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Chapter 2
Sea as Method: Borobudur and the Ontology of the Maritime World

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Instead of going into detail by elaborating on the data and statistics, I will start by giving you an overview of conceptual issues that we can reflect on while doing digitalization work. This is important in order to explain this project not only in terms of the technical context, but also in terms of how it can shed light on some new questions, new challenges from an engineering point of view, and also from a scientific perspective.

I will begin with a brief introduction to why maritime studies are important for Indonesia by turning to the work of Professor Adrian. B. Lapian. Next, I will briefly elaborate on what I mean by "sea as method" and how it might be relevant as a way of reflecting on areas studies work, not only in terms of reflecting on the technical aspects of the project, but also on some broader conceptual issues that are related the notion of the theoretical framing of what we usually call area studies. I will describe two important sites, Borobudur and the Punjulharjo Boat, to show how materials found at the archaeological sites and digitization networks could help us to illustrate the "sea-as-method" approach. Finally, I will conclude by visiting this conceptual point and some other thoughts on how, in particular, a project can benefit from the "sea as method" using a project that we have been working on collaboratively with Ritsumeikan University on digitizing Borobudur and also the upcoming digitizing projects and ways of reflecting on the wider issues of my maritime work in Indonesia.

Indonesia has many islands and comprises a large body of seawater, not to mention thousands of river systems that also connect the hinterland to the coastal area. However, when one pays close attention to scholarly literature concerning Indonesia, the majority of researchers only talk about the history and the politics of agricultural land-based communities. This does not mean that there are no studies on maritime ecology communities, but most of them talk about agricultural land-based communities. In fact, when the US instituted area studies in the 1960s and 70s, the Indonesian studies focused largely on the cultures of people who live in Java, Sumatra, and Bali hinterlands, and Indonesian studies were primarily identical to the study of peasants and land-based cultures.

This situation drove the late Adrian B. Lapian (1929–2011) to challenge the status quo, and he succeeded in shifting the focus from the land to the sea. He thought that Indonesian history has basically been about the people within the interior. People are more familiar with ethnic diversity in Sumatra or the Kalimantan jungle than with the ethnic groups found along the coastal areas of the Indonesian archipelago, not to mention the ethnic groups who live entirely on the sea, such as the Sama-Bajau people. To fill in the lack of the studies of maritime communities, Lapian (2001) wrote a very important dissertation titled "Orang laut, bajak laut, raja laut: sejarah kawasan laut Sulawesi abad XI" ("Sea Nomads, Pirates, Sea Kings: Regional History Sulawesi Sea in the Eleventh Century") that has now become a classic in maritime historical studies in Indonesia. His dissertation was published later in Indonesian with the same title. It is a critical historical work. Lapian spoke Dutch, Spanish, and Portuguese languages, a rare capability among Indonesian historians, and having access to the primary archival sources allowed him time to pay more critical attention to the politics and the circumstances that served the Dutch, Spanish and Portuguese

archival records, as the three major actors plying maritime trade in the 15th to 19th centuries in Southeast Asian waters.

Lapian suggests that the European sources used the denigrating term "pirates" to refer to the people who attacked European ships and disturbed the trade routes and shipping activities. Lapian argues that the maritime activities in the Indonesian sea took place actually long before the Europeans came. There were three social groups who were engaged in maritime network activities before that period. Those were the real pirates, the sea nomads, and later on, the maritime kingdom, political units who possessed significant naval powers. One of the major points Lapian highlights is that when we rely on European sources to study maritime power, we risk overlooking the so called "indigenous" maritime activities and materials that might be less interesting to the Europeans. We have neglected too many of those activities and materials regarding the daily life of the people, since long before the Europeans came seeking for spices and other traded goods.

Much of the project that we currently engage in is about trying to recover these indigenous materials and activities that might be less interesting to Europeans, but that actually became a central part of the daily life of people living in the Indonesian archipelago.

Sea as Method

Let me briefly explain what I mean by "Sea as Method." Adrian Lapian states that we should imagine the sea as a system, and he proposed the concept of *systim laut* (sea system) to discuss the maritime world that is the Sulu Sea, as a sea system, which is the precursor to the expression "Sea as Method." This chapter proposes a different kind of approach, what I call the topological approach to study the sea or the maritime world. What we understand as the maritime world actually

consists of three major material components: the people, the material cultures, and the ecologies. Although we can argue that these components can form any landscape, in this case they comprise the dynamics and flexible relations that exist throughout the conduits of waterways and marine ecologies. So, when the people, the material cultures, and the ecology are assembled at one point in time, and at a particular location, what emerges is what I call the ontology of the maritime world.

I should also emphasize that what I take as an ontology is different from the philosophical notion of ontology, because the assembling and the network in my concept of ontology are always in a dynamic relationship, which is different from the notion of philosophical ontology, which is always regards ontology as something that is fixed and continuous throughout time. The ontology of the maritime world indicates a more dynamic notion of assembling a network when we are talking about ontology. We could mention here how recent work in digital anthropology also talks of the so-called digital as having its own kind of ontology. This chapter will not discuss the point here, but it is important to see that this is actually one way that Lapian was referring to when he spoke of wrapping up the theoretical questions that can bridge the humanities, social science applications, and technological engineering approaches.

Topologies

What we perceive as the Sulu Sea, from Lapian's point of view, is a geographical entity that can be distinguished from, for example, the Indian Ocean or the Java Sea. His notion of a map of this area is very much embedded with the GIS that Professor Feener mentioned in Chapter 1. When we talk about the maps, we are talking about the particular boundaries of a certain region. However, we see it from a different angle. That is, we can see the sea as a water conduit that allows the processes

of topological formations to take place. The waterways facilitate the networks through which the assembling and branching out of people, material culture, and ecologies happen. Hence, it is more interesting to focus on the sea as a topological conduit that facilitates the assembling and branching out of people, material culture, and marine ecologies, rather than discussing the city solely as a site for activities.

Let me now illustrate my conceptual points with two archaeological data, the Borobudur Relief, and the Punjulharjo Boat site.

Borobudur and the Ocean

Borobudur is a Buddhist temple dating from the ninth century AD and a World Heritage site. You might wonder what Borobudur has got to do with the maritime world as it is located far inland on the central plain of Java Island.

Figure 1. Borobudur World Heritage Buddhist Temple.
9th Century AD: Hindu Buddhist Period
Source: Author

However, the water conservation office has identified at least ten reliefs of ships and boats depicted on different parts of Borobudur. Reliefs of ships and boats are scattered around, and they have already found at least ten depictions of boats and ships on the reliefs.

Figure 2. Ship depicted on the Borobudur Relief
Source: Author

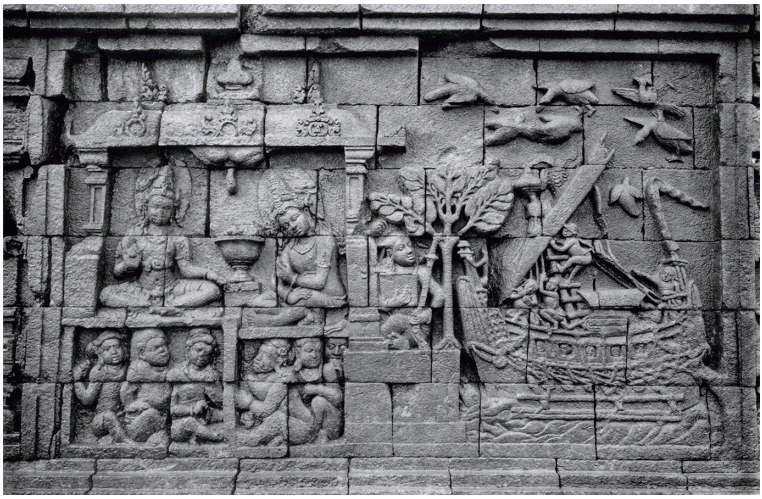

Figure 3. Ship depicted on the Borobudur Relief
Source: Author

Let me draw attention to Figures 2 and 3. These are the most important and iconic depictions of ships on the Borobudur temple. If you carefully examine the pictures of the ships, you will see that these are most probably ocean-going ships.

If you look carefully, you can see the ships have outriggers. From this, we can conclude that these are not Chinese, Arab, or Indian ships, but locally built ships that commonly ply the Southeast Asian seas. Outrigger ships are the typical style of shipbuilding that is common in the Pacific or Southeast Asia. Thus, when you see this kind of outrigger ship depicted on the Borobudur reliefs, you can be sure that the people who built this temple in the ninth century AD were already familiar with the local technology of boat or shipbuilding, prior to the arrival of Chinese junks or European ships. This is an important historical fact that we should pay more attention to. One of the projects that we do when visualizing the Borobudur 3D model, is to focus on this kind of aspect, to see to what extent this kind of technology was actually already available during the construction of the temple.

In addition to the outrigger, the Borobudur ship in Figures 2 and 3 also uses fore and aft rigging, and this is another shipbuilding technique that is common in Southeast Asia. Figure 3 shows a full-scale reproduction of such a ship. It was constructed in 2002 by As'ad Abdullah, a master shipbuilder from Kangean Island, of East Java province. It was reconstructed in the shape of the Borobudur ship by traditional methods using the wood and bamboo materials commonly found in Southeast Asia.

Figure 4. The working reconstruction of the Borobudur ship
Source: Author

In 2003, this reconstructed ship then sailed from Jakarta to Accra, Ghana, to prove the seaworthiness of the design, and eventually, it arrived safely in Accra in 2004. This experiment successfully proved that in the Borobudur time, local people had the necessary knowledge to build long-distance, ocean-going ships. In Figure 5, you can see a digital reconstruction of the ship made by the Borobudur Preservation Office. There are some differences in details, but as you can see, they are trying to reconstruct the two major components depicted in the relief: the outrigger and the rigging system.

Figure 5. The digital reconstruction created by the Borobudur Preservation Office
Source: Author

This case is interesting because the actual reconstructed boat was made before the digital reconstruction, and usually it would be the other way round.

Figure 6. Boat with double outriggers from Palau, the Philippines.
Source: <https://www.flickr.com/photos/kartlasarn/23836007653/>

Figure 6 gives you an idea of what other examples of outrigger boats look like in the Pacific region. This one is from the Philippines.

Figure 7. Punjulharjo boat
Source: Author

The Punjulharjo boat was found and excavated by the Jakarta archaeological office, and the site was found near the town of Raman on the northern coast of Central Java, quite a distance from the Borobudur. In terms of the archaeological material, it is really interesting, because remains of boats are rarely found in Indonesia due to the hot humid climate. The Punjulharjo boat was carbon dated from the seventh to eighth century AD, a little earlier than Borobudur, so it is from the time of the early Sriwijaya Buddhist Empire (7th–14th Century AD) period and Hindu-Buddhist Mataram Kingdom (8th–12th Century AD) but not very far separated from the time of the Borobudur temple. According to one of the archaeologists, it was probably left behind and not wrecked during a trip, which is probably why the condition of the boat was quite intact.

Figure 8 shows the Punjulharjo boat, which is definitely different from the Borobudur boat as it has no outrigger. Perhaps it comes from a

different boat-building tradition than the other ship. This is an important distinction that I would like to emphasize, as later on when I discuss topology, this kind of technological aspect is very important.

Figure 8. The preserved skeleton of the Punjulharjo boat
Source: Author

This boat also shows the techniques that are also common in Southeast Asia, which are the application of a certain design and lashed-lug techniques where the lugs and planks are lashed together with coconut fiber roots. These techniques are also commonly found in the Indonesian waters and in some of the Southeast Asian coastal communities.

Figure 9. No-outrigger boat for river transportation on the Borobudur relief
Source: Author

However, as you can see in Figure 9, a boat with no outrigger can also be found on Borobudur relief this year. The scene around the boat looks like a forest, and the animals also suggest that the boat is on a river not the sea. Therefore, this relief, together with the ship relief, indicates that the artisans and the people who built the temple and made the relief were already familiar with different types and functions of water transportation, one with ocean-going technology and the other with inland river transportation technology. So here we have two different kinds of technology that we can learn more about from the digital reconstruction of the Borobudur relief.

Conclusion

After briefly discussing the Borobudur ship and the Punjulharjo boat as examples of material cultures that are related to the maritime world, I would now like to go back to the conceptual points that I raised earlier. The important question is: How do we talk about the ontology of the maritime world? This chapter proposes that we can understand ship or boat-building technology as an assemblage that comes together to constitute an ontological space of the maritime world. Shipbuilding technology is not just a technology; it consists of an assemblage of materials, designs,

experts, knowledge, belief system, and the ecological components.

From the above, my argument on the Borobudur Relief and the Punjulharjo Boat shows that we can at least talk about two ontologies of the maritime world that were constituted by how the outrigger technology, the building technology, or the shape of these boats and ship designs, are shaping the topologies of the maritime networks. Thus, when we talk about these kinds of topological connections there is not only assembly, but also branching out, so we can have those networks in which one representation of the network comes in the form of an outrigger boat and the other one as the assemblage of a technology, and that later on produces this kind of non-outrigger shipbuilding technology. These are the two kinds of ontologies which appear by using the maritime world as a context instead of the land base or country-specific context of an area.

To conclude this chapter, let me briefly illustrate what I mean by the topological network, and how this topological network can illustrate the networks that emerged from the technological assemblage.

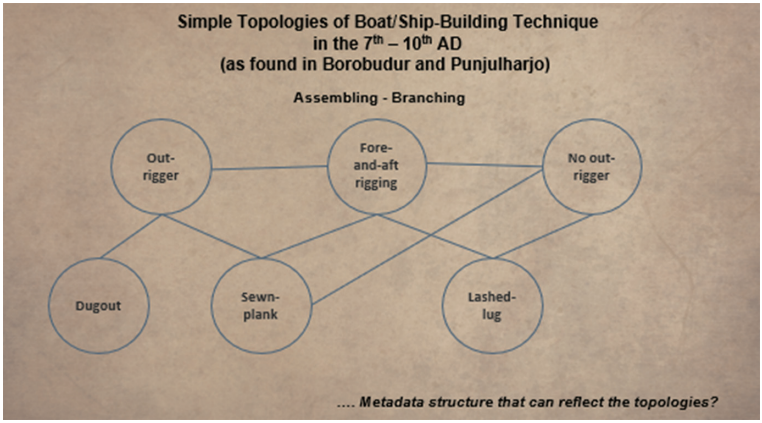

Figure 10. Simple Topologies of Boat/Ship-Building Technique in the 7th-10th AD
Source: Author

We should note that this deals only with the selected technological features of shipbuilding I mentioned earlier, which is the rigging and construction of the hull of the ship or the boat. There are many other technological features that can complicate the topological network such as the steering design, the stabilizing, and other social and cultural features, such as the composition of the crews and also the navigational technology.

I will close this chapter by returning to the central thread of this book: digital technology. I would like to propose an opening question. If we would like to create a digital database of the maritime world, such as the one Professor Feener has already been working on for quite some time, how can the structure of the database metadata reflect the complex topological networks? This question is important for me, because, as Professor Feener mentioned in the previous chapter, the most important part of this kind of new initiative is not only creating the database, but also reflecting on how the database could inform new conceptual and theoretical reflection, not only for the social science of humanities, but also in terms of technology, and computer science expertise.

Finally, regarding this digital ontology, we should all consider to what extent these techniques that we have been using into visualize components in Borobudur Relief, can also give more nuance to the complexity of this typological network that we have been describing in terms of our work on the maritime world?

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Chapter 2. Sea as Method: Borobudur and the Ontology of the Maritime World

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