On the Cultural Pressures and Practices of Ancient Rome and Aqueducts

HIST*1250: S*cience and Technology in a Global Context*

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I. Introduction

Traditionally throughout antiquity water has been sourced from cisterns, wells, or nearby springs and rivers making accessibility and reliability a continual concern[1]. Though the Romans did not invent the aqueduct they certainly deployed them on a previously unprecedented scale[2] and ushered in a water revolution, relieving accessibility and reliability concerns[3]. By the height of the empire the Romans had built a staggering number of aqueducts littered across the mediterranean and former Roman provinces[4]. The aqueducts were so common that modern historians and archaeologists have not yet discovered them all, and have located the remains of long forgotten aqueducts as recently as 24 years ago[5]. The Romans had numerous needs for water deeply ingrained in their culture, thus driving their construction of aqueducts. Notable consumers of water were textile, clothing, and food production, as well as the beloved bathing complexes[6]. Thus, Rome's ubiquitous building of aqueducts was driven by a cultural scene which demanded reliable access to clean water for textile production, culinary uses, and bathing.

[1] Eliav, *A Jew in the Roman Bathhouse*, 22
[2] Britannica, "aqueduct"
[3] Eliav, 22
[4] Eliav, 24
[5] Dimitriou, "Roman aqueduct of Samos", 131
[6] Sánchez López, "Water Supply to Urban Workshops", 29–33

II. Water Consumption of the Textile Industry

Clothing within ancient Rome is often seen as being synonymous with the *toga*, a semicircular garment draped over the shoulders and torso. This is true for the republic and early empire where citizens would don their woolen *toga* daily. However, around the 3rd century CE the *toga* began to fall out of cultural fashion as it became a garment for the higher class, and by the 5th century CE a common citizen would be found wearing a *paenula*[7]. While the cultural milieu around the *toga* may have changed in the later empire the textiles and fabrics themselves were largely the same, as a *paenula* was also made from wool[8]. Regardless of the specific style of garment, ancient Rome saw an extensive variety of trade around textiles and clothing. Specifically, the culture of ceremonial dress, as many religious events and locations required appropriate attire for the Romans. This is demonstrated in the culture of *otium* which Dr. Morris Silver translates to mean "leisure", though with a clear distinction that *otium* is an activity for Roman elites to engage in self-realization and altruism[9]. From elites to the common citizen, every Roman wore culturally informed clothing on a daily basis. The textiles could either be produced in an urban area such as *Pompeii* and traded widely[10], or produced locally, following the cultural practice of self-sufficiency[11]. Irrespective of where a roman textile was produced, its manufacturing needed large quantities of water. Throughout the process any textile would need to be washed and perhaps dyed, both steps requiring water[12]. The textile industry would have benefited from direct access to clean and reliable water. In some cases parts of the manufacturing process did boast direct connections to clean water. Specifically *officinae fullonis*, which is said to have consumed the most water within textile production. The *officinae fullonicae* were

[7] Rothe, *The Toga and Roman Identity*, 17–36, 147–158
[8] Hurschmann, "Paenula"
[9] Silver, "Those Exotic Roman Elites", 350
[10] Flohr, "The Textile Economy of Pompeii", 75
[11] Flohr, 76
[12] Sánchez López, 32

responsible for cleaning, rinsing, and washing fabric and were often plumbed directly to an urban water distribution system fed by an aqueduct. As of 2021, all but one of the *officinae fullonicae* examined in *Pompeii* were connected directly to the aqueduct water network[13]. Proving that the culture around wearing clothing and producing textiles in ancient Rome had great demands for water. Thus, by being directly plumbed to the water distribution system the industry would have contributed to the prevalence of aqueducts.

[13] Sánchez López, 32–36

III. Culinary Demand for Water

Undeniable staples of Roman culinary culture were the fermented fish sauces of *garum* and *liquamen*. The sauces were traded and prepared for over a thousand years throughout antiquity, and *garum* is described as the taste that binds all Romans together[14]. A love for these sauces was deeply rooted in Roman culture. There is abundant evidence for fish sauce playing an important role in Roman society, being an important commodity in trading and in the culinary world. It was believed to represent the Roman way of life[15]. It is worth noting that there is a close relationship with the term *garum* and *liquamen*. In surviving literature from the later empire there does not seem to be a functional distinction between the two terms[16] and it is assumed in this period *garum* and *liquamen* can be used interchangeably, though there does appear to be a distinction in the early Roman empire of the 1st century BCE[17].

There is much evidence for *liquamen* being widely traded. It was a prolific commodity widely accessible to lower class and common citizens within the empire as a common condiment and ingredient[18]. In her work, "Garum and Liquamen, What's in a Name?" Grainger summarizes the three recipes for *garum* found within the *Geoponika*, which is an agricultural manual with preserved ancient material. The first recipe takes small fish and excess salt to ferment in an open vessel in direct sun. The second allows for an enclosed fermentation, and the third method calls for brine brought to a boil to extract the sauce from the fish[19]. The production of *liquamen* is closely linked with a supply of fresh and clean water. The first method allows the salted fish to ferment uncovered in the direct sun, and any available water would evaporate long before the

[14] Comis, "The archaeology of taste", 33
[15] Molnár, "The Roman Garum", 69
[16] Grainger, "Garum and Liquamen, What's in a Name?", 248
[17] Grainger, "What's in a Name?", 248
[18] Grainger, *The Story of Garum*, 2
[19] Grainger, "What's in a Name?", 251

sauce can be harvested. As the goal is to have a liquid sauce, and not a solid fishy mass, it is clear the artisan responsible for the *liquamen* would need to repeatedly supply new fresh water as the previous water evaporates. Water was also a key ingredient in the boiling method from the *Geoponika* as one would need to make a brine in the correct ratio from fresh water and salt[20]. This is further corroborated by Sánchez López who states that water was fundamental in the preparation of sauces like *garum* and *liquamen*[21].

The pervasiveness of *garum* is due in part to the accessibility of fresh water. Without accessible water the open fermentation method to produce *garum* would not be possible. Likewise the boiling method would be equally impossible without water. There is no explicit relationship between the production or consumption of *garum* and aqueducts, though the need for water to make this fish sauce is clear. With *liquamen* core to Roman life it would have been necessary to produce it in great quantities. Large scale *garum* production would no doubt also demand large quantities of water, adding further stress and demand to any local supply. The Romans were well known for wanting to supply copious amounts of water, as they did with aqueducts. In fact, aqueducts were overbuilt as seen in Samos[22] and Corinth[23] to have excessive and reliable water to account for any extra stresses on the water infrastructure. While *garum* production alone would not have been reason enough to build an aqueduct, the water needed to make the sauce likely would have contributed to the need to bolster and expand a water supply network. Romans often expanded their water distribution network with aqueducts, seeing as many cities have multiple[24], and so the never ending cultural demands of *garum* would have contributed to the ubiquity of Roman aqueducts.

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[20] Grainger, “Garum, Liquamen and Muria: A New Approach to the Problem of Definition”, 43
[21] Sánchez López, 32–33
[22] Dimitriou, 142
[23] Lolos, “The Hadrianic aqueduct in Corinth”, 106
[24] Britannica, “aqueduct”

IV. Water Needs of Roman Bathing

The Roman bath house and bathing complex was of great importance to the people of rome, and was the cultural cornerstone of the Romans[25]. It is said that bathing was a crucial element in the Roman identity. With the wide variety of people from all walks of life attending daily, bathing was a distillation of Roman culture. Even in the decline of the empire great effort was taken to preserve the baths and their surrounding culture[26], further demonstrating how valued bathing was to the Romans. Within these bathing complexes there was a wide variety of activities, recreation, and culture on display. In his book, *A Jew in the Roman Bathhouse*, Yaron Eliav states any Roman attending would marvel at a range of features from "engineering and architecture to food and fashion, from sculpture to sports, from nudity and sex to medicine and magic"[27]. Thus, it is abundantly clear that much of Roman culture is housed within the baths. The beauty of the Roman baths is that they were an equitable feature visited by any member of society from the rich and powerful elites to the lowest class of society including even the slaves that would make a daily pilgrimage to the baths en masse. Not only were the baths an equalizer of class, but also of location. It was not only the large urban centers that were privy to the cultural benefits of the baths, but also towns like Nicopolis[28] in the remote greek provinces and small islands like Samos[29]. Considering that even small islands and cities far from the Roman capital were employing considerable time and effort to build these complexes demonstrates how crucial they were to Roman life.

The culture of bathhouses was so core and universal to the Roman empire that it spread along with the Romans. Where the Romans went, so did their baths. With the need for many

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[25] Eliav, 2
[26] Zytka, *A Cultural History of Bathing*, i–184
[27] Eliav, 3
[28] Zachos, "The Aqueduct of Actian Nicopolis", 26
[29] Dimitriou, 131–132

baths so too came the necessity for large quantities of flowing water. This prompted a Roman settlement to be supplied by an aqueduct leading from a clean reliable spring. Baths supplied by aqueducts were so culturally significant, even taking hold as far as Roman palestine. The fourth century writer R. Ḥanina lived in the city of Caesarea Maritima which reaped the many benefits of plentiful water from an aqueduct. Ḥanina was appreciative of seemingly limitless water in Roman cities, and uses it as a metaphor for Torah. Ḥanina goes on to specifically mention baths as one of the reasons for water flowing to the city[30]. The significance of the connection of the abundant water from the Roman aqueducts to the divine text of the Torah cannot be overstated. With the Torah being such an important religious text in Judaism it commands an abundance of respect. When the handwritten copy of the Torah, that all synagogues have a parchment copy of, is handled it is done with reverence[31]. This then shows the cultural significance of the Roman baths and corequisite aqueducts, as they were elevated to the divine comparison of the Torah even in a province far from the capital of the empire. It is worth noting that Eliav puts forth an explanation that the demand for baths in the Roman world created a need for more water, and directly resulted in the construction of aqueducts[32]. If this logical explanation is to be believed, then it is clear that with the building of many baths the corollary is that the Romans then needed to build many aqueducts, thus causing the prevalence of said aqueducts.

[30] Eliav, 25
[31] Britannica, “Torah”
[32] Eliav, 26

V. Conclusion

Aqueducts were littered throughout the ancient Roman world due to the culture of the Romans driving aqueduct construction. There were many such cultural pressures including the Roman practice of bathing. Roman baths demanded much water, and were often connected directly to the supply network of an aqueduct. Additionally, the production of fermented fish sauces like *garum* that were frequently traded and consumed throughout Rome also required plenty of water. Moreover, the Roman textile industry necessitated large amounts of water , and parts were often plumbed directly to the network of an aqueduct. Roman culture included and required bathing, *garum* production, and textile manufacturing. All of which consumed a great deal of water and would have demanded the resource to be plentiful and reliable. With such high demands of water the Romans turned time and time again to build aqueducts for their cultural needs, and in doing so left their former empire scattered with aqueducts and their remains.

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