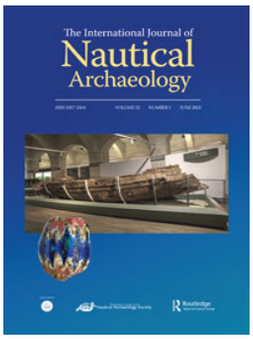

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(Re-)interpreting the Artefact Collection of the *Nossa Senhora da Consolação* Wreck (1608)

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ABSTRACT

The discovery of the sea route around the Cape by Vasco da Gama in 1498 opened the maritime trade between Europe, East Africa and India. At this time, Mozambique Island played a significant role mediating this maritime network. As a result, an impressive amount of underwater cultural heritage was created, but it was heavily impacted over the last decade by commercial salvage activities. In the aftermath of the impacts from treasure hunting, this paper presents an on-going (re-)interpretation and assessment of indicative archaeological artefacts recovered from the *Nossa Senhora da Consolação* wreck (1608). The on-going (re-)interpretation is based on comparative analysis with artefact assemblages recovered in other contemporary shipwrecks and terrestrial sites around the world. Results suggest that *Nossa Senhora da Consolação* was a ship integrated in global trading networks, which met its fate at Mozambique Island due to commercial competition and access to the strategic coastal position between the Portuguese and the Dutch.

(Re)interpretando la colección de artefactos del pecio *Nossa Senhora da Consolação* (1608)

RESUMEN

El descubrimiento por Vasco da Gama en 1498 de la ruta marítima en torno al Cabo abrió el comercio marítimo entre Europa, África Oriental e India. En esa época, la isla de Mozambique jugaba un rol importante como mediadora de esta red marítima. Como resultado, se generó una cantidad significativa de patrimonio cultural subacuático pero este se ha visto fuertemente impactado en la última década por actividades comerciales de salvamento. Tras el impacto de la caza de tesoros, este artículo presenta una (re)interpretación y evaluación, en curso, de los artefactos arqueológicos indicativos recuperados del pecio *Nossa Senhora da Consolação* (1608). La (re)interpretación en curso se basa en el análisis comparativo con conjuntos de artefactos recuperados en otros pecios contemporáneos y en sitios terrestres de todo el mundo. Los resultados sugieren que *Nossa Senhora da Consolação* era un barco integrado en redes de comercio globales, que halló su destino en la isla de Mozambique debido a la competencia comercial y al acceso a una posición costera estratégica entre portugueses y holandeses.

(重新)阐释'圣母神慰号'（*Nossa Senhora da Consolação*）沉船（1608年）上的人工制品

摘要

1498年瓦斯科·达·伽马发现了绕开普敦的航路，开启了欧洲、东非和印度之间的海上贸易。此时，莫桑比克岛在调解这一海上网络方面发挥了重要作用。由此产生了大量的水下文化遗产，但在过去的十年里，它们受到了商业打捞活动的严重影响。在寻宝活动冲击的余波中，本文介绍了对'圣母神慰号'（*Nossa Senhora da Consolação*）沉船（1608年）上发现的指示性考古文物所做的持续（重新）阐释和评估。这种持续的（重新）阐释是基于与世界各地其他同时代沉船和陆上遗址中发现的文物组合的比较分析。结构表明，'圣母神慰号'是一艘融入全球贸易网络的船舶，由于商业竞争和进入葡萄牙和荷兰之间的沿海战略位置，它在莫桑比克岛遭遇了翻覆的命运。

(重新)闡釋「聖母神慰號」（**Nossa Senhora da Consolação**）沉船（1608年）上的人工製品

摘要

1498年瓦斯科•達•伽馬發現了繞開普敦的航路，開啟了歐洲、東非和印度之間的海上貿易。此時，莫桑比克島在調解這一海上網絡方面發揮了重要作用。由此產生了大量的水下文化遺產，但在過去的十年裏，它們受到了商業打撈活動的嚴重影響。在尋寶活動沖擊的余波中，本文介紹了對「聖母神慰號」（*Nossa Senhora da Consolação*）沉船（1608年）上發現的指示性考古文物所做的持續（重新）闡釋和評估。這種持續的（重新）闡釋是基於

KEYWORDS
Maritime trade networks; competition; imported material; local material

PALABRAS CLAVE
Redes de comercio marítimo; competencia; material importado; material local

关键词
; 海上贸易网; 竞争; 进口材料; 本地材料

關鍵詞
海上貿易網; 競爭; 進口材料; 本地材料

الكلمات الدلالية
شبكات التجارة البحرية
المنافسة
المواد المستوردة
المواد المحلية

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與世界各地其他同時代沉船和陸上遺址中發現的文物組合的比較分析。結構表明，「聖母神慰號」是一艘融入全球貿易網絡的船舶，由於商業競爭和進入葡萄牙和荷蘭之間的沿海戰略位置，它在莫桑比克島遭遇了翻覆的命運。

(إعادة) تفسير لمجموعة القطع الأثرية الخاصة بحُطام سفينة نوسا سينهورا دا كونسولاساو (١٦٠٨)

المُستخلص

لقد فَتح اكتشاف الطريق البحري حول الكيب (الرأس بجنوب أفريقيا) بواسطة فاسكو دا جاما عام ١٤٩٨ التجارة البحرية بين أوروبا وشرق إفريقيا والهند. وفي هذا الوقت لعبت جزيرة موزمبيق دوراً هاماً في التوسط في هذه الشبكة البحرية. ونتيجة لذلك تَكون قدر هائل من التراث الثقافي التحتماني ولكنه قد تأثر بشكل شديد على مدى العقد الماضي وذلك عن طريق أنشطة الإنقاذ التجارية. وفي أعقاب الآثار الناجمة عن أعمال البحث عن الكنوز، يُقدم هذا المقال (إعادة) تفسير وتقييم تحت قيد التنفيذ للقطع الأثرية الدلالية التي تم انتشالها من حُطام سفينة نوسا سينهورا دا كونسولاساو (١٦٠٨). وتعتمد (إعادة) التفسير قيد التنفيذ هذه على التحليل المقارن مع مجموعات القطع الأثرية التي تم انتشالها من حُطام السفن والمواقع الأرضية المعاصرة الأخرى حول العالم. وتشير النتائج إلى أن سفينة نوسا سينهورا دا كونسولاساو كانت سفينة مُدمجة في شبكات التجارة العالمية حيث لقيت مَصيرها في جزيرة موزمبيق بسبب المنافسة التجارية والوصول إلى الموقع الساحلي الاستراتيجي بين البرتغاليين والهولنديين.

Introduction

Mozambique Island is 3 km long and 200–500 m wide and located off the northern coast of Mozambique in the province of Nampula (Figure 1). The Island is commonly characterized by a tropical humid climate influenced by the Intertropical Convergence Zone (ITCZ) responsible for two environmental periods: a rainy season from November to March and a dry season from May to October (Fonseca, 1996). Over time, the environmental characteristics of the ITCZ have shaped the monsoon winds, which benefited navigators in the development of maritime trade networks, navigating towards Mozambique Island and other trade ports along the East African coast (Duarte, 1993).

From the early 2nd millennium AD, in the 12th or 13th century, Mozambique Island was under the political and economic dominance of Kilwa, in present-day Tanzania, which was the major regional Sultanate (Newit, 2004; Sutton, 1998). Thus, the island contributed to an intense maritime trade that took place alongside the establishment of socio-economic networks that influenced cultural miscegenation between the hinterland, coastal people and foreigner traders (see Fleisher et al., 2015; Kusimba & Walz, 2018; Newit, 2004). One of the results of all these interactions are well-preserved shipwrecks from the 16th century onward, along with a multitude of archaeological objects, later looted by a treasure hunting company from the early 2000s to 2014. A good example of these activities is the wreck of *Nossa Senhora da Consolação,* looted and then left to deteriorate. From this wreck site many artefacts were collected; those with commercial value were sold while the non-commercially valuable ones, presented in the list in Appendix 1, were left in Mozambique Island Museum. Today, it is a challenge to reconstruct and (re-)interpret this archaeological collection that is part of a largely-unknown cosmopolitan past (Duarte, 2012). This paper attempts an on-going process to (re-)interpret the artefact collection of *Nossa Senhora da Consolação,* mainly those in the museum, at a global scale of maritime trade and address further analysis.

Description of Mozambique Island's Underwater Cultural Heritage

The discovery of the sea route around the Cape of Good Hope by Vasco Da Gama in 1498 allowed the creation of new maritime trade dynamics between Europe, Africa, and the Indies with the establishment of the *Carreira das Indias* route, which increased substantially the maritime trade in the Indian Ocean (Bastião, 2010). In this period Mozambique Island played an important role in mediating the maritime networks, since Portuguese vessels that followed this route often passed through Mozambique Island to resupply, repair, wait for the monsoons, heal the sick, and shelter shipwrecked people (Newit, 2004). The crucial importance of Mozambique Island in the *Carreira das Indias* was recognized by the Portuguese crown, and in 1507 King D. Manuel ordered the construction of the São Sebastião Fortress and the establishment of a military position (Garcia, 2009).

Portuguese vessels operating in the *Carreira das Indias* transported rich cargos from the Indies to Europe and vice-versa, creating a prosperous route which developed not only the local socio-economic dimension, but also shipbuilding technology, navigation systems and cultural interaction (Castro, 2013). Mozambique Island witnessed these intense trade activities that created a precious cultural heritage whose remains still lie on land – classified as UNESCO World Heritage Site in 1991 – and under water. The importance of underwater cultural heritage (UCH) on Mozambique Island was recognized in the early 1960s by Quirino Da Fonseca who carried out the first underwater survey program. Da Fonseca (1964) was able to identify three main areas where shipwrecks occurred, specifically the channel in front of the São Sebastião Fortress, the area near São Lourenço Fort, and the Cabaceira Pequena area. The project undertaken by Da Fonseca (1964) in the 1960s was the

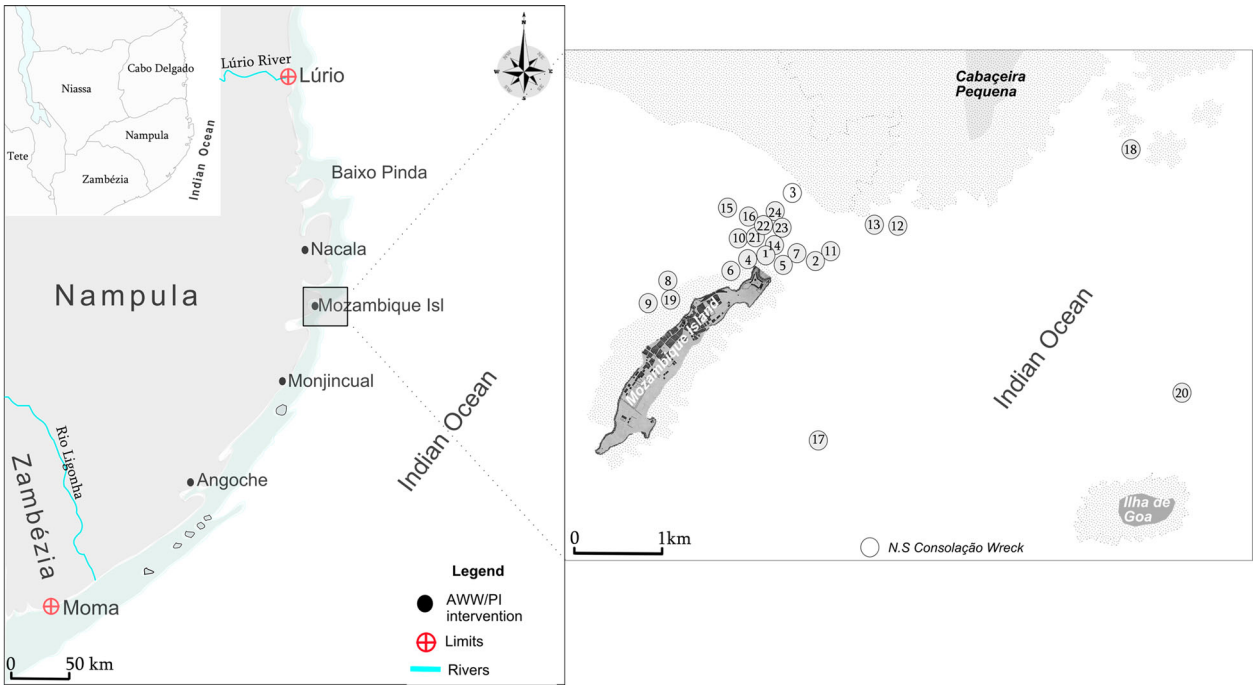


Figure 1. Map of the AWW/PI consent area and location of the Mozambique Island wrecks (after AWW/PI, 2014, p. 34).

first effort to study Mozambique Island's UCH using a detailed methodology to locate sites and describe archaeological features (Duarte et al., 2015; Mahumane, 2020).

Right after Da Fonseca's project, the war for independence was launched in Mozambique (1964–75). No underwater archaeological project was reported in the whole country until 1982 when Ricardo Teixeira Duarte and Per Inger Lindquist surveyed the northern coast of Mozambique, Cape Delgado, and the Nampula Province, revealing the presence of significant UCH (Duarte, 2012). Later, in 1984, Jean-Yves Blot from the Portuguese National Centre of Nautical and Underwater Archaeology (CNANS) joined the work, and more than ten shipwrecks were located in the area between Baixo Pinda, Mozambique Island, and Mongicual in Nampula Province (Duarte, 2012; Duarte & Menezes, 1994). Among these areas, Mozambique Island was declared by far the richest area and the formulation of a long-term research program was recommended.

Thereafter, between 1998 and 1999, the Department of Archaeology and Anthropology of Eduardo Mondlane University (DAA-UEM) in partnership with Brown University, conducted a preliminary study of the maritime heritage of Mozambique Island (Duarte, 2012; Mahumane, 2020). Several surveys were carried out at Mozambique Island and at Cabaceira, revealing two sites from the early Portuguese period: one wreck located in front of the São Sebastião Fortress was identified as the São Sebastião Fortress shipwreck or IDM-002 (1558); the other wreck, located 1 km from the fortress towards Cabaçeira Pequena, was later identified as *Nossa Senhora da Consolação* or IDM-003 (1608) (Duarte, 2012; Duarte et al., 2015; Mahumane, 2020). Due to the importance of these sites, a monitoring program began in 1999 and an ambitious UCH research project was formulated with the support of the SIDA-SAREC, UNESCO, and the US National Park Service (Duarte, 2012). The aim was to study and preserve the maritime heritage in the National Marine Parks and Reserves of Mozambique and provide public education and well as linked initiatives to promote local sustainable development, including cultural tourism (Duarte, 2012; Mahumane, 2020).

However, all these initiatives ended abruptly in mid-1999, when the Mozambican Government, against the advice of heritage officials and national archaeologists, decided to develop an extensive program for recovery and commercialization of UCH with the treasure hunting company Arqueonautas Worldwide/Património Internacional (AWW/PI) over an area of 700 km (see Figure 1) between Cabo Delgado and Nampula (Duarte, 2012; Duarte et al., 2015; Mahumane, 2020).

For over 14 years, the UCH around Mozambique Island and in its vicinity were negatively impacted and 24 known shipwrecks were affected, including the wreck of *Nossa Senhora da Consolação* (see Figure 1). The salvage operations on this wreck resulted in the exposure of its wooden hull (Figure 2) and recovery of material culture evidently linked to global transactions. Unfortunately, some of the artefacts were sold and part of the collection was dispersed (Mahumane, 2020; Simbine, 2013). After years of national

and international pressure denouncing the level of irregularities undertaken by AWW/PI on the UCH of Mozambique Island, the Mozambican Government allowed a team of maritime archaeologists to carry out an assessment of the 14 years of AWW/PI activities. This team was led by DAA-UEM in partnership with a technical team assembled under the auspices of the Slave Wrecks Project, with technical expertise drawn from four of the institutions involved in that collaboration (George Washington University, USA; Smithsonian Institution's National Museum of African American History and Culture, USA; IZIKO-Museums of South Africa; Africa Centre for Heritage Activities, South Africa) as well as expertise from the US Naval Heritage Command. The assessment team produced a report informing of several levels of destruction and loss of heritage. The poor documentation, conservation and mitigation methodologies used by AWW/PI imposed serious limitations for the possibilities for archaeological re-interpretation of the looted sites (Duarte et al., 2015). Consequently, in 2014, the Mozambican Government cancelled the AWW/PI permit and tasked the DAA/UEM and their international partners to work on the conservation of the UCH and the development of methodologies to re-interpret what was left, as well as to build local capacity to study and preserve this irreplaceable heritage.

Therefore, since 2016 many efforts have been undertaken to preserve and reconstruct the maritime history of Mozambique Island linked to local and global developments (Duarte et al., 2015; Mahumane, 2020). This paper will focus on the material culture stored in Mozambique Island Museum that still are undergoing analysis to re-interpret the maritime trade history of one of the most disturbed sites, the *Nossa Senhora da Consolação* wreck.

Contextualizing the Wreck of *Nossa Senhora da Consolação* (1608)

The *Carreira das Indias* was the most prosperous maritime route for the European world to gain access to rich resources of the Indies, particularly spices. During the 15th century AD, Portugal was the only European nation with ships sailing to the Indies to buy spices and other exotic goods appreciated in Europe (Arnold, 2014; Barradas, 2018; Murteira, 2006). However, later in the 16th century, this situation changed when Portuguese ships were constantly attacked by British and Dutch ships that were regularly sailing to Asia using the Cape of Good Hope route. Consequently, with this rise of commercial and maritime competition, Portugal was forced to use military fleets to escort its cargo ships coming and going to the Indies (Ferreira, 2007; Murteira, 2006; 2017).

In the beginning of the 17th century, Portuguese and Dutch fleets were often sailing across this route, resulting in conflicts for territory and trade harbours in West and East Africa (Ferreira, 2007). Both nations battled several times near St Helena Island, which was a strategic location for water, food supplies and ship repairs in western Africa (Ferreira, 2007; Murteira, 2006). After losing many ships, the Portuguese abandoned St Helena Island, which meant that the Dutch, with more territory under their influence, could send even more ships through this route (Arnold, 2014; Ferreira, 2007; Murteira, 2006). With these new conquests and the profitability of the trade to the East, the Dutch created the VOC (*Verenigde Oost-Indische Compagnie* – Dutch East India Company), on 20 March 1602. The main objective of this company was to end internal commercial competition, to build a unified military force and to attack *Carreira das Indias* ships (Arnold, 2014; Ferreira, 2007; Murteira, 2006). In this sense, the Dutch cast longing eyes on Mozambique Island, in East Africa, as it was the most important trade harbour for Portuguese ships (Barradas, 2018; Cardoso, 2013; Ferreira, 2007).

On three occasions the Dutch attempted to occupy the island resulting in the loss of many ships, among which was *Nossa Senhora da Consolação*. The first attempt took place in 1604 and was led by Steven Van Der Hagen with a fleet composed of 12 ships. However, the Portuguese were able to resist the attack and defend Mozambique Island (Arnold, 2014; Murteira, 2006). The second attempt to occupy the Island came in 1607 with a fleet of eight ships under the command of Paulus Van Caerden. Once again, the Portuguese were able to defend Mozambique Island. However, the Dutch presence delayed a Portuguese fleet heading to the Indies, which included the ship *Nossa Senhora da Consolação,* forcing it to winter on Mozambique Island until the next year's monsoon (Arnold, 2014; Durão, 1633; Murteira, 2006).

In 1608, the Dutch launched another attack on Mozambique Island led by Verhoeff, who left the Netherlands with a fleet composed of nine ships – *Geunieerde Provincien, Middelburg, Hollandia, Amsterdam, Roode Leeuw met Pijlen, Zeelandia, Rotterdam, Delft* and *Hoorn* – and four sloops – *De Pauw*, *Den Arend*, *De Valck* and *Griffioen* (Ferreira, 2007). Verhoeff was given the order to attack *Carreira da India* ships in the Mozambique Channel and at Goa, but he was advised to avoid Mozambique Island after the failures in 1604 and 1607 (Murteira, 2006). However, Verhoeff decided against this advice and preferred to wait for the ships at Mozambique Island. While based here, he attempted to occupy the São Sebastião Fortress (Arnold, 2014; Ferreira, 2007). On 28 June 1608, the Dutch fleet anchored in front of Mozambique Island and found the ships that had wintered there. By this

Figure 2. Site plan of *Nossa Senhora da Consolação* (after AWW/PI, 2014, p. 39).

time, no new ships had yet arrived from Portugal that year (Arnold, 2014; Durão, 1633). Verhoeff, anxious to engage in battle, decided to attack the fortress even though he had limited time available since he needed to depart for the Indies during the August monsoon (Murteira, 2006).

The Dutch fleet was seen approaching the São Sebastião Fortress and D. Estevão de Ataíde, Governor

of Mozambique Island at the time, organized the defence to protect the fortress and the ships anchored in the port (Barradas, 2018; Durão, 1633; Murteira, 2006). The vessels anchored in shallow water and near the fortress were saved (Durão, 1633). However, the firepower and range of the fortress' artillery were not sufficient. Ships out of cannon range were captured among which was *Nossa Senhora da Consolação*. At the moment of the attack, it was getting ready to sail to the Indies (Barradas, 2018; Durão, 1633; Ferreira, 2007). The crew of 36 were unable to resist the attack as the ship was being loaded with cloth, ivory, hippopotamus tusks, wine, spices and *cruzados* – all trade goods for the Indies (Barradas, 2018; Durão, 1633).

During the attack, the Dutch tried to move *Nossa Senhora da Consolação* away from the fortress using four sloops, but the ship was stranded on shoals near Cabaceira Pequena because of the low tide (Da Fonseca, 1964; Durão, 1633). Taking advantage of the situation, during the night of 25 July 1608, D. Estevão de Ataíde sent soldiers to set fire to the ship to prevent the Dutch from taking it (Durão, 1633). The mission was led by Bartolomeu Correia, the master of *Nossa Senhora da Consolação* and five soldiers. Using gun powder, the group was able to light a large fire severe enough to prevent any boat from approaching and causing the ship to wreck (Da Fonseca, 1964; Durão, 1633). With the Dutch presence on Mozambique Island, no ship of the Portuguese outward-bound fleet arrived in the Indies in 1608, either due to military operations or because they wrecked due to other causes. This same year was profitable for the Dutch as they did not suffer any losses of ships (Arnold, 2014). The presence of VOC fleets in the Indian Ocean undoubtedly displayed the considerable strength of the Dutch, becoming a real threat to Portuguese *Carreira das Indias* ships and responsible for the loss of many ships.

Earlier Disturbance Operations on the Wreck Site

The first effort to locate *Nossa Senhora da Consolação* wreck on Mozambique Island was made in the 1960s by Quirino Da Fonseca while conducting his underwater project. However, the location of the wreck was not found (Da Fonseca, 1964). In 1998 and 1999, the DAA-UEM archaeologist team reported a ballast pile, with some timbers and olive jars protruding out of the sediment, but the designation of the wreck was unknown until 2001, when the AWW/PI re-located the same site (code-named IDM-003) and later identified it as *Nossa Senhora da Consolação* (AWW/PI, 2014; Mirabal, 2007, 2013). The identification of the wreck seems to be assertive, as it was located on the area described in the historical accounts and the wooden hull structure was burnt, together with cloth, ivory, hippopotamus teeth, wine bottles, spices and some *cruzados*, all of which were being loaded onboard *Nossa Senhora da Consolação* at the time of the Dutch attack.

The shipwreck is located 1 km north of the São Sebastião Fortress between Mozambique Island and Cabaceira Pequena (Figure 1). The area of the wreck is characterized by shoals with flat sediments and coral heads which developed along the narrow channel (Duarte et al., 2015; Mahumane, 2020). The first intrusive operation on this site was carried out in 2001, when AWW/PI opened a test pit from which six boat-shaped lead ingots were recovered for identification purposes – although nothing has ever been reported (Duarte et al., 2015; Mirabal, 2001; 2004; 2005; 2013). In 2003, AWW/PI carried out more intrusive operations on the site digging four test pits in different sections of the wreck. The test pit on the north end (S1) revealed coarse-earthen ware ceramics and four boat-shaped lead ingots similar to those recovered during the 2001 operation (Mirabal, 2004; 2013). The three test pits in the southwest end (S2, S3 and S4) revealed olive jars, some sections of the wooden hull structure (Figure 2), fragments of martaban jars, lead seals, silver coins, and an iron cannon (Mirabal, 2004; 2013). However, as the site was not presenting any commercially valuable artefacts, the excavation on the site was abandoned in 2003 and attention turned to another wreck, *São José,* found with a great quantity of silver coins in Angoche (Guambe, 2015).

When nothing was left at *São José,* AWW/PI developed an extensive intrusive operation at *Nossa Senhora da Consolação* between 2005 and 2006, opening 18 squares that were continued from earlier campaigns (Figure 2) that revealed a diversity of artefacts informing about life on board and the nature of the activities the ship was involved in at the moment it wrecked. The findings from the intrusive operation included the rest of the remaining hull structure, olive jars, glazed ceramics, Chinese porcelain, martaban jars, two complete local pots, boat-shaped lead ingots, hippopotamus and elephant tusks, silver coins, copper objects, navigational tools and lead seals (Duarte et al., 2015; Mirabal, 2006; 2013), all listed in Appendix 1. Recording of artefacts' position and typology were not a major concern for AWW/PI, therefore the exact number of objects recovered is unknown, limiting any accurate artefact interpretation found in association with the hull remains (Duarte et al., 2015; Mahumane, 2020).

After the completion of the intrusive operations, the recovered artefact collection was treated and conserved, but not appropriately stored at the AWW/PI laboratory on Mozambique Island. Since basic aspects of conservation and numbering methodologies were

never made available, the collection is disorganized. Furthermore, AWW/PI never attempted an interpretation of the findings in relation to the site, limiting reporting simply to brief descriptions with illustration of the objects recovered.

(Re-)interpreting Recovered Artefacts from *Nossa Senhora da Consolação*

The number of artefacts collected by AWW/PI during the excavation of *Nossa Senhora da Consolação* wreck is unknown, mainly because the artefactual assemblage with commercial value was immediately sold and another portion was kept for private collections. Meanwhile, the non-commercial valuable artefacts were left in the storeroom at the Mozambique Island Museum.

In the research project described in this article, these remaining artefacts at the Mozambique Island Museum are analyzed to understand as much as possible the nature of the wreck within global maritime trade. The main methodology employed for the ongoing artefact analyses comprises a comparative study of indicative artefacts from the wreck with similar assemblages recovered in other relevant and contemporary shipwrecks and terrestrial sites to understand the dimension of the trade network in which *Nossa Senhora da Consolação* was involved. The initial analyses of the artefactual assemblage were based on the catalogue left by AWW/PI and Mirabal's book, *The excavation of the Nossa Senhora da Consolação (1608)*, which is a compilation of the 2005, 2006 and 2009 interim reports, describing site condition, excavation procedure, hull documentation, and artefacts collected (Mirabal, 2013). However, it is deficient in interpretation of the site as well of its archaeological context. Further comparison was established with other wreck sites found in Africa, Europe, Asia, and America. The artefacts and the results obtained from the analogies are discussed below.

Boat-shaped Lead Ingots

When the *Nossa Senhora da Consolação* wreck was located by AWW/PI in 2001, the company found six boat-shaped lead ingots and a sample from these was collected for identification purposes. However, nothing has been published or mentioned about the identification or analyses of these ingots. In addition, the 2006 excavation revealed 106 similar boat-shaped lead ingots found and collected from a single square (S14) (Figure 2) (Mirabal, 2006; 2013). Each weighed approximately 50 kg and measured 65 cm in length (Mirabal, 2013). In total, it is estimated that 5 tons of lead ingots were recovered from this wreck (Duarte et al., 2015). Ships like *Nossa Senhora da Consolação* would have maximum capacity of 400–500 tons (Castro, 2008). In this wreck excavation, between 2005–2006, approximately 250 tons of ballast were removed (Mirabal, 2007), which means the ship would still have half its capacity available to load cargo in the Indies.

All lead ingots onboard *Nossa Senhora da Consolação* had a triangular transversal section, narrower toward the ends. One of the flat surfaces of the ingots showed circular marks that may be indicators of ownership (Figure 3). The identity of this marker was not investigated at all. Unfortunately, the entire lead ingot collection was sold right after the end of the excavation season in 2006 (Duarte et al., 2015). Therefore, the comparative analyses of the ingots' characteristics, employed here in this paper, is based on available images of the ingots with other similar lead ingots collections found on other shipwrecks.

Generally, lead ingots in maritime archaeology are well published, thanks to scholars such as Willies (1985), Stedman (2009) and Van Duivenvoorde et al. (2013). Their work is the basis of comparison of the boat-shaped lead ingots, found on several wrecks of ships that sailed from Europe to Asia. The boat-shaped ingots share similarities in shape, weight, and marks, but are not identical. The specific boat-shaped lead ingots from *Nossa Senhora da Consolação* have not been identified in any of the literature so far. However, similar, but not identical lead ingots have been found on the *Zeepaard* wreck, which was lost on 28 October 1665 off the Shetland Islands during a storm (Brady, 2017). In the *Zeepaard* wreck, eight boat-shaped lead ingots were recovered with different lengths: two ingots are 70 cm, four are 80 cm, and the rest are 78 cm. All ingots, except one, has stamped marks on their surfaces and at least 13 different stamp designs were recognized (Brady, 2017).

The most precise method of dating ingots is by identification of the markings, as it provides authentic information concerning metal trade by the company or year of manufacture (Stedman, 2009; Tripati et al., 2003). The boat-shaped lead ingots from *Nossa Senhora da Consolação* all have a stamp mark on the surface. However, the one single available image of the stamp mark is not clear enough to allow further comparison with markings from other boat-shaped lead ingots collections (Figure 3). Willies (1985) established a standard typology method based on the size and shape to determine dating and comparison of lead ingots. The six ranges of lead ingots found on the *Zeepaard* wreck and those from *Nossa Senhora da Consolação* fit into what Willies (1985) considers as 'great pigs', or pig-shaped ingots. These were common in the 17th century AD, they were produced in northern England and the Dutch were the main buyers of this type. English historical source mentioned by Stedman (2009) and Van Duivenvoorde et al. (2013) support the idea that the Dutch looked for large

Figure 3. Boat-shaped lead ingot found at the *Nossa Senhora da Consolação* site (after Mirabal, 2013, p. 42).

quantities of lead in England. Moreover, chemical analyses of lead ingots from other wrecks such as from *Zuiddorp* (1712) and *Poompuhar* (1792) suggest that the ingots came from England (Stedman, 2009; Tripati et al., 2003; Van Duivenvoorde et al., 2013).

In the history of maritime trade, lead has played a major role, as by the 17th century AD, it was being used for multiple purposes. It could be re-smelted into musket balls and cartridge shot, anchor-stocks, gutters, seals and stamps, furniture parts, and tablet decoration (Stedman, 2009; Tripati et al., 2003; Van Duivenvoorde et al., 2013). Many European countries bought lead to use as cargo or paying ballast. It appears that the vessels coming from European countries carried lead, which was relatively cheap, heavy, durable and with ready market value (Tripati et al., 2003). The 5 tons of lead ingots found during the *Nossa Senhora da Consolação* excavation clearly suggests that lead ingots can be considered more as cargo than ballast, considering the ship total capacity. It also suggests that the Dutch were not the only nation acquiring lead in great quantities, as Portugal did on this occasion.

Coins

During the excavations, AWW/PI reported to have found 37 silver coins in poor condition of conservation, and therefore it was almost impossible to look into numismatic or historical insights (Mirabal, 2013). However, some of the markings on the coins are still visible and their origin could potentially be reconstructed (Figure 4). Most of the coins do not show any Portuguese markings, and it suggests that the coins are more likely to have emanated from the Spanish Empire, at a time when Portugal was linked to it through the Filipes´ Dynasty. Historical sources assert that during the mid-16th century, European countries did not have silver mints, except for Spain, the only nation mining silver in the Mexican mines (Cardoso et al., 2014). Silver coins were the dominate currency in European and international markets between the 16th to the 18th centuries (Cardoso

Figure 4. Silver coins from *Nossa Senhora da Consolação* (photo: Cezar Mahumane).

et al., 2014; Banco do Mexico, 2018). In the 17th century, the demand for silver coins increased; thus, Spain had to increase its coin production, opening new silver mints at Potosi (Bolivia) and Lima (Peru) (Cardoso et al., 2014). The characteristics of the coins found on *Nossa Senhora da Consolação* show strong similarities with those found on *Nossa Senhora dos Mártires* (1606) in Portugal and have been investigated by Cardoso et al. (2014), who analyzed a collection of 507 coins. Among the entire collection, all the coins were Spanish except for 25 that were Portuguese. The coins in question were called *Macuquina,* and they were minted and inscribed with the dates of King Filipe II, who reigned Portugal and Spain (Cardoso et al., 2014; Banco de México, 2018).

The analysis carried out by Cardoso et al. (2014) on the coin collection from *Nossa Senhora dos Mártires* aimed to determine their origin and to associate the collection with the wreck itself. This work was done to contextualize the ship chronologically and to reconstruct the commercial activities it was involved in. Therefore, recording accurate positioning of the coins at the site was fundamental for their interpretation. The methodology of Cardoso et al. (2014) also comprised comparisons of Portuguese and Spanish markings, dates, and values inscribed on the coins. The results revealed that Spanish coins were dominant in the *Nossa Senhora dos Mártires* collection, similar to other European wrecks used in commercial transactions in America, Africa, and Asia (Cardoso et al., 2014). A comparison of this collection and that of *Nossa Senhora da Consolação* shows great similarities and even though the coins from this wreck are in poor condition of conservation, it is possible to recognize traces of the minting of the *Macuquina*.

In maritime archaeology, the analysis of coin collections associated with specific wrecks can only be well performed if the contextual information is present and analysis of other types of archaeological materials with chronological sequence and typological significance is undertaken (Guerra, 1998). Through time, archaeological science has built the capacity of tracing back the origin of metals using different types of analysis such as XRF (as discussed below), which analyses metallic proprieties (Guerra, 1998). This helps in understanding the origin of metals and the technology of minting (Guerra, 1998; Cardoso et al., 2014), and the association of these elements provides a base for comparisons. These kind of analyses and comparisons are useful tools to understand social dynamics and commercial importance of metals, especially coins that were used in global trade networks. Coin analysis in archaeology can be used as an absolute dating method, providing a wide range of data used to ascertain details about a particular period much more accurately than historical sources (Guerra, 1998). Despite the similarities mentioned between the *Nossa Senhora dos Mártires* coin collection and the *Nossa Senhora da Consolação* collection stored at Mozambique Island Museum, further numismatic and archaeological investigation is needed using the above-proposed methodologies or others which can contribute to the contextualization of the collection recovered from the shipwreck, helping to understand its place in global commercial networks.

Lead Seals

Within *Nossa Senhora da Consolação*, AWW/PI recovered 49 lead seals that were analyzed by Mirabal (2013) and divided into two different types. Type A's shape is formed by two lead discs attached by lead strip, pressed together to close both discs. Type B's shape is a flattened octagonal cylinder with small stamps on both flat faces, which Mirabal (2013) considered not to be proper seals, as they lacked an apparent sealing function. However, De Sousa (2016; 2019) has developed a comparative framework on European lead seals in which he categorized 15th- to 19th-century AD Portuguese lead seals mostly based on the iconography depicted on them, such as royal army, private braziers, city braziers, religious or company symbols. These provide information about the origin or function of the seal. From this comparison of motifs De Sousa identified three main categories of seals: customs seals, cloth seals, and personal seals.

The collection of seals recovered and described by AWW/PI falls within De Sousa's Type A, which lies in the category of cloth seals used to certify cloth quality or its provenience (Figure 5). This kind of seal was first used by the Dutch in the 13th century AD in Leiden, but later in the 15th century AD, the seals were compulsory in Europe and many countries used them to identify cloth quality and provenience (De Sousa, 2016). Among the cloth seal assemblage found at *Nossa Senhora da Consolação*, there are two peculiar seals with different iconographic motives depicted. One has three letters ('A' and two linked 'C's), and it is likely to be an indication of a private or personal seal of someone responsible for cloth production. It may also represent ownership of the sealed product. It was common in England that a private seller or cloth producer had private seals with their initials depicted, attesting to the quality of the product. It is also likely that these seals were being used to identify the owner of the product (De Sousa, 2016). The other seal has a horse with a pole and Mirabal (2013) describes it as a representation of *Agnus Dei,* a traditional representation of Jesus Christ. The representation of religious symbols was directly linked to the hope that God would protect the products along the way against piracy or wreckage, as their losses were expensive (De Sousa, 2016). De Sousa has identified it as French with a possible origin from cities like Rouen, Bourges and St Omer (Figure

Figure 5. Lead seals from *Nossa Senhora da Consolação* (photo: Cezar Mahumane).

5). Because of the high level of erosion of the reverse of the seal, not much further information could be obtained. Still, this added information shows that the artefacts recovered from the excavations can provide a wide range of information on the international trade networks in which a ship was involved, if investigated properly.

The lead seals categorized as Type B by Mirabal (2013) are considered by De Sousa (2019) as custom seals. These seals were introduced in Portugal on 21 January 1547 to control imported and exported goods, thus taxed goods were certified using these lead seals. If the iconography represented on custom seals was rather uniform throughout most of the custom houses that controlled exchanges of goods, many carried the name of the city where the taxes were paid (De Sousa, 2019). The main iconographic feature seen on this type of seal from *Nossa Senhora da Consolação* is the representation of the *Esfera armilar,* which was introduced by King D. Manuel I, and was a symbol of maritime, economic, and political power linked to navigation, representing Portuguese supremacy on the world (Chirikure et al., 2010; De Sousa, 2016, 2019).

Hippopotamus Teeth and Elephant Tusks

The tusks and teeth collected from *Nossa Senhora da Consolação* by AWW/PI have been described as belonging to the African elephant *Loxodonta* Sp. and *Hippopotamus amphibious* (Mirabal, 2013). There is no reference by AWW/PI to any kind of specific studies to identify them or determine where the tusks came from. A comparison is therefore required with more general studies discussing the origin and function of hippopotamus teeth and elephant tusks found on *Carreira das Indias* shipwrecks. Tripati and Godfrey (2007) and Mowa et al. (2018) have two different approaches to study the origin of most hippopotamus and elephant tusks traded in the *Carreira das Indias.* Their discussion is essentially based on historical sources and DNA analyses of tusks found in different shipwrecks.

During the mid-16th and early 17th centuries AD, the Portuguese had the monopoly of trading elephant tusks and hippopotamus teeth to the Indies and obtained finished objects that were taken to Europe to satisfy the increasing demand of ivory (Chirikure et al., 2010; Coutu & Lane, 2021; Mowa et al., 2018; Tripati & Godfrey, 2007). The majority of elephant tusks and hippopotamus teeth found in *Carreira das Indias* shipwrecks are likely to be African. Through comparison, Asian elephant tusks are smaller, whiter, softer, and more opaque, with a tendency to discolour, requiring less fine polish than African ivory (Tripati & Godfrey, 2007). When exposed to light it tends to become dull in appearance, whereas African ivory often takes on a porcelaneous sheen (Tripati & Godfrey, 2007). Ivory from the African elephant is much better in quality than the Asian elephants because of its superior hardness, pale blonde transparency, and ability to be more finely polished. African ivory is of the highest quality, hardest and most shiny, tending to retain its yellowish-white colour better as it ages. The African elephant tusk can measure up to 2 m in length with

diameters of 9 cm to 11 cm and weigh up to 90 kg (Mowa et al., 2018; Tripati & Godfrey, 2007).

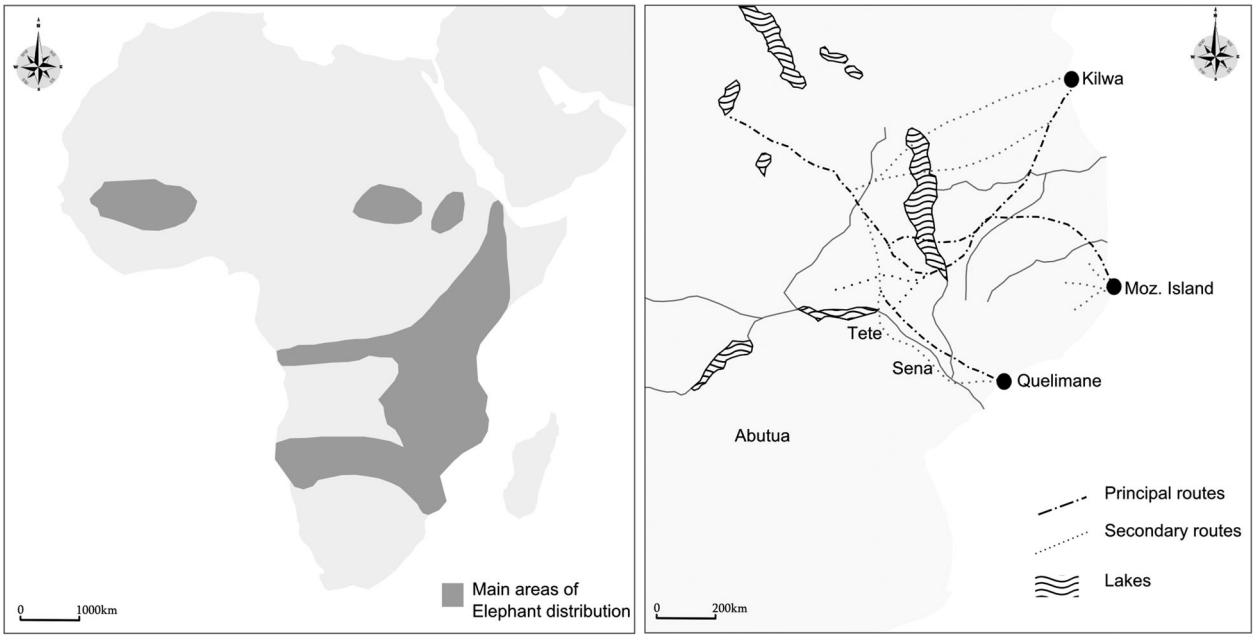
In general, maritime trade records also suggest that central Africa and the West African coast (Congo, Senegal, and Angola) (Coutu & Lane, 2021; De Flamingh et al., 2021) and the East African coast (Mozambique and Tanzania) are likely the main sources of elephant tusks and hippopotamus teeth (Alpers, 1975). From these regions, the ivory was transported to the great trade centres in India (Cambay, Surat and Gujarat) where artisans were more skilled in crafting this material (Alpers, 1975; Mowa et al., 2018; Tripati & Godfrey, 2007). Alpers (1975) and Tripati and Godfrey (2007) asserted that the best African ivory was from Mozambique and Zanzibar. Moreover, Alpers (1975) mentions that the Yao and Makua traders harvested and transported ivory from the interior of Mozambique in the western Maravi and Chewa territories. However, traders also bought ivory from the Lenje and Bisa hunters who inhabited the area of Zumbo located at the confluence of the Zambezi River and the Luangwa River in southeastern Africa (Figure 6). In the 17th century AD, more than 50% of the ivory imported to the Indies through Portuguese ships was exported from Mozambique (Tripati & Godfrey, 2007). On the other hand, Chirikure et al. (2010), Mowa et al. (2018) and De Flamingh et al. (2021) present a different approach to source the origin of ivory with the example of the *Bom Jesus* wreck. They consider that the ivory found in this wreck is most likely from West Africa, as the Central and West African regions were inhabited by Forest and Savannah elephants with tusks similar to those found in many 17th century AD shipwrecks (Coutu & Lane, 2021; De Flamingh et al., 2021). During this period, elephants were often hunted and there were well established markets in Central and West Africa which were opened to Portuguese traders. Both elephant tusks and hippopotamus teeth from the wooded and humid regions of Africa were considered better for carving sculptures, statues, bangles, and other religious objects and secular art (Chirikure et al., 2010; De Flamingh et al., 2021; Mowa et al., 2018).

Hippopotamus have been hunted for millennia for meat and their teeth, as the animal has enormous jaws that hold the long, curving teeth which consist of enamel. The teeth are hard and retain the characteristic whiteness for a long time and do not change colour when cut and polished (Coutu & Lane, 2021; Tripati & Godfrey, 2007). As hippopotamus herds are now only confined to African countries, their teeth are mostly suggestive to have come from Africa. The location of hippopotamus teeth with elephant tusk material may indicate that these tusks are also likely to have been sourced in Africa although it is still unclear whether the elephant tusks and hippopotamus teeth are of Mozambican origin or came from another part of Africa. The total number of hippopotamus teeth and elephant tusks recovered by AWW/PI from *Nossa Senhora da Consolação* is unspecified, but some are still available on Mozambique Island for further investigation that may shed light on their origin and commercial circulation.

Martaban Jars

The excavation performed by AWW/PI at the *Nossa Senhora da Consolação* site revealed three entire martaban jars and many sherds (Figure 7). Mostly considered as storage wares, these jars were used to hold, store, and preserve liquids and solids, and for the transport of delicate and precious goods on board (Borell, 2014; Coelho, 2008; Simões, 2009). The use of these jars has been reported since the Song (AD 960–1279) and Ming (AD 1368–1644) Dynasties when they were used to transport goods overland from China to Martaban and shipped from there to western Asia, the Indies, Africa, and later in the 16th century to Europe (Borell, 2014). The precise origin of these storage jars is still unknown, but they were either made in China or in Southeast Asia. Their name came from the Arabic pronunciation of the port of Martaban on the Gulf of Pegu, now Myanmar (Burma), a meeting point for trade routes in the Far East and a place of compulsory passage for European merchants and navigators since the 16th century AD (Borell, 2014; Simões, 2009).

Since the 16th century AD, this port city has been known for its intense trade and has been famous for its large clay jars which were recorded in the writings of several travellers who visited these places (Borell, 2014). One of the main characteristics of these jars is their resistance to breakage, which is conferred by the type of coarse clay of which they are made. The clay has a consistent grain size and because it contains feldspars and quartz becomes waterproof and more solid upon firing (Simões, 2009). These fabric characteristics explain why these martaban jars were suitable as liquid containers, safely carrying for example water, wine, and oils (Simões, 2009). There is not much known about the functionality of the martaban jars in the *Carreira das Indias* ships. Despite the fact that there has been some research on the martaban jars found on European shipwrecks and on terrestrial sites, the most advanced studies on these jars were made at the *Nossa Senhora dos Mártires* (1606) wreck by Simões (2009) and Coelho (2008) who agree that they were used as containers for different goods, mainly water for the long voyage from the Indies back to Portugal and vice-versa. Two of the complete martaban jars and many sherds found on *Nossa Senhora da Consolação* share similarities with fragments found in *Nossa Senhora dos Mártires, a* wreck in São Julião da Barra, Portugal (Simões,



a. Main areas of Elephant distribution in Africa. Map adapted from Waser *et al.*, (2004)

b. Main Ivory trade routes in Central East Africa Map adapted from Alper (1975)

Figure 6. Maps of elephant tusk distribution and main routes in Central-East Africa (after Mowa et al., 2018, p. 66).

2009). The jars from these wrecks are of large dimensions, robust, and have a brownish and blackish tonality. They have a flat and smooth base to make them stable, increasing the friction between the jar and the surface on which it rested. The body and the neck are commonly decorated with vertical and horizontal parallel painted white lines with circular applications, which forms an *efeito de pregaria* – nail-like effect (Simões, 2009).

Close to the neck of these jars are applied handles. These handles could not have been used to hold or suspend the jars, since they are applied and very small considering the proportions of the whole martaban jar. The handles offer low resistance and are unable to bear the weight of the jars, especially when these are filled. However, this does not imply that they were completely devoid of functional use. In some cases, they may have been used as a means of holding ropes attached to a lid or may have been used to tie the jars to each other during voyages, preventing them from breaking under the impacts caused by the rocking of the ships (Simões, 2009). The martaban jars from *Nossa Senhora da Consolação* are contemporaneous with those of the *Nossa Senhora dos Mártires* wreck and the typologies indicates that these jars would have been imported to Portugal in the late 16th century AD. Most of the martaban jars arrived in Portugal and Europe during the 17th century AD because of the intensification of commercial networks between Asia and Europe (Simões, 2009). Furthermore, in Europe, these jars became a trade good of great demand as suitable vessels for freshwater storage, not only onboard ships, but for regular household use in tropical climates. Their special quality for

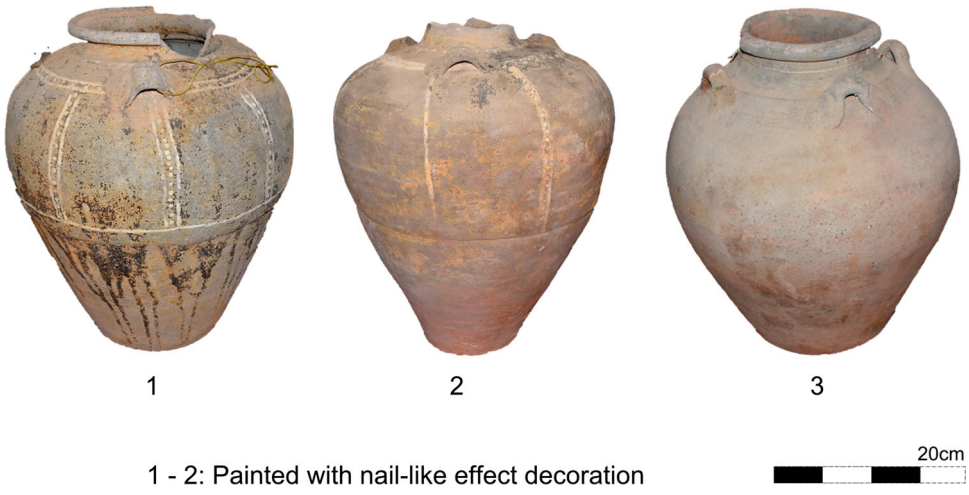


Figure 7. Martaban jar found at the *Nossa Senhora da Consolação* site (photo: Cezar Mahumane).

conservation of water and subsistence items made them valuable for life in the tropics. To a great extent, their distribution from China to Africa and Europe was dictated by the needs for these jars from travellers themselves. Onboard Portuguese ships, the jars arrived at the Portuguese forts on the East African coast such as Fort Jesus in Mombasa, Kenya, and São Sebastião Fort on Mozambique Island, Mozambique (Borell, 2014). The presence of these martaban jars provides some of the best evidence for the context of trade routes, as well as for economic exchanges that took place in the past. These jars witnessed the convergence of cultural traditions resulting from contact between different civilizations integrated in large-scale international trade networks (Simões, 2009).

Olive Jars

The so-called 'olive jars' (Figure 8) are common finds in shipwrecks from the 16th and 17th centuries AD onward (Cook, 2012). AWW/PI recovered several of these jars during their excavation of *Nossa Senhora da Consolação*. These jars were primarily used to contain liquids like olive oil, or olives in brine and wine. They could also have been utilized for transporting condiments and vegetables, such as beans and chick-peas, as well as lard, pitch, and tar (Cook, 2012). The thick walls and rounded shape of the jars resulted in considerable structural integrity, allowing them to fit well in limited cargo space to be stacked efficiently against rounded hulls, and their round opening was easily secured with minimal airspace to protect against spoilage (Cook, 2012; Malcom, 2017). J. Goggin (1960) conducted considerable research on olive jars and defined a chronology based on the shape, paste, and surface treatment, divided into a three-period typology: early (AD 1490–1580), middle (AD 1580–1780), and late (AD 1780–1850 or later); with four vessel styles: A, B, C, and D. Within each style there are changes that can be noted on the profile of the vessel ´s rim. According to Goggin's (1960) typology, olive jars started as thin-walled, rounded vessels with two opposing handles arching from the shoulder to the rim, defined only as style A. In the middle period, the jars shape was heavier, more elongated, and egg-shaped within three different sizes, all with thickened rims that could be categorized as style A, B, or C. In the late period, the bulbous bodies remained, but jars of a sharply conical design also came into use, increasing the style variabilities from A, B, C, to D. Over time the design of the rims narrowed from a heavy, almost rectangular cross-section; some fabrics of late-period olive jars show a paste with very little sand temper.

The olive jars recovered from *Nossa Senhora da Consolação* are most similar to the middle period (AD 1580–1780) described and defined by Goggin (1960) and include the styles A, B, and C. The middle period style A is characterized by the classic shape of a tall ovoid body surmounted by a short, high-set rim above a rounded shoulder inclining relatively smoothly to a gently rounded base (Avery, 1997). The rim profiles are angular and incorporate a wide overhang above and covering the neck (Avery, 1997; Kingsley et al., 2014). The lip is often pinched to form a vertical terminal. Broad riling occurs across the upper shoulder and lower quarter of the body; lighter riling occupies the central body area. Small air bubbles are common in the body walls (Kingsley et al., 2014). The middle period style B is characterized by being a small, compact globular jar, almost circular in anatomy, with a continuously rounded base, body and shoulder. The style displays a more pronounced neck and higher rim (Kingsley et al., 2014). The middle period style C is described as being a carrot-shaped vessel, far narrower than the other styles, with a slender body, more V-shaped in profile and leading to a more pointed toe (Pasinski & Fournier, 2014)

Olive jars with similarities like those from *Nossa Senhora da Consolação* have been observed on other 17th-century AD shipwrecks such as the Tortugas wreck (1622), off Dry Tortugas Island/Florida Keys (Pasinski & Fournier, 2014) and the Spanish wrecks *Nuestra Señora de Atocha* and *Santa Margarita* (1622) in Florida, USA (Pasinski & Fournier, 2014). The similarities of the jars from these three wrecks indicate a 17th-century AD chronology. By the 17th century AD, Portugal and Spain were both producing this type of jar, but Portugal adopted and tended to maintain a wheel-thrown, globular, two-handled vessel for its oceanic commerce (Pasinski & Fournier, 2014). Although most literature classifies olive jars as exclusively Spanish in production, it is known that Portugal also produced these kinds of vessels. The city of Aveiro was known for manufacturing olive jars, shipped for trade in large quantities, since the mid-16th century AD onward (Casimiro & Newstead, 2019). The Portuguese olive jar shape was rather similar to the Spanish.

Local Pottery – the Lumbo Pots

Much of the archaeological materials collected by AWW/PI during excavations at *Nossa Senhora da Consolação* were imported materials. However, two complete, locally-made pots were found, both from the Lumbo pottery tradition (Figure 9). The Lumbo pottery tradition was named by P. Sinclair in 1985, when he carried out excavations on the mainland Lumbo area, opposite Mozambique Island (Madiquida, 2015; Sinclair, 1987). During excavations, Sinclair found a significant ceramic collection that allowed the description of the pottery tradition characterized by fine incised lines, shell and comb-stamping, triangle bands and other geometric motifs,

Figure 8. Olive jars from the *Nossa Senhora da Consolação* site (photo: Cezar Mahumane).

immediately below the rim (Duarte, 1993; Duarte et al., 2015; Madiquida, 2015; Sinclair, 1987). Lumbo pottery assemblages are commonly found on sites dating between the 13th and 15th centuries AD (Duarte, 1993; Madiquida, 2007; 2015; Sinclair, 1987).

The tradition is mostly associated with later coastal farming communities and archaeological evidence suggests that it stretches along the Mozambique coast from Sofala to Cabo Delgado, linked to the development based on maritime resource exploitation for food supply and economic exchange dominated by Swahili communities (Duarte, 1993; Madiquida, 2015). However, investigations in southern Tanzania at the Mikindani site have revealed the presence of comb-stamped ceramics dated to the 12th century AD, similar to the Lumbo pottery tradition, suggesting that these ceramics are not only confined to the Mozambican territory (see Pawlowicz, 2011).

Before the Portuguese arrival, the Swahili communities along the East African coast had an economic system based on exchange and redistribution (Duarte, 1993). This economic system allowed for the foundation and development of commercial centres, especially in northern Mozambique at sites such as Lumbo, Somaná, Matemo, and the Quirimbas archipelago, where the Lumbo pottery tradition is also found (Chami, 1994; Duarte, 1993; Duarte & Menezes, 1994; Madiquida, 2007). However, this situation changed when the Portuguese settled mainly on Mozambique Island and other areas of the East African coast from 16th century AD onward (see Duarte, 1993).

The Portuguese transformed Mozambique Island into the most important trade harbour for the *Carreira das Indias*, introducing new trade systems purely based on capitalism and profit generation for the crown (Duarte & Menezes, 1994). Therefore, the original trade systems in the Indian Ocean were interrupted. Duarte and Menezes (1994) and Madiquida (2007) consider that the redistribution system is likely to have continued along the coast at a small scale, and that the Portuguese traders may have been integrated into this local trade. The participation of the Portuguese in the local trade system is witnessed through shipwrecks found with local pottery in their archaeological context. For instance, besides the Lumbo tradition pottery vessels from *Nossa Senhora da Consolação*, the 17th-century AD wreck *Santo António de Tanna* (1697) (initially excavated in 1970, and in the four major seasons of 1977, 1978, 1979 and 1980; see Piercy, 1977; 1978; 1979; 1981; Sassoon, 1981), revealed a number of imported and local ceramics. However, local potsherds had been characterized as deriving from the Sancul pottery tradition, commonly found in the sites of northern

Figure 9. The Lumbo pots found at the *Nossa Senhora da Consolação* site (photo: Cezar Mahumane).

coast of Mozambique (see Sassoon, 1981; 1982; Sinclair, 1985; 1987).

The presence of Lumbo pots in the *Nossa Senhora da Consolação* wreck is of high relevance for reconstructing local trading patterns and raises questions about the temporal spread of this pottery tradition. Terrestrial sites reveal samples dated to 13th and 15th centuries AD through radiocarbon dating (Duarte, 1993; Sinclair, 1987), while its appearance in the 17th-century AD shipwreck suggests a continuation in use of Lumbo pottery on Mozambique Island, although it may have changed from domestic context to being a local trade good and part of maritime commerce.

Despite the irregularities made by AWW/PI when collecting and describing the material, some artefacts analyzed here show similarities with other wrecks from the same period. But the Lumbo tradition presence in an underwater context may bring new insights regarding the chronologies of this pottery tradition. The archaeological interpretation of Mozambique Island needs to find a balance to associate and interpret archaeological artefacts found at terrestrial and underwater sites. These artefacts witness cultural, social, and economic roles played by the island as an important harbour even before the Portuguese presence. Therefore, new analysis and dating may better inform the temporal and spatial spread of the artefacts in the region and globally.

Discussion

The comparative analysis carried out on selected artefacts – see the full list in Appendix 1 – collected from the *Nossa Senhora da Consolação* wreck opens an opportunity to zoom in the global maritime networks during the 17th century AD. Most of the materials found were part of its cargo and came from different continents that fed into the maritime trade that linked America, Europe, Africa, and Asia. The artefacts analyzed here revealed imported materials that were common in international markets in the early 17th century AD, as well as local materials from more restricted markets that played a role within major maritime global trade. On-going analysis of artefact collections from *Nossa Senhora da Consolação* shows that it made important contributions to the commercial networks of the 17th century AD.

For instance, the boat-shaped lead ingots were likely moulded in England and apparently the Dutch used to buy lead in this shape in England. However, the presence of these lead ingots in a Portuguese ship shows that other nations also bought boat-shaped lead ingots, most likely to use as paying ballast, as it was relatively cheap and heavy (Stedman, 2009; Tripati et al., 2003; Van Duivenvoorde et al., 2013). Although the Portuguese were interested in spices from the Orient, they had to supply commodities that were in demand in Europe to maximize their profit (Chirikure et al., 2010; Coutu & Lane, 2021; De Flamingh et al., 2021). Obviously, the flourishment of global maritime trade networks required finances, therefore, the presence of silver coins in *Nossa Senhora da Consolação* is not surprising. These coins were used in global transactions between the Americas (where the coins were minted), Europe, Africa, and Asia. The coins were minted by the Spanish Empire and became a dominating currency in European and international markets for more than three centuries (Cardoso et al., 2014; Banco de México, 2018).

During the global commercial network, exported and imported goods needed to be taxed when crossing borders and quality control. Thus, the lead seals found in the *Nossa Senhora da Consolação* wreck provided an important source of information, because the seals were also an indication of private initiatives, as people responsible for cloth production used customized seals attesting the product quality (De Sousa, 2016). Therefore, seals were an important trademark that prevented people from selling fake or sub-standard goods (Chirikure et al., 2010). Furthermore, the presence of unworked hippopotamus teeth and elephant tusks from *Nossa Senhora da Consolação* suggests that African elephants were hunted and the ivory was traded to great commercial centres in India (Cambay, Surat, and Gujarat) known to have the most skilled artisan in working this material (Alpers, 1975; Coutu & Lane, 2021; De Flamingh et al., 2021; Tripati & Godfrey, 2007). The presence of large and small tusks suggests that there were no particular preferences for the ivory from large bulls as was the case in other parts of Africa such as the Zimbabwe plateau where the Portuguese were highly selective in the tusks in which they traded (see Chirikure et al., 2010). The variable sizes of the tusks do not provide any information about their origin in Africa, but isotopic studies on the ivory would help to shed light on their source which can also provide information on trade and exchange relationships (Chirikure et al., 2010; Coutu & Lane, 2021; De Flamingh et al., 2021).

When it comes to shipping and life on board *Nossa Senhora da Consolação*, there is evidence of conventional material such as the martaban and olive jars, generally used to store liquids and spices. Similar jars had been found during the excavation of *Nossa Senhora dos Mártires* (1606) (Coelho, 2008; Simões, 2009) and *Santo António de Tanna* (1697) (Piercy, 1977; 1978; 1979; Sassoon, 1981). The frequent use and re-use of these jars also show the global network in which this ship was involved during the 17th century AD. The martaban jars were brought from Asia, where they originated, and were used along with olive jars of European origin to store grain goods

and liquids. Perhaps the most intriguing find recovered from *Nossa Senhora da Consolação* was the two pieces of Lumbo pottery, a ceramic tradition commonly dated to the 13th–15th centuries AD. The presence of these pots raised local discussion and two hypotheses are to be considered. The first is that absolute dating on terrestrial archaeological sites is not yet solid to confidently pinpoint the chronology of this pottery tradition. Consequently, there is not enough data to help contextualize the presence of these pots on *Nossa Senhora da Consolação* wreck. More dates need to be acquired from 'Lumbo' tradition terrestrial archaeological sites so that its temporal extension can be clarified.

The second hypothesis questions the accuracy of artefact recovery and recording by AWW/PI. Their excavation on *Nossa Senhora da Consolação* was hurried, and the site plans produced lack necessary detail. It is possible that the recovered Lumbo pots may not belong to the wreck context itself. Raises the hypothesis of there being another wreck lying alongside *Nossa Senhora da Consolação* where these pots may have been collected. This hypothesis was raised after a field project in 2017 which revealed a ballast pile siting 3 m left of the *Nossa Senhora da Consolação* wreck. This pile, covered by seagrass and composed of small, rolled ballast stones, contained a few wooden remains as well as other pieces of local ceramics.

To us, it seems that the referred pile is most likely the accumulation of ballast stones removed from the *Nossa Senhora da Consolação* while it was dug in the 2005–2006 excavation season and was never placed back (see Duarte et al., 2015; Jeffery, 2011; Mahumane, 2020; Mirabal, 2013). As reported by Mirabal (2007; 2013), approximately 250 tons of ballast stones removed from *Nossa Senhora da Consolação* were the smallest ever found in Mozambique Island, having a diameter of 20 cm, but the common size is between 5 and 10 cm, all rounded and with a smooth surface. This may also reinforce the idea that the Lumbo pottery were recovered on *Nossa Senhora da Consolação*.

It is clear that local pottery on Portuguese shipwrecks needs to be compared to a more solid chronology and better contextual information. The quantity of local pottery of African origin is most valuable for archaeologist because the life expectancy of an unglazed pot is very short. When found on a shipwreck context, it can be useful to date land sites with unclear chronologies (Sassoon, 1982). This is especially so when it comes to the possible presence of Lumbo pottery tradition on *Nossa Senhora da Consolação* that would stretch this tradition chronologically to the 17th century AD.

The story told by the analyzed artefacts from *Nossa Senhora da Consolação* shipwreck is that of the beginning of an increasingly globalized trade through transoceanic commerce and voyages of discoveries. However, to understand the complexities, artefacts need to be found in a secure context, and then recorded and recovered properly to allow appropriate interpretations. Most of the collection discussed in this paper are still preserved on Mozambique Island, apart from the boat-shaped lead ingots. These materials have an important scientific value that can still inform the dynamics of the trade in East Africa and other areas where the raw material was sourced. In-depth laboratory analysis using methods such as XRF and isotopic analysis will shed new light on the origin of the principal raw-materials and the extent of the relations established for the trade (Chirikure et al., 2010; Coutu & Lane, 2021; De Flamingh et al., 2021; Guerra, 1998).

Conclusion

The artefactual collection from the *Nossa Senhora da Consolação* wreck derives from different contexts around the globe. As shown along the paper, local trade routes supplied raw materials or finished fine goods that fed a growing maritime global trade in the 17th century. These routes were mostly dominated by the Portuguese that established the *Carreira das Indias* and invested in shipbuilding to sail to the Indies to buy spices and other exotic goods appreciated in Europe. The variability of the *Nossa Senhora da Consolação* artefacts tell stories of the beginning of an increasingly globalized trade and control of strategic maritime harbours. The recovered artefacts, like the lead seals, were important for testify quality or border control, while coins show a monetized system for product exchange. Elements like lead ingots would be used for several other purposes as it could be re-smelted. Ivory and hippopotamus tusks could also be crafted by skilled artisans to obtain final products the fed the trade. On the other hand, containers like the martaban and olive jars were utilitarian objects used to store liquids or grain-like cargoes. Coarse earthen ware pots like the Lumbo pottery, could have changed from domestic contexts to being a local trade good, as part of maritime commerce. However, substantial data from other wrecks are necessary to understand the role of coarse earthen wares onboard European ships.

As a trade ship, *Nossa Senhora da Consolação* was following its course to the Indies, loaded with goods ready to be commercialized, but it found its fate on Mozambique Island due to the commercial competition that arose in the early 17th century between the Portuguese and the Dutch. Historical accounts presented by Durão (1663), Da Fonseca (1964), Murteira (2006), Ferreira (2007), Cardoso (2013), Arnold (2014), and Barradas (2018) refer to the context and the moment *Nossa Senhora da Consolação* was captured during a Dutch attack on Mozambique Island.

While the ship was getting ready to sail to the Indies, it was captured with 36 people onboard who were unable to resist the attack as it was being loaded with cloth, ivory and hippopotamus teeth, wine bottles, spices, and *cruzados*. All these had been stored in the São Sebastião fortress since 1607, when *Nossa Senhora da Consolação* was wintering at Mozambique Island harbour (Barradas, 2018; Durão, 1633; Ferreira, 2007). Seeing the ship captured, D. Estevão de Ataíde ordered a night attack to set fire to *Nossa Senhora da Consolação* rather than being taken by the Dutch (Durão, 1633).

Almost 300 years later, AWW-PI initiated intrusive operation on the wreck and located the above-mentioned artefacts, together with a burnt wooden structure in the same location described by the historical account. All this evidence supports the identification of the wreck as *Nossa Senhora da Consolação* Durão (1633). Furthermore, the 2020 laboratory analysis of the wood samples collected from the wreck has proved the wood to be European, reinforcing the idea of the wreck being Portuguese (Mahumane & Duarte, forthcoming).

This paper explored some of artefacts collected from *Nossa Senhora da Consolação* and stored in Mozambique Island Museum. However, there are some other artefacts from the same collection, grouped as navigational tools, personal ornament items, glass bottle, porcelain ware and small furniture objects (see the artefactual collection list in Appendix 1), that may be analyzed in the future.

The study of this underwater cultural heritage, reflecting people's relationship with the sea, is guided by a multidisciplinary approach that enabled the development of underwater archaeology as an academic field. However, its development has faced major challenges, the most serious of which is contra-acting the impacts of treasure hunting activities on underwater cultural heritage in many places around the world, and Mozambique is not an exception (Duarte, 2012; Mahumane, 2020). As the field evolves, there are developments in paradigms to understand and interpret sites, materiality, and relationships between people. As a developing field in an African context, there is great demand within underwater archaeological research to find evidence of local contributions within the global trade that developed for centuries. However, to date, there are few studies that reveal the presence of local materials in shipwrecks. This is even worse when analysing European shipwrecks, as imported materials receive much more emphasis in these studies.

We hope that future studies will enrich our understanding of Africa past maritime initiatives and that even studies that are carried out in so-called historical European shipwrecks can shed new light. This will help in understanding the role, timeframe and spatial distribution of local African initiatives that are mostly overlooked within the discipline.

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Disclosure Statement

No potential conflict of interest was reported by the author(s).

Author Contribution

Cezar Mahumane: developed the research on the artefactual assemblage collected by AWW/PI on the *Nossa Senhora da Consolação* wreck and the comparative study with similar material from other wrecks. He redrew maps and photographed the artefactual collection. Celso Simbine: worked on the discussion of local and imported material from *Nossa Senhora da Consolação*.

Permissions Statement

The re-investigation of the *Nossa Senhora da Consolação* wreck started in 2015 when the Mozambican Government cancelled the AWW/PI activities in Mozambique and authorized Eduardo Mondlane University to undertake research, assessment and monitoring activities of the impacted Underwater Cultural Heritage at Mozambique Island. Therefore, permission to undertake this work was granted by the Eduardo Mondlane University and Museum of Mozambique Island, where the collection is currently stored.

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