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Emplazamiento, infraestructuras y organización de los puertos romanos

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Antonio Pizzo
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Índice

VOLUMEN I

ÁFRICA DEL NORTE

MAR ROJO

MEDITERRÁNEO ORIENTAL I

VOLUMEN II

MAR NEGRO

MEDITERRÁNEO ORIENTAL II

OCÉANO ATLÁNTICO

PUERTOS FLUVIALES Y LACUSTRES

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Harbour Facilities at the Fish-salting Production Centre of Tróia (Portugal)

Instalaciones portuarias del centro de producción de salazón de pescado de Tróia (Portugal)*

Ana Patrícia Magalhães, Sónia Bombico**, Inês Vaz Pinto*****

Abstract

The site of Tróia is a well-known archaeological site for its outstanding fish-salting production activity. Located in the Sado River estuary and part of *Lusitania* province, presents, on the shoreline, in the area of the so-called "Porto Romano", two very thick walls with rounded corners that face the estuary. Is it possible to interpret them as harbour structures?

The majority of the fish-salting factories and workshops identified in Tróia extend along the north shore of the archaeological site along c. 1km. Next to this long line of fish-salting infrastructures and other buildings is the so-called "Fundão de Tróia", a sub aquatic area 25 to 28m deep in the south channel of the Sado River estuary, where many vessels and objects were collected, most of them amphorae, suggesting an anchorage area.

The shoreline was extensively eroded, but docks or harbour constructions were needed to disembark raw materials and empty containers and embark products for sale.

As traditionally viewed, the large walls parallel to the coastline with a building on the rear could be a harbour, but they may also act as a bulwark, shielding against high tides several times a year.

This paper presents these masonry structures in the shoreline of Tróia and discuss for the first time the type of harbour infrastructure and port operation of this fluvial-maritime interface.

Keywords: harbour, Tróia, fish-salting, fluvial maritime port, *Lusitania*.

Resumen

Tróia es un conocido yacimiento arqueológico por su destacada actividad de producción de salazón de pescado. Ubicado en el estuario del río Sado y parte de la provincial de *Lusitania*, presenta, en la costa, en el area del llamado "Porto Romano", dos muros muy gruesos con esquinas redondeadas que dan al estuario. ¿Es possible interpretarlos como estructuras portuarias? La mayoría de las fábricas y talleres de salazón de pescado identificados en Tróia se extienden a lo largo de la costa norte del yacimiento arqueológico, aproximadamente a lo largo de 1 km. Junto a esta larga línea de infraestructuras de salazón de pescado y otros edificios se encuentra el llamado "Fundão de Tróia", una zona subacuática de 25 a 28 m de profundidad en el canal sur del estuario del río Sado, donde se recogieron muchos recipientes y otros objetos, la mayoría de elos ánforas, lo que sugiere la existencia de un área de fondeadero.

La línea de costa estaba ampliamente erosionada, pero eran necesarios muelles o construcciones portuarias para desembarcar materias primas y contenedores vacíos y embarcar productos para la venta.

Como tradicionalmente se ha visto, los grandes muros paralelos a la costa con un edificio en la parte trasera podrían ser un puerto, pero también podrían actuar como dique contra las mareas altas varias veces al año.

Este artículo presenta estas estructuras de mampostería en la costa de Tróia y debate por primera vez el tipo de infraestructura y funcionamiento portuarios de esta interfaz marítimo-fluvial.

Palabras clave: puerto, Tróia, salazón de pescado, puerto marítimo-fluvial, *Lusitania*.

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Introduction

The site of Tróia is located in the Iberian Peninsula, in Portugal, 50 km south of Lisboa. This Roman archaeological site is located in the Peninsula of Tróia, on the left shore of the Sado River estuary and is part of the Lower Sado River Valley harbour complex (Fig. 1).

Tróia is implanted on a quaternary sand embankment that archaeologists and geologists believe to have been an island or a sequence of islands in Roman times (Freitas and Andrade, 2008, 27). Apparently, a very large urban-industrial settlement grew out of an industrial cluster of fish-salting factories, dependent on water transportation for supplies and trade. Almost all the factories that have been unveiled open to the Sado River Estuary and the buildings are perpendicular to the shoreline. Harbour activity on this shore was obligatory, probably spread along 800 m with continuous remains of ancient buildings, but a severe process of coast erosion has washed away the frontline vestiges. The thick round corner walls infrastructure presented here seem to be the only left connected to harbour activity.

This paper will present the masonry structures located on the shoreline of Tróia, in the so-called "Porto Romano" (Lat.: 38.4861 and Long.: -8.8823) and intends to discuss their function and possible relation to harbour activities for the first time. The interpretation of this archaeological evidence visible at Tróia will increase the knowledge of the ports' infrastructures and port operation in the Lower Sado River Valley.

Brief historiography of the discoveries

The site is known since the 16th century because of coast erosion that brought to light many walls and vats that had been buried in sand for centuries. Scholars, antiquaries, treasure hunters and all sorts of visitors would come to Tróia since that period to collect Roman objects in the beach (Castelo Branco, 1963).

In the late 1950s, the archaeologists Manuel Heleno and Fernando Bandeira Ferreira promoted one of the first diving campaigns in Portugal, along the shore in the "Fundão de Tróia", the deepest area of the river in the south channel of the estuary. These brought to surface several hundreds of amphorae, both regional and imported. They considered that a submerged port had been found (Diário Ilustrado,

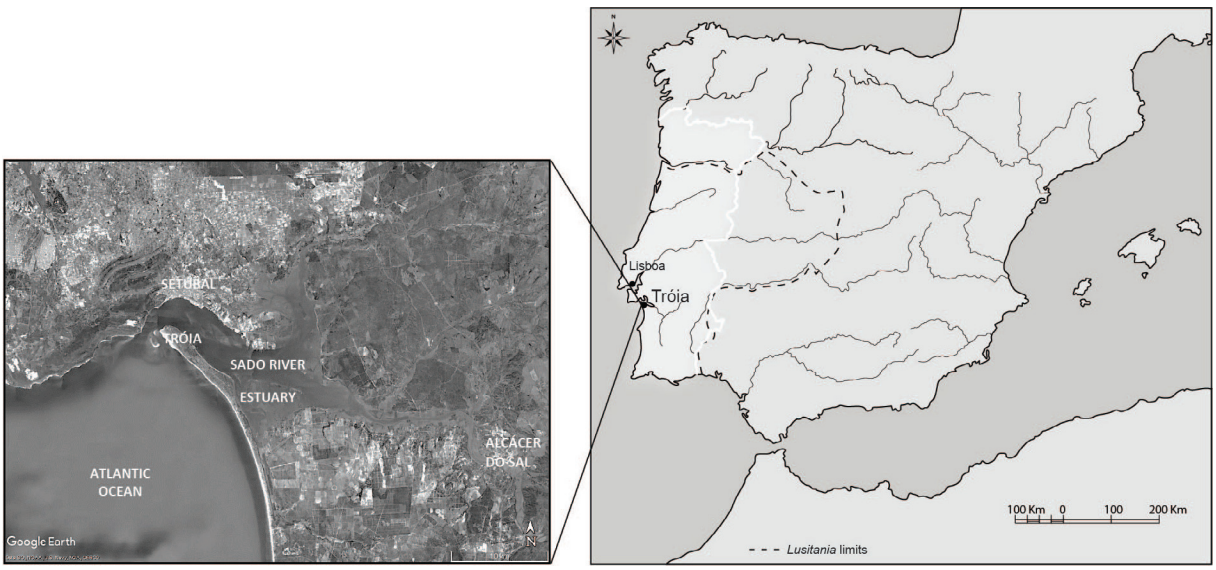

Fig. 1. Geographic location of the archaeological site of Tróia and the Lower Sado River Valley (www.googleearth.com).

12-10-1959) and that the structures on the shore were the Roman Docks. The diving campaigns continued until the 1970s, and several studies on the amphorae were published (Cardoso, 1978; Diaz Álvarez, 1981; Diogo and Trindade, 1998; Almeida *et al.*, 2014), but a global study remains to be done.

In the 1960s, Fernando de Almeida promoted excavations in the high dunes behind the Roman Docks. These brought to light the top of a few walls belonging to several tall buildings, but the results were not published. R. Étienne, Y. Makaroun and F. Mayet (1994, 98 and planche XV) were the first to present the "monumental complex" composed of docks and an *opus quadratum* building that may have been a market or warehouses.

Description and typology of port infrastructures

In the shoreline of Tróia, next to fish-salting workshop 15, there are two very thick aligned walls, parallel to the waterline, which are most certainly harbour structures (Fig. 2 and 3), as they were traditionally interpreted. They may correspond to part of a wharf structure or a seawall to protect the area from exceptionally high tides that may occur several times a year. Behind these walls, a large building in *opus quadratum* with wide entrances seems to be a warehouse possibly related to the port (Fig. 3 and 4).

A recent opportunity for further research in this area gave new information.

Recent archaeological works

The archaeological data currently available was insufficient to discuss the function and phases of the harbour structures presented here. For that reason, in April 2022, we undertook a two-week excavation campaign to open two trenches: one in the southwest side of the entrance composed by the upper thick walls; and another one, with the same orientation, on the northeast side of a compartment created on a later phase (Fig. 4).

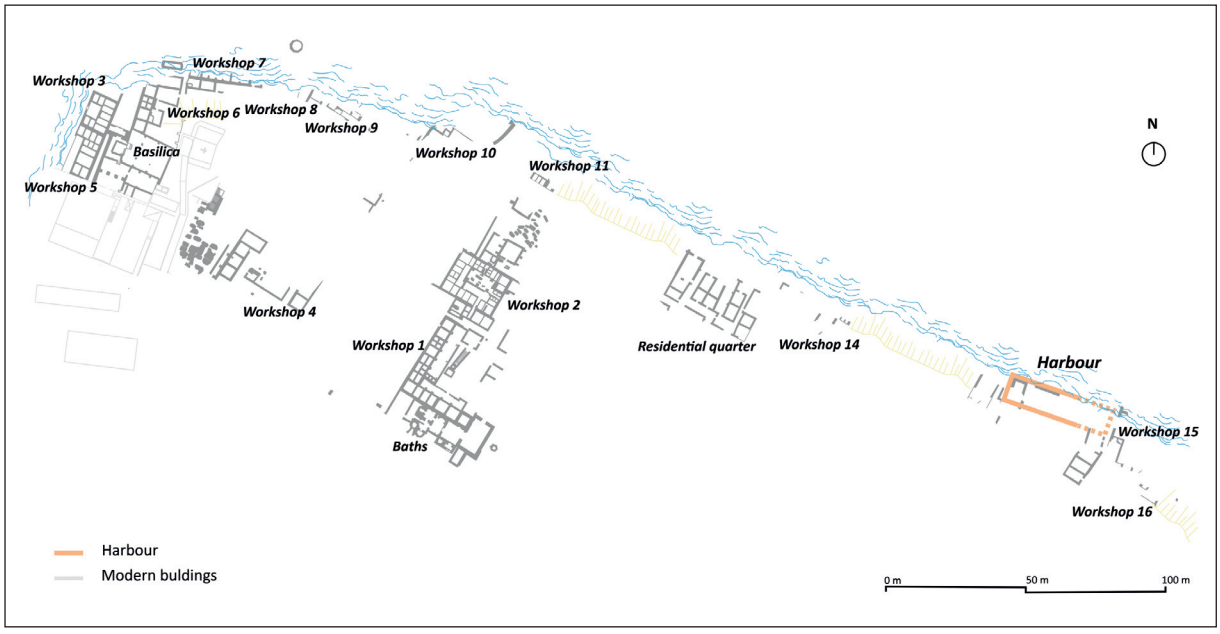

Fig. 2. Area of the potential harbour in the partial plan of the Roman Ruins of Tróia.

Fig. 3. Aerial view of the area with the port infrastructures (NE-SW view) (THEIA).

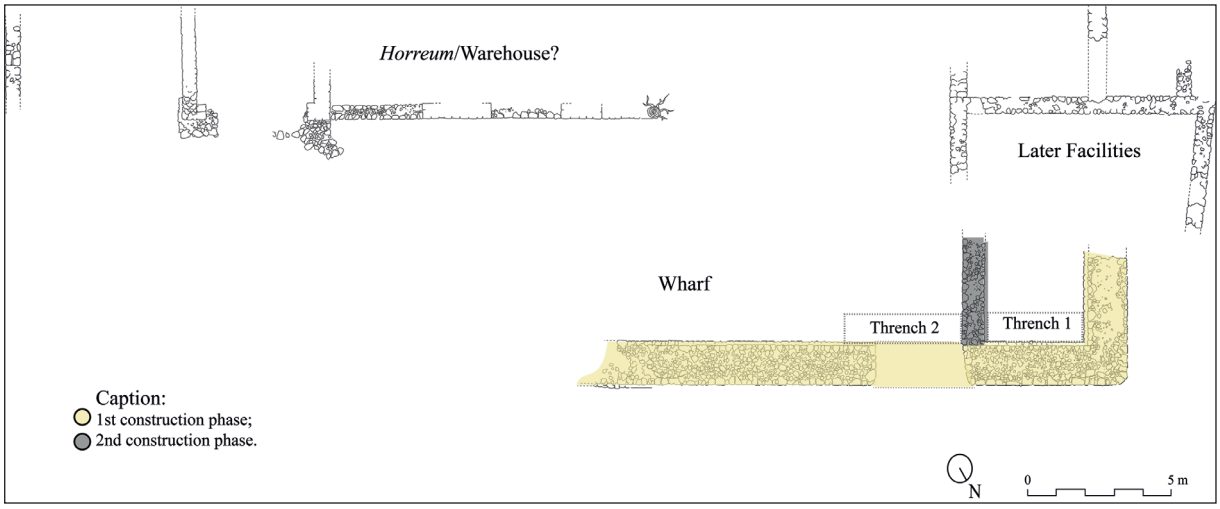

Fig. 4. Top plan of the area in discussion with the trenches location (José Luís Madeira and Ana Patrícia Magalhães, 2008).

The archaeological works on the site were very difficult to manage due to the proximity of the water line and to tide activity that partially submerged the structures and one of the trenches at high tide.

However, the preliminary results of this excavation enabled us to precise the interpretation of the building construction, with the observation of the masonry preserved down to the foundation level. The stratigraphy was contaminated and continuously affected by tides, but it provided data materials from the 1st to the 5th century, with Gaulish *Terra Sigillata* (Drag. 11, 24/25 and 30), the earliest versions of regional amphora Dressel 14 and Almagro 51c. These data extend the period of use of this area until the abandonment moment of the fish-salting production (Pinto, Magalhães and Brum, 2012; Magalhães, 2021).

Construction characteristics and building phases

The waterfront construction is formed by thick walls with frequent large limestone and conglomerate (*brecha da Arrábida*) blocks on the sides filled with concrete made of hydraulic mortar, gravel and smaller stones, with a northwest-southeast orientation, in an *opus incertum* with fairly regular rows.

After the recent excavation, it was possible to understand that the two large thick walls with an entrance (Fig. 5a and b) are part of the same large structure and belong to the same original building phase.

The possible wharf was therefore outlined by a solid and continuous base, with irregular large stones in *opus incertum,* establishing a solid base of 0,63 m in height, with a thicker foundation created by a first row of blocks 16-25 cm deep (Fig. 5c).

On top of this foundation three walls were raised creating an entrance with rounded corners facing the estuary. They present a regular facing, mainly composed by large limestone blocks, with more regular rows.
These walls were made with two different masonry levels completely aligned with the foundation on the side facing the estuary. On their internal face, the first masonry level is aligned with the continuous foundation wall on the bottom but is thicker than the top level, which seems to have provided a step to hold a wooden structure, and we propose that step indicates the circulation level (Fig. 5c).

It was possible to recover many iron nails, some of them connected with stone and one inclusively integrated in this level of the wall, suggesting that they were associated with the construction technique used to deploy the wood beams to support the wooden floor. This masonry level measures 0,63 m, the same height identified in the continuous wall forming the foundation level on the bottom, being consistent with the theory that they are from the same construction phase.

On the upper part of this structure, also forming the entrance, it is possible to observe another masonry level less thick than the previous one which could have been made to offer more protection from the tides and to prevent the water to come inside. This last level of the walls seems to be incomplete, with only 0,53 m preserved, but it could have the same height as the previous ones.

On the north side, the quay wall makes a 90° angle, forming a rounded corner and giving the structure an L-shape. (Fig. 5d). It is not yet clear how the port structure would end on the south side, but this structure is parallel to a large building located behind it, so it will most likely have followed the length of that building.

On a second building phase, it is only possible to observe the construction of another wall, less thick, but of similar construction and with a thicker foundation level, that develops towards the south-southwest, forming a compartment with a U-shaped plan in the north corner of the wharf (Fig. 4 and 5d). The interpretation of this later compartment is yet uncertain, but it is frequent to find administrative control towers in this type of harbour infrastructures.

Coast erosion heavily affected the shoreline but the activity of disembarking raw materials and empty containers and embarking the products for sale took place in this area, and therefore docks or other harbour structures should exist.

The entrance created (1,19 m a.s.l.) is 3,10 m wide and might have allowed the access or shelter of small boats on the space between the thick walls and the buildings behind them, as we see today in dry docks.

Moreover, it is possible that the stone quay constituted a fixed base, from which wooden quays developed parallel or perpendicular to the walls, extending to the estuary. The use of stilted quays is still observable in the region, namely in the small fishing palafitte harbour of Carrasqueira (Fig. 5e), located c. 20 km southwest of Tróia. This solution allows the port to cope with the large amplitude tides proper to the Atlantic coast, keeping the port in operation during low tide.

The existence of wooden port structures is quite usual in Roman Atlantic ports, as it is the case of *Londinium* (Rogers, 2011).

Associated facilities

On the backside of these walls, there is a large building made in *opus quadratum*, mostly made of limestone, with several wide entrances, possibly doors, integrated in the first building phase (Fig. 5f). The entrances seem to have provided a series of compartments typical of shops or small markets, and most likely *horreum* connected with fluvial/maritime warehouses, common in port areas.

The industrial nature of the archaeological site of Tróia do not let us disregard a possible maritime warehouse to store amphora containers and salt needed for the fish salting production, as well as foodstuffs and other goods necessary to daily life in Tróia coming from nearby areas or from other regions of the Roman world. Warehouses would also be necessary to store the fish product amphorae ready for shipment.

The structural connection between the harbour infrastructure and the building located immediately behind it is not entirely clear, but that infrastructure seems to have provided a platform and shelter for the *horreum* activity and to facilitate the loading and unloading of goods from and to the ships. Its circulation level is 2.00 m a.s.l. while the inner step on the wharf is 1,85 m a.s.l. which is very close, and the 0,15 m difference could have been for the presumed wooden floor.

Fig. 5. Port infrastructures: 5a - Walls with entrance facing the waterline; 5b – Continuous wall on the bottom of the entrance and trench 2; 5c – Internal face of the different wall levels with foundation visible in trench 1; 5d – Round Corner on the N side with the later compartment; 5e – Palafitte harbour of Carrasqueira; 5f – Large building with wide entrances on the back of the seawall (NE-SW view) (Inês Vaz Pinto photos).

On the upper part of the sand dune, on the back of these structures, there are buildings with thinner walls at different levels, certainly from a different construction phase and problably built for another purpose, not yet determined.

Administrative context, relationships with urban settlements and the territory

The Lower Sado River Valley is an interesting case study to understand the port systems of Roman Lusitania, revealing an interest in estuaries and protected bays for the establishment of ports and maritime cities, and thus adjusting to the Atlantic navigation conditions.

Located in the middle of the Western coast of the province of Lusitania, the Lower Sado River Valley gathered the perfect conditions for vessels and cargo, in the domain of both maritime and land routes, such as the Atlantic Route and Via XII from the Antoninus Pius itinerary (Carneiro, 2008, 50).

This region would benefit from the abundance fisheries of the Atlantic and from the excellent anchorage and shelter conditions for boats.

The economic system specialized in the fish-salting production characterized the Roman occupation of this maritime region, formed by cities and small dependent villages and productive areas. Two cities stand out: Alcácer do Sal (*Salacia*), 30 km upriver, was the capital of the *civitas* and Setúbal (*Caetobriga*) was a secondary urban agglomeration on the river mouth.

The study of the imports from Alcácer do Sal suggests an urban decadence from the end of the second century (Faria, 2002; Viegas, 2014), when the economic power would have shifted to the river entrance, possibly because of the axle formed by Setúbal and Tróia (Soares and Silva, 2018) controlling the fish-salting production. With its numerous intricate fish salting factories on the left bank of the Sado River, Tróia had the largest production capacity known in a Roman fish-salting production centre (Pinto, Magalhães and Brum, 2014, 156). Smaller fish processing units were active in the urban centre of Setúbal and along the northern bank of the Sado estuary (Silva and Soares, 2020).

Upstream on the right bank, near the clay deposits, potteries grew to respond to the growing need for amphorae to pack the fish sauces and salted fish, destined for large scale commerce for the Empire. From the second half of the 20th century onwards, archaeological data on the pottery centres of the Sado have multiplied – Pinheiro, Abul, Enchurrasqueira, Bugio e Barrosinha (Mayet and Silva, 2017). These kiln sites revealed the evolution of regional amphorae, produced between the mid-1st century AD and the mid-5th century AD (Mayet and Silva, 2016).

Besides the already mentioned «Fundão de Tróia», underwater archaeological data reveals a large area of anchorage on the extension of the river mouth, at Cabo Espichel, with lead anchor stocks (Alves *et al.*, 1988-89).

Area of influence and radius of exchanges

Initiated by Augustus, Rome's Atlantic policy seems to have been consolidated in the age of Claudius, with the acknowledgement of the economic potential offered by the Atlantic region. Between the middle of the 1st century BC and the first half of the 1st century AD, an important Atlantic Route was established, linked to the supply to the army in the North of the Iberian Peninsula and in *Britannia*, recently conquered. It is in this context that the development of the fish products industry in *Lusitania*, which developed from the middle of the first century AD, must be understood (Fabião, 2009).

Active from the 1st to the 5th c. AD, in the *civitas* of Salacia in the province of Lusitania, Tróia took advantage of the prosperity of the fish-salting production made possible by environmental conditions proper for the establishment of anchorage, docks, harbours or ports vital for the supply of raw materials and to the flow of production.

The fish products from the fish-processing factories of Tróia, exported through its "port", must have reached consumer markets throughout the Roman world (Bombico, 2017) in Lusitanian amphorae, as evidenced by their presence in many land sites, and above all in Rome (Pinto, Almeida and Martin, 2016) but also in shipwrecks identified in the Western Mediterranean (Bombico, 2016).

The Cala Reale A shipwreck (Strait of Bonifacio), dating from the end of the 4th century to the middle of the 5th century AD, deserves to be mentioned for carrying an homogeneous cargo of more than 2000 Lusitanian amphorae, probably from the Sado, of the types Almagro 51a-b, Almagro 51C, Sado 3 and Beltrán 72 *similis* (Spanu, 1997; Gasperetti, 2012).

The weight of the fish industry in the Sado fluvial-maritime interface, as well as the study of the imports in archaeological contexts such as Alcácer do Sal, Setúbal and Troia confirm the enormous importance of port activity in this Atlantic region.

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