

Lashing the loose planks: Making sense of the understudied “new” lashed-lug sites in Sumatra, Indonesia

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ABSTRACT

The topic of this abstract fits best within this Session 6 Lashed-lug boats: Emerging research from Southeast Asia and the Pacific because it presents new information about the understudied and/or unpublished lashed-lug boats/ships found within the last decade in the island of Sumatra, Indonesia. The case studies under consideration are the lashed-lug boat remains from sites in the provinces of North Sumatra, South Sumatra, and Jambi. The resources available to conduct the work include boat/ship timbers consisted of hull planks, wing ends, and other hull component, as well as rudders, kept in the artefact storages and museums. The research questions of this project are what new information can be obtained from a close examination of the boat/ship planks and other timbers, and how such information would contribute to the advancement of the knowledge about the lashed-lug boatbuilding. The result of the detailed documentation of the boat/ship remains is a comprehensive dataset which covers many variables including ones overlooked in previous research. This project is a part of the author’s doctoral research which expected result is the insights of variations within this particular boatbuilding and the factors causing the variations.

Keywords: shipwreck analysis, hull catalogues, boat remains, and environmental context

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INTRODUCTION

The study of archaeological remains of the Southeast Asian lashed-lug boatbuilding tradition was initiated in the 1980s (Manguin 1989) and developed rather slowly in the following three decades. Fortunately, the last decade witnessed a more promising progress of this topic with new findings and more sites were being investigated closely. In Indonesia, archaeological missions to shipwreck or boat remains sites had been fluctuating throughout decades, with most missions conducted in response to accidental findings by local communities. Other times, the ship/boat timbers were discovered during excavation in areas not intended to investigate nautical archaeology, which resulted in preliminary documentation without further analysis.

After the initial studies of general characteristics of the lashed-lug ship/boatbuilding, close examinations of artefactual data had provided essential information about the details of the construction and other related aspects such as raw materials and associated cargo. In the last decade, many findings were reported in Indonesia, especially in Sumatra (Akbar 2019; Indradjaja 2012; Intan 2017; Purnawibowo and Restiyadi 2020), but only limited detailed recording and in-depth analysis was performed. Sumatra had been one of the most important places in the history of maritime network within Indonesia, in Southeast Asia, as well as the Indian Ocean. However, it was unfortunate that ship/boatbuilding study was many times overlooked in the archaeological investigation of the region.

This project attempts to closely examine the new findings of lashed-lug boat remains in Sumatra as well as to re-examine previous findings not analysed. The aim is to learn about how they can contribute to

the discussion of the study of lashed-lug tradition. Emphasis is on the variations in the construction, to further the knowledge about the past seafaring in the region.

CASE STUDIES

The project presented in this paper investigated archaeological remains of lashed-lug watercrafts in three provinces in Sumatra, namely North Sumatra, South Sumatra, and Jambi (Figure 1). South Sumatra and Jambi were on the east coast of Sumatra and famous for their rich archaeological remains, especially the Buddhist artefacts and monuments, many associated to Sriwijaya Kingdoms, one of the largest kingdoms of pre-modern Indonesia (Degroot, Griffiths, and Manguin 2014; Utomo 2010). Major rivers, Musi and Batanghari, run as the vein of people's activities since early times. Unsurprisingly, many lashed-lug sites were found along the riverbank of the two rivers and their tributaries (Sadzali 2019), also near the coastal lines (Rangkuti 2017). There are also sites located underwater, such as Tanjung Rengging (Adhityatama and Sulistyarto 2018) and Lingga (Flecker 2019), proof that the lashed-lug watercrafts were used in both inland and marine waters.

The case study site in North Sumatra is located on the west coast, in Central Tapanuli Regency. In terms of archaeological remains, the regency was considered as one of the most important places in the history of Islam in Indonesia. The Barus site is the first point where Muslims came to Nusantara (modern Indonesia) in the ninth century CE (Guillot et al. 2008). However, the evidence of the initial landing, old harbour, or coastal settlement was almost non-existent. That was until the report in 2019 of archaeological findings from Bongal site, around 95km south of Barus.

Surveys and excavations in the Bongal site reveal a likely harbour and settlement close to the Lumut river estuary. Artefacts from this site include ship and boat components, ceramics, beads, coins, and inscriptions. Radiocarbon dating results of one sample of timber and one sample of rope indicate the site was in use as early as the seventh century CE. Two centuries earlier than Barus (Purnawibowo and Mochtar 2021). Since the first report, the locals found more ship/boat timbers but, unfortunately, they were taken from the location without any documentation.

RESOURCES

Documentation for this project up to early 2023, included ship and boat timbers kept in different types of storage in three provinces. The storage varied from semi-permanent shed built near the site, a local government office, museum display rooms, museum storages, and an artefact storage building. Boat timbers in North Sumatra came from Bongal site, located in the western coast of Sumatra, on the rim of the Indian Ocean. Meanwhile, those in both South Sumatra and Jambi came from several sites in the province.

South Sumatra

East coast

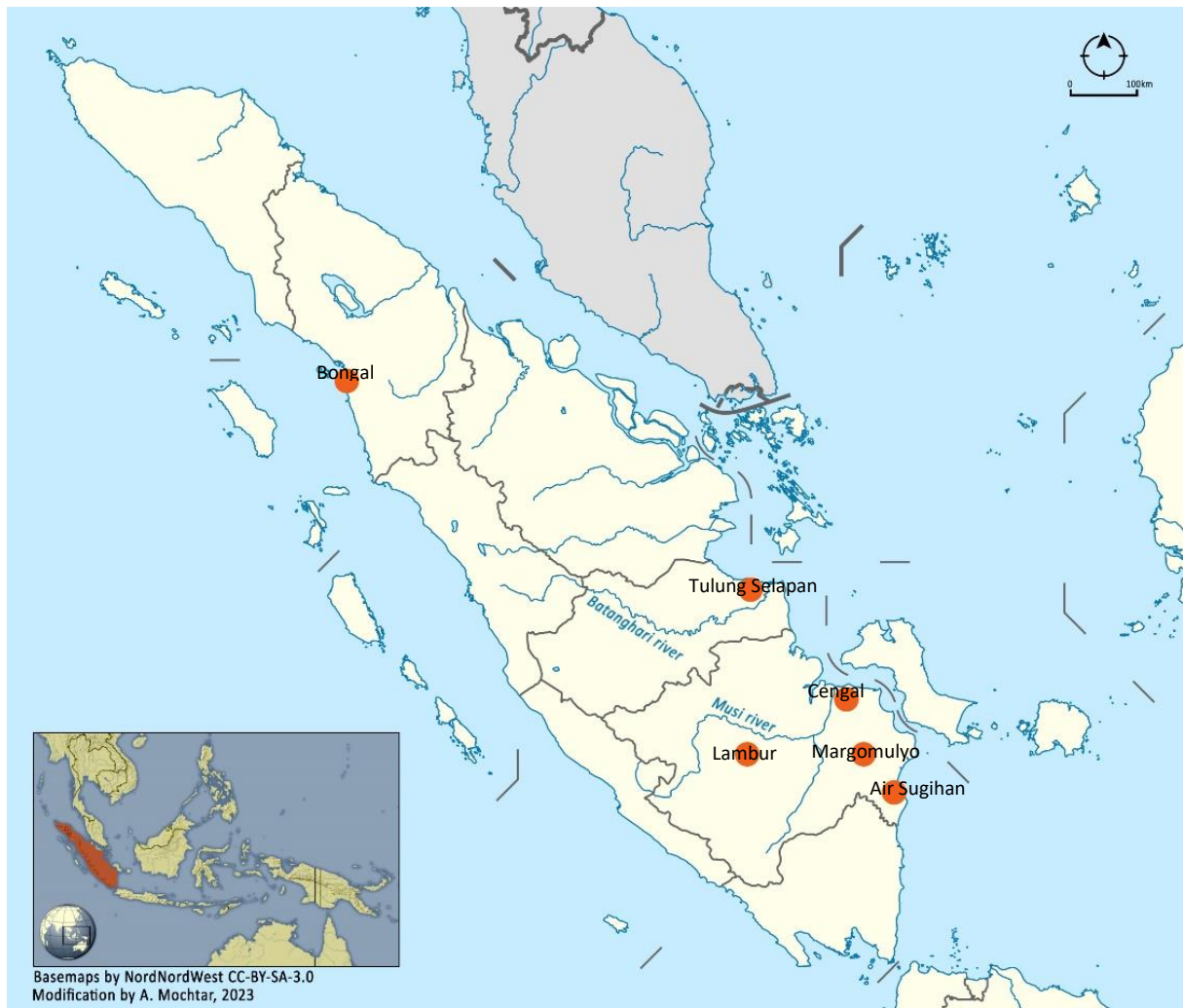


Figure 1. Distribution map of the sites studied in the project.

In the last decade the national archaeological research centre in Indonesia, Pusat Penelitian Arkeologi Nasional (Puslit Arkenas) and the regional agency for archaeological research in South Sumatra, Balai Arkeologi Sumatera Selatan (Balar Sumsel) conducted surveys and excavations on the east coast of South Sumatra to study the wetland settlements in the area. During the missions the teams found components of lashed-lugs vessels which varied from keel planks, hull planks, rudders, to oars. According to the project reports and personal communication with the team members, larger timbers were left close to the site locations while some small to medium timbers were collected and kept in the offices for further analysis.

During the author's data collection in 2023, site visits were not possible due to the weather constraint thus the documentation of the ship/boat timbers from the east coast was conducted on those kept in the artefact storage in Balar Sumsel office. The recorded timbers include fragments of a keel plank, hull planks, a wing end, a rudder, and some paddles from Tulung Selapan site, Cengal site, and Margomulyo site.

Inland

Other boat timbers recorded during the data collection were found on the riverbank of Lematang River, a tributary of the Musi River, far inland around 200km from the coast. The locals who accidentally found the boat dismantled one of the extremities due to curiosity. The authorities then came and brought

the timbers, which consisted of hull planks and a frame, to the artefact storage/display building of the Bumiayu temple complex.

Jambi

The timbers recorded during the data collection early this year were kept in Museum Siginjei, the regional museum of Jambi. Two fragments of hull planks, a wing end, and some rig components were displayed for the public. The museum storage housed one small vessel, possibly a canoe, with apparent lugs on the keel plank. According to the information from the museum employees, the canoe was found in Lambur Village, probably close to the recently excavated intact lashed-lug boat. Unlike the canoe, the provenance of the boat timbers being displayed was, unfortunately, unknown.

North Sumatra

The lashed-lug boat timbers from the Bongal site were kept in three locations namely, the semi-permanent artefact storage building near the site, the local government office, and the Museum Abad 1 Hijriah in Surakarta, Central Java. The timbers in the storage and the office were documented in the 2023 data collection while those in the museum were documented last year. The timbers in the office were from the initial survey after the first report from the locals, they are generally small to medium fragments. Meanwhile, the timbers in the storage were mostly hull planks, the longest at over two meters and some planks were heavy with almost eight centimetres total thickness.

FRAMEWORK

The project presented in this paper was part of the author's ongoing doctoral research project. It started last year and is expected to be finished by the end of 2024, titled 'A technological study of lashed-lugged, plank-built boats and vernacular boat building practices in Indonesia'. The project aims to investigate variations within the lashed-lug boatbuilding tradition through a close examination of archaeological remains found in Indonesia, with the aid of other data including ethnography and iconography. Variations within the lashed-lug boatbuilding were addressed previously (Manguin 2019; Lacsina 2019; Lacsina and Mochtar 2020) but with minimal investigation of possible influences.

This project used a nautical archaeology approach to understand the correlation of attributes within one artefact, of one artefact to others, and of artefacts to other data. From such correlations the author synthesises aspects of the boatbuilding technology. Emphasis is on technique variations used in, among others, fastening systems, plank-shaping, bow and stern assembly, as well as to identify the possible variation influences. Due to the current non-intact stage, of the majority of the ship/boat timbers, the analysis was conducted by identification of the artefact attributes and their function and recorded in a database.

RESULTS

Documentation of timbers

During data collection in 2022–2023 the author recorded 50 lashed-lug ship/boat components in various sizes and conditions (see Table 1). All the recorded timbers were first grouped into six types of components, namely keel plank, hull plank, bow/stern assembly, rudder, rig, and unidentified. The last category was to accommodate the timbers, which until this article was written, were still unidentified in

terms of their position or function. The hull planks were, by far, the most oft recorded component. This was expected because in a complete boat or ship the number of hull planks are highest, compared to other components.

Besides the verbal description, the author made manual drawings and/or photogrammetry of the timbers. The combination of recording methods was chosen to handle the different conditions of the data. Some timbers were waterlogged, and due to the time constraints, it was difficult to obtain detailed data. For example, the photogrammetry failed to record minor details such as the depth of the holes and the connections between lashing holes. In addition, close-up pictures were taken to record details, such as a fragment of rope inside a lashing hole. The author also recorded before and after photographs of all samples taken for radiocarbon dating and species identification.

Table 1. Recapitulation of timbers documented in 2022–2023.

<i>No</i>	<i>Ship/boat component</i>	<i>Qty</i>
1.	Keel plank	2
2.	Hull plank	31
3.	Bow/stern assembly	6
4.	Rudder	5
5.	Rig	1
6.	Unidentified	3
<i>Total</i>		50

Keel plank and hull planks, preliminary analysis

The initial stage of analysis was conducted on hull planks because they held many attributes related to the construction of the vessel. Macroscopic observation was performed on surfaces and the seams of planks to identify the dowel holes, lashing holes, and/or peg holes. Observation was also performed to see variables such as degree of degradation, shape of lugs, type of plank fastening, and type of joinery. Whenever possible, tool marks and other technological traces were observed and analysed. Every attribute on each plank was recorded in a database, which was further elaboration on the extensive database published by Manguin (2019). Whilst his database included both lashed-lug and non-lashed-lug vessels found in Southeast Asia, the author's database only covered lashed-lug vessels in Indonesia, with emphasis on the new and/or unrecorded findings. The database helped the author to identify the similarities and dissimilarities in the construction of the lashed-lug vessels represented by the hull planks.

Plank fastenings

The hull planks showed variations of the plank fastening. The majority was the combination of dowels and plank lashings. A particular case was found in the planks from Bongal site (Figure 2) where four types of fastening holes were identified: dowel holes, lashing holes, peg holes, and go-through holes. The last type of hole was possibly drilled for a long dowel that went through three parallel planks. A keel plank showed the use of only lashings for plank fastening, even though they were rather thick and heavy.

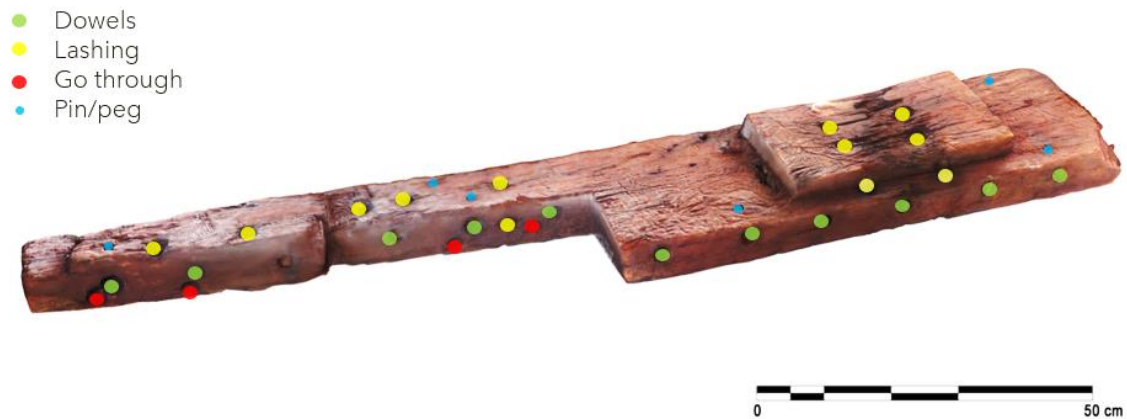


Figure 2. Plank fastening on a hull plank from Bongal site, North Sumatra.

Lugs

In general, the lugs are rectangular with two pairs of lashing holes. Some variations were noted on some planks with ridges, but the number of lashing holes was always the same. Apparent distinction is found on the canoe from Lambur, which had smaller lugs with one large hole through the width of the lug.

Correlation between attributes

The Bongal site had further in-depth analysis to understand the assemblage of hull planks, which attributes were varied and without information of the provenience. The grouping of the planks based on their attributes revealed a possibility of multiple vessels in one site. At this stage, the author put the planks into four groups based on the difference between the plank fastening system, the dimension of the plank, and the character of the wood such as the weight and the level of degradation (see Table 2). The last two variables might indicate different species, which were a weak evidence to support a possibility of different vessels, like those examples in the Butuan boat that used several different types of wood (Lacsina 2016) or in case of a repairment. However, combined with a significant difference in the plank thickness and the use of different plank fastening, it was difficult to imagine them to be from the same vessel.

Table 2. Preliminary grouping of hull timbers from Bongal site.

GROUP	DESCRIPTION	LUGS	DOWELS	PLANK LASHINGS	PEGS	QTY
A	Plank with scarf joints, 3cm thick	Rectangle, 2 pairs of lashing holes	yes	no	yes	2
B	Heavily degraded, 5cm thick	Rectangle, 2 pairs of lashing holes	yes	yes	no	2
C	Flat, heavy plank, rectangular cut joints, 3cm thick	Rectangle, 2 pairs of lashing holes	yes	yes	no	4
D	Thick plank, 7cm thick	Rectangle, 2 pairs of lashing holes	yes	yes	yes	1
TOTAL						9

Rudder

The rudders documented during the data collection were found by local people without clear information of their finding process. Although they were different in dimension, all rudders due to their similar features could be easily identified as belonging to same tradition. The whole rudder, the stock and the blade, made from one solid wood. The stock was cylindrical and gradually flattens towards the mid part to form the blade.

The interpretation of this type of rudder as one used in lashed-lug vessels was based on the rudders found in Bongal site and from the Cengal site. Despite the missing information about the actual location, the rudder from Bongal site was found in the same area with the hull planks and other ship/boat timbers and, to date, all the ship/boat timbers unearthed from the site belong to the lashed-lug tradition. Similarly, the rudder from Cengal site (Figure 3) was found during a survey where local people report the rudder with other lashed-lug hull planks. Further, during the excavation in Air Sugihan area in South Sumatra, the team unearthed some lashed-lug planks and a rudder in one context (Indradjaja 2012; Intan 2017).

Further analysis

During the data collection, wood samples were taken from selected timbers for radiocarbon dating and species identification. The author proposes the results from the analysis will correlate the variation within the construction with different periods and/or with different raw materials. Secondary sources about lashed-lug ship/boats from other places in the region would also be consulted to investigate whether the variations were due to the production of vessels in different workshops.

CONCLUSION

After the success of a previous study in synthesizing the general characters of the lashed-lug ship/boatbuilding traditions (see Session 6_Lacsina and Mochtar in this APConf 5 Proceedings), we now need the investigation of archaeological remains in detail, and to update the record of new findings throughout Southeast Asia. Indonesia played a significant role in the early days of this study because many lashed-lug archaeological remains were found. This became the primary data to understand the tradition, which previously was only in historic ethnographic research. However, the work of the author's project was conducted to further the knowledge of the ship/boatbuilding tradition by closely examining details in the more recently discovered and/or understudied ship/boat timbers.

The result from the preliminary analysis of the timbers highlights the variations of techniques used in the lashed-lug construction, even on the planks from one site. Such variations were noted in previous research but further study to understand them and the influencing factor behind such variations were scarcely done. As it progressed with the analysis on more timbers, as the radiocarbon dating and species identification results return, hopefully this project would provide more detailed insight. Meanwhile, from observations during data collection and preliminary post-fieldwork analysis, this project has documented new information regarding the lashed-lug ship/boatbuilding, such as propulsion of the vessels and the identification of a harbour site on the eastern rim of the Indian Ocean.



Figure 3. Rudder from Cengal site, South Sumatra.

ACKNOWLEDGEMENTS

The author would like to express gratitude to the institutions, who authorise all the data documented in this project, for the permit to access their collection: BRIN Sumatera Selatan, BRIN Sumatera Utara, BPK Wilayah V Jambi, BPK Wilayah VI Sumatera Selatan, Dinas Kebudayaan dan Pariwisata Tapanuli Tengah, Museum Abad 1 Hijriah Surakarta, Museum Siginjei Jambi, as well as Museum Balaputeradewa and Museum Sriwijaya Palembang. The author would also like to thank Prof Chiara Zazzaro at Università di Napoli “L’Orientale” as the author’s tutor for this research for all the supports and supervisions.

BIBLIOGRAPHY

Adhityatama, Shinatria, and Priyatno Hadi Sulistyarto. ‘Bukti Langsung Interaksi Perdagangan di Kepulauan Riau: Studi Pada Situs Arkeologi Bawah Air di Pulau Natuna dan Pulau Bintan’. *Jurnal Segara* 14, no. 3 (6 December 2018): 127–35. <https://doi.org/10.15578/SEGARA.V14I3.7348>.

Akbar, Ali. ‘Laporan Akhir Pelaksanaan Kegiatan Penelitian Situs Perahu Kuno di Desa Lambur, Kecamatan Muara Sabak Timur’, 2019.

Degroot, Véronique, Arlo Griffiths, and P.-Y. Manguin, eds. *Kedatuan Sriwijaya: Kajian Sumber Prasasti dan Arkeologi*. 2nd ed. Depok, Indonesia: Komunitas Bambu, 2014.

Flecker, Michael. ‘Sister Ships: Three Early 12th Century CE Shipwrecks in Southeast Asia’. *Current Science* 10 (2019): 1654–63. <https://www.jstor.org/stable/27138527>.

Guillot, Claude, M. -F. Dupoizat, U Sumaryo, D Perret, and H Surachman. *Barus Seribu Tahun Yang Lalu*. Jakarta: KPG & Ecole française d’Extrême-Orient, 2008.

Indradjaja, Agustijanto. ‘The Pre-Srivijaya Period on the Eastern Coast of Sumatra: Preliminary Research at the Air Sugihan Site’. In *Connecting Empires and States: Selected Papers from the 13th International Conference of the European Association of Southeast Asian Archaeologists*, 32–42, 2012.

Intan, M. Fadlan S. *Air Sugihan: Jejak Sungai Lama di Lahan Basah*. Yogyakarta: Penerbit Ombak, 2017.

Lacsina, Ligaya. ‘Examining Pre-Colonial Southeast Asian Boatbuilding: An Archaeological Study of the Butuan Boats and the Use of Edge-Joined Planking in Local and Regional Construction Techniques’. Flinders University, 2016. <https://www.academia.edu/download/54800536/ThesisLacsina2016.pdf>.

———. ‘The Same-Same Boatbuilding Tradition? Looking at Different Examples of Lashed-Lug Boats from the Southeast Asia Region’. In *Past, Present, and Future of ASEAN Maritime Heritage*, 38–53, 2019.

Lacsina, Ligaya, and Agni Sesaria Mochtar. ‘The Lashed-Lug Tradition Beyond the Commonalities: A Closer Examination of Variations in Keel Design within Southeast Asian Shipbuilding Tradition’. In *Advancing Southeast Asian Archaeology 2019: Selected Papers from the Second SEAMEO SPAFA International Conference on Southeast Asian Archaeology, Bangkok, Thailand 2019*, edited by Noel Hidalgo Tan. Seameo-Spafa, 2020. <https://www.spafajournal.org/index.php/spafapub/issue/view/136>.

Manguin, P.-Y. 'Sewn Boats of Southeast Asia: The Stitched-Plank and Lashed-Lug Tradition'. *International Journal of Nautical Archaeology* 48, no. 2 (2019): 400–415. <https://doi.org/10.1111/1095-9270.12367>.

———. 'The Trading Ships of Insular Southeast Asia: New Evidence from Indonesian Archaeological Sites.' In *Proceedings of Pertemuan Ilmiah Arkeologi in Yogyakarta, 4 – 7 Juli 1989*. Ikatan Ahli Arkeologi Indonesia, 1989.

Purnawibowo, Stanov, and Agni Sesaria Mochtar. 'Boatbuilding Technology Analysis of the Seventh Century Boat Remains from Bongal Site on the West Coast of North Sumatera'. *KALPATARU* 30, no. 2 (30 November 2021): 99–112. <https://doi.org/10.24832/kpt.v30i2.821>.

Purnawibowo, Stanov, and Andri Restiyadi. 'Identifikasi Tinggalan Arkeologi Maritim di Situs Bukit Bongal, Tapanuli Tengah, Sumatera Utara'. Medan, 2020.

Rangkuti, Nurhadi. 'Teluk Cengal: Lokasi Pelabuhan Sriwijaya?' *Berkala Arkeologi* 37, no. 2 (11 December 2017): 125–40. <https://doi.org/10.30883/jba.v37i2.206>.

Sadzali, Asyhadi Mufsi. 'Hulu ke Hilir: Jaringan dan Sistem Perniagaan Sungai Kerajaan Srivijaya'. *Paradigma, Jurnal Kajian Budaya* 9, no. 1 (2019): 61. <https://doi.org/10.17510/paradigma.v9i1.276>.

Utomo, Bambang Budi, ed. *Ekspedisi Sriwijaya: Mencari Jalur yang Hilang*. Palembang: Balai Arkeologi Palembang, 2010.