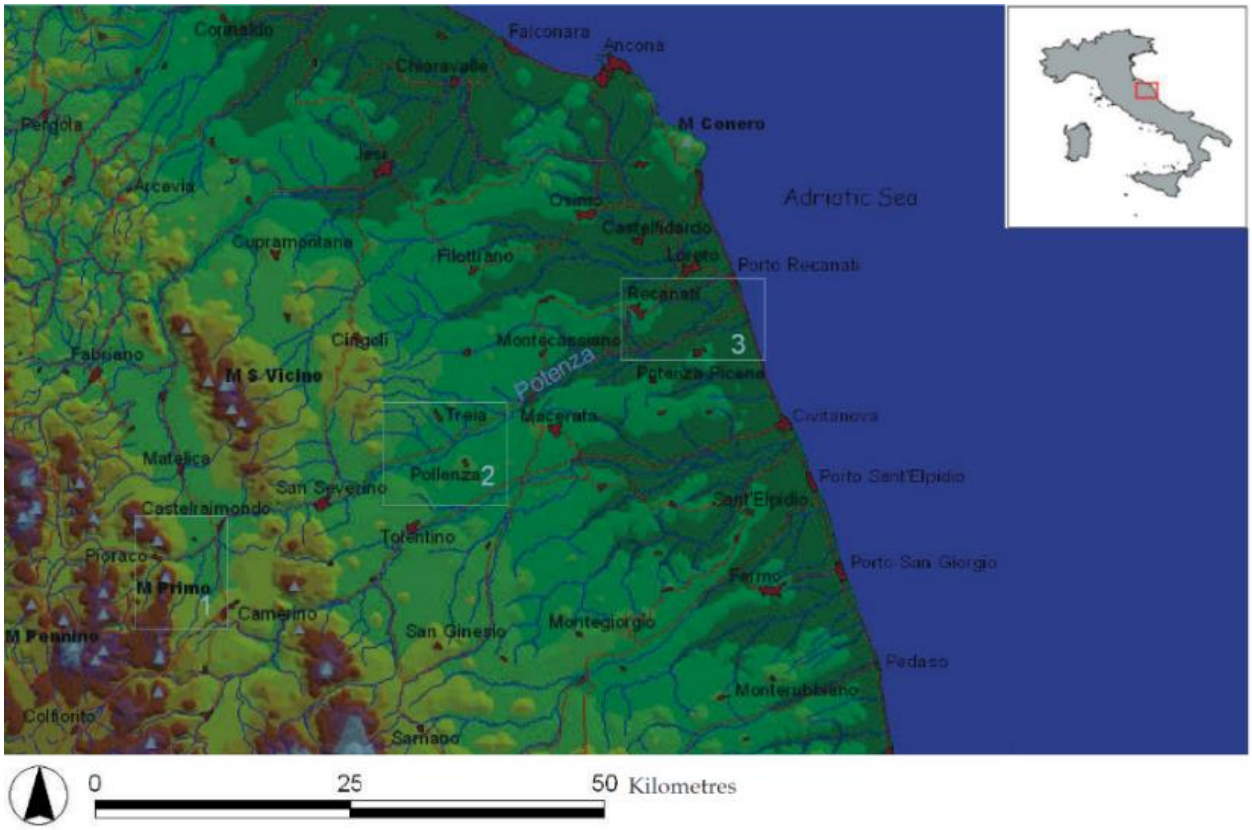


***Figure 2.4.*** *A map of the Potenza Valley, with the research areas indicated with rectangles. Rectangle 1 corresponds to the area around Camerino, 2 to the area around Treia and 3 to the area around Porto Recanati (Vermeulen et al. 2003, 72).*

The third and last survey is the Metaponto Survey (MS), performed by the University of Texas. Just like the PRP and the PVS, it is a project that has spanned multiple decades, starting from 1974. As a longstanding project, its methodology has changed over time. The earlier phases of the survey were founded on the basis of existing knowledge in regard to specific sites in the region and consequently took a more site-focussed approach. Later on, the survey methods become more systematic, employing fieldwalking and artefact collection in a similar fashion as the other surveys. The main aim of the MS was to trace the patterns of human settlement in the Metaponto across time. While the main focus was on the period of Greek occupation of the region, evidence dating to prehistoric, Roman, Medieval and Post-Medieval times were included as well. (Coleman and Prieto 2011). The exact areas surveyed can be found in Figure 2.3.

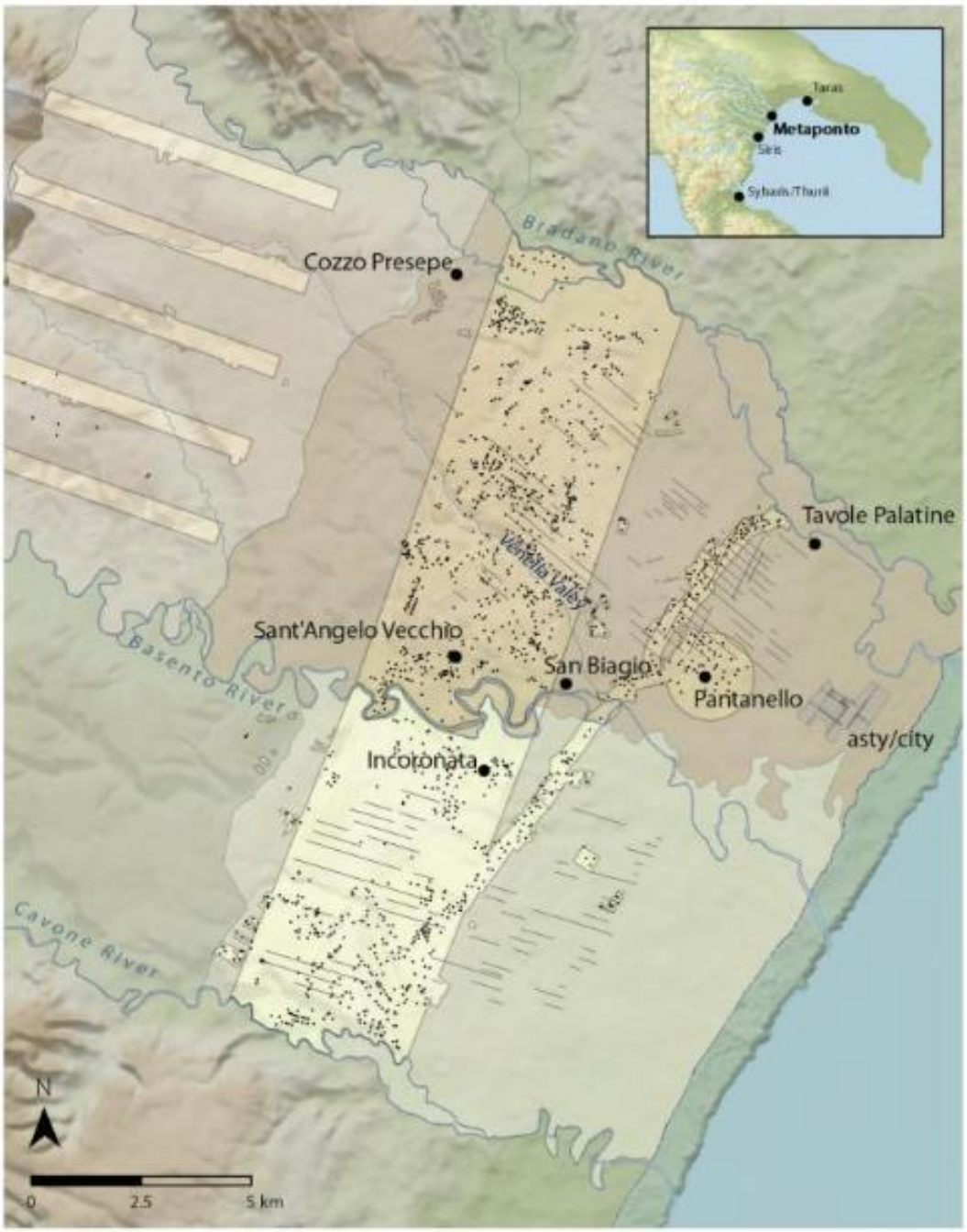


***Figure 2.5.*** *A map of the Metaponto, with the research areas highlighted (Coleman and Prieto 2011, 21).*

# The Regions

## History

### Pontine Region

With the advent of the Archaic Period (600 BC), the Pontine region became the focus of Roman colonisation efforts, heralding its incorporation into the Roman sphere of influence. It is during these phases of intensified colonisation that Norba and Setia were founded. Finally, it was in the late fourth century BC that the region came fully under stable Roman rulership. With this came the construction of the Via Appia, which provided an easy and safe way through the Pontine marshes to the Roman capital. Less is known about the following centuries. What is known is that the region was severely impacted by Sulla's Civil War during the Late Republican Period, as a result of which Norba and several surrounding Pontine cities were conquered or even destroyed. In this same period, the local elites came to play a larger role, and are known to have possessed estates in the region. During the Late Republican period, the different landscapes in the Pontine region start to follow diverging timelines. The marshy, inland plains of the region become increasingly wet, affecting agriculture and providing increasingly suitable conditions for malaria to spread. This trend continues into the Imperial Period, and even state-sanctioned projects were not capable of preventing the area's abandonment in the second and third century AD. Meanwhile, the coastal region, particularly the port cities continued to prosper well into the Imperial period (Attema, 1993; Attema *et al.*, 2010; de Haas, 2017).

### Potenza Valley

The favourable features of the Potenza Valley, among which its natural harbours, made it a popular target for Greek trade and settling efforts. These activities, which reached their peak between the sixth and fourth century BC, promoted the development of the region as an important player in the Central Italian trade networks. The Potenza Valley has historically been relevant as a connection between the western, Tyrrhenian half of Italy and the eastern, Adriatic half. This connection remained important when the region came under Roman control near the end of the third century BC. With the establishment of Roman rule came the construction of several settlements as well as large-scale infrastructure. A side road, or *diverticulum*, of the major roadway of the Via Flaminia, ran through the valley floor, connecting the region to the city of Ancona, situated to the north. Roman settlements which were established include (Helvia) Ricina, Trea, Septempeda and Prolaqueum, each established progressively further

inland. At the very mouth of the river Flusor lay the city of Potentia, founded in 184 BC, whose favourable position gave access to coastal trading routes. Potentia continued to grow well into the second century AD but started its decline in the third century AD (Corsi *et al*., 2009; Vermeulen, 2015; Vermeulen & Boullart, 2001, Vermeulen *et al.*, 2006, 2009).

### Metapontine Region

The Metapontine region was a popular target for Greek colonists, whose settling efforts peaked in the sixth century BC. The Greek influence over the region came to an end with its conquest by the Romans in the third century BC. After a war with the burgeoning Roman Republic, the Greek inhabitants were definitively defeated in 280 BC, initiating the decline of Metapontum as a Greek colony. When Hannibal began his famous invasion of Italy during the Second Punic War, Metapontum was quick to align itself with this Carthaginian general. After the defeat of Hannibal's brother and the subsequent Carthaginian withdrawal from Italy, Metapontum was severely depopulated as a result of fear of Roman retribution, sealing the city's fate at the beginning of the third century BC (Coleman & Prieto, 2011).

## Geography

### The Apennine Mountain Range

The geography of the Italian peninsula is for a significant part dictated by the presence of the Apennine mountain range. This range runs through nearly every part of the Italian landscape, from the northwest down to the Calabria in the south. For the most part, it divides the length of the peninsula roughly into two equal halves, and further sections off smaller regions. Connections across these mountainous barriers were made through networks of roads and rivers, as well as coastal routes accessible through ports, along which goods and information could be exchanged (de Haas, 2017).

### Pontine Region

The Tyrrhenian coast in the west, on which the Pontine Region is located, was characterised by a relatively high degree of connectivity. Perhaps the main contributor to this fact was the presence of major rivers, connecting the coastal plains to areas located further inland. Not only within the region did long rivers enhance connectivity, but also the long coastline with many harbours formed links with the outside world. Lastly, the region was intersected by major roads of Roman infrastructure. Particularly the Via Appia served as an important connection to Rome (de Haas, 2017).

The Pontine region lies on the Tyrrhenian coast, several dozen kilometres southeast of Rome. It consists of marshy plains, hills and marine terraces, with natural features delineating the outer borders. The northern edge of the region is formed by the Sacco River valley, while on the eastern border lie the Monti Ausoni, part of the Apennine mountain range. The western outline is formed by the Tyrrhenian coastline, in combination with a stretch of coastal land extending from the coast to the ancient town of Ardea (de Haas, 2017).

Major sites in the Pontine region known from historical sources are Antium and Satricum. Antium in particular is a long-lived settlement and has been inhabited from the period between the tenth century BC to the sixth century AD. Furthermore, this settlement had control over a harbour. Another important feature of the Pontine region is the presence of Roman villas. These properties, owned by the elite and some even by emperors, were built in the coastal region and were particularly numerous in the vicinity of Antium and Nettuno (Attema *et al.*, 2010).

### Potenza Valley

The Potenza Valley is located on the Adriatic coast, bordering the Adriatic Sea. This eastern coastline of the Italian peninsula is traversed by a multitude of river valleys, which run relatively parallel to each other. These valleys tended to function as separate units, with fewer connections to the larger networks of the Roman world. This form of isolation – as was the case in the Potenza Valley – could be overcome through the presence of a harbour, through which products from outside the region were traded (de Haas, 2017).

Naturally, the main feature of this region is the Potenza river, which flows from its origin in the Apennine Mountains to the east to drain into the Adriatic. The western section of the valley consists of a rather narrow passage through the Apennines, after which the valley opens up as it flows beyond the mountains and into the foothills (Vermeulen & Taelman, 2017).

### Metapontine Region

The Lucania, or modern Basilicata, in which the Metapontine region was located, is not as rich in major rivers, hampering the exchange between the interior and the coastal areas bordering the Gulf of Taranto. Generally speaking, the region also lacked ports, leaving it relatively isolated from the larger trade networks (de Haas, 2017).

The Metapontine region lies furthest south and is situated on the Gulf of Taranto of the Ionian Sea. It is enclosed by the Basento river in the southwest and the Bradano river in the northeast. The landscape consists of sloping terraces, river valleys and coastal plains (Coleman & Prieto, 2011).

The main settlement of the Ancient Metapontine region was the city of Metapontum, which was originally established as a Greek colony. The marine terraces of the region furthermore provided land suitable for agricultural exploitation, promoting the establishment of farmhouses. These farmhouses were built further and further inland, where the land was most fertile. Furthermore, these sites were often built around rivers, along which produced goods could be distributed (Di Leo *et al.*, 2018).

# Hypotheses

## Pontine Region

The Pontine region has several features that facilitate and promote trade. The region is traversed by multiple rivers, as well as major infrastructure. Furthermore, the region is located in close proximity to Rome and would have near-direct access through the Via Appia and the Tyrrhenian Sea. Moreover, the presence of multiple harbours along a long coastline likely connected the region to intraregional trade networks, potentially granting access to a wide range of imported ceramics. Lastly, considering the Pontine region was a popular location for the Roman elite to build their villas, it could be hypothesised that this would increase the demand for imports. Taking these features into account, one would expect that the Pontine region would be a popular destination for a variety of ceramics exports throughout the Roman Empire.

Since it is known that the coastal area and its ports in particular prospered in the Imperial period, it can be expected that this will be reflected in the distributions of the Imperial period and beyond, perhaps through an increased variety in ceramic types and a general increase in the numbers of sherds.

## Potenza Valley

If we take into consideration that the geographical characteristics of the Potenza Valley have an isolating influence, we may expect that fewer imported ceramics were found in this region. An influence possibly counteracting this isolation was the presence of a harbour in the town of Potentia, which may have attracted trade in imports despite barriers formed by the geographical features of the region. Nevertheless, as a region relatively less connected to larger trade networks, internal trade might have been more common here. Intra-regional connectivity is higher, due to the presence of the Flusor river – known today as the Potenza river. The link between the coastal and inland areas would also facilitate the transport of imported pottery deep into the valley.

With the influence Greek colonists and traders exerted on the region, especially in the period between the sixth and fourth century BC it is expected that the Greek provenance will have a significant presence in the region and will be particularly abundant in the Republican period. The city of Potentia began its decline of the city began in the third century AD, and continued into the sixth century AD, although it appears that the city did become not entirely obsolete. Thus, a reduction in the number of sherds, certainly of imported ones, can be expected for the Late Imperial and Late Antique periods.

### The Metapontine Region

The Metapontine region in the south contains both rivers and roads. The Bradanus and the Casuentus flow roughly parallel from the northwest to the coast in the southeast, and roads cross the landscape in multiple directions. The city of Metapontum is known to have controlled a port, extending connection beyond the region. Based on this, it could be expected that a variety of imported sherds would be distributed throughout the region via this harbour.

Like the Potenza valley, the Metapontine region has been the focus of Greek colonising efforts, exemplified by the establishment of Metapontum as a Greek colony. Thus, Greek sherds can be expected to be present in significant amounts. From historical sources, it is known that the city Metapontum became severely depopulated in the Republican period, after the end of the Second Punic War. Considering that Metapontum is a major settlement in the region and is known to have possessed a port, the decline of this city could have resulted in increased isolation of the region from outside trade networks, and thus a decrease in the number and variety of imported ceramics.

### General Expectations

Each region is known to have possessed at least one port, which could have functioned as a hub within their expected regions, and have formed a link with intraregional networks. Distantly traded goods and ceramics will almost certainly be present in all regions. However, the Pontine region possessed multiple port sites, and could therefore be expected to be richer in both the number and variety of ceramic types. This trend could have been further amplified by the fact that the Pontine region was denser in (major) settlements, and therefore likely had a larger population than both the Metapontine region and Potenza valley. This larger population would likely have resulted in a greater potential market for imported goods.

With the acceleration in the expansion of Roman-controlled territory in the Imperial Period and the subsequent integration of these regions into the Roman sphere of influence, it follows that the advent of this period would see an increase in imported sherds, granting traders in the respective regions access to a ceramics produced in a wider range of production centres. On the other hand, this trend could have been counteracted by demographic declines known to have occurred at different points in the Republican and Imperial periods.

## Conclusion

This chapter introduces the great value ceramic evidence can play in archaeological research. Furthermore, this chapter addresses the first research aim by providing existing theories on the nature of the Roman economy. These different models will provide a framework in which the results of this research can be placed. Furthermore, the different surveys are described, as well as the regions they took place in. The characteristics of these regions are used to provide both general and specific hypotheses. With the formulation of these hypotheses, the first research aim of investigating and exploring the existing knowledge of Roman trade networks is met.

# Chapter 3 Methodology

## Introduction

This chapter will describe the methods used to perform this research. This chapter reflects the two main steps taken to obtain results. This first step is to properly edit the database containing information from all three surveys, allowing the data from this database to be properly fed into a GIS application. This functions as a preparation for the second step, which will directly address the second research aim. This step involves the visualisation of the different sherd provenances and how they are distributed across each region. As part of this, the appropriate spatial context (topography, terrain, infrastructure, etc.) is added to these visualisations.

## Database Structure

The database used in this research consists of a Microsoft Access file, in which the data from three Italian regional surveys are contained. The term "composite" database in this context refers to the fact that the database is based on data from different primary sources. The database contains entries on several finds classes – including ceramic sherds. For this research, only the data obtained during the Pontine Regional Project, Potenza Valley Survey and the Metaponto Survey will be taken into consideration. The database was made available to me by Dr. T.C.A. de Haas, and previously contained only the necessary data for the PRP and the PVS.

The first step of this research was to edit the existing database so that the desired research could be performed on it. These edits involved the formatting and standardising of the existing data on the PRP and the PVS. The largest change was the addition of data from the MS. This data was taken from the catalogues contained in the volumes of *The Chora of Metaponto 3: Archaeological Field Survey Bradano to Basento* by Joseph Cole Carter and Alberto Prieto.

Something which became clear during this process is that the amount of data collected varies significantly from survey to survey. The PRP, from which data from multiple surveys were included, yielded more relevant database entries than the PVS and the MPS combined. This major difference is also reflected in the size of the survey areas covered in each regional survey. This means that the visualisations of sherd distributions created of the Pontine region will be comparatively much denser in information.

The database contains three tables that are directly relevant to this research: SITES, ARTEFACT_TYPES and ARTEFACTS. The table SITES contains an entry for each of the

sites investigated, along with identifying codes and additional information, including the state in which they were encountered, with qualifiers such as “overgrown” or “ploughed”. Most importantly, this table also contains the x- and y-coordinates of each relevant site. It is this data which allows the data on provenance to be placed in a spatial context using a GIS programme. The table ARTEFACT_TYPES contains a catalogue of all the different ceramic types encountered. It includes the time range in which the ceramics were produced, their provenance and the vessel shape. Finally, the main table and the dataset that will be used as a foundation for this thesis is the table ARTEFACTS. See Figure 3.1 for a report of how this table relates to the database as a whole.

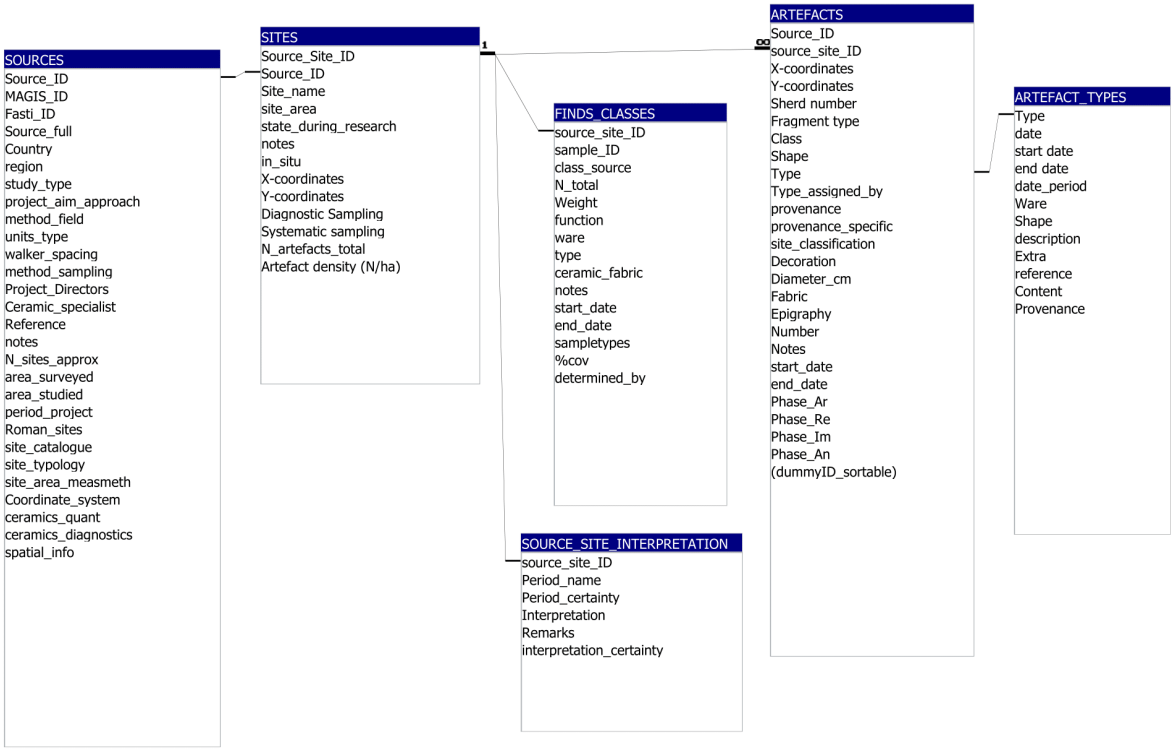


***Figure 3.1.*** *A report of the relationship between the tables contained in the Access database (author’s work).*

ARTEFACTS contains separate entries on individual ceramic artefacts documented across all surveys included. Each ceramic sherd is given a unique identifier or the “Sherd number”. The sherd number is designated as the primary key within the database. Each survey can also be identified by a unique code. For this research, entries were selected based on their shape and class to include only amphorae and fine ware. In practice, this means that all sherds classified as “amphora” in “Shape”, and all sherds classified as either “terra sigillata”, “African red slip ware” or “Late Roman C / Phocaean red slip ware” in “Type” are included, while the rest is disregarded. Further specification of the sherd class is contained in the column “Type”. Based on the ceramic type and their known production sites, the provenance of the sherd can be

determined. In some cases, fabric analysis has been performed on the sherd, in which case the provenance can be determined with more certainty. The determined provenance of each relevant sherd is listed in the column “provenance”. Examples of provenance indications are “Northern Africa”, “Eastern Mediterranean and “Central Italy”. Clearly, the level of specificity with which provenance is determined differs. Some ceramic types, like the Phocaean red slip ware, can only be given a more general indication – the eastern Mediterranean in this case. Other types could be given a much more specific provenance. This rather stark difference in provenance determination can be attributed to gaps in existing knowledge. In order to create a universal system, applicable to the data from all three surveys, this discrepancy had to be accepted to avoid losing a significant amount of resolution across the database.

The last column of specific importance is the column “phase”, in which the general dating of the sherd in question is indicated. In order to make it possible to assign every sherd to overall periods, a total of four larger phases were defined. These phases aligned across the periods which were defined differently for or were unique to certain regions. These four universal phases were Archaic (before 500 BC), Republican (500 to 50 BC), Imperial (10 BC to 400 AD) and Late Antique (after 400 AD). See Figure 3.2 for an overview of all periods and phases. Within this periodisation, each ceramic type was assigned a dating; if the known time range for a type overlapped with a period, every corresponding sherd was tagged with this period. If the time range overlapped with multiple periods, both periods were recorded. Admittedly, this is a very rough manner of dating each sherd. However, in the context of this research, which relies on the standardisation of three surveys with very different methods, it could be considered to be an unfortunate but necessary evil.

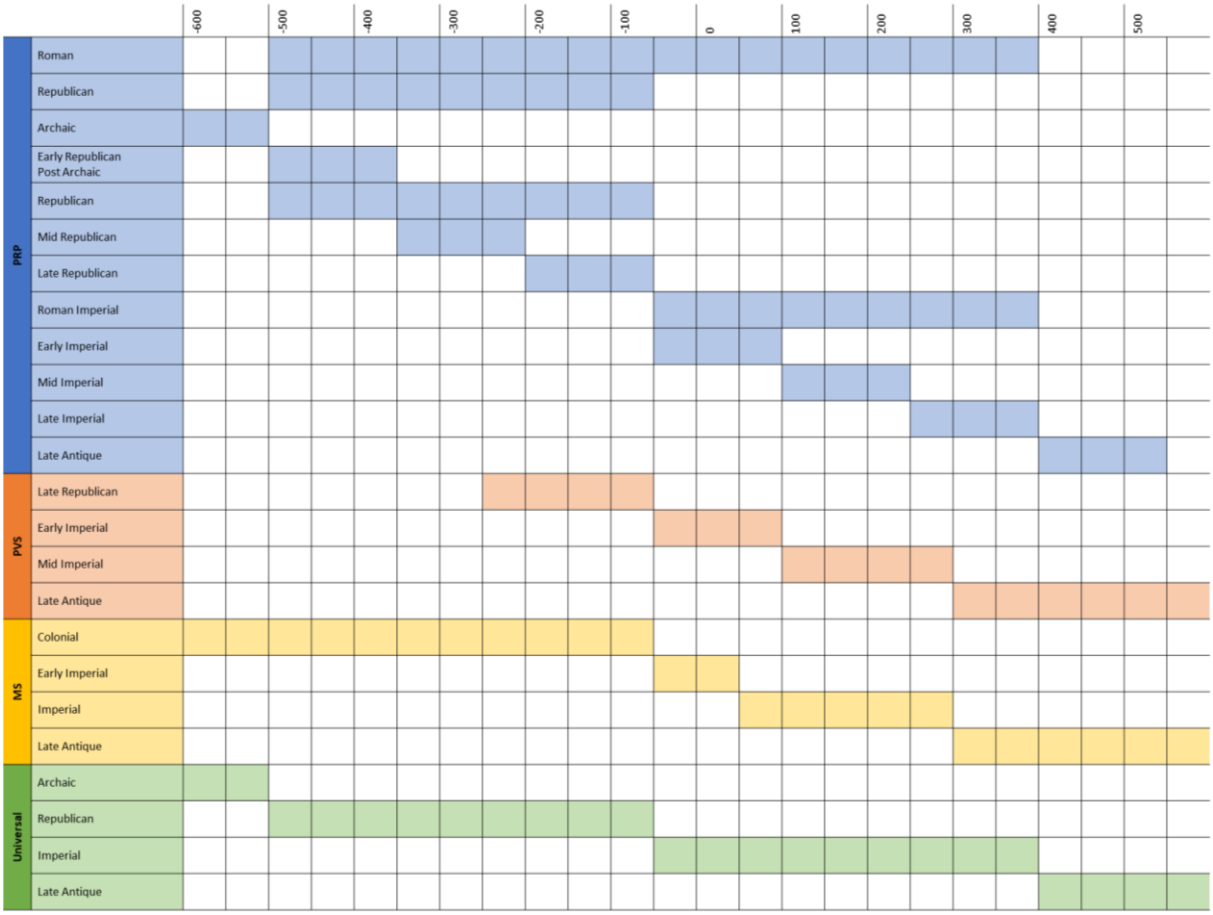


***Figure 3.2.*** *A schematic overview of the periods defined for each region, and how they correlate to the five general phases of Archaic, Republican, Imperial and Late Antique (author's work).*

# Visualisation of Sherd Distributions

## Excel Charts

To gain fundamental insight into the general ceramic proportions across all regions, simple charts were created using Microsoft Excel 2016. As a first step, the absolute number of sherds was visualised by means of a column chart, clustered by region. For each region, the number of sherds was displayed for each provenance separately. Furthermore, the bars of the column chart were colour-coded according to provenance. The rest of this research adhered to this same colour-coding.

The second step was the creation of pie charts visualising the general proportions of provenances for each region. These proportions were subsequently broken down for the different periods, creating the second chart type. This was done using 100% stacked column charts. These charts allowed for the tracking of the relative proportion across time.

## GIS Maps

The creation of GIS maps of the data compiled in the Access database aimed to place the collected data in the appropriate geographical context. To this end, the open-source software QGIS was used, specifically version 3.22.11 "Białowieża", which is a stable long-term release. For each region, a separate project was created, in which geographical data was combined with the data contained in the ARTEFACTS and SITES tables in the Access database.

The first step in this process was to create a suitable base map, displaying spatial data that can potentially provide an explanation or insight into how the different provenances are dispersed across each region. The choice was made to include relief, elevation, Roman topography, Roman roads and Roman rivers in the base map. On top of this, the total amount of sites surveyed was included as well. The base map displaying relief was retrieved as "ESRI Shaded Relief" through the QuickMapServices plugin in QGIS. This added the map "World Shaded Relief", created by the Environmental Systems Research Institute (ESRI) (ESRI, 2009) and with a resolution of 90 metres in the regions of interest. The map of Roman roads, as well as Roman rivers, are digitised versions of the same maps in the Barrington Atlas of the Greek and Roman World (Talbert, 2000). The digitisation process was performed by Dr. Tymon de Haas and the files were provided through personal communication. The digital elevation map (DEM) and the maps containing all survey sites were also provided through personal communication. The resolution of the DEM is 20 metres, and its source is the DEM is the Italian Ministry for the Environment and the Protection of Land and Sea (2008). Lastly, a map of known major

Roman topography was included. This topography was based on the *Cities Database* compiled by J.W. Hanson, which was made available on the Oxford Roman Economy Project website (Hanson, 2016). In order to classify the places relevant to this research, their associated entries in this database were given an additional label. This sorted the sites into cities, settlements, sanctuaries, cemeteries, bridges, fortifications, road stations, mines, forts and villas. Important to note here is that this is only a general indication of topography, which would have varied from period to period. Geographical features in the form of mountains and lakes were classified as well. Each site type was given a unique symbol, allowing one to make a distinction between them on the created maps. This classification was based on the Digital Atlas of the Roman Empire (DARE), made available by the Centre for Digital Humanities of the University of Gothenburg (Åhlfeldt, 2019).

Each provenance was displayed in a separate layer, with consistent colour-coding across all projects. For each site, a count was made of the provenances encountered. The symbology of each layer was set to display the markers as dots of differing sizes. The resulting maps thus displayed the geographical layout of each region, approximating the landscape as it was in the Roman period. Overlaying, there are markers indicating the total amount of sites surveyed, as well as dots of increasing size at the sites where a larger amount of sherds of the provenance in question was encountered. This provided an overview of how ceramics are distributed across each region.

## Conclusion

The methods described above use a formatted and standardised database, in combination with a GIS programme to produce a visualisation of proportions of ceramic provenances and landscape distributions for each region. These visualisations will take the form of simple pie charts, accompanying sherd distributions placed in the respective landscapes, colour-coded for the different provenances present. In the GIS maps, the amount of sherds of a certain provenance present is reflected by the marker size for each survey site. These maps will provide further context to these distributions, by also displaying elevation, hill shade, roads, rivers and topography.

# Chapter 4 Results

## Introduction

The results will be discussed for each region separately. This will be done in a general fashion first, by describing the overall proportions of sherd provenances, followed by a discussion of these general sherds distributions across the different landscapes. Secondly, these distributions will be broken down and assessed per period. The final section of this chapter will establish the overall trends, in the form of the similarities and differences observed across all regions. Finally, this chapter will assess how these trends change over time.

To establish the difference in dataset size for the three surveys, Figure 4.1 visualises the absolute sherd numbers for each region, broken down and colour-coded for each provenance.

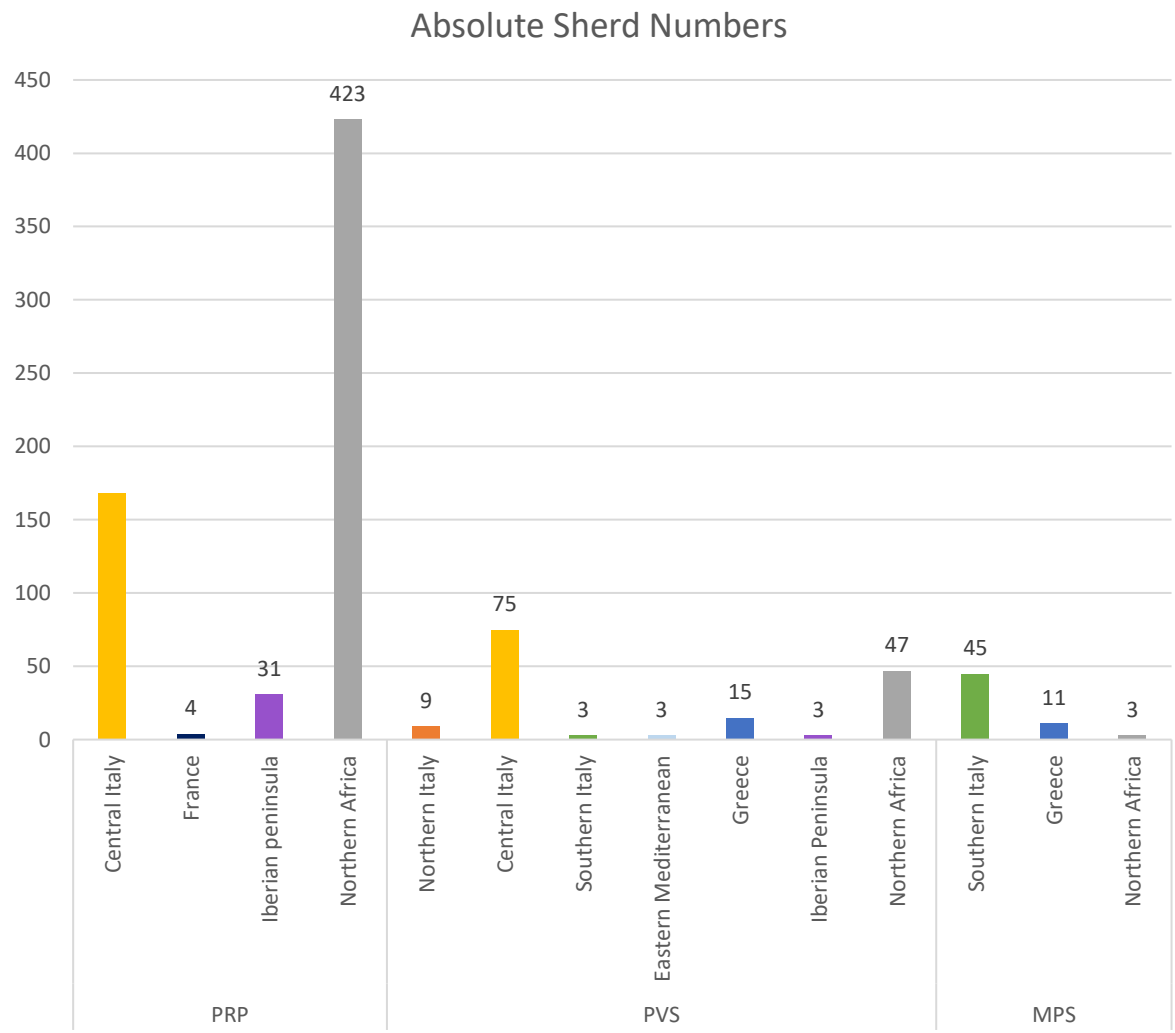


***Figure 4.1.*** *The absolute number of sherds found in each region, sorted by provenance (author's work).*

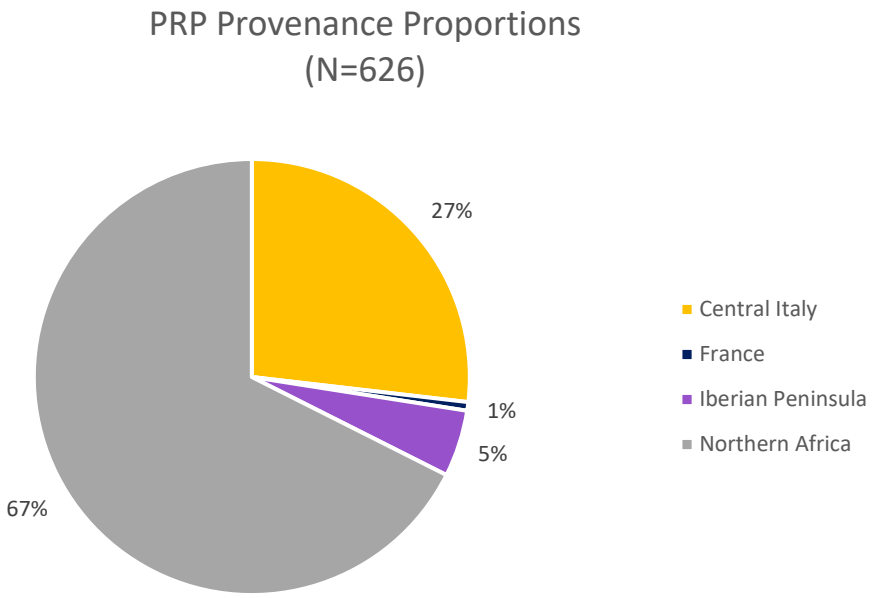


***Figure 4.2.*** *The relative proportions of ceramic provenances in the Pontine region (author's work).*

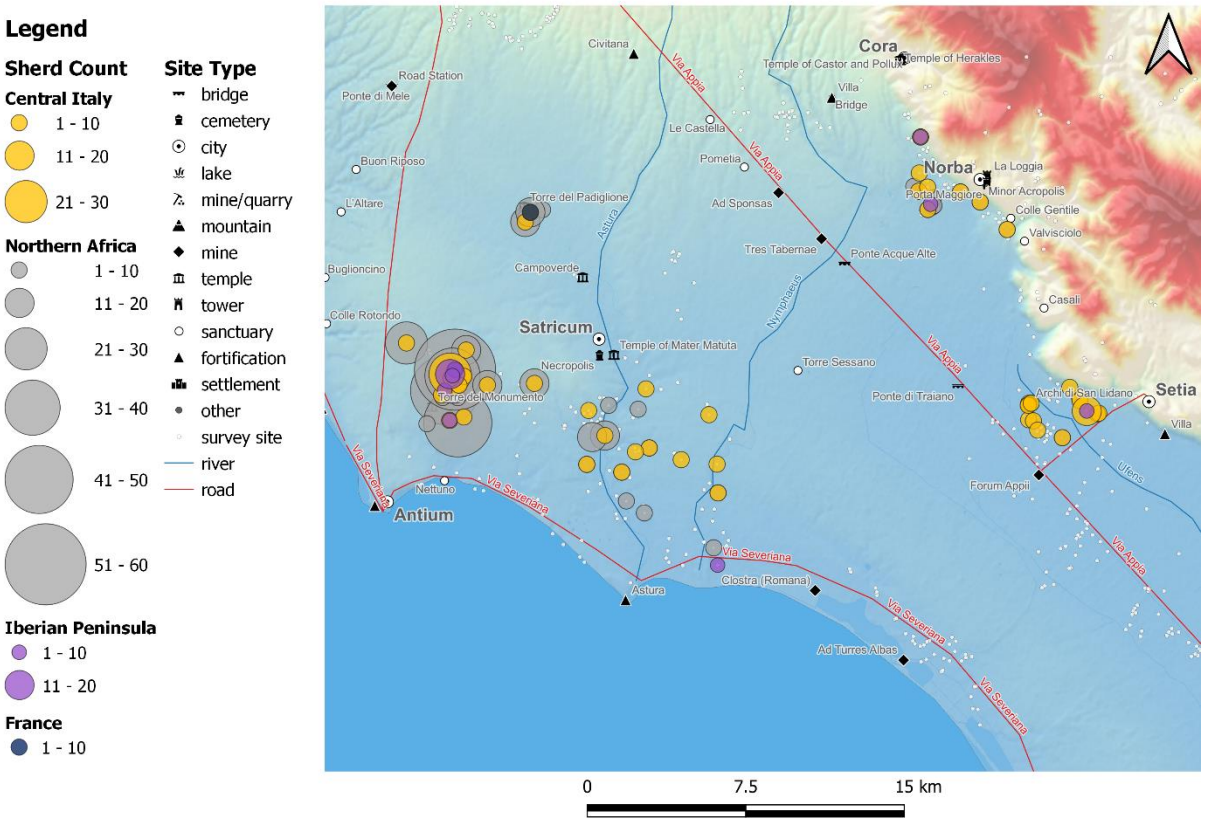


***Figure 4.3.*** *The distribution of sherds throughout the Pontine region, colour-coded according to provenance. The size of the markers corresponds to the number of sherds found per site (ESRI, 2009; Talbert, 2000; Italian Ministry for the Environment and the Protection of Land and Sea, 2008; Hanson, 2016; Åhlfeldt, 2019).*

The general proportions of sherd provenances in the Pontine region, as visualised in Figure 4.2, show that only four different provenances were encountered. The North African provenance is overrepresented, with the Central Italian provenance being common as well. Iberian and French sherds make up the smallest percentages.

Looking at the sherd distribution across the landscape of the Pontine region, visualised in Figure 4.3, one major aspect that stands out is the difference in the composition of the distributions nearer to the coast as compared to the distributions found more inland. Particularly, Northern African ceramics make up far more of the sherds recovered in the southwestern part of the region, closer to the coast. Further inland, in a more north-eastern direction, Northern African ceramics are certainly present, but not to the degree that they are found closer to the coast. In contrast, Central Italian sherds are found more consistently throughout the landscape, with more similar amounts found both in the southwestern and the more inland, north-eastern areas.

## Potenza Valley

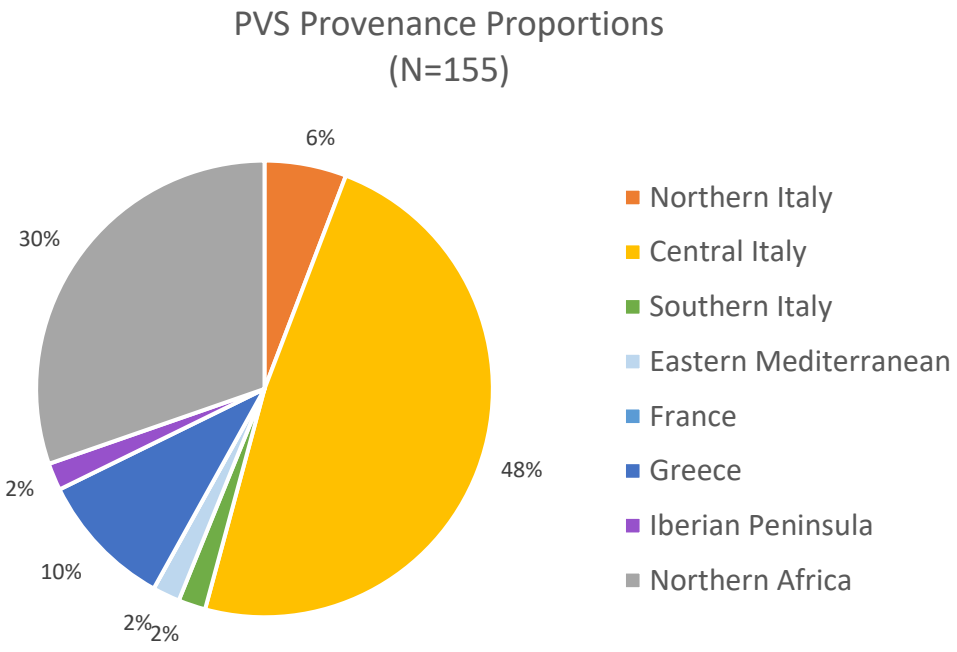


***Figure 4.4.*** *The relative proportions of ceramic provenances in the Potenza valley (author's work).*

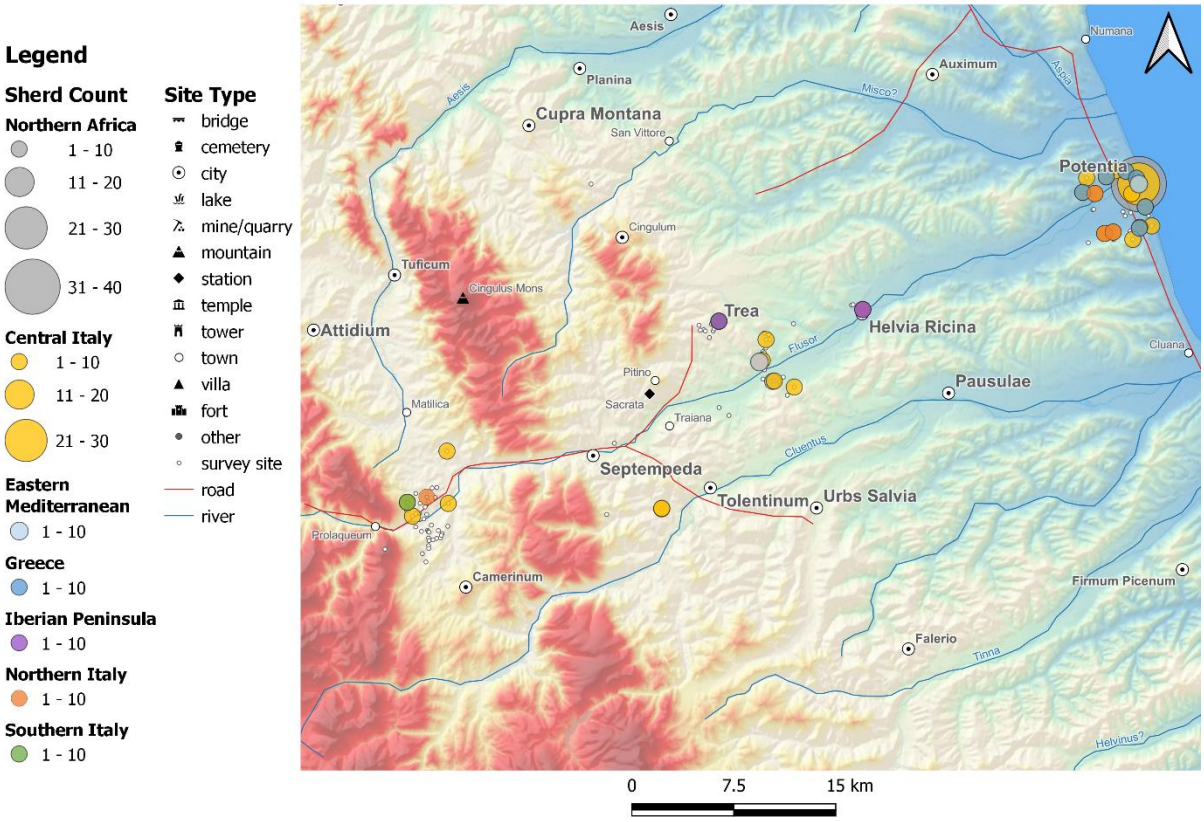


***Figure 4.5.*** *The distribution of sherds throughout the Potenza valley, colour-coded according to provenance. The size of the markers corresponds to the number of sherds found per site (ESRI, 2009; Talbert, 2000; Italian Ministry for the Environment and the Protection of Land and Sea, 2008; Hanson, 2016; Åhlfeldt, 2019).*

The general proportions of sherd provenances in the Potenza valley, as visualised in Figure 4.4, show a total of seven different provenances. Nealy half of all sherds were produced in Central Italy. Northern African sherds are the second most common, comprising more than a quarter of all sherds. Greek sherds come in third place, making up ten per cent. Northern Italian, Southern Italian, Eastern Mediterranean, French and Iberian sherds were found in small amounts as well.

As can be seen in Figure 4.5, the largest amount of sherds was recovered at and around Potentia, where the river Flusor drains into the Adriatic Sea. Northern African sherds are significantly present here, as well as Central Italian and Greek sherds. The composition of distributions further upstream of the Flusor is notably different. The Northern African provenance is relatively less abundant in the middle of the valley and even disappears completely in the areas even further inland. This trend appears to be similar for the Greek provenance; Greek ceramics comprise a significant amount of the sherds recovered around Potentia, but they become relatively less abundant in the middle of the valley and were not found in the areas surveyed in the higher parts of the valley. Eastern Mediterranean ceramic types are particularly rare, but

again they are found only as far inland as the middle of the valley. Comparing this to Central Italian ceramics appears to reveal a significant difference in how provenances are distributed across the landscape. Like African and Greek sherds, Central Italian sherds are numerous around Potentia. However, they maintain a greater presence further inland and can be found in relatively larger amounts in the middle of the valley as well as the areas furthest inland. Interestingly, other Italian ceramic types – Northern and Southern – can also be found across the whole valley, although generally in smaller amounts. Finally, Iberian ceramics were found in only very small amounts, and only in the areas in the middle of the valley.

## Metapontine Region

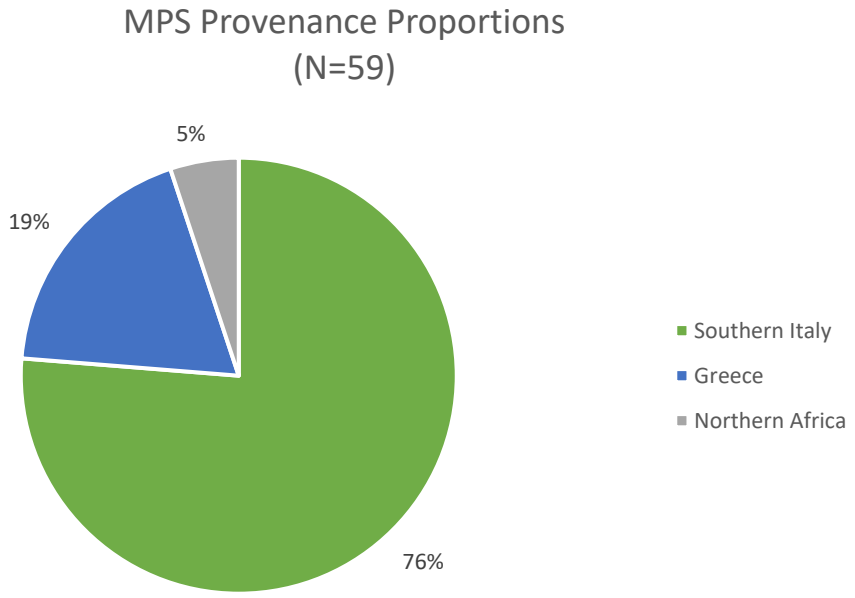


***Figure 4.6.*** *The relative proportions of ceramic provenances in the Metapontine region (author's work).*

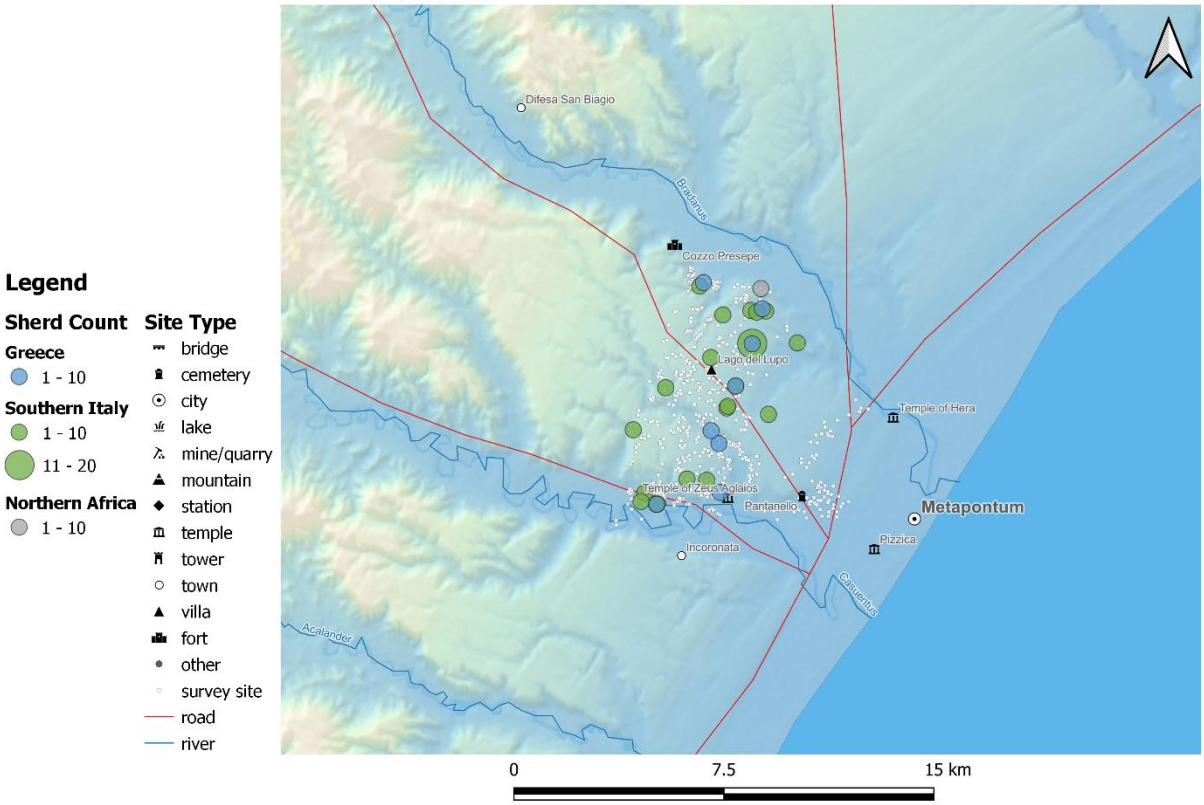


***Figure 4.7.*** *The distribution of sherds throughout the Metapontine region, colour-coded according to provenance. The size of the markers corresponds to the number of sherds found per site (ESRI, 2009; Talbert, 2000; Italian Ministry for the Environment and the Protection of Land and Sea, 2008; Hanson, 2016; Åhlfeldt, 2019).*

The general proportions of sherd provenances in the Metapontine region, as visualised in Figure 4.6, show only three different provenances. Southern Italian ceramics make up more than three-quarters of all sherds. Greek sherds were encountered rather frequently, while Northern African sherds make up the smallest portion.

Considering the Metapontine region is far smaller than either the Pontine region or the Potenza valley, larger trends in sherd distribution are harder to observe. As visualised in Figure 4.7, Southern Italian and Greek ceramics are spread relatively evenly across the landscape, both in small numbers. The only site at which the Northern African provenance was encountered, is located in the northern part of the region.

## Changes Over Time

### Pontine Region

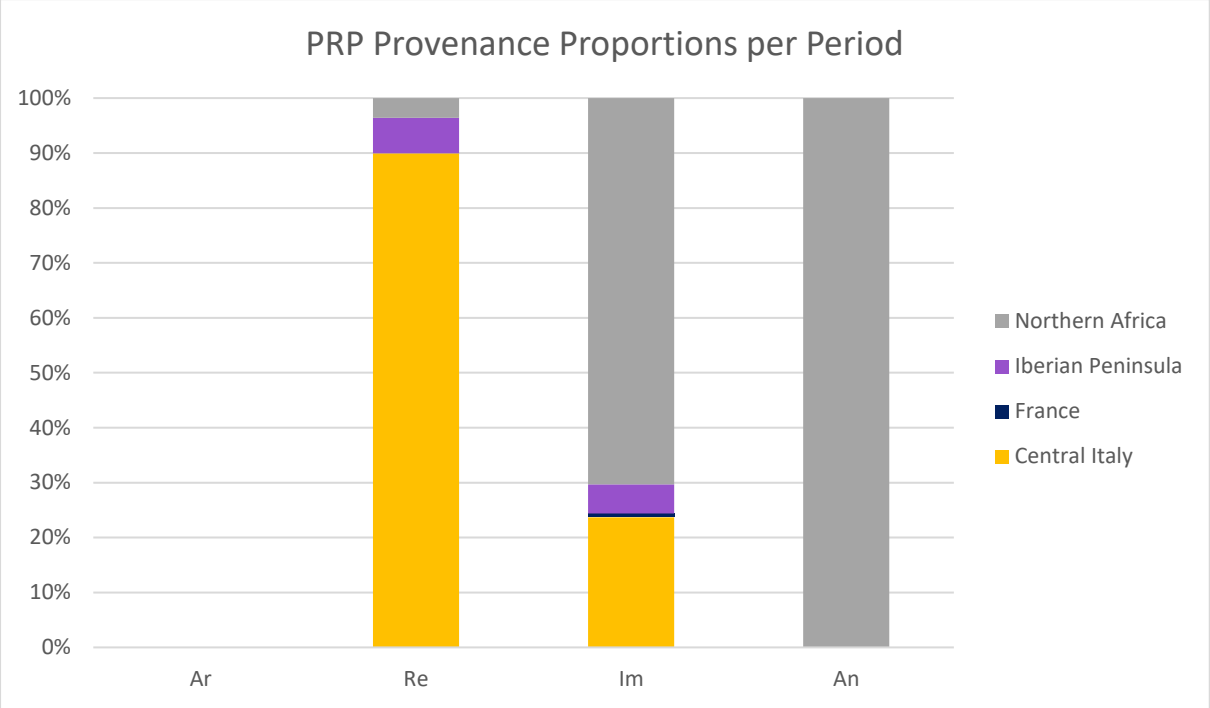


***Figure 4.8.*** *The relative proportions of ceramic provenances in the Pontine region, sorted by period (author's work).*

Looking at the relative provenance proportions for each period in the Pontine region (see Figure 4.8), a few trends can be observed. Central Italian sherds dominate ceramics retrieved from the Republican period, comprising 90 per cent of all sherds. Central Italian ceramics were still found for the Imperial period, but they make up a far smaller portion of roughly 25 per cent. Seemingly replacing Italian sherds, Northern African ceramics take over: from not even 4 per cent of sherds in the Republican period, African sherds comprise around 70 per cent of sherds in the Imperial period. No Italian sherds were found for the Late Antique period, with African ceramics making up all of the sherds recovered. It should be noted that only a very small number of sherds were found dating to the Late Antique period in general. Iberian ceramics comprise smaller portions of sherds for the Republican and Imperial periods and maintain a more constant presence from period to period (6.5 in the Republican period and 5.3 per cent in the Imperial period). The small number of French sherds that were recovered dates to the Imperial period, where they make up less than 1 per cent of all sherds.

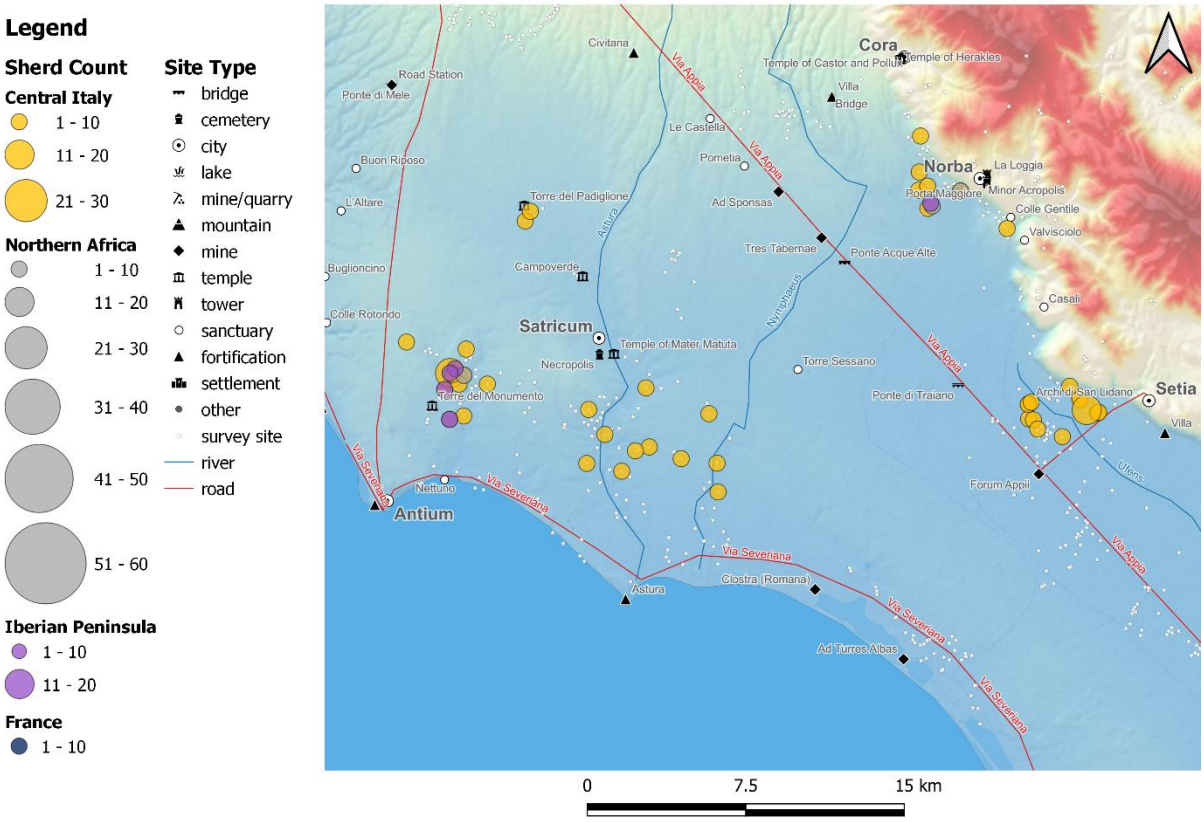


***Figure 4.9.*** *The distribution of sherds throughout the Pontine region in the Republican period, colour-coded according to provenance. The size of the markers corresponds to the number of sherds found per site (ESRI, 2009; Talbert, 2000; Italian Ministry for the Environment and the Protection of Land and Sea, 2008; Hanson, 2016; Åhlfeldt, 2019).*

As from the visualisation in Figure 4.9, Central Italian ceramics dominate the sherd distributions dated to the Republican period. When looking at how these distributions fit in the landscape, it is clear that Central Italian ceramics were found at more inland survey sites as well as sites closer to the Tyrrhenian coast. In contrast, most of the Iberian ceramics were found closer to the coast, in the areas around Astura and Nettuno, although a singular sherd was found around Norba, in the foothills of the Monti Lepini. Northern African ceramics are even rarer than Iberian ceramics for this period. Roughly the same (small) amount of sherds was found in coastal areas and more inland areas.

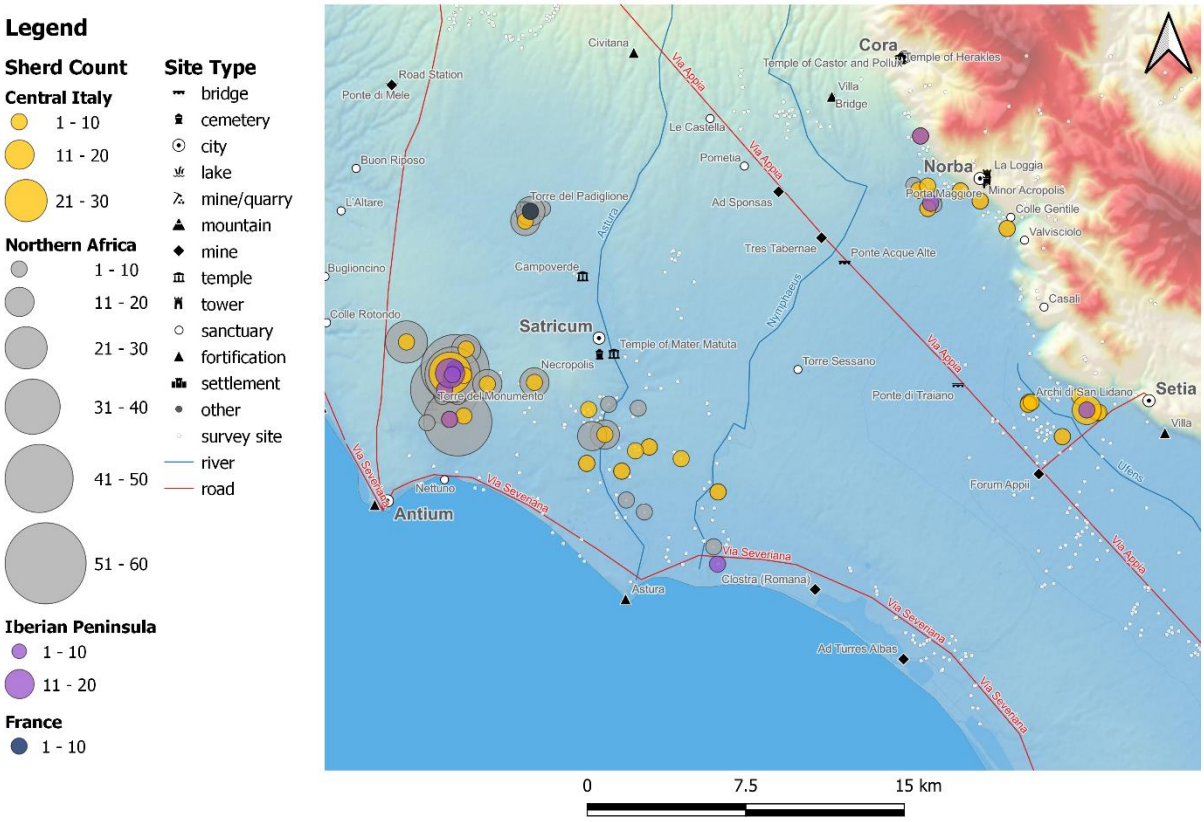


***Figure 4.10.*** *The distribution of sherds throughout the Pontine region in the Imperial period, colour-coded according to provenance. The size of the markers corresponds to the number of sherds found per site (ESRI, 2009; Talbert, 2000; Italian Ministry for the Environment and the Protection of Land and Sea, 2008; Hanson, 2016; Åhlfeldt, 2019).*

The situation is much different for the Imperial period (see Figure 4.10) when Northern African sherds become more abundant, particularly in the areas around Nettuno. Inland, African sherds remain relatively rare, however. Iberian ceramics also become more abundant, mostly around Nettuno, with a few sherds found near the Montin Lepini around Norba and Setia. Central Italian ceramics not only remain relatively constant in the number of sherds found but also in the way they are distributed across the landscape, being found in large numbers both at inland sites and more coastal sites.

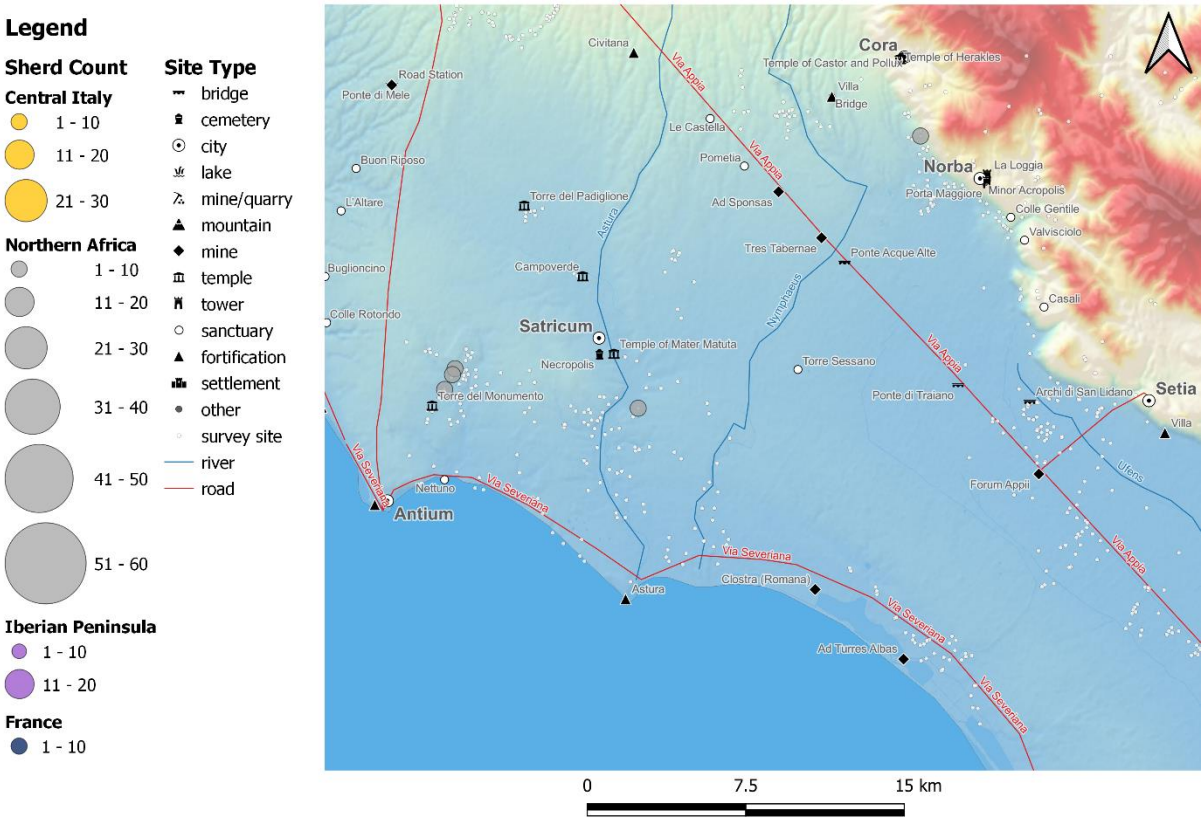


***Figure 4.11.*** *The distribution of sherds throughout the Pontine region in the Late Antique period, colour-coded according to provenance. The size of the markers corresponds to the number of sherds found per site (ESRI, 2009; Talbert, 2000; Italian Ministry for the Environment and the Protection of Land and Sea, 2008; Hanson, 2016; Åhlfeldt, 2019).*

The sherd distributions for the Late Antique period are again markedly different from those from the preceding period (see Figure 4.11). First of all, a far smaller amount of sherds were found dating to this period, and second of all, all of these sherds originated from Northern Africa. A trend that does appear to persist into the Late Antique period is that these African sherds were more numerous in areas around the coast, with a singular sherd found during the survey around Norba.

## Potenza Valley

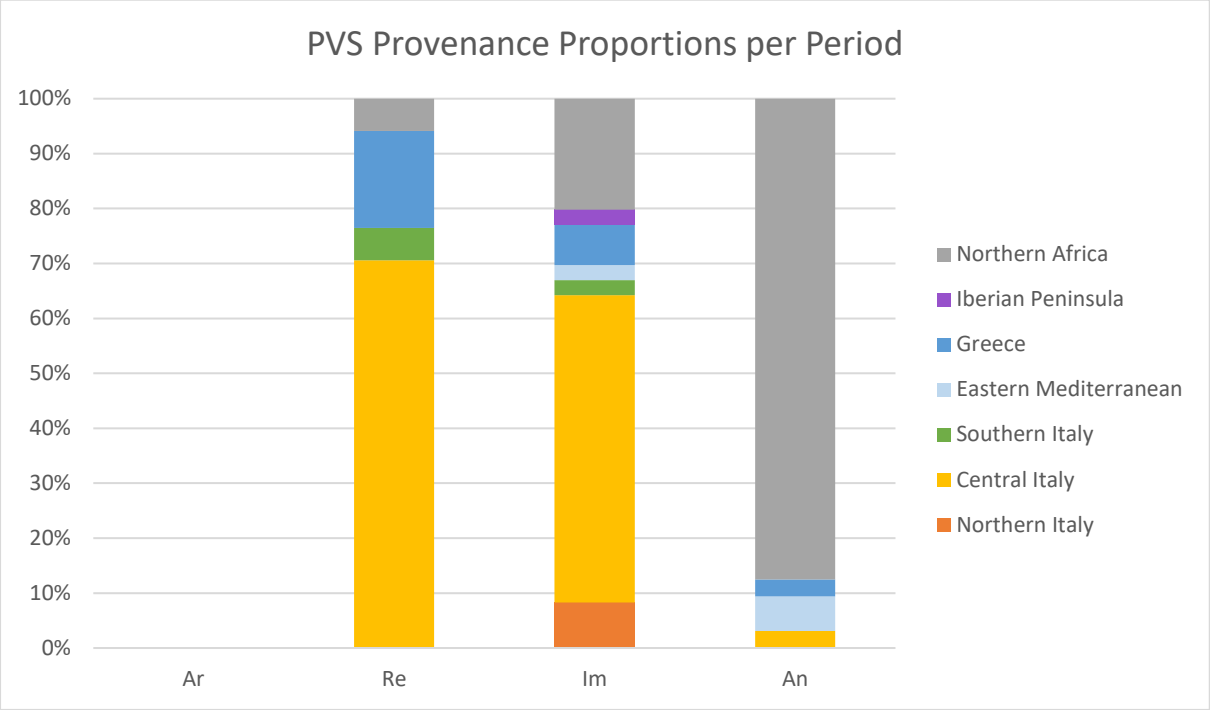


***Figure 4.12.*** *The relative proportions of ceramic provenances in the Potenza valley, sorted by period (author's work).*

The visualisation of the provenance profile for the Potenza valley appears to show a few trends (see Figure 4.12). Central Italian ceramics make up most of the sherds found for the Republican period, with roughly 70 per cent of sherds having this provenance. The second most abundant provenance is Greece, with a total of 18 per cent of sherds having originated there. Northern African sherds and Southern Italian sherds are also represented, but only in small fractions of roughly 6 per cent. This picture changes in some aspects during the Imperial period. Northern African ceramics become relatively more abundant, comprising 20 per cent of all sherds. At the same time, Central Italian and Greek ceramics are represented less, comprising a fraction of 56 per cent and 7 per cent respectively. Southern Italian sherds become particularly rare and comprise merely 3 per cent of all sherds. Additionally, new provenances appear in the Imperial period, although in smaller proportions; Northern Italian sherds make up 8 per cent, and Iberian sherds as well as Eastern Mediterranean sherds only 3 per cent. A significant change in the profile appears to occur during the Late Antique period. Northern African ceramics continue to increase in relative abundance and now comprise 88 per cent of sherds. Iberian and Northern Italian sherds disappear from the profile, leaving the only other provenances as Central Italy, Greece and the Eastern Mediterranean, each now making up less than 6.3 per cent of sherds.

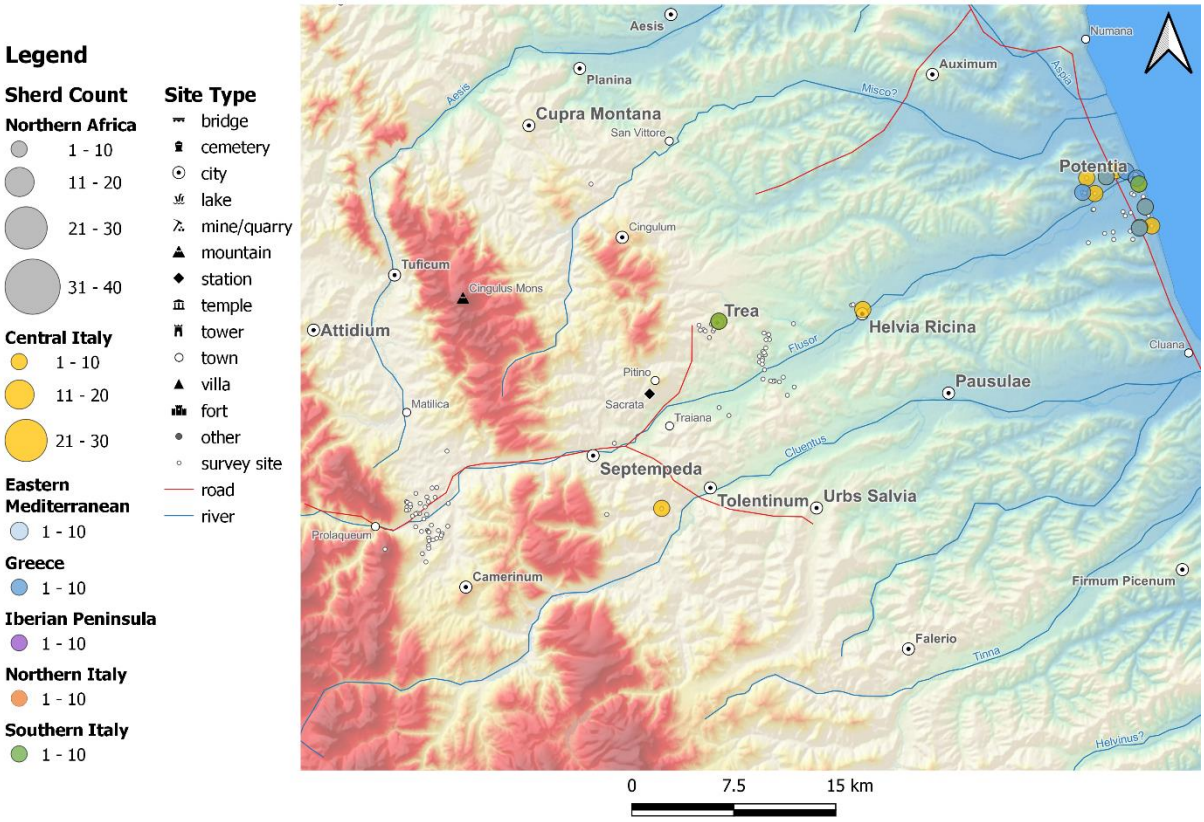


***Figure 4.13.*** *The distribution of sherds throughout the Potenza valley in the Republican period, colour-coded according to provenance. The size of the markers corresponds to the number of sherds found per site (ESRI, 2009; Talbert, 2000; Italian Ministry for the Environment and the Protection of Land and Sea, 2008; Hanson, 2016; Åhlfeldt, 2019).*

The sherds distributions for the Republican period in the Potenza valley show a very varied pattern, with relatively small amounts of sherds recovered per site (see Figure 4.13). No Republican sherds were found at sites in the upper valley, while the greatest amount of sherds was found at the large coastal site of Potentia. Both Southern and Central Italian sherds can be found at the coast as well as the middle valley, while Greek and Northern African sherds are exclusively found around Potentia.

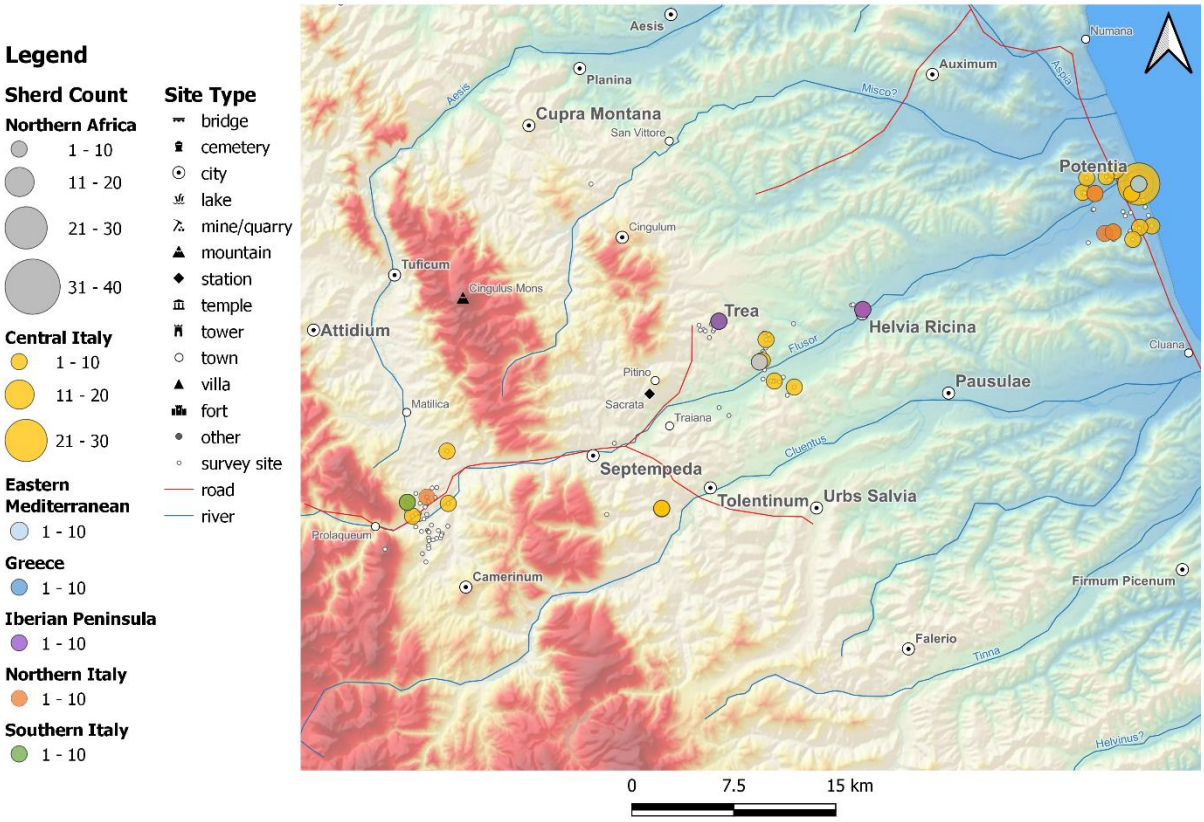


***Figure 4.14.*** *The distribution of sherds throughout the Potenza valley in the Imperial period, colour-coded according to provenance. The size of the markers corresponds to the number of sherds found per site (ESRI, 2009; Talbert, 2000; Italian Ministry for the Environment and the Protection of Land and Sea, 2008; Hanson, 2016; Åhlfeldt, 2019).*

For the Imperial period (see Figure 4.14), sherds were found in the upper valley as well. Interestingly, these sherds are all of Italian origin. Notably, Northern, Central and Southern Italian ceramics are found throughout the valley. Northern and Southern Italian ceramics were found in smaller numbers, while Central Italian ceramics are – like in the Republican period – the most numerous by quite some distance. Northern African ceramics are distinctly more numerous as compared to the Republican period, particularly around Potentia. They are no longer restricted to the coastal area of the valley, with sherds being encountered in the middle of the valley as well – although in rather small numbers. Greek Imperial ceramics maintain their presence in the valley. The absolute number of sherds remains nearly constant, although the relative portion of Greek sherds is reduced as compared to the Republican period. Furthermore, Greek Imperial sherds are found in the middle valley, and not exclusively around Potentia. The very rare Eastern Mediterranean ceramics are found at the coast as well as in the middle of the valley. The equally rare Iberian ceramics are found only in the middle of the valley.

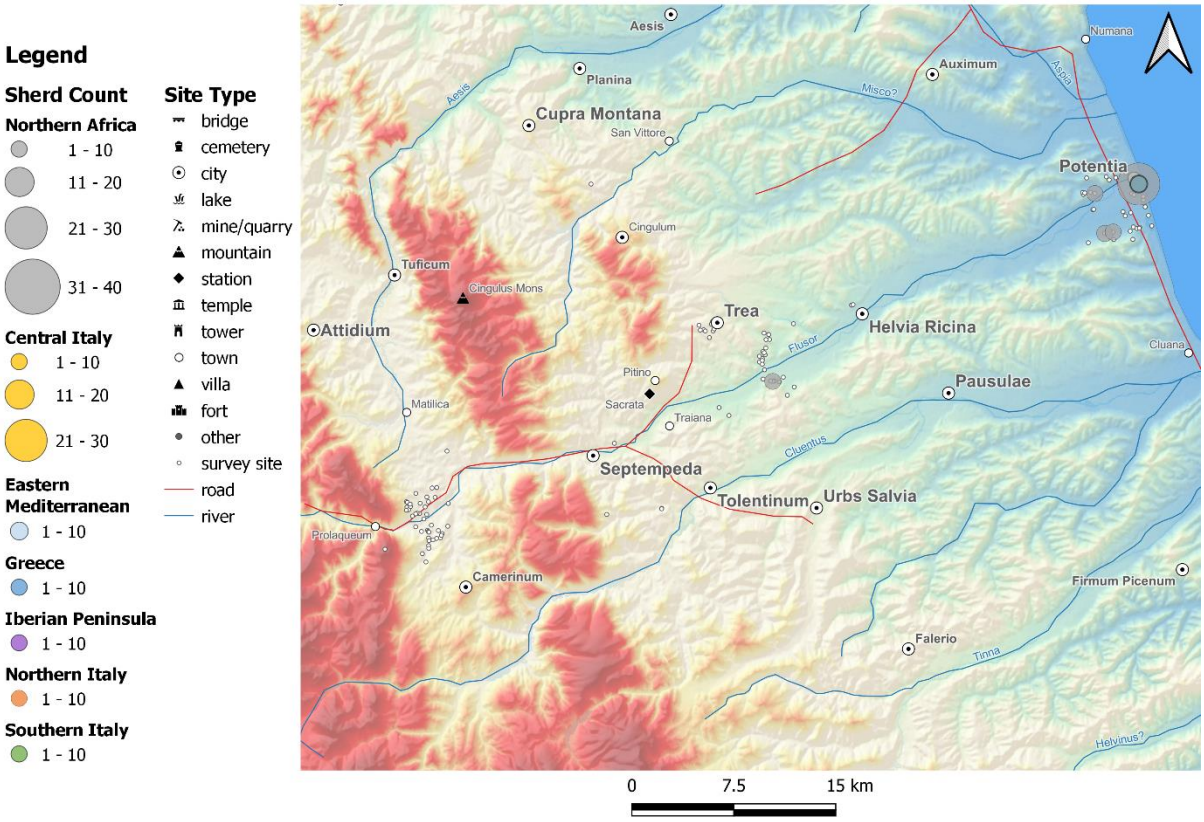


***Figure 4.15.*** *The distribution of sherds throughout the Potenza valley in the Late Antique period, colour-coded according to provenance. The size of the markers corresponds to the number of sherds found per site (ESRI, 2009; Talbert, 2000; Italian Ministry for the Environment and the Protection of Land and Sea, 2008; Hanson, 2016; Åhlfeldt, 2019).*

The provenance profile for the Late Antique period in the Potenza valley is markedly different from the preceding periods (see Figure 4.15), although it should be noted again that the amount of sherds found for this period is also significantly decreased. Sherds were found around Potentia and the middle of the valley. The vast majority of the sherds are of Northern African provenance. The smaller amount of Eastern Mediterranean and Greek sherds were found exclusively around Potentia.

## Metapontine Region

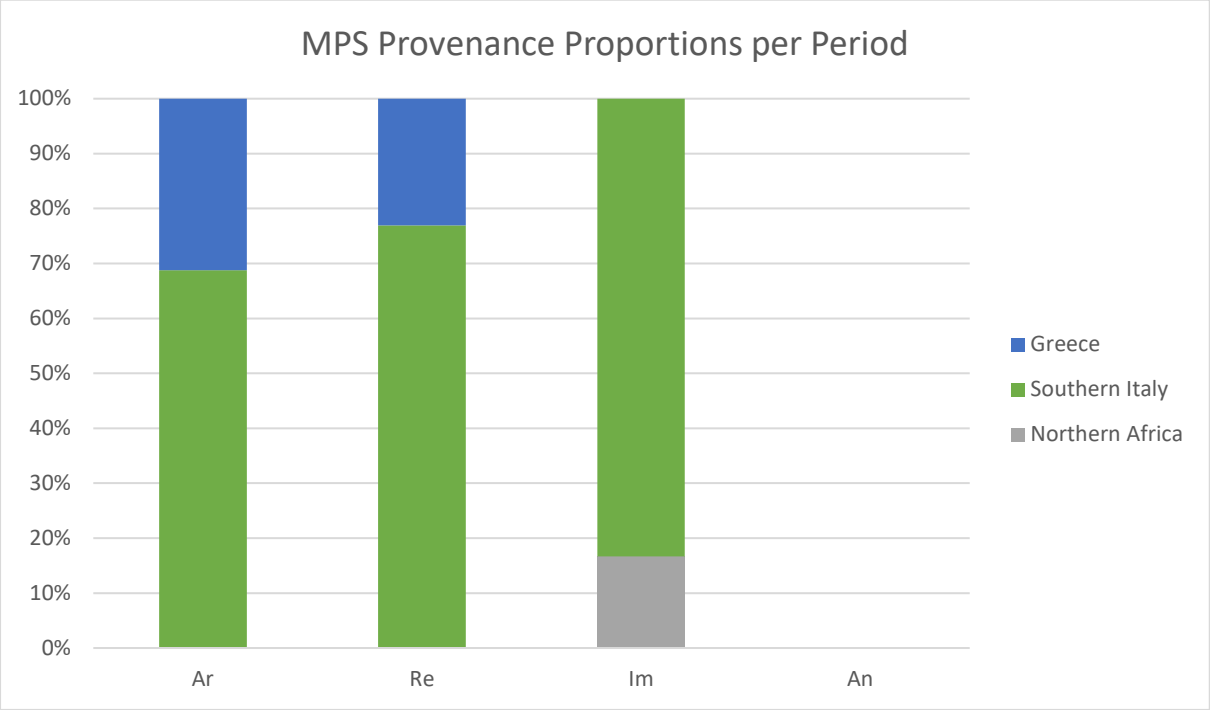


***Figure 4.16.*** *The relative proportions of ceramic provenances in the Metapontine region, sorted by period (author's work).*

The visualisation of the proportions of sherds provenances in the Metapontine region shows relatively less varied profiles as compared to the two other regions (see Figure 4.16). It is important to reiterate here that the total amount of sherds found in the survey of this region was also far less as compared to the other surveys. Only two provenances were found for the Archaic period; Southern Italian and Greek. Italian ceramics are relatively more abundant, making up 69 per cent of sherds. The picture painted here does not appear to change much for the Republican period; again, the only two provenances are Southern Italy and Greece. Southern Italian ceramics increase somewhat in abundance, now making up a total of 77 per cent. Greek ceramics disappear from the profile during the Imperial period, while Northern African sherds make their first appearance. Southern Italian ceramics maintain their dominant presence in the region, comprising 83 per cent of sherds.

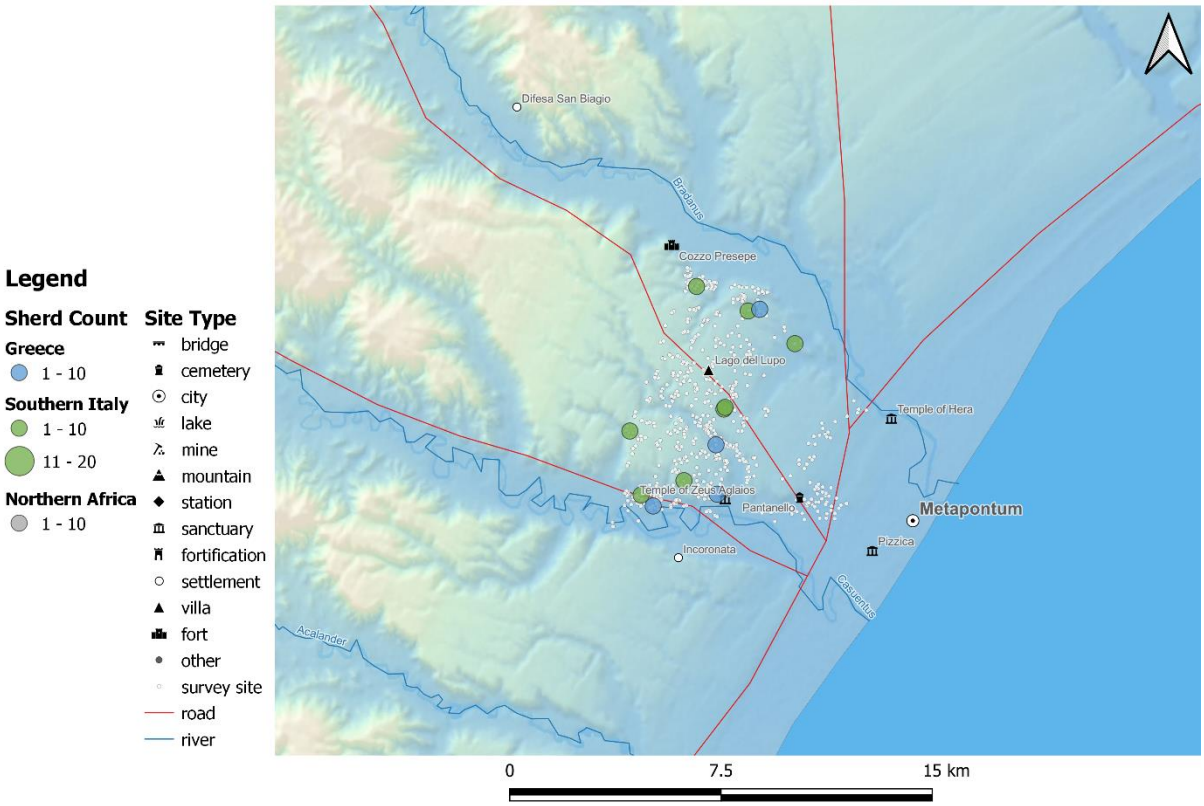


***Figure 4.17.*** *The distribution of sherds throughout the Metapontine region in the Archaic period, colour-coded according to provenance. The size of the markers corresponds to the number of sherds found per site (ESRI, 2009; Talbert, 2000; Italian Ministry for the Environment and the Protection of Land and Sea, 2008; Hanson, 2016; Åhlfeldt, 2019).*

Due to the fact that the survey area in the Metapontine region is comparatively limited, it is much harder to make any comparative observations within this region, i.e. juxtapose coastal areas to inland areas. The landscape The two provenances found for Republican ceramics are spread out throughout the region, seemingly without any obvious patterns (see Figure 4.17). Greek ceramics were found from the northern to the southern edge of the survey area, as were Southern Italian ceramics. The overall number of sherds encountered is small, as well as the number of sherds found per survey site.

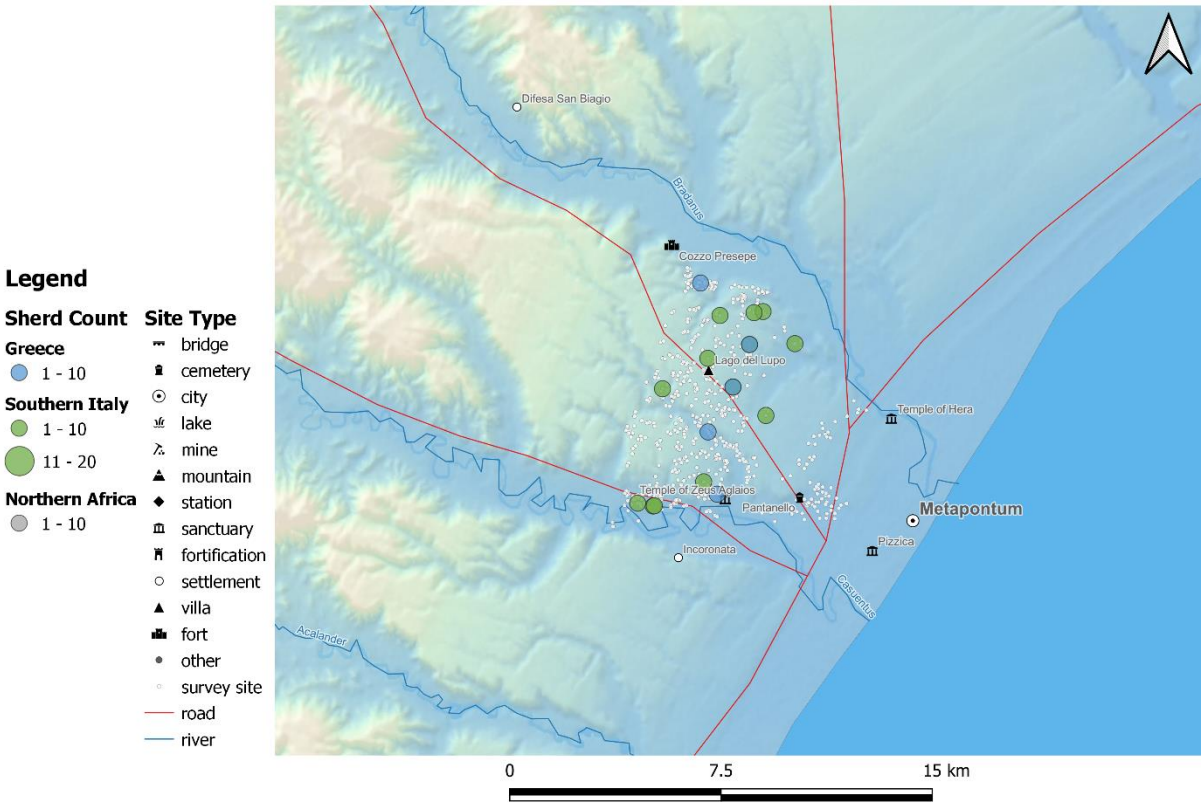


***Figure 4.18.*** *The distribution of sherds throughout the Metapontine region in the Republican period, colour-coded according to provenance. The size of the markers corresponds to the number of sherds found per site (ESRI, 2009; Talbert, 2000; Italian Ministry for the Environment and the Protection of Land and Sea, 2008; Hanson, 2016; Åhlfeldt, 2019).*

The provenance profile for the Republican period does not appear to be much different from the profile for the Archaic period (see Figure 4.18). Again, the only two ceramic provenances encountered were Greece and Southern Italy. Another aspect seemingly consistent with the Archaic profile is the consistent spread throughout the entire survey area for sherds with both provenances, and the small number of sherds found for each site.

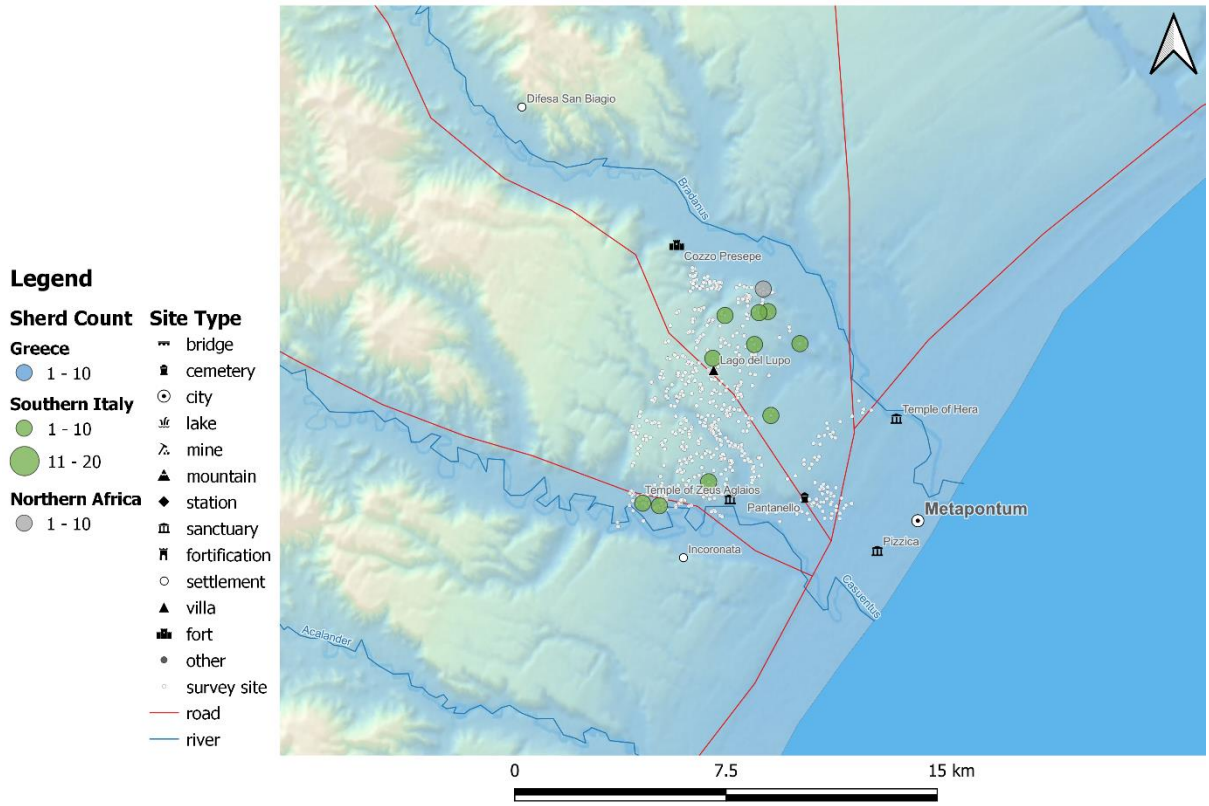


***Figure 4.19.*** *The distribution of sherds throughout the Metapontine region in the Republican period, colour-coded according to provenance. The size of the markers corresponds to the number of sherds found per site (ESRI, 2009; Talbert, 2000; Italian Ministry for the Environment and the Protection of Land and Sea, 2008; Hanson, 2016; Åhlfeldt, 2019).*

The picture finally changes for the Imperial period (see Figure 4.19); the Greek provenance disappears from the region, and Northern African sherds are now encountered as well. Southern Italian sherds are distributed throughout the landscape in a similar fashion as in the preceding periods.

# Trends

## Differences

A first observation that can be made in regard to the differences between the survey regions is the stark contrast in variation. In the Potenza valley, a total of seven different provenances were encountered, while four different provenances were encountered in the Pontine region and only three in the Metapontine region. When we take into account the fact that the sample size of the Pontine region is much larger than either the Potenza valley or Metapontine region, it is especially significant that the PVS data shows such a large variation. On the other hand, the humbler amount of sherds collected during the MS might provide an explanation for the decreased number of provenances encountered.

Keeping this in mind, the profile for the Metapontine region still appears to paint a picture very distinct from the other survey areas: Southern Italian ceramics are overrepresented, with more than three-quarters of all sherds originating here. Contrastingly, Southern Italian ceramics comprise only 2 per cent of the PVS data and are completely absent from the PRP data. Northern African ceramics are also present to some degree (5 per cent of sherds), but far from the extent to which these ceramic types are represented in the Potenza Valley and the Pontine region, where they comprise 48 per cent and 27 per cent of all sherds respectively. After Southern Italian ceramics, Greek ceramics are most common in the Metapontine region (19 per cent of all sherds). This is a far larger portion than in the Potenza valley, where Greek ceramics were also present, but comprised only 10 per cent. No Greek sherds were found in the Pontine region.

As mentioned above, there is an increased variation in sherd provenances in the Potenza valley, the only area where Iberian, Eastern Mediterranean and Northern Italian sherds were found. These provenances are furthermore less common and comprise only 2 to 6 per cent of sherds. As opposed to the Metapontine region, the most common Italian sherds in the valley are Central Italian, instead of Southern Italian: almost half of all sherds in the Potenza valley were of this provenance.

Relatively speaking, the most abundant sherds in the Pontine region are Northern African sherds (67 per cent of sherds), followed by Central Italian sherds (27 per cent of sherds). The Pontine region is also the survey area with the most Iberian sherds comparatively (5 per cent of sherds). Furthermore, it is the only region where French sherds were found, even though they were found in only very small amounts (1 per cent of sherds).

### Similarities

Generally, the profiles for each region appear to be very different. However, some general trends can be observed for multiple or all regions. The only provenance that can be found in all three regions is Northern Africa. Furthermore, for both the Pontine region and the Potenza valley, Northern African and Central Italian sherds are both the two most represented origins in the data. For both the Potenza valley and the Metapontine region, Greek sherds are significantly present. Lastly, Iberian sherds were found in small amounts in both the Pontine region and the Potenza valley.

As expected, more locally produced ceramics are found in larger numbers across all regions; Central Italian sherds in the case of the Pontine region and Potenza valley, and Southern Italian sherds in the Metapontine region.

### Similarities and Differences Over Time

When looking at how these similarities and differences change over time, further observations can be made. The transition from Republican to Imperial appears to be clearly reflected in the ceramic provenances established for the Pontine region and Potenza valley, although in differing ways. Meanwhile, the change from one period to the next seems to have had less impact in the Metapontine region. Notably, there is a distinct change in the relative amount of Northern African ceramics in the Pontine region; Central Italian ceramics are most numerous in the Republican period, while the number of sherds produced in Africa comprises only 4 per cent – a number which balloons to 70 per cent in the Imperial period, replacing Central Italian ceramics as the most common in the region. Like in the Pontine region, Central Italian ceramics are the most prevalent in the Republican period in the Potenza valley. Following the same trend, Northern African sherds increase in relative quantity in the Imperial period. However, unlike in the Pontine region, Central Italian ceramics remain the most common type in the Imperial period. Furthermore, the variety in provenance – which was already the highest of all survey areas – increases further as compared to the Republican period.

The Metapontine region appears to be the "odd one out". With its history as a Greek colony, the region has amphora and fine ware dating to the Archaic period. These ceramics are mostly of Southern Italian origin, while the rest of the sherds is of Greek origin. This trend continues into the Republican period. Thus, unlike the other regions, no Northern African ceramics dating to this period were retrieved. Only in the Imperial period are the first Northern African ceramics found. It is also in this period that the Greek provenance disappears. The Southern Italian provenance remains the most common by some distance.

The trend of an increased presence of Northern African sherds over time persists into the Late Antique period for both the Pontine region and Potenza valley; most of the sherds have this provenance in the Potenza valley and even all of the sherds in the Pontine region. Another trend that persists is the increased variation in provenance in the Potenza valley; next to the Northern African provenance, small numbers of sherds from Central Italy, Greece and the Eastern Mediterranean were found.

### Similarities and Differences in Landscape Distribution

To compare the differences and similarities in sherd distribution across the landscape, it is difficult to involve the Metapontine region, for the reason of the comparatively smaller size of the areas surveyed This does not allow for the comparison of different sections of the larger region – particularly coastal to inland. This leaves us once again to focus on the Potenza valley and Pontine region. A shared feature of both distribution patterns is the comparatively consistent spread of Italian sherds in both coastal and inland sites. Ceramics imported from more distant locations appear to be distributed more at and around coastal areas. This is certainly true for Northern African ceramics, which were found in large amounts around Astura and Nettuno, and less so around Setia and Norba in the foothills of the Monti Lepini. Similarly, the majority of the African sherds in the Potenza valley were found around Potentia, while the rest was encountered in the middle of the valley. This is also true for Iberian ceramics in the Pontine region, as well as Greek and Eastern Mediterranean ceramics in the Potenza valley.

## Conclusion

The results contained in this chapter address the first two points of the second research aim, as the visualisations and maps show how the different provenances are distributed within each region. Furthermore, by breaking down the results for each period, the changes in provenance proportions and distributions can be tracked over time.

The most important observations were the following. In the Potenza valley and Pontine region, the number of sherds increases drastically with the advent of the Imperial period. This increase is particularly distinct for the North African provenance. The Late Antique period sees a uniform decrease in sherd numbers present. The Metapontine region appears to follow a distinctly different trajectory. The great majority of the sherds are of a more local, Southern Italian provenance, while a smaller, significant portion consists of Greek sherds.

Another notable observation is the increased variance in sherds provenances in the Potenza valley as compared to the other regions. Finally, ceramics imported from outside the Italian peninsula tend to be found at or near the coast in all regions.

# Chapter 5 Discussion

## Introduction

This chapter will open with a comparison between the posed hypothesis and the obtained results. It will outline the main ways in which the hypotheses line up with the results and naturally will also discuss the most important deviations from the expectations. Following this, possible explanations will be provided for the general trends observed in the results. Finally, important weaknesses in the methodology will be highlighted, as well as the main strengths.

## Hypotheses vs Results

Several of the findings of this research line up with the previously posed hypotheses, with some notable exceptions. Based on knowledge regarding the (social) geography of all regions, the Pontine region was classified as the region with the higher connectivity, and as a more attractive destination for trade in exported goods, due to the presence of multiple ports, roads and rivers, presence of an elite and generally larger population as well as a close proximity to Rome. The expected increase in the variety of ceramic provenances was not observed, however. The Potenza valley on the other hand, qualified as a more isolated region, shows a great variety in the provenances of imported ceramics. The fact that the results are the exact opposite of the expectations appears significant, especially considering the sample size of the PVS was far smaller than that of the PRP.

The flourishing of the coastal areas in the Pontine regions during the Imperial period appears to indeed be reflected by a (small) increase in provenance variety and a definite increase in the general number of sherds. Meanwhile, the decline in settlements that are known to have occurred in the middle of the Republican period in the Metapontine region and the latter half of the Imperial period in the Potenza valley were expected to have negatively impacted the number and/or variety in these respective regions. However, this is not immediately apparent in the obtained results; rather, there is even increased variety or not much change at all. Important to note here is that the temporal resolution for this research is rather low, and does not allow for the investigation of changes in proportions in provenances at the exact points in time that the demographic changes occurred.

Another somewhat unexpected result is that the intra-regional connectivity in the Potenza valley, due to the central presence of the river Flusor, is less pronounced; the majority of the sherds, and particularly the more distantly traded ceramics, were found at the coastal site of

Potentia. These numbers decrease, as does the variety in provenance, when moving upstream to the middle of the valley. In the higher parts of the valley, exclusively sherds of Italian sherds can be found.

Lastly, the variety in ceramic provenances in the Metapontine region is far less than was hypothesised. Due to the presence of a port, as well as rivers and roads, one would expect to find a significant range in ceramic provenances. However, compared to the other regions, Metapontine ceramics show less variance.

## Explaining the Observed Trends

### Similarities

Although Northern African ceramics are not universally numerous, they are the only ceramics to be present in all regions. This is a testament to the mass production and mass distribution of these products, particularly that of African red slip ware. Both the Potenza Valley and the Pontine region share an abundance of Central Italian ceramics. This follows expectations, as importing ceramics from nearby production centres on the Italian peninsula would be an attractive option. Similarly, this makes the abundance of South Italian sherds in the Metapontine region an expected result.

### Differences

The increased variability in provenances in the Potenza valley and the decreased variability in the Pontine region could be explained through geographical context and the general positions of the regions within the Italian peninsula. The Pontine region is located not far south of Rome, the beating heart of the Roman World. Both lie on the Tyrrhenian coast, bordering the same ocean. The Pontine region has more direct connections with Rome, facilitated by multiple main arteries of Roman infrastructure. Along the coast, the Via Severiana runs north to Portus – Rome's harbour – and the Via Appia leads to Rome itself. It can thus be concluded that the position of the Pontine region and its topographical features makes it a favourable location for trade to and from Rome. It is this advantageous position in relation to the capital of the Roman world which could have granted those involved in trade the most options for transport routes and types of goods exchanged. This is even more true when comparing it to the Potenza valley, which lies on the opposite side of the peninsula. For goods to be transported by ship to this region would require sailing north from the Mediterranean Sea, into the Adriatic Sea. On the other hand, the geographical feature of the valley itself played an important role in connectivity by cutting through the Apennine mountain range, thereby providing a route for travel between

the Adriatic and Tyrrhenian half of the Italian peninsula. Furthermore, a branch of the Via Flaminia connects Septempeda, in the middle of the valley, to Rome. However, there is no such convenient route as the direct connection that the Via Appia provides in the Pontine region. This leads to the formation of a tentative theory. The more advantageous location and features of the Pontine region provided traders access to a greater amount of and range in ceramics, and more convenient routes along which they could be transported. This, likely in combination with a greater demand for imported goods due to the more numerous population, may have led these traders to focus their efforts on the most profitable ceramic types, transporting them along the roads of least resistance, and "streamlining" the process in this way. The result could have been a reduced variety in ceramic types and thus provenances. To further elaborate on this theory, a type of trading called "cabotage" might be relevant. Cabotage, also known as tramp trade, refers to a method of small-scale, "off-the-cuff" trading where maritime traders travel from coastal site to coastal site without any pre-arranged schedule. Goods are traded locally, on the spot and in response to demand (Hohlfelder & Vann, 2000). The Potenza valley, as a more decentral destination, might have been a more popular target for cabotage-type trading, as opposed to the regular routes. The result of increased reliance on this more spontaneous and unplanned trading could provide an explanation for the wider range of ceramic origins.

If this theory is accepted, however, the results from the Metapontine region would somewhat challenge it. Even though this region is located relatively decentral, the provenance variety is very low – even lower than in the Pontine region. Furthermore, the region is intersected by multiple roads, providing potential links to the trade networks of the wider Roman world. It should be noted that the Metapontine region was the location of only one major settlement, namely Metaponto, which moreover experienced a demographic decline earlier than other regions. A smaller (urban) population and dataset could explain at least part of the low variety. More surveys covering larger areas, particularly further inland could shine light on this discussion.

Looking at which provenances are found where helps us to formulate further hypotheses. Next to the simple fact that the Potenza valley is located in relative proximity to Greece, the valley has furthermore been a popular target for Greek traders and colonists, matching the significant presence of Greek ceramics in the region's dataset. Greek ceramics make up an even larger part of the sherds in the Metapontine region. Although the Potenza valley is also known to have had close ties with Greek settlers and merchants, the impact of these relations is evidently not

as great in this regard as in the Metapontine region, perhaps as a consequence of more intense colonising efforts (Di Leo et al., 2018; Vermeulen & Boullart, 2001).

Greek sherds are absent from the Pontine region. Instead, Northern African ceramics make up the majority of the sherds found. The abundance of these ceramic types fits in the frame of the aforementioned theory on trade streamlining. African ceramics mostly comprise red slip fine ware, the alternative to the terra sigillata fine ware produced in Italy. After Northern Africa was incorporated into the Roman sphere of influence, African red slip ware began to be produced in very large quantities and distributed throughout the Empire. Such a widely accessible, mass-produced product would be appealing to traders in the Pontine region looking to maximise their profits, resulting in African fine ware outcompeting the alternatives, and the central location opposite the Tunisian coast would make the import of these ceramics particularly cost-effective. This can be identified as the same reason why African red slip is rarer in the Potenza valley and the Metapontine region, as these destinations require longer, detouring shipping routes.

### Similarities and Differences Over Time

As established before, the transition from the Republican period to the Imperial period was less pronounced in the Potenza Valley and the Metapontine region as compared to the Pontine region. This is particularly regarding the great increase in Northern African sherds in the Imperial period, something absent or not observed to the same degree in the Potenza valley and Metapontine region. Northern Africa became Roman territory in 36 BC when it was conquered by Octavian at the end of the Republican period. Production centres began producing red slip ware in the first century AD, at the start of the Imperial period, after which it gained in popularity. By the third century AD, these ceramic types were distributed on an Empire-wide scale.

The distinct increase in imported African sherds, as well as an increase in the total number of deposited ceramics as compared to the preceding periods, could therefore potentially reflect the societal and political changes occurring during the Imperial period. These results could potentially add to the discussion about the nature of Roman trade as formulated by Woolf. Between these three regions, it seems that the Pontine region was more tapped into general changes within the Roman world, while the other two were less affected. Therefore, these results seem to underline that the increase in integration throughout the Empire did not universally affect the whole of the Italian peninsula, and could have been limited to certain

regions – perhaps those in a more central position and connected to the more well-travelled, "highways" of Roman trade routes.

In the Late Antique period, the amount of sherds found is low for both the Potenza Valley and the Pontine region, but both show a consistent trend of increased relative consumption of Northern African ceramics. These observations might be the result of the continuing process initiated in the preceding periods of mass industrialisation and subsequent wide distribution of African red slip ware, firmly establishing these ceramic types as the most popular and profitable choice. Notably, the Potenza valley still retains a certain degree of variety in provenance, with small numbers of ceramics from the Eastern Mediterranean, Greece and Central Italy, likely underlining the more decentralised position of this region in the trade networks of the Roman world.

### Similarities and Differences in Landscape Distribution

The sherd distributions in the Pontine region and Potenza valley suggest that ceramics imported from outside of the Italian peninsula over longer distances tended to be consumed or otherwise remain close to the port through which they were imported into the region. Thus, long-distance networks could have been connected more to coastal sites, where ports and harbours served as access points to the region. Subsequently, however, there was less exchange between these "global" trade routes across the sea and the local networks extending across the land. Settlements located at larger distances from seaside trading hubs would be serviced by networks in connection with production centres on the peninsula that produced Italian ceramics.

## Weaknesses of the Research

An important weakness in this research concerns the fact that the survey methods used will never be able to cover the full extent of each area under investigation. Although the total of specific sites investigated is indicated for each survey, caution should be taken when interpreting the pattern in provenance distribution; we cannot know how the results would change if the areas that were not surveyed were studied as well. Therefore, these patterns should certainly not be taken at face value, considering they cannot possibly convey the full picture without bias. Therefore, for the interpretation of these patterns, it was necessary to rely on intra-regional comparisons to establish some general trends, which could subsequently be compared inter-regionally. Intra-regional comparisons were done by juxtaposing coastal areas to inland areas where possible and tracking changes in sherds distribution from period to period. This

then posed an obvious problem, and highlighted a flaw in the research; the different ways the surveys were designed meant that the Metapontine region had a vastly different research area, which was focused more around a singular site – in this case, the city of Metaponto – than was the case for the other two surveys. This made it harder or impossible to assess sherds distributions and the general trends therein and left the Metapontine region outside many of the discussions around the results.

## Strengths of the Research

Part of the aim of this study was to prove that the regional survey is a valuable research method to take in archaeological research. The approach taken here has hopefully shown that, even though the methods of intensive artefact collection and documentation are comparatively time-consuming, they can be a worthwhile endeavour in the case of particular research questions. These intensive methods have been proven here to be useful tools in assessing processes on a large scale. Evidently, they can be used to assess economic processes across very large research areas. In this case, they enabled the investigation of trade networks in three different regions, from the middle to the south of Italy, and subsequently, compare and contrast them. It is the design of the three associated regional surveys, particularly the collection of a great number of ceramic sherds in combination with the detailed recording of their characteristics, which allowed for the creation of the composite database. It was this large collection of standardised data from different sources which formed the basis of this research.

## Conclusion

This chapter addresses the final two points of the second research question by comparing the obtained results to the previously formulated hypotheses. This places the results in their respective historical and geographical contexts. Based on this, several possible explanations for the observed trends are given, detailing what they can tell us about the trade routes involved.

The main conclusions drawn are the following. Firstly, the Potenza valley displayed an unexpected variety of provenance, particularly compared to the centrally located Pontine region. A potential explanation for this observation is a “streamlining” of trade in the Pontine region, possibly in combination with a greater reliance on cabotage-type trade in the Potenza valley. Secondly, there is a larger relative increase in Northern African sherds associated with the Imperial period in the Pontine region. This suggests that this region was better connected to more integrated trade networks, making it more susceptible to empire-wide changes and trends.

Finally, there are several significant weaknesses in the research that should be addressed. These weaknesses are mainly related to the fact that regional survey methods by definition create bias in the observed results. On the other hand, the design has strengths which should be similarly highlighted. The major strength of this research is the large spatial and temporal scope it has, making it possible to gain a rather detailed overview of the economic processes influencing the survey areas.

# Chapter 6 Conclusion

As part of the first research aim, this thesis sets out to explore the existing knowledge of the Roman economy. An important finding is that there is a debate to which degree the burgeoning political influence of the Imperial period worked as an integrating influence on trade networks. Continuing in the context of the first research aim, the historical and geographical characteristics of each region were used to formulate hypotheses. The Pontine region in particular, with its central location in combination with several geographical and demographic features promoting exchange within and outside the region, was expected to show a greater range in provenances as compared to the Potenza valley and the Metapontine region. Particularly the Potenza valley was expected to function as a more isolated unit, with less contact with distant trade routes.

The results obtained visualised how the different ceramic provenances were distributed within the survey regions, completing the first step of the second research aim. The Central Italian provenance was most common in the Potenza valley, while the Southern Italian sherds comprised the majority of the ceramics found in the Metapontine region. This makes the most locally produced ceramic types the most popular overall in both regions. The Pontine region forms an exception to this rule, with Northern African ceramics being the most numerous and Central Italian ceramics taking second place. Lastly, in both the Potenza valley and the Metapontine region Greek ceramics are significantly represented.

As the second step of the second research aim, the changes in provenance distributions were assessed over time. In the Pontine region, Central Italian sherds are initially the most common but are replaced by Northern African sherds during the Imperial period. Similarly, Central Italian sherds comprise the majority of ceramics in the Potenza valley, and while Northern African sherds become more numerous in the Imperial period, they do not become the most popular ceramics types until later, in the Late Antique period. Throughout all periods, the Potenza valley retains a larger variety of provenances. Unlike the other regions, sherds dating back to the Archaic period were found in the Metapontine region. In this period, most of the sherds were of Southern Italian origin, while the remainder was Greek. This does not change greatly with the advent of the Republican period. The Greek provenance disappears during the Imperial period, with a small portion now consisting of Northern African sherds.

As the last steps of the second research aim, the results were placed in their respective historical and geographical contexts, and theories were formed on the implications for the involved trade

routes. Logically, Italian sherds make up large portions of the sherds found in all three regions. In the Pontine region, however, Northern African sherds are most common overall. This could be explained by the more favourable position of this region, as well as several features promoting connectivity. This might have facilitated more intense exchange along distant trade routes. This seems to be supported by the fact that the transition from the Republican to the Imperial period brought about a radical shift from reliance on more locally produced, Italian sherds to Northern African sherds – a shift that did not occur to the same degree in the Potenza valley. This suggests that the Pontine region was more susceptible to the trends of the wider Roman world. This theory could add to the debate around the degree of integration of the Roman economy during the Imperial period, as it would suggest that the integrating influence of the contemporaneous political changes did not affect every region in a similar fashion. Finally, the significant amount of Greek sherds in both the Potenza valley and the Metapontine region seemingly reflect their shared history of Greek colonisation.

Contrary to expectations, there is decreased variance in provenance in the Pontine region as compared to the Potenza valley. This observation could be explained by the explanation that the Pontine region, as a more central location, depended more on empire-wide, integrated trade routes, while the Potenza valley depended more on more local markets and cabotage-like forms of trading.

Lastly, more distantly traded ceramics were concentrated mostly near the coast, while Central Italian sherds are spread out more consistently throughout the landscapes of both the Pontine region and Potenza valley. This suggests that long-distance networks were oriented towards coastal sites, where ports and harbours served as access points to the wider region. These more global routes would subsequently have fed less commonly into intra-regional networks distributing goods to sites removed further from coastal hubs.

## Suggestions for Future Research

Research that in the future could add further detail and better insight, is to simply cover larger sections of each region, expanding on the existing survey areas where possible. As mentioned as a weakness of this research, the patterns observed cannot give a complete representation of the true sherd distributions in each region, as they are partially shaped by the patterns formed by the survey areas themselves. Any additional part of the landscape covered in possible future campaigns would add to and further complete the picture presented in this research. Naturally,

it cannot be expected that the entirety of each region can ever be covered due to limitations posed by difficult terrain.

Another direction for future research could take, is to take a closer look at which products can be related to the distribution patterns outlined here, particularly related to amphora contents. Different amphora types can be related to different associated contents, such as wine or oil (Bonifay, 2021). Performing the same research, adding the additional aspect of the products likely traded with the use of the investigated ceramics. Due to the more limited dataset of the PVS and the MPS, this would possibly only yield significant results for the Pontine region. Nonetheless, this could provide an additional dimension to the overview of the trade networks in this region, and possibly expand on the understanding of how they practically manifested.

# References

## Websites

Åhlfeldt, J. (2019). *Digital Atlas of the Roman World (DARE)*. Centre for Digital Humanities, University of Gothenburg.
https://dh.gu.se/dare/, accessed 17 October, 2022.

British Museum. *Catalogue of the Roman Pottery in the British Museum*.
https://www.britishmuseum.org/collection/image/496909001, accessed 28 April, 2023.

Environmental Systems Research Institute (ESRI) (12 December, 2009). *World Shaded Relief.*
https://server.arcgisonline.com/ArcGIS/rest/services/World_Shaded_Relief/MapServer/tile/{z}/{y}/{x}, accessed 25 September, 2022.

Hanson, J. W. (2016). *Cities Database (OXREP databases, Version 1.0)*.
http://oxrep.classics.ox.ac.uk/databases/cities/, accessed 17 October, 2022.

Italian Ministry for the Environment and the Protection of Land and Sea (1 June, 2008). *Modello Digitale del Terreno 20 Metri*.
https://geodati.gov.it/resource/id/m_amte:299FN3:eba41113-4141-4d46-9cdf-b0848deec44d, accessed 25 October, 2022.

Gent University. *The Potenza Valley Project*.
https://potenza.ugent.be, accessed 3 October, 2022.

Leiden University. *The Pontine Region Project*.
https://www.universiteitleiden.nl/en/research/research-projects/archaeology/the-pontine-region-project, accessed 24 May, 2022.

## Bibliography

Arobba, D., Bulgarelli, F., Camin, F., Caramiello, R., Larcher, R., & Martinelli, L. (2014). Palaeobotanical, Chemical and Physical Investigation of the Content of an Ancient Wine Amphora From the Northern Tyrrhenian Sea in Italy. *Journal of Archaeological Science*, *45*, 226–233. https://doi.org/10.1016/j.jas.2014.02.024.

Attema, P.A. (1993). *An Archaeological Survey in the Pontine Region: A Contribution to the Early Settlement History of South Lazio, 900-100 BC* (Vol. 1). Archeologisch Centrum Groningen.

Attema, P.A., de Haas, T. & Tol, G. (2010). *Between Satricum and Antium: Settlement Dynamics in a Coastal Landscape in Latium Vetus* (BABESCH Annual Papers on Mediterranean Archaeology Supplement 18). Peeters.

Attema, P.A. (2017). Landscape Archaeology in Italy: Past Questions, Current State and Future Directions. In T. de Haas & G. Tol (Eds.), *The Economic Integration of Roman Italy: Rural Communities in a Globalising World* (pp. 426–435). Brill.

Attema, P.A., de Haas, T., Tol, G., & Seubers, J. (2022). Towards an Integrated Database for the Study of Long-term Settlement Dynamics, Economic Performance and Demography in the Pontine Region and the Hinterland of Rome. In P. Attema & G. Schörner (Eds.), *Proceedings of the 19th International Congress of Classical Archaeology* (Vol. 50) (pp. 35–53). Propylaeum.

Banning, E.B. (2002). *Archaeological Survey*. Springer.

Barker, D., & Majewski, T. (2006). Ceramic Studies in Historical Archaeology. In M.C. Beaudry & D. Hicks (Eds.), *The Cambridge Companion to Historical Archaeology* (pp. 205–231). Cambridge University Press. https://doi.org/10.1017/CCO9781139167321.

Blanton, R. (2001). Mediterranean Myopia. *Antiquity*, 75(289), 627–629. https://doi.org/10.1017/S0003598X00088918.

Bonifay, M. (2021). African Amphora Contents: An Update. In D. Bernal-Casasola, M. Bonifay, A. Pecci & V. Leitch (Eds.), *Roman Amphora Contents: Reflecting on the Maritime Trade of Foodstuffs in Antiquity* (pp. 281–297). Archaeopress. https://doi.org/10.2307/j.ctv22zp41p.

Cherry, J.F. (2003). Archaeology beyond the site: regional survey and its future. In J.K. Papadopoulos & R.M. Leventhal (Eds.), *Theory and Practice in Mediterranean Archaeology: Old World and New World Perspectives*, (pp. 137–159). The Cotsen Institute of Archaeology Press.

Coleman, J.C., & Prieto, A. (2011). *The Chora of Metaponto 3 – Archaeological Field Survey Bradano to Basento*. University of Texas Press.

Corsi, C., De Dapper, M., & Vermeulen, F. (2009). River Bed Changing in the Lower Potenza Valley (Mid-Adriatic Italy): A Geo-archaeological Approach to Historical Documents. *Zeitschrift für Geomorphologie. Supplementband*, *53*(1), 83–98.

de Haas, T. (2017). Managing the Marshes: an Integrated Study of the Centuriated Landscape of the Pontine Plain. *Journal of Archaeological Science: Reports*, *15*, 470–481.

de Haas, T. (2017). The Economic Geography of Roman Italy and Its Implications for the Development and Integration of Rural Economies. In T. de Haas & G. Tol (Eds.), *The Economic Integration of Roman Italy: Rural Communities in a Globalizing World* (Mnemosyne, Supplements, History and Archaeology of Classical Antiquity 404) (pp. 51–82). Brill.

de Haas, T., & Tol, G. (2017). The Analytical Potential of Intensive Field Survey Data: Developments in the Collection, Analysis and Interpretation of Surface Ceramics Within the Pontine Region Project. In A. Meens, M. Nazou, & W. van de Put (Eds.), *Proceedings of a Conference Held at the Danish Institute at Athens*. Sidestone Press.

Hanson, J. W. (2016b). *An Urban Geography of the Roman World*. Oxford: Archaeopress.

Hohlfelder, R.L. & Vann, R. L. (2000). Cabotage at Perlae in Ancient Lycia. *The International Journal of Nautical Archaeology*, *29*(1), 126–135. https://doi.org/10.1006/ijna.2000.0281.

Di Leo, P., Bavusi, M., Corrado, G., Danese, M., Giammatteo, T., Gioia, D., & Schiattarella, M. (2018). Ancient settlement dynamics and predictive archaeological models for the Metapontum coastal area in Basilicata, southern Italy: From geomorphological survey to spatial analysis. *Journal of Coastal Conservation*, *22*(5), 865–877. https://doi.org/10.1007/s11852-017-0548-y.

Dunnell, R.C. & Dancey, W.S. (1983). The Siteless Survey: A Regional Scale Data Collection Strategy. In M.B. Schiffer (Eds.), *Advances in Archaeological Method and Theory* (pp. 267–287). Academic Press. https://doi.org/10.1016/B978-0-12-003106-1.50012-2.

Fentress, E. (2000). What Are We Counting For? In R. Francovich, H. Patterson, & G. Barker (Eds.), *Extracting Meaning From Ploughsoil Assemblages* (pp. 44–52). Oxbow.

García Vargas, E. & Vázquez Paz, J. (2013). Rural Population of Farmlands South of the Guadalquivir Valley in Late Antiquity (Fourth-Sixth Century AD). In R. Garciá-Gasco, S. González Sánchez, D. Hernández de la Fuente (Eds.), *The Theodosian Age (A.D. 379-455): Power, Place, Belief and Learning at the End of the Western Empire* (99–122). Archaeopress.

Maritan, L., Mazzoli, C., & Mazzocchin, S. (2019). Provenance of Wine and Oil Amphorae in Northern Adriatic: Archaeometric and Epigraphic Approaches. *Archéosciences*, *43*(2), 203–210. https://doi.org/10.4000/archeosciences.6732.

Moore, R.S. (2014). Roman Empire. In C. Clark Northrup, J.H. Bentley, A.E. Eckes, P. Manning, K. Pomeranz, & S. Topik (Eds.), *Encyclopedia of World Trade: From Ancient Times to the Present* (Vol. 4) (pp. 794–799). Routledge.

Sciau, P., Sanchez, C., & Gliozzo, E. (2020). Ceramic Technology: How to Characterize Terra Sigillata Ware. *Archaeological and Anthropological Sciences*, *12*(9). https://doi.org/10.1007/s12520-020-01137-8.

Schwartzwald, J.L. (2014). *Ancient Near East, Greece and Rome: A Brief History*. McFarland & Company.

Snodgrass, A. & Millett, M. (2012). What is Classical Archaeology? In S.E. Alcock and R. Osborne (Eds), *Classical Archaeology* (pp. 11–50). Wiley-Blackwell.

Talbert, R.J.A. (2000). *Barrington Atlas of the Greek and Roman World*. Princeton University Press.

Vermeulen, F., Dapper, M., Crombé, P., De Vliegher, B., Monsieur, P., Boullart, C., Goethals, T., Verreyke, H., Verhoeven, G., Devriendt, I., Vanheddeghem, G., & Semey, J. (2003). The Potenza Valley Survey: Preliminary Report on Field Campaign 2002. *BABesch - Bulletin Antieke Beschaving*, *78*, 71–106. http://doi.org/10.2143/BAB.78.0.503922.

Vermeulen, F. (2012). Integration of survey, excavation and historical data in Northern Picenum. In P.A. Attema & Günther Schörner (Eds.), *Comparative issues in the*

*archaeology of the Roman rural landscape: site classification between survey, excavation and historical categories* (Journal of Roman Archaeology Supplementary Series 88) (pp. 43–54). J. H. Humphrey.

Vermeulen, F., & Boullart, C. (2001). The Potenza Valley Survey: Preliminary Report of Field Campaign 2000. *BABESCH - Bulletin Antieke Beschaving*, *76*(0), 1–18. http://doi:10.2143/BAB.76.0.71.

Vermeulen, F., Hay, S., & Verhoeven, G. (2006). Potentia: An Integrated Survey of a Roman Colony on the Adriatic Coast. *Papers of the British School at Rome*, *74*, 203–236.

Vermeulen, F., Van Limbergen, D., Monsieur, P., & Taelman, D. (2017). *The Potenza Valley Survey: Settlement Dynamics and Changing Material Culture in an Adriatic Valley between Iron Age and Late Antiquity* (Studia Archaeologica 1). Academica Belgica.

Vermeulen, F., De Dapper, M., Music, B., Monsieur, P., Verreyke, H., Carboni, F., Dralans, S., Verhoeven, G., Verdonck, L., Hay, S., Sterry, M., De Paepe, P., & De Seranno, S. (2009). Investigating the impact of Roman urbanisation on the landscape of the Potenza Valley. A Report on Fieldwork in 2007. *Bulletin Antieke Beschaving*, *84*, 85–110. http://doi: 10.2143/BAB.84.0.2041638.

Will, E.L. (1977). The Ancient Commercial Amphora. *Archaeology*, *30*, 264–278.

Wilson, A.I., & Bowman, A.K. (2009). Approaches to Quantifying Roman Trade. In A.I. Wilson & A.K. Bowman (Eds.), *Quantifying the Roman Economy: Methods and Problems* (pp. 213–249). Oxford University Press.

Wilson, A.I., & Bowman, A.K. (2017). Introduction: Trade, Commerce, and the State. In A.I. Wilson & A.K. Bowman (Eds.), *Trade, Commerce, and the State in the Roman World* (pp. 11–50). Oxford University Press.

Woolf, G. (1992). Imperialism, Empire and the Integration of the Roman Economy. *World Archaeology*, *23*, 283–293. https://doi.org/10.1080/00438243.1992.9980180.