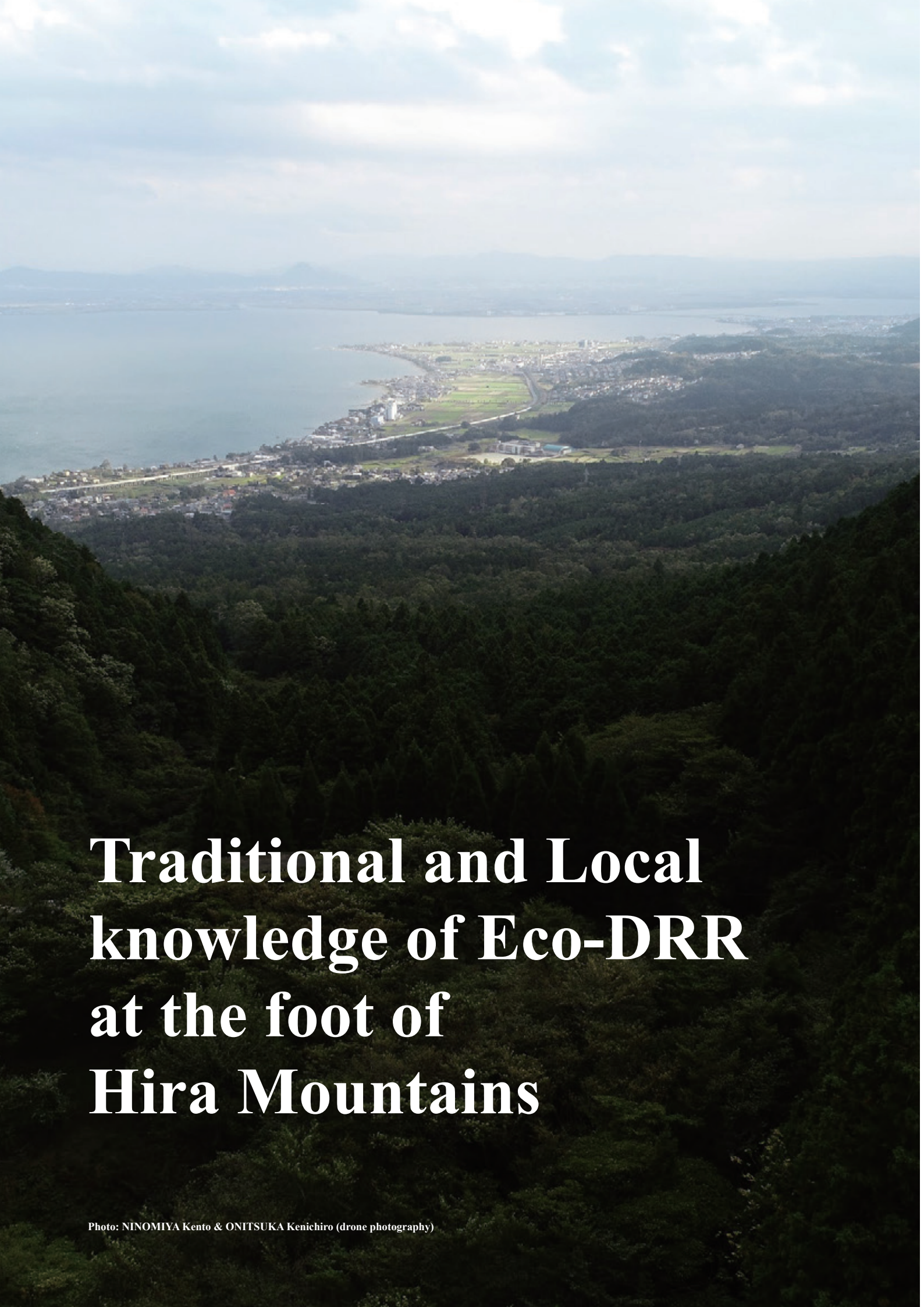
Traditional and Local knowledge of Eco-DRR at the foot of Hira Mountains



Traditional and Local knowledge of Eco-DRR at the foot of Hira Mountains

Photo: NINOMIYA Kento & ONITSUKA Kenichiro (drone photography)

Foreword

Nature's blessings and troubles are closely related. While nature's diverse blessings support and enrich our lives, it also delivers various challenges, the most severe of which is a natural disaster.

Since people began living in this area, they have been constantly affected by nature's blessings and troubles, and the history of the relationship between people and nature is interwoven into this context. Natural disasters have been viewed as undesirable to human societies, and we have succeeded in reducing damage from them due in part to various technical developments. However, even today, it is not possible to suppress every trouble through the power of technology. In the age before the development of modern technology, how did people relate to nature's blessings and troubles? People's abundant knowledge and wisdom to deal with nature accumulated over a long time. As people in each area created relationships with nature, they accumulated vast volumes of traditional knowledge and wisdom passed down over generations (traditional knowledge) particular to their region (local knowledge). By developing modern technology, have we not sought to create relationships with nature that conversely abandon traditional and local knowledge? Have we not come to believe we can suppress troubles from nature through the power of the technology we developed? This reflection echoes through various parts of society. However, the traditional and local knowledge passed down in each area until only a few decades ago is no longer passed down to those living today in the way it once was.

The series of booklets “Eco-DRR as Learned from Local History” emerged from a desire to trigger a re-examination of how our forebears dealt with both the positive and negative aspects of nature. If learning traditional and local knowledge can make people consider the history of the relationship between nature and us, and contribute—even a little—to building better relationships between us amid ongoing climate change and socioeconomic changes, the hard work of the many involved with the publication of this series will be rewarded. Although the road ahead may seem long, I believe that firm steps are being taken throughout society.

YOSHIDA Takehito

Research Institute for Humanity and Nature, Eco-DRR Project, project leader

Research Institute for Humanity and Nature, and University of Tokyo

Cover photo: Map of Moriyama and Kita-funaji Village and environs (Moriyama Zaisanku Collection, photographed by Shimizu Kōgeisha)

Contents

Photo: NINOMIYA Kento & ONITSUKA Kenichiro (drone photography)

Traditional and Local knowledge of Eco-DRR at the foot of Hira Mountains: Local wisdom and technology for facing the blessings and troubles of nature

Kyoto University **FUKAMACHI Katsue**

The Hira mountain range, located in the cities of Ōtsu and Takashima in the Kosei region of Shiga prefecture, is an area delineated from the Tamba Highlands by Lake Biwa to the east, the Wani River to the south, and Ado River to the north and west. The Hira mountain range includes a series of steep mountains more than 1,000 meters high, and the rivers and streams from the eastern base of Mt. Hira pass through an alluvial fan to flow into Lake Biwa. These streams and rivers include raised-bed rivers, in which sand and gravel have accumulated to raise the riverbed, and beaches and inner lakes have developed along the lake shores.

The base of Mt. Hira has been inhabited since ancient times, mainly along the shores of the lake. Each village conducts agriculture, forestry, fishery, stonecutting, and other occupations that harness the natural environment and resources. Moreover, people and goods go back and forth to Hokuriku, Kyoto, the Kotō Region of Shiga, and other areas through routes such as the Hokkoku Kaidō and Lake Biwa. On the other hand, when heavy rains fall, landslides, flooding and other natural disasters occur. The people living at the foot of Mt. Hira have created various innovations to respond to such disasters. The stone which is found in the mountains and rivers surrounding the villages, including granite and chert, has been used for embankments, aqueducts, and stone breakwaters to prevent natural disasters, and in stonework for *shishigakine* (stone walls) and terraced fields.

This booklet focuses on traditional and local knowledge at the foot of Mt. Hira and introduces “local wisdom

Photo 1. Stone embankment to prevent landslides

Photo 2. Field trip to a rock-paved aqueduct as a voluntary disaster prevention activity

and technology for facing the blessings and troubles of nature" that link the past, present, and future through the outcomes of investigations by experts and students in various fields. This book comprises five sections: "The natural environment of the Hira Mountains," "Life at the foot of Mt. Hira based on historical materials," "Stone culture at the foot of Mt. Hira: Local wisdom and technology harnessing nature's blessings," "History of disaster response at the foot of Mt. Hira," and "Toward an Eco-DRR that utilizes traditional and local knowledge." In these sections, we seek to comprehensively describe the methods for handling natural disasters learned from history. Furthermore, we clarify how people harnessed the characteristics of the natural environment and nature's blessings in their daily lives. Moreover, we present examples of various investigation methods and local efforts to collect and use traditional and local knowledge in familiar regions.

An important keyword in this booklet is "ecosystem-based disaster risk reduction" (Eco-DRR), a concept produced through international efforts to prevent and reduce disaster risk. Healthy, rich ecosystems serve various roles that can directly reduce the risk of disaster damage or indirectly alleviate their effects. We invite the reader to join us in thinking about how to handle natural disasters in the future while treasuring healthy, rich local ecosystems and the cultures particular to each area.

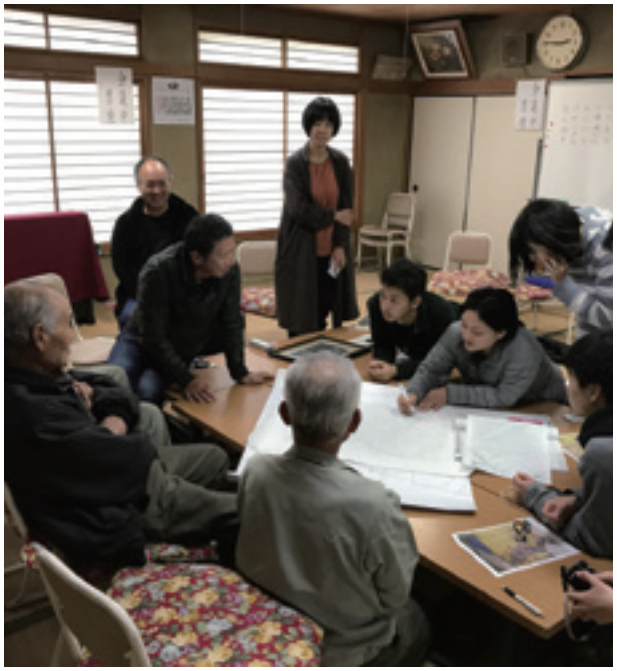


Photo 3. Interview-based investigation of the history of local stone usage

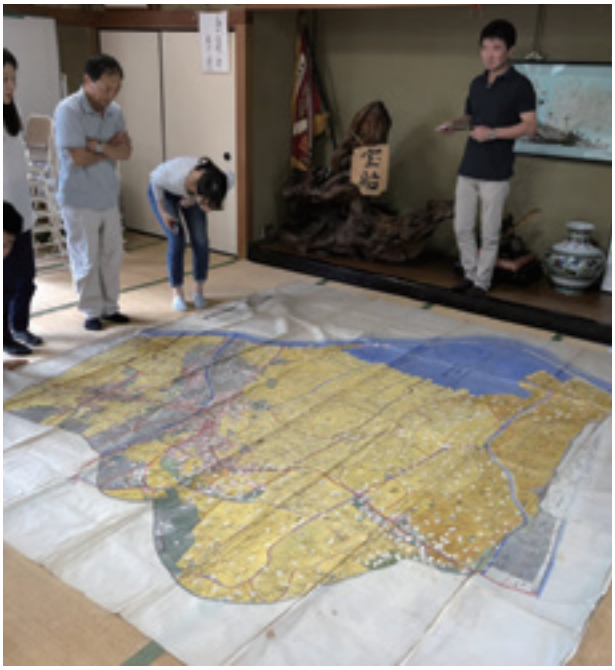


Photo 4. Investigating ancient maps in a village

【The natural environment of the Hira Mountains】

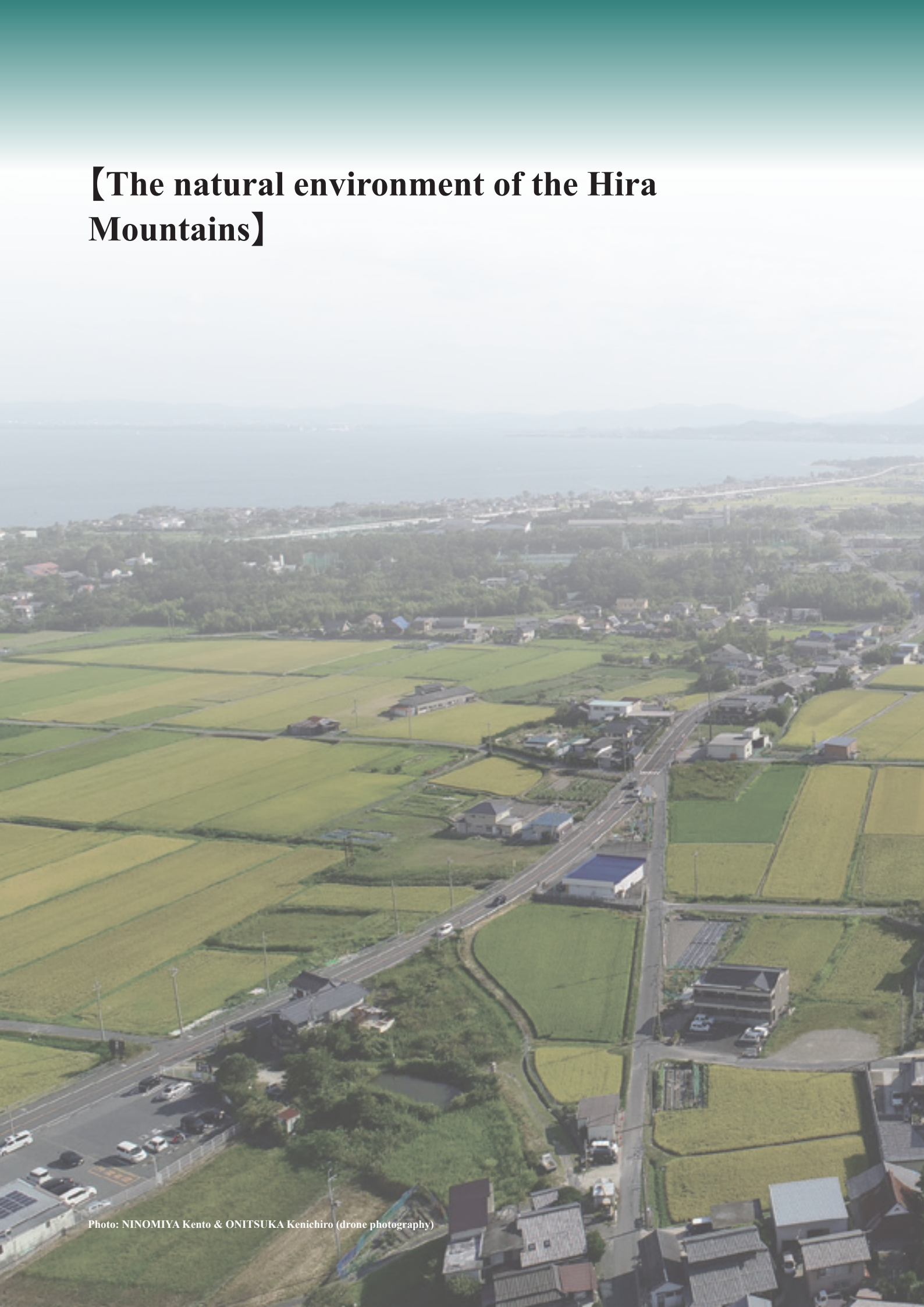


Photo: NINOMIYA Kento & ONITSUKA Kenichiro (drone photography)

Understanding the topography of the Hira Mountains using a drone

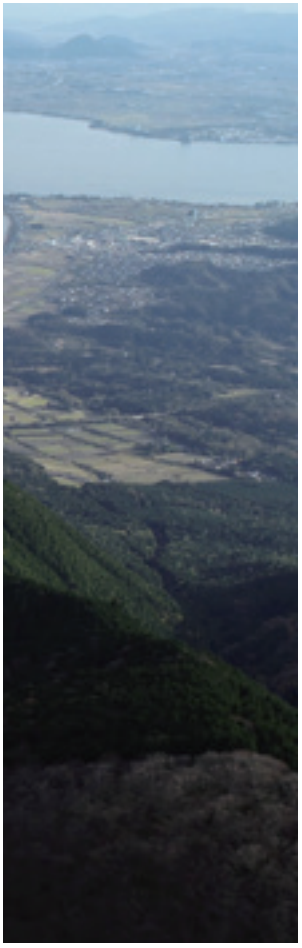
Kyoto University

NINOMIYA Kento
ONITSUKA Kenichiro

"Drone" is the commonly used name for unmanned aerial vehicles. Their use as a tool for taking highiy-detailed aerial photographs is becoming widespread. Using drones to reexamine areas from angles we are not able to see before gives us new insights. For this investigation, we used a drone to take aerial photographs at the foot of Mt. Hira. Here, we examine the topographic characteristics of the Hira mountain range based on two images captured near the Moriyama district in Hachiyado, Ōtsu, Shiga prefecture.

The photograph on the right was taken from Lake Biwa looking toward the Hira mountain range. The slope extending away from the edge of Lake Biwa appears relatively flat, but the height suddenly increases toward the ridgeline at the base of Mt. Hira, where the land is very hilly. The photograph also shows two lines stretching from left to right. The upper line is the Biwa Kosei Longitudinal Road (Kosei Road), which runs from Hokuriku toward Kyoto. The lower line is the JR Kosei Line, which joins Ōmi-Shiotsu and Kyoto stations. More than half of the area between these two lines is filled with the fields, and residences there are clustered together. The roads in the residential area are comparatively narrow, and many are too narrow for large vehicles to pass.

The photograph on the left looks in the other direction, downward near the peak of the Hira mountain range



toward Lake Biwa. The shape of the land surrounding Lake Biwa is clearly seen. Also apparent is the extremely steep slope from the foot of Mt. Hira to Lake Biwa. This is a large densely wooded mountainous area, and space for people to live is limited. Hamlets are close to the shores of Lake Biwa, of which only a small part of the shores have beaches. Moreover, we can see Okishima in Lake Biwa and the city of Ōmi-Hachiman on the opposite shore, making Lake Biwa, Japan's largest lake, seem smaller than one might have imagined. In the mountains, the ridges and valleys are clearly distinguished, and the valleys either have rivers flowing through them or show signs of past river movement.

Using a drone to capture a bird's-eye view of an entire region enables us to see the region in a way we cannot readily appreciate in our day-to-day life and allows us to use this for various purposes including community building and disaster planning.

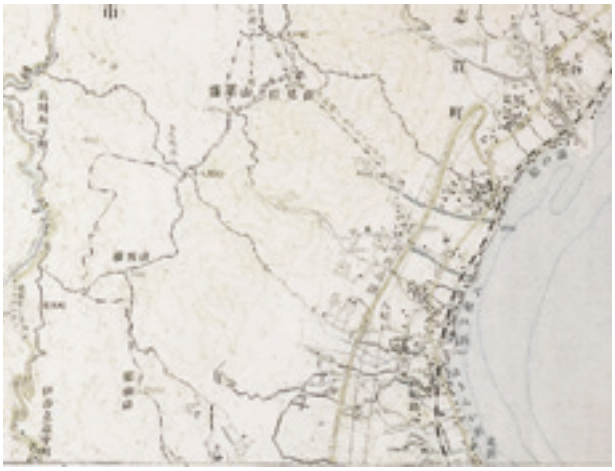


Figure 1. Topographic map of Moriyama and environments. Prepared from the Geographical Survey Institute's 1:50,000 map of Kita-komatsu (issued November 1, 1994)

The geology of the Hira Mountains

Kyoto University of Education
Research Institute for Humanity and Nature

IMOTO Nobuhiro
SENDA Masako

The Hira mountain range runs along the west coast of Lake Biwa and is encircled by the Ado River to the north and west and the Wani River to the south. The eastern half of the Hira mountain range is formed from the Cretaceous granite known as Hira granite (Fig. 1). The western half consists of the Mesozoic–Paleozoic sedimentary layers as the Tamba Highlands further to the west. Let us examine where these rocks come from and how they formed the Hira mountain range according to the history of the Earth.

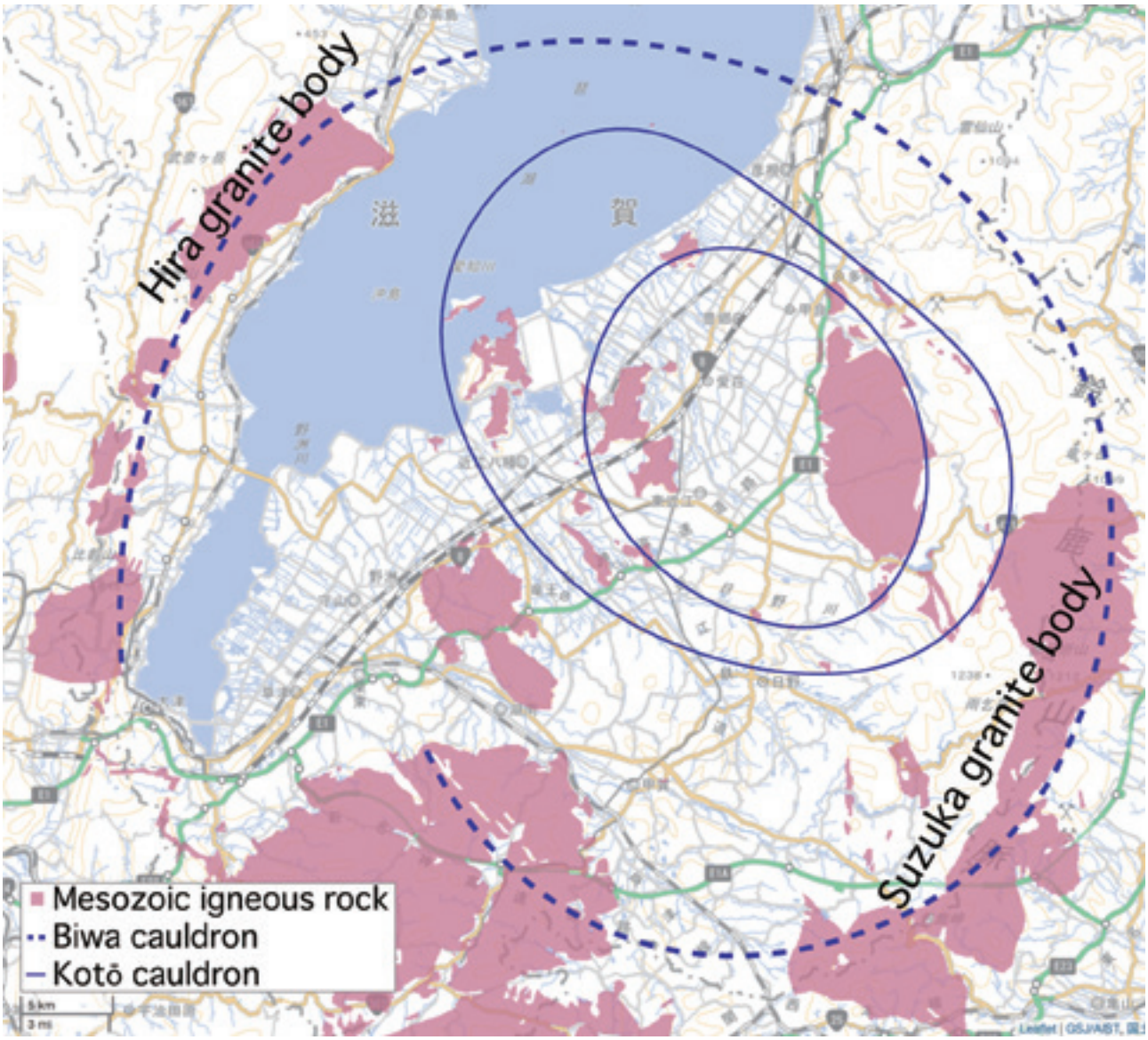


Figure 1. Distribution of Mesozoic igneous rock around Lake Biwa. Hira granite is one type of this rock and thought to form a circular cauldron with the distant Suzuka granite body. Figure based on Kiji et al. (2019) using 1:200,000 Japan Seamless Geological Map v. 2 (Geographical Survey of Japan, AIST).

Sedimentary layers are from the sea

The sedimentary layer in the Hira mountain range began accumulating on the seafloor. Around 200–300 million years ago, the remains of plankton composed of mainly radiolarians accumulated in the open ocean far from the land (Fig. 2). The ocean plate with ites accumulated sediment moved toward the continental plate margin on currents in the mantle. While slowly moving, fine mud carried by ocean currents and/or winds continued to accumulate and gradually began to form strata. When the ocean plate collided with the continental plate and sank beneath it, its sedimentary layers were scraped off and pushed onto the continental plate, where they stayd. This occurred about 145 million years ago, in a phenomenon known as accretion. The accreted sedimentary layers are known as accretionary wedges. In this way, the sedimentary layers from the ocean floor reached land. Sedimentary layers that accumulated for a period of 100 million years can now be viewed on land.

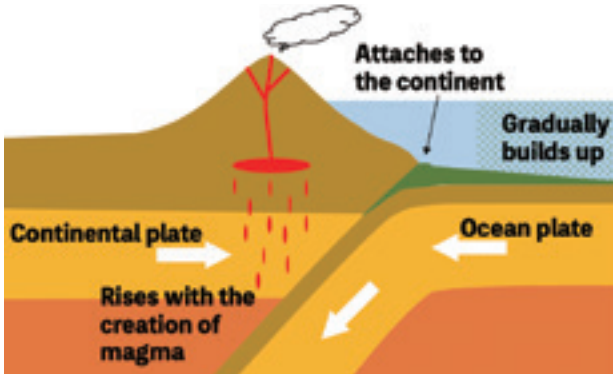


Figure 2. Sedimentary layers from the sea, granite from magma

Granite is from magma

On the other hand, the ocean plate continued to sink, bringing in sedimentary layers that contained seawater. The melting point of rocks containing seawater decreased such that water deeper than 110 kilometers below the ground melted the high-temperature rocks and turned them into magma. The magma slowly rose to beneath the accretionary wedge to form a magma chamber, which ranges between a few and 10 kilometers in-depth at a temperature of 750–850°C. This occurred about 95 million years ago in the Cretaceous Period when dinosaurs roamed the Earth.

When the magma chambers rose, the sedimentary layers above them were pushed up and formed cracks through which the lava erupted (Fig. 3). Following this, the pressure in the magma chamber fell and the sedimentary layers that had been pushed up collapsed. This collapsed landform is called a cauldron. Cauldrons are characterized by collapsing in a ring form according to the shape in which the magma chamber lifted them. Magma rises around the edge of the collapse, as though squeezed out by the collapsed sedimentary layers, distributing the rising magma in a ring form. The magma slowly cooled and hardened into a circular granite body around 80 million years ago.

The many granite rocks surrounding Lake Biwa and the Ōmi Basin were likely formed in this way. Hira granite is one example of these types of rocks. Several eruptions and collapses occurred until 66 million years ago, forming at least three cauldrons as concentric circles. Their scale is 60 kilometers along the major axis and 40 kilometers along the minor axis of the outermost cauldron.

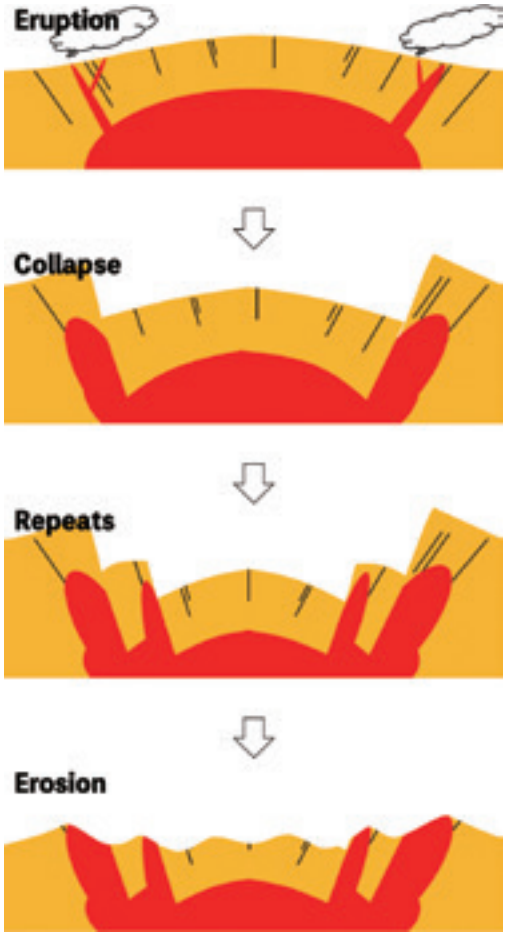


Figure 3. The eruption of magma and formation of cauldrons

Thermal metamorphism in sedimentary rocks

Magma chambers cool gradually over at least several million years. A lit cigarette is supposedly about 700°C, so you may think that something at this temperature would quickly cool. However, even though it is also 700°C, the magma does not act in the same way as a cigarette. Since something with a volume of many cubic kilometers contains this heat in a place several kilometers underground, it takes millions of years to cool and harden.

The sedimentary layers around the magma chamber are continually exposed to high temperatures over these millions of years, like a rock casserole. What happens after that? The rocks themselves change in a phenomenon called thermal metamorphism. The rocks that undergo this metamorphism are called thermal metamorphic rocks. Thermal metamorphism refers to the phenomenon in which minerals that exist stably at low temperatures are continually exposed to high temperatures during a long period of millions of years, which destabilizes the composition of their chemicals, changing them into minerals stable at high temperatures. Chemicals move and crystalline structures change to create new minerals in a process known as recrystallization. Put simply, thermal metamorphic rock is formed when new minerals are created. Thermal metamorphism can extend from several hundred to 1,000 meters from the edge of the magma chamber.

Photo 1. Bedded chert. The characteristic striped pattern and "folds" were desired and used as a garden stone. (taken by IMOTO Nobuhiro in the Heian Shrine sacred garden)

Photo 2. At a private residence at the foot of Mt. Hira. Local stones have been used in the approach to the entrance. The white stone used at the edges is granite, and the striped stone is bedded chert.

A sedimentary rock formed from main radiolarian remains as stated before is called chert. The chert in the Hira mountain range has many alternating siliceous and clay layers, and it is thus known as bedded chert (Photo 1). Bedded chert has the characteristic of peeling easily along the layers; however, the chert in the Hira mountain range has undergone the thermal metamorphism described above and is extremely hard. At the same time, the striped layer structure has remained without change. A clear striped pattern and the folds in it can be observed. However, because it has undergone thermal metamorphism, the plankton cannot be observed even under magnification.

Why do stripes form in chert?

How does the striped pattern in chert form? Originally, it was formed from plankton remains that fell to the seafloor of an extremely deep ocean, probably several thousand meters deep. The thick layers that seem white are a collection of plankton remains, and the thin layers sandwiched between them are clay. The clay layers are extremely fine and would even be suitable for high-grade finishing whetstones. Various theories attempt to explain why the stripes form. One is that it was due to cyclical changes in the ocean environment. This theory suggests that periods in which plankton easily formed alternated with those when it did not. Thanks to recent progress in radiolarian fossil research, the types of radiolarians in each layer of the chert can now be investigated with a microscope. We found that the combinations of the types of plankton change, as does the thickness of the sedimentary layers, which has enabled the proper identification of geological eras. We can now identify from particular radiolarian combinations that this is from a certain age in the Permian period of the Paleozoic era or Triassic or Jurassic period in the Mesozoic era. Based on this, trial calculations suggest that plankton accumulate at 1 millimeter per 1,000 years. Assuming this, a 5-centimeter layer of chert would have accumulated over 50,000 years. In some places in the Hira mountain range, neat piles of chert layers can be observed; actual investigation of the stones there shows how many tens of millions of years one layer has laid in place. Furthermore, the different colors of the stripes reflect changes in the types of clay and minuscule chemical components they contain.

Why are the Hira Mountains high?

The Hira mountain range lies between the Hira fault to the east and the Hanaore fault to the west; these faults have exhibited activity on many occasions and raised the Hira mountain range. Mountain rises mean that as a contrary element, mountains break down. The Hira mountain range has ceaselessly gone through the motions of rising and breaking down. The rocks break down form the sloping land at the foot of the mountains; the deposits that form this sloping land are called piedmont slope deposits. In the Hira mountain range, these deposits contain mixtures of Hira granite and bedded cherts (Photo 2).

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【Life at the foot of Mt. Hira based on historical materials】

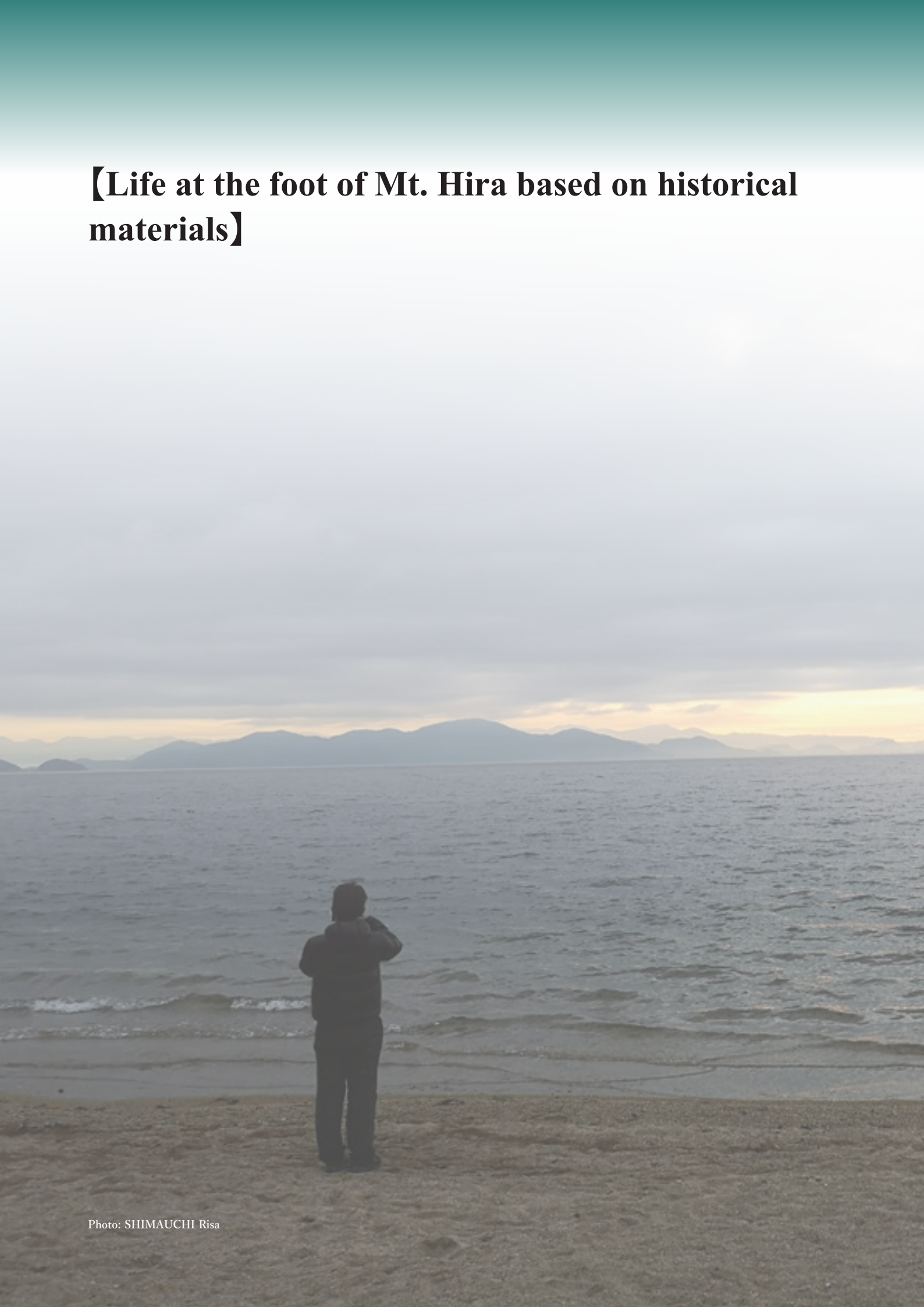

Photo: SHIMAUCHI Risa

Toward local understanding: From ancient manuscripts from the foot of Mt. Hira

University of Shiga Prefecture **AZUMA Sachiyo**

It is important to appreciate past disasters in the region when considering reducing disaster risk from an ecosystem perspective.

What methods can we use to investigate past disasters, apart from a natural science approach? In particular, what should we do if we want to know about the direct relationship between disasters and people's lives?

If people recently experienced a disaster, we can "interview" them. In addition, some regions pass down disaster folklore as "legends," in which case interviewing can be an effective method.

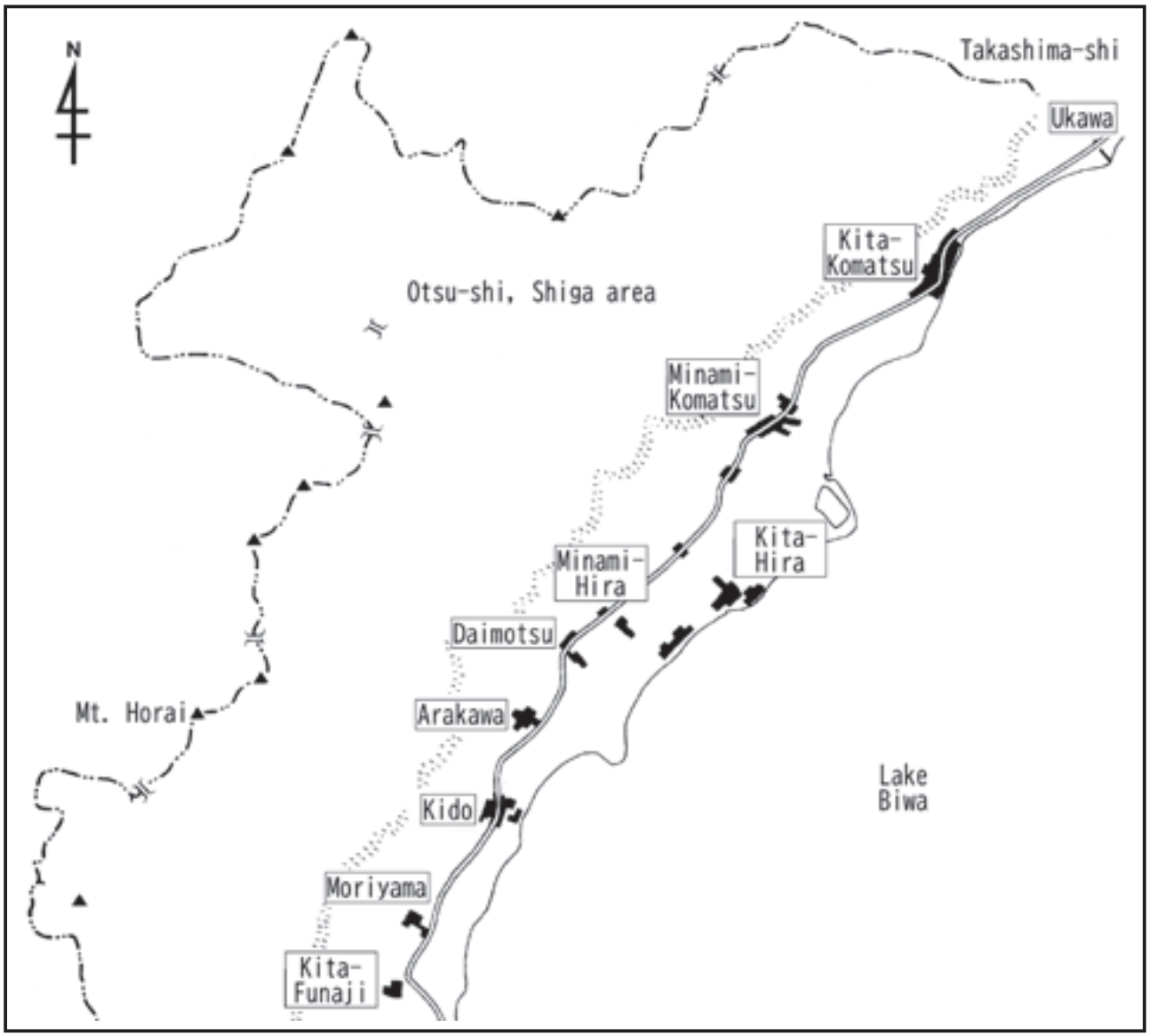

Figure 1. Early modern villages at the foot of Mt. Hira. (Partial extraction from *Shiga chōshi*, vol. 2, Fig. 28 with author's additions)

When investigating older periods that interviewing cannot cover, investigating and deciphering ancient manuscripts is effective. Because Shiga Prefecture (the ancient province of Ōmi) is adjacent to Kyoto, the former capital, its timber forests and farms were designated as places that offered goods to the imperial court and shrines, and it had estates for the powerful. Therefore, ancient manuscripts written by those in control (starting with the court) contain place names and similar historical information.

In addition, the region at the foot of Mt. Hira had estates for the Enryakuji and Onjōji temples, including Hira Estate, Komatsu Estate, Otowa Estate, and Kido Estate, where many historical materials relating to those in control remain. The Moriyama district formed part of the Kido Estate at that time.

Unfortunately, not many ancient manuscripts remain that could reveal the state of the Moriyama district and rest of the region at the foot of Mt. Hira, which was under control. This is due to the state of this region around the time of Oda Nobunaga. Nobunaga burned Mt. Hiei in 1571 (Genki 2), destroying many historical materials including ancient manuscripts. Furthermore, the entier region around the Hira Mountains was the battleground for the Ikkō uprising against Nobunaga, and the battle against the Azai and Rokkaku clans from 1571 to 1573 (Tenshō 1). This likely resulted in the burning down of all shrines and temples at the time, and the loss of all ancient manuscripts and records. Accordingly, it is difficult to reconstruct the state of this region in the middle ages.

However, ancient manuscripts from the Edo period have survived in each district. In Shiga, most Edo-period villages have moved to their current districts (Fig. 1). Ancient manuscripts have remained in temples and shrines and in the houses of families who engaged in important roles in the villages. In the area at the foot of Mt. Hira today, documents shared by districts are frequently stored in the district's community hall. Many of the documents shared by districts are village documents thought to have been kept by the village headman, who was the top official in the village. The village headman had the central position of receiving documents from the feudal lord who controlled the village and creating documents, most of which accumulated at his house. Their contents vary widely and include orders from the feudal lord, other control-related items, and items relating to the administration of the village. The most important documents were handed to the new village headman when the position changed. These were transferred to the management of the community hall at some stage in or after the Meiji era; depending on the village, ancient manuscripts from several houses were collected in the community hall.

In the late 1970s and early 1980s, Gangōji Institute for Research of Cultural Property investigated the mountain religions in the Hira Mountains. At the time, the investigation covered 65 ancient manuscript groups from the former town of Adogawa (now Takashima City), north of the city of Ōtsu in the south. The district shared documents of the Moriyama district, and surrounding districts were also investigated.

The shared documents of the Moriyama district dating back to the Edo period were investigated separately in the late 1980s. This investigation produced a list of ancient manuscripts classified by content. In total, 27 items are classified, for example, “water utilization.”

For a short time, the author has held irregular ancient manuscript lectures in the Moriyama community hall, using district shared documents as texts to assist people in discovering by themselves the form of the district (Photo 1). In addition, on May 19, 2018 (Heisei 30), the local people confirmed the existence of unorganized early

Photo 1. Ancient manuscript lecture (taken September 18, 2018)

Photo 2. Confirming ancient manuscripts with people from Moriyama (taken May 19, 2018)

Photo 3. Early modern documents from Moriyama (taken May 19, 2018)

modern documents that remained in the district (Photo 2, Photo 3). The form of Moriyama district in ancient times, which has not yet been properly discovered, will gradually become clearer in the future through examinations of these ancient manuscripts.

The author conducted these activities because of her desire for the local community to understand and share the state of their area. Today, based on our experiences of the large-scale disasters that have frequently occurred since the 1990s, we believe that disaster measures require comprehensive knowledge that extends beyond the framework of liberal arts versus sciences. Furthermore, collaborations between researchers, residents, local governments, and others have given rise to the need for disaster prevention and reduction measures appropriate to the local situation. Here, it is meaningful to understand the history that formed the area's characteristics to the present and to share this information.

This book presents only one part of these activities. For example, investigating the disasters that occurred in a village first requires a deeper understanding of the conditions in the village. Nakai Minami's article “Edo-period village reports with Moriyama as example” uses village reports classified as “village administration” to comment on the condition of the village of Moriyama. The village reports are important historical materials that elucidate the state of the village before land was cultivated and civil engineering works using concrete were performed.

In addition, from plans (ancient maps) classified as “maps” we can perceive the views in each village and surrounding villages at the time they were created. Takahashi Hiroki’s “Ancient maps of the villages around the foot of Mt. Hira: Possibilities of links between historical materials and traditional knowledge” clarifies the spatial characteristics of

the foot of Mt. Hira and Moriyama village and provides hints on how to decipher traditional and local knowledge from these plans.

Carefully reading village reports and other ancient manuscripts is a good way to learn about the condition of villages in the Edo period. Ancient manuscripts that remain in one village may mention conditions in other villages. Some of these documents are related to disputes with other villages and classified as “litigation.” Yamamoto Akiko's “Border disputes between villages at the foot of Mt. Hira” uses these types of ancient documents to depict the world at the foot of Mt. Hira. One characteristic of disputes with other villages is that relevant plans are retained.

Hints for promoting Eco-DRR are also hidden in our forebears’ ways of life and our local history. Let us find them.

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Edo-period village reports with Moriyama as example

Research Institute for Humanity and Nature **NAKAI Minami**

Introduction

Historical Material 1 is a village report on Moriyama Village, Shiga County, Ōmi Province written in 1712 (Shōtoku 2). Village reports are records the village was asked to submit when a feudal lord was transferred from one fief to another or passed the role to his or her successor. An inspector was dispatched by the Tokugawa government, or a feudal lord or local governor traveled through the villages under their purview to learn about the actual situation in the village. The reports provide an overview of the village, including its yield, farmland area, buildings, population, temples and shrines, rivers, mountains, and forests. The former village of Moriyama is located on the western shore of Lake Biwa at the foot of Mt. Hira. It ranges from the lakeshore (85 meters above sea level) to the peak of Mt. Hōrai at 1,174 meters above sea level. Several village reports remain for Moriyama; here I introduce Moriyama in the Edo period by deciphering two historical materials from 1712 and 1736 (Genbun 1).

Moriyama village report from 1712

Moriyama was mostly ruled directly by the Tokugawa government throughout the Edo period. However, in 1661 (Kanbun 1), it became the land of Prime Minister Tatebayashi (who later became Tokugawa Tsunayoshi, the fifth shogun in the Edo government). Later, with the succession of the shogunate of Tsunayoshi in 1680 (Enpō 1), Tsunayoshi's oldest son Tokumatsu succeeded to the fief of Tatebayashi. After the fief was abolished with the death of Tokumatsu, it seems to have been controlled by local governors through former retainers who became retainers of the shogun. From 1707 (Hōei 4) to 1712 (Shōtoku 3), which includes the year when the village report in Historical Material 1 was created, it was controlled by Andō Suruga-no-kami (Andō Tsuguyuki*), a magistrate of Kyoto Higashi-machi. In the second and third lines from the top, the records say,

Historical material 1. Moriyama village report, 1712 (Shōtoku 2) (Moriyama Zaisanku Collection)

“Moriyama Village, Shiga County, Ōmi Province, under the control of Andō Suruga-no-kami.”

Article 1 describes the yield, highlighting the productivity of the fields and household land converted into an amount of rice. The yield for Moriyama was 418 *koku*, 5 *to*, 9 *shō*, 3 *gō* (1 *koku* = 10 *to* = 100 *shō* = 1000 *gō* ≒ 180.3 liters).

“Year of the Tiger: 1. Rice received …” in Article 2 and “Year of the Rabbit: 1. Rice received …” in Article 3 describe the land tax for the two years preceding the year the village report was written. The land tax acquisition rate for the Year of the Tiger is described as “4 *tsu*, 4 *rin* of the yield,” meaning that 40.4% percent of the total amount harvested was paid to the feudal lord, and the remaining 59.6% was kept by the villagers. The land tax acquisition rate for the Year of the Rabbit is described as “3 *tsu*, 7 *bu*, 3 *rin*, 3 *mō* of the yield” (meaning 37.33%), showing a decrease from the previous year. In Moriyama, the state of the crop yield is accredited and the land tax acquisition rate is fixed each year to determine the amount to be paid in land taxes. One-third of silver payments was a form of substitute payment of yields adopted in the Edo period in fiefs directly governed by the Tokugawa government in western Japan, under which part of the land taxes was paid in silver instead of rice. The records state that Moriyama's payment of land taxes in the Year of the Tiger was 169 *koku*, 9 *to*, 7 *gō*, of which one-tenth was paid in soybeans, one-third in silver, and the remainder in rice. The soybeans and rice were stored in warehouses in Nijō and Ōtsu.

Articles 4 and 5 describe sundry taxes on mountains. The “mountain land tax” of 2 *to*, 5 *shō*, 9 *gō* of rice is considered a sundry tax imposed on the owner of Mt. Hōrai, which rises to the west of Moriyama. The “tree fee” of 4.32 *monme* of silver was imposed on resources that could be obtained from the *mountain*, mainly firewood. In contrast to the honnengu imposed on fields and households, this was called *komononari* and paid in a fixed annual amount in rice or silver.

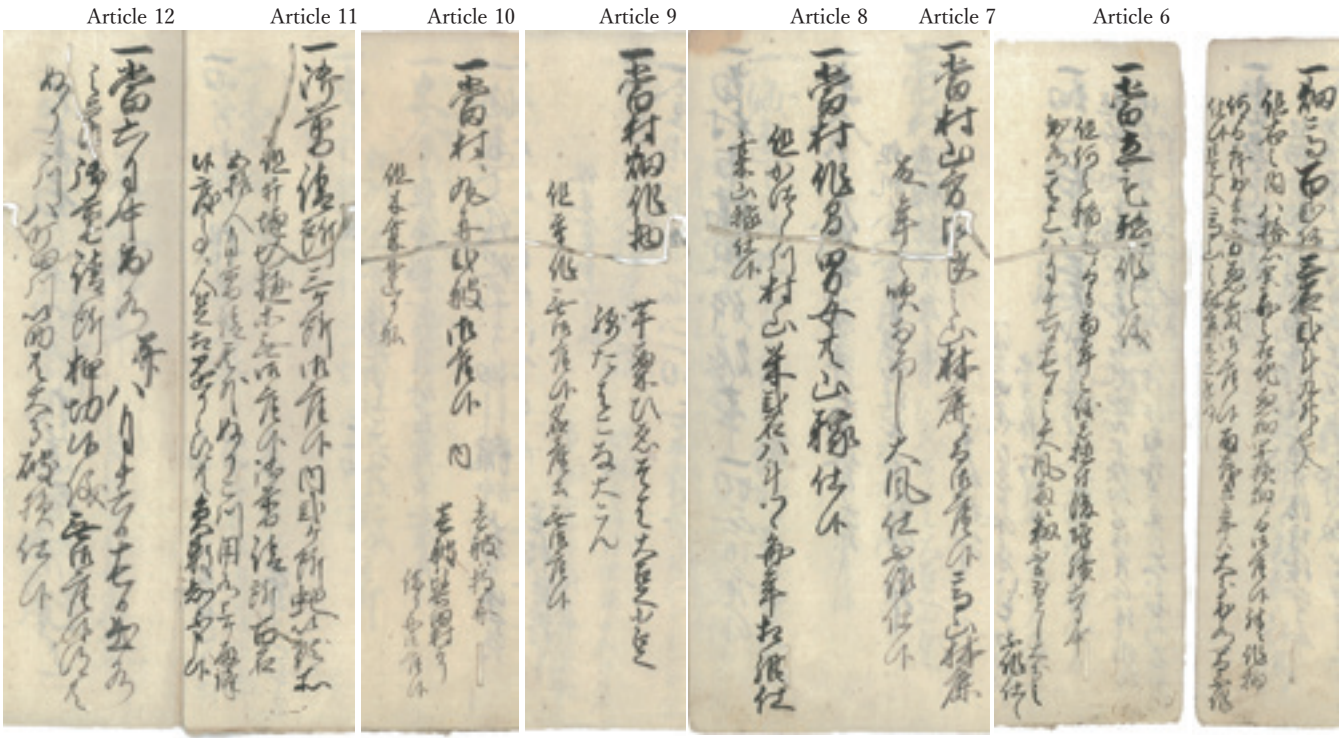
Articles 6 and 7 describe river improvements. For rivers, water supply, road bridges, and so on, works for which the peasantry bore the expenses are called *jibushin*, while those for which the feudal lord bore the expenses are named *gofushin*. The records state “*Gofushin*: 1. Nuruko River …” and “Ditto: 1. Hacchōda River …”; thus, the river works were carried out at the expense of the feudal lord. In the Nuruko River (currently Noriko River), the works were located on a stretch 160 *ken* long and 2 *ken* wide (1 *ken* is approximately 1.8 meters). In the Hacchōda River (currently Hachiyado River), the

works were located on a stretch 400 *ken* long and 2 *ken* wide on average, and in the spring of the Year of the Dragon, works to dredge 183 *ken* of that stretch and to fill doubled gabions with stones, drive piles, and make baskets on a total of 25 *ken* were conducted. A workforce of 183 people was required for the dredging work and 28 for the gabion work, and an allowance of 5 *gō* of rice per person was paid for 211 people. The records state that the rice allowance of 1 *koku*, 5 *to*, 5 *shō* was converted into 74.9 *monme* of silver at 71 *monme* per *koku*. The 8.4 *monme* of silver for the bamboo and wood used in the works was paid by the feudal lord to the village because the works were *gofushin*.

Article 8 describes "granaries," namely the village-owned grain warehouses in the village used to temporarily store the land taxes. Granaries had no productive capacity; therefore, their land taxes were often reduced or exempted. However, in Moriyama, a tax of 1 *to*, 4 *shō* was imposed on 1 *se* (approx. 1 are) of the higher-quality field land where the granary was built.

"Year of the Rabbit, minor requirements …" in Article 9 and "Same year, Korean requirements …" in Article 10 describe *takagakarimono*, which are value-added taxes imposed on each village based on its yield. "Minor requirements" refers to the farmers' burden other than land taxes imposed through the village to raise reconstruction expenses if the feudal lord's residence was damaged in a disaster or the expenses when the feudal lord's daughter was married, for example. Various other expense items are listed under minor requirements. "Korean requirements" are expenses imposed when Korean envoys were dispatched. Requirements could be collected in one of two ways. One was to divide the expenses between all households in the village so that each household paid the same amount; the other was to pay an amount determined according to each household's holdings. In the early Edo period, the former method was more common, but the latter, fairer method gradually came into favor. Moriyama adopted the latter method, and for each *koku* in holdings, each household had to pay at least 6 *shō*, 5 *gō*, 6 *shaku* in rice and up to 4.17 *monme* in silver for minor requirements, and at least 4 *monme* in silver for Korean requirements.

Articles 11 to 13 describe the number of houses, people, and cattle. Moriyama had 57 houses, of which 39 were free-holding peasants who had land, and 18 were poor peasants who did not have land. In some villages, land taxes for temples were exempted, but Moriyama had one temple described as "land for land taxes." The



Historical material 2. Moriyama village report, 1736 (Genbun 1) (Moriyama Zaisanku Collection)

population was 262 people: 111 men, 149 women, and 2 priests. There were 45 cattle, all-female.

Article 14 describes “common land.” Moriyama seems to have had common land measuring 10 *chō*, 40 *ken* from north to south and 6 *chō* on average from east to west.

“Silver for the lord's warehouse” in Article 15 refers to expenses the villagers paid to maintain the feudal lord's land tax warehouses outside the village. The use of the character 御 (an honorific) before the character for warehouse indicates these are land tax warehouses belonging to the feudal lord. In this year, 62.79 *monme* of silver was paid.

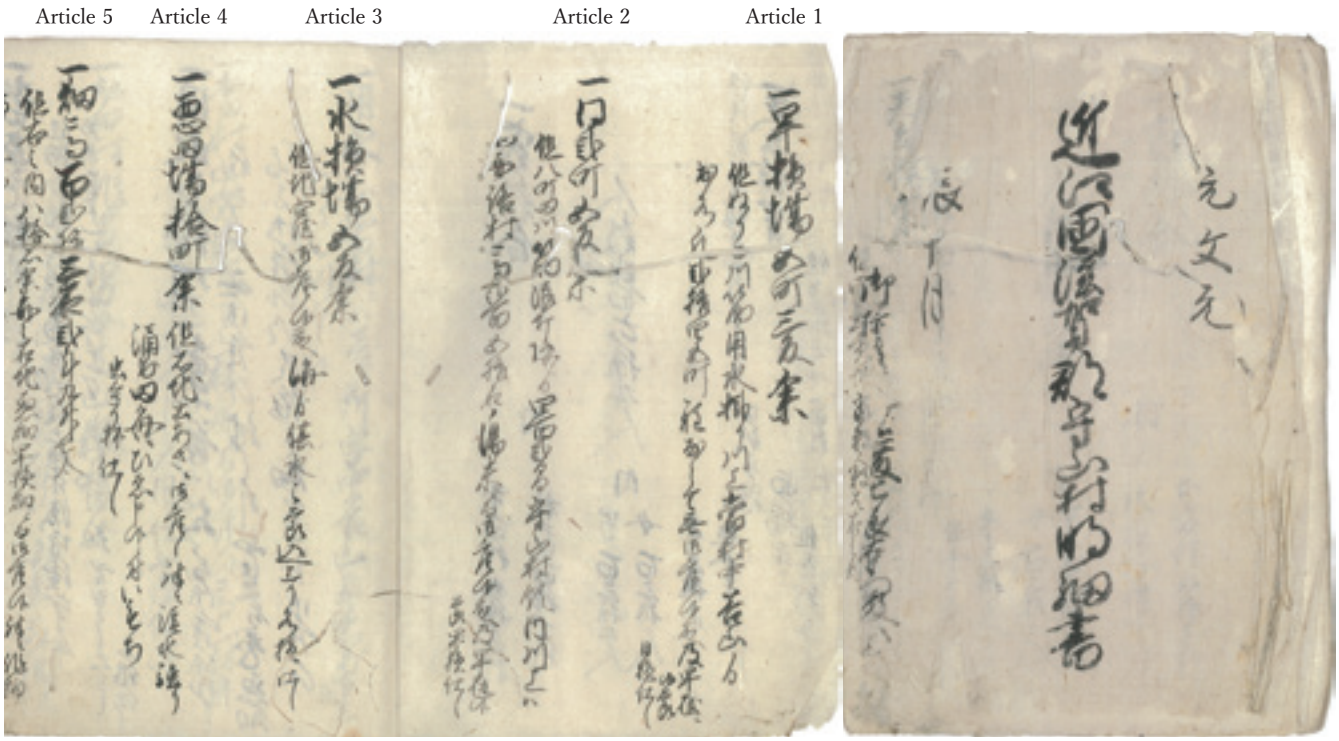
The recipients of the village report of Historical Material 1 are Naruse Gohachirō, Hara Shinroku, and Yamazaki Nenzaburō*. These three men were inspectors dispatched by the Tokugawa government to inspect the administrative and civilian situations in various provinces each time the shogun changed. This village report is believed to be a document created when the inspectors were dispatched.

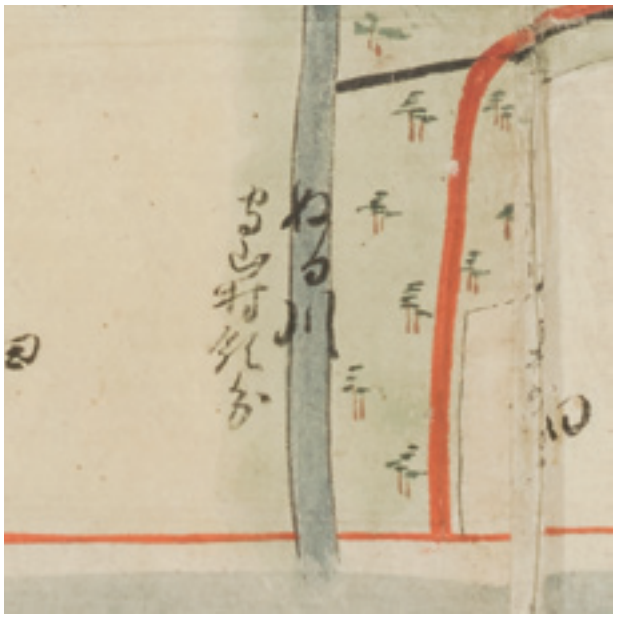
Moriyama village report from 1736

Historical Material 2 is part of the village report from Moriyama Village, Shiga County, Ōmi Province prepared in 1736 (Genbun 1). It was created in the same village of Moriyama, 24 years after the village report of Historical Material 1. Here, I outline the items not described in Historical Material 1.

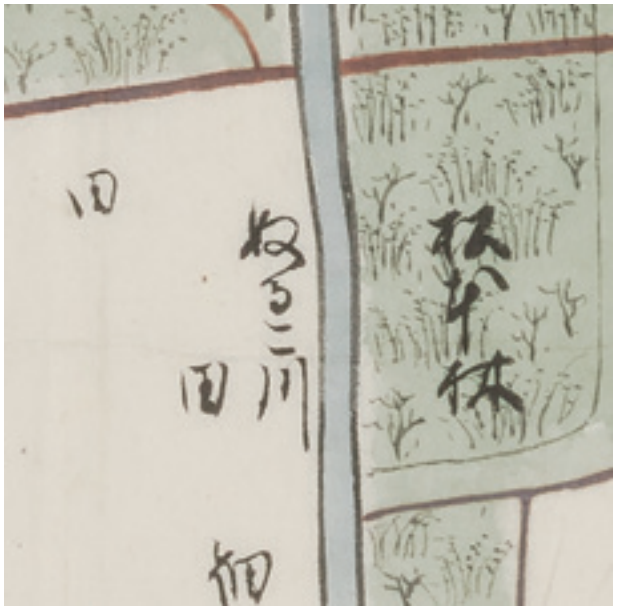
Articles 1 and 2 describe “drought damage locations” in the land along the Nuriko and Hacchōda Rivers. Drought damage, as the term implies, is damage to fields due to drought. The fields along the Nuriko River suffered over 5 *chō*, 3 *tan* of damage during a drought because the flooding from Mt. Nakatani was only approximately 24.5 *chō*. The fields along the Hacchōda River suffered more than 2 *chō*, 5 *tan* of damage during the drought because they were downstream in the neighboring village. While Historical Material 1 calls the river “Nuruko River” and Historical Material 2 names it “Nuriko River,” both are now referred to as the Noriko River. The plans of Moriyama indicate Nuru River, Nuruko River, and Nuriko River, among others (Plans 1–3).

Article 3 describes “flood damage locations.” The village of Moriyama faces Lake Biwa. More than 5 *tan* of flood damage locations emerged when water flowed into depressions as the level of the lake rose.

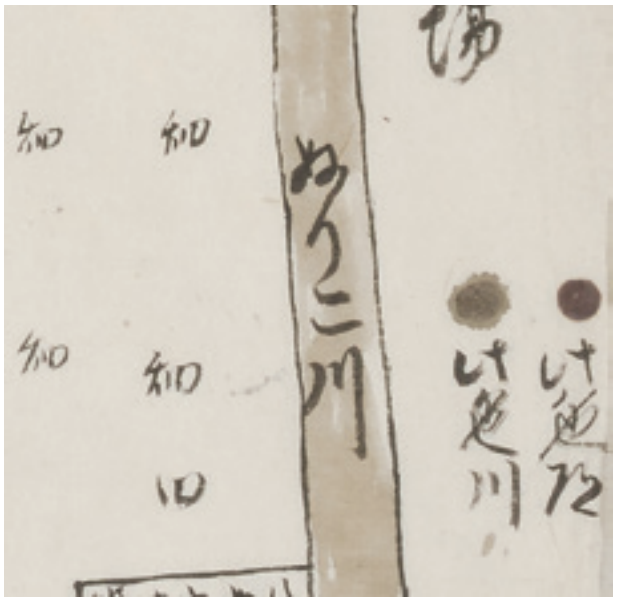




Plan 1. Nuru River



Plan 2. Nuruko River



Plan 3. Nuriko River
(Plans 1–3: Moriyama Zaisanku Collection)

Article 4 describes “poor paddy locations.” The village had more than 10 *chō* of land that was rocky, with shallow soil, and constantly cold because of spring water gushing out in large volumes, leading to damage from rice blight (a disease that occurs in rice) and insects.

Article 5 describes “field yield.” The yield from Moriyama's fields was 123 *koku*, 2 *to*, 9 *shō*, 7 *gō*, of which 80 *koku* was from rocky poor, or drought-damaged fields. Regardless of the crop, the harvest was poor, and in rainy years, the fields flooded heavily, also yielding a poor harvest.

Article 6 describes “standing crops and rice harvest.” Standing crops grow in the fields. In the year 1736, rain continued to fall after the rice was planted, with the region flooding in June and experiencing strong winds and rain on August 16th and 17th, blowing off the rough rice and causing an extremely poor harvest.

Article 7 states that the fields on the mountainous region of Moriyama were located at the foot of Mt. Hira, a high mountain; therefore, the harvest was poor because of the strong winds that blew down the mountainside every year.

Article 8 states that men and women from Moriyama went to the mountains to work during the slack season on the farms.

Article 9 describes field crops. In Moriyama's fields, potatoes, Italian millet, Japanese millet, buckwheat, soybeans, adzuki beans, cotton, tobacco, and daikon were grown. Farmers did not plant multiple crops at the same time, and the village did not seem to have any specialties.

Article 10 describes the “*marubune* (*marukobune*),” sailboats with a unique structure used in water transport on Lake Biwa from the Edo period to the Shōwa era. Moriyama had two *marubune*, one of which belonged to the village and the other borrowed from the village of Katata and used to transport wood.

Article 11 describes the river works. Moriyama had *gofushin* in three locations, two of which were for gabion

works. There were no weirs or sluices, and the Nuriko River needed laborers each time it rained, although the number of these is unknown.

Article 12 describes the flooding in June and on August 16th and 17th, 1736 (Genbun 1). The flooding did not destroy the *gofushin* locations in Moriyama, but the report states that the land along the Nuriko and Hacchōda Rivers was severely damaged.

Space does not permit me to discuss them, but the Moriyama village report for 1736 also describes "water use," "distances," "fertilizing," and other topics.

Conclusion

Do you now have a little understanding of the state of Moriyama village in the Edo period? The village reports were prepared from examples presented by the feudal lord or local governor and the items described varied depending on the village and period. The village report from 1712 (Shōtoku 2) is historical material with items describing the yield, improvements, number of houses and people, temples and shrines, rivers, and the like. The village report from 1736 (Genbun 1) provides information on restoration works after drought damage, water damage due to rising water levels in the lake, flooding, heavy rains and winds, damage to fields and rivers from strong winds blowing down the mountains, and disasters. In addition, the village report includes information on the state of the villagers' lives in the Edo period, such as their work during the slack season on the farms, the boats they owned, crops and specialties grown in the village, fishing and silkworm-raising, mining, and other industries specific to the area. The village reports were documents relating to taxation submitted by the village to the feudal lord or local governor. The village may have manipulated the reports to a certain extent when preparing them based on their intention to lighten their tax burden as much as possible. For example, Article 3 of Historical Material 2 mentions "flood damage locations, more than 5 *tan*," but whether the damage covered more than 5 *tan* is uncertain and this would need to be confirmed from other ancient manuscripts, plans, and similar documents. Regardless, village reports are highly valuable historical materials that convey the present-day changes for the state of villages in the Edo period, lives of their farmers, and information about disasters. If we consider the villages' deliberate intentions when examining them, these historical materials should help us learn more about villages in the Edo period.

What is a gabion?

Article 7 of Historical Material 1 and Article 11 of Historical Material 2 mention "gabions." A gabion is a basket woven in a cylinder and filled with stones. It is used in water control works, river improvements, and disaster restoration works. In ancient times, bamboo was the main material, but today, steel wire is frequently used.

Bamboo gabion

Reference materials

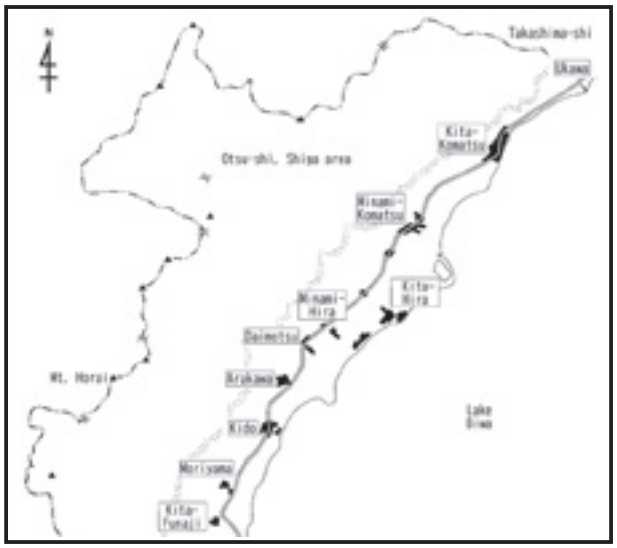
Shiga Chōshi Henshū Iinkai [Shiga town history editorial committee] ed., *Shiga chōshi* [Shiga town history] vol. 2 (Shiga Town, 1999) 308–309.

Explanation of terms

* Note: How to read is speculation

Ancient maps of the villages around the foot of Mt. Hira: Possibilities of links between historical materials and traditional knowledge

Ōtsu City Museum of History **TAKAHASHI Hiroki**



Villages at the foot of Mt. Hira. (Partial extraction from *Shiga chōshi*, vol. 2, Fig. 28 with author's additions)

Introduction

When we spread out a single ancient map that has been folded and examine at the state of the village areas and natural features while deciphering the verbal information written on it, the historical landscape of the area and aspects of the age instantly expand before our eyes. The author was responsible for a special exhibition of a careful selection of ancient maps from the Muromachi period to Meiji era of the Shiga region of the villages at the foot of Mt. Hira (until 1889 (Meiji 22), the region consisted of 18 villages). The exhibition was held at the author's workplace at the Ōtsu City Museum of History in March 2017, and entitled "Ancient maps of villages: Walking through the Shiga region."

The Shiga region still has shared documents collected since the Edo period and many ancient maps. However, leaving aside the issue of the number of ancient maps, we were overwhelmed by the volume of information in each map. Thus, we could only present a small part of them in the exhibition and were unable to fully grasp the contents. Since then, the Ōtsu City Museum of History has continued investigations of historical materials on the Shiga region. Thanks to the launch of this project and the cooperation of people in various fields, historical materials including ancient maps have attracted new attention. As such, we have entered a new stage of investigation for thinking about the history of disasters and landscapes.

1. History of investigations of the area around the foot of Mt. Hira and its ancient maps

Ancient maps provide a variety of geographical and historical information to project participants from a range of academic fields. These materials provide keys to the multidisciplinary activities that merge the liberal arts and sciences. In order to properly evaluate, analyze, and use the materials while removing the boundaries between academic disciplines we must investigate them carefully and sincerely as we carry out the work to publish and share them. These materials are records of the history of life. They are essential not only to researchers but also to the people from the regions depicted. It is vital that we preserve and store then properly in order to convey them to future generations.

Here, the author provides an overview of the ancient map materials in each region around the foot of Mt. Hira.

In the sense of *discovering* ancient maps from these regions, past academic investigations (Gangōji Institute for Research of Cultural Property 1979) as well as the investigation and organization in the institute to compile a history of the town of Shiga, which was completed in 2005, has great meaning (Shiga Town 1996–2005). In particular, as mentioned, each region has huge volumes of ancient manuscripts and records, which were investigated and organized jointly with local people and used in the compilation exercise. Today, the photographic

materials from these ancient documents (printed onto paper) were transferred to the management of the Ōtsu City Museum of History with a list of items upon the merger with Ōtsu in 2006.

On the other hand, although the ancient maps included among these materials were recorded in the list of items, they were too large or difficult to photograph, and therefore very little information on their contents has been passed down, except for those used in the town history (and photographs of a few items). Given this situation, when the Ōtsu City Museum of History held its 2017 special exhibition “Ancient maps of villages” we visited each region using a list of documents (materials from the compilation of the Shiga town history) from about one year before the exhibition and asked to borrow the ancient maps to investigate and photograph them. Some ancient maps were not included in the list, and we also found new maps. As such, we could confirm a huge volume of about 750 ancient maps in 18 regions (some regions have not yet been investigated).

Naturally, the ancient maps vary in size and condition and include plans that are little more than notes. However, all are filled with historical information. We strongly feel the need to examine each in detail in the future

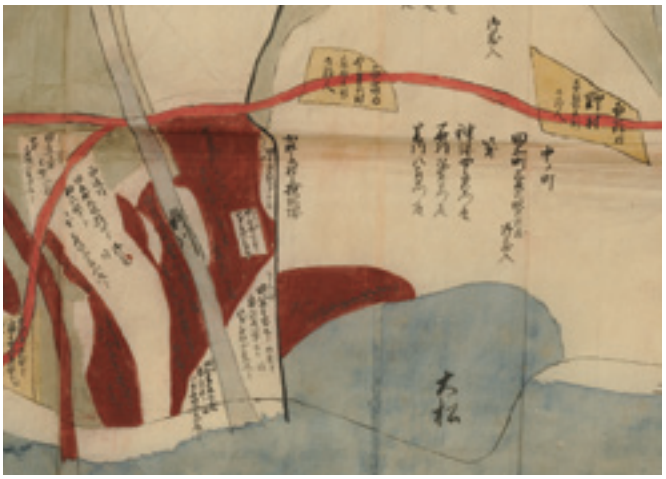
2. Viewing the regions around the foot of Mt. Hira as a whole

We now look at the regions around the foot of Mt. Hira in the Edo period (particularly the Kita-komatsu to Kita-funaji regions), which are the areas this project covers.

Ancient maps from the Edo period were prepared in different ways, including village report maps for submission to the feudal lord and judgment plans created for the management of common land or in border disputes. Some were created in a single village, and others by checking their contents with several villages in the form of attendance. The ancient maps passed down this way are historical materials for reconstructing the landscape through information on control by the feudal lord (the Tokugawa government, daimyo, etc.) in the Edo period and issues of local occupations concerning common land. Moreover, they convey a variety of historical information.

Plan of Kita-komatsu, Minami-komatsu, and Kita-hira villages, 1669 (Kanbun 9). (Kita-hira Asset Management Committee Collection. Photo: provided by Ōtsu City Museum of History, same applies to p. 26)

Extract: Plan endorsement



Extract: State of Minami-komatsu village and inner lakes

Extract: State of mountains and valleys

Extract: Taki-yama

Ancient maps from the Shiga region are considered extremely rare materials in the reconstruction of historical information on the region. Noteworthy is that only one village does not have a detailed map, and a few plans depicting several villages remain.

One of these is the “Plan of Kita-komatsu, Minami-komatsu, and Kita-hira villages” (pp. 27, 28), which was passed down in the Kita-hira district and depicts the villages of Kita-komatsu, Minami-komatsu, and Kita-hira at the time. It is large, extending to 109.8 centimeters vertically and 182.1 centimeters horizontally, and has notes on the back including the date it was created in July 1669 (Kanbun 9). The writing on the back also shows that the fields and fallow land, as well as owned mountains and common land (shared land), were carefully confirmed in the presence of village headmen and peasants from each village and drawn up in detail. Before submitting the man to the feudal lord (the Tokugawa government or local governor in Ōtsu), the village headmen, intermediaries, and head peasants of the three villages signed it to handle cases of errors and guarantee the contents later. However, this is not the original document, only a copy retained in the village.

Examining the face of the plan reveals that the use of each parcel of land is color-coded as explained in the legend, and over this is depicted detailed information about the feudal lord of each village and its yield and number of houses, locations of tutelary deities (shrines), and information on rivers and roads, among other items.

In contrast, many mountains and valleys have been named and classified according to their usage such as mountains for grass or for firewood. Fallow land (red), “bald mountains,” and flood damage information is aldo included.

Plan of Kido, Daimotsu, Arakawa, and Kita-funaji villages, 1669 (Kanbun 9). (Arakawa Ward Common Land Management Committee Collection. Photo: provided by Ōtsu City Museum of History)

Extract: Area around Mt. Fukutani, Kita-funaji Village

Extract: Area around Arakawa Village and Ōtani River

Extract: Area around Moriyama and Kido villages

Extract: Area around Daimotsu Village and Hyakken (100-*ken*) Embankment

Furthermore, besides land information, the plan depicts "Yoroi-iwa" (lit. "armor rock") and "Taki-yama" (lit. "waterfall mountain") (Yōbai Falls), and the inner lakes and inlets of Ōmi-Maiko. This enables us to reconstruct in detail the historical landscape from Kita-komatsu to Kita-hira.

The next plan I present is the "Plan of Kido, Daimotsu, Arakawa, and Kita-funaji villages" (p. 29), which was similarly created in 1669 (Kanbun 9). This plan depicts the four villages in its title and is extremely large, measuring 156.6 centimeters vertically and 263.5 centimeters horizontally. The plan is endorsed in the same way as the "Plan of Kita-komatsu, Minami-komatsu, and Kita-hira villages," indicating that it was carefully examined when prepared in the presence of the village headmen, intermediaries, and head peasants from each village.

Regarding its contents, the area in each village (white) shows the number of *tan* for homesteads and number of houses and indicates the permanently fallow fields around them in yellow. The mountains nearer to the village areas are depicted in detail as being used for grass, and those further away as mountains for firewood. The paths leading to them are marked "grass path" with the distance from the peak to lakeshore. These paths are connected to the village areas and to the inlets. This plan better details how firewood and stones were shipped to Ōtsu and Ōmi-Hachiman than other ancient maps.

Incidentally, did you notice that the place where Moriyama should be is blank, with nothing drawn there? This does not mean that Moriyama did not exist. The fact that Moriyama is not depicted connects this plan to the reason the "Plan of Kita-komatsu, Minami-komatsu, and Kita-hira villages" was created. The key point regarding why it was not depicted lies in the possessive (controlling) relationships of these villages at the foot of Mt. Hira at the time. The villages depicted in these plans were all owned by the Tokugawa government (or contain land in the possession of the Tokugawa government), while Moriyama was the estate of Prime Minister Tatebayashi (who later became Tokugawa Tsunayoshi) and was not included in the land owned by the Tokugawa government.

In other words, considering various possibilities, these two large plans were prepared to depict and describe the villages in the possession of the Tokugawa government and submitted under government orders, albeit for reasons not currently clear.

Note that the village of Minami-hira (which links the two plans but is not depicted in either) was the estate of the Shōda family, direct retainers of the shogun, and was not included in the land owned by the Tokugawa government (which is probably why it was not included in the report).

Either way, these maps are valuable plans from which we can learn about the living spaces of the people in the northern area at the foot of Mt. Hira 350 years ago, including control mechanisms, lifestyles, and local occupations.

3. Reading the historical landscape of the Moriyama district

As mentioned, many ancient maps remain for the regions around the foot of Mt. Hira. These historical materials are worthy of attention in terms of reconstructing the actual conditions and landscape for land use. It is not possible to present them all here, but below I discuss a few ancient maps of the Moriyama district in Hachiyado, Ōtsu, Shiga, the main area of investigation in 2018. Andō Kōichi and Fukamachi Katsue also introduce and analyze the Minami-komatsu district, which was investigated at the same time, from the perspectives of flood damage and land use. I refer the reader to their article (p. 64).

In addition, the state of the Moriyama district in the Edo period, described below, is analyzed in detail from reports submitted to the feudal lord in an article by Nakai Minami (p. 20). Furthermore, Azuma Sachiyo provides information about the history of disasters (p. 58). I refer the reader to these articles as well.

What information can we obtain from ancient maps of the Moriyama district? The shared documents from

(1) Plan from the Mt. Fukutani dispute judgment, 1664 (Kanbun 4). (Moriyama Zaisanku Collection. Photo: taken by Shimizu Kōgeisha)

the Moriyama district include 92 ancient maps from 1664 (Kanbun 4) to the Meiji and Taishō eras. Ranging from detailed maps to little more than rough notes, they comprise a wide variety of contents. Below, I select for discussion some of the ancient maps of the Moriyama district that merit attention.

(1) Plan from the Mt. Fukutani dispute judgment

This is the oldest ancient map left in the Moriyama district. The face of the plan includes Lake Biwa on this one side (with east at the bottom) and looks west toward the Hira Mountains at the top. It shows the relative positions of Wani (Kitahama), Minami-funaji, Kita-funaji, Moriyama, and Kido villages in order from the south, and the feudal lord, yield, and amounts from working in other villages. It also indicates the paths leading to the mountains and lake (beaches) with red lines and the “estate boundaries” with yellow lines. Land usage is shpwn as “rice fields” and “plains.” The reason for creating the plan is not immediately apparent, but the endorsements suggest more about its background and history.

The plan has two endorsements. Both are dated 1664 (Kanbun 4). The one at the lower left is a note from when the plan was submitted by Moriyama and Kita-funaji villages (Endorsement 1), and the one in the upper right is the judgment from the feudal lord in response (at this time, the area was the estate of the Tokugawa government) (Endorsement 2). In summary, they state that (i) the plan was created in the presence of Moriyama and Kita-funaji, and each village's arguments about the contested “mountain border” were written and submitted (Endorsement 1). In response, (ii) the issues were carefully considered and a judgment was rendered, which seems to not have determined the border, but merely forbade people from Kita-funaji from cutting down trees on Moriyama's “Mt. Nakatani.” Conversely, people from Moriyama were forbidden to cut down trees on Kita-funaji's “Mt. Fukutani” (Endorsement 2).

From this, we see a problem concerning the management of mountain forests in the mid-17th century, and particularly relationships with the feudal lord and state of his judgments. However, this plan seems to have been copied many times, and many copies can be confirmed among the shared documents of the Moriyama district. The shared documents of Moriyama district show that mountain and water-related disputes concerning Mt. Fukutani occurred frequently from 1664 to 1673 (Kanbun 4–13). Moreover, while it is not possible to confirm documents relating to the Kanbun 4 dispute in the shared documents of Kita-funaji district, we can look further back to a memorandum from 1662 (Kanbun 2) forbidding people from each village from going to work in the other village until the judgment was handed down. This suggests that problems surrounding Mt. Fukutani had a history of repeated occurrence.

The plan from the Mt. Fukutani dispute is merely a slice of the situation at one point in time in 1664. However, it can be considered material for reconstructing the landscape at the time based on broadly shared spatial recognition in the presence of both villages, albeit with

(1) Plan from the Mt. Fukutani dispute judgment. (Endorsements. Frames and labels added by author. Photo: provided by Ōtsu City Museum of History)

slight differences between them.

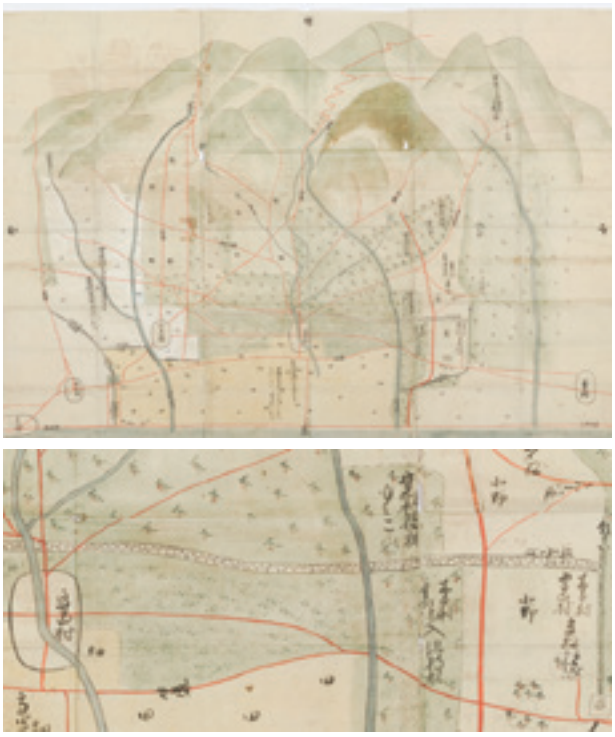
(2) Map of Moriyama and Kita-funaji villages and environs

The next plan I present also depicts Mt. Fukutani and Nakatani, and is centered on the village of Moriyama.

The composition is the same as the "Plan from the Mt. Fukutani dispute judgment," but the way it is depicted and verbal information differ slightly. First, the following three points draw attention: (i) the fields spreading on the lakeshore side of Moriyama are yellow (statements relate to external worker relations in Kita-funaji and Kido villages); (ii) the "plains," mountains, and valleys around Moriyama are depicted in green and show flora (standing trees and undergrowth are distinguished); and (iii) the scope of external work in Kita-funaji from Moriyama is shown in white. The year the plan was created is not known, but given the external work problems between the two villages, it is thought to be from the early to mid-Edo period.

One interesting thing about these landscape depictions is that the *shishigaki* (stone walls for keeping out animals) separating the village and mountainside of Moriyama are shown. On the border with Kido to the north, an "estate boundary" in the form of a stone wall is also depicted, but the *shishigaki* does not extend toward Kita-funaji to the south; thus the situation is unclear. We can confirm ancient records from the mid-Edo period relating to the maintenance of these *shishigaki* around Moriyama (for example, shared documents of Moriyama district). On the other hand, pleadings from village headmen and others from Kita-funaji dating to the mid-Edo period (shared documents of Kita-funaji district) describe the extension of "*shishitakegaki*" from the north and show that the village requested prompt construction with "the generous assistance of his lordship" because boars were seen around Kita-funaji and the farmers were experiencing difficulties in this regard.

This plan depicts the village landscape but also hints at common land and external work problems where neighboring villages struggled against each other, as well as problems pertaining to the construction of *shishigaki*.



(2) Map of Moriyama and Kita-funaji villages and environs, early to mid-Edo period. (Moriyama Zaisanku Collection. Photo: taken by Shimizu Kōgeisha) Top: Entire map; bottom: extract (*shishigaki* section)

(3) Map of the mountains and forests around Moriyama and Kita-funaji villages

This plan includes Moriyama and Kita-funaji villages and depicts the surrounding mountains and beaches. The face of the plan confirms that the steepness of mountains like Mt. Hōrai and Kojorō Pass are expressed in deep green, and the area before them—thought to be grassy land—is colored light green and marked "野" (plains) in black ink. The yellow areas are the fields of Kita-funaji.

The purpose and year of this plan's creation are unclear, but the legend includes "dispute about land along the shore" as an explanation of the white areas. Thus, it may have been created with a dispute about the shores being used as harbors for shipping firewood and timber. Regarding disputes about shoreland, documents and records from 1733 (Kyōhō 18) remain, and their historical progress and actual state of use can be considered in conjunction with the plan.

(3) Map of mountains and forests around Moriyama and Kita-funaji villages, mid-Edo period. (Moriyama Zaisanku Collection. Photo: taken by Shimizu Kōgeisha)

(4) Plan of lakeshore flooding in Moriyama and Kita-funaji villages

This plan has Lake Biwa at the front, as expected, and covers the area from Minami-funaji to Kido, centered on Moriyama. From its characteristics, it seems to depict the state of flood damage. The blue coloring around the lakeshore and the Hachimachida and Noriko Rivers is thought to indicate the extent of damage from flooding, known as "inflow." There are no historical materials for determining or comparing the year of creation, and while we can say it must have been created in the mid to late Edo period, this is not certain. For example, the Moriyama district shared documents contain records on flood damage in 1700 (Genroku 13), 1704 (Hōei 1), 1708 (Hōei 5), and 1734 (Kyōhō 19), and "inflow" damage due to the rising level of Lake Biwa in 1789 (Kansei 1). It is probable that this plan was a draft of a plan to be submitted later to the feudal lord to convey the state of damage from one of these events.

Parts of the plan are colored pink, with section names and "requests" written and depictions of piled-up stones. It is not currently clear what this signifies, but it appears to be an important expression. Analyzing it in detail is an issue for the future.

(4) Plan of lakeshore flooding in Moriyama and Kita-funaji villages, mid to late Edo period. (Moriyama Zaisanku Collection. Photo: taken by Shimizu Kōgeisha)

(5) Jinshin title deed and land surveying plan of Moriyama and Kita-funaji villages

Finally, I present two maps from the modern era.

In the early Meiji era, reforms were conducted to move from the former system of payment of land taxes in kind (e.g., rice) to one of determining the value of each parcel of land and paying taxes in money. As part of this process, "cadastral maps" were created depicting in detail the state of each land parcel.

Both (i) and (ii) depict Moriyama and Kita-funaji villages, except for their mountainous, forested parts, and were created in the early Meiji era. They are known as the Jinshin title deed and land surveying plans. Moriyama and Kita-funaji merged in 1874 (Meiji 7) to become the village of Hachiyado; thus, we infer that the plans were created that year.

Because the lot numbers have been corrected in part, channels and rural roads were added in light colors,

(5) Jinshin title deed and land surveying plan of Moriyama and Kita-funaji villages, early Meiji era. (Both top (i) and under (ii), Moriyama Zaisanku Collection. Photos taken by Shimizu Kōgeisha)

and traces of corrections made before creating the final map are evident. As such, this is thought to be a draft. It enables a detailed analysis of land usage and landscapes in the early Meiji era.

A land surveying plan created around 1885–1889 (Meiji 18–21) also survives (Ōtsu City Museum of History Collection), enabling us to trace the changes in the village space from the Edo period to Meiji era.

Conclusion

Here, a general overview was provided of ancient maps in the area around the foot of Mt. Hira, with a focus on the ancient maps in collections in the Moriyama district.

Superimposing a pastoral or nostalgic image when looking at ancient maps from the Edo period may diverge from the actual conditions portrayed.

As seen in the dispute plans, securing the use and benefit of mountains and forests was an important issue. Villages relied on their use and benefit for the occupation of shipping firewood. The writing of "bare mountains" on several plans indicates development and ruin connected with these issues or the movements of villagers risking their lives to respond to flood damage. We must consider the fierce competition with neighboring villages that required the preparation of these plans; including the confrontation with the feudal lord, and the living conditions, while reading about the villagers' lives.

The depictions expressed on ancient maps and the letters written on them show us the views of the villagers at the time, the footsteps of our forebears that are carved into the earth, and the changing nature and appearance of the mountains, fields, rivers, and seas. We are able to decipher a better sense of the period and its issues, which become more visible.

The Edo period and contemporary times are not separate from each other, but are connected. The presence of ancient maps and other historical materials tells us that people have made these connections. The area around the foot of Mt. Hira and the hundreds of ancient maps that remain there are filled with enormous amountes of historical information.

I specialize in work on the investigation, organization, and analysis of ancient manuscripts and records, but am still a layman in terms of analyzing ancient maps. Even when I oversaw the "Ancient maps of villages" exhibition mentioned in the introduction, I progressed with the advice of many geographers and historians. They continuously taught me the importance of going to the site and walking every inch of ground while comparing

the map of today with that of ancient times.

Now, this project is proceeding to unearth local historical materials, including ancient maps, and organizing and analyzing them in collaboration with researchers from various fields and local cooperators. Having done so, we look together at the ancient maps and walk every inch of the area with the guidance of residents. We overlay "talking" about former paths, rivers, mountains, and forests, or the state of lifestyles in olden times, with the information in the ancient maps. We connect this shared historical information and traditional knowledge in various ways and investigate how to use it.

Then, we fold up the ancient map we had spread out and put it in its storage box, and spread out the next one to dive into that period. The history of investigating the area around the foot of Mt. Hira that concerns ancient maps has only just begun.

Photo: Photographing an ancient map at Shimizu Kōgeisha. (confirming the fixing position with lasers)

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Acknowledgments

The Kitahira Asset Management Committee, Moriyama Zaisanku, and Arakawa Ward Common Land Management Committee granted their permission to use their materials. In investigating and analyzing the cadastral maps, I was advised by Koseki Daiju (geographer, part-time instructor at Kyoto Women's University). I thank them deeply.

Postscript

This project set out to decipher relevant ancient manuscripts. Although I referred to them when writing this article, I have not specifically introduced them. I wish to relate them to ancient maps and present the historical materials as they become available. Finally, I thank the people below who lent their strengths in deciphering the documents.

Araki Keiichi, Katō Miho, Katō Yukiko, Kōriyama Shiho, Nabeshima Emiko, Matsushima Sumiko, Sakurai Michio, Takano Ryūichi, Yoshii Asuka, Watanabe Junko

In addition, I thank the students from Bukkyō University and Ritsumeikan University and others listed below who assisted in digitizing and organizing the materials compiled from Shiga Town History.

Akamatsu Yui, Koegaitsu Tadashi, Nishiya Yūki, Matsumoto Riki, Miura Kaho, Miura Rin, Ochiai Yūsuke, Takada Mizuho, Ueda Tomoka, Yagi Sae

Border disputes between villages at the foot of Mt. Hira

Takashima City Board of Education **YAMAMOTO Akiko**

Plan of Iguro Village border dispute (face). (Ukawa-ku Collection. Photo: provided by Takashima City Board of Education)

The village of Ukawa, located on the eastern slope of the Hira Mountains, falls within the city of Takashima under today's administrative divisions. We know that in the Edo period, it was formed as Ukawa Village, Shiga County, and was subdivided from Uchioroshi Village, Takashima County to the north.

At its southern border is Kita-komatsu Village, Shiga County. Thus, it could be considered a village located on the border of Takashima and Shiga counties.

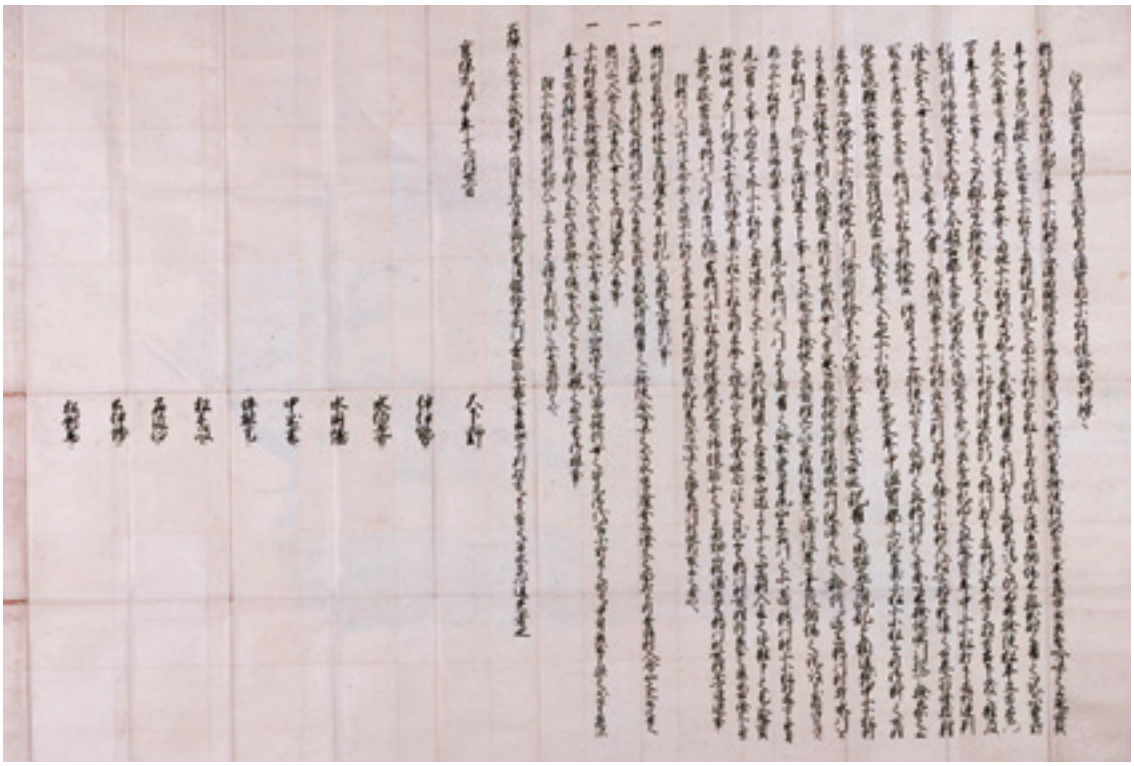
Given this location, Ukawa and Kita-komatsu have repeatedly been in dispute concerning the border between the two villages and their common land rights.

Disputes concerning villages' rights became more frequent after the dawn of the Edo period. This is closely related to the land surveying that commenced during Toyotomi Hideyoshi's unification of the country.

Land surveying provides an understanding of land productivity and imposes obligations on the peasants working the land to pay land taxes. Land tax payments were undertaken at the responsibility of the village. In addition, it organized external work (farming outside the village where one lives) and internal work (farming in one village by a peasant from another village) relationships between villages and ascertained the village boundaries.

As a result, the mountains, forests, and plains came to have village boundaries where they had none before. In particular, mountains, forests, and plains provide fertilizer, fuel, and construction materials, so their usage value is high. Thus, throughout the countrya, disputes on the borders of mountains (mountain disputes), forests, and plains occurred repeatedly.

One such mountain dispute, between Ukawa and Kita-komatsu, was based on disagreements the middle ages and



Plan of Iguro Village border dispute (reverse). (Ukawa-ku Collection. Photo: provided by Takashima City Board of Education)

continued into the Edo period without resolution. It was eventually brought to the supreme court of the shogunate in Edo.

In general, mountain and water disputes in regional villages were settled privately through discussion between the villages or resolved through a decision of the magistrate's court in Kyoto. If a resolution could not be reached at this stage, the dispute was transferred to the highest judicial organ of the Tokugawa government in Edo, known as the *hyōjōsho*. Decisions here were rendered primarily by the commissioner of finance (*kanjō bugyō*), commissioner of the city of Edo (*Edo-machi bugyō*), and commissioner of shrines and temples (*jisha bugyō*) with senior councilors (*rōjū*) participating in some cases.

The dispute between Ukawa and Kita-komatsu, which started during the Kōan era (1278–88), developed into a lengthy disagreement that continued until June 1416 (Ōei 23), when the Muromachi shogunate of the time rendered a decision that the border between Takashima and Shiga counties was "limited to the base of the waterfall on Mt. Kanegatake at the top and the southern shore of the Ukawa River at the bottom."

However, after the Edo period began and Ukawa was subdivided from Uchioroshi, the dispute concerning the border between the villages of Uchioroshi and Ukawa and the village of Kita-komatsu re-emerged.

According to the complaint by Uchioroshi and Ukawa on August 6, 1710 (Hōei 7), they were ordered to install a stone wall along the lakeside in the village of Imazu in Takashima County. However, when they mined the necessary stone in Ukawa and loaded it onto boats from Ukawa's shores to transport it to Imazu, Kita-komatsu strongly opposed it and demanded an "injunction against loading," marking the beginning of the problem.

Kita-komatsu alleged a right of control over Ukawa's shores that extended over the county border. The basis for this was as follows:

(i) Since the Keichō land survey, the parts of Ukawa's fields, mountains, and shores within the borders of Takashima and Shiga counties were Kita-komatsu's territory, and workers from Uchioroshi worked externally and paid land taxes to the lord of Komatsu.

(ii) The fishing villages of Ukawa had submitted sundry and business taxes on netting boats, and the land near the county border was under the control of Kita-komatsu.

(iii) For these reasons, since the Enpō land survey, the shore area had been a taxable area for Kita-komatsu, and the fishing villages, booms, loading, and so on were under Kita-komatsu's control.

Plan of Iguro Village border dispute (face). (Iguro-ku Collection. Photo: provided by Takashima City Board of Education)

In response, Uchioroshi and Ukawa argued that the 1416 decision extending "to the southern shore of the Ukawa River" had designated the border. Therefore, Uchioroshi commenced an action asserting Kita-komatsu's injustice for making a new road to Mt. Takanoo that crossed both sides of the Ukawa River and misappropriated it beyond the border of the fields.

This dispute originally began with the right to control the shores of the Ukawa River, but gradually developed into one involving mountains and then county borders. It seems that different attitudes about borders between Kita-komatsu, which expanded the village's right to control to the county border since the Keichō land survey, and Uchioroshi and Ukawa, which asserted village borders based on borders decided in the middle ages, developed into a dispute on county borders.

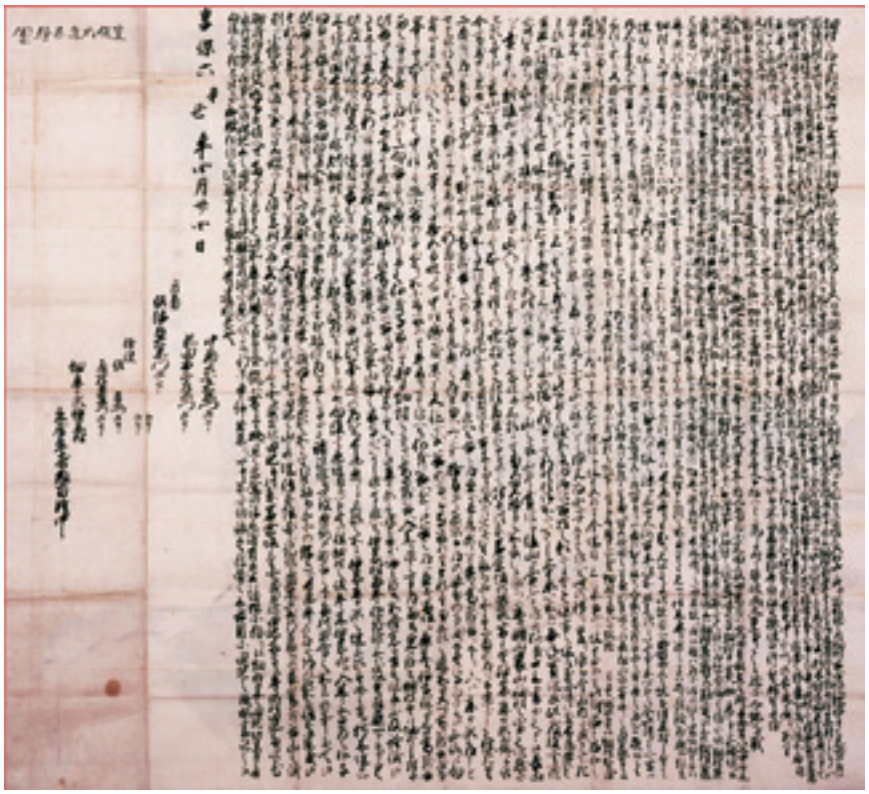
Ukawa (which had been subdivided from Uchioroshi) was an oddly formed village at the time; because the peasants of Ukawa lived in Uchioroshi, it was called Uchioroshi rather than Ukawa. The actual situation was that the peasants of Ukawa were only occupying about 10 households near Shirahige Shrine, and the remainder lived in Uchioroshi. These are considered the reasons for Kita-komatsu's strong assertion of control as a county estate.

In August 1711 (Shōtoku 1), the county magistrate handed down a judgment that the fishing villages and the Mt. Takanoo section, land worth a yield of around 60 *koku*, belonged to Kita-komatsu. Ukawa did not accept this, and litigation continued. In May the following year, a judgment decreed that the mountain land belonged to Uchioroshi and Ukawa and the fields to Kita-komatsu, Mt. Takanoo was a mountain being used as commonage, the fishing villages were under Uchioroshi and Ukawa's control, and the net fishing was for Kita-komatsu. However, this outcome was unacceptable to both villages, rendering the dispute even more complicated.

A resolution was reached through a judgment signed by 10 magistrates (*gojippan*) in Edo in December 1716 (Kyōhō 1). The "border dispute plan" prepared at this time shows "Ukawa's mountains" and "Kita-komatsu's mountains" in different colors on its face, and divides the "north face" and "south face" of "Kanegatake," the mountain forming the border, with a thick line. In addition, the reverse side describes the history of the dispute and judgment outcome under "Each item in the border dispute and decision between Ukawa Village, Shiga County, Uchioroshi Village, Takashima County, and Kita-komatsu Village, Shiga County, Ōmi Province." The salient points of the judgment are as follows:

(i) The county border is the line from the peak of Mt. Kanegatake to the southern shore of the Ukawa River.

(ii) The four locations of Mt. Okubi, Mt. Umagase,



Plan of Iguro Village border dispute (reverse). (Iguro-ku Collection. Photo: provided by Takashima City Board of Education)

Koyagatani, and Mt. Kitasaka in Kita-komatsu were originally mountains where hunting and forestry were prohibited. It was again decided that it was a serious crime for peasants to misappropriate their resources and so they remained prohibited mountains.

(iii) The village of Otowa's right of commonage on Ukawa-yama is not explicitly mentioned, so it is not allowed.

Moreover, the criminal offenses of each person in Ukawa and Kita-komatsu were to be investigated and their punishments added, which added to the already tense dispute. The result of this was that around 40 villagers from Kita-komatsu who journeyed to Edo to issue the complaint were ordered to serve prison sentences.

In this dispute, an argument over the mountains between the village of Kita-komatsu and villages of Ukawa and Uchioroshi continued for seven years, but ultimately, the ancient deed from the Ōei era (1394–1428) provided the basis for Ukawa and Uchioroshi's argument to be accepted. Thereafter, litigation and other actions were initiated because of repairs to stone walls along the lakeshore and similar causes during the An'ei (1854–60), Bunka (1804–18), Bunsei (1818–30), and Tenpō (1830–44) eras. None of these developed into major disputes and each was resolved by the decision from 1716 (Kyōhō 1).

Incidentally, Otowa's right of commonage on Ukawa-yama, referred to in part (iii) of the 1716 judgment, was asserted by Otowa based on the history of the Otowa Estate border dispute in 1433 (Eikyō 5) and dispute in the Keian era (1648–52). However, because the deeds for both these disputes did not mention Ukawa-yama by name, referring only to Uchioroshi, the 1716 decision did not use the two ancient deeds as a basis and did not allow Otowa's right of commonage on Ukawa-yama.

Nevertheless, for Otowa, which considered Ukawa-yama a mountain it had a right of commonage for and regarded Ukawa as part of Uchioroshi, this outcome was not convincing. Thereafter, it only had a right of commonage to Uchioroshi-yama.

The three villages of Iguro, Hata, and Shishigase located northwest of Uchioroshi and Ukawa were also involved in disputes concerning boundaries in 1721 (Kyōhō 6). A plan showing the boundaries was prepared when the judgment of this dispute was rendered, and the reverse side shows a lengthy copy of the history and result of the decision.

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【Stone culture at the foot of Mt. Hira: Local wisdom and technology harnessing nature's blessings】

Photo : Research Institute for Humanity and Nature (drone photography) at Hyakken (100-*ken*) Embankment

The landscape surrounding stonemasons

Research Institute of Humanity and Nature **SHIMAUCHI Risa**

Introduction

The bird's-eye view on the left page is a map of the foot of Mt. Hira, depicted with the line from Hira Station to Ōmi-Maiko Station in the center (Fig. 1). Indicated on the map are places that stonemasons were involved with, as learned from interview surveys.

The interviewee HIRAOKA Shichirō (aged 93 years) was born to a master stonemason in Kita-hira, and his home holds various tools stonemasons have used since the Meiji era. In Kita-hira, firewood, brushwood, stone, and other goods were sold through trade using major routes and shores until the 1960s. Regarding the stone used by the stonemasons, Hiraoka said, “After heavy rain, stones would fall unendingly when you went to the mountain. The soil around here is sandy and granitic, so it collapses easily. This is why the stone is easy to obtain and process.”

The eastern parts of the Hira Mountains, located in Ōtsu, Shiga, are characterized by continuous steep slopes from their summits at about 1,000 meters above sea level, with streams and rivers of various sizes flowing into Lake Biwa. When heavy rain falls, there is a risk of mudslides and flooding, and the people living at the foot of the mountains have implemented various innovative methods to handle natural disasters. The granite, chert, and other stone from the mountains and rivers around

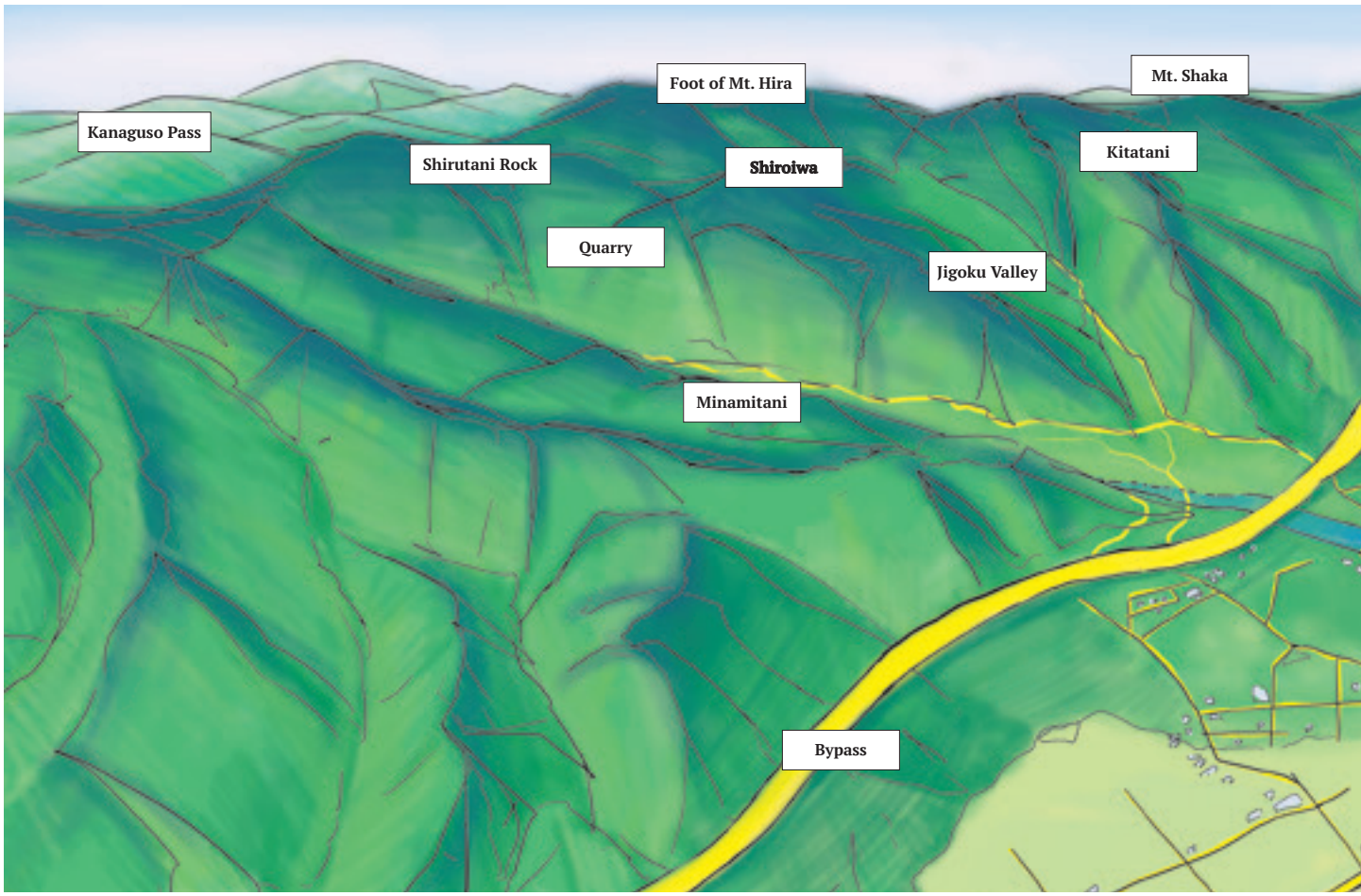

Figure 1. Bird’s-eye view of Hira Mountain stonemasonry

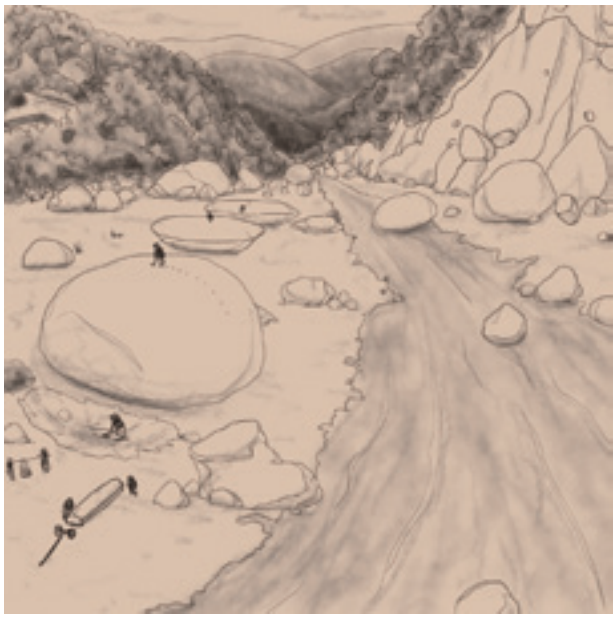

Figure 2. The quarry

the villages are used for embankments and aqueducts to prevent disasters, and for stonework in stone walls and terraced fields. Here, I discuss those who have faced the threats and blessings of nature within this lifestyle about the work of stonemasons.

What are quarries?

The Hira River flows between the Kitatani and Minamitani Mountains on the border between Hira and Minami-komatsu. From its upper reaches, it carves away at the mountains to expose large rocks. These upper reaches are the workplace where granite was cut out, known as a quarry. Nearby are mountain huts and places for storing tools.

The stonemasons climbed the mountain and started work here at sunrise; each had a different role, such as bringing the stones down, splitting, carting, and processing them. Explosives were used to drop granite from several hundred meters high down to the river, where the stonemasons waitied to split it into transportable sizes (Fig. 2).

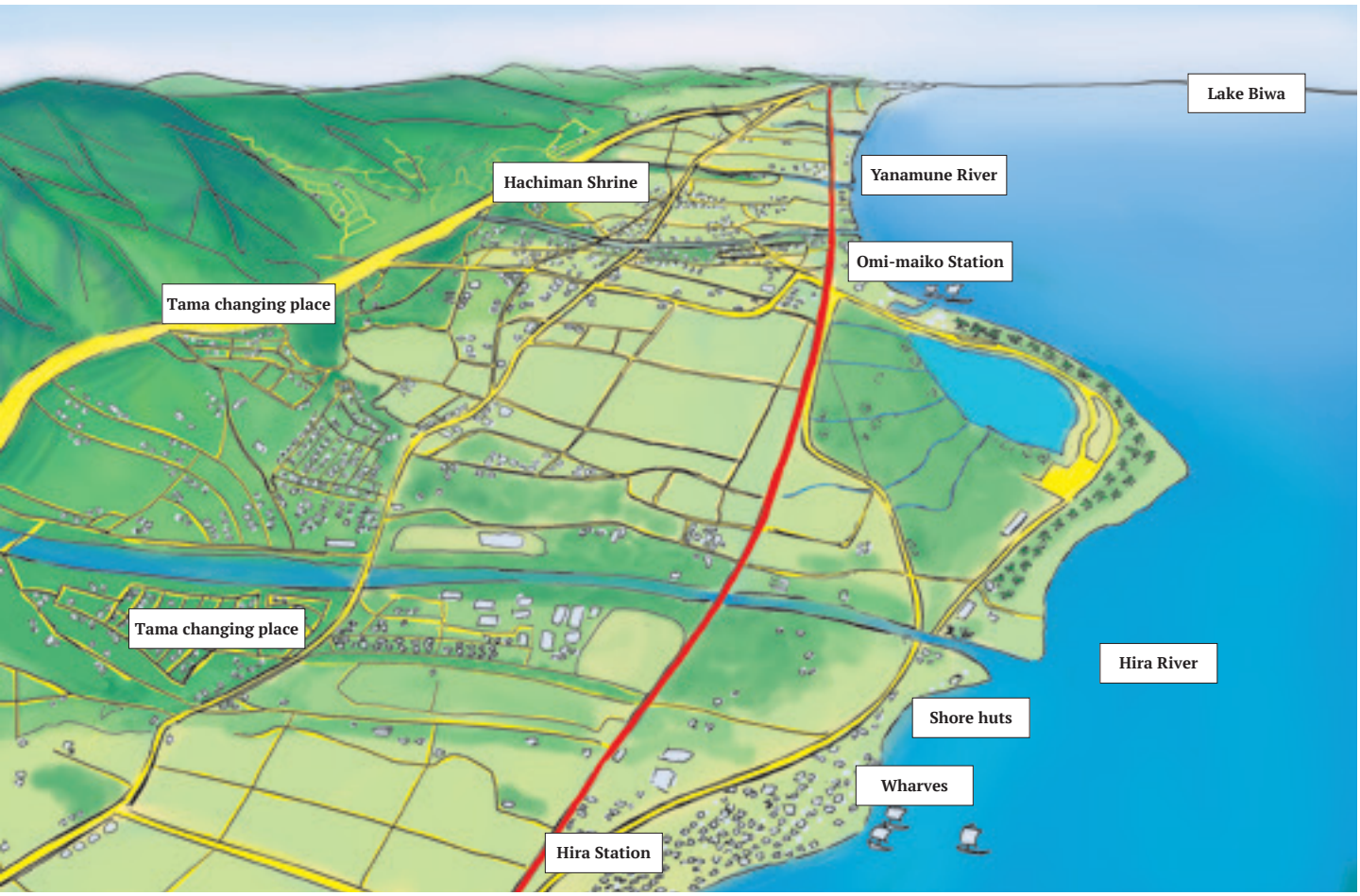

Figure 3. Carting a stone down from the mountain

Figure 4. Loading stones onto *marukobune*

Wagons for transporting stones

When carting stones, the stonemasons used wooden wagons called "*kuruma*." *Kuruma* had wheels (*tama*) made from Japanese red pine or a similar wood and were used to cart stones sometimes as long as 5 meters. Stonemasons usually carted the stones alone, but sometimes worked in teams of four.

The illustration shows the stonemasons coming down a slope. To shift the center of gravity toward the back, the stonemason adjustments by loading small stones, or sometimes had his daughter sit on the stone (Fig. 3).

Near the village was a flat place for changing the *tama* to larger *tama*, after which the stones would be carted to the shore hut.

Loading onto *marukobune*

The stone cut from the mountain was loaded onto *marukobune* (a type of boat) and taken to be sold in other areas.

To transport the stone onto the boats, workers placed a board on platforms called "*uma*," then used logs called "*koro*" to load the stone in teams of four. The floor of the boat was loaded with small stones to stabilize it, and boards were placed over them to allow people to walk. The small stones were also taken to be sold in other areas (Fig. 4). Kita-hira produced many long stones, which were processed for use as curbstones and flagstone, and in torii. Minami-komatsu produced many round stones and had many stonemasons specialized in detailed work such as stone lanterns, basins, and stone mortars.

The stone was transported to areas on the opposite side of Lake Biwa (Nagahama, Hikone, Ōmi-Hachiman, Moriyama, Ōtsu, etc.) and Kyoto to be sold.

Figure 5. Shore huts

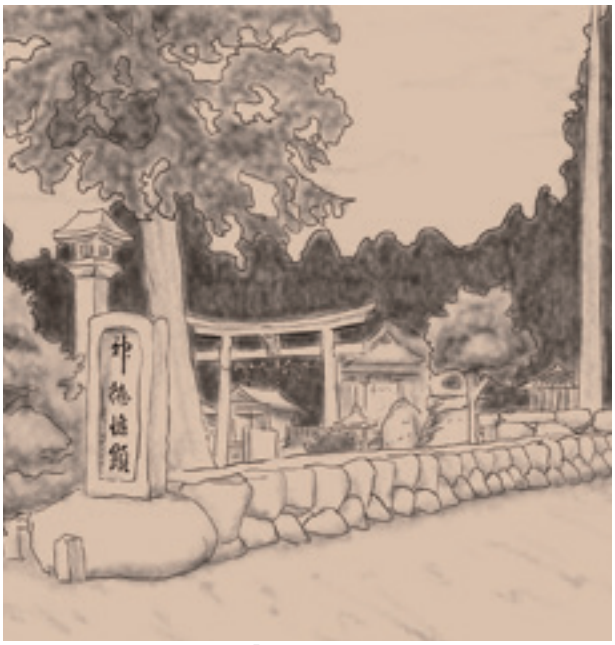

Figure 6. Hachiman Shrine near Ōmi-maiko Station

Shore huts

In addition to loading the stones onto *marukobune*, Kita-hira had huts where they could be processed on-site. When processing stone, they used a range of tools including chisels, wedges, sledgehammers, and bellows.

In Kita-hira, they built thatched shore huts near the shore where stonemasons who specialized in processing worked. In Minami-komatsu, the villagers-built stonecutter's huts in the village, where stonemasons carried out their respective jobs.

There were many shore huts, the largest of which had space for three people to work. In addition, some huts with bellows were built next to the shore huts. An illustration has been drawn with this in mind (Fig. 5). Bellow huts were about as big as two *tatami* mats (approximately 1.8 meters by 1.8 meters) and were simple, containing only the bellows, forge, and a cistern for water. They were just big enough for one adult to crouch down and enter. The stonemasons used these huts to make and fix the tools they used to process the stones into various shapes.

Remaining processed items

The stone was applied for various uses, including as breakwaters on the lakeshore; stone embankments along rivers; stone walls and other structures for preventing flooding, mudslides, and damage from animals; aqueducts; house foundations; stonework for terraced fields; and decorative stones in gardens. This stonework and various processed items can still be seen in living spaces around the Hira Mountains, making up a stone culture unique to the area. Hachiman Shrine in Minami-komatsu still has torii, stone lanterns, and other works made by the stonemasons. The guardian dogs (*komainu*) created by local stonecutter Jinpachi are reportedly among the largest in Japan (Fig. 6).

Survey of tools used by “stonecutters” at the foot of Mt. Hira

Lake Biwa Museum

WATANABE Keiichi
MIMASU Yurika

Photo 1. Main building and garden of Hiraoka residence. Local stone has been used generously (January 19, 2019)

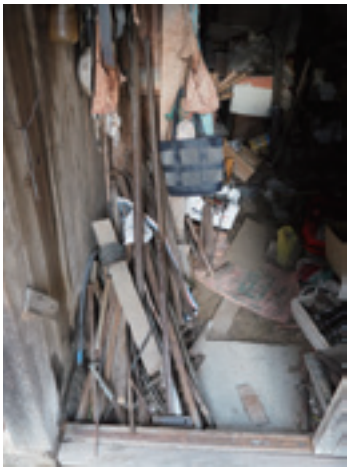

Photo 2. Inside the shed before organizing the tools (February 24, 2016)

Encountering “stonecutter's” tools

We first visited the home of HIRAOKA Shichirō in Kita-hira, Ōtsu, on February 24, 2016, which was a frigid day typical of winter in the Kosei region. Shichirō was born on October 6, 1926, and is an elder who has passed his years at the same pace as the Shōwa era. We heard the Hiraoka family once engaged in the occupation of stone cutting and had stored many old tools the craftsmen used in the production of stone (Photo 1).

Mr. Hiraoka brought out tools, saying, “This is a wedge, and this is a chisel, and this is a sledgehammer.” These were all made of iron and quite weighty and were covered in rust and dust. Furthermore, the shed of the Hiraoka residence was like a time capsule filled with a complete set of stonecutter's tools that had lain dormant since the 1940s or 1950s. There were roughly 100 tools (Photo 2).

This was the first time we had seen numerous tools that belonged to craftsmen involved in stone production. This experience was accompanied by the commanding appearance of the white Mt. Hira as it towered over us, filling our field of view like a folding screen. It was enough to arouse our interest in the worksite of the people who strode onto this steep mountain to carve out huge stones.

While it may have been different several decades ago, today, local museums do not commonly accept all the tools in a craftsman's home. This is because to effectively use limited (or rather, already overfilled) storage space, the most we can do is remove the typical tools and store them. The Lake Biwa Museum had several reasons for accepting all these tools.

The first is that the materials have survived in an organized form that follows the process of harvesting, transporting, and processing stone, making them effective raw materials for learning about labor, resource management, and use in the mountains at the time. Second, we thought we would be able to interview Mr. Hiraoka to elicit more detail on each tool based on his knowledge of the period when stonecutters worked in the mountains against the backdrop of the foothills of the Hira Mountains.

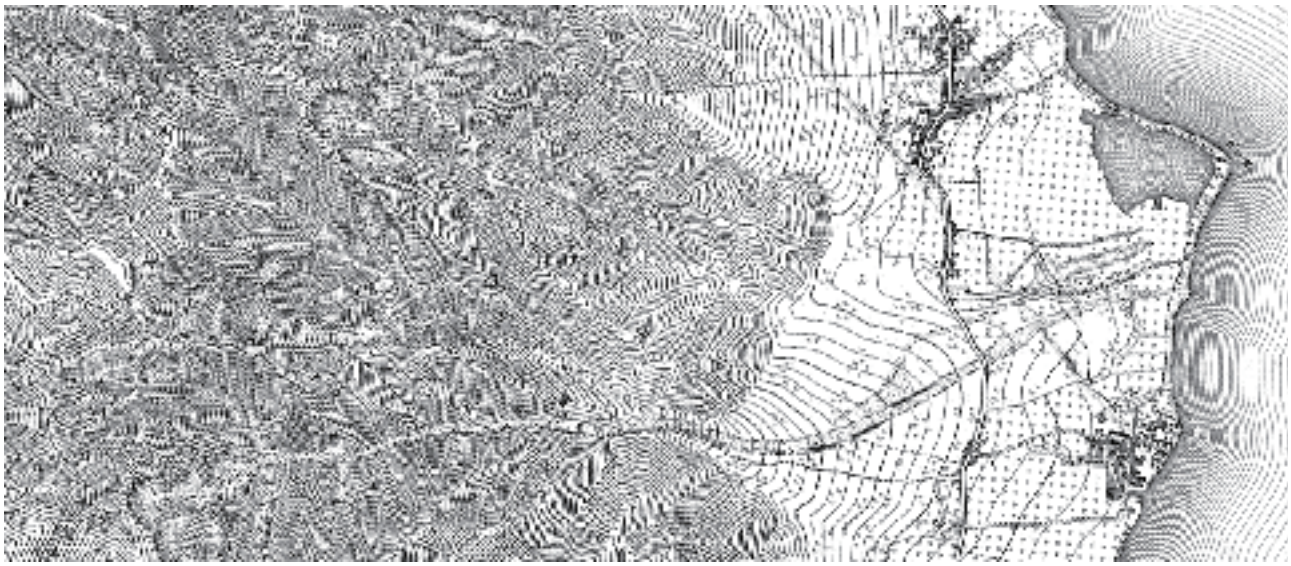

Figure 1. Topography of Kita-hira, Ōtsu. Created from old 1:20,000 topographical map "Komatsu Village" from the Geographical Survey Institute (April 1895, issued by Land Survey Department, Great Empire of Japan)

Fear the river and battle the sand: Nature in Kita-hira

The village of Kita-hira is positioned at the edge of the alluvial fan formed by the Hira River, which springs from the Hira mountain range (Fig. 1). The watercourse of the Hira River turns to the east as if to avoid the village. (Local legend holds that this is the result of artificial changes to the river path.) Furthermore, several complicated levees have been built near the lakeshore. The broad riverbed shows the unstable dynamism of the Hira River, which does not stay within a fixed watercourse. As noted, "This river brought sand right out of the mountains" (Hiraoka), meaning the river and riverbed accumulated sand and created the topography of a raised-bed river like the other rivers in this area.

The comment, "That is not good, water is coming out of that high place in front of us" (id.) recollects the terror of the sound of river water echoing from overhead when the river rose. Mr. Hiraoka well remembers the damage from the flooding and mudslide that assailed the foot of Mt. Hira in 1937 (Shōwa 12). The Hira River broke its levees and many fields were damaged by sand. He says that even after the Second World War ended, the mouth of the Hira River was regularly dredged by everyone in the village as a joint effort, dragging the sand in the river out into the lake using hand dredges. This provides a telling glimpse of the hard work of the villagers of Kita-hira, who feared the water of the river and were forced into a daily battle with the sand.

Reflecting the rolling topography of Kita-hira, the stonemasons' workspace is broadly divided into the shore of the lake (*hama*) and the mountain (*yama*). In contrast with the mountain, where they cut out and transported stones, these were processed into smaller pieces and moved onto ships as a product at the shore. In the late 1930s and early 1940s, the masters each had their own worksite, near which they would have a "mountain hut." Conversely, along the shore, several huts for processing, commonly known as "shore huts," were lined up, of which the Hiraoka family had several. One large set of "bellows," which were essential for the day-to-day maintenance of the stonemasons' tools, was always installed in the mountain hut, with another smaller bollows installed in the shore hut.

Photo 3. Work to number the tools. Temporary tags with numbers written on them are attached and each type is moved to a plastic box (November 21, 2016)

The life history of a stonecutter

Mr. Hiraoka was born the eldest son in a family with three boys and two girls. The Hiraoka family was an ancient house with a lineage of several hundred years, and featured one of thne three “master stonecutters” in Kita-hira. The name Shichirō takes the “shichi” from the Hiraoka house name, Shichibee. Mr. Hiraoka started helping with stonecutter work directly after graduating from combined ordinary and higher elementary school (1941). However, he said that even while at school, children had to help in ways that they could, such as taking the wheels (*tama*) of the wagons for carting stones (*kuruma*) back up the mountain; there was no time to play after coming home from school.

Mr. HIRAOKA explaining while drawing on the ground (October 18, 2016).

Explaining how to split stone using a real curbstone (November 21, 2016).

Recording a video of commentary on complicated usage methods (January 19, 2019).

At the time, Japan was in the middle of the Second Sino-Japanese War, and working-age males were gradually being sent into battle as soldiers. The Hiraoka family had 15–20 craftsmen, but during the war, this number almost halved. Kita-hira stone masonry is characterized by its production of “long stone” (large stones used in stone steps and torii for temples and shrines), which requires large-scale labor organization. It seems this was directly affected by the prolonged war. Mr. Hiraoka applied to join the navy in 1944 and spent the period from January to October 1945, after the war ended, at the Ōgusu Naval Engineer School.

Directly after the war ended, the mountain huts remained, and work to cut out stones restarted. The Hiraoka family retained craftsmen and continued operations until about 1949/50, but thereafter, the craftsmen's activities shifted to other public projects such as erosion control. Mr. Hiraoka only occasionally engaged in stone processing, and his work to create the arched bridge in the garden at his home with his father was his final job. As such, the Hiraoka family's main tools have remained as they were in the late 1950s, and

Photo 5. Cleaning after transporting materials into the museum. With the cooperation of DATE Hitomi’s laboratory, Kyoto University of Art and Design (March 13, 2019)

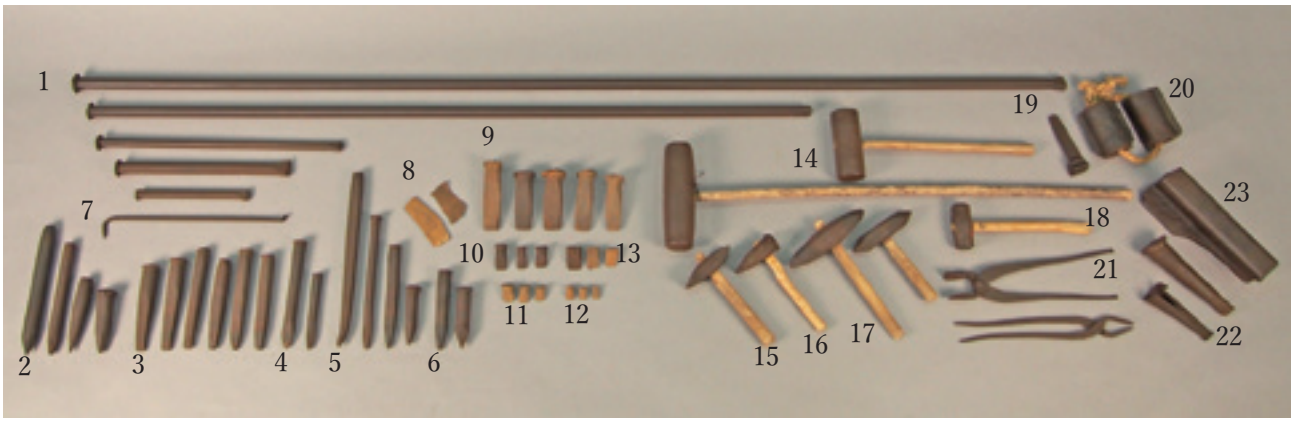

Figure 2. The main iron stonemasonry tools
1: *Teppōnomi* (blunt chisel) (5 items) 2: *Marunomi* (round chisel) (4 items) 3: *Nomi* (chisel) (6 items) 4: *Sokozuki* (2 items) 5: *Tekkanomi* (4 items) 6. *Hatsurinomi* (shaving chisel) (2 items) 7: *Kasunuki* (cleaning stick) (1 item) 8: Name unknown (used by inserting into the gap between the large wedge and the hole) (2 items) 9: Large wedge (10 items) 10: Small wedge (3 items) 11: Mountain wedge (3 items) 12: Shore wedge (3 items) 13: *Tobiya* (small wedge) (3 items) 14: *Gennō* (sledgehammer) (2 items) 15: *Ryōha* (double-bladed hammer) (1 item) 16; *Kataha* (single-bladed hammer) (1 item) 17: *Bundera* (2 items) 18: *Tsuchi* (hammer) (1 item) 19: *Tamadome* (pin for tama) (1 item) 20: *Kamo* (1 item) 21: Name unknown (tool for holding chisels when firing them) (2 items) 22: *Yakizutsu* (tube for inserting quenched items) (2 items) 23: *Toko* (1 item)

Mr. Hiraoka's memories are thought to have been formed in the late 1930s and early 1940s when he started going into the mountains.

"Counting" the tools

Our investigation in the first year focused on allocating serial numbers to the tools. It a lot to ask of Shichirō, but we had him take all the items out of the shed and we grouped them in plastic boxes in a rough classification. As the Hiraoka residence is such a large site, we borrowed a parking space for a small truck in which we could work. For a while, new tools appeared each time we visited, and it took until 2016 to number them all.

To number the items on-site, we attached labels with numbers written on them in a marker, but if the items were too small, we temporarily wrote the numbers on protective tape and attached it to them (Photo 3). At the same time, we worked on recording basic information and photography; however at this stage, our priority was to gain an appreciation of the overall image of these tools as quickly as possible and give them all serial numbers.

There was a reason for rushing to finish the numbering. When Mr. Hiraoka talked about the closely arranged tools, he took a tool in hand and mixed in gestures, drew a diagram with a stick on the ground, or made a display of splitting a real rock in his garden. It was dizzying (Photo 4). Our conversations while looking at the actual objects contained many demonstrative words like "this" and "that," and the tools sometimes differed only slightly. To ensure accurate records of Shichirō's rich talks, we had no alternative but to rely on numbers.

In 2017, the tools had mostly been produced and we had finally numbered all items. As of April 2017, there were 1,112 tools. From March 2017, we began transporting them to the museum, and as we write the manuscript for this article in March 2019, about 70% have been moved. We are not rushing the process, but checking how each tool is used in detail through interviews and carrying out the transportation work slowly, in small lots.

The tools brought into the museum are being cleaned and treated to prevent rust as we go along because most stonemasonry tools are made from iron and rust is a problem. We scrub the surface dust and rust off with a hard brush, but our aim is not to remove it all, just to a level where the rust does not come off when you touch it. After cleaning, we paint an extremely thin layer of camellia oil on the surface to prevent further rust. This process takes time and effort. The museum seeks guidance from specialists in the preservation of cultural property and uses this opportunity as teaching material for practical lessons and lectures (Photo 5).

Photo 6. Comparison of *mameya* heads. Left: Greatly damaged *mameya*. Center: Partly damaged *mameya*. Right: Normally worn *mameya*.

What stonecutters' tools tell us

Most stonecutters' tools are heavy and made from iron. As shown in the photo, their shapes and uses vary widely, and we cannot provide a complete view of them here. To mention some, the chisel (a tool for boring holes in stone) and wedge (a tool for inserting into the hole and splitting the stone) could be considered the most basic set among a stonecutter's tools. There are many wedges; they account for more than half the total. Wedges of different sizes are used according to the size of the stone to be split. The small wedges, around 2–3 centimeters big, are called "*mameya*" and kept with many other items with the same specifications. This shows how frequently they were used by many craftsmen in their stonemasonry work.

One element we focus on when asking about the tools is the degree of breakage or wear. This is because the more often a tool was damaged or worn out, the longer it was used on the worksite, and thus the more frequently it was newly procured and disposed of (or repurposed). Stonecutters' tools are like living creatures and gradually replaced through new procurement or replacement. We demonstrate part of our questioning about "*mameya*" as an example (Photo 6).

This photo shows the heads of three *mameya*. To Mr. Hiraoka, there are obvious differences, greater than those in their observable shapes. First, the left item is cracked; this reflects someone who "is bad at pounding." (Pounding here means hitting a wedge with a sledgehammer or mallet.) The tool has been hit at the edge rather than the center, and has broken. In contrast, the one on the right "is a wedge that has worn down beautifully." In other words, it has been hit well and has been worked correctly. The center item seemed the same as the one on the right to us, but Mr. Hiraoka evaluated it harshly, saying, "Going like this is the worst." Although only a small amount, part of the head has failed and it will not function properly as a wedge.

Mr. Hiraoka also noted two types of *mameya*: shore *mameya* and mountain *mameya*. We mentioned that stonemasons' workplaces were divided between the mountains and shore, but in the case of wedges, the difference was their size. The shore wedges are one size smaller than the mountain wedges. This corresponds to the difference between wedges used on the mountain to split stone to specification for transport and those used on the shore to split stone into smaller pieces as per product specifications. Just as the goods have specifications, so too do the tools. The shore *mameya* were stored in the shore huts and mountain *mameya* in the mountain huts.

By carefully examining each tool, we can reconstruct the two "places" for labor where these tools were used.

Conclusion: What the river and sand connect to

We cannot yet fully reconstruct the kind of activities stonecutters engaged from the more than 1,000 stonecutter tools we examined. Nevertheless, in the case of Kita-hira, most of the tools were likely used at the mountain worksite. The fact that compared to other regions, there are not as many *kataha* (single-bladed hammers), *bishan* (bush hammers), and other hammers, which were used for processing and dressing stone on the shore, is one sign of this. The activities of the stonecutters in this region, who were skilled at producing long stone, focused their attention on the mountains. Certainly, the knowledge of people who overcame long distances and great elevation differences in going from the steep mountains to the lakeshore was fully applied.

According to Mr. Hiraoka, the worksite owned by each master was set up at the bottom of the valley, and the wide river banks were used to split the stones that rolled down the slopes. Wooden wagons (*kuruma*) were

used to bring the heavy stones down from the mountains, and the transport road along the broad riverbed was a comparatively even sandy road; therefore the wheels (*tama*) of the wagons sunk into the sand just enough to help with the work of carting the heavy stones.

The production of long stone in Kita-hira is labor inseparably bound to the presence of the “river” and “sand” that connect the steep mountains and shores of the lake. We are beginning to accept this view from the testimony of an elder who has lived through the reigns of four emperors. Our task for the future is to confirm this view by closely examining the remaining tools (similar to a census), conducting thorough interviews, and using the abundant early-modern, modern, and current written materials availavle in Kita-hira.

The stone culture and village of Minami-komatsu

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ŌSAWA Sōtarō
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Introduction

The history of stone culture in Shiga Prefecture is extremely long. Various stone tools were used as early as the Jōmon period, and examples of their discovery and excavation can be seen throughout the prefecture. Many research papers and books have been written about the religious meanings and roles of stonework in the prefecture. However, there are no detailed accounts of how the people of the time were involved in the stone industry or on the lives of the stonemasons. This investigation summarizes the work and life of stonemasons in modern times (since the Meiji era [1868–1912]) based on literature surveys and interviews with residents. Reports of the life of the stonemasons in the Meiji era is the oldest information passed down to elderly residents of the village. Residents younger than 80 years old have only heard fragments about the lives of modern stonemasons and therefor do not know much about them. The decline of the stone industry after 1945 with the Second World War is thought to be one contributing factor in this regard.

From June 2018, we investigated stone culture in the Kosei region.

The investigation covers the eight villages of Moriyama, Kido, Arakawa, Daimotsu, Minami-hira, Kita-hira, Minami-komatsu, and Kita-komatsu. Each village features many stone sructures and processed stone items related to religion or daily life. For example, Moriyama produces stone characterized by the striped pattern from chert on the surface (known as “Moriyama stone”) (Photo 1). This stone is frequently used in stone walls and garden stones. The unprocessed rough stone has its beauty; it is known that once the Lake Biwa Canal opened in 1890 (Meiji 23), OGAWA Jihee VII transported many of the stones by boat to use in gardens in Kyoto. From an interview with Mr. Ishizuka, a stonemason in the village, we learned that many stonemasons in Moriyama brought the Moriyama stone down from the mountains to use for stone walls and garden stones without processing, rather than making processed stone goods. On the other hand, the other villages produced large volumes of granite, which is suitable for processing. This history goes back a long time, even before the Meiji era, stone was produced for use in the tori-gate and column foundations in shrines. Minami-komatsu had NAKANO Jinpachi and NISHIMURA Kahee, skilled masons who excelled at processing stone known for their lanterns and guardian dogs (Photo 2), which remain in the village. NISHIMURA Kahee's lanterns are called Kahee lanterns (Photo 3) and are highly prized for their detailed craftsmanship. However, there are almost no accounts of the work and lives in general of stonemasons in the period when they lived. Therefore, we discuss the work or daily lives of stonemasons in Minami-komatsu based on the interviews we

Photo 1. Moriyama stone

Photo 2. NAKANO Jinpachi’s guardian dog

Photo 3. Kahee lantern

conducted and historical materials we collected.

The stonemasons of Minami-komatsu and their lives

The history book of Minami-komatsu village contains this account: "I was born in 1922 (Taishō 11) and only know from the start of the Shōwa era (1926–89), but when you go into the mountains, everywhere you turn are huge holes, which are the traces of quarrying. At the time, Minami-komatsu had as many as 120 households. About two-thirds of those engaged in work related to stone. During the slack season on the farms, villagers were quarrying." According to the *Shiga-ken bussanshi* (Shiga prefectural produce journal) compiled in 1880 (Meiji 13), Minami-komatsu had 175 households, all described as farmers. Thus, we can infer that they worked in the stone industry while farming. However, the interviews revealed that in the early Shōwa era, the main occupation of many of villagers was in the stone industry.

Based on the interviews, Fig. 1 shows a stonemason's hut, where stonemasons processed stone, and the path for carting it. We found people currently in Minami-komatsu with experience in stonemasonry and asked about their work and lives at the time. Stonemasons would quarry stone in the mountains, process it in the village, and transport the finished goods by boat from Lake Biwa to other places. The mountains suitable for quarrying each had owners, and the stonemasons quarried the stone there. Based on our interviews, we indicate some quarry sites in the figure (shown in brown in Fig. 1). The stonemasons first thrust a metal pole known as a *kanadeko* into the mountain slope to search for large stones. *Kanadeko* came in various sizes, with the largest measuring 150 centimeters. The stonemasons could determine when the *kanadeko* hit a large stone by the differences in sound. When finding a large stone, they dug it out by scraping away with a tool known as a *tonga*. A *tonga* is a metal tool with a pointed and flat side affixed to a handle made from a wooden pole. The worker holds the handle and uses the pointed side to dig into the mountain, and uses the flat size to scrape away the sand around the stone. The "huge holes" mentioned in the account above are formed when digging out stones in this way. Near every hole rails were laid for trolleys, onto which the sand scraped out when digging up the stones was loaded and carted away. Further into the mountains are large stones big enough to make a tori-gate. The history book of Minami-komatsu village, which details the stone industry from the Taishō to early Shōwa era, mentions that stones were cut out with dynamite in some places. We were informed that large stones were not longer quarried using dynamite in the early Shōwa era.

Photo 4. Stone with marks from inserting *seriya*

The stones extracted in the quarries (shown in brown in Fig. 1) were about 2–3 meters on their longest side, not large enough for big stone constructions like tori-gate. However, they were sufficiently sized for making lanterns and basins, and some weighed over 10 or 15 tons. Every stone is extremely heavy, and the work of a stonemason involved hard labor, such that children could not help until they turned 15 years old. The stonemasons chose what they would make with the extracted stone and split off some of the volume to process so it would be easier to cart. They used chisels to cut wedge-holes about 3–7 centimeters deep in a row along the grain of the stone, inserted wedges known as *seriya* into the wedge-holes in order, hit the *seriya* to apply force evenly, and split the stone (Photo 4). The ability to find the grain of the stone and technique to hit the *seriya* evenly could not be acquired overnight; two or three years of training after starting to help their parents was necessary. Quarry work entailed many processes, both technique and experience were needed to skillfully use the tools for each one.

Next, we examine the work of carting the stones, for which the stonemasons used quarry wagons. They did not have automobiles or rubber tires at the time, so they cut axle-holes in circles from pine trees to make wheels. They changed the length of the axle according to the weight of the stone to be loaded and lined thick timber on the axle to make a bed. Shafts for pulling the quarry wagon were attached perpendicularly to the axle, and two poles that served as brakes were attached in the opposite direction. To slow down the quarry wagon, someone would get on the two poles and push down with their weight. Teams of three to four people would cart stones down the quarry path. When going up to the quarry, the stonemasons

broke the quarry wagon down and carried parts up.

Work in the stonemason's hut

In the stonemason's huts built in the village (the black dots in Fig. 1), the stonemasons processed the stone into stonework, making lanterns, Buddhist statues, basins, stone weights, and the like. Different stonemasons were skilled in different areas, and their work varied.

Stonemasons responsible for each part cooperated to make a single lantern. The decoration on the base, middle platform, and firebox is extremely fine, and only a limited number of skilled stonemasons were capable of doing that work.

The metal tools needed for the stone industry (*seriya*, chisels, etc.) break or blunt when used all day. Stonemasons repaired these tools in the stonemason's huts with bellows installed (bellows huts). The work of a stonemason began each morning with about an hour spent reforming the necessary tools. Another cause for the decline of the stone industry, in addition to the death of young stonemasons in battle during the Second World War, was that these metal tools were all confiscated.

Stonemason's huts and houses

In the village of Minami-komatsu, no stonemason's huts have survived, so we cannot see in person what they looked like. However, a detail record of residences drawn in 1887 (Meiji 20) includes several stonemason's hut, enabling us to learn what they looked like in that period. The historical materials describe stonemasons' huts as “craftsmen's huts” that range in size from small 3-*tsubo* (9.92 square meters) huts (2 *ken* by 1½ *ken*, or 3.64 meters by 2.73 meters) to larger structures of 22-*tsubo* (72.82 square meters). In some cases, the site includes only the craftsman's hut (Photo 5), but in others, the hut is placed in addition to a main building (Photo 6) and ancillary structures. There were 18 of the former and 17 of the latter. Most craftsmen's huts had thatched roofs. The main buildings and ancillary structures built on the site and their roofing materials afford us a glimpse into the owners' lifestyles. The history book of Minami-komatsu village reads, “There were known as master stonemasons and their households consisted of the craftsmen who processed stone and their apprentices; there were about a dozen master's households in the village, which were very busy and full of young people.” The fact that there were about 80 households of stonemasons at the time suggests that each master had

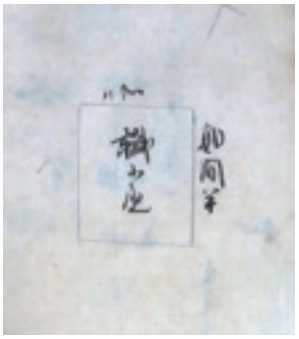

Photo 5. Drawing of stonemason’s hut (Minami-komatsu Neighborhood Association Collection)

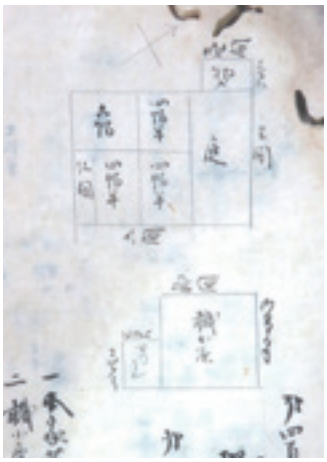

Photo 6. Drawing of main house buildings (Minami-komatsu Neighborhood Association Collection)

several stonemason workers or apprentices. Stonemasons with comparatively large main houses were called masters and held the group of stonemasons together.

The parts in red in Fig. 1 show locations of the stonemason's huts in 1887 (Meiji 20). Our interviews revealed that the Meiji-era lot numbers shown in the diagrams match the current lot numbers, enhancing our understanding of the location of the stonemason's huts. The locations of some of the huts had changed in the early Shōwa era (shown in black) due to rebuilding and changing employee numbers. However, in both the Meiji and early Shōwa eras, the stonemason's huts were located along the quarry paths. As such, the connected process for producing goods from stone was established in the Meiji era.

Shipping processed stone goods

The products processed in the stonemason's huts were either sold in the village or carted to the wharves on Lake Biwa and shipped to the Kotō region (east side of Lake Biwa) or Kyoto.

Summary

Here, we summarized the work and lives of stonemasons following the quarry path. To understand the state of the stone industry in the Meiji era, we conducted interviews and gained a spatial appreciation from information in historical materials. We came to learn that stonemasons did not only process stone; the actual work of a stonemason was wide-ranging, including extracting, transporting, processing, and shipping stone, as well as blacksmith work. There is no way to know exactly how difficult it was at the time, but stonemasonry was assuredly hard labor and required many people.

The work to process stone was founded on the division of labor, meaning not all stonemasons made the same processed goods; stonemasons included masters, craftsmen, and apprentices. Very few stonemasons were capable of the detailed decorations on lanterns. Mr. Hirade of Hirade Sekizaiten (company), which is still in operation today in Minami-komatsu, provided the photo from the construction of the tori-gate at the Taishō-era Mio Shrine (Photo 7). It shows the cooperation between Hirade Sekizaiten and Masuo Sekizaiten. From this, we see that fellow masters would cooperate when creating a large stone construction. In future investigations, we are keen to clarify the work and lives of stonemasons, their cooperative relationships, and organizations conducting interview surveys and deciphering ancient manuscripts.

Photo 7. The state of work on construction of the Mio Shrine tori-gate

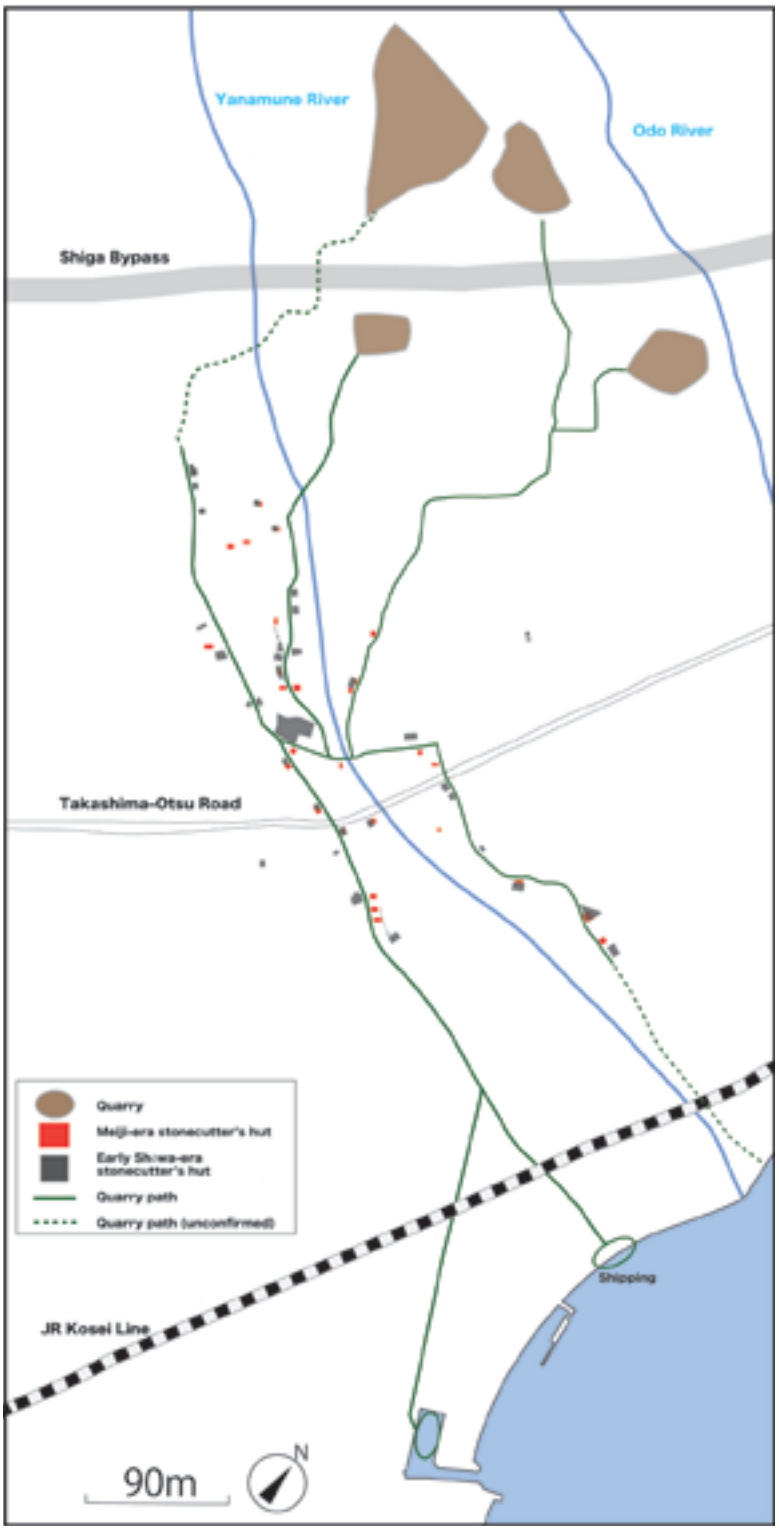

Figure 1. Layout plan of quarry paths and stonemason's huts in Minami-komatsu

【History of disaster response at the foot of Mt. Hira】

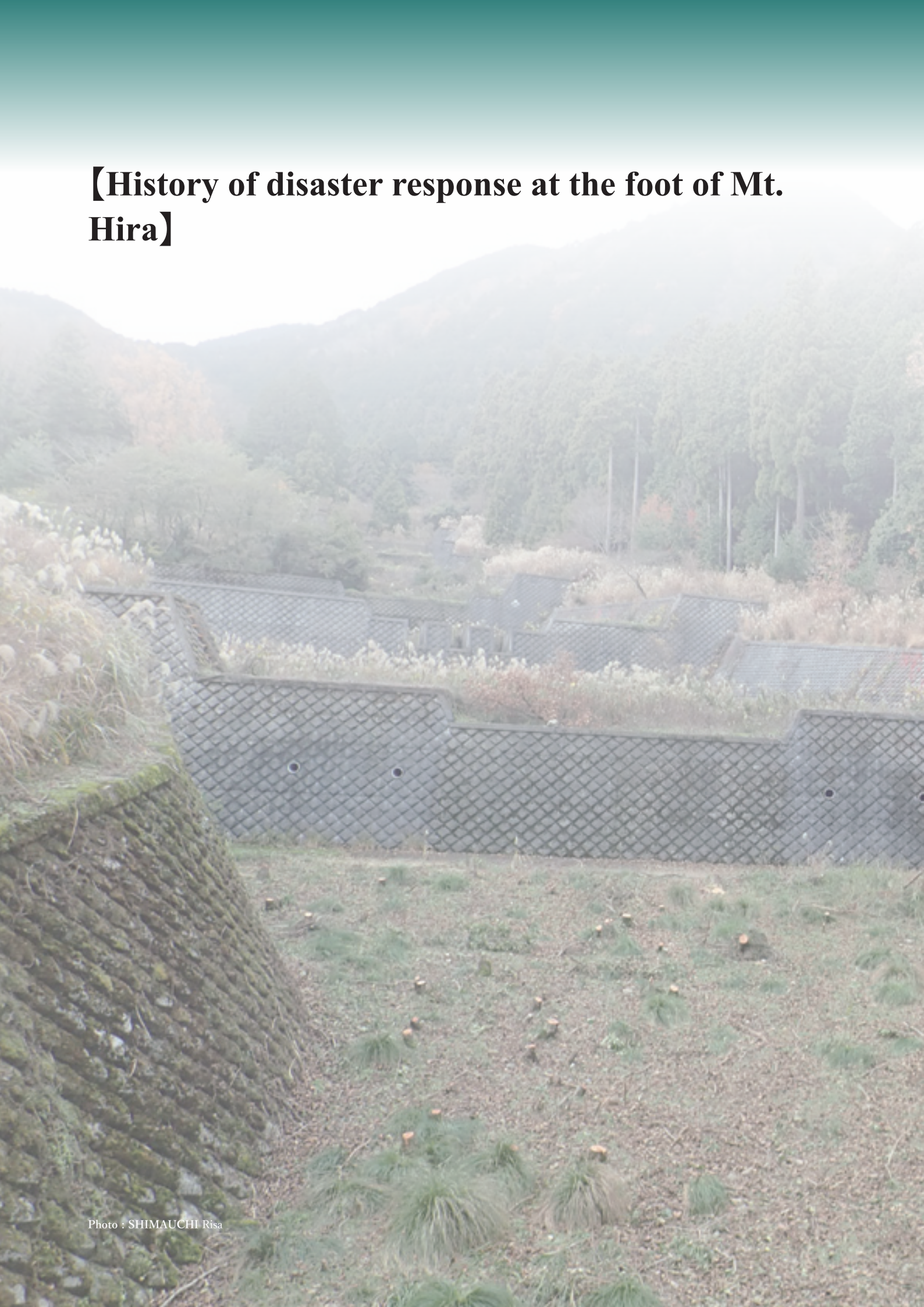

Photo : SHIMAUCHI Risa

To those seeking to investigate disasters in ancient times

University of Shiga Prefecture **AZUMA Sachiyo**

After the Great Hanshin–Awaji Earthquake in 1995, efforts to learn about disasters in ancient times and to use that knowledge in disaster reduction and prevention today commenced and accelerated. With the occurrence of the "Great East Japan Earthquake" and the tsunami in 2011, the periodicity of earthquakes has attracted greater attention.

What ancient manuscripts should we examine when investigating disasters in ancient times? Many disaster-related historical materials were created in the Edo period, when writing spread throughout the populace. These include lists of notable disasters prepared in the style of a chronology, such as village records and writings about disasters in personal diaries. Some diarists expressed their shock at encountering the disaster and include lessons to be learned. Depending on the contents, it may be possible to learn from the lessons left by our forebears and connect them to disaster reduction today.

Regarding major disasters, so many relevant ancient manuscripts remain that they could be called a dossier. One example is major earthquakes. The people of the Edo period who encountered a major earthquake often described their experience as "unprecedented," which is likely their honest impression. However, disasters are not always enormous events that "occur just when you forget about them."

Regardless of the frequency of occurrence and scale, many disaster-related ancient manuscripts that remain in villages are pleadings requesting relief measures from the feudal lord. Reading them allows us to understand the state of damage. The possibility that the author is reporting damage greater than the actual situation cannot be ruled out, but we can approximate conditions. Among these, we sometimes find ancient manuscripts that describe the disaster occurrence itself or its recovery.

Photo 1. Hachiyado River and environs in the early Shōwa era (Moriyama District Collection, provided by Mr./Ms. Matsui)

As noted, the Moriyama district shared documents are classified by their contents into 27 groups: water utilization, shogunate administration, post stations, loans, sundry, maps, litigation, taxation, land, laws, public safety, manners and customs, commerce, relief, agriculture, construction, status, sales and purchases, finance, number of houses and inhabitants, households, religion, industry, disasters, village administration, assistance to post stations, and fragments. Many investigators of groups of ancient manuscripts commonly classify them considering the future convenience of use, and this is not limited to the Moriyama district shared documents.

In the case of Moriyama district, "disasters" are included as a classification. Anyone considering researching disasters would first direct their attention to this item, which includes four ancient manuscripts. Two relate to fires that occurred in the village in 1669 (Kanbun 9) and 1671 (Kanbun 11); two relate to a breach of the levee on the Hacchōda River (currently the Hachiyado River) in 1725 (Kyōhō 10) and collapse of the Hacchōda River and Nuriko River (currently the Noriko River) in 1735 (Kyōhō 20). Does the existence of only four documents relating to disasters among so many district that shared documents mean that Moriyama suffered fewer disasters?

No, that is certainly not true. The occurrence of and damage from natural disasters is greatly influenced by topography and geology. In the area around the Hira Mountains, the river valleys that dissect the cliffs supply large volumes of sand to the foot of the mountains. For example, the basin of the Noriko River has a steep alluvial fan that develops into foothills.

Because of this topography and other features, the rivers in Moriyama in the Edo period frequently broke their banks. The Hachiyado and Noriko Rivers broke their banks many times and many related documents (such as estimates for their repair) survive. These two rivers were designated

"*gofushindokoro*," which are places where the feudal lord bears the expenses for any civil construction works. Moriyama repeatedly prepared pleadings and records to claim these expenses from the feudal lord, retaining receipts for the village records. These ancient manuscripts are classified under "water utilization" and "land."

The classifications of these ancient manuscripts are understandable for people studying the history of the Edo period. The two rivers flowing through the village usually had low flow volumes but were prized as the water supply for farmland. Managing the water supply was a matter of life and death for the villagers, and repairing banks that has collapsed from heavy (storms and) rain was part of "water utilization." Similarly, insufficient water supply due to frequent drought was also considered an issue inseparable from "water utilization."

Furthermore, among the ancient manuscripts classified under "land" are documents relating to "shore failure" (*hamagake*). This refers to the situation where the water level in Lake Biwa rose and the land on the lakeshore flooded. In Shiga Prefecture, this disaster was also called "*mizugomi*," and was not an unusual phenomenon along the shores of Lake Biwa in the Edo period. "Shore failure" was a phenomenon relating to the usage of land along Lake Biwa's shores, so it is included under "land" and similar items. Note that although embankments were constructed along the shore and rivers were improved in water management projects under the Lake Biwa Comprehensive Development Plan started in the late 1960s and early 1970s, submersion of the lakeshore due to rising water levels in Lake Biwa is still a matter of concern. Regions along the shores of Lake Biwa experience the same problems today as they did long ago.

Ancient manuscripts that were not widely used in earlier disaster historical studies are now used more frequently in research. Kamatani Kaoru's article "Life and natural disasters in Edo-period Moriyama based on land tax demands" uses ancient manuscripts concerning land taxes classified under "taxation" to reconstruct the appearance of the village in the Edo period.

In this way, even groups of ancient manuscripts that may not include classification categories relating to disasters clarify the conditions thereof when they are thoroughly read with the characteristics of the land in mind. Deciphering them may require perseverance, such as needing to interpret the documents while considering changes to topography and other historical context. However, this is essential work when thinking about Eco-DRR.

The three types of damage mentioned above—river breaches due to heavy (storms and) rain, insufficient water supply due to drought, and water damage to land due to rising water levels in Lake Biwa—were problems common to the villages at the foot of Mt. Hira in the Edo period. Damage from boars and deer was also a major factor threatening village life. I leave the details to the articles in this book, but the Hira Mountains caused damage in addition to providing resources to reduce disaster (in the form of stones to the villages located at their base).

Photo 2. 1935 landslide disaster (Moriyama District Collection, provided by Mr./Ms. Matsui)

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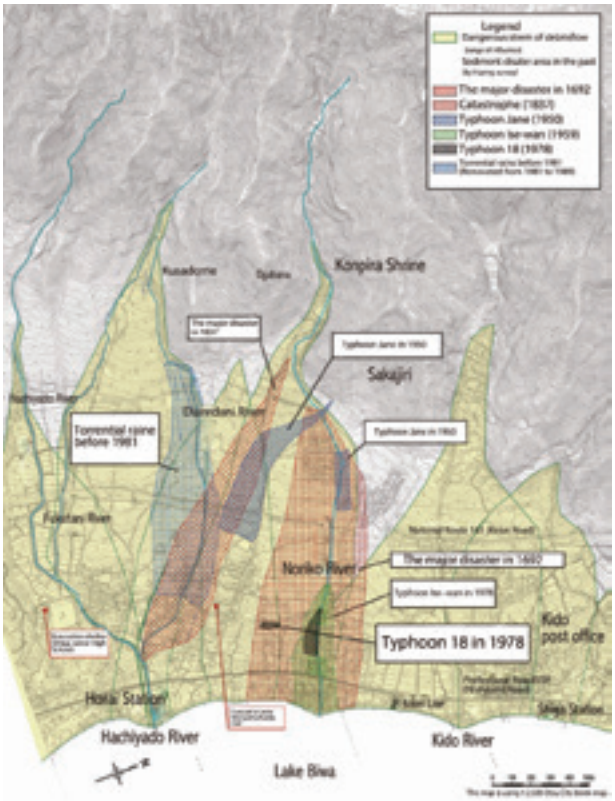


Figure 1. Past disasters and warning areas in the Moriyama district (provided by Moriyama Neighborhood Association Voluntary Disaster Prevention Committee, issued 2016)

Life and natural disasters in Edo-period Moriyama based on land tax demands

Ritsumeikan University **KAMATANI Kaoru**

The Edo period was characterized by a yield-based society in which value was represented by amounts of rice. Even the village land, measured by the comprehensive means of land surveying, was converted into *koku* (a unit for measuring rice). This was considered the number that represented the productivity of the village (yield). "This is a 50-*koku* village" means "the amount of rice predicted to be harvested from the land area of this village is 50 *koku*." The yield (*kokudaka*) of a village was also called the village yield (*muradaka*).

What was the village yield for Moriyama? An ancient document written in December 1619 (Genna 5) gives Moriyama's yield as "418 *koku*, 5 *to*, 7 *shō*," meaning the village's productivity was about 418 *koku*.

Here, I inquire into the productivity of Moriyama Village and concrete aspects of the taxation it paid each year according to this productivity, using the land tax demands created in the Edo period as a base.

Photo 1 shows a land tax demand sent to Moriyama in 1623 (Genna 9).

A land tax demand is a bill for land tax (taxation) given to each village by the feudal lord (the governor's office in the Tokugawa government in the case of government fiefs). Unlike today, in the Edo period taxation was demanded in village units. The village calculated the taxation amount for the villagers depending on their productivity each year (according to this document) gathered it, and paid it. The demands are also known as land tax assignments.

What is written on the land tax demands? Let us closely examine Photo 1.

The first thing to note is the part with the sender and addressee. "Ono Sōemon" is the sender, and "Village headman and peasants of Moriyama Village" are the addressees. This seems strange. Usually, when writing a letter vertically, the sender's name is never written in a position higher than the addressee's name. In this ancient document, it is the other way around. Why is that? The reason is that the sender, Ono Sōemon, is of the "warrior class," and the village headman and peasants of Moriyama—the addressees—are of the "peasant class." In the Edo period, this format was the norm. The relationship between the person receiving land tax and the people paying it is apparent when looking at this document.

The title is written: "Regarding the demand for the Year of the Boar." This means it is a bill for the land tax for the Year of the Boar. In the Edo period, they did not use the Western calendar. Unlike today, the era name changed comparatively frequently. In the Edo period, the 10 calendar signs and 12 zodiac signs were more important than the era year. As such, demands usually avoided the trouble of writing the era year in the title section and simply used the 12 zodiac signs, writing "Regarding the demand for the Year of the X."

Next, let us examine the body.

Here is written "Yield of 418 *koku*, 5 *to*, 7 *shō*; both fields and residences." This is the yield for all of Moriyama. Next to this is a figure beginning with "This received." This is the total land tax paid by Moriyama this year. It says "187 *koku*, 2 *to*, 7 *shō*." Some people may believe that in the Edo period, the government's land taxes were extorted from "peasants so as not to let them live, but not to kill them either." However, is this true? To learn what proportion was paid as taxes, we could divide the land tax amount by the village yield, but we can also see it on the demand without having to calculate it ourselves. Written on the same line as the land tax amount is "However, 4 *tsu*, 4 *bu*, 7 *rin*, 2 *mō*." This is the land tax rate. In other words, the land tax this year was 44.72%. Is this a lot or a little?

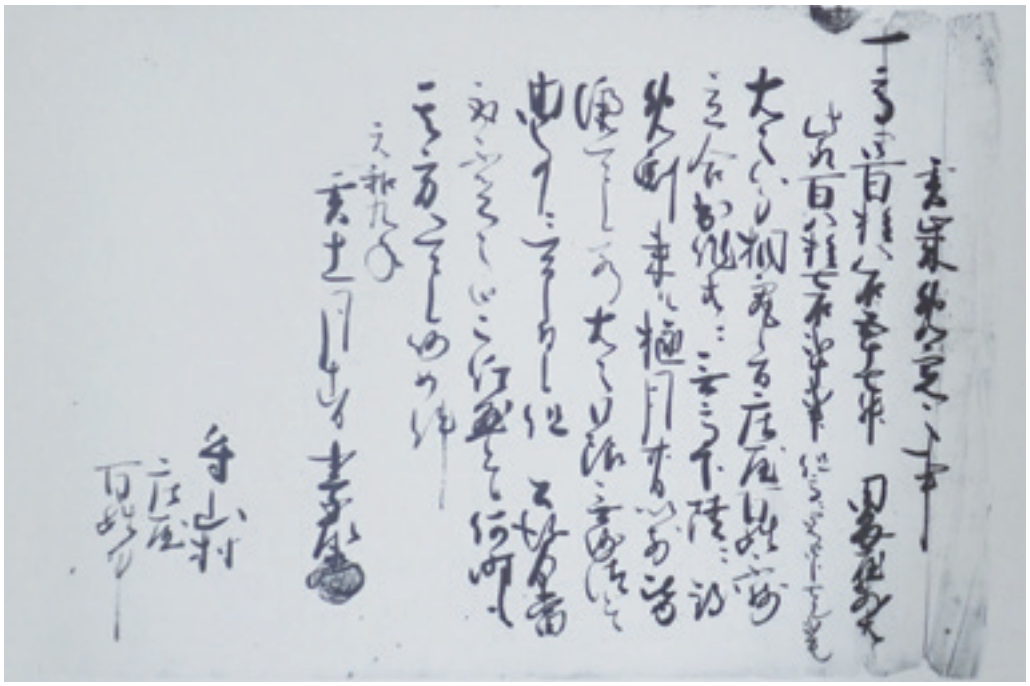
Taxation in the Edo period worked under various systems due to differences between feudal lords, regions, and periods. For example, the land tax rate might vary by year. Sometimes

a fixed amount would be collected for a certain length of time (called *jōmen*, which means “fixed rate”). In some cases, tax was assessed by calculations based on the village yield; in others it was calculated from the area measured in the land survey. Besides these, the taxation system in the Edo period shows variation in each of its items, but this is not within the scope of this discussion and is thus omitted.

Nevertheless, remember that the demands are ancient manuscripts that provide important clues for learning about village production and taxes.

In Moriyama, land tax demands over a long period have been retained. Because the demands were official documents, they were carefully stored in the village.

Photo 1 shows a demand from the early 17th century. What types of demands did Moriyama receive thereafter? Let us consider a land tax demand from about 200 years later.



Historical Material 1. Land tax demand for Moriyama from 1623 (Genna 9)

亥歳免定之事

一、　高四百拾八石五斗七升　　田畠屋敷共

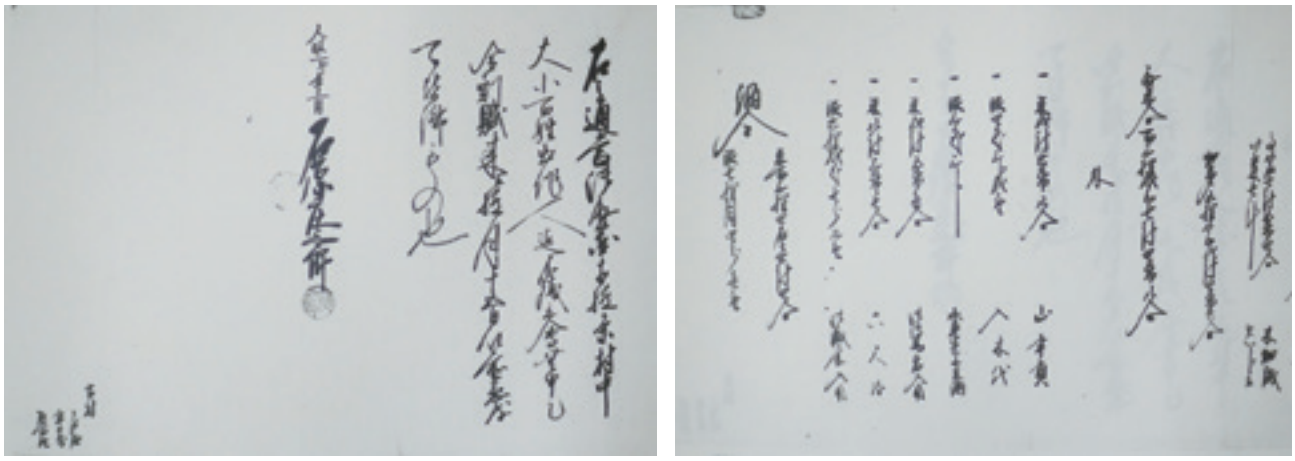
此取百八拾七石弐斗弐升　　但高ニ四つ四分七厘弐毛

右之分、相究候間、庄屋・百姓不残
立合、出作共ニ無高下、陸ニ致
免割、来ル極月廿日以前、皆
済可申候、若右之日限無沙汰候ハハ
曲事ニ可申付候、但　公儀方当
取不足之由被仰懸候ハハ、何時も
其方へ可申候、仍如件

元和九年
亥十一月十八日　　小　宗左衛門　（印）

守山村
庄屋
百姓中

Reproduced text from land tax demand for Moriyama from 1623 (Genna 9)



Historical Material 2. Land tax demand for Moriyama from 1819 (Bunsei 2)

Photo 2 is a demand from 1819 (Bunsei 2). It says, “Yield of 418 *koku*, 5 *to*, 9 *shō*, 3 *gō*,” a slight increase from the village yield in the early 17th century, which was “Yield of 418 *koku*, 5 *to*, 7 *shō*.” In the next line, we see “This meaning,” which refers to a detailed breakdown. The following lines describe the total village yield divided into the rice paddy yield and field yield.

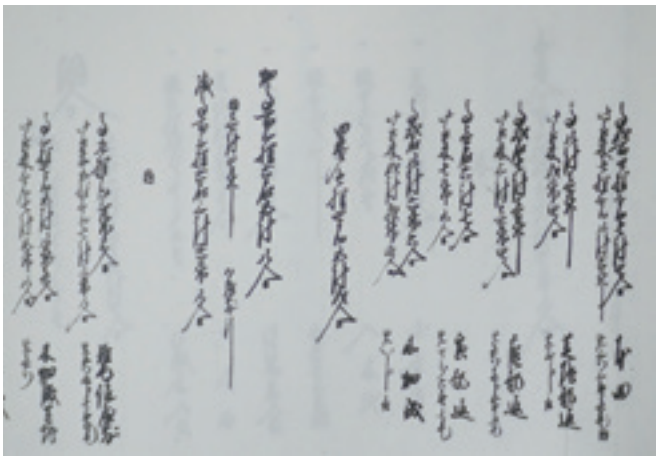
Note the three items under “Among this” written on the line after the rice paddy yield stating the following: “embankment site, stony ground, discount”; “became lake, shore failure, sand inflow, discount” and “no harvest, discount.” This refers to the parts of the rice paddy yield for land that were not productive for those various reasons. Of 282 *koku*, 8 *shō*, 5 *gō* for the rice paddy yield, 3 *koku*, 4 *to*, 7 *shō*, 5 *gō* became an embankment and stony ground that cannot be farmed; 4 *koku*, 1 *to*, 6 *shō*, 2 *gō* became a lake from an inflow of water and sandy ground that cannot be farmed; and 22 *koku*, 7 *to*, 5 *shō*, 1 *gō* did not yield any harvest.

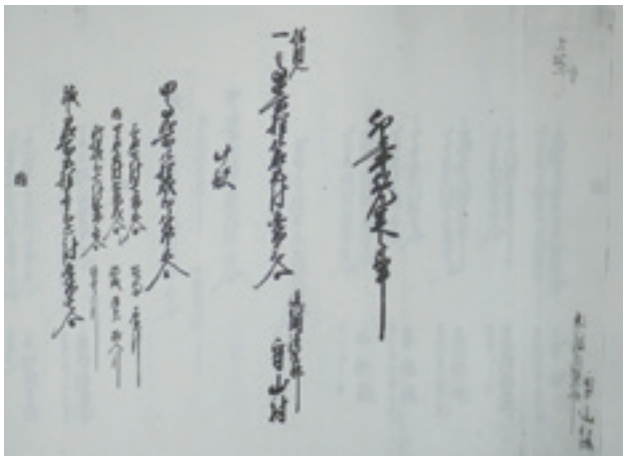
We see that this year the rice harvest in Moriyama was adversely affected by flooding and other damage.

How were these figures derived? The typical custom was when disasters occurred, the village headman or a similar figure investigated the land in his village and acknowledged the state of and damage to crops. This was submitted when the feudal lord came to inspect the site. For the village, accurately reporting the damage from the disaster would affect the land tax amount for that year, which was also an issue of life and

此取米三石七斗五升八合
高八石七斗五升四合
此取米七斗
畑米〆五拾八石弐斗四升六合
取米合百三拾弐石七斗四升八合
外
一、米弐斗六升八合　山年貢
一、銀四匁三分弐厘　入木代
一、銀三匁三分　水車運上定納
一、米弐斗五升壱合　御伝馬宿入用
一、米八斗三升七合　六尺給
一、銀六拾弐匁七分九厘　御蔵前入用
米百三拾四石壱斗四合
納合
銀七拾目四分壱厘
右之通、当御取箇相極条、村中
大小百姓・出作人迄不残立会無甲乙
令割賦、来ル極月十五日以前急度
可皆済もの也
文政二卯年十一月　石原庄三郎（印）
右村
庄屋
年寄
惣百姓
免壱つ
木畑成
免八分取

Reproduced text from land tax demand for Moriyama from 1819 (Bunsei 2)





death. Because of this and other reasons, the land tax rate was decided while considering the books written (such as the impairment book*). Therefore, these items written in the land tax demand are also the official figures for the village's damaged yield acknowledged by the feudal lord.

On the following line is written “balance.” The yield written here is the remainder after deducting the yield for land that did not produce a yield from the village yield. As such, this balance can be considered a guide for the effective productivity of Moriyama for that year.

The movement in these figures reveals the fluctuations in Moriyama's productivity during the Edo period. Moreover, by organizing the yields for unproductive land and the reasons for the lack of productivity, we learn specific details of what regulated Moriyama's productivity and the environment that affected it.

I intend to analyze this topic in detail in a later paper.

Explanation of terms

* Impairment means the condition where rice or other crops do not grow well because of various kinds of damage and cannot be harvested.

卯年免定之事

検見

近江国滋賀郡

一、高四百拾八石五斗九升三合　守山村

此訳

田高弐百八拾弐石八升五合　堤敷　石原引

三石四斗七升五合　湖成浜欠砂入引

内　四石壱斗六升弐合　皆無引

弐拾弐石七斗五升壱合

残高弐百五拾壱石六斗九升七合

内

高弐百四拾三石七斗四合　本田

此取米七拾三石八斗六升　免三つ三厘壱毛内

高八斗壱升　芝地起返

此取米弐升四合　免三分取

高弐石七斗壱升　葭起返

此取米三斗壱升四合　免壱つ壱分五厘九毛

高壱石六斗七合　寅起返

此取米七升五合　免四分六厘七毛

高弐石八斗六升六合　木畑成

此取米弐斗弐升九合　免八分取

田米〆七拾四石五斗弐合

畑高百三拾六石五斗八合　雑毛作屋敷

内壱斗四升　郷蔵敷引　免五つ九分七厘四毛

残高百三拾六石三斗六升八合　木畑成芝地

内

高九拾石三升三合

此取米五拾三石七斗八升八合

高三拾七石五斗八升壱合

The Land-use and Disaster Management based on Old Maps from Minami-komatsu

Kyoto University
ANDŌ Kōichi
FUKAMACHI Katsue

Figure 1. Minami-komatsu, Ōtsu (drone photography)

In this article, we examine the actual landuse for rivers, inner lakes, and lakeshores in the Edo to early Meiji eras, focusing on plans created at the time in Minami-komatsu, Ōtsu City.

Minami-komatsu (Fig. 1) is further north from the Kosei Line than Moriyama. The lakeshore has been selected as one of the 100 best beaches in Japan with its white sand and green pines, as Omatsuzaki, and is visited by many tourists in the summer as a swimming spot. Attractions include inner lakes, stone wall ruins, and other precious satoyama (semi-natural areas that coexist with nearby populated areas) landscapes created by nature and people. Many ancient documents and plans from the Edo period and later survive in Minami-komatsu, thus it is possible to reconstruct the landuse and disaster management from long ago.

First is the "Plan of Minami-komatsu" in Fig. 2. It is not known when this Plan was created, but a note at the bottom left shows that the village of Minami-komatsu at the time (with a yield of over 1,093 *koku*) was divided between several feudal lords (the Tokugawa government, direct retainers of the shogun, etc.). Examining these closely, we infer that the Plan was created around the middle of the 17th century. Furthermore, it is believed to have the nature of a detailed diagram that depicts the entirety of Minami-komatsu, including information about the feudal lords of neighboring villages and the entire scope of lifestyle spheres and productive activities (mountains, forests, etc.) in the village.

What was the village like and how was the landused? The Plan has a legend explaining the color-coding for landuse. First, red lines are paths, and the line running through the center of the plan (north-south) is the main street of the village, the Hokkoku Kaidō. Along this route, three hamlets are drawn in yellow. At the time, Minami-komatsu comprised three hamlets: Imazaike, Nomura, and Manaka. The fields are not colored; the blue indicates rivers, inner lakes, and lakes. On some inner lakes, the maker has written "reed field," leading us to imagine that reeds grew well and were used in people's lives. Some inner lakes have a "*Funairi* (channel)/*Eri* (fish trap) entrance," showing that they functioned as ports and fishing locations.

The mountain forests are shown in grey, and the scope of mountain edges and commonages (commonages with Busshōjino and Kita-hira villages) are indicated with black ink lines.

The white item in the legend marked "*Kōryū*" (waste flow) is marked "permanent waste" on the plan itself. "Permanent waste" refers to fields, turf, marshland, and the like long-ruined by disaster. Given that it has very little productive capacity, this land is excluded from land tax by the feudal lord. This plan shows permanent

Figure 2. Plan of Minami-komatsu (Minami-komatsu Neighborhood Association Collection, photo: provided byŌtsu City Museum of History)

wastelands around the rivers and inner lakes on the eastern side of the Hokkoku Kaidō (the lakeshore), indicating that water damage occurred due to sediment disaster in the lower reaches of the rivers and rising water in the inner lakes. Furthermore, "*Suishoden*" (watery fields) extend along the lakeshore where 田 (rice field) is written faintly, indicating fields often subject to damage from submersion, which suggests frequent water damage.

Along the Ōtani River that slows between Nomura and Manaka, the plan shows from upstream: "north and south 100-*ken* embankment"; "south embankment 190 *ken*, north embankment 160 *ken*"; and "south embankment 240 *ken*, north embankment 240 *ken*." This means that embankments (mostly made of stone) were constructed. From these lengths, the embankments must have continued from the river mouth to a point slightly upstream of the hamlets. Immediately east of Nomura is "Hachimangū," where an embankment was built on the south side with a length of 30 *ken*. It seems that the people of the time intended to protect not only their hamlets and fields but also their tutelary deity, Hachiman Shrine, from sediment disaster.

Fig. 5-1 is the "Plan of Minami-komatsu" created in the tenth month of 1771 (Meiwa 8). The endorsement in Fig. 5-2 indicates that the plan depicted the village in detail on orders from the feudal lord, who likely had it

Figure 3. Stone embankment ruins and erosion control dam in the upper Yanamune River

Figure 4. Raised-bed river flowing above a road, lower Yanamune River

Key point: Expanding the Ōtani River embankments

One ancient document from Minami-komatsu describes the construction of embankments in the eighth month of 1792 (Kansei 4). According to this document, a stone embankment 120 *ken* long existed in the upper reaches of the Ōtani River, and a sand embankment 1,000 *ken* long in its lower reaches. Moreover, the Shiga County, Ōmi Province journal states that the embankments along the Ōtani River measured 26 *chō*, 14 *ken* (approximately 2.8 kilometers) in 1881 (Meiji 14). Thus, the embankments expanded to three times their length in the 200 years since the creation of the plan in Fig. 2.

Based on this, the people of the time handled water damage from the river by installing and expanding the embankments.

Today, the Ōtani River is a raised-bed river called the Yanamune River. We can see a mixture of stone embankment ruins and erosion control dams upstream (Fig. 3) and the river flowing above the road downstream (Fig. 4).

created to better understand the fields that had suffered water damage. As the plan in Fig. 2, this one describes landuse through color-coding. Based on what is written in the endorsement, the light blue item in the legend marked "waste flow" likely indicates places that became "*Kawanari.*" *Kawanari* is a term used in taxation law in the Edo period and refers to the condition where earth and sand flow out due to sediment disaster; the fields become a waste land similar to a river beach. *Kawanari* land was surveyed again and exempted from land tax.

This plan was created about 100 years after the plan in Fig. 2, but comparing the distribution of waste flow, the places that suffered water damage had hardly changed. This suggests that the people of the time understood which pieces of land were likely to be damaged and avoided them.

Waste flow decreased until the start of the Meiji era, in conjunction with the development of new rice fields. However, until recently, some places around the lower reaches of the Yanamune River still contained wastelands with thick groves of pine and bamboo. Even today, the remnants of former wastelands are seen in some residential areas (Fig. 6).

Fig. 7 is part of the "Plan of Minami-komatsu." It is unclear when it was created, but from the information in the plan, it may date from 1861 (Bunkyū 1).

"Kaei 5 [1852], Year of the Rat, sand inflow" and "Ansei 5 [1858], Year of the Horse, sand inflow"

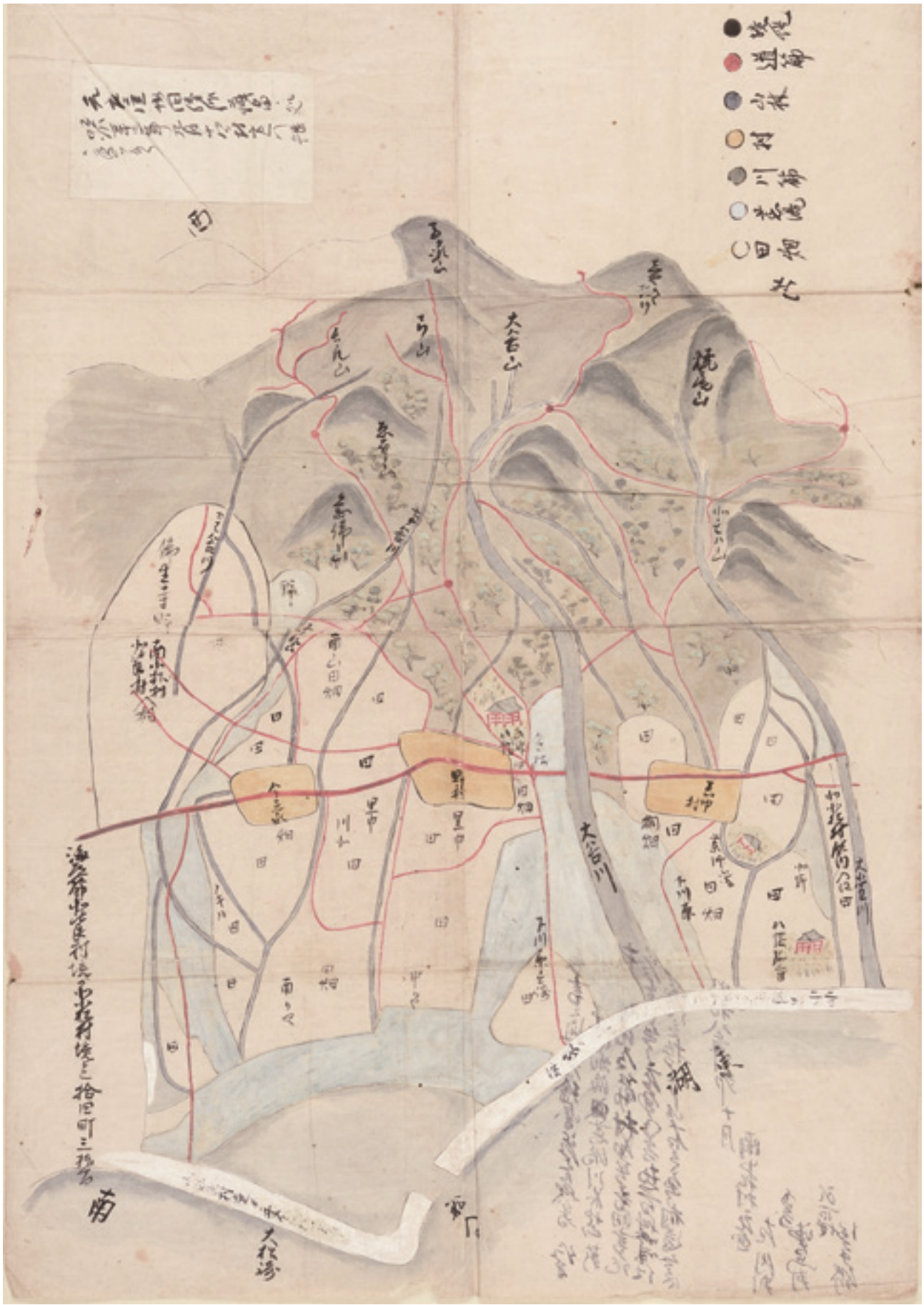


Figure 5-1. Plan of Minami-komatsu (Minami-komatsu Neighborhood Association Collection, photo: provided byŌtsu City Museum of History)

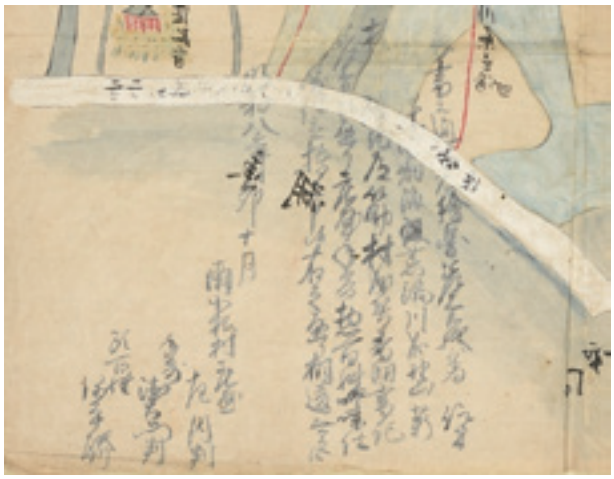


Figure 5-2. Endorsement of Plan of Minami-komatsu

is written along the black ink line. This line is the embankment along the Hira River that flows through the neighboring village of Kita-hira. It shows that sand inflow occurred in 1852 (Kaei 5) and 1858 (Ansei 5). “Sand inflow” refers to land where earth and sand flowed into fields because of sediment disaster, but the fields can be restored. We see that the damage from sediment disaster in the neighboring village extended to Minami-komatsu.

Relationships with neighboring villages were very close. Some plans depict the locations of disputes over land with neighboring villages (Kita-komatsu, Kita-hira), clarifying their deep involvement with each other. Minami-komatsu has various other types of plans, including some depicting channels in inner lakes and house layouts. Plans are extremely valuable materials that teach us about relationships with other villages, aspects of contemporary people's occupations, and how the people of the time used their land.

Figure 6. Lower Yanamune River (residential area and remains of wasteland)

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Figure 7. Plan of Minami-komatsu (extract) (Minami-komatsu Neighborhood Association Collection, photo: provided byŌtsu City Museum of History)

Tracing memories of flooding in Minami-komatsu

Kyoto University

NARITA Mayu
OCHIAI Chiho

Introduction

Disasters greatly influence the formation and development of a village. For example, in the Konan region (south part of Lake Biwa) of Shiga Prefecture, a village relocated its shrines and temples, as well as two-thirds of the houses toward the mountainside in response to water damage in 1802 (Kyōhō 2). However, when Typhoon No. 18 (Typhoon Man-yi) struck the area in September 2013, the homes that had not been relocated and had not previously experienced water damage suffered water submersion damage (History of Water Damage in Shiga Prefecture).

The Kosei region (west part of Lake Biwa) has long been affected by flooding due to its topography; in recent years by typhoons and torrential rains in particular. Even regions with no major water damage in the last few decades remain at risk. We contend that it is especially important for people who have not experienced flooding to acquire traditional wisdom about this disaster in visual and experiential ways in their own villages. Given this, we trace the memories of flooding, focusing on Minami-komatsu.

Figure 1. Rough plan of Minami-komatsu Village, Shiga County, Western Ōmi Province, 1827 (Bunsei 10) (Minami-komatsu Neighborhood Association Collection)

Topography and history of the hamlet of Minami-komatsu village

Minami-komatsu is located between Kita-komatsu and Kita-hira villages. To the southeast, it faces Lake Biwa, while the steep mountains of Mt. Hōrai, Mt. Shaka, and others are lined up to the northwest.

Let us go back in time and look at the "Rough plan of Minami-komatsu Village, Shiga County, Western Ōmi Province" (Fig. 1), which was drawn in 1827 (Bunsei 10). Three hamlets can be seen along the Nishi-Ōmi Road (red). In order from the north (right), they are the hamlets of Manaka, Nomura, and Imazaike. The "Plan of Kita-hira Estate" drawn in the Muromachi period (about 1400) shows the hamlets of Manaka and Nomura, indicating there were settlements from that time. According to "Shiga-chō Mukashi-banashi" (Tales of old Shiga Town), Imazaike once belonged to Kita-hira village.

Fields spread out and inner lakes and beaches continue on the Lake Biwa side of the village. The Yanomune River, which flows between Manaka and Nomura (in the plan, the Naka River [中 川]), is a raised-bed river, which is quite common around Lake Biwa. People raised the embankments on both sides of the river to prevent flooding. However, the riverbed repeatedly accumulated sediment and grew higher than the surrounding land. In general, raised-bed rivers are difficult to restore once they have broken their banks, and damage tends to spread. To date, the main factors in water damage in Minami-komatsu involved the flooding of the Yanomune River and the rising water levels of Lake Biwa.

The Yanomune River in the plan (Fig. 1) shows forested zones along both banks. An investigation conducted in Shiga in 1994 found that mixed forests mainly consisting of pine trees continued to the shore until about 1950, when embankment work was conducted. In this investigation, residents told us about gloomy, dense forests that once grew throughout this area.

It is believed that buildings began to be constructed in these forested zones in the early Meiji era (the late 1860s). The number of households, which was constant at about 150 units until the Edo period, had increased to 175 units in 1881 (Meiji 14). A residential diagram of all households in Minami-komatsu created in 1887 (Meiji 20) records 228 households and shows that houses and stone huts were built on the banks of the Yanomune River, which was formerly a forested zone. Thus, residential land was rapidly developed in this period with the progress of stone culture. Thereafter, having passed through wartime, the number of households greatly increased—to 252 units in 1980 and 781 units in 2017. Today, the forested zone from memory have disappeared, and the settlement area has increased.

Thus, we should remember that the development and flourishing of settlements has come at the cost of fragility in the face of disaster.

This investigation found the "Report of temples" written in 1887, which shows that Saihōji, now in Manaka, used to be in Omatsu (currently Ōmi-Maiko-hama). Given that before Lake Biwa flooded in 1356 (Shōhei 11), Hachiman Shrine was located near the lakeshore where the *otabisho* (resting place for a portable shrine) is today, and that Yakushidō was once next to it, the village of Minami-komatsu may have faced the lake a long time ago (like the other old villages in the Kosei region). We intend to continue investigating this contention.

Memories of water damage in the settlements

When we asked residents about their experience of water-related disasters throughout history, we heard that after the Muroto Typhoon in 1934 (Shōwa 9), which caused severe damage throughout Shiga Prefecture, serious water damage also occurred from flooding and landslides in 1935 (Shōwa 10) after torrential rain in Minami-komatsu.

According to Mrs. Kimura (90s), the village has a sluicegate that divided the water in the Yanomune River, which was managed by a *suiban* (water-keeper). A catastrophic water event during the early Shōwa era (1930s) caused a *suiban* closing the sluicegate to be washed away by strong flows; gravel entered his clothes and caused severe skin injures, leading to his death. The floodwaters at the time were so strong they flowed through the sluice to the path beside Hachiman Shrine and carved out the road.

Mr. Masuo (80s) said that both sides of a bridge crossing the Yanomune River near the settlement had stone gates, and regidents would insert the bridge flooring into grooves dug into the center to prevent the river water from flowing into the settlement. Additionally, a *hanshō** was placed at the foot of the bridge to inform residents of the danger of flooding and mudflow.

Mr. Masuo (70s) recalls that two places were often flooded in the Yanomune River (Fig. 2: red crosses). Previous water damage buried residences between Hachiman Shrine and the bypass with the sediment that flowed out. During the water damage of 1951 (Shōwa 26), the park east of Hachiman Shrine (the former site of the elementary school) was filled with sediment. Mr. Masuo, an elementary school student at the time, told us, “I was told by my parents, and I desperately scraped the water and sediment out so that it would not flow from the Yanomune River into our house.

Conclusion

The village of Minami-komatsu has developed while simultaneously managing water-related disasters. However, the wisdom and memories of previous generations regarding water damage and evidence of their responses are gradually disappearing from the village. Retaining what is visible in the form of the hamlets, and tracing and passing down memories leads to the sharing of intellectual resources important for reducing and preventing future disaster damage. It is important to utilize the local history and experience that has been developed with the natural and living environments in preparing for disasters.

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Explanation of terms

* Note: A *hanshō* (alarm bell) is a small hanging bell used to notify people of emergencies such as fires and floods.

Figure 2. Diagram showing hamlets and water damage in Minami-komatsu

Shishigaki and disaster response at the foot of Mt. Hira

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ŌSAWA Sōtarō

Introduction

Since long ago, settlements at the foot of Mt. Hira have used stone in various forms in people's lives to form a unique stone culture. Hearing the term "stone culture" prompts images of stone constructions such as the stone walls of a castle or lanterns; however, here we focus on *shishigaki*, a stone wall for protecting settlements.

Shishigaki are barriers originally built by residents to prevent boars and deer from entering settlements and destroying fields. Many are located near the border between the settlement and the surrounding mountains or forests, with the longest stretching up to dozens of meters.

In the former town of Shiga in the Kosei region (west side of Lake Biwa), the Arakawa district is known for the ancient remnants of its *shishigaki*. These *shishigaki* also served as a measure against the water and mudflow caused by the flooding of the Ōtani River, and they remain in a shape surrounding the settlement (Takahashi, 2010). According to research by TAKAHASHI Shunjō, *shishigaki* are recorded in the Arakawa village in the "Compact plan of Arakawa Village, Shiga County" from the early Meiji era, and in ancient manuscripts written in the Edo period and Meiji era. *Shishigaki* remained through the cooperation of the villagers, from creation to their maintenance and management. However, as embankment work on rivers and residential development progresses relationships between the region and nature also change, and they are gradually being forgotten—many are being torn down. These *shishigaki* are records of lives in which local people overcame the difficulties of animal and water damage, and we want as many people as possible to learn about and protect them as "local assets."

The form of *shishigaki*

Not many people hear "*shishigaki*" and think, "Oh, those things!" *Shishigaki* has been written in various ways, including 猪垣 (lit. "boar fence"), 鹿垣 (lit. "deer fence"), 猪鹿垣 (lit. "boar [and] deer fence"), and even 獅子垣 (lit. "lion fence"). They are broadly distributed in areas south of the northern Kanto region, particularly in Nagano, Yamanashi, and Gifu. In the Kinki region, they are interspersed throughout Shiga, Nara, Mie, and Wakayama (Yagasaki, 2001). *Shishigaki* materials vary by their location and region; some use the natural topography, others have piled up stone and earth, and others are formed from woven wood or bamboo. The stone walls are not high, reportedly because boars are not proficient at jumping and low walls are sufficient (Nukada, 1984). Fences were placed on top of stone walls as measures against deer.

Their shapes are broadly classified according to demarcation type (Great Wall type) and enclosure type (castle wall type). It is not known when *shishigaki* were first made, but in Shiga Prefecture, many records remain from the mid to late Edo period (Takahashi 2010). In records on *shishigaki* in the former Shiga Town area, the records in the Minami-komatsu district-held document

Photo 1. *Shishigaki* in Arakawa district

Figure 1. Compact plan of Kido village, Shiga County (Reproduced from Ōtsu City Museum of History) (Extract: *Shishigaki* shown on ancient map of Kido village)

Figure 2. Map of Moriyama village, early to mid-Edo period (Moriyama Zaisanku Collection. Photo: taken by Shimizu Kōgeisha) (Extract: *Shishigaki* shown on ancient map of Moriyama village)

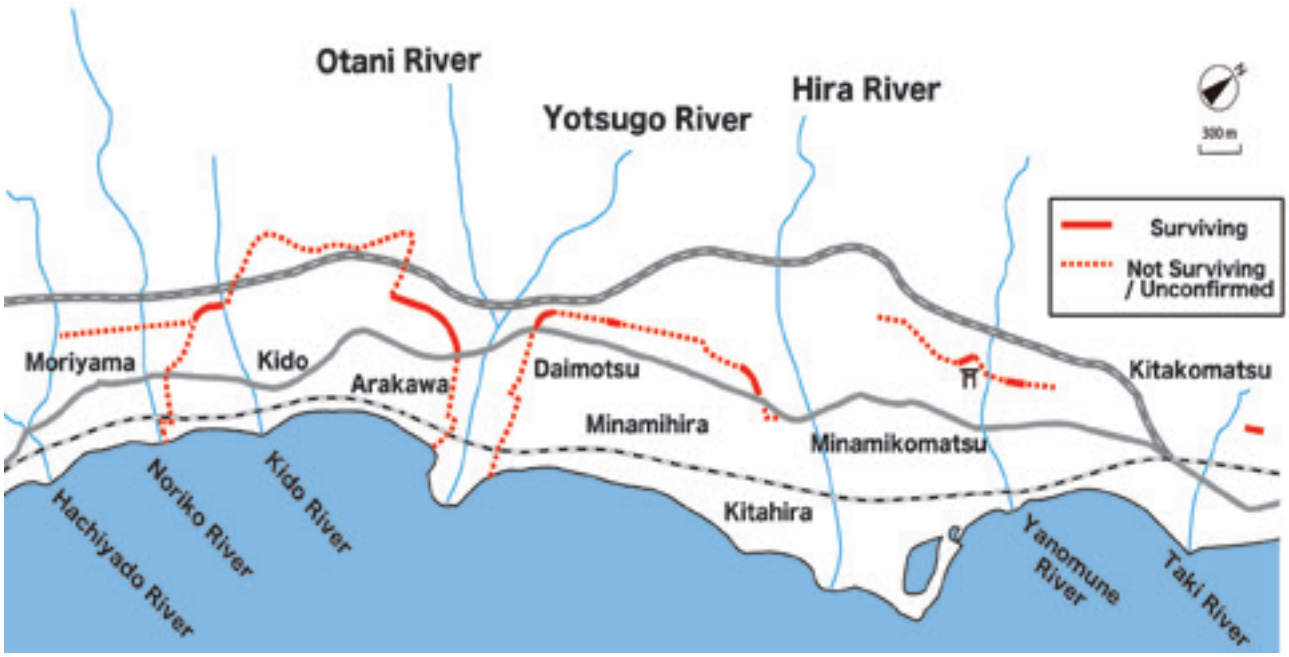

Figure 3. Distribution and location of *shishigaki* in former town of Shiga

District	Moriyama	Kido	Arakawa	Daimotsu	Minami-hira	Kita¬hira	Minami-komatsu	Kita-komatsu
Ancient map	Yes	Yes	Yes	Yes	Yes	Unconfirmed	Yes	Unconfirmed
Ancient manuscripts	Unconfirmed	Unconfirmed	Yes	Unconfirmed	Unconfirmed	Unconfirmed	Yes	Unconfirmed
Form	Demarcation	Enclosure	Enclosure	Enclosure	Demarcation	Enclosure Demarcation	Demarcation	Demarcation
Use	Shishigaki	Shishigaki	Shishigaki sediment damage	Shishigaki sediment damage	Shishigaki	Shishigaki	Shishigaki sediment damage	Shishigaki
Surviving	Unconfirmed	Partial	Yes	Partial	Partial	Partial	Partial	Partial

Table 1. *Shishigaki* forms and state of survival

"*Shishigaki* allotment name book" (7th month, 1788 (Tenmei 8)) and Arakawa village's "*Shishigaki* allotment book" (1816 (Bunka 13), 1820 (Bunsei 3), 1866 (Keiō 2)) allows us to infer that *shishigaki* were made in each villages in the mid-Edo period.

Ancient remnants of *shishigaki* in the former town of Shiga

The history book of Kido village compiled in 1880 (Meiji 13) gives the topography and population for each *ōaza* (the administrative unit below the village) at the time. The book describes the Arakawa village thus: "… in the south, from the south border of Mt. Nakatani, Kayagatani, irrigation aqueduct, *shishigaki*, go down, Hokkoku Kaidō …" We see that if you go down to the irrigation water supply and *shishigaki*, you reach the Hokkoku Kaidō, where the settlement is. Similarly, for Minami-hira village, it says,"… cross eastward, reach the *shishigaki* and fence, turn south, and reach the border plate …," suggesting that Minami-hira village had a *shishigaki* near the border.

Ancient maps collected by the Ōtsu City Museum of History depict thick, black, spiky *shishigaki* which "divide" the settlements, mountains and forests in the Minami-hira district (Ōtsu City Museum of History, 2017). Ancient maps depicting the Kido village in the mid-Meiji era show that *shishigaki* were created surrounding the settlements (Fig. 1).

Fig. 2 is an ancient map stored in the Moriyama village. The part circled in red depicts a *shishigaki*. It extends almost directly north to south, continuing to just short of Kido village and the Kido River in the north and to near the border with the district of Kita-funaji village in the south. This figure shows it is located just at the border of the settlements, farmland, and mountains and forests.

We interviewed the people from the area based on this information. The results show that all settlements from Kita-komatsu to Moriyama once had *shishigaki*. Many were pulled down in the confusion and development

Figure 4. Minami-komatsu cadastral map in Meiji period (Minami-komatsu Neighborhood Association Collection) (Extract: *Shishigaki* shown on ancient map of Minami-komatsu)

following the Second World War, but remnants are still found in each district.

Fig. 3 shows the location of the *shishigaki* we have found thus far. The *shishigaki* extend to surround the settlement in some villages, going up to the eastern side of the current Shiga Bypass, while in other villages, they extend directly north to south. As rivers divide many of the villages, *shishigaki* continue to the lakeshore in some villages.

Table 1 shows the form of the *shishigaki* and state of its remains in each village. *Shishigaki* are depicted in the ancient maps preserved in each village; based on these, we can learn about them at the time and their relation to the settlements. In this region, many ancient manuscripts and ancient maps servive, and some record divisions of roles or costs when building and repairing the *shishigaki*. In this region, we can confirm both demarcation and enclosure types. Sometimes the enclosure types were formed to surround the settlements, because two settlements were linked. We also confirmed *shishigaki* built with water and sediment damage from river flooding, such as in the Arakawa village.

Below, we discuss the *shishigaki* in Minami-komatsu village in detail.

The *shishigaki* of Minami-komatsu

Using the ancient maps as hints, we visited the actual site. Looking at the mountainside of the shrine, we saw a flowing aqueduct and beyond that, a stone wall in the forest. In Minami-komatsu, we found four documents concerning *shishigaki.* The first was an ancient map from about 1873 (Meiji 6), which depicted something like a fence separating the mountains, forest and the settlement. This *shishigaki* does not seem to be made of stone but is more like a fence of braided wood or bamboo. The fence curves around the mountainside of Hachiman Shrine and then extends north and south (see Fig. 4). The second reference material is the “Minami-komatsu district-held documents.” As shown in Photo 2, on the cover is written “Tenmei 8 [1788] Minami-komatsu Village *shishigaki* allotment name book, Year of the Monkey, 7th month, day, public official.” This ancient manuscript states that the three *aza* in Minami-komatsu—the hamlets

Photo 2: Left: *Shishigaki* allotment name book, 1788 (Tenmei 8). Right: *Shishigaki* renewal book, 1886 (Meiji 19) (Minami-komatsu Neighborhood Association Collection)

Village hall sundry expenses	51 yen, 45 sen
Village shrine management, salary, etc.	10 yen, 70 sen
Various festivals, etc.	10 yen, 9 sen
Mountain and forest investigation costs	2 yen, 54 sen
Road cleaning, etc.	4 yen, 50 sen

Table 2. Account book from Minami-komatsu in 1873 (Meiji 6) (extract)

Imazaike, Jingū, and Kitade—were each responsible for the construction of 20 *ken* (approximately 38 meters) of *shishigaki* to the east. The length of *shishigaki* to be constructed according to the area of farmland owned was decided because the full allocation per rice field was 3 *ken* and the half allocation were 1 *ken*, 3 *shaku*. We know that system is the same in Arakawa and in the city of Takashima, where *shishigaki* have already been investigated. The reference materials note the name of the head of each household, the area of farmland, and the length of *shishigaki* for which they are responsible. We learned that more than 150 households were involved. The 1886 (Meiji 19) "*Shishigaki* renewal book" records the divisions for 116 households and notes that four teams in Imazaike, five in Nishide, six in Kawara, and 10 in Manaka were involved. (The cover is shown in Photo 2.) The "Shiga prefectural produce journal" published in 1879 (Meiji 12) lists 175 households in Minami-komatsu, suggesting that many participated in improving this *shishigaki*. Moreover, the 1873 (Meiji 6) "Minami-komatsu Village sundry cost investigation book" notes that 21 yen was spent on boar and deer prevention fences. This year was not unusual, as 15 yen was spent in 1874 (Meiji 7) and 50 yen in 1875 (Meiji 8). A comparison to the amounts spent on festivals and well and embankment management shows how large this number was. (Table 2 presents an extract from an account book.)

Our *shishigaki* measurement investigation in February 2019 revealed that stone walls were stacked using quarry stone to a height of between 60 and 170 centimeters depending on the place. In general, they were about as high as an adult's chest to head. The top of the stone wall was about 150 to 180 centimeters wide and the bottom was about 180 to 200 centimeters wide. The surface of the stone walls used large to mid-sized stones, with small stones or soil stuffed in the gaps between stones. The stones varied greatly in size, ranging from 30 centimeters to between 80 and 120 centimeters. Most of the stones used retained their naturally rounded shape, but in some we could confirm traces of the wedge-holes cut when they were split. This surviving stone wall is about 97 meters in length; another portion remains a short distance away. Photo 3 shows the *shishigaki* in Minami-komatsu. Fig. 4 shows the measured cross-section acquired at that time. This diagram shows that the size of the stones is greater at the bottom and decreases toward the top. Trees grow thickly around the stone wall and fallen leaves have piled up. On the front (mountainside) of the *shishigaki*, earth and sand have piled up to the uppermost part, making it difficult to ascertain the state of the entire stone wall.

The stone used in this *shishigaki* is granite; most are gray with a few stones having brown or blue tinges.

Apart from one section, the stone wall is badly collapsing and many parts are buried in soil, so to check its actual height would require removing the surrounding soil for a detailed re-investigation.

When we interviewed people older than 70 years in the

Minami-komatsu district, they said, "There's a *shishigaki* near the back of Hachiman Shrine. It was already there when we were children. We used to play around there. I do not remember activities to maintain and manage the *shishigaki* at the time." Based on this, in Minami-komatsu, the *shishigaki* stopped being maintained or managed and slipped from memory during or after the Second World War. Today, the remnants of the stone wall stand quietly in the mountain forest, buried in trees and earth (Photo 3). This mostly happens when the land on which the *shishigaki* sit shifts ownership to someone not from the village or is demolished for road expansion works (since the late 1960s).

Shishigaki is an important ancient remnant for conveying the lifestyles of former residents. We wish to continue to uncover further details about them.

Photo 4. Stones used in *shishigaki*

Photo 3. *Shishigaki* remaining in Minami-komatsu (behind Hachiman Shrine)

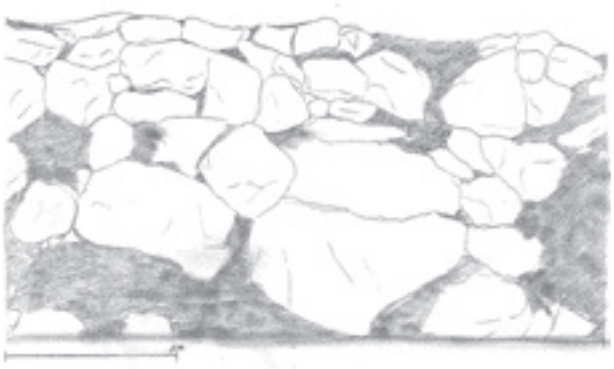

Figure 5. Measured cross-section of Minami-komatsu *shishigaki* (part)

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【Toward an Eco-DRR that utilizes traditional and local knowledge】

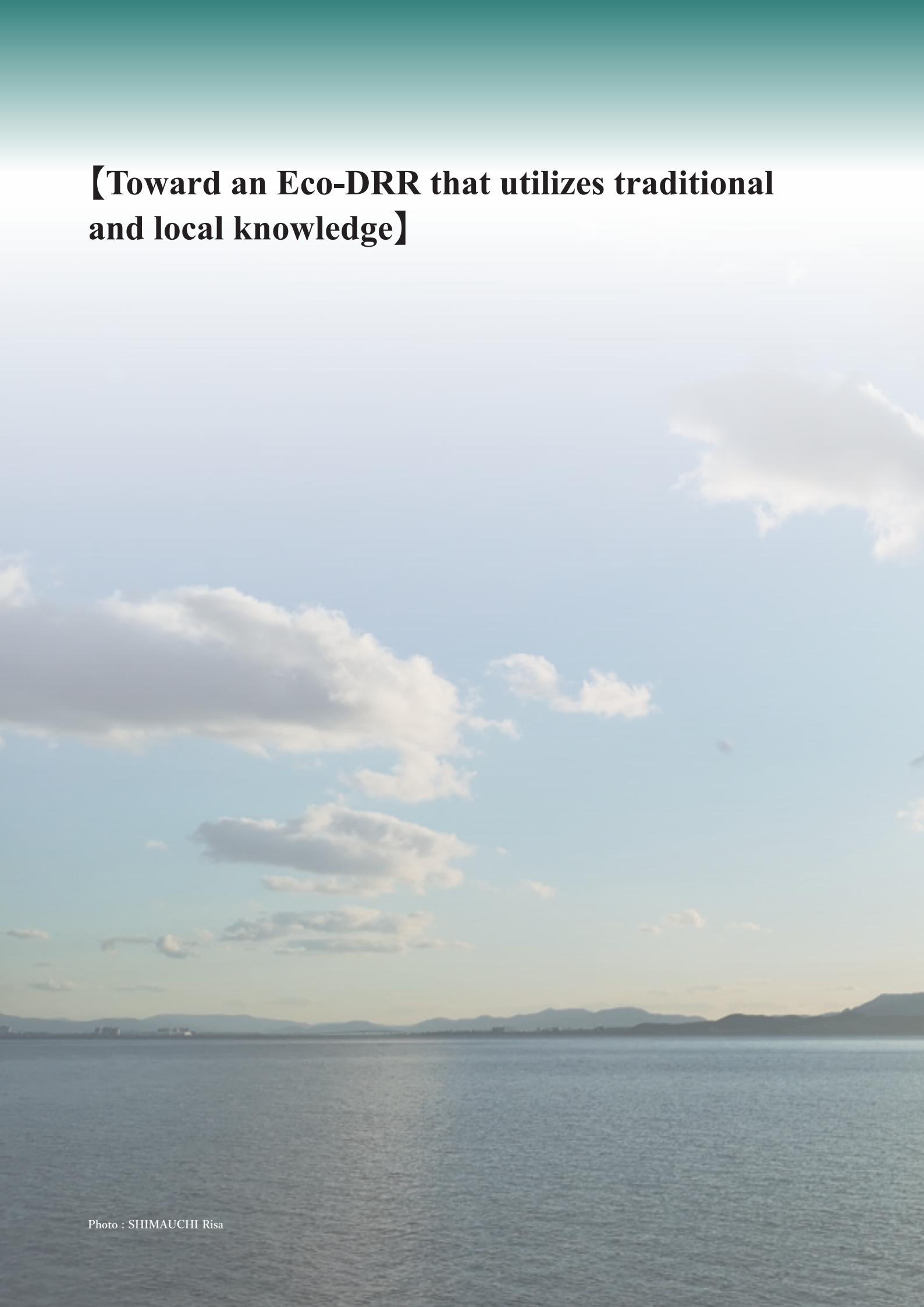

Photo : SHIMAUCHI Risa

The landscape and disaster response at the foot of Mt. Hira

Kyoto Prefectural University **MIYOSHI Iwao**

Figure 1. The area around Mt. Hira as seen from above Lake Biwa (near Moriyama)

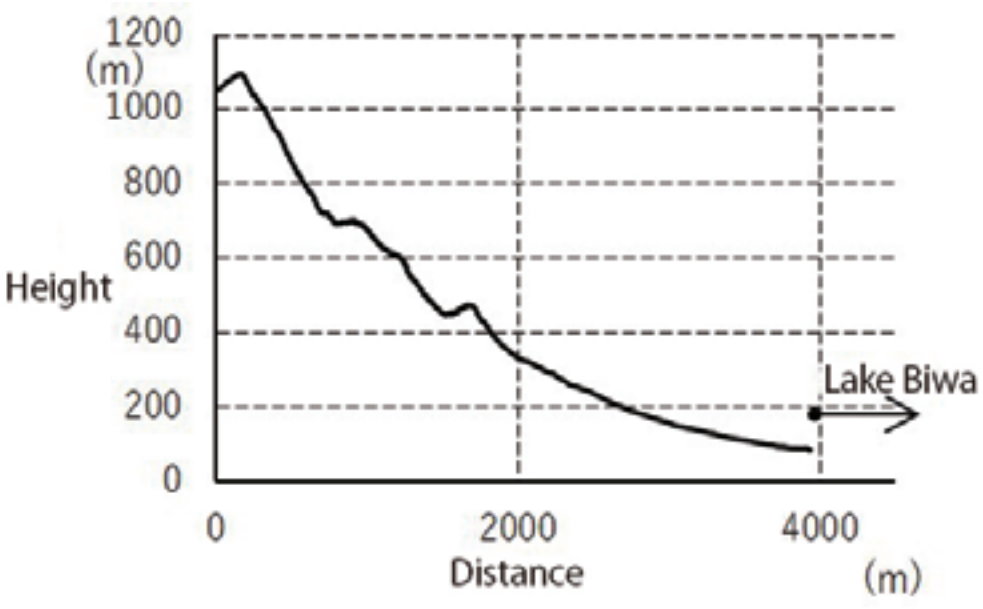

Figure 2. Vertical topography from Hira Mountains ridgeline to Lake Biwa shoreline near Moriyama

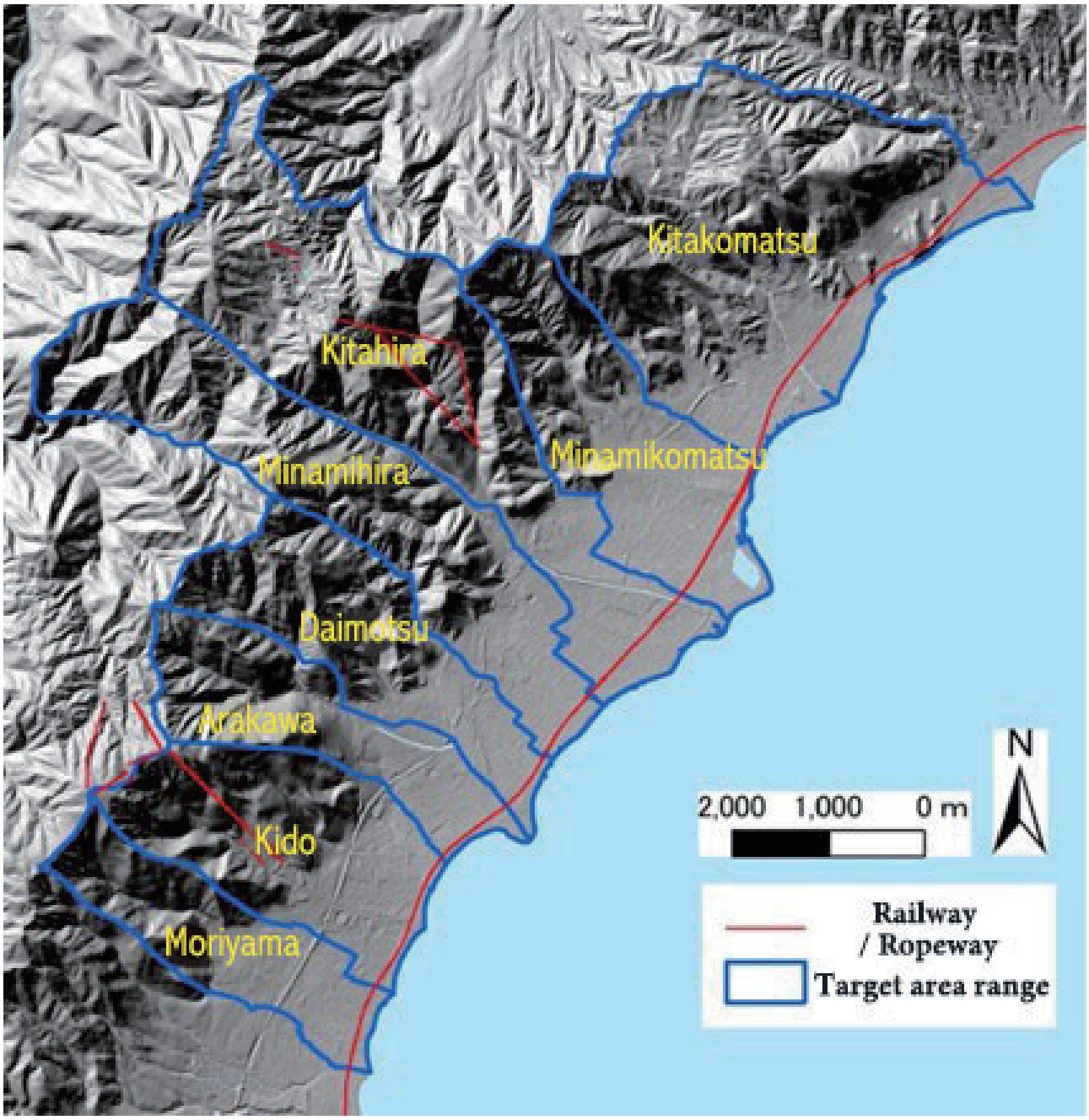

Figure 3. Scope of analysis

Outline of the topography at the foot of Mt. Hira

The western side of Lake Biwa has very little flat land that could be called plains. The Hira Mountains run north to south as if hugging the shoreline of Lake Biwa, and between the mountains and lake is only a narrow strip of gently sloping land (Fig. 1). Fig. 2 shows the cross-sectional form from the ridgeline of the Hira Mountains toward Lake Biwa. A steep sloping face of greater than 45°continues eastward from the ridgeline of the Hira Mountains at about 1,000 meters above sea level, and although the inclination gradually flattens as the height decreases, a slope with an angle exceeding 5°continues almost to the lakeshore. The slope has several ridges and valleys, and many rivers flow in parallel to Lake Biwa. Most of these rivers are mountain streams with a risk of mudslides; their lower reaches have been damaged by mudslides over many years. Repeated mudflows have flooded and accumulated at the mouths of the valleys, creating a large alluvial fan topography. Because the alluvial fan tends to suffer damage from mudslides and the soil is filled with rocks and stones and thus not suited to farming, it was used for forestry rather than residential or farming land. Moreover, until the construction of the Seta River Weir, a facility to regulate the water level in Lake Biwa, the water level rose with every heavy rain, causing submersion damage on low-lying flat land

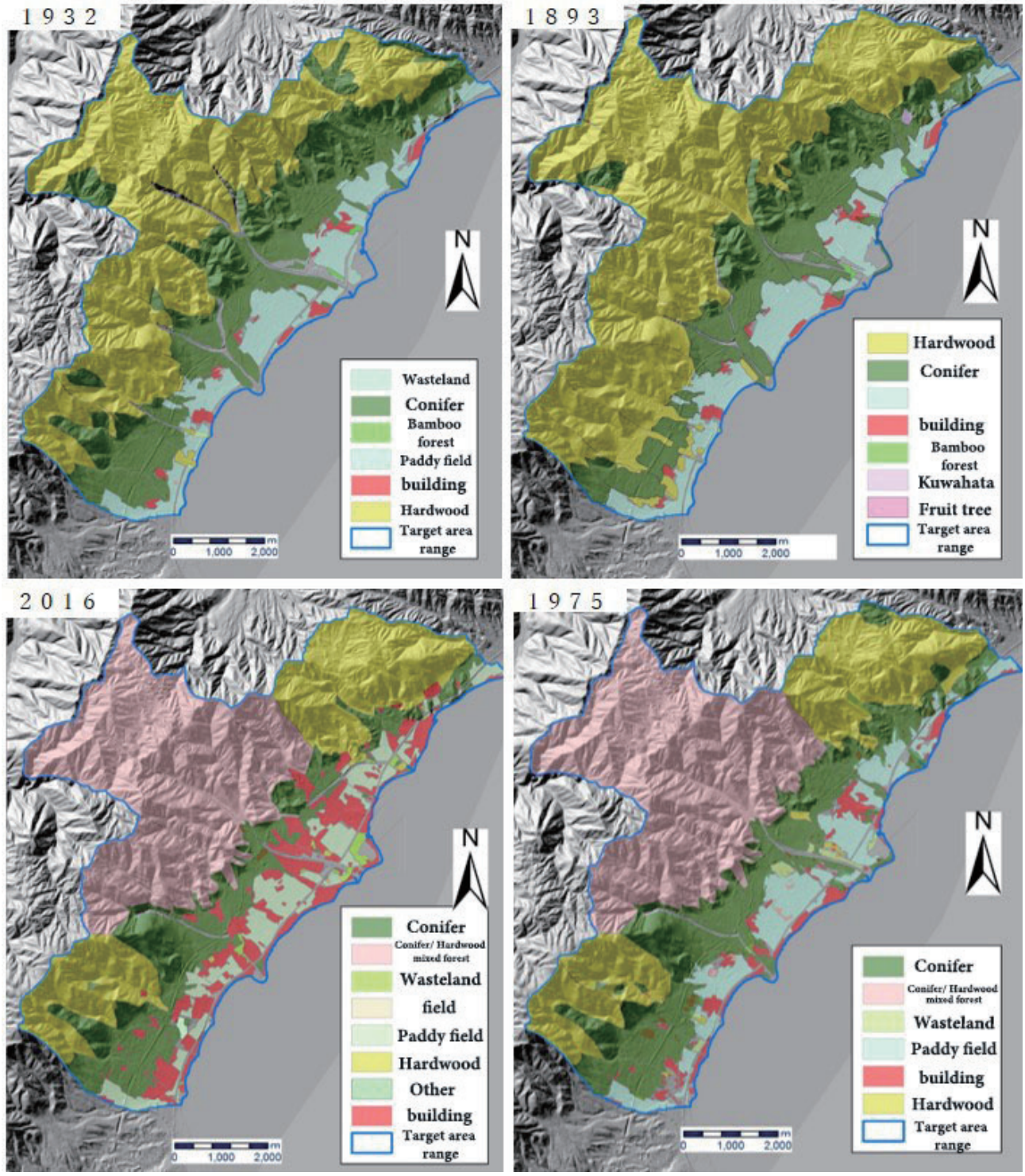

Figure 4. Changes in land usage in the area around Mt. Hira

along the shores. Settlements avoided risky areas near comparatively large rivers and in favor of land slightly higher than the lakeshore.

Changes in land usage at the foot of Mt. Hira

We will examine changes in the land usage within the scope shown in Fig. 3 from the late 19th century. The scope covers the settlements in the former villages of Kido and Komatsu (currently part of Ōtsu City). From the north, the hamlets of Kita-komatsu, Minami-komatsu, Kita-hira, Minami-hira, Daimotsu, Arakawa, Kido, and Moriyama are lined up facing the lakeshore, and each hamlet includes the land from the shore of Lake Biwa to the ridgeline of the Hira Mountains in its territory. We interpreted the land usage within this scope in 1893, 1932, 1975, and 2016 from map symbols on topographic maps. For the topography, we used the 5-meter mesh numerical topography information provided by the

Figure 5. Residential land developed on high land as holiday house sites

Geographical Survey Institute and merged it with land usage information in the geographic information system (GIS) to analyze how land was used on what types of topographies. We also incorporated mudslide damage warning areas into the GIS to represent damage risk within the scope under analysis and analyzed the topographic characteristics of the mudslide disaster warning areas and their relation to residential zones.

Fig. 4 shows the land usage in each period. In each period, broad-leaved or mixed coniferous and broad-leaved forests are distributed near the ridgeline, with coniferous forests near the foot and rice fields on the lakeshore. Residential land is located around the rice fields. Most of the coniferous forests are artificial forests of Japanese cedar (*sugi*) and Japanese cypress (*hinoki*); it seems that the forests that nearly reached the lakeshore along the rivers inland usage up to 1975 were pine. Many of the forests that continued along the rivers to the shores of Lake Biwa have in recent years been converted to residential land. The reasons for the distribution of forests along the rivers may be that the areas near the rivers flooded, preventing advanced land use, and were deliberately maintained as flood prevention forests.

Regarding the distribution of residential land, there was little change between 1893 and 1932, and the traditional land usage forms that continued from early-modern times seem to have been maintained. The change from 1932 to 1975 was that new residential areas formed in places that had been forest. We see that residential land greatly expanded from 1975 to 2016, centered on the new residential areas and original hamlet. This is considered closely related to the opening of the JR Kosei Line in 1974, which allowed this area to be developed for residential land as a bedroom community for Kyoto and Osaka. Regarding the 1975 usage of land converted into residential land from 1975 to 2016, 60% was forest, 27% were rice fields, 8% were fields, and 5% was wasteland. The reason for the increase in residential land where there were once forests could be because forests are easier than farmland to develop for residential purposes. As a result, residential land grew in areas that are higher and steeper than the residential land before 1975. The area and location of residential land hardly changed between 1893 and 1932, but from 1932 to 1975 it increased 2.4 times, and from 1975 to 2016it increased 2.64 times. The height of the residential land ranged between 84 and 154 meters above the shore of Lake Biwa; in 1975, the distribution range expanded to between 84 and 331 meters, with residential areas growing in high areas. This was also influenced by the development of high areas as locations for holiday houses in the 1970s. The highest residential land in 2016 was the same as in 1975, but residential land grew in range of 84 to about 300 meters above the shore of Lake Biwa. In terms of the slope of the residential land, the proportion of its area on gently sloping sites with an inclination of less than 5° to the total area of gently sloping land with an inclination of less than 5° in the entire analyzed area was about 4% in 1893 and 1932, 10% in 1975, and 22% in 2016, indicating the spread of residential land in gently sloping areas. Moreover, the proportion of residential land area on sloping sites with an inclination of at least 5° but less than 10° to the total area of sloping land with an inclination of at least 5° but less than 10° was only about 5% in 1893 and 1932, but 12% in 1975 and 34% in 2016, showing larger growth than for gently sloping land. This seems related to the abovementioned development of holiday house sites. In addition, while residential land grew along the shores of Lake Biwa, the stabilization of the water level in the lake thanks to the construction of the Seta River Weir is considered a major factor in the reduction of submersion damage.

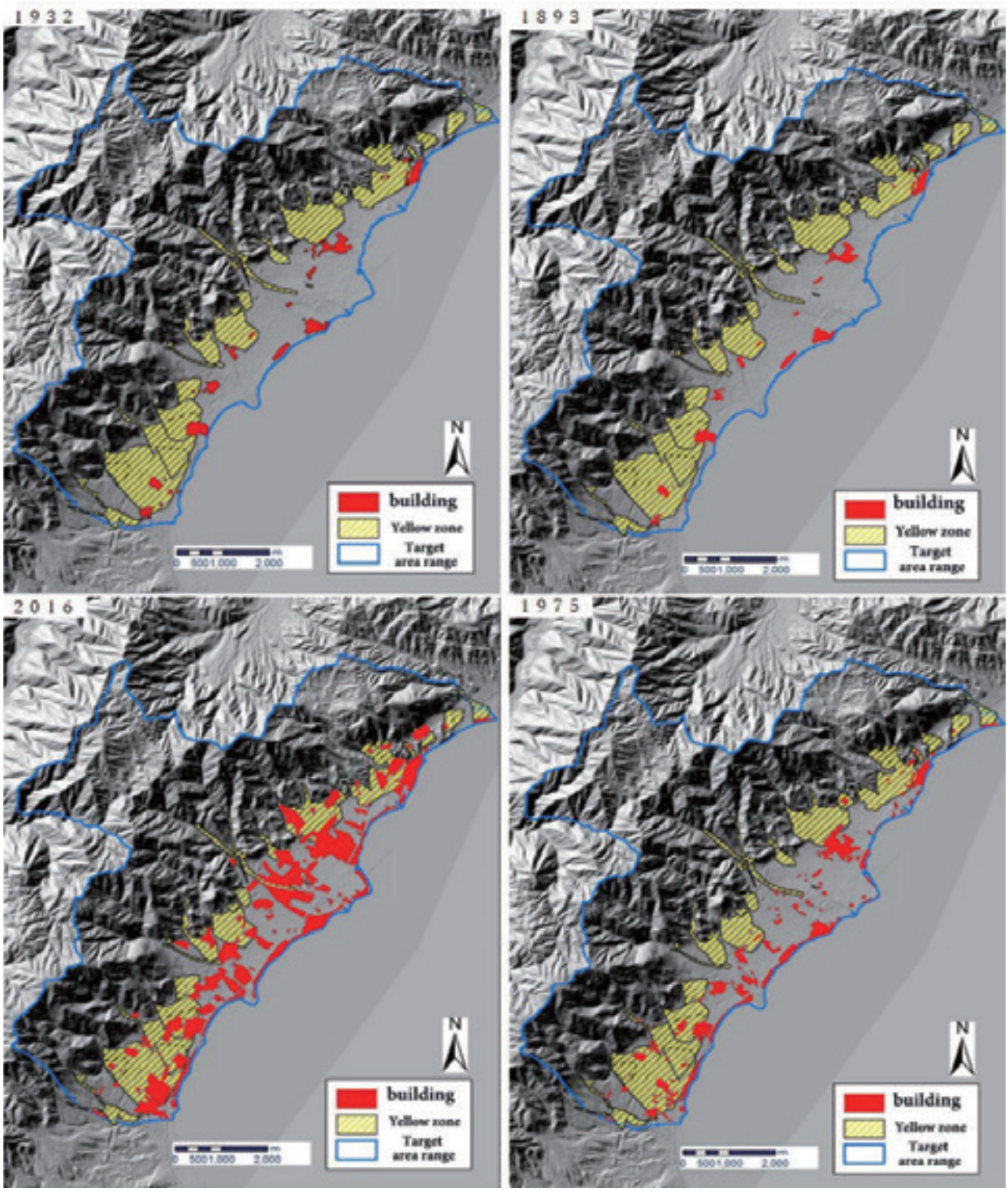

Figure 6. Distribution of mudslide disaster warning areas and residential land

The relation between mudslide disaster warning areas and land usage

Fig. 6 shows changes in the distribution of mudslide disaster warning areas (yellow zones) and residential land. Mudslide disaster warning areas are designated as being at risk of mudslide disasters including mudslides, landslides, and collapses. In 1893 and 1932, most of the residential land was outside the mudslide disaster warning areas, but even so, 25% of the residential land area in 1893 and 19% in 1932 was within these areas. This is because in places like Moriyama, which have the potential for large-scale mudslide disasters that only occur once every few centuries, disaster risks that cannot be evaluated using traditional knowledge based on experience were considered when establishing the areas at risk. From 1975, residential land within mudslide

Figure 7. Disaster prevention facilities in the Noriko Rive

disaster warning areas began to increase, and 26% of the total residential land area lies within this area. In 2016, even more, residential land was created in mudslide disaster warning areas, with 46% of the total residential land area lying within these areas. These areas spread from the valley mouths over the alluvial fans to the low flatlands in some parts. Regarding the height distribution, where 4.6 square kilometers of the region is below an elevation of 154 meters, residential land was distributed here until 1932. Most of this lies within the mudslide disaster warning areas, accounting for 55% of the total area. The zones between 155 and 331 meters, where residential land increased from 1932, have mudslide disaster warning areas of 3.1 square kilometers in total, accounting for 40% of these areas in the analyzed scope. On the other hand, examining the distribution of residential land by height from 2016 shows that the zones below 154 meters that also had residential land in 1893 have 4.8 square kilometers of residential land, and 1.4 square kilometers of this (equivalent to 29%) lie in a mudslide disaster warning area. The zones between 154 and 331 meters, where residential land increased after 1932, have 0.63 square kilometers of residential land, of which 0.43 square kilometers, or 68%, is residential land within mudslide disaster warning areas.

Disaster measures at the foot of Mt. Hira

Based on the land usage analysis, we learned that the areas established as residential land before the 1970s are in locations comparatively resistant to disasters. It is inferred that traditional knowledge, obtained from encounters with many disasters, was used in this case. In contrast, the development of residential land from the 1970s has not applied traditional knowledge, and the risk of mudslide disasters, in particular, does not seem to have been sufficiently considered. The forests near the peak of the alluvial fans can be expected to function as a buffer zone against mudslides, and it is necessary to be cautious about developing them.

In the area around Mt. Hira, places meriting the fear of water-related disasters are limited due to topographical characteristics. Nevertheless, the riverbeds of the lower reaches of the Hira and Ōtani Rivers are higher than the surrounding land; if the rivers break their banks, the environs will suffer damage from submersion and mudslides. The advanced development of this land was traditionally avoided, and it was left as forest or wasteland. However, today it is being converted into residential land. The risk from mudslide disasters requires the greatest caution in the area around Mt. Hira. In the rivers at the foot of Mt. Hira, erosion control projects and river improvements have progressed, and small to medium-level rain events, landslides, mudslides, and the like are less likely to cause damage. However, there is still the possibility of heavy rainfall or mudslide disasters that exceed the scale planned for disaster prevention facilities. We stromgly recommend reexamining the meaning of traditional land usage and thinking about disaster prevention.

Relationship between Eco-DRR and traditional disaster prevention technology

Kyushu University **SHIMATANI Yukihiro**

Photo 1. Satoyama forest (erosion control forest) in Moriyam

Introduction

We often encounter situations in which Eco-DRR and traditional disaster prevention technology are similar. This article discusses their relationship and outlines the traditional technology in Hira in Shiga Prefecture.

The concept of Eco-DRR

Eco-DRR is an idea stemming from international disaster prevention efforts. In particular, the Sendai Framework for Disaster Risk Reduction from the Third UN World Conference on Disaster Risk Reduction held in 2015 included the recommendation to "strengthen the sustainable use and management of ecosystems and implement integrated environmental and natural resource management approaches that incorporate disaster risk reduction." This clearly represents the relationship between ecosystem management and disaster prevention.

Produced through international debate, how is Eco-DRR defined? A statement on Eco-DRR by the Partnership for Environment and Disaster Risk Reduction (PEDRR), a partnership of more than 10 international organizations and NGOs formed in 2008 to promote Eco-DRR for the environment and disaster reduction, defines it as an idea that seeks to ameliorate disasters, which limit sustainable development, through ecosystem management. This is also emphasized by the UN World Conference on Disaster Risk Reduction

More clearly, the PEDRR states: "Ecosystem-based disaster risk reduction (Eco-DRR) is the sustainable management, conservation, and restoration of ecosystems to reduce disaster risk, to achieve sustainable and resilient development (Estrella and Saalismaa, 2013)." "Well-managed ecosystems, such as wetlands, forests, and coastal systems, act as natural infrastructure, reducing physical exposure to many hazards and increasing the socio-economic resilience of people and communities by sustaining local livelihoods and providing essential natural resources such as food, water, and building materials (Sudmeier-Rieux and Ash, 2009)." In other words, "ecosystem management not only offers an opportunity to strengthen natural infrastructure and human resilience against hazard impacts, but also generates a range of other social, economic and environmental benefits for multiple stakeholders, which in turn feed back into reduced risk outlines."

Eco-DRR

The sustainable management, conservation, and restoration of ecosystems to reduce disaster risk to achieve sustainable and resilient development (Estrella and Saalismaa, 2013).

Traditional land management technology

Land management technology enacted through the installation of artificial structures and/or the utilization and management of natural resources, while reducing disaster risk for sustainable regional maintenance (Shimatani).

Figure 1. Definitions of Eco-DRR and traditional land management technology

Photo 2. Foothills as seen from Hira Station

Traditional disaster prevention technology, traditional land management technology

Next, we consider the relationship between traditional disaster prevention technology and Eco-DRR. The term "traditional disaster prevention technology" may require explanation. From our perspective today, disaster prevention and the environment are considered as having separate functions; thus flood control forests, circle levees, open levees, and so on are viewed as water control facilities. However, is this view correct? Until early-modern times, were these facilities viewed as things that merely fulfilled disaster prevention functions? I do not think so.

Traditional technologies originated from thinking about the transfomation people wanted to make to particular areas (e.g., creating a forest that would prevent flooding, while also changing the land into fertile farmland and providing living materials). People then arranged structures and natural resources appropriately. Over time, these functions were improved and reinforced as the area was repeatedly struck by disasters and other events, resulting in the traditional technology we see today.

We are familiar with viewing things in a way that divides primary functions infavor of and creating more advanced individual functions (auguably based on reductionist thinking by modern science and technology). Perhaps traditional technology should be examined from a more multifaceted perspective.

Investigating traditional disaster prevention technology reveals that although different places may have functions to greater or lesser degrees, the technology is not merely disaster prevention technology. Rather, it is a comprehensive effort in the form of technology for regional or land management. In relation to civil engineering technology, the history of civil engineering up to the Meiji era investigated early-modern technology throughout Japan. Thanks to case examples from Shiga, I strongly feel that an analysis from the modern Eco-DRR perspective may provide the tools to excavate, evaluate, and research new case examples as complex, multifaceted district management technology.

Here I analyze the relationship between traditional land management technology and Eco-DRR. Traditional land management technology is defined as "land management technology enacted from a comprehensive perspective for sustainable regional maintenance while reducing disaster risk through the installation of artificial structures and/or the utilization and management of natural resources." This definition is similar to that of Eco-DRR presented above. Accordingly, case examples of traditional land management techniques that reduce disaster risk (I believe that almost no traditional land management technology is not aware of disaster risk reduction, but the evidence of this will have to await further research) and use and manage natural infrastructure can be considered to be aligned with Eco-DRR. If artificial structures are added (e.g., open levee + a flood prevention forest), this could be called hybrid Eco-DRR.

Concerning traditional land management technology that involved only artificial structures: Until early-modern times, traditional structures were constructed of natural materials such as stone, earth, and trees. Compared to modern technology made of concrete and steel, they were built using methods closer to nature. Including this practice in Eco-DRR is still open to discussion. If an ecosystem-maintenance perspective is added, such as using wooden materials to ensure sustainable mountain and forest management, this could be called Eco-DRR.

As shown below, some traditional technology can be included in the category of Eco-DRR, while others cannot.

Eco-DRR in Hira, Shiga

Arriving at Hira Station and looking toward the mountains, you see a forest belt on the alluvial fan sections of the mountains' skirts, and below these, residential and farming areas. Looking at the slope, it is clear that this mountainous region actively produces earth and sand.

Traditional technology in Hira is Eco-DRR technology, which is used from the mountainous region to the alluvial fan area, to deal with mudslide disasters.

	Naturalness	Disaster prevention	Blessings and Benefits
Erosion control forest	2nd-degree forest	Accumulation space for mudslides	Use as satoyama
Flood control forest	Artificially planted forest (bamboo, camphor, etc.)	Flow speed reduction, debris trap, sediment prevention	imber, bamboo shoots
Shishigaki	Artificial, stone, porous	Suppress landslides	Prevent animal damage
Stone embankment for watercourse diversion	Artificial, stone, porous	Avoid mudslides	Outlet for water supply
Open levee	Artificial, earth or stone	Flood drainage, fixing channels	Accumulation of nutrients

Table. Traditional element technologies in Hira and their functions

Traditional technology to prevent erosion damage was described in books in the early-modern period. Sand controls built in the Edo period in the Dōdō River and Bessho in the Fukuyama fiefdom in Hiroshima are well known. The Fukuyama fiefdom prevented mudslide disasters through a series of sand controls (erosion control dams) built from stone. Coupled with the beauty of their form, they have become materials for reinvigorating the region. Of course, they retain their disaster prevention functions today. However, although the historical value of each structure has been evaluated, they have not been fully assessed in terms of their disaster prevention functions or as traditional technology that includes the blessings of nature. They cannot be evaluated strictly as Eco-DRR because they are stone sand controls.

Interestingly, the traditional method in the land along the Ōtani River in Hira has been combined with complex methods with a view toward the sustainable development of the region.

The watercourse of the channel of the Ōtani River is permanently fixed to the south side of the alluvial fan at its peak. It is believed the watercourse was fixed in this way to avoid flooding in the hamlets of Daimotsu and Minami-hira downstream. In addition, a large embankment of stone was constructed where the watercourse changes direction; this directs the potential flood path. The embankment where the watercourse direction changes includes a water outlet, which has the added water supply function of directing water to the hamlets and farmland downstream. These systems are known as traditional alluvial fan treatment technologies. The downstream face (the inner side) of the embankment has an extensive forest zone considered an erosion control forest for preventing mudslides. Here, the forest zone was made to function as a *satoyama* (semi-natural areas that coexist with nearby populated areas) forest. The hamlets are surrounded by stone *shishigaki.* These are large for *shishigaki*, and likely had the effect of preventing flooding from upstream. Moreover, old aerial photographs show wide forest zones along the rivers on the plains, which functioned as flood prevention and *satoyama* forests.

As is evident, the traditional erosion control technology in Hira combined several structures including watercourse diversion, stonework embankments, water outlets, erosion control forests (*satoyama* forests), *shishigaki*, and flood control forests. This comprehensive system reduced disaster risk throughout the region and harnessed nature's blessings. It is astounding that Japan had such an advanced, yet unknown, Eco-DRR system in place. I anticipate that future research will elucidate the quantification of disaster prevention functions and natural resource values, and firmly believe that Eco-DRR will come to be appreciated worldwide.

The traditional technology I saw in Shiga is the very definition of Eco-DRR. Traditional technology is formed in response to the topography of the land, the form of disasters, and state of natural resources. While it tends to be unique, I suggest we might find common, consistent technical thought

Photo 3. Stone embankment near Ōtani River

and methods. A panoramic view of these technologies has not yet been clarified, but this case example demonstrates the depth of traditional technology.

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Scenic photos from local conference investigation (December 10, 2018)

Photo 4. Water supply aqueduct in Moriyama

Photo 7. Stone embankment near Hachiman Shrine

Photo 5. Yotsugo River, stone embankment

Photo 8. Hyakken (100-*ken*) Embankment

Photo 6. *Satoyama* forest in Minami-komatsu

Photo 9. *Shishigaki* in Arakawa

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Eco-DRR as Learned from Local History

Traditional and Local knowledge of Eco-DRR at the foot of Hira Mountains

Edition August 2020

Publisher Research Institute for Humanity and Nature
457-4 Motoyama, Kamigamo, Kita-ku, Kyoto
603-8047, JAPAN
TEL：+81-75-707-2100
FAX：+81-75-707-2106
URL：https://www.chikyu.ac.jp

Project Research Institute for Humanity and Nature
Eco-DRR Project
Research and Social Implementation of Ecosystem-based Disaster Risk Reduction as Climate Change Adaptation in Shrinking Societies

Design SHIMAUCHI Risa

Editing SHIMAUCHI Risa, NAKAI Minami, Gavin Walton, et al.

Print Hokuto Print Co., Ltd.

ISBN 978-4-906888-77-1

Inter-University Research Institute Corporation
National Institutes for the Humanities
Research Institute for
Humanity and Nature