Liquid footprints : water, urbanism, and sustainability in Roman Ostia

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Liquid Footprints

Water, Urbanism, and Sustainability in Roman Ostia

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Preface

The eminent position of water in the Roman world embedded it within every aspect of its culture and history. Multi-faceted combinations of cultural, technological, religious, and natural factors have always influenced the reactions to this universal human need. While resource usage has always been the most pressing concern of human communities, the global community of the 21st century is becoming increasingly aware of the fragility of essential resources such as clean air, food, and water. Global warming and related violent weather episodes, economic upheaval, and military action related to water resources are pressing realities by the end of this century, although they are already present in numerous sub-sections of the globe. It is clear that resource usage is, just as all aspects of human activities, experienced through a host of (un)conscious decisions motivated by social culture, technology, and the object's physical properties.

The path to this 21st century moment of resource awareness has recently been trailed by the growth of sustainability and development studies. The present study does not use "sustainability" as an amorphous buzzword, or to ask to what degree we are more or less like the Romans in terms of resource usage patterns. Rather, it aims to create a methodological bridge between the rich archaeological evidence from Roman urban sites and the burgeoning field of contemporary urban resource management. The decadence of Roman water usage is an oft-quoted proverb cited to complicitly support the perennial nature of human water waste; the opulent bath buildings of Rome and their landscape striding aqueducts conjure up ideas of an extremely wasteful society oblivious or ignorant of their local landscapes. Indeed, numerous Roman authors themselves praise the conquest of Roman architecture over the landscape.[1] However, the context of these Roman *encomia* have become increasingly scrutinized following the explosion of literary, historical, and archaeological research conducted in the past century.[2]

This study explores the limits and expressions of Roman resource usage and identifies how Roman cities managed issues of water supply, usage and drainage. It questions how the urban landscape of a Roman city reacted to changing hydraulic needs. Rome's imperial harbor city of Ostia has been chosen as the case study for this project, as more than a century of excavation has revealed an incredible wealth of water features from nearly all periods of Roman history. As part of its mandate to identify the means by which Ostia reacted to its constant need for water, this work acts as a case study for elucidating Roman perceptions of the environment, the (un)sustainability of Roman urbanism, and historical patterns of resource usage.

Initially acting as a military and economic base around the late 4th century B.C., Ostia developed into a thriving harbor of Rome in the late Republican and early Imperial period. The urban fabric of Ostia changed in the 2nd century, and despite a slight urban reduction in the 3rd century, a thriving population of wealthy senators and merchants continued to inhabit the city well into the 6th century.[3] Unlike the abrupt finale of Pompeii, life at Ostia slowly dwindled away until the site was largely abandoned in the 9th century, with the inhabitants clustering around the nearby church of St. Gregory.[4]

[1] E.g. Rutilius Namatianus, *De redito suo* I.15-19 for the topos of Rome's hydraulic glory still used in the early 5th century.

[2] See e.g. Bruun 2016, Sachs 2010.

[3] Procopius, *De bello Gothicus* 1.26.7-13, 5.26.8-19 for Ostia during the Gothic wars.

[4] See Boin 2013 and Lavan 2012 for an update on the archaeological and cultural manifestations of the Late Antique and Early Christian community at Ostia.

Throughout the centuries of habitation at Ostia, the population waxed and waned like the flow of the Tiber, the city's mercurial neighbor.[5] This dynamically changing population, coupled with culturally specific expressions of hygiene, entertainment, and living standards, created the need for an equally responsive hydraulic system, acting in constant dialogue with the larger socio-economic trends in the Mediterranean world.

An introductory chapter (Ch. 1) presents a review of Roman water research, sketching out the development of the field from the Roman writer Frontinus to recent advances in geological analyses. Following this is a presentation of the extensive archaeological work already carried out on the water systems of Ostia. This not only acknowledges the achievements of previous hydraulic researchers, but contextualizes the present study. The history of the excavation of Ostia is briefly described, as the excavation preferences, especially of the mid-20th century, shaped the urban form of Ostia in a profound way. These choices had important consequences for our understanding of Roman urbanism from the 3rd century and later. Delving deeper, the environmental setting of Ostia is presented, to show how many different types of water existed within, below, and around the city. While the literature on the urban development of Ostia is immense, it is summarized here to bring out the larger urban forces at play in different periods of the city's life. This also provides a larger structure within which to place the city's numerous infrastructure networks.

The following chapter (Ch. 2) lays out the theoretical and methodological underpinnings of the study as a whole. In this chapter, we introduce the theoretical framework of this study, engaging with recent debates in materiality and phenomenology, as well as recent developments in socio-cultural studies to demonstrate new ways of thinking of, and with water. This approach opens up myriad horizons for questioning our current and past relationship with water. Shifting from the cultural to the urban, we present recent work on Roman urbanism and approaches to modern urban infrastructure, such as urban metabolism. Expanding in scale, we present a brief introduction of sustainability and, more precisely, sustainable resource management to investigate how urban water usage is studied today. Combining these different streams of inquiry, we present the methodology created for this study, the Roman Water Footprint, which offers a framework for creating a holistic snapshot of water usage in a Roman city. In this way, we can apply an approach used in studying aspects of modern water to our investigation of Roman water usage.

With the theoretical and historical framework laid out, the three case studies are presented. These city blocks, designated III, i, IV, ii, and V, ii, are spread out across Ostia, and have different chronological and archaeological resolution (fig. 0.1). Every structure at Ostia is labeled using a three-part system created during early excavations, which describes the city in terms of five larger zones (regione), the city block (insula), and finally the individual structure within each *insula* (e.g. Regio II, iv, 2 for the Terme di Nettuno). This system will be retained in the present work for clarity, and to more precisely locate individual water features. Every case study is composed of two parts. In the first part (3.1, 4.1, 5.1), the architectural chronology and hydraulic evidence for each building is described. In the second part (3.2, 4.2, 5.2), the hydraulic infrastructure of the entire insula is contextualized with wider cultural and paleo-environmental data available for Ostia.

[5] Meiggs 1973, 532 for 50-60,000 inhabitants in the Antonine period, although this is based only on the 69 ha intramural area.

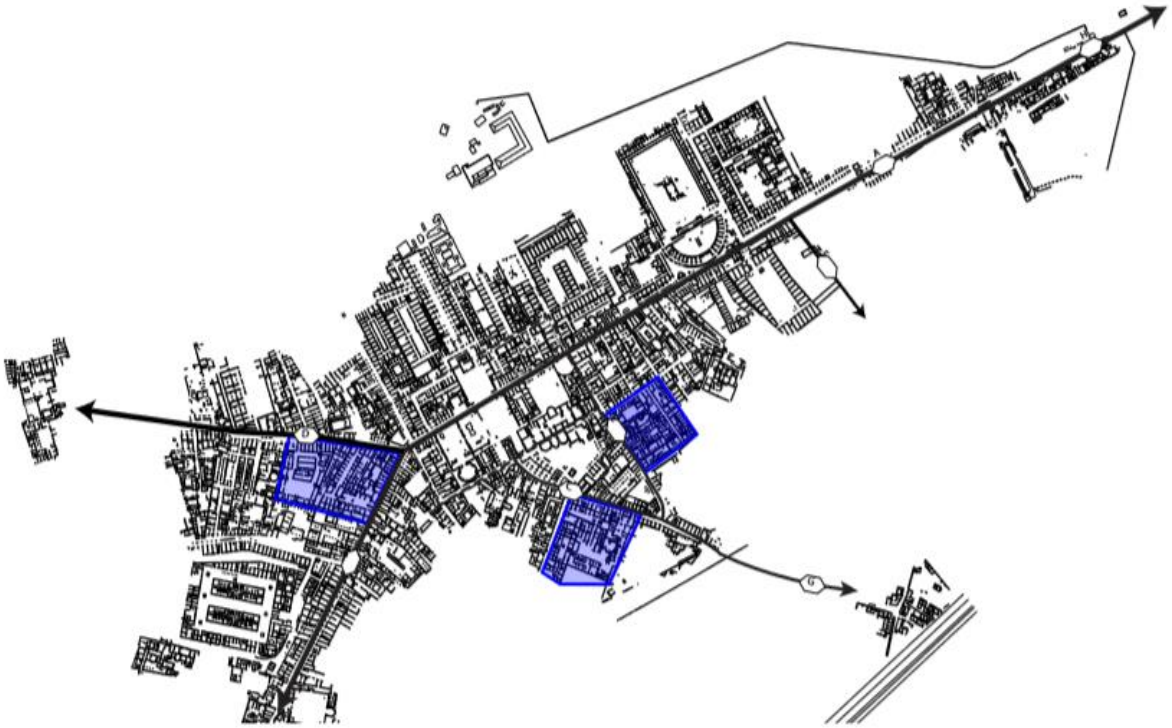

Figure 0.1: Insulae studied in this study.

These three types of data are inserted into the Roman Water Footprint methodology, as outlined in Chapter 2. This method highlights different scalar levels of the infrastructure systems, moving from an individual lead pipe to the level of a bath building, and finally to the level of an entire city block. By assembling all contemporary water features within the insula, these chapters demonstrate urban changes at the level of an entire city block, as well as how water usage in each city block changed through time.

Insula III, i (Ch. 3) is located in the western part of Ostia, where the east-west section of the *decumanus maximus* turns obliquely to the southwest and towards the coast. This insula contains a diverse assemblage of structures, and has attracted most attention for its so-called Basilica Cristiana. The choice of this insula comes from its wealth of surviving structures from the 3rd and 4th centuries AD. The excavation history, chronology, and identified water features are laid out for every building of the insula. Its meager list of past publications makes it a good methodological comparison with the better published insulae discussed in this study.

Insula IV, ii (Ch. 4) is an interconnected group of buildings located along the southern stretch of the *cardo maximus*, and was highly integrated into the urban network. Recent archaeological and socio-spatial research on this block has created a detailed picture of the historical development of movement patterns within the block, as well as within Ostia as a whole.[6] This *insula* comprised structures of domestic, religious, industrial, and entertainment purposes, which all interacted to create a space of dynamic structural and spatial exchange. The diversity of structures present in this block and the distribution of water features make it an excellent case study.

Insula V, ii (Ch. 5) is arguably one of the most well-studied insula in the entire Roman world. It lies southeast of Ostia's forum, and like *insula* IV, ii, also contains a variety of structures. Building upon the meticulous publication organized by Johannes Boersma in 1985, urban survey and archival work undertaken by the author identified important new water features. This chapter incorporates the excavation and restoration carried out by Roberto Petriaggi in the 1990s, which revealed an entirely

[6] Stöger 2011.

new structure underneath a seemingly empty building, as well as a network of sewer channels. The evidence from this insula provides new material to the discussion about Late Antique infrastructure of Ostia, and adds important new dimensions to the chronology and distribution of Ostia's little explored sewer network.

Chapter 6 presents the analyses of large scale trends of urban water usage at Ostia. This is done by comparing the same Roman Water Footprint in all three insulae, so that Roman Water Footprint #1 of insula III, i is compared to Roman Water Footprint #1 in insulae IV, ii and V, ii. This spatial comparison highlights common trajectories and particular differences within separate areas of the city. New perspectives on the role of water in Ostia's history are given, creating a more nuanced picture of urban life in Ostia. Rather than a city of discretely separated homes, workshops, and religious buildings, the hydraulic evidence presents a city in which neighboring buildings of different functions share water systems, Republican water features stubbornly influence Late Antique building layout, and sewers are found "floating" above the street.

Chapter 7 demonstrates the potential for increased collaboration between urban specialists of all time periods. Implications for the dialogue between 1st and 21st century water usage are explained, and some final remarks are made regarding the further development and future application of the Roman Water Footprint.

Several appendices conclude this study, with Appendix 1 providing a list of terminology used throughout this work. This is given to ensure clarity, or at least consistency in the use of terms like, "basin", "downshaft", or "drain". Appendix 2 presents several pieces of epigraphic data identified from the three insulae studied. Appendix 3 lists every water feature identified for each insula, as well as some additional information for each water feature. All photographs in this study were taken by the author unless otherwise notes.