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Navigating the past of the Pontine plain, human and wetland interaction from protohistory to the Early Modern period

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ABSTRACT

Throughout history, the Pontine Plain was characterised by the presence of numerous and extensive water bodies. Lagoons lined the coast while rivers, lakes and marshes characterised the vast inland plain up till the Lepine and Ausoni mountains. Essentially this situation lasted up to the fascist land reclamations of the 1930s when drainage of superfluous water became controlled and malaria was eradicated. Before this transformation, the populations inhabiting the Pontine Plain interacted closely with this wetland ecosystem, using its rich natural resources and profiting from access to the sea. The coastal lagoons could be used as natural ports when trading became increasingly important within a context of growing social complexity. The dynamic nature of the wetlands, however, posed challenges to its exploitation in terms of permanent settlement and agricultural exploitation and we know of several historical attempts to improve drainage conditions dating as far back in time as the Roman Republican period. This contribution aims to delineate the nature of human and landscape interactions in the Pontine wetland environment over time and the scale and scope of human interventions in the natural landscape. It discusses changes in settlement organisation, in the wetland and in its periphery, over a period spanning the ancient Bronze Age to the Early Modern period. The authors draw upon data from various research projects coordinated by the Universities of Groningen and Amsterdam, which have focused on this area, and add new data provided by their current work. The mapping of anthropic dynamics is complemented, in a dialectical relationship, with that of the environment and physical landscape. Together, geology and archaeology reveal the dynamic nature of human interactions with this wetland through time.

Keywords: Wetland exploitation in antiquity, Pontine marshes, Latium vetus, Pontine Region Project, *longue durée* landscape studies.

Introduction

Spurred by landscape archaeology, mediterranean archaeologists and ancient historians have over the last decades become increasingly aware of the fact that in the preindustrial period coastal flats and river deltas in many parts of the world had inland lakes, lagoons and at times extensive marshy areas. In addition, the awareness grows that these wetlands were not marginal, but had an economic value for contemporary societies, as shown by ethnographic, anthropological and historical studies. To put this statement in perspective we may turn to the ethno-archeological and historical study of the rapidly disappearing wetlands of the Valley of Mexico by anthropologist and ethno-archaeologist Jeffrey R. Parsons. This scholar documented and contextualised in an exemplary way the ways in which the *Pescadores* exploited the Chimalhuacán wetland and processed its

wide variety of aquatic resources, ranging from aquatic insect eggs as staple food to reed mats to be sold on the market¹. In the same vein as his study on traditional salt makers in the Valley of Mexico, he compared the results of his archaeological and ethnographic fieldwork with the exploitation of aquatic resources in other wetland regions, among which the Tigris-Euphrates Delta, home to the Marsh-Arabs². Parsons collected such information to study the organisation, control, distribution, and exchange of these valuable wetland resources within broader political, social and economic frameworks to finally evaluate the archaeological implications³. The work of this remarkable scholar prompts archaeologists to evaluate past importance and integration of wetland resources within long term demographic,

¹ Parsons 2006, 127-167.

² Parsons 2006, 248-261; cfr. Parsons 2001 for salt.

³ Parsons 2006, 277-334; Parsons 2001, 195-239.

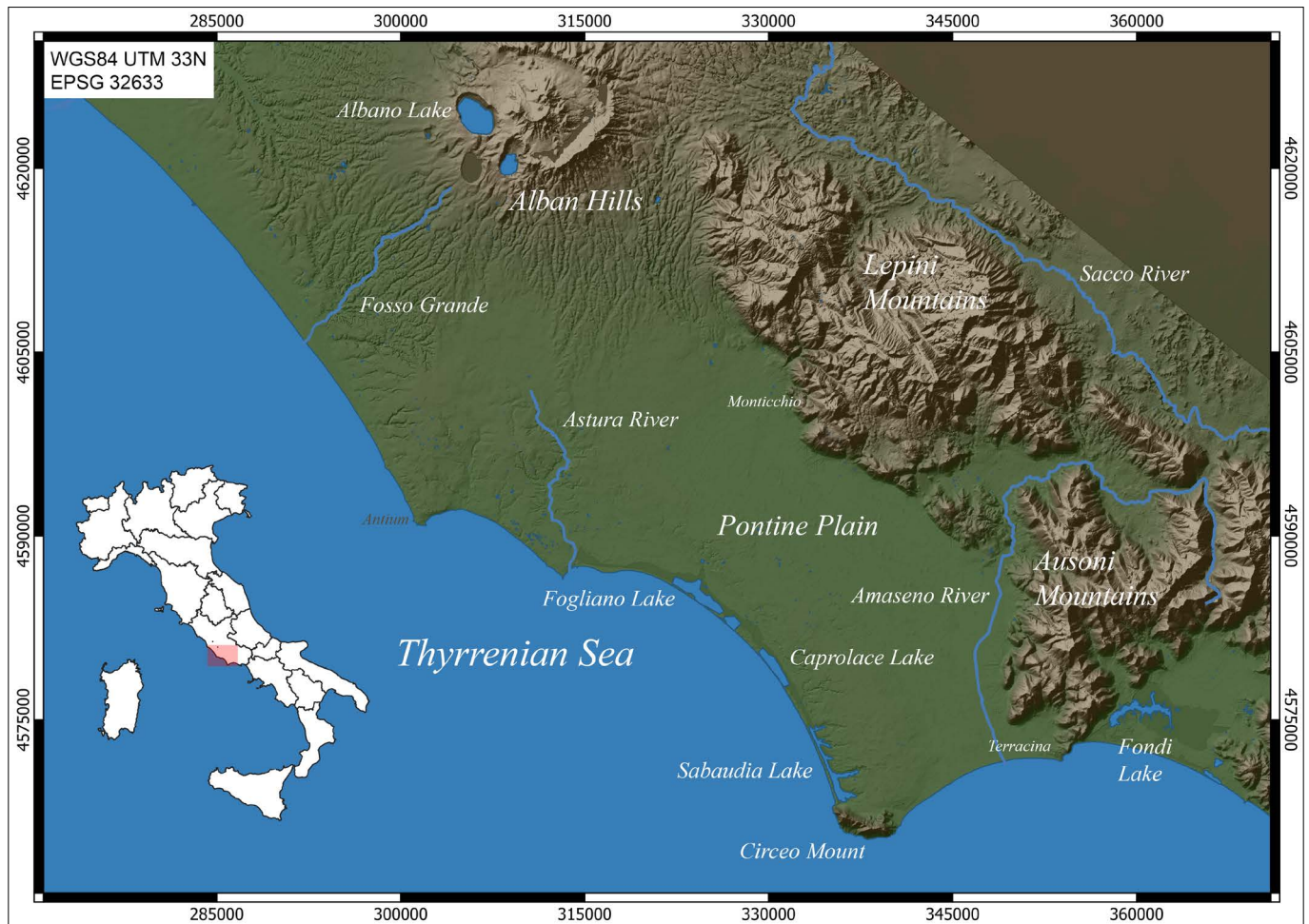


Fig. 1 - Location of the Pontine plain in Central Italy and places mentioned in the text (map by L. Alessandri).

economic and political scenarios of regional landscapes. In addition, his methodological approach stimulates archaeologists to try and identify potential signatures of aquatic resource use in the archaeological record based on historical and ethnographic data. By asking us to do so, he raises our awareness of the poor archaeological visibility of historically and ethnographically known uses of wetlands in our own time in which wetlands are either eliminated or highly controlled⁴. Finally his adoption of a cross-cultural perspective allows archaeologists to be more confident in connecting settlement patterns, including off-site archaeological remains, to landscape exploitation beyond agriculture and pastoralism⁵. Parsons in fact concluded in his study of the Mexican Pescadores that «historical and ethnographic sources indicate that in the Valley of Mexico, aquatic resources were formerly regarded in much the same way as was agricultural land»⁶. These and comparable global ethnographic insights in the functioning of wetlands in the past are valuable for our understanding of the role

of the Pontine wetlands and the way this landscape was settled and exploited from prehistory onwards. As in the case of the Valley of Mexico, also in the case of the Pontine wetlands we can glean from historical cartography and documentary sources its economic value through time and learn how local economic perceptions did not necessarily match that of “outside” rational agricultural perceptions⁷. Despite this economic importance of wetlands, external political and economic forces already from Roman Republican times onwards promoted major attempts at (partial) reclamation of the Pontine wetlands to transform part of it into cropland and pasture⁸. Such attempts continued all through the imperial, medieval, and early modern period up to the comprehensive reclamation scheme of the 1930s in the modern era under the fascist regime⁹. The “*bonifica integrale*” of the fascist period eventually turned the sparsely settled Pontine wetlands into the now densely urbanised Agro Pontino

⁴ Parsons 2006, 331-333.

⁵ Parsons 2006, 277-328.

⁶ Parsons 2006, 331.

⁷ See Cambi 2021, 31-33 on «Agrarian Tyranny» in ancient historical and archaeological approaches to the landscape; Traina 1988 on ancient literary perceptions of marshlands; for recent case studies on the Pontine plain, see Tol, de Haas 2022; de Haas, Schepers 2022.

⁸ de Haas 2011; Haas 2017.

⁹ Attema 1993.

regulating its drainage and eliminating malaria. The archaeological evidence for permanent settlement and exploitation of the wetlands however goes back much further, to the Early Bronze Age¹⁰. This time-depth allows us to evaluate the *longue durée* of human-environment relationships in the Pontine plain within the context of the changing landscape.

Our contribution starts with a brief overview of the geology and changing geomorphology of the Pontine plain with reference to landscape taphonomy affecting settlement and land use conditions through time. It will then move on to a discussion of settlement and wetland exploitation during the Middle to Final Bronze Age and the Early Iron Age to Archaic period. In the latter period the impact of early complex society on wetland exploitation increased, a development that is archaeologically most visible along the coast. By the Roman period the perception of what could be done with wetlands in terms of agricultural production changed and we have evidence of the first attempt of large-scale land reclamations. We will then summarise settlement and land use during Late Antiquity and the Early Medieval period, as recently discussed by Satijn¹¹ who has brought to light complex exploitation patterns and starkly contrasting economic perceptions of the wetlands. Finally we will bridge the gap to the Modern Period for which a rich body of historical cartography is available and to a much lesser extent archaeological evidence. Our 'deep time' perspective reveals the versatility of wetlands environments requiring a high degree of adaptation of local inhabitants and users to adjust to changes, both environmental, economic, political and social¹². Below we will first introduce the geology and the changing geomorphology of the Pontine plain (fig. 1) through time, influencing the way this landscape could be settled and exploited.

Geology and geomorphology of the Pontine plain

Recently, a synthesis of the geology of the Pontine Marshes was published by Sevink *et alii*¹³ in which results from past studies by Dutch earth scientists are summarised. The description below is based on this synthesis and gives insight into the genesis of the Pontine wetlands (fig. 2). In the Pontine plain, during the Late Eemian a large marine complex formed, composed of a beach ridge and a large lagoonal plain that extended far to the NW. This complex was described by Sevink *et al.*¹⁴ as the Late Eemian Borgo Ermada marine complex, dated

to the MIS 5.3 stage by Hearthy and Dai Pra¹⁵ and recently by Marra *et al.*¹⁶. During the subsequent Würmian glacial period, a system of fluvial incisions originated by backward incision of a branched river system (see T1, fig. 2). Its main branch - the palaeo-Amaseno, descending from the mountains to enter the plain near Fossanova - ran through a deep incision towards the sea, southeast of Terracina. A tributary river drained the central and northern parts of the plain and the adjacent mountains to join the paleo-Amaseno near Monticchio. Large karstic sources at the foot of the Monti Lepini fed this tributary that also had cut a deep valley, but apart from these incisions the Borgo Ermada lagoonal plain remained rather untouched¹⁷. The Würmian sea level stood considerably lower than today (T1 in fig. 2), but this changed during the Early Holocene when the climate became warmer and more humid¹⁸. In this period, the Pre-Holocene landscape started to drown by the ascending sea and river incisions were gradually filled in. In the coastal area near Terracina, sea level rise ultimately led to the build-up of beach barriers and coastal lagoons, with a barrier system that closed around 2000 BC when sea level was at c. -1 m asl and its rise slowed down¹⁹. This stage is depicted in fig. 2 as T2. In the west, in between Sabaudia and the Astura valley, a similar system formed but its closure dates later²⁰. Because of its rising base level, the Amaseno river upon entering the plain built up a large deltaic system, which at some stage started to block the tributary river draining the interior plain, causing the gradual development of a large inland wetland with associated marshes and inland river deltas (T3 in fig. 2). The overall history of this wetland, which forms the core of the infamous Pontine Marshes, has been described by Van Gorp and Sevink²¹. Characteristic for both the coastal areas and the inland wetland was the predominance of organogenic sediments (peats and calcareous gyttjas) over clastic sediments (clays), due to the low influx of clastic material from the hinterland. This changed during the Late Bronze Age, when a massive influx of eroded soil material started covering the plain²². In the northwest, these fluvio-colluvial sediments ultimately largely covered the sediments belonging to the Holocene 'natural' sediments (mostly peats and described as the Terracina complex²³) and to the Borgo Ermada marine complex (mostly heavy clays). Further SE they formed

¹⁵ Hearthy, Dai Pra 1986.

¹⁶ Marra *et al.* 2020; 2023.

¹⁷ Sevink *et al.* 2018.

¹⁸ Lambeck *et al.* 2004; 2011; Vacchi *et al.* 2016.

¹⁹ Van Gorp *et al.* 2020.

²⁰ Alessandri *et al.* 2019.

²¹ Van Gorp, Sevink 2019; Van Gorp, Sevink 2020; Van Gorp *et al.* 2022.

²² See e.g. Feiken *et al.* 2012; Feiken 2014; Bakels *et al.* 2015.

²³ Cfr. Sevink *et al.* 1984.

¹⁰ Alessandri 2007; Alessandri *et al.* 2019; Sevink *et al.* 2023.

¹¹ Satijn 2020.

¹² Walsh *et al.* 2014.

¹³ Sevink *et al.* 2023.

¹⁴ Sevink *et al.* 1982; Sevink *et al.* 1984; Sevink *et al.* 2018.

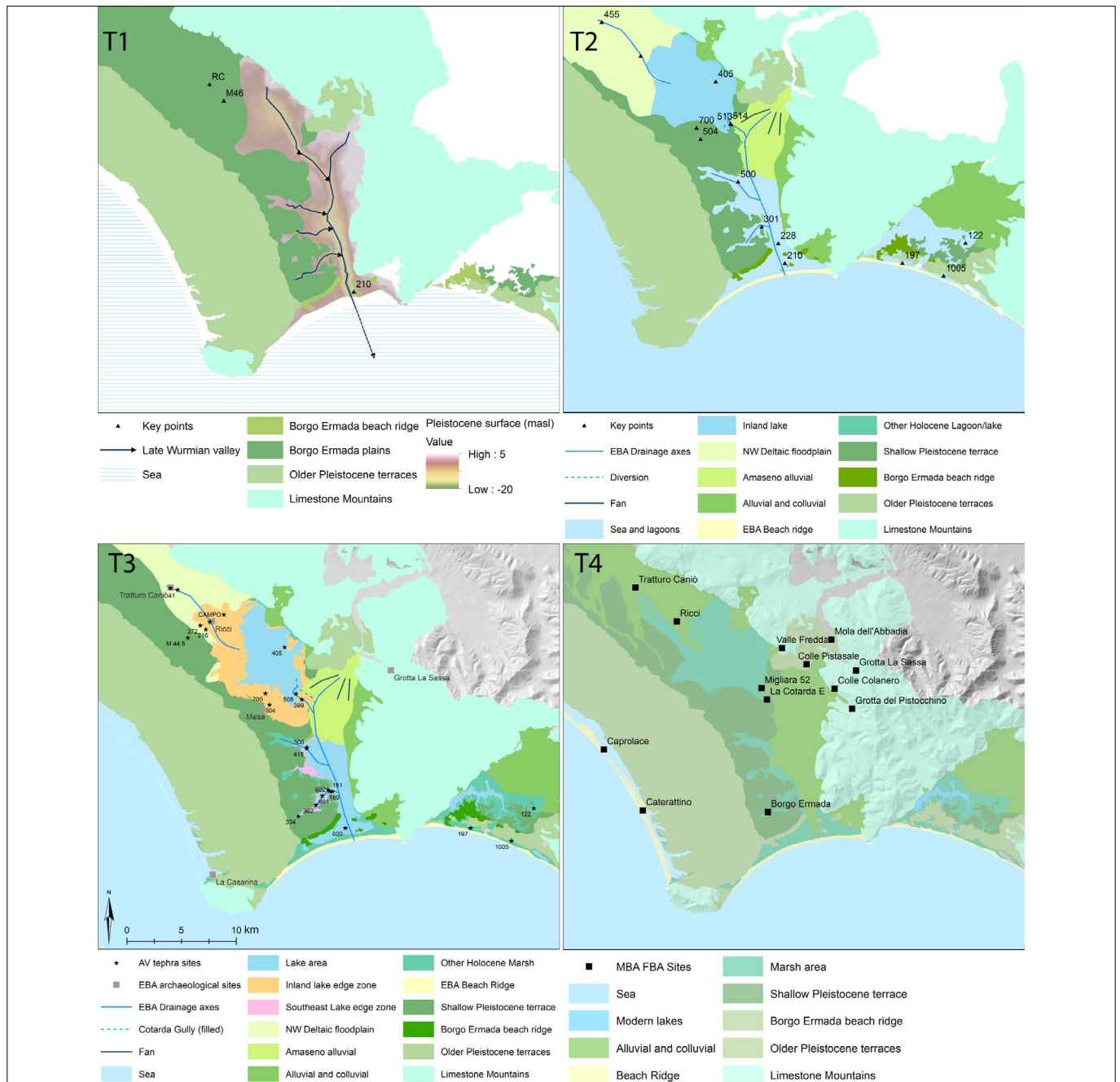


Fig. 2 - Palaeogeography of the Pontine plain. T1=Early Holocene/Late-Pleistocene (10–12 ka BP); T2=Mid-Holocene until AV event; T3=During and directly after AV event; T4=After AV event (c. 0 BCE). Sea level curve for Tiber delta (Vacchi et al., 2016) with *indicating age of phase concerned. All maps have identical orientation and scale (after Van Gorp and Sevink, 2023 to which reference is made for explanation of names and numbers of the sites indicated, map by W. van Gorp).

low elongated levees that extended as ‘fingers’ far into the central wetland, where peat growth continued (T4 in fig. 2). In Roman republican times, the massive influx of eroded soil material ended, and the levees were settled, although locally sedimentation continued along still active canals and canalised rivers²⁴. In the paleo-Amaseno valley the influx of eroded soil material led to a continued aggradation of the deltaic fan and its further extension towards Terracina, which is depicted in fig.

2 as T4²⁵. The geological history of the higher marine terrace complex that forms the Southwestern part of the Pontine plain is far less complex. In geological terms, this higher complex was a very stable system, with only some local aeolian activity, leading to the development of dunes and sand sheets, particularly in the South and in the North-West, near Borgo Sabotino. Beach ridges developed by long-shore transport of sand from the North-West to the Sud-East. Because of the very low input

²⁴ Feiken 2014; de Haas 2011; Tol et al. 2021.

²⁵ After Van Joolen 2003.

of fine clastic material, the lagoons remained open, and only in the North-West where the Astura river brought sediment into this lagoon, a gradual infill over the river valley and associated lagoon took place, similar to the developments in the Pontine marshes.

The Pontine plain in the Bronze and Early Iron Age; new insights in wetland, settlement and subsistence

In 1986, Italian protohistorian Alessandro Guidi highlighted the role and importance of water bodies in the settlement dynamics of central-southern Lazio during the Bronze Age and the early Iron Age in the context of what at that time was known in terms of palaeogeography and climate²⁶ (fig. 3). The paper dates to a period in which important discoveries were made regarding the relationship between water bodies and protohistoric settlement in all of Latium. Just one year earlier, the Early and Middle Bronze Age pile-dwelling site of Villaggio delle Macine had been discovered on the shores of Lake Albano, situated in the midst of the Alban Hills that mark the nor-

thwestern boundary of the Pontine plain. The site revealed a rich material culture, including numerous basalt mill stones²⁷. The lake sediments had preserved much organic remains giving insight in the varied diet of the community²⁸. Evidence for the Early Bronze Age in the Pontine plain is however scarce although we do have some evidence for draining activities²⁹. This early phase of land use may eventually be linked to a somewhat drier climatic phase rendering the dominantly clayey soils of the Borgo Ermada complex more suited for agriculture, while the wetter climatic phase that started around 2150 calBC and lasted till c. 950 calBC will have contributed to the deteriorating drainage status of these soils. The dynamic nature of the interior Pontine plain also explains the low density of archaeological finds from this period in the Pontine Plain with later sedimentation turning it into a truly archaeologically “hidden landscape”³⁰. In the next phase, the Middle Bronze Age, settlements within the plain become more abundant, with many of them situated in the lake

²⁶ Guidi 1986.

²⁷ Angle *et al.* 2007; 2014; Chiarucci 1988.

²⁸ Carra *et al.* 2007.

²⁹ Tol *et al.* 2021.

³⁰ Feiken 2014; van Leusen 2010.

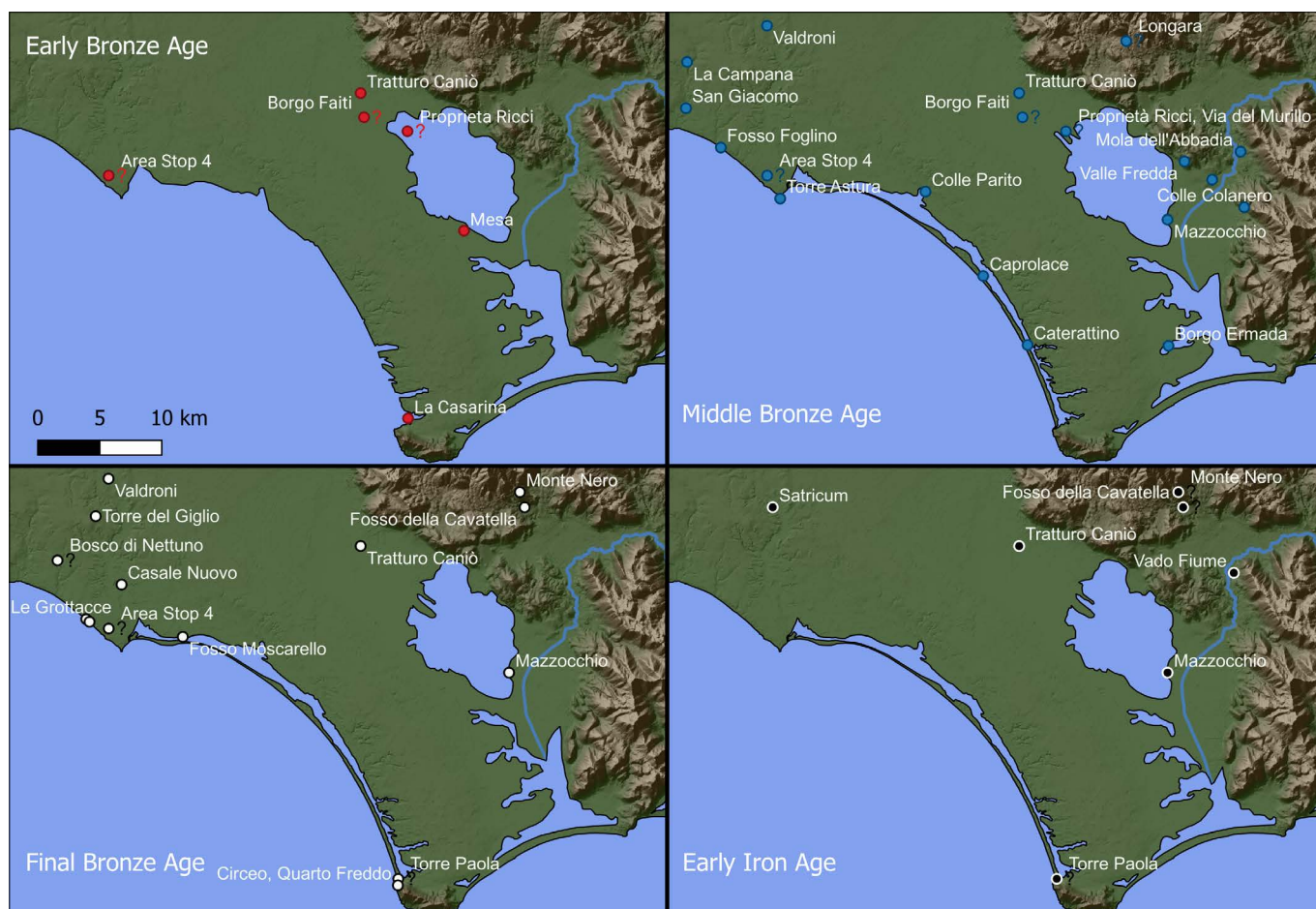


Fig. 3 - Phase maps showing landscape and archaeological sites dating to the period between the Early Bronze and the Early Iron Age.

environment at the base of the Volsci mountain range³¹. Other settlements were dispersed along the coast, which, at that time, lacked the sand dunes that caused the development of a lagoon system into a lagoon system that is partially visible even today, although modified by land reclamation efforts in the 1930s. One of them, Caprolace, has revealed possible traces of the salt production process known as *briquetage*, in a domestic context³². Some ceramic supports found at the site ('pedestals') are in fact comparable to those found in the context of the so-called French and British "*Ateliers de Briquetage*" on the Atlantic coast. Here, they have been identified as supports for the vessels in which brine was boiled till salt crystals would form to produce a portable salt cake³³. With only a few exceptions, salt production in Italy primarily occurs along the coast using seawater. Since salt must have been fundamental for the population of inland settlements, animal husbandry (possibly already of a mobile nature), and other activities like fish salting, preservation of meat and cheese making, the production of salt cakes at Caprolace is a good indication of the development of trade and exchange³⁴. In this regard, the recently discovered and excavated site of Mazzocchio in the interior plain is a case in point³⁵. Strategically positioned on the shores of the northern lake, this Middle and Final Bronze Age site is located along the route leading to the entrance of the Amaseno valley. The latter is the natural corridor to access the Sacco and Liri valley, a crucial passage way through the Apennines linking the central regions of the peninsula with Southern Italy. Over time, geomorphological change influenced the conditions for settlement and mobility in the Pontine plain. Natural processes linked to sea level rise and climate governed the early drainage history of the Pontine Plain till the onset of the Iron Age (around 950 BC). Particularly important were the built-up of the Amaseno deltaic fan due to the rising base level of this river. The fan obstructed the draining system of the northern lake towards the more southern one and led to the creation of an extensive wetland and marshy areas³⁶. This is the period in which the above-mentioned settlement at Mazzocchio was abandoned. Its inhabitants gave up this location around the turn of the first millennium BC, likely on account of the increasingly marshy conditions. Inland in the Pontine plain, the conditions for settling must have become even more difficult, as by the end of the Bronze Age a fundamental change occurred: the start of a significant influx of eroded soil material that can be linked to a major expansion of agriculture in the adjacent

uplands and mountains. This may have been enhanced by the more xeric, open vegetation that existed till c. 350 BC. This massive influx of eroded sediment enhanced the development of the Amaseno fan and further hampered the drainage of the interior wetland. Under such critical conditions, we have evidence of archeological sites only in the relatively higher parts of the Pontine plain, along the Lepine foothills and along the coast. Here, many sites with evidence for *briquetage* and related activities are recorded, now dating to the Late Bronze Age, showing exploitation of marine and lagoonal resources. In this period lagoons may have become used more intensively as natural harbours³⁷. In the Iron Age, sites dedicated to salt production, and related products, can be found all along the Tyrrhenian coast, like Saline di Tarquinia³⁸, Piscina Torta³⁹ and La Fibbia⁴⁰, the latter in the Pontine plain. The Iron Age sites are much larger than those from the Bronze Age. The vast amount of discarded pottery, along with the absence of settlement evidence and the standardisation of vessel shapes, suggests that we deal with a form of proto-industrial production⁴¹. Such sites will have produced for the emerging city-states of Tarquinia, Rome, and in the case of La Fibbia in the Pontine plain for Satricum. As in Etruria, also in Latium vetus settlement became nucleated in the course of the Iron age and located on higher grounds, as at Caracupa Valvisciolo⁴² located on the footslopes of the Lepini mountains or Pometia⁴³ and Satricum⁴⁴ located on hilltops of volcanic origin. Such Iron Age sites would in the Archaic period grow into substantial early urban settlements. At current knowledge, archaeological evidence for human interaction with the wetland environment during the Archaic period by the communities living in these early urban settlements is scarce and mainly limited to the edges of the wetland. Although this dearth of evidence might partly be due to relevant layers being buried at considerable depth, beyond the reach of the plough, it does reflect a decrease in the direct engagement with the wetland environment by Archaic communities. One site where Archaic activity has been attested is Tratturo Caniò, a cultic site located on the edge of the wetland⁴⁵. This site was presumably linked to the long-standing practice of mobile pastoralism between the Monti Lepini and the Pontine coast. This situation of reduced human interaction with the marshland likely lasted till the mid-Republican period when Rome became interested in the Pontine plain as a potential agricultural resource.

³¹ Alessandri 2013.

³² Alessandri *et al.* 2019.

³³ Cassen, Weller 2013; Harding 2021.

³⁴ Alessandri *et al.* 2021; Alessandri, Attema 2022.

³⁵ de Vos forthcoming 2024; Melandri 2022.

³⁶ Sevink *et al.* 2023.

³⁷ Alessandri 2013.

³⁸ Mandolesi 1999, 2014.

³⁹ Alessandri *et al.* 2024.

⁴⁰ Alessandri 2013.

⁴¹ See for the use of this term, Olivier 2006.

⁴² Attema 1993; Quilici, Quilici Gigli 1987.

⁴³ Quilici Gigli 1976.

⁴⁴ Maaskant Kleibrink 1991; Maaskant Kleibrink 1992.

⁴⁵ Feiken 2014; Feiken *et al.* 2012.

Between palus and ager, exploitation of the Pontine marsh during the Roman period

For the Roman period, several interventions to improve the conditions for exploitation of the Pontine Marshes are documented by the ancient written sources. The earliest clear Roman interventions date to the later part of the 4th century BC with the construction of the *via Appia*, commissioned by *Appius Claudius Caecus*, straight through the wetland, and the establishment of the roadside settlement of *Forum Appii*. These interventions might however have been preceded by land allotments to Roman citizens, which – although not specifically mentioned in the sources – may have occurred after the conquest of Privernum in 341 BC and again in 329 BC and upon the foundation of the *tribus Oufentina* in 318 BC. These interventions must have involved at least localised drainage works: the *via Appia* could not have been constructed without the excavation of the adjoining *Decennovium* canal. Renewed reclamations were commissioned by consul *M. Cornelius Cethegus* in 160 BC, and later during the reigns of Nerva and Trajan⁴⁶. Although little is known about the motivations behind these drainage attempts nor about their scale and longevity, they likely reflect responses to persisting drainage problems and form a testament to the ongoing challenges involved in keeping the area dry. Investigations by Italian scholars showed that the remains of Roman Republican sites and an elaborate centuriation system may relate to these historically documented interventions of the late 4th century BC⁴⁷. Further insight into these Roman-period reclamation attempts has been obtained through our research in the lower Pontine Marshes, carried out since 2007. Through systematic and intensive surveys that focused mainly on the area between the Roman road stations of *Forum Appii* and *Ad Medias*, a major phase of colonisation of the marshland has been attested, which –based on the ceramic assemblages recorded on the many small rural sites – can be placed in the late 4th or early 3rd century BC, so more or less contemporary to the construction of the *via Appia*, but possibly with a preceding 4th century phase⁴⁸ (fig. 4). More recently, a program of research focused on the traces of the centuriation. Analysing LiDAR data and aerial photographs traces of this system were identified and further investigated through geophysical prospecting, coring and ¹⁴C dating. These investigations have confirmed that the human interference in the Pontine Marshes during the Roman Republican period was at a scale not witnessed before and profoundly affected the landscape and its subsequent

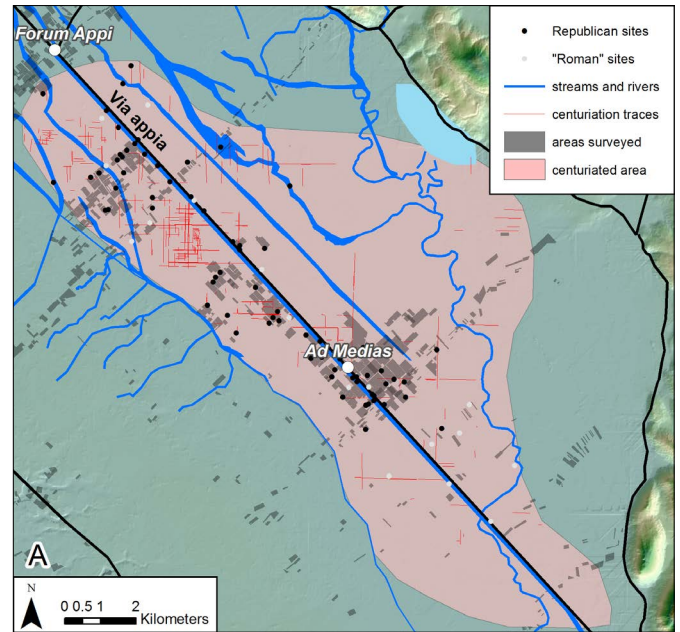


Fig. 4 - Map showing archaeological features pertaining to Roman Republican agricultural colonisation (from De Haas 2017).

development⁴⁹. It involved the imposition of a land division scheme (*centuriatio*), covering an area of at least 120 km², with a clear integrated system of canals (from small side canals of c. 1 m wide to major arteries with a width of up to 7 m) eventually discharging in the *Decennovium* canal. In this period, the area must have been characterised by a predominantly agro-pastoral economy as is clear from the presence of loom weights on many of the recorded small farmsteads, and the recovery of cereal pollen and charred macro-remains in sediment samples procured from several canals. The intensive exploitation of the Pontine marshes appears to have been a relatively short-lived phenomenon, possibly lasting for not more than a century. From the 2nd century BC a strong decline in settlement numbers is apparent. This might be related to worsening drainage conditions, as is clear from the fact that several canals started to fill up by this time. The renewed reclamation attempts by *Cornelius Cethegus* in 160 BCE might thus have mainly been aimed at halting or reversing – unsuccessfully – further dilapidation of the drainage system. However, even though drainage problems might have rendered parts of the ancient wetland unsuitable for continued habitation and arable farming, the area was certainly not completely abandoned. On the contrary: it is during the 2nd century BC that we see the development of several sites into larger estates, especially in relatively well-drained locations in the landscape, mainly along the *via Appia*. Some of these sites display clear signs of investments in luxury architecture such as mosaics and painted walls. Although agriculture and pastoralism must have remained important cornerstones of

⁴⁶ de Haas 2011, 206-207 with references.

⁴⁷ Cancellieri 1985; Cancellieri 1990.

⁴⁸ de Haas 2011 and 2017; Tol, de Haas, Attema i.p.

⁴⁹ Tol *et al.* 2021; de Haas 2023; de Haas, Tol, Schepers, i.p.

the local economy, remaining sites demonstrate a trend towards economic diversification, aimed at exploiting the natural riches of the (returning) wetland environment. Attested economic activities include fishing (as evidenced by fish hooks and the frequent occurrence of circular ceramic net weights on sites), the production of pottery and the breeding of dormice⁵⁰. This upscaling of settlement and increased economic diversification suggests a greater control over the period materials found during field surveys indicate the persistence of a degree of human interaction with the wetland environment resources exerted by local elites. After the 1st c. BC, a further decline in settlement is apparent in the Pontine plain and with the drainage system now largely dysfunctional only a handful of sites, mainly along the *Appia*, remain active. Even though sparsely populated, the wetland was, however, never completely abandoned: *Forum Appii* remained an important regional hub and imperial materials found during field surveys indicate the persistence of a degree of human interaction with the wetland environment.

The Pontine plain from Late Antiquity to the Medieval period

Evidence for human engagement with the marshes and its resources thins out in Late Antiquity, although a remarkable newly founded rural site, clearly still embedded in supra-regional trade networks is established along the *Appia* close to mile 48 during the late 4th or 5th century AD⁵¹. The early 6th century AD reclamations carried out by *Caecina Mavortius Basilius Decius* on request of the Ostrogothic king Theodoric – attested through a number of inscriptions and a number of letters published by Cassiodorus in his *Variae* – appear to have been largely ineffective⁵². At the same time, the presence of various types of activity nodes, notably villages, roads, churches and defended locations in the wider surroundings does show how the wetlands and lagoons in the early medieval period remained encapsulated in an infrastructural network⁵³. Among the nodes were the settlements of *Antium*, *Astura* and *Terracina* in the margins of the lagoonal environment and those of *Forum Appii* and *Tres Tabernae* in the Pontine wetlands⁵⁴. After Late Antiquity up to the Renaissance documentary archaeological data on wetland exploitation becomes scarce and we must rely foremost on contextual information. Satijn's comprehensive historical and landscape archaeological analysis of Tyrrhenian southern Lazio spans from late Antiquity to incastellamento and incorporates the

lagoons and inland Pontine wetlands. The analysis reveals a general trend of urban and rural demographic and economic decline, deterioration of the Roman infrastructure and diminished centralised territorial control following the mid-Imperial period. However, it also shows how new ways of settling, exploiting and controlling the landscape emerge from the evidence. On the margins of the lagoons and wetlands, monasteries and churches became focal points and towards the end of the first millennium AD the rise of medieval towns resulting from the incastellamento process is a fact. These new forms of settlement on the margins of the wetlands and lagoons brought complex forms of wetland exploitation with it⁵⁵. The 7th – 10th century AD witnessed the foundation of *domuscultae* (agricultural production annexes for the papal court and city of Rome consisting of lands or groupings of lands with farms)⁵⁶. One such *domusculta*, *Ant(h)ius*, was reportedly located at former Roman *Antium* but the extent of its territory is not known. Also we know of the *fundus Folianus* (first mentioned early 8th c. AD) near the lagoon of Fogliano⁵⁷. Around the 10th c. AD, the site types *Castrum* and *Castellum* appear in the documentary record representing various fortified new and reused, inhabited structures that can be seen as part of the incastellamento process⁵⁸. These formed, together with the monasteries and churches, main settlement nuclei in the mediaeval settlement configuration surrounding the wetlands and lagoons of the Pontine plain from this period onwards. Of this category, it were the fortified hilltop towns of Norma, Sezze and Terracina that started to dominate the settlement pattern, each claiming exploitation rights to portions of the wetlands and lagoons they controlled from their elevated positions in the foothills surrounding the plain. Remarkable in this long period is how class-based human-environment interaction with the wetlands reappears in the evidence already from the 8th c. AD onwards (if it had ever vanished in between Roman Imperial times and the advanced mediaeval period). Satijn notes how by the 8th century onwards the papal possessions, known collectively as the *Patrimonium Appiae*, extended over large parts of the Pontine plain towards *Terracina* and the coast at Fogliano. Moreover he mentions how in the 11th century the monastery of Subiaco claimed and secured its possessions in the lagoonal area at Fogliano. In the late middle ages monasteries documented their privileges to engage in pisciculture in the area⁵⁹. After the 10th c. AD, we have many indications for wetland exploitation related to the elite of the mediaeval hilltop

⁵⁰ Tol, Borgers 2016; Tol, de Haas 2022.

⁵¹ Tol *et al.* i.p.; see also Bruckner 1995.

⁵² Tacoma 2020.

⁵³ Satijn 2020, 330-340.

⁵⁴ Tol *et al.* 2018; see Tol 2012 for *Astura*; Satijn 2020, 337, tab. 7.7.

⁵⁵ Satijn 2020.

⁵⁶ Satijn 2020, 163.

⁵⁷ Satijn 2020, 372.

⁵⁸ Satijn 2020, 161.

⁵⁹ Satijn 2020, 374-375.

towns. In the reconstruction of the economic use of the wetlands and lagoons, the archaeology and documents concerning the pedemontana road on the edge of the Pontine wetlands, the part of the *via Appia* and *Decennovium* canal cross-cutting the Pontine wetlands and the infrastructure along the vast stretch of the lagoonal coastal environment between *Terracina* and *Astura* is fundamental. These arteries, of which the coastal route is difficult to reconstruct, were the life-lines of the small settlements in the wetland and lagoonal environment connecting them with the mediaeval hilltop towns, but also with Rome and the Roman campagna.

The Pontine plain from the Renaissance to the Modern Period

From the Renaissance onwards, cartography becomes a fundamental source. The rich cartography of the Pontine wetlands is for a large part related to the various reclamation projects and fills in the period between the Renaissance up to the period of the fascist reclamation from a

spatial point of view⁶⁰. From the early 16th AD onwards, historical cartography furnishes an increasingly detailed spatial view on the extension of the Pontine wetlands, including details on settlement and land use and insights in the scale of reclamation projects undertaken then⁶¹. The latter bring out opposed interests between local communities and papal interventions emphasising the importance of wetland exploitation in the local economy. The reclamation project by Pope Sixtus V in the late 16th c. AD, for instance, led to sabotage of the drainage works by the local population loathing to see their fishing and hunting areas, woodlands for timber and fire-wood, meadows for hay, and various products of the marsh as rush, taken away⁶². Local opposition appears as a recurring problem in the realisation of similar projects after Pope Sixtus' attempt⁶³. In fig. 5 we present Giacomo Filippo Ameti's map (1678) that underscores the importance in the local economy of fishing in the Pontine wetlands. It

⁶⁰ See maps and interpretation in Satijn 2020; Attema 1993.

⁶¹ Attema 1993, 41-50.

⁶² Attema 1993, 42.

⁶³ Attema 1993, 44-48.

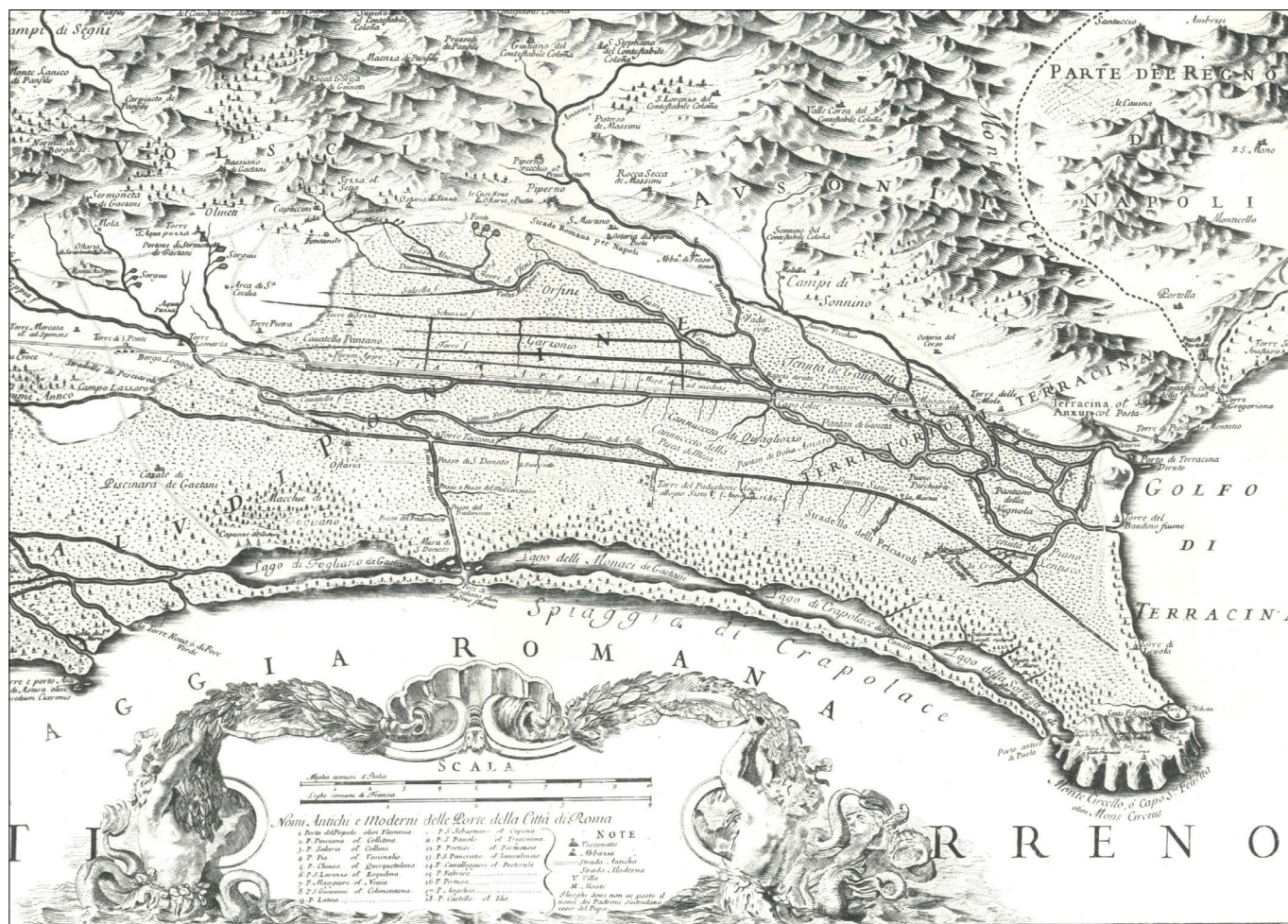


Fig. 5 - Detail of map by Giacomo Filippo Ameti (1678) indicating the importance of fish in the local economy (downloaded from Geoportale Cartografico Città Metropolitana di Roma Capitale at <https://geoportale.cittametropolitanaroma.it/cartografia-storica/19/29/lazio-e-patrimonio-di-s-pietro-2>).

indicates the roads along which fish was transported, fishing areas and settlements. In this context, we may also cite Napoleon's engineer De Prony who in his *Description hydrographique des Marais Pontins* (1822) states that there is probably no other country that, on a similar scale to that of the Pontine marshes, offers such ample possibilities for navigation, a remark endorsed by late 19th. c. scholars as archaeologist and ethnographer De La Blanchère⁶⁴. Material evidence for exploitation of the wetlands and lagoonal area is however scarce, despite the recent increase in surface finds dating to the 17th/19th AD generated by our intensive surveys. The evidence consists mostly of isolated sherds, or small concentrations of sherds but also a single site was recorded that included a number of sherds belonging to so-called *colini*, strainers used in cheese making. The dearth of material evidence linked to the exploitation of the wetlands is undoubtedly due to visibility biases of the archaeological record of the period. Just as in Parsons' case study of the Valley of Mexico, the invisibility of the exploitation of the Pontine wetlands and lagoons by common people, hides the nature and scale of the exploitation of aquatic resources, whether centrally controlled or independently undertaken⁶⁵. Neither do the archaeological and documentary sources for the period reveal the use of the wetlands for seasonal human presence in the context of transhumance and temporary economic subsistence, as is amply recorded in photos and in the literature for the period immediately preceding the fascist reclamation. Documents on the use in the Pontine wetlands during the 19th century AD prior to the fascist reclamations is plentiful and includes evidence for widespread seasonal presence of communities engaged in fishing and animal husbandry⁶⁶.

Discussion: Navigating the past of the Pontine plain, landscape, *longue durée* and human resilience

Global case studies show that lake or river environments offer communities advantages in terms of connectivity and subsistence opportunities, but also that settlement locations in these landscapes are sensitive to environmental change, potentially endangering their very existence. This was for instance the case of the recently discovered Bronze Age site of Mazzocchio, whose inhabitants had to give up their location at the beginning of the first millennium BCE on account of increasingly marshy conditions brought about by colluviation. More in general it appears that Bronze age settlements were never far from major

water bodies. Based on his inventory of Bronze and Early Iron Age sites of the Pontine plain and using the palaeogeographical data available at the time, Luca Alessandri in 2013 calculated that the majority of the sites – i.e. more than what was statistically expected – would have been located in proximity to significant water bodies, i.e. within 36 minutes on foot⁶⁷. This certainly sheds light on the importance of aquatic and marine resources in the Bronze Age subsistence economy. At the turn of the millennium a new dynamic becomes apparent. Now the exploitation of the wetlands and lagoons seems rather related to the larger nucleated settlements that sprang up in landscape zones in the periphery of the wetlands and lagoons. Deteriorating conditions for permanent settlement in the wetlands itself quite certainly was the direct cause for this. At the same we can discern a trend towards external control of the wetlands and lagoons. In fact, in our current project *Salt and Power* our main hypothesis is that in the course of the first millennium BCE control of access to nearby lagoonal resources became important to the Latial and Etruscan city states for securing the production of salt, preservation of fish and their use as natural harbours⁶⁸. The effects of this new dynamic of control is reflected in the abundant presence of the production sites in the lagoonal environment and the overall dearth of permanent settlement during the period. We may extend this mechanism of external control to the exploitation of wetlands, as is indeed suggested by the evidence from our archaeological surveys for the Late Republican Roman period and thereafter by the documentary evidence. This, however, does not imply that individuals and small groups could not escape this tendency towards externally controlled exploitation of the wetlands and lagoons. Some of our archaeological and certainly the later historical documents point to this. An intriguing question still is the effect on wetland exploitation emanating from the series of *villae maritimae* that dotted the coast in the Late Republican and Imperial period⁶⁹. While these *villae* certainly had a major impact on the coastal economy, their interaction with the developments in the Pontine plain itself remains to be investigated in more detail⁷⁰. In sum, the Pontine case clearly shows how wetlands are extremely versatile environments in the short and the long run and as such conditioned people's interactions with it, both institutionalised and not. The episodes of reclamation illustrate the latter opposition very well, revealing as they do contrasting economic values that often lead to the frustration of political or elite-based schemes to turn *palus* into *ager*. As we have shown in this paper, such schemes in the Pontine plain already started in the

⁶⁴ Attema 2019.

⁶⁵ See also Satijn 2020, 606-609.

⁶⁶ Attema 1993 with references, see for landuse in this period in general, especially de La Blanchère 1889.

⁶⁷ Alessandri 2013.

⁶⁸ Alessandri, Attema 2022; Attema *et al.* 2024.

⁶⁹ Marzano 2007; Venditti 2011 for an inventory of these *villae*.

⁷⁰ Attema 2018.

mid-Republican period, after which many attempts followed. For a complex of reasons, the early reclamations proved, however, difficult to sustain, revealing the essential role of local environmental and technological knowledge as a major factor of human resilience in the face of technocracy. In this paper we have discussed the current status of our knowledge of settlement and exploitation of the Pontine wetlands from the Bronze Age to the present, citing new palaeogeographical and settlement evidence

and integrating this with the detailed landscape archaeological knowledge that we have built up for the Pontine wetlands since the 1970's. We realise, however, that there is still a vast 'hidden heritage' in the Pontine wetlands, both archaeological and documentary, that needs to be further explored within the context of the changing landscape and which needs to be scientifically valorised to help raise global awareness of the relevance of (former) wetlands in past, present and future.

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