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Preliminary report on the Lagoi shipwreck, Bintan Island, Indonesia

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ABSTRACT

In August 2023 a joint team of the Research Center for Environmental Archaeology, Maritime Archeology and Sustainable Culture - BRIN (Indonesia) and the Università di Napoli L'Orientale *(Italy), started a project on a shipwreck discovered in 2016 on a beach in Lagoi, on the Island of Bintan (Indonesia), facing the Strait of Singapore. This area, together with the Strait of Malacca, has always been an important sailing passage connecting East Asia, South-East Asia, and the wider Indian Ocean. Numerous ancient shipwrecks have been discovered here, but very few have been so far investigated in detail. The shipwreck, 23.4 m in length, is in excellent condition and it is probably the best preserved and most complete pre-modern shipwreck in South-East Asia; it has been dated by radiocarbon dating to the to the 12th-13th century and it reveals a surprisingly diversified combination of fastening systems. The presence of lashed lugs and the use of dowels for joining planks, suggests a typical South-East Asian system of construction, but the coexistence of these fastenings with nailed frames alternated to lashed frames and the presence of continuous tenons, is unique among other shipwrecks found in the region. The shipwreck also includes some Chinese pottery fragments, glass and metal objects.*

Keywords: *ceramic roofing materials, shipwrecks, trade, tonnage, tiles.*

Grace emerges in the ebb and flow
R.B.

Introduction

The project «*Land shipwrecks and their environmental context*» is a collaborative research among the Research Center for Environmental Archaeology, Maritime Archeology and Sustainable Culture - BRIN and the Università di Napoli L'Orientale (UNO). The project involves the study of shipwrecks and boat remains found on land or beaches in Indonesia, and of their environmental context. The earliest investigations were conducted from 2019 to 2022 on the Punjulharjo boat, found in Central Java, then in Sumatra and on Bintan Island in 2023. This article focuses on the fieldwork conducted in August 2023 on a shipwreck dated to the 13th century, found in one of the Nirwana resort beaches [1], in Lagoi. Lagoi is an area of recent tourism development on the Island of Bintan, one of the six administrative regencies of the Riau Islands province, located approximatively 12 nautical miles south of Singapore (fig. 1-3). The beach faces the Strait of Singapore and the South China Sea. This area was historically, and is still today, a highly frequented passage by trading ships sailing between southern China and Indonesia and beyond, as far as the western Indian Ocean. Boats, sailors and traders passing through this Strait at the time of the Lagoi shipwreck were from India, Arabia, China and South-East Asia. This crucial passage among Singapore and Bintan Island is characterized by numerous navigational hazards including reefs, shallows, and rocks [2]. It is therefore unsurprising that there are many shipwrecks dating to different periods located near Bintan Island [3].

The kingdom of Srivijaya, based in Sumatra, was the first political entity in the region to promote long-distance maritime trade starting from the 7th century CE and up to the 13th century CE, involving South Asia, South-East Asia and the wider Indian Ocean. At that time the coasts of Sumatra Island and the nearby small islands and archipelagoes, including the Island of Bintan, played a crucial role. This maritime prosperity continued during the Majapahit era, in the 14th and 16th centuries CE, a period characterized by the South-East Asian hegemony of the Majapahit Empire, based in Java. The Lagoi boat sank in between these two important eras of Indonesian history.

The boat, 23.4 m long, is characterized by the lashed-lug system of construction, diffused in pre-modern South-East Asia, with very limited contemporary survival in Lamalera (Lembata, East Nusa Tenggara). Lashed-lug boats are usually built shell-first: planks are initially joined edge to edge with dowels,

1 https://www.nirwanagardens.com.

2 Horsburgh 1811.

3 Purnawibowo *et al.* 2023; Flecker 2022.

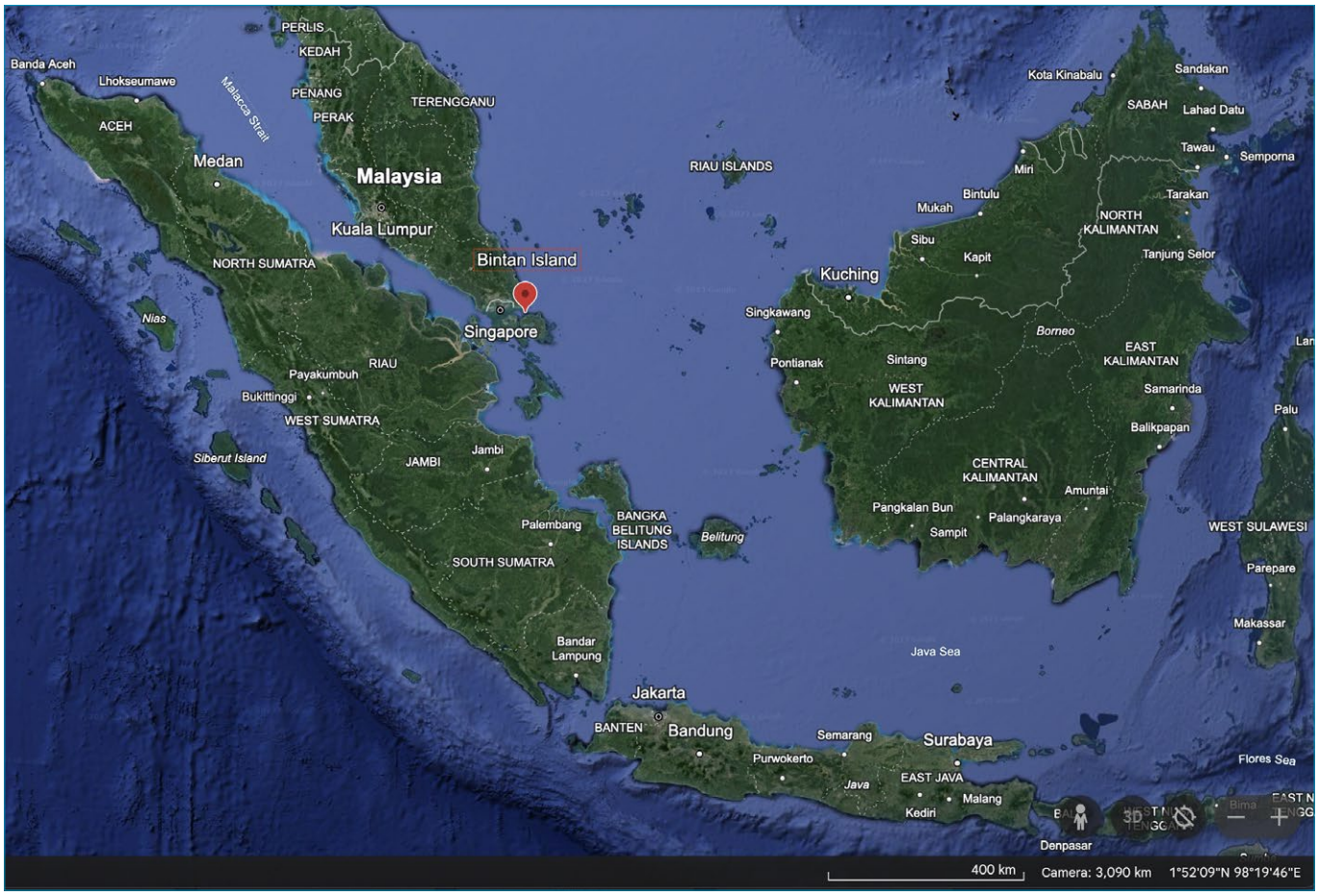


Fig. 1 - *Location of Bintan Island.*

Fig. 2 - *Location of the Lagoi shipwreck on the intertidal beach.*

Fig. 3 - *View of the shipwreck from the drone during the excavation.*

stitches, lashings, or a combination of these methods prior to the addition of frames or ribs. The planking includes a keel plank, while the bow and stern are characterized by wooden blocks (instead of a stem or sternpost), commonly described as wing-ends. The frames are fastened to the protruding lugs of the planks by vegetal-fibre rope lashings [4]. Beside these common features, variations within this shipbuilding tradition were observed, including the shapes of lugs and the fastening types both in archaeological [5] and ethnographic contexts [6].

Several shipwrecks characterized by the lashed-lug system of construction have been reported in Indonesia and in the regions adjacent to the Lagoi shipwreck. These boat remains range from the 3rd century Pontian planks [7] to the early 13th century Tanjung Renggung fragmentary planks [8], the 12th century Lingga wreck [9] and the presumed 16th century terrestrial Lambur shipwreck(s) [10]. Unfortunately, detailed descriptions of these boats are unavailable beyond the confirmation that they present this particular system of fastening.

The aim of the first field season on the Lagoi shipwreck was first of all to evaluate the state of conservation of the wreck along the uncovered parts of the sheer line, date the wood, and to record the hull construction. Beside this, the team evaluated the possibility to develop a suitable strategy for excavating in an intertidal environment subject to severe change of tide and waves, and to start a conservation and dissemination plan for the future.

Previous research

The shipwreck lies in excellent conditions on an intertidal beach locally known as "Lancang Kuning Beach", due to the presence of the shipwreck. In fact, *lancangkuning* means "yellow boat" which refers, in the Riau tradition, to royal boats characterized by yellow color (*kuning*) sails or hull. The shipwreck is perceived by local people as a sort of ghost boat because it used to appear and disappear, being periodically exposed by monsoons.

The shipwreck was most recently exposed during a heavy storm in 2016; the former Head of Village in Sebung Lagoi and the local people witnessed the exposure of one end of the boat and a loose hull plank sporting the apparent lugs [11].

At the request of the Bintan Regency Government, an archaeological survey was carried out by the Archaeological Center of North Sumatra in August 2016, and followed up by an excavation in mid-2017 [12]. Within twelve days of excavation, the team managed to uncovered both ends of the boat. They noticed several rather fresh cuts on the west wing-end of the boat, possibly made by the locals when it was exposed the year earlier. The team measured the length of the boat from the two remaining ends and recorded 23.4 m. However, they did not uncover other parts of the boat and, in the report, could only offer an estimation of the breadth which varies from 6-7.5 m, leaving some confusion for the readers [13].

The excavation was primarily conducted on the shallower portion of the preserved hull and focused on the west side. Here, a portion of the hull from the west wing-end up to the fourth frame, was uncovered. The archaeologists noticed two different sizes of frames: the third frame was described as bigger than the other frames, and they also noticed that the frames sat on top of lugs which were aligned side by side on adjacent planks. The report also mentioned the presence of holes for dowels (treenails) and ropes [14]. However, the description of the shape of the lugs is confusing, as well as the description of the fastening with the mention of "dovetail pieces" which should refer to the dovetail recesses carved in the lugs for the insertion of the beams noticed during the 2023 fieldwork (see below).

Two wood samples were taken during this excavation, one from each wing-end, and sent to a laboratory in Bandung (Java, Indonesia) for radiocarbon dating. The results pointed to a period between the 13th-15th century, while a sample taken from the loose hull plank, during the first survey conducted in 2016, was dated to a period between the 16th-18th century. The team then, questionably, concluded in the report that the boat was dated from the 14th-17th century [15].

The report also mentioned the species of woods used for the different components of the boat: sappan wood (*Caesalpinia sappan*) for treenails, *bungur* wood (*Lagerstroemia spp.*) for frames, and iron wood (*Eusideroxylonzwageri*) for the wing end. However, this wood identification most likely was based merely on preliminary observation since no further details on specific analysis are provided in the report [16].

Excavation methods

The BRIN-UNO excavation project stared at the beginning of August 2023 and lasted three weeks. The shipwreck loca-

4 Lacsina 2016; Manguin 2019.
5 Lacsina, Mochtar2020; Lacsina, Komoot 2023.
6 Horridge 1982.
7 Gibson-Hill1952.
8 Koestoro *et al.* 2015; Adhityatama, Sulistyarto 2018, 127.
9 Flecker2019.
10 Akbar 2019.
11 AlfeniHarmi, perscomm, August 2023.
12 Koestoro*et al.* 2017.
13 Koestoro*et al.* 2017.
14 Koestoro*et al.* 2017.
15 Koestoro*et al.* 2017.
16 Koestoro*et al.* 2017.

Fig. 4 - *Archaeologists examining the shipwreck while snorkeling.*

tion was identified by the presence of wooden sticks inserted into the sandy sea bottom in the area that was indicated to the team by local collaborators. The wooden sticks delimited the area of the shipwreck and were positioned during the investigations conducted in 2016.

Excavations in intertidal zones require a sort of hybrid methodological approach which includes both land and underwater excavation, according to the variation of the tides which is caused by a combination of effects. In the case of the *Lancang Kuning* beach, the tides are semi-diurnal. There are two high tides and two low tides each day at intervals of circa 6-7 hours. The two high tides and the two low tides are not the same height, and they oscillate from a minimum of 0.1 m up to 0.5 m varying each day according to the cycle of the moon. Tide variation was monitored using the app Tides.

During low tide, excavation of the sandy sediment was conducted by 10 workers using shovels and baskets. Sometimes the workers would operate with the same tools during high tide but with more difficulties. During low tide, the archaeologists monitored the workers' excavation and, depending on the variation of the tide, excavated too via hand fanning while using snorkeling equipment (fig. 4). During high tide, with the top strakes of the boat's hull at 40-80 cm below the sea surface, the team dove and continued excavation by hand fanning.

Different methods were tried to protect the excavation area from sand pulled by waves into the trench at each change of the tide. The boat was encircled by multiple layers of sand bags but unfortunately, this system proved to be insufficient to prevent that the excavated parts of the boat were covered up again by sand. Air lift or water dredge were not employed for the excavation to avoid disturbance of the resort customers caused by the compressor noise. A tentative plan was made to remove the water in the trench during low tide by using a water pump in order to facilitate a land excavation. This system also proved insufficient as the pumping rate was not fast enough to empty the trench before the rise of the tide.

Despite all the above-mentioned difficulties, excavation activities allowed the team to expose the top of the uppermost strakes from bow to stern and to partially excavate the sides of the hull. In order to check the level of preservation of the hull, a 40 x 40 cm test pit was excavated at the presumed bow of the boat.

The boat

The circumstances that caused the wreckage of the boat are still unknown. The boat is embedded in the sand and lays flat on its keel, with the sides parallel to the shore. Future geomorphological and geoarchaeological investigations will help to understand the variation of the coastline and of the sea level during antiquity and they may suggest a hypothesis for the wreckage event.

The hull is completely preserved for its entire length, 23.4 m from wing to wing, and it is approximately 6 m wide amidships (fig. 5). The bottom of the boat was reached in a test pit at the bow, at circa 80 cm depth from the top of the bow wing.

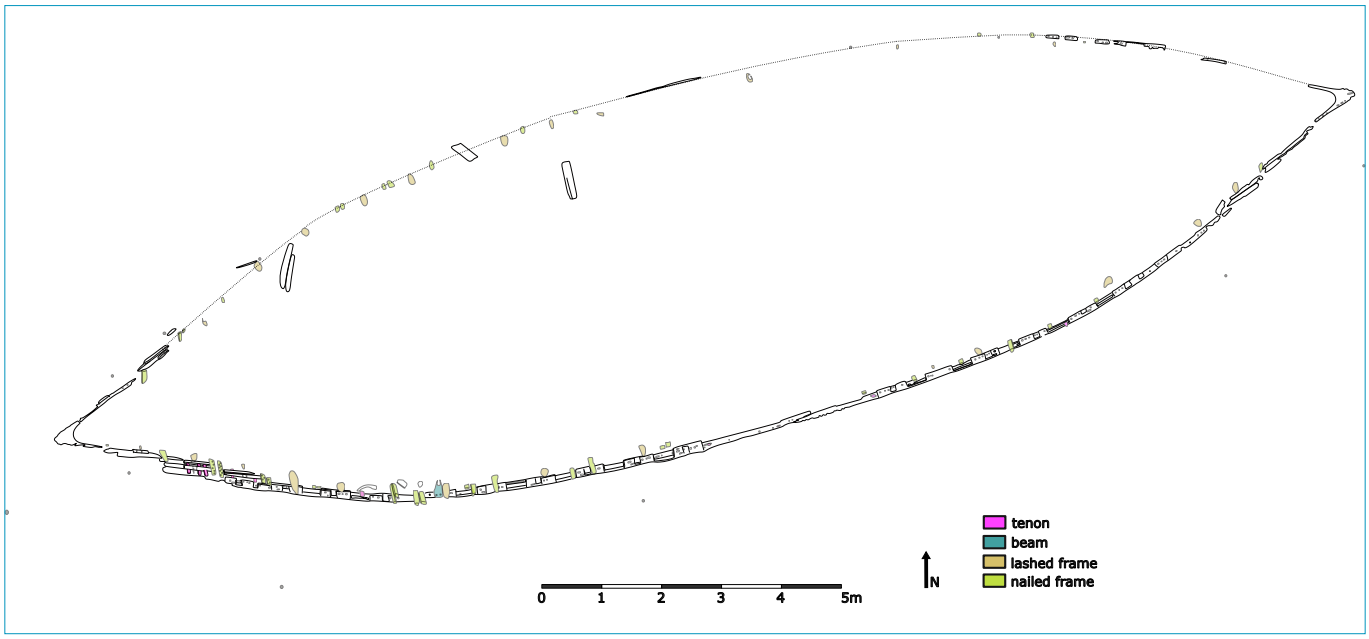


Fig. 5 - *Plan view of the Lagoi shipwreck.*

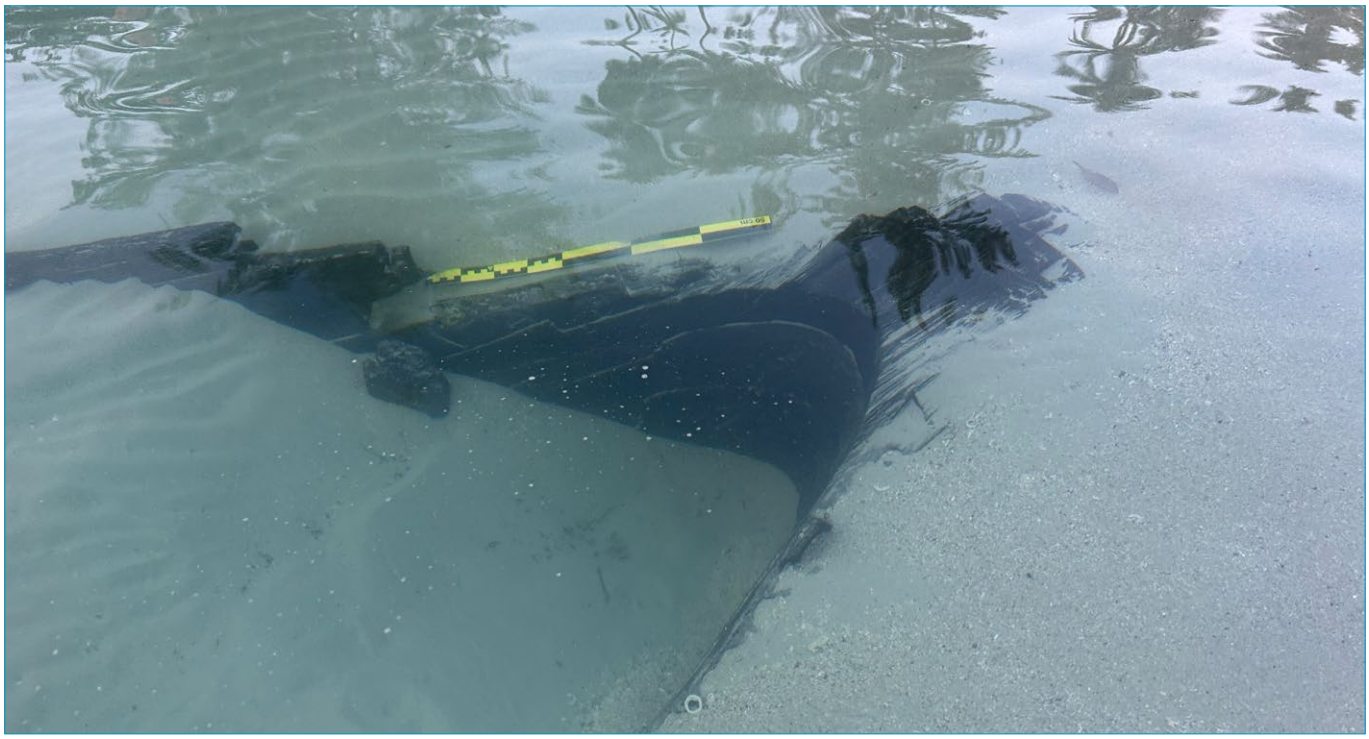


Fig. 6 - *Detail of the stern.*

Here, at least 8 plank strakes and wing blocks were counted (fig. 6).

A preliminary evaluation of the state of preservation of the boat suggests that most of the visible parts of the hull are intact with only one or two top strakes missing, and with no evidence of repair work or damages. The presence of beams and beam recesses indicate that a large part of the hull is certainly preserved above the waterline, at the deck level (fig. 7).

The boat is double ended, east-west oriented, with one end slightly larger than the other end (fig. 5). Based on comparisons with the hull shape of the Punjulharjo boat, we assumed that the stern end (east end) would correspond to the larger end, while the bow (west end) would correspond with the thinner end [17].

The boat is built following the lashed-lugs system of construction; however, it shows previously unattested variations consisting in frames fastened to the hull by metal nails, alternated to lashed frames, and in the use of mortise and long tenon.

17 Mochtar 2018.

Fig. 7 - *Detail of the beam.*

Fig. 8 - *Detail of the lashed-lug and mortise and continuous tenon fastening.*

Such a combination of fastening systems is unique and it has never been attested to in South-East Asia or elsewhere.

Planking

The description of the planking is primarily based on observations conducted on the uppermost strakes exposed during the excavation. At amidship the deck level strake is preserved for ca. 17 m, while at the bow and at the stern one or more strakes are missing below the deck level. The strake at the deck level is characterized by larger lugs and recesses for fitting beams. The sequence of larger lugs and recesses interrupt for ca. 3.17 m in the central part of the hull, ca. 9.53 m from the stern and ca. 10.7 m from the bow. Perhaps this design was meant to leave space for a mast and rigging (fig. 5).
Planks are ca. 4.5 cm thick and 10-15 cm wide. Narrow lugs are carved along the length of the planks in the strakes below the deck level. Long tenons pass through those lugs. At this stage is still not possible to clearly determine the full length of the planks. Planks ends are fastened to the fore and aft wing blocks with joggled edges and hook scarfs, similarly to the Punjulharjo boat [18] and to the Cirebon shipwreck [19]. Given the limited excavation, it was not possible to observe the end-to-end joints in other parts of the hull. On the exposed portion of the port side (south) at least 6 strakes were counted, while 8 strakes were counted at starboard side. Distances between on the uppermost strake were measured on the two exposed sides and they range from 2-13 cm.

Frames

Two types of frames have been recorded, and they are characterized by different shapes, different species of wood, and different fastening systems. These two types of frames are typically alternated: one large lashed and treenailed frame is followed by a pair of nailed frames. In only one case, 6 m from the bow, there is a sequence of two pairs of nailed frames without alternation with a lashed and treenailed frame (fig. 5).

18 Mochtar 2018.
19 Liebner 2018.

Fig. 9 - *Detail of a lashed frame.*

Fig. 10 - *Nailed frames and mortise and continous tenons fastening.*

The lashed and treenailed frame is typically round on the top, flat on the bottom, and is fastened to the hull using treenails and lashings passing through lugs. The average thickness of the lashed and treenailed frames is 12 cm, while treenails are 2 cm in diameter (fig. 9). The lashed and treenailed frames are typically located every two lugs, just aft to the beam recesses (fig. 5, 7). The distance between lashed and treenailed frames is circa 85-95 cm on the north (starboard) side and 85-93 cm on the south (port) side.
The nailed frames always appear in pairs, and are made of a

different species of wood than the lashed and treenailed frames. These frames are also smaller, darker in color, and harder than the lashed and treenailed frames (fig. 10). The frames are rectangular in section, circa 9.5 x 3 cm or 7 x 5 cm, on average. They are nailed to the lugs and the planks. The nails are corroded, therefore their original shape is not easily determined, but they likely have an umbrella head and squared section. Where possible, the nail holes were measured and the size is circa 0.6 x 0.6 cm in average. The distance between nailed frames is circa 85 cm both on the port and starboard sides, the first two frames from the bow end (west end) are spaced at 95 cm. The distance between lashed and treenailed frames and nailed frames is about 40-45 cm, and 50-55 cm towards the bow end (west end) (fig. 5).

Beams

Only one beam has been recorded so far, but many recesses carved on the lugs of the top strake are visible. The preserved fragmentary beam measures ca. 4 cm in thickness and 15 cm in width; it narrows to ca. 9-10 cm into a recess carved in the lug, only to widen again to ca. 12-13 cm towards the outer part of the hull. The beam is fastened to the lug by two dowels (fig. 7). All the beam recesses have the same range of dimensions as the beam which was recorded, and they are regularly spaced center to center ca. 87-90 cm.

Lashed lugs and mortise and tenons

Two different types of lugs have been observed, and they have different shapes, sizes, and quantities of recesses and holes for multiple fastening functions (i.e. lashings, tenons, and dowels) (fig. 8).

A series of larger lugs were observed on the uppermost strake starting ca. 2.85 m from the bow and from the stern. These lugs are likely absent fore and aft of these locations because the uppermost strake is missing in those positions. This type of lug measures ca. 50-52 cm in length and ca. 10-17 cm in width and it is ca. 7-8 cm high. 9 lugs were counted at fore and 9 at aft of amidship. Each of these lugs show a sequence of 3 L-shaped lashing holes, a beam recess and another L-shaped lashing hole. Lashing holes are squared or oval, and some are certainly used for lashing the frames to the hull since the lugs are aligned to the frames and rope remains are still visible both around the frame and in the holes (fig. 11).

Another type of lug has been attested in the exposed forward portion of the hull, on three strakes. This type of lug is long and narrow, over 1 m, it measures ca. 5-7 cm in width and it is ca. 3 cm thick, it has lashing holes measuring ca. 2 cm in diameter and mortises for continuous tenons measuring 0.7 cm in thickness, 4.5/5 cm in width. The tenons are over 30 cm long (the full length could not be determined because it was not fully excavated) and are locked to the lugs by wooden pegs ca. 1 cm in diameter. Three mortises are carved in each of the lugs examined so far. The lashing holes were most likely meant to fasten the lashed frames.

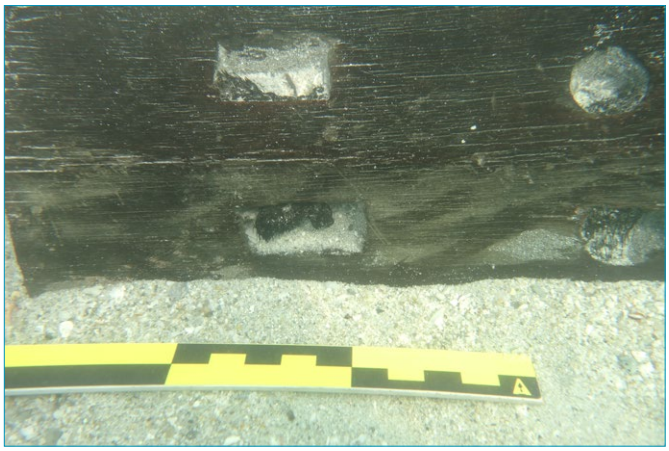


Fig. 11 - ***Detail of the L-shaped hole for lashings in one of the lugs.***

Sampling and dating

Two wood samples were taken: one from a lashed frame and one from the nailed frame to identify the species and date the wood using radiocarbon dating. The lashed frame and the nailed frame were chosen for dating to determine if these two different types of frames were contemporary. The result of C14 analysis revealed that the wood employed for making the lashed frame was likely cut between the second half of the 12th century and the first half of the 13th century CE, while the wood for the nailed frame may have been cut in between the first half of the 11th century and in the second half of the 12th century CE (tab. 1). This result suggests that the boat may have been built sometime between the second half of the 12th century and the first half of the 13th century, or slightly after considering that the wood may have been reused or utilized several years after having been cut.

Conservation

Wood samples were analyzed by Nahar Cahyandaru at the Borobudur Laboratory (Central Java, Indonesia). The purpose of the analysis was to identify the deterioration state of the wood by determining the water content and the deformation during the drying process.

Determination of the water content

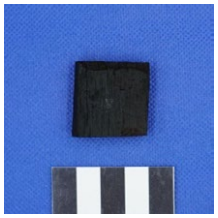
Two selected samples (S2 = tenon, S3 = dowel) were cut and dried, then weighed and measured twice per day. The water content measurement consisted of two steps: an eight days

Sample No.	Material	Radiocarbon Age	Calibration*
Beta – 674636	Wood, lashed frame	840 +/- 30	1162 – 1267 calCE
Beta – 674637	Wood, nailed frame	930 +/- 30	1032 – 1178 calCE

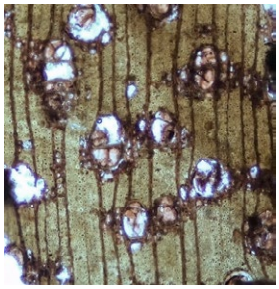
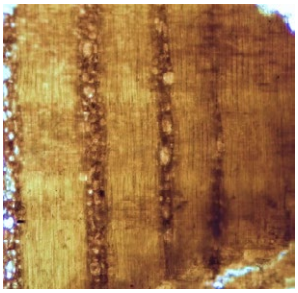
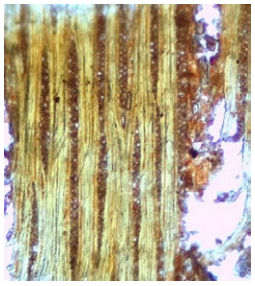
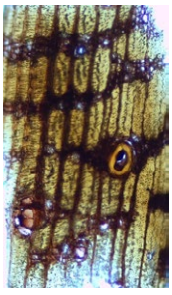
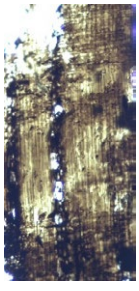
Tab. 1 - ***Calibration of the radiocarbon dating results using OxCAL v4.4.4 (© Bronk Ramsey 2021); based on IntCal20 atmospheric curve (da Reimer* et al. *2020).***

Sample	Initial Weight (g)	Final Weight (g)	Water Content (%)
2	9,995	4,221	136,79
3	3,84	1,814	111,69

Tab. 2 - *Water content of the samples.*

Sample	Initial (cm)			Final (cm)			Initial Photo	Final Photo
	length	width	height	length	width	height		
Sample 2	3,11	2,91	1,11	3,11	2,30	1,01		
Sample 3	2,75	1,69	1,31	2,50	1,42	1,12		

Tab. 3 - *Samples dimension change during the drying process.*

A			
	Tangential	Transversal	Radial
			
B			
	Tangential	Transversal	Radial
			

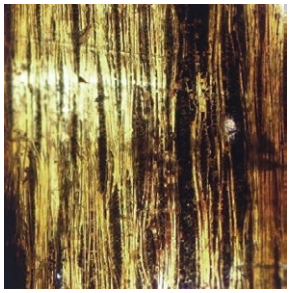
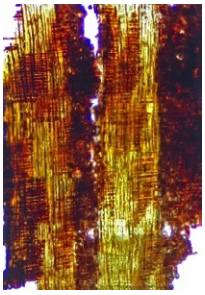
Tab. 4 - *Tenon (A) and Dowel (B), Lagoi.*

natural drying process followed by 8 cycles of oven drying, each cycle at 105 °C for 2 hours. The water content was calculated using the following formula:

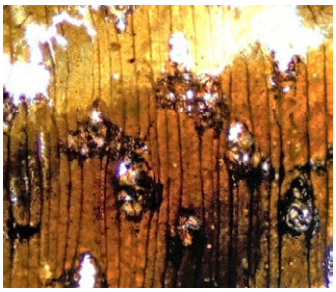
The result of the water content is shown below (tab. 2). The final weight corresponds to the dry weight of the sample.

This result suggests that the samples can be categorized as low deteriorated waterlogged wood, being the water content is under 185%, according to Hamilton [20].

20 Hamilton1999.

C			
	Tangential	Transversal	Radial
			

Tab. 5 - ***Nailed frame 3 (C), Lagoi.***

D			
	Tangential	Transversal	Radial
			

Tab. 6 - ***Plank 2 (D), Lagoi.***

Deformation

Deformation of the wood during the drying process was also measured in parallel with the weigh measurement. The length, width, and height of the samples were measured to identify possible changes in dimension. The sides of the sample were plotted on paper to identify form changes (tab. 3). The results of the water content analysis and that of the dimensional changes of the samples suggest that the woods could be categorized as lightly deteriorated waterlogged wood. This analysis will be the basis from which to start planning conservation strategies for the future.

Thin sections

To identify the species of the wood, four samples were taken for thin sections. These were observed and photographed under microscope. Further analysis conducted by a specialist will allow the identification of wood type/species (tab. 4-6).

The cargo

Part of the boat's cargo is preserved and consists, so far, of large ceramic containers, glass and metal objects, including a key (fig. 12). Concentrations of ceramics were found on the port side between the sixth and seventh frame and between the tenth and eleventh frame from the bow (fig. 13).
The ceramic assemblage includes, among the diagnostic

Fig. 12 - ***Concentration of potsherds at port side.***

Fig. 13 - ***Metal key.***

Fig. 14 - *Globular jar with cylindrical neck, everted rim and small handle on the shoulder with moulded decoration perhaps of a monster-mask head.*

Fig. 15 - *Ceramic body fragment showing a moulded and incised decoration of a dragoon, glazed inside.*

sherds, a flat bottom of a light brown-pink glazed vessel, a carinated casserole with everted rim and thick dark brown glaze, a globular jar with cylindrical neck, everted rim and small handle on the shoulder with moulded decoration, perhaps of a monster-mask head (fig. 14). The external body surface of this jar is incised with festoon-like patterns and it is glazed inside. A body fragment showing a moulded and incised decoration of a dragon, glazed inside (fig. 15) was also found, as well as a body fragment with small handle and incised wavy decoration and a molded and incised dragon showing part of the body and the leg (fig. 16).

Among the most significant fragments are those of two stone-

Fig. 16 - *Ceramic body fragment with small handle and incised wavy decoration and a molded and incised dragon showing part of the body and the leg.*

ware jars with applied decoration consisting of dragons or monster-masks. This type of jars, which can be compared with materials found in Singapore [21], could be a product of the kilns of southern China, in particular of the Fujian or Guangdong provinces. Other possibly comparable stoneware fragments have been unearthed at the Trowulan site, East Java [22]. The proposed dates for all these sherds range from the 13th to the 15th century, when these jars, which were basically used to store liquids and food on boats, were widespread in Southeast Asia.

It must be said that the identification of the stoneware is very preliminary; such type of productions are, in general, little published and further considerations are pending until a more extensive survey is conducted.

Discussion

The Lagoi shipwreck belongs to the lashed-lugs, shell-first system of construction, largely attested to in pre-modern South-East Asia. However, the use of continuous tenon and of alternated nailed frames and lashed frames has not been reported in the region prior to the Lagoi shipwreck. Extened lugs have already been recorded on the side planking of the Cirebon shipwreck [23] and in the Lambur ship remains [24]. The closest

21 See e.g. the Singapore Cricket Club Excavation Site Report or the fragment preserved in the National Museum and published by Miksic 2009, 150.

22 Dupoizat 2007, 72.

23 Liebner 2018.

24 Akbar 2019.

comparison for the use of the mortise and tenon system in the area is the Punjulharjo boat found in Central Java and dating to the 7th century CE [25]. Here mortise and tenon joints are attested on planks near the bow and stern. The presence of nailed frames on the Lagoi shipwreck is also an unusual feature considering that all archaeological evidence of lashed-lug shipwrecks and boat timbers found to date exclusively use non-metal fastenings for the various components of the boat architecture, including the frames. The closest comparison for the use of nails in the frame fastening is a group of over 20 shipwrecks belonging to the so-called South China Sea construction, a "hybrid" of Southeast Asian and (Northern) Chinese boatbuilding traditions. Such boats show a V-shaped hull with a keel plank similar to that of Southeast Asian boats and bulkheads which were neither significant for the structure nor watertight, unlike those on the Chinese junks. The planks were fastened exclusively with dowels, but the frames were nailed to the hull. This system of construction is assumed to be originated from Southern China where ocean-going shipbuilding only started in the 2nd millennium CE and presumably intensified during the restriction of commercial activities in China from 15th to 17th centuries. Within this period many Southern Chinese merchants probably commissioned ships from Southeast Asian shipwrights.

Flecker [26]reported around twenty shipwrecks of this type dated from the 14th to the 16th century, the majority found on the eastern rim of the South China Sea and associated with Thai ceramics. Interestingly, the Bukit Jakas shipwreck, dated from the early 15th century [27], was found southeast of the Lagoi shipwreck around 2 km inland of Bintan Bay [28]. In addition to this, two other "hybrid" shipwrecks, the Royal Nanhai and the Nanyang, were also found in underwater sites just north of Bintan Island, off the east coast of the Malay Peninsula [29].
It is still uncertain the reason why the Lagoi boat sunk. The presence of the cargo and the excellent level of preservation of the boat suggests that it was most likely not abandoned on the sea shore, but it may have wrecked while at the anchor in the bay, or during a storm and was then pushed towards the shore. Considering the exceptional state of preservation of the vessel, it is probably the most complete ancient find discovered so far in Southeast Asia. Further research will focus on continuing the excavation of the shipwreck to study the cargo and the boat architecture, and on developing a strategy for conservation, promotion and dissemination of the research in cooperation with local institutions.

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25 Mochtar 2018.
26 Flecker 2007.
27 Manguin 1993.
28 Dhaniska2018.
29 Flecker 2007.

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