

Not Only Clay. The Role of Water throughout the Pottery Making Process

Elena H. Sánchez López – Juan Jesús Padilla Fernández

Studies about pottery workshops in antiquity generally focus on two elements: one of the activities in the production processes, the firing of the wares, thoroughly studying the kilns, and the results of the production processes, the pottery itself. Only in very few cases other structures or activities within a pottery workshop and the pottery production process are really taken into account. In this sense, three elements are essential in the pottery production process: apart from the clay, vegetable combustible and water were also essential. It is true that in many cases, those two other raw materials and their uses are difficult to identify in the archaeological record, especially in the case of the water supply or water management. The fact is that in many cases the presence of water channels, vats or cisterns, is noted while the structures remain un-described; as a result of a lack of interest toward them. In spite of which, the importance of water in the pottery making is very often highlighted by archaeologist analysing those pottery workshops¹ and even by ancient texts. *P. Oxy.* L 3595-3597, three leases dated from the mid third century AD, refer to the renting of potter's workshops in Oxyrhynchus (Egypt). In every case, the owner of the facilities had to provide all the elements needed: earth, firing material and, of course, water.²

In this paper we will use ethnological analyses to complete the information given by the archaeological record about the pottery making process, to determine the role of water throughout the different stages.

The first step is the preparation of the clay, which starts with the curing, in which after the collection of the clay, it is left in the open air in order to eliminate organic impurities. Next step is the rehydration of the clay in large basins of still water in order to favour sedimentation, by the action of gravity, of the stones and other impurities that would negatively affect the rest of the processes. The identification of those settling vats in the archaeological record is slowly increasing, even if some data are still missing, and sometimes it is difficult to know for example the total volume of this kind of structures. Most of the remains belong to quadrangular vats (fig. 1), but some circular examples have been identified, it is the case for instance of the ones in La Bourderie³ (Rezé, Loire-Atlantique, France). They were made of different kind of materials: stones, case of the potter's workshop at rue Chapeau Rouge at Lyon-Vaise⁴ (France); tiles, like the settling vats at Cartuja⁵(Granada, Spain); or bricks, case of the potteries of the Hospital de las Cinco Llagas⁶ (Sevilla, Spain).

The sedimentation was made possible by the addition of water to the cured clay. But which are the evidences for the presence of water in the workshops? The most common structures related to the water supply of these facilities are wells, like

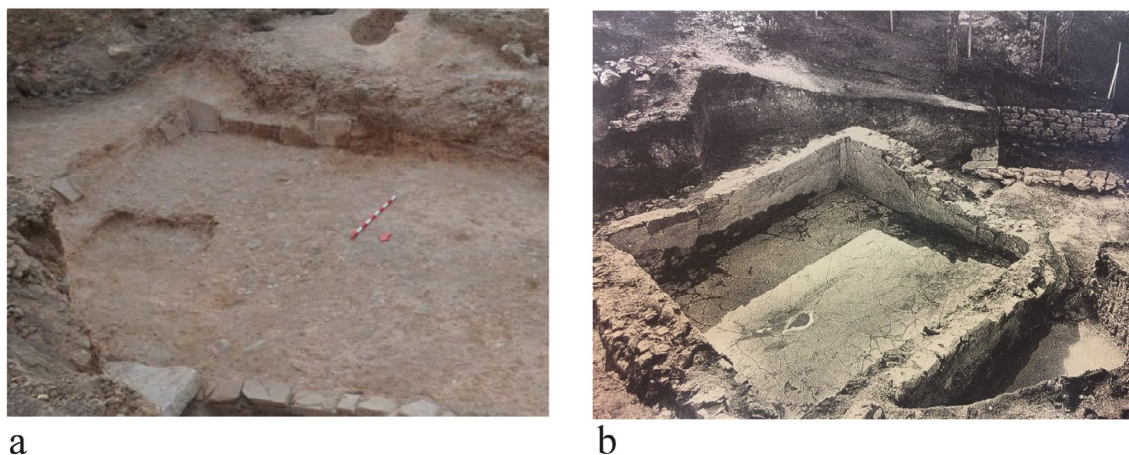


Fig. 1: Settling vats at Cartuja (a) and Phari (b).

the ones in the potteries of Venta del Carmen⁷ (Los Barrios, Cádiz, Spain) or La Bouderie⁸. A bit less common are cisterns, like the ones in the potteries of Via dei Sepolcri and Via Nocera in Pompeii⁹ or the three chambered one in Puente Melchor¹⁰ (Puerto Real, Cádiz, Spain) (fig. 2). In other cases, the water could be taken from a nearby aqueduct, what seems to be the case in La Maja and the aqueduct of Sierra de la Hez, which supplied the city of *Calagurris*¹¹. It has even been suggested that in some cases water could have been directly diverted from a nearby river or stream. It must be noted that many potter's workshops were near rivers, since those were essential also in the transport and marketing of the vessels. But in other cases they are close to small streams that could not have been useful in the transport, but could have been able to provide the water needed. This could be the case in the potteries of Casas de Luján¹² (Saelices, Cuenca), Villares de Andújar¹³ (Spain) or La Graufesenque¹⁴ (Millau, France).

The distribution of water within the potter's workshops is more difficult to analyse. Different kinds of channels, made of bricks, blocks, *caementicium*, or even pottery pipes¹⁵ (fig. 3) or pipes reusing amphorae,¹⁶ have been published from several of these facilities, but in most cases the provenance or destination of those channels or pipes is unknown since there is no information about their gradient.

Back to the clay preparation process, the fluid clay, free of impurities thanks to sedimentation, is stocked in vats in order to lose part of its water by evaporation. Once the clay reaches the adequate texture, it has to be kneaded (sometimes treaded), before been stored. During the storing time the clay may lose part of its water, and need to be rehydrated before the modelling. Then the process of modelling the clay to build the pottery vases also needs water, since the potter's hands and all the tools used need to be soaked. Water was also used for the decoration of the ceramic wares, in case for instance of the preparation of the slip (*engobe*), made with clay diluted in water, or the glaze.¹⁷

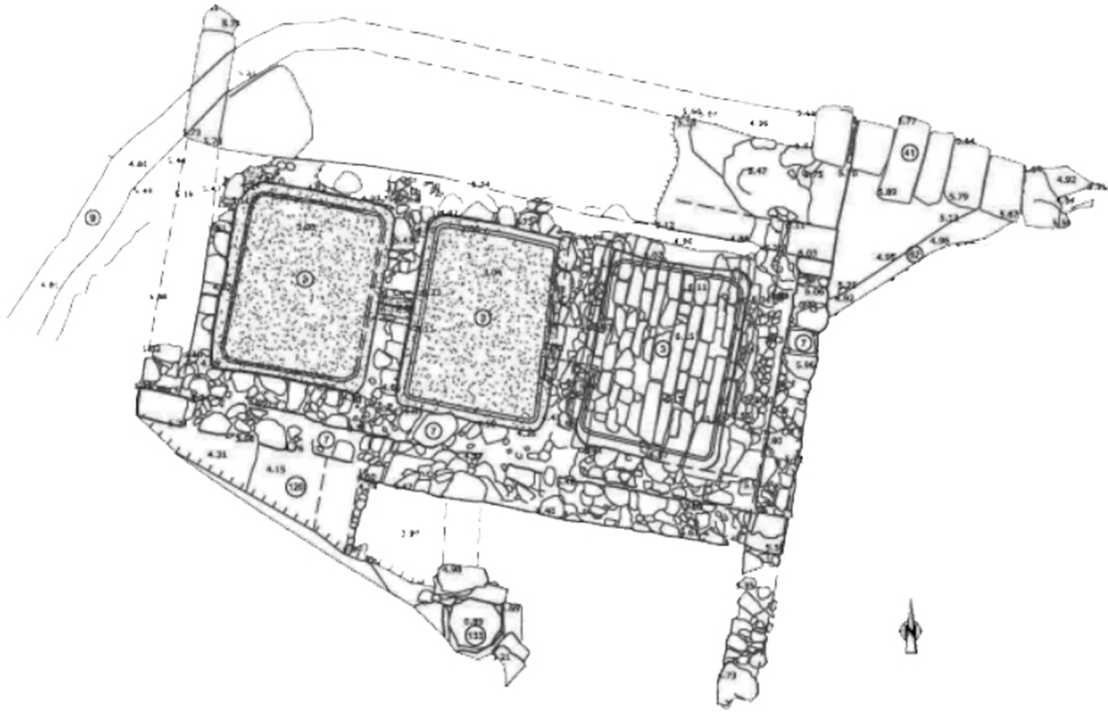


Fig. 2: Cistern at Puente Merchor's workshop.

The final steps in pottery production would be drying the wares in a place away from direct sunlight and airy, and the firing in the kilns.

Summarising, the addition of water is essential in the preparation of the clay (primarily in the sedimentation process), and then its presence is also required for the rehydration of the clay before the modelling, during the modelling itself and even for the decoration of the wares (fig. 4). Accordingly several researchers have stated that a lot of water was used in those workshops.¹⁸ Recent studies about ancient economies defend the idea that their quantification, in a similar way to what is done in modern economy studies, is not only possible but also necessary.¹⁹ In this line, the assertion that an important amount of water was needed for the production of pottery is too general. The combination of archaeological and ethnological data could help to create a more accurate picture, which would help in the assessment of the real role of water in pottery production processes.

For this reason, ethnoarchaeological experiments were carried out in collaboration with Antonio and Bartolomé Padilla Herrera, potters still using traditional methods to produce pottery in Bailén (Spain). According to these experiments, the decanted liquid clay obtained after the decantation processes already explained, was composed by water (40%) and clay ready to be modelled (60%). Analysing the loss of volume during drying and firing processes, we concluded that 30% of the modelling clay was still water. That means that 60% of the decanted liquid clay was

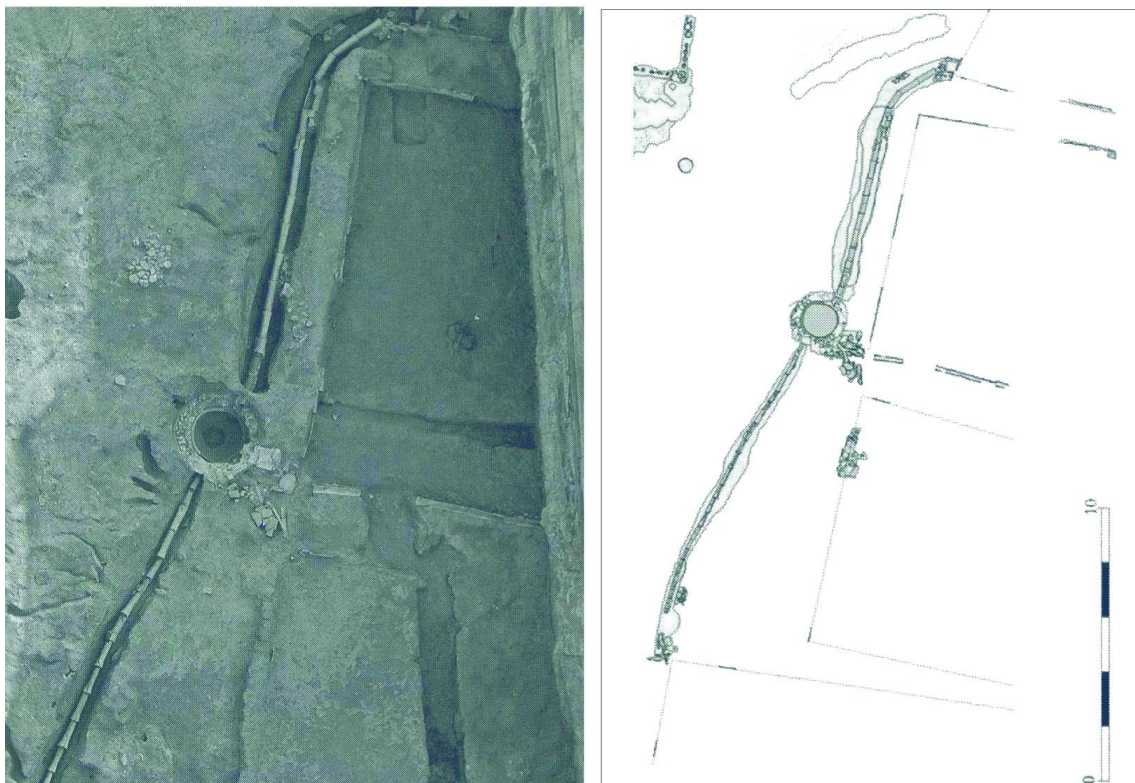


Fig. 3: Pottery pipe at Illa Fradera.

actually water. Being aware that these numbers refer to traditional pottery making process in this Andalusian workshop, we think they can apply in a very general way also to ancient pottery. This means that 42 kg of modelling clay were used to build a Dressel 20 amphora that once fired weighted around 30 kg; 12 litres of water were lost during drying and firing processes added to almost 30 litres already lost during the dehydration. The liquid lost in the decantation together with what was used during the modelling and decoration of the wares must be added to these figures. That means that the fabrication of the 191 Dressel 20 amphorae and the 28 supporting bowls that could be fired in kiln 3 of Las Delicias, according to the recently published reconstruction,²⁰ would have consumed at least 8.250 litres of water.

In view of those references we can conclude that in antiquity water was a very critical resource for the production of pottery. It was needed in huge quantities and despite clay or firewood, its transport and storage would have needed some planification and the construction of infrastructures. That is to say, even if potter's workshops had to be placed nearby clay quarries and woods, it is very possible that the determining factor for their location was the presence of water (wells, rivers, aqueducts) or the possibility of storing it (cisterns).

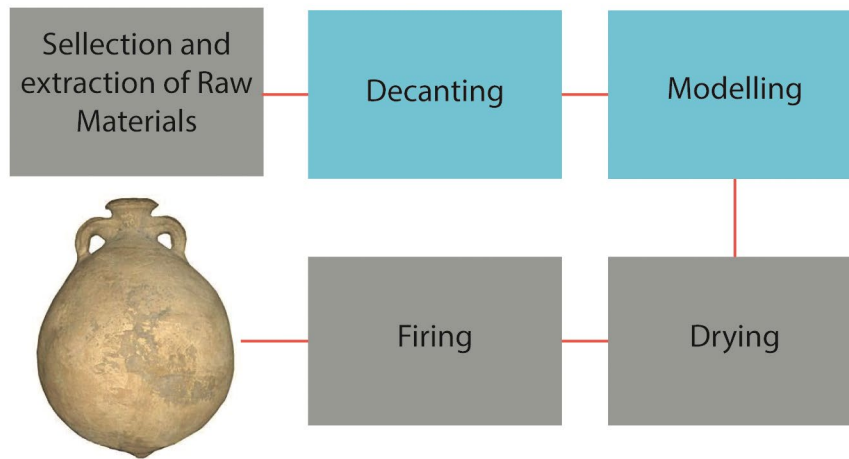


Fig. 4: Diagram of the pottery manufacturing process. The steps in which water was essential have been highlighted in blue.

Notes

¹ Peacock 1982; Echallier – Montagu 1985; Jubier-Galinier et al. 2004; Cuomo di Caprio 2007; Díaz Rodríguez 2008 and 2013.

² Cockle 1981; Mayerson 2000.

³ Pirault et al. 2001, 152.

⁴ Desbat 2002, 202.

⁵ Moreno – Orfila 2017, 196–199.

⁶ Díaz Rodríguez 2013, 51.

⁷ Bernal – Sánchez 1998.

⁸ Pirault et al. 2001, 150.

⁹ Cavassa et al. 2014; Peña – McCallum 2009.

¹⁰ Chacón Mohedano 2013.

¹¹ González Blanco et al. 1989, 51; González - Amante 1992, 47–48; Sáenz – Sáenz 2013, 475.

¹² Almeida et al. 2013, 368.

¹³ Ruiz Montes 2011, 259.

¹⁴ Vernhet 1986, 96.

¹⁵ A *tubuli* pipe was identified for example at Illa Fradera (Badalona, Spain); Padrós et al. 2013, 450.

¹⁶ A recycled amphorae water channel was excavated for instance at the potter's workshop of Venta del Carmen; Bernal – Sánchez 1998.

¹⁷ Coll Conesa 2000, 196.

¹⁸ For instance Díaz Rodríguez 2008, 95.

¹⁹ Bowman – Wilson 2009; Callataÿ 2014.

²⁰ Carrato et al. 2018, 313.

Image Credits

Fig. 1: (a) Moreno – Orfila 2017; (b) Blondé et al. 1992. – Fig. 2: Chacón Mohedano 2013. – Fig. 3: Padrós et al. 2013. – Fig. 4: by the authors.

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