

Lagoon as a port: reconstructing topography and seascape of the past

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ABSTRACT

In this study I demonstrate that lagoons were generally used as ports in ancient Japan. A lagoon is not suitable for anchoring large boats because of its shallow water depth; however, it was the best anchorage for shallow draft boats in ancient times. Based on archaeological evidence, it is likely that many of the ancient Japanese boats were dugout canoes, or enlarged ones by adding side boards to the hull of dugout canoes. In the Kofun period, around 4th century, it is often the case that a huge burial mound was built near the lagoon and used as a port. I consider that it was a landmark made visible from boats sailing along the coast.

In the 7th century, the technology to make large plank-made boats was introduced to Japan from the Korean peninsula and used for open sea voyages to the mainland of China. Since these boats require deep water ports, bays were then used as ports. Traditional boats, however, continued to be used in the Japanese archipelago, and many lagoons continued to be used as ports. It was in the Middle Ages after 14th century, the technology of making large ships called wasen developed, so lagoon ports gradually became obsolete. Many of the lagoons thought to have been used as ports in ancient times have been buried and many of them have lost their existence. In this study, I point out the existence of lagoons that are likely to have been used as ports in ancient times by performing topographic reconstruction using GIS. In addition, the GIS 3D model reproduces how the port site looked from the coast and shows that there is a high possibility that the burial mound was made as a landmark.

Keywords: Lagoon, Port, Seascape

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INTRODUCTION

In ancient Japan (from prehistoric times to the end of the 12th century), lagoons were often used as ports. A lagoon is a shallow body of water separated from the open sea by a sand bar. It is a good place for mooring ships because of the calm waves (Mori, 1986). However, ancient lagoons have become terrestrial due to subsequent terrain changes (e.g. uplift, sea level declination, artificial landfills, and etc.), and have often disappeared by today. For that reason, the fact that it was once a port can often be known only by lore or place name. In particular, a place name with the word 'tsu' in Japanese, meaning port, is likely to have been a port, even if it is currently located inland (for example, 'Kibitsu' in Okayama Prefecture). In addition, important archeological sites are often located near the lagoon, which was used as an ancient port. Especially during the Kofun period (ca. 3rd to 7th centuries), huge burial mounds called Keyhole-shaped tumuli are often built. Since these mounds are often visible from the sea, it is considered that it served as a landmark indicating the location of the port and a monument indicating the power of the local chief who ruled the land (Mori, 1986).

Well-organized methodology on archeological research is essential to reconstruct such an ancient port site. At this time, reconstruction of landscape using GIS is also an important tool, in addition to conventional research on archeological sites and artifacts. In this paper, I will show the effectiveness of landscape reconstruction using GIS in a case study of a region in western Hyogo prefecture (former Harima Country).

CASE STUDY OF MITSU IN WESTERN HYOGO

Mitsu, located in the western part of Hyogo Prefecture, was once in Harima Country in the ancient regional division, and faces the Seto Inland Sea, the inland sea between Honshu and Shikoku Islands. It is located near the mouth of the Ibo River (Figure 1a). The place name ‘Mitsu’ contains the word ‘tsu’, implying that it was once a port. The name of the place, Mitsu, appears in the historical document, *Harima-no-kuni Fudoki*, written in the 8th century. According to the document, this is where Empress Jingu stopped over on her expedition to the Korean Peninsula. Empress Jingu is the empress of the 14th emperor Empress Chuai, and is estimated to have been in the latter half of the early Kofun period (around the late 4th century). Therefore, it is possible that Mitsu was used as a port around the 4th century.

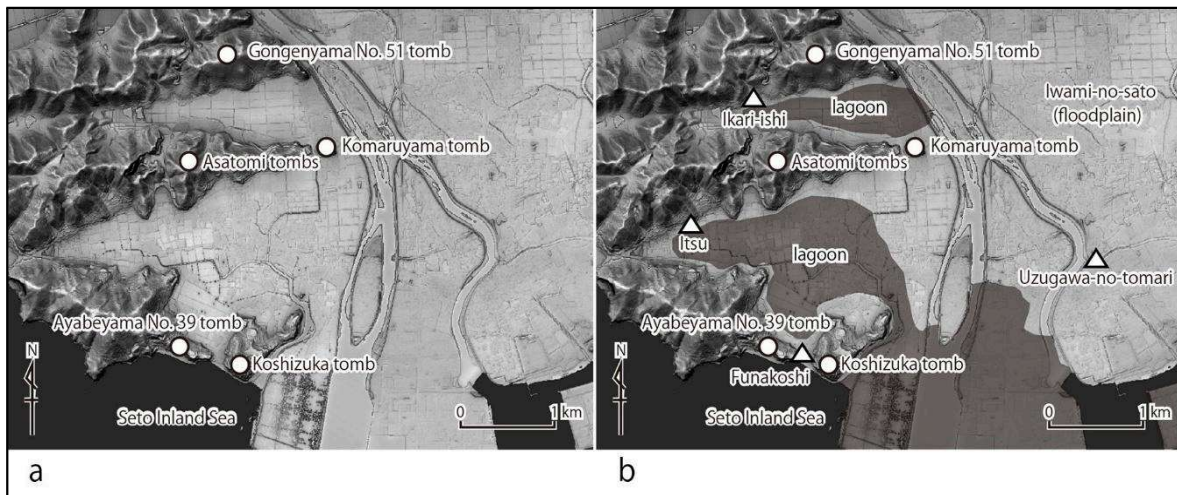


Figure 1: Present Topography of Mitsu (a) and Its Reconstructed Topography of the Past (b). Circular Symbol Indicates Archaeological Site and Triangular One Place of Lore or Tradition

Looking at today's topography around Mitsu, there is no lagoon. However, important archeological sites are distributed around this area. For these reasons, the lagoon of Mitsu may now be buried and landed. Therefore, I conducted a research that focuses on reconstruction of the past topography based on 1) the distribution of archeological sites and the subtle height difference of the current terrain, 2) the traces of the old river channel, 3) the place names described in the *Harima-no-kuni Fudoki*, and 4) the place where there are some traditions and lore about Empress Jingu. Fig. 1b shows the result. The results of this research indicate that there was a high possibility that two lagoons existed in Mitsu. There are some important archeological sites around the lagoon. The most

important of these are the burial mounds called Gongenyama No. 51 tomb built in the former half of the early Kofun period (ca. mid 3rd century), and the Koshizuka tomb built in the latter half of the early Kofun period (ca. late 4th century). The condition for the location of the two are different, which is thought to be related to the port landscape.

KOSHIZUKA TOMB AND ITS LANDSCAPE

The Koshizuka tomb is a burial mound that is thought to have been built in the latter half of the early Kofun period (late 4th century). This is an approximately 100-meter-long keyhole-shaped tumulus. It is believed to be built in the same period with the period of Empress Jingu appears in *Harima-no-kuni Fudoki*. Since this mound is located on a small hill facing the Seto Inland Sea, it can be easily seen from the sea. In this sense, it is considered that this monument served as a landmark. I used GIS to reproduce what the Koshizuka tomb looks like from the sea. The GIS software of ‘Kashmir 3D®’ was used in this study. This software can reproduce landscape three-dimensionally at any point and from any altitude. The software is easy to use and is often used by mountaineers. This time, the point was set at the sea off the coast of Mitsu, and the altitude was set at 1 meter. This is because the viewpoint of a person on an ancient boat is expected to be at most 1-2 meters.

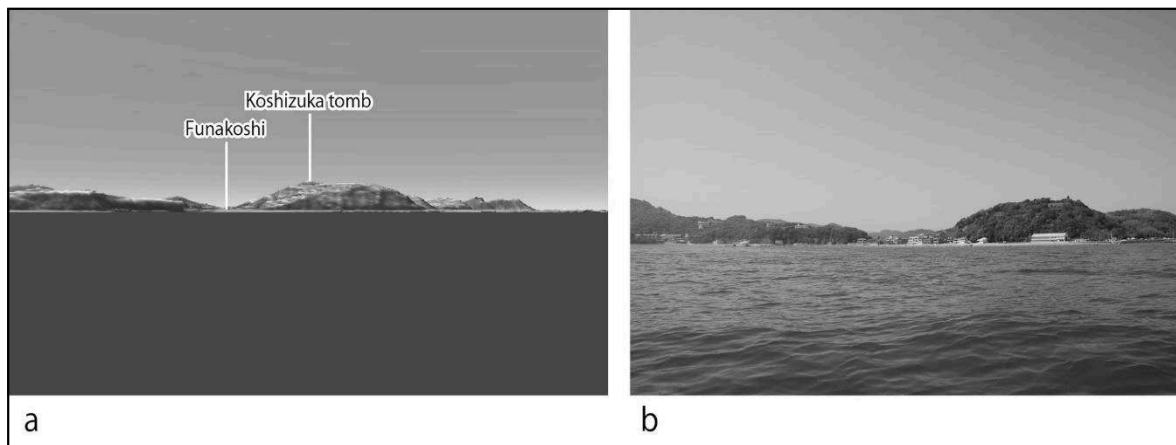


Figure 2: View of Mitsu from the Sea: GIS 3D Model (a) and Photographic Image (b)

Figure 2a shows the 3D model that was reproduced by GIS. It shows that the Koshizuka tomb was easily seen from the sea. In addition, Fig. 2b shows Mitsu from the sea by a kayak. Today, the hills are covered with trees and the mound cannot be seen directly, but assuming that there were no trees in the past, the mound could have been easily seen. On the west side of the hill where the Koshizuka tomb is located, there is a narrow sandy coast. It is now called ‘Shin Maikohama’, but was used to be called ‘Funakoshi’. The name of the place, ‘Funakoshi’, also appears in the text of *Harima-no-kuni Fudoki*, which describes that the boat of Empress Jingu was pulled by a rope and crossed over the land. The word of ‘Funakoshi’ has the meaning of ‘a boat crosses the land’. Furthermore, if you look at the reconstructed topography of the past, you can see that this area used to be a sandbar, and there was a lagoon behind the sandbar.

These facts indicate that the Koshizuka Tumulus was built beside the entrance to the lagoon in Mitsu. In other words, the Koshizuka Tumulus was constructed by selecting the most important location in the port of Mitsu. Looking at the reconstructed topography of the past, the lagoon of Mitsu is also connected to the sea on the east side of the hill where the Koshizuka tomb is located. This is also the mouth of the Ibo River. Alluvial soil has been deposited at this point, making it difficult for boats to enter. For this reason, it is highly probable that the route that crosses the sandbar at 'Funakoshi' was used as the main entrance into the lagoon.

GONGENYAMA NO. 51 TOMB AND ITS LANDSCAPE

There is another important archeological site in Mitsu. It is the Gongenyama No. 51 tomb, which was built earlier than the Koshizuka tomb. It is considered that this burial mound was built in the former half of the early Kofun period (ca. mid 3rd century). This is a 43-meter-long keyhole-shaped tumulus, smaller than the Koshizuka tomb. This tomb is important because it is estimated to be one of the oldest mounds in the Kofun period that built on the Japanese archipelago. The middle of the third century, when this tomb was built, is considered to be the time when the process of the state-formation began in the Japanese archipelago. In the Yamato Basin in Nara Prefecture, a group of large-scale tumuli and a complex of large buildings were established. From the Gongenyama No. 51 tomb, five bronze mirrors called 'sankakubuchi shinjukyo' and a number of earthenware called 'tokusyu-kidai-gata haniwa' have been recavated, and both are common elements to the burial mounds in the Yamato Basin. For these reasons, it is highly likely the chief who built the Gongenyama No. 51 tomb was associated with political leaders in the Yamato Basin (Ishimura, 2017: 61-62).

The Gongenyama No. 51 tomb is located beside the small lagoon in the northern part of Mitsu. It is estimated that this lagoon was able to be accessed from the Ibo River. To the west of the lagoon, there is a rock called 'Ikari-ishi' (literally means anchor stone), which is said to have been used for mooring the boat of Empress Jingu. As can be seen from the 3D view produced by GIS (Fig. 2a) and the view from the kayak (Fig. 2b), however, the Gongenyama No. 51 tomb cannot be seen from off the coast of Mitsu, since the ridge line extending east and west on the south side of the tomb blocks the direct view.

Looking at the direction of the Seto Inland Sea from the Gongenyama No. 51 tomb, however, you can see off the Seto Inland Sea. Figure 3a shows the view reconstructed in GIS, and Figure 3b shows the view from tomb. From this viewpoint, you can see up to Shikoku Island on the other side of the Seto Inland Sea. From these facts, it is clear that while the Gongenyama No. 51 tomb cannot be seen from the sea along the coast of Mitsu, but you can see far away in the Seto Inland Sea from there. In other words, although this tomb did not serve as a landmark from the sea, it is highly likely that the view from the tomb was significant.

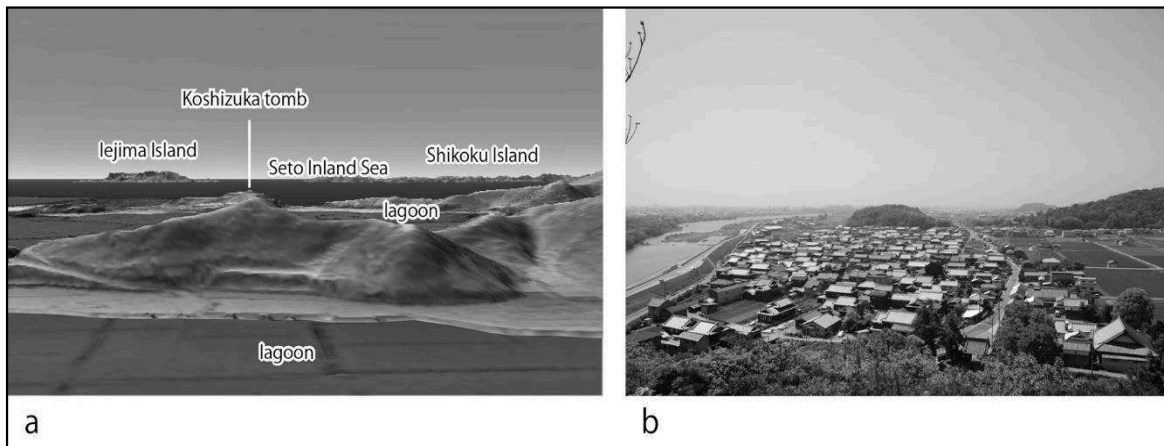


Figure 3: View from the Gongenyama No. 51 Tomb: GIS 3D Model (a) and Photographic Image (b)

DIFFERENCE IN LOCATION BETWEEN THE KOSHIZUKA TOMB AND THE GONGRNYAMA NO. 51 TOMB

It is highly likely that the difference in location between the Koshizuka tomb and the Gongenyama No. 51 tomb reflects the difference in the role of the monument at the time of its construction. In the former half of the early Kofun period, when the Gongenyama No. 51 tomb was built, the burial mounds tend to have been built on small hills and ridges through the Japanese archipelago. This is probably because the view from the mound was emphasized. It is presumed that in ancient times a chief climbed a mountain or hill to view the land he ruled, as a ritual performance called 'kunimi' (Ishimura, 2019: 69). From the Gongenyama No. 51 tomb, you can overlook the two lagoons of Mitsu and the Seto Inland Sea. Therefore, it is highly likely that this mound was built by selecting a location that emphasizes the view.

On the other hand, in the latter half of the Kofun period, when the Koshizuka tomb was built, many huge burial mounds were built along the coast through the Japanese archipelago. Typical examples are the Goshikizuka tomb in Hyogo Prefecture (194 meters long) and the Yanai-Chausuyama tomb in Yamaguchi Prefecture (ca. 80 meters long), both facing the Seto Inland Sea, and the Shinmeiyama tomb (ca. 190 meters long) and Amino-Choshiyama tomb (200 meters long) in Kyoto Prefecture, both facing the Sea of Japan. All of these tombs are located where they can be easily seen from the sea. The construction of the Koshizuka tomb is consistent with this tendency at that time throughout the Japanese archipelago. During this period, it is highly likely that the mounds played a role as a landmark visible from the sea.

DECLINE OF MITSU AND RISE OF MUROTSU

Although Mitsu's lagoon was used as a port during the Kofun period, in the following Asuka period (late 7th century) and Nara period (8th century), it is likely that the role of the port in this area shifted to Murotsu, west of Mitsu (Fig. 4). The port of Murotsu is located on a small cove. The name also appeared in the text of *Harima-no-kuni Fudoki*, but the port was fully developed in the Nara period. It is believed that the port was renovated by a monk called Gyoki. He developed five ports in the Seto Inland Sea. He was a Buddhist monk conducting missionary work without the

approval of the state, and often the state persecuted him. Later, however, the state appointed him to the High Priest and also as the person in charge of the erection of Todaiji, a big national enterprise.

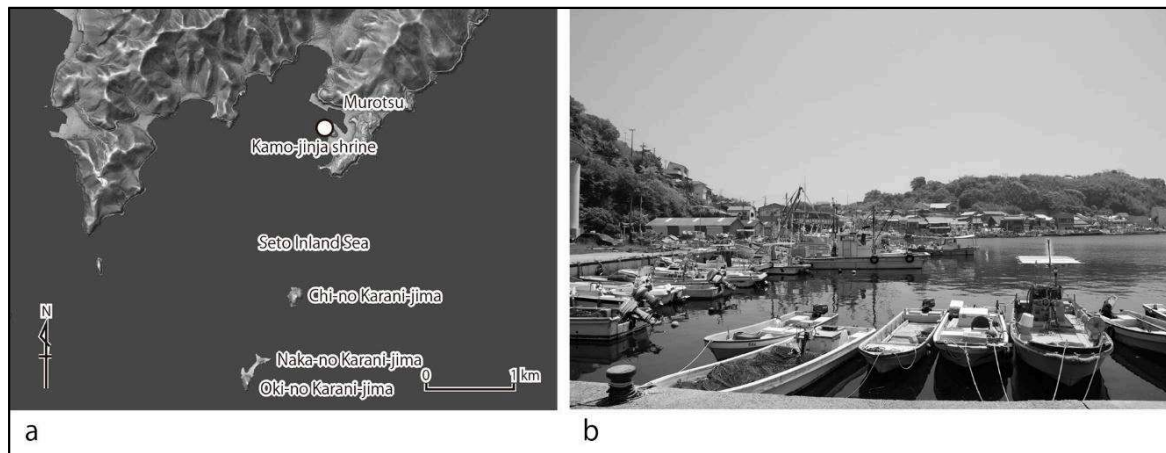


Figure 4: Murotsu's Present Topography (a) and Photographic Image (b)

In addition, the songbook called *Manyoshu*, compiled during the Nara period, contains three songs depicting Murotsu. This indicates that Murotsu was known as a famous port in the Nara period. However, the terrain of Murotsu is surrounded by steep cliffs, and there is almost no flat land. There are few archaeological sites before the Kofun period around Murotsu. These facts show that the geographical environment is quite different from Mitsu. One of the features of the port of Murotsu is its location in a cove with deep water. It is a good place to moor a boat because the waves are calm. There are three small uninhabited islets off the coast of Murotsu. The text of *Harima-no-kuni Fudoki* tells the story that cargos from a wrecked foreign boat (from China or Korea) drifted down to the islets. This tradition implies that the port of Murotsu was associated with foreign trade.

When you see the reconstructed 3D view of Murotsu from the sea, there is a cape in front of the cove, and a shrine called Kamo-jinja is located on it (Fig. 5a). In the view from the kayak (Figure 5b), the shrine's building is covered with trees and is invisible, but the shrine's front hall is built facing the sea side. If there are no trees, you can see the shrine with its entrance open to the sea.

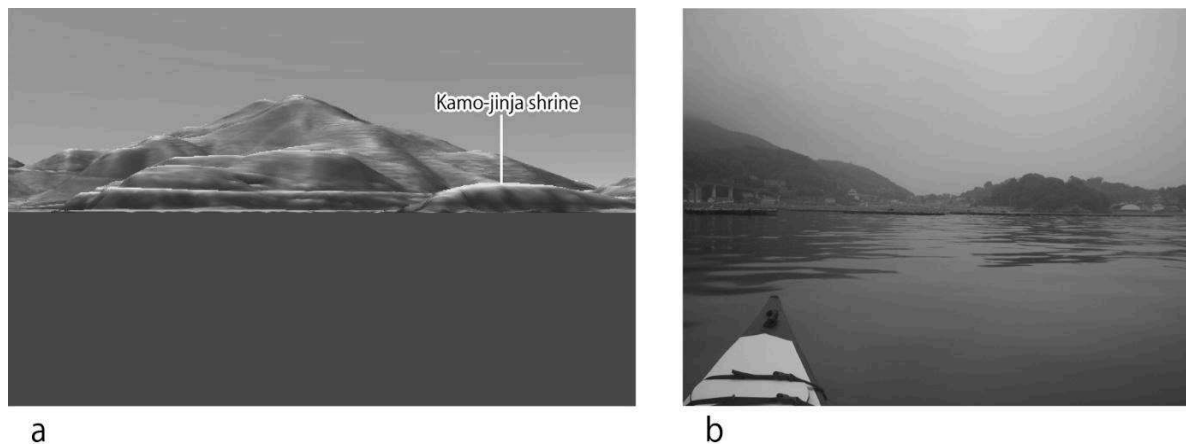


Figure 5: View of Murotsu from the Sea: GIS 3D Model (a) and Photographic Image (b)

HISTORICAL BACKGROUND OF THE TRANSITION FROM MITSU TO MUROTSU

In this area, the function of the port transferred from Mitsu to Murotsu, probably due to a change in the structure of the boat. During the Asuka period (late 7th century) and the Nara era (8th century), large boats with deep drafts began to be constructed. Such large vessels were most likely difficult to use in lagoons. Therefore, Murotsu, which has a deeper water depth, was required instead of Mitsu, which has a shallower water depth.

In the Japanese archipelago, boats generally used until the Kofun period were extended dugout, which has a structure that side boards were attached to a hull of dugout canoe. The size of this type of boat was limited by the diameter of the log, making it difficult to build a large boat. The description that large boat was firstly made in the Japan is written in the historical document of *Shoku Nihongi*. It is described that two boats called ‘Kudara-bune’ were built in Aki Country (now Hiroshima Prefecture) in 650, which was used for the national mission to the Tang dynasty in China in 653. The meaning of ‘Kudara-bune’ means ‘Baekje boat’, and it is highly likely that the boat was plank-made boat built by technology from Baekje, one of the states in Korean peninsula. Although the exact size of these boats is not clear, the mission in 653 was recorded that 241 people were onboard on two boats, suggesting that it was a large boat with a capacity of about 120 people.

It is thought that these large boats were made during the Asuka, Nara, and early Heian periods (late 7th century to early 9th century), when national missions were regularly dispatched to the Tang dynasty in China. However, in 894, the dispatch of missions to China was abolished, due to the political instability in China and the rise of national identity in Japan. Later, it is likely that these large boats were no longer being constructed. According to the archaeological data so far, most of the excavated artifacts associated with boats in the ancient times of Japan (until the end of the Heian period, the late 12th century) consisted of a traditional boat with a structure in which sideboards were attached to a dugout canoe (Ishimura, 2019: 252). It is assumed that large boats were built again on the Japanese archipelago only in the medieval Kamakura period (after the late 12th century). According to the history book of *Azuma-kagami* in the Kamakura period, the shogun Minamoto no Sanetomo ordered a person named Chin Wakei from China to build a large boat for trade with China in 1217. It is recorded that this boat wrecked shortly after the launching.

Archaeological data indicates that artifacts that suggest the presence of large boats, such as iron boat nails, appear after the 13th century. Construction of boats of the type called 'wasen' began after this time.

In the Middle Ages, in addition to boats built on the Japanese archipelago, trade was also conducted by chartering vessels built in China. One of the evidences is a shipwreck found at Sinan in Korea. It is considered that the wreck was a vessel chartered by the Tofuku-ji temple in Kyoto for trading. It departed from Ningbo, China with cargos such as ceramics and copper coins, and sank off the Korean Peninsula on its way to Japan. It is estimated that the date of wreckage was around 1323 at the end of Kamakura period, number/inscription depicted on wooden tags excavated from the wreck displayed the year 1323.

Therefore, it is likely that the use of large boats became common in the Japanese archipelago during the Middle Ages. By this time, deep ports were required to moor ships with a deep draft, and shallow lagoons would have lost its position as ports. Many of the lagoons that were no longer used as ports have disappeared due to alluvial accumulations and artificial landfills in the later period.

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Biography

Born 1976 in Hyogo Prefecture, Tomo Ishimura completed a doctoral course at the Graduate School of Letters, Kyoto University, and earned a Ph.D. as a specialist in archaeology. He engaged in international cooperation for cultural heritage protection at Nara National Research Institute for Cultural Properties from 2006 to 2015. His cooperation was instrumental in inscribing the Nan Madol site in Micronesia on the World Heritage List (2016). From 2015, he has engaged in making audio-visual documentation of intangible cultural heritage in Japan, as a member of the Department of Intangible Cultural Heritage in Tokyo National Research Institute for Cultural Properties.

