Submerged Archaeological Sites in the Lake Biwa, Japan

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Abstract

Lake Biwa, the largest in Japan, is in the heart of Shiga Prefecture, occupying an area of 670 square kilometers. Because the lake has about 4,000,000 years of history, it has been closely related to local people's everyday lives which have largely depended upon its freshwater and fishery resources. In addition, it has served as a strategic zone for waterborne transportation for many years in Japanese chronicles. According to an old proverb, those who succeed in controlling Shiga Prefecture could reign the world. Geologically, on the other hand, the poor subsoil of the lakeside has frequently caused large-scaled landslides by earthquakes, as well as the high fluctuation of the water level and strandline due to climate change; many villages and settlements are said to have been submerged beneath the lake. At present, as many as 90 underwater archaeological sites have already been identified in the Lake Biwa by the researchers. Those sites vary in type; from shell mounds during the prehistoric era to material remains of dwellings or bridge piers of the modern period. As a leading research body, the Shiga Prefectural Association for Cultural Heritage and academic organizations such as the University of Shiga Prefecture have long investigated and researched these areas. Here we present the newest research results with some future plans for preserving the archaeological sites around Lake Biwa in order to inform the world academic circle of them.

Keywords: Japan, Underwater archaeology, Lake Biwa, Shiga, Earthquake

Introduction

Lake Biwa is the largest and oldest lake in Japan. It occurred in the Ueno basin approximately 60 km away from where it lies today, moved by sedimentation and diastrophism over 4 million years ago. About 400,000 to 300,000 years ago, it arrived at its current position. The Lake had never been connected to the sea in history, and a rich and unique ecosystem exists. There are more than one thousands of animals and plants that inhabit the ecosystem and the many endemic species exist here now. Many people gathered these resources for a long time. More than 90 underwater archaeological sites are known (Fig. 1), and it becomes approximately 120 sites if

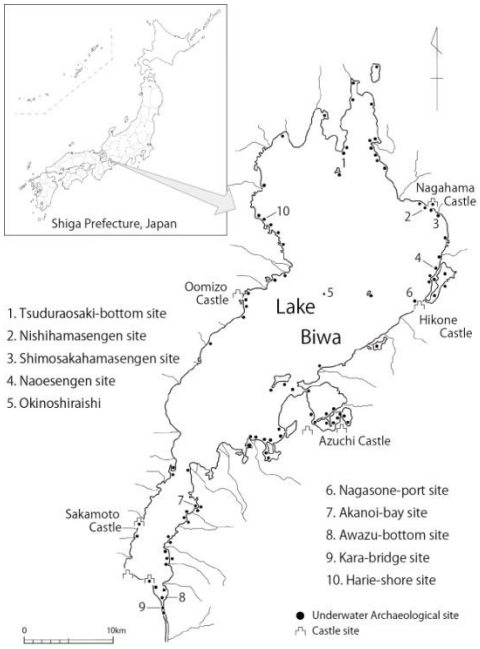

Fig. 1 Distribution Map of the Sites. (H. Nakagawa)

incorporated with lakefront ones. About half of those sites is from the Jomon period (Prehistoric era in Japan). Huge shell mounds are found here therefore people at the time strongly depended upon the Lake. In the historical age, Lake Biwa comes to play a socially important role due to its geographical characteristics. Mainly, it links the capital city (Kyoto) to the eastern and northern country. One must travel through the Shiga Prefecture to go between the two areas and cross the “Kara-bridge”. In many cases, the bridge was often reconstructed over the years, and it is discovered through excavation and old historical documents. However, water transport was the most important means for carrying supplies and materials, therefore, many ports flourished and a lot of people and information came through here from all over the country. From such a social importance, it was said that those who succeed in controlling Shiga Prefecture could reign the world and persons of power always put this lake under their control. For example, the ancient government constructed large barrows (an ancient burial mound, square at the front and rounded in the rear) near the lake, and made it local symbols (Youda, 2007). Nobunaga Oda (1535-1582) who was the most famous person living in the Age of Civil Wars constructed the Azuchi-Castle in the shore mountain as a base of the national unification. Similarly, he made vassals construct castles (Sakamoto-Castle, Nagahama-Castle, and Oomizo-Castle), and ruled the water transport (Nakai, 1997). Of course, many ordinary people gathered and established villages and engaged in fishery and transport and others. On the other hand, the poor subsoil of the lakesides has frequently caused large-scale landslides by earthquakes and many villages and settlements are said to have been submerged beneath the lake. In addition, approximately 460 rivers flow into this lake, but its only discharge is the Seta-River; therefore, the water level is greatly fluctuated by the sedimentation situation of riverbed.

The History of the Underwater Archeology around Lake Biwa

In Japan, underwater archaeology lags behind compared with other maritime nations. However, the Shiga Prefecture is known as an area where the concern is exceptionally high. The history of the Shiga Prefecture's underwater archaeology can be divided into 3 terms.

Term Ⅰ: Pioneering Studies (From Early Modern times to 1960s)

In Japan, concern about underwater cultural heritage goes back to the Edo period. The Edo period is the early modern times of Japanese history (1603-1868). Mr. Sekitei Kiuchi was a collector of unusual stones and came from Shiga Prefecture. While recording the collected stones in his writings a stone spear was given to him. The spear was raised by fisherman, and this record is the first concern about the underwater cultural heritage of Japan. The first academic concern is in 1928. Prof. Sadahiko Shimada had been set out to examine the origin of underwater archaeological sites; for example, the Tsuduraosaki-bottom site is well-known (Shimada, 1928). After that, Ph.D. Yoshio Oe rendered distinguished service. He was from Shiga Prefecture and made an effort for prevention of the scattering of relics raised from the Tsuduraosaki-bottom site. Moreover, he introduced underwater archeology to Japan for the first time, and typified underwater archaeological sites (Oe, 1950). As a result of these achievements, he is known as the "Father of Underwater Archaeology of Japan". As previously stated, the Tsuduraosaki-bottom site attracted attention most in those days. This site is unique; it is at a depth between 10 and 80 m, but almost all of other sites are between 1 and 10 m. Incidentally, the water level is converted into the standard water level (T. P: 84.371 m) because it keeps changing every day in Lake Biwa. In 1924, at the end of the Taisho period, Jomon wares (straw-rope pattern pottery) were raised by fisherman, which interested archaeologists. In addition, Yayoi period potteries and ancient potteries, dating between approximately 2,800 to 900 years ago, were raised. Approximately 140 potteries were recovered presently, and many complete shapes are included. Various hypotheses about origin of this site are suggested. For example, (a) The hypothesis that land sites were washed out by a rise in water level, (b) The hypothesis of pottery being thrown away that was used in facilities on the lakefront, (c) The hypothesis to be burial at sea, (d) The hypothesis that the ground sank by an earthquake, however, the

issue is not yet settled (Shiga Prefectural Azuchi Castle Archaeological Museum, 2009).

Term Ⅱ: Progress of the Investigation and Study with Lake Biwa Comprehensive Development Program (Since 1972 to 1997)

The Lake Biwa Comprehensive Development Program was carried out for the purpose of exploring water resources and the maintaining the social infrastructure. They constructed a breakwater and dredged for a lake-line. However, it was evident that many underwater archaeological sites will be destroyed by these developments; therefore, many investigations were carried out by Shiga Prefectural Association for Cultural Heritage. Many techniques were accumulated in these investigations, for example, excavation via airlift, and underwater photography greatly contributed to the development of underwater archaeology in Japan. The investigation method was to make the underwater sites dry up using steel boards and a drainage pump, labelled as the "Lake Biwa method" produced especially good results (Fig. 2). Finally, more than 200 investigations were carried out over a total excavation l area of 240,000 square kilometers.

Fig. 2 Excavating by "Lake Biwa Method" in Harie-Shore Site. (Shiga Prefectural Azuchi Castle Archaeological Museum)

The Awazu-bottom site is one of the most famous sites that were excavated at this time by the "Lake Biwa method". This site is the largest fresh water shell mound in Japan, and located in depth of water of approximately 2 to 3 m. Three shell mounds are known, but only the No. 3 shell mound was excavated. All shells, earth and sand were sorted by floatation; therefore, small remains were collected in this manner. The site is mainly attributed to the early phase of the middle of Jomon period (ca. 4,500 BC). As well as shellfish and animal bones, many foodstuffs were excavated. For example, there are nuts such as chestnut and buckeye, plants such as gourd and perilla which form a layer, therefore a lifestyle of hunting and gathering was restored. In addition, organic materials such as net baskets, lacquering products and earthenware vessels of various parts of Japan were recovered. As a result, the Awazu-bottom site became an historical source of the highest value in the Jomon period (Shiga Prefectural Association for

Cultural Heritage, 1997).

The Kara-bridge site located on the bottom of Seta-River is the only river flowing out of the lake. Excavation and research was carried out by the "Lake Biwa method". The bridge piers were discovered during this excavation research, and as a result of studying, it was found that the remains of that stage are from the Zinshin-Civil-War (672 AD); it was the biggest war in Japanese ancient history. After that, other remains were confirmed off the coast and a full-scale excavation by the diving team was carried out from a view of flood prevention and the ship navigation. As a result of this, the bridge piers, including the Nara period (710-794 AD), the Kamakura period (1185-1333 AD), the Muromachi period (1336-1573 AD), and the Edo period were excavated. This bridge was a strategic point which connects the eastern and northern country to the capital city (Kyoto) since ancient times, and old historical documents inform us that the bridge was a battle setting many times over; these descriptions were supported by excavation and research (Shiga Prefectural Association for Cultural Heritage, 1992). The Harie-shore site, located 200 to 400 m off of the lakefront, was considered mainly an early Yayoi period site. The Yayoi period (ca. 300 BC-250 AD) is one of the prehistoric eras in Japan next to the Jomon period. In the investigation, a full picture of village was excavated and the discovery of the earthquake traces attracted attention. The earthquake was estimated at a magnitude of approximately 7.5, with sand boiling and liquefaction phenomena destroying the remains; this is regarded as reason for the village extinction (Shiga Prefectural Association for Cultural Heritage, 1990). The Akanoi-bay sites locate from lakefront to bottom of the lake. Approximately 80 pieces of tiles, old coins, and other items were excavated from the lakefront, and these remains date to the Asuka period (592-710 AD). It is thought that this site resembles a loss of cargo or a sinking of the ship were made this situation since almost all tiles were unused and heaped up. There are few sunken ships in this Lake except for the prehistoric times; therefore, this site is important for looking into ancient water transport (Shiga Prefectural Association for Cultural Heritage, 1998).

TermⅢ：After the Lake Biwa Comprehensive Development Program (Since 1992～)

A variety of investigative organizations did work here after the Lake Biwa Comprehensive Development Program. In particular, the investigation conducted by the University of Shiga Prefecture is important. Lake Biwa has legends; villages and settlements that once existed here yet now submerged on the bottom of the lake. PhD Hiromichi Hayashi had investigated the legends since 1992. For example, the Naoesengen site was portrayed in old drawing in 1291 (Kamakura period), and it was traced to the Edo period (Fig. 3). Currently, a part of the land disappeared, therefore it is said that it sank down by an earthquake. In his research, for example, pottery and tiles of the 12th century were recovered. In addition, a barrow from the 7th - 8th centuries and the wreckage of the stone wall in the 18th century was discovered from a depth between of 1.4 m to 4.1 m. The existence of barrows were portrayed in the old drawing, therefore the discovery was the important evidence for proving the legend. At the same time, PhD Toshitaka Kamai (Disaster Prevention Research Institute Kyoto University) and Assoc. PhD Tsuyoshi Hraguchi (Graduate School of Science / Faculty of Science Osaka City University) carried out the joint investigations, and as a result of this, traces of the earthquake were confirmed from on the land and bottom of the lake. The same traces were confirmed from other sites, for example Shimosakahamasengen site and Mitsuyasengen site. It made clear that many underwater archaeological sites on the bottom of Lake Biwa were formed by local landslides (Lateral Flow – Ground flow due to liquefaction) that occur due to earthquakes.

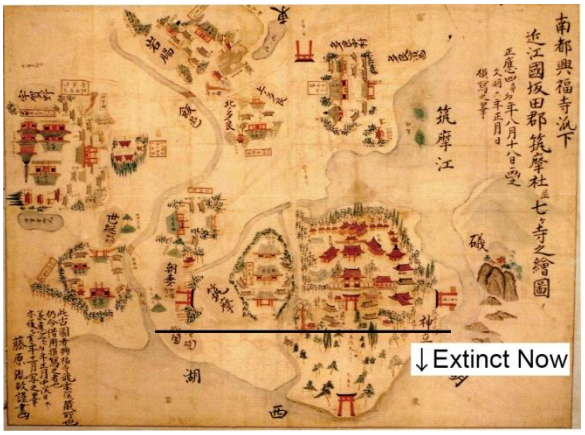

Fig. 3 Old Drawing of Naoesengen Site and its Environs. (T. Hayashi and others)

In addition, these investigations were important activities for educational institutions. Currently, there are few institutions where students can learn underwater archaeology in Japan. Nevertheless, students have participated as staff in these investigations, and the

author received a degree in the discipline since a university admission. As a result of such steady instructional activity, a research group with which author acts as a representative continues this investigation.

As other example, Okinoshiraisi, a remote and lonely rock island, was investigated by ARIUA (Asian Research Institute of Underwater Archaeology) and Research Institute of Underwater Archaeology. The island is located at the center of Lake Biwa, therefore, sailors had regarded it as traffic sign since ancient times. Currently, the clear archaeological remains have not been found, yet future study on the island is expected. In addition, a joint-investigation by PhD Kenichi Yano (Archaeology) and PhD Sadao Kawamura (Engineering) of Ritsumeikan University was carried out in the Tsuduraosaki-bottom site. It attracted a significant amount of attention since the investigation is connected with advanced robot development and technology.

Fig. 4 The Exhumation Situation of Glazed Pottery of the Early 10th Century. (H. Nakagawa)

Fig. 5 The Exhumation Situation of a Part of Five-Ring Pagoda. (H. Nakagawa)

A Short Study of the Legends of Submerged Villages

The East Japan Earthquake Disaster, which occurred on March 3, 2011 made scholars research the remains of the disaster and investigate old historical documents about the natural disaster. Because of this, the legends of submerged villages attract attention. I would like to show materials based on the latest investigation, and perform a short study. The Society for Underwater Archaeological Sites in Lake Biwa, was inaugurated in 2011 by graduate and university students, and has been dedicated to the investigation of the Nishihamasengen site. The site has a legend; a village called Nishihama existed here

once, but it was submerged in the bottom of Lake Biwa by a severe earthquake between 1460 to 1466 CE. We performed the site survey by scuba diving and skin diving, and finally, investigated offshore 250 m, a range of lakefront line approximately 800 m, at a depth of approximately 1 to 2 m. At present, more than 200 pieces of pottery (Fig. 4), the wreckages of pillars, and a graveyard of the medieval period have been found. The pillars are considered to be what once was fences and sheds (Nakagawa, 2012) (Nakagawa, 2013). The fences were made not only with timbers but with bamboo, and the buildings were made with only timber. Additionally, all of timbers were thin; less than 10 cm in diameter, which is a notable peculiarity. As the reason for this, it is believed that the buildings were not houses, but were sheds. We will carry out an additional investigation in the near future, to examine it in greater detail. The extent of graveyard area is 38 m in the east-west direction and 26 m in the north-south direction, and there are approximately 16 simple graves and that were constructed by rocks and stones. The stone statue, Amitabha Tathagata and a part of Five-ring pagoda (Fig. 5) was found, made by granite and a small plate of unglazed earthenware was offered on the graves. In addition, household goods, big earthenware pots and earthenware mortars and other material were excavated. The materials indicating the last period of this site are earthenware goods and stone statues; the last settlement patterns date the site to is the latter half of 15th century to early 16th century. From these result, I would like to examine the origin of this site. The water level in the 15th century to 16th century is considered to be 84 m to first half of 85 m (Hayashi, H., Kamai, T., and Haraguchi, T., 2012). The graveyard and pillars are located at 83.1 m above sea level or less, in addition, the remains of the houses built on piles in lakes are not prevalent in this region. Therefore, same as the legend, it is regarded that this village, which was on the land, was submerged via ground change caused by an earthquake. However, the year that an earthquake occurred seems to be different from the legend. According to the legend, the Nishihamasengen site submerged into bottom of the lake in the middle of the 15th century, yet, relics of the 16th century were recovered. Because of this, when we corroborate the old historical documents, a severe earthquake which is estimated to be magnitude 7.8 in 1586 was written down; swas called the Tensho-Severe-Earthquake, and occurred on January 18, 1586 (Iida,

1987). According to the documents, there were 1000 houses in this region. Half of the houses were destroyed by fire, and the other half were destroyed by collapse, therefore it is assumed that the Nishihamasengen site was caused by this earthquake. Many sites which were damaged by this earthquake were investigated. For example, the Shimosakahamasengen site, located to southeast 2.2 km of the Nishihamasengen site, was caused by the earthquake and in past investigations and old photographs, remains of submerged wells, and withered Japanese cedar via submergence were observed. Additionally, a part of the Nagahama-Castle, located between Nishihamasengen site and Shimosakahamasengen site, was submerged by this earthquake, and was recorded in old historical documents. As a result of these, the possibility that a large-scale landslide occurred over more than 2.2 km of the lakefront line and more than 500 m offshore is arguable. However, such a historical disaster record is not reflected by former disaster prevention plans. This is an important problem about the disaster prevention for not only Shiga Prefecture but also all of Japan due to our large shoreline.

Problems and Prospects

As mention above, many sites have been investigated for many years in Lake Biwa, and Shiga Prefecture is admired as an advanced area of underwater archaeology in Japan. However, the area still has many problems. Some examples will be highlighted below, as well as addressing some of the future plans for the area. At first, the problems about the research organization exist. There is no public research organization and technically no research worker who works on the underwater archaeology in Shiga prefecture now. In other words the current investigations are carried out by a few university teachers and graduate students. In connection with this, educational problems exist. There are few universities which teach underwater archaeology in Japan, and there is even no course offered in Shiga Prefecture. The investigation by the University of Shiga Prefecture is outside the regular academic curriculum, and it is carried out by the author

Fig. 6 Current Condition of Nagasone-Port Site. (H. Nakagawa)

and volunteer students; therefore the longevity of the program is in danger.

The legal recognition of sites is a concern as well. For example, the initial sites survey is a basic excavation for material and research when sites are threatened by development. Sites that are not registered as such, excavation cannot be conducted. In Shiga Prefecture, many underwater archaeological sites are registered more than other local self–governing bodies; nevertheless, there is an imbalance between registered and unregistered sites. For example, most of the port sites which can be dated to a period by old historical documents are not registered. One example among many is the Nagasone-port site located in Hikone City. There is at least one breakwater remnant and five pier remnants 1 kilometer away from Hikone Castle. We can confirm their appearances easily when we look around Lake Biwa from the lakefront (Fig. 6). It is considered that a part of these were constructed in the early Edo period from the old historical documents, but it is not recorded on the site register. Needless to say, Japan has not ratified the Convention on the Protection of the Underwater Cultural Heritage; therefore there are many positions between each local self–governing bodies where they recorded on modern period sites. Registering sites dated to after the early modern times are entrusted to local self–governing bodies. Nevertheless, Hikone City aims at making Hikone Castle a World Heritage, and it was asserted that they are a castle town as well as a castle (Hikone City HP). However, it is problem that even the Nagasone-port site, which is clearly part of castle town, was not recorded as a site. It is clear from this example that underwater archaeological sites are held to a lower regard than land sites.

Yet all is not lost, things look like they are moving forward positively. For example, associated old historical documents about Lake Biwa are being compiled, and research is being conducted. Many sites exist in the shallows at a depth between 1 and 5 meters. Because of this, we are able to investigate these sites easily by skin diving or beach diving. The shallower the water, the more we can ensure safety, meanwhile, the basic techniques do not change with the depth. Accordingly, I think Lake Biwa a great area to learn the technical aspects of underwater archaeology. The establishment of a long-term study system by the public institution is necessary in the future, and a cooperation system with an organization inside and outside of the prefecture will be necessary, as

well.

Conclusion

Until recently, underwater archaeology had not been recognized sufficiently as a field of archaeology, in Japan. However recently, it is attracting attention because of the discovery of sunken Mongolian Invasion Ships in the Takashima-Kouzaki site. Taking advantage of this, it is expected that Japanese underwater archaeology will develop greatly. Lake Biwa is the field which has been known since the old days in Japan but it is almost obscure worldwide. However, many sites exist in the area, therefore it an indispensable field for developing the Japanese underwater archaeological program. It is an unexpected delight if I can tell the attraction of Lake Biwa to world researchers through this paper.

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Biography

Hisashi Nakagawa *was born in Aichi Prefecture in 1988. During the undergraduate level, he learned underwater archaeology and was supervised by Prof. Hiromichi Hayashi at the University of Shiga Prefecture (2007-2011). Prof. Hayashi did study underwater archaeology from Prof. Yoshio Oe, who is respected as the "Father of Underwater Archeology in Japan". With the retirement of Prof. Hayashi, he has succeeded to the research around Lake Biwa since 2011. In 2013 he completed the master program (Human Culture) at the University of Shiga Prefecture, and then since 2013 he has been a PhD candidate in the same university, and a Research Fellow of the Japan Society for the Promotion of Science.*