

研究テーマ

次世代に資する人と森林の関係性の構築にむけて：
インタラクティブ・リサーチ・プログラムと建築的施策の開発
（北海道十勝地方におけるケーススタディ）

Research Title

Towards building people-forest relationships for the next generation: Development of an interactive research program and architectural interventions (Hokkaido, Tokachi Case Study)

再読レポート

（「レイヤー1：再読」に関する結果のまとめ）

The Rereading Report

(Observations and the analysis of “Layer 1: Rereading”)

作成者・Authors

memu earth lab
東京大学 / The University of Tokyo
森下 有 (Yu Morishita)
ウンル ハンデ (Hande Ünlü)

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Preface

In this report, the study's objectives and the research roadmap are explained in “Chapter 1: Research Background.” The study consists of three layers, and this report is divided into two parts to present the findings from the “Layer 1: Rereading”.

“Chapter 2: Rereading Part 1: Initial Analysis and Hypothetical Summary” introduces the process of data collection, data analysis, and the hypothetical interpretation of the research question based on the findings.

In “Chapter 3: Rereading Part 2: Fieldwork Notes”, memu earth lab. has compiled the transcripts of conversations during the post-fieldwork review (online) with participants of the Rereading Fieldwork “Forest in Winter” conducted on February 18, 19, and 20, 2022.

Finally, in Chapter 4, the results of the analysis and fieldwork observations are presented. Additionally, following the findings, the future work planned to be conducted next (within Layers 2 and 3 on the research roadmap) is explained in detail.

Acknowledgments

We would like to thank all of the interviewees and participants in the re-reading fieldwork workshop for their valuable knowledge and input on this study. We would also like to express our sincere gratitude to the local governments in the surveyed areas and the survey participants who understood the purpose of this study and willingly cooperated with us. We hope this research will help build long-lasting friendships between experts and local people.

CHAPTER 1: Research Background

Research Background and Objectives

The total area of forest land in Japan accounts for 67% of the national land. However, despite this wealth and hundreds of years of silviculture history, today, Japanese forestry faces socio-economic stagnation [1]. While the growing gap in the people-forest relationship causes the depopulation and economic recession of many forest communities, this research aims to contribute to revitalizing the people-forest relationship by creating a sense of belonging in such communities. To gain a multi-dimensional perspective of the situation, we prioritize working with the local community through conducting a case study at Taiki town (and its neighboring forest communities) in the Hokkaido region. Our work suggests approaching the objective of revitalizing the local people-forest relationship by proposing architectural interventions (the concept of the suggested architectural interventions is explained in Chapter 3).

Earlier research shows that the continuous participation of local people in the development of design proposals creates a sense of belonging to the place [2]. Therefore, it is essential to communicate with the locals during the design development period. Finally, our work proposes a research roadmap conducting continuous, interactive research addressing the needs of the place together with the community (see Fig. 1). In addition, prospective solutions for revitalizing the people-forest relationship shall suggest opportunities for the local children to experience natural forests and promote their growth into healthy and nature-aware adults [3].

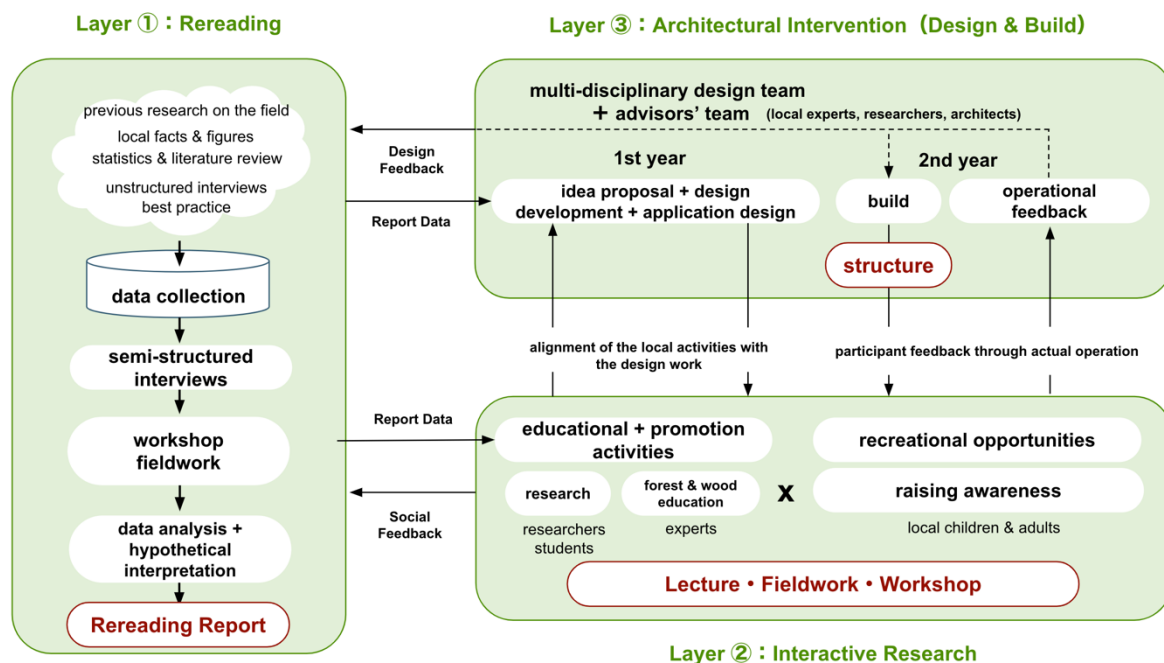


Fig. 1 Research Roadmap to Develop a Sustainable Circle of Community and Experts Involved Projects

Research Roadmap and the Methodology

The research roadmap was developed upon three layers: “Layer 1: Rereading”, “Layer 2: Interactive Research”, and “Layer 3: Architectural Interventions”. As Fig. 1 illustrates, our three-layered roadmap suggests activities performed consecutively as well as simultaneously and generate iterative cycles based on feedback obtained at each Layer. Our methodology is explained in detail:

Layer ①: Rereading

The initial data collection in this research is summarized and illustrated as Layer 1 in Fig.1, which focuses on “Rereading” the place. In other words, the focus is on understanding the place through its community, its resources, geo-cultural inheritance, and analyzing the place's specific socio-economic issues through data collection (literature review, research on the local facts, and so on). Based on the collected data, we designed semi-structured interviews, which were conducted from October to December 2021 (explained in detail below). After analyzing the initial findings from the interviews, the workshop and fieldwork to re-read the people-forest relationship at Memu were organized. During the two-day workshop, the participants shared their opinions about the research topic and discussed the initial findings. Details about the workshop exercises are presented in this chapter below. In addition, the discussions from the fieldwork and post-fieldwork reviews (online) with the participants are introduced in the next chapter under the “Fieldwork Notes.”

Based on the outputs of Layer 1: Rereading, we've gathered our initial observations under this “Rereading Report.” We hope this report will shed light on critical issues that may contribute to developing locally sourced architectural designs that can act as a unifying element between the forest and the people of Taiki town and its close region.

Layer ②: Interactive Research

In Layer 2: Interactive Research, we aim to continue rereading the place while organizing educational & promotional activities to raise local people's awareness of forests and the use of local wood. The Interactive Research activities are planned to be conducted around the year, offering lectures and varied hands-on experiences by local experts in forests (ex: Taiki town, Ikeda-town) and suitable spaces in urban areas (ex: Obihiro-city). This way, we expect to increase the chances of gathering with the community to hear their feedback while creating continuous engagement opportunities with the forest to raise awareness. These events provide a valuable source of feedback to be considered in future design proposals as part of Layer 3: Architectural Interventions.

Layer ③: Architectural Interventions

In parallel to the interactive research activities, we plan to conduct Layer 3: Architectural Interventions. During this phase, a multi-disciplinary design team will be established based on selection through a call for collaborative research-design-build. During the research and design development period, the designers will be given opportunities to travel to the place multiple times, attend the interactive research events (explained in Layer 2), and meet the local experts and community to hear their opinions. The current place-specific issues and social and cultural properties must be well understood and adequately addressed in the design by interdisciplinary approaches. Moreover, the proposals are encouraged to create use of local resources, traditional

knowledge, and motives.

Finally, this collaboratively created design will be built and presented for the local people's use during future forest events and activities (iterations in Layer 2). During these events, the interaction between the local people and the architecture will be recorded, and the feedback will be grouped as [Design feedback] and [User feedback]. The design feedback will improve the technical aspects of the architecture during the next proposal development stage, while the user feedback will provide a benchmark to create the following educational & promotional activities for raising awareness of the issue.

Chapter 2: Rereading Part 1: Initial Analysis and the Hypothetical Summary

Outcomes of “Layer ①: Rereading”

The research work in Layer 1 is divided into three phases: data collection, data analysis, and the hypothetical interpretation of the initial observations, shown in Fig. 2.

Data Collection	① Background research
	↓
	② Preparing for the interview
	↓
	③ Semi-structured interviews
	↓
Data Analysis	④ Creating the transcripts (quotes)
	↓
	⑤ Coding the quotes
	↓
	⑥ Grouping the codes under themes
	↓
	⑦ Interrelation pattern between critical Issues
	↓
Hypothetical Interpretation	⑧ Evaluating the priority degree of the critical issues
	↓
	⑨ Hypothetical summary of regional problems

Fig. 2. The Flow of Research Data Collection, Analysis, and the Hypothetical Interpretation

1- Data Collection

Initially, our work focused on data collection of tangible and intangible elements that define a place by literature review research on local facts and figures. Next, based on the findings, the question items of the semi-structured interviews were created in the step of “② Preparing for the interview” (see Fig. 2). Thirteen experts participated in the interviews from October to December 2021. The interviewees were selected due to their diverse knowledge and experience about the region, people-forest relationships, and forest management. In detail, the profile of the interviewees was as follows:

- Three Taiki town hall members (deputy mayor of Taiki and two members from the Planning and Commerce Division)
- CEO of a forest infrastructure company from a different region in Japan with many years of experience of forestry in other countries
- CEO of a local forestry company
- CEO of an architecture (shrine carpenter) firm from the region
- A senior project manager from a local construction company
- An institute manager and one member from the University of Tokyo, Fuji Iyashinomori Woodland Study Center
- An assistant professor from the University of Tokyo research forest at Hokkaido,
- Three members of a local forest development cooperation team from Ikeda town

For each interview, the questions were restructured according to the interviewee's profile. Each interview covered free discussion as well. Next, the collected data and interview findings were analyzed through the steps of “Data analysis ④~⑦”. Later, the findings were discussed during the workshop with the participants (explained in detail in Chapter 3) on the 1st day of the workshop at Memu, Taiki town. On the 2nd day of the workshop exercise, the “⑧ Evaluating the priority degree of the critical issues” (see Fig.2) was conducted with the participants explained below in detail.

2- Data Analysis

Varied subjects discussed during the interviews were analyzed, and outcomes were explained and discussed during the 1st day of the workshop. Below is detailed information about the analysis process and the findings.

④ Creating the transcripts (Quotes):

Initially, interview notes were converted into transcripts. Each interview transcript was summarized into quotes. Each quote represents the essence of the addressed issues during the interview. In total, 108 quotes are listed as the summary of the frequently highlighted factors shaping people's relationship with the forests. These quotes, representing the critical factors, were mostly place-specific but not limited to the place and also summarized the lessons learned from the best practices.

⑤ Coding the quotes:

Secondly, an inductive approach was applied to interpret the quotes effectively. The similar quotes were listed together under the same code. Decision-making about the suitable code was based on the quote's core value: what it represents and its aims. The common sense generated by the core value of a quote led to the coding process [4], [5].

⑥ Grouping the codes under themes:

Following the theoretical coding process described above, the classification of problem themes was done by grouping similar codes together. In total, ten codes were identified from the interviews. These codes are represented as "themes" of the critical issues and are listed in Table 1 and explained in detail below:

TABLE 1
TEN THEMES OF THE CRITICAL ISSUES

No	Theme
1	Financial management
2	Recreational opportunities
3	Forest education / raising awareness
4	Architectural use of the local wood
5	Forest infrastructure
6	Forest safety
7	Production willingness and ability
8	Forestry workforce
9	Local community involvement
10	Utilizing unused timber

- 1) **Financial management:** This theme represents the comments and facts about the economic value created by forest resources such as wood and plants. Additionally, efforts in Taiki for the creation of sustainable financial resourcing such as forest recreation were listed here as well as the government funds and incentive programs. Some of the interviewees mentioned the adequate financial funding provided by the local government. They have proposed a three-year development plan for a forest area that wasn't covered by the municipality's development plan. The same interviewees also mentioned that the interrelation between developing a recreation forest and sustainable financial resourcing is a critical issue for the continuation and development of the business.
- 2) **Recreational opportunities:** During the interviews, some interviewees mentioned that during forest visits, people enjoy shared experiences, such as tasting edible forest plants, the most, and that is what strongly encourages them to visit again. Quotes similar to the shared experiences were listed under this theme. This is because such activity/opportunity

takes occurrence as an event. In the case of eatable plants being picked to do business, it was listed under Financial Management because the core value of the quote was aiming for financial gaining.

- 3) **Forest education/raising awareness:** Local forest and wood education efforts were mentioned in seminars and activities during the interviews. Observed local efforts initiated by the local government and individuals were grouped under this theme. Moreover, interviewees explained their efforts in the region related to raising nature awareness at young ages (mainly under 12 years old), such as regular visits to the forests, learning plant names and seeking them in the forest, etc. They added that there is a great interest from the young children in learning about and playing in forests. Often, it's the children encouraging parents to visit forests together. Interviewees agreed that such awareness at a young age is critical for caring for and working for the forest-people relationship.
- 4) **Architectural use of the local wood:** The reasons behind using (and not using) the local wood, as well as the methods and difficulties with the architectural use of local wood versus imported wood explained by the interviewees, were listed under this theme. In summary, imported timber dominates the architectural use of wood because of its affordable cost and accessible supply.
- 5) **Forest infrastructure:** This theme listed local and national facts and lessons learned from best practices concerning forest roads, access points, essential architectural structures (such as toilets, shelters during rain, rooms for rest and warm-up, etc.), and other infrastructure that might ease visitors' experience. Some of the stakeholders who organize recreational events in forests mentioned that sufficient infrastructure is significant for engaging visitors, families in particular.
- 6) **Forest safety:** Providing and protecting a safe environment is critical during the interaction between people and the forest. Controlled environment against the intervention of wild animals and close contact with poisonous plants are some of the issues most interviewees highlighted. Before bringing visitors into the forests, the staff makes last patrolling throughout the designated walk paths to detect any changing environment, such as a fallen tree or the appearance of wild animals. Particularly, in West Tokachi, brown bears live in the forests. Due to the expansion of residential areas toward forests in years, the natural habitat of brown bears has become closer to humans. Precautions and other taken actions for the safety of forest animals, flora-fauna, and visitors are listed under this theme.
- 7) **Production willingness and ability:** Previous research shows that using local materials for buildings creates a feeling of belongingness to the place [2]. Moreover, using local materials and involving the local community amateurs in the wood fabrication process and production fosters their knowledge, skills, and sense of belonging [6], [7]. During the interviews, comments, opinions, and supporting efforts were mentioned related to the locals' willingness to participate in production, their abilities, and the supporting role of fabrication technology. Especially, young locals during the interviews said their initiations of using technology acquiring machinery to involve other locals in wood processing. In addition, an architect highlighted the critical importance of revitalizing the teaching methods of traditional

Japanese carpentry skills and knowledge to the next generations. He added that young people are interested in forest and wood processing if the teachings are addressed through effective methods and tools. Interviewees frequently mentioned the necessity of new approaches to trigger production willingness and generate ability as critical issues.

- 8) **Forestry workforce:** This theme covers the facts and comments about the declining workforce in the local forestry business. Additionally, the quotes about the lack of a young population to continue the forestry works were also listed under this theme.
- 9) **Local community involvement:** This theme represents the comments and facts about communication between the local community and forest stakeholders. During the interviews, several effective methods and advice were mentioned to attract the local community into the events, activities, or recreational opportunities in the forests. Keeping a small number of visitors per group is recommended in the forest to keep a close eye on everybody's safety and keep the explanations hearable to everyone and experiences easy to share for every participant. Local experts and researchers agreed that small groups create better connections between the participants and enriches the experience.
- 10) **Utilizing unused timber:** As explained in the introduction chapter, West Tokachi forests have a large amount of unused timber left behind after thinning. Due to climate change, its negative impacts, and rising environmental awareness, the world is now focusing on the effective and efficient use of local materials more than ever before. Adding value to the left-behind timber has been a field of effort in practice and research [7]. Interviewees were asked about the local facts if the left-behind timber is later used or unused and the reasons behind not using them. One of the local architects mentioned that he uses left-behind timber as non-load-bearing elements in his projects. He added that using wood with its natural shape adds originality to his design and adds value to rough timber, which is usually left behind due to its shape.

⑦ Interrelation pattern between critical issues:

In addition to identifying the critical issues under ten themes, the interrelations between the themes were analyzed next. The aim was to identify patterns of interrelation between the issues. All listed quotes within the same theme were evaluated based on the context the interviewees highlighted them to reveal their secondary links. Initial findings are illustrated in Fig. 3.

The circle sizes represent the number of quotes listed under the theme.

The secondary links (interrelation), shown by arrows in Fig. 3, were found to be a “one-way link” or a “two-ways link.”

For instance, more than 20% of the quotes about “Utilizing unused timber” were mentioned together with “Financial management,” such as this quote: “*Processing unused timber is costly, earnings do not cover the expenses.*” However, in the case of “Financial

management,” there was no quote mentioned about “Utilizing unused timber.” This interrelation is interpreted that although “Utilizing unused timber” generates facts about “Financial management,” it doesn’t occur happening vice versa. Hence, we explain the interrelationship between these two themes as a “one-way link.”

On the other side, findings showed that more than 70% of the quotes under the theme of “Architectural use of the local wood” were linked with “Financial management” and vice versa. The interrelation in between was defined as a “two-ways link.” Another strong “two-ways link” was found between “Forest infrastructure” and “Recreational opportunities” at 69% of the quotes. It was followed by 67% of the quotes related to the “Forest education/raising awareness” having a “two-ways link” with “Recreational opportunities”

In light of observed interrelations, it is interpreted that financial resourcing and economic gain are the frequent causes of using and not using the local wood architecturally.

In addition, the “Recreational opportunities” provided in the forests, such as hands-on experiences or educational excursions, were observed to have a notable dependency on sufficient forest infrastructure.

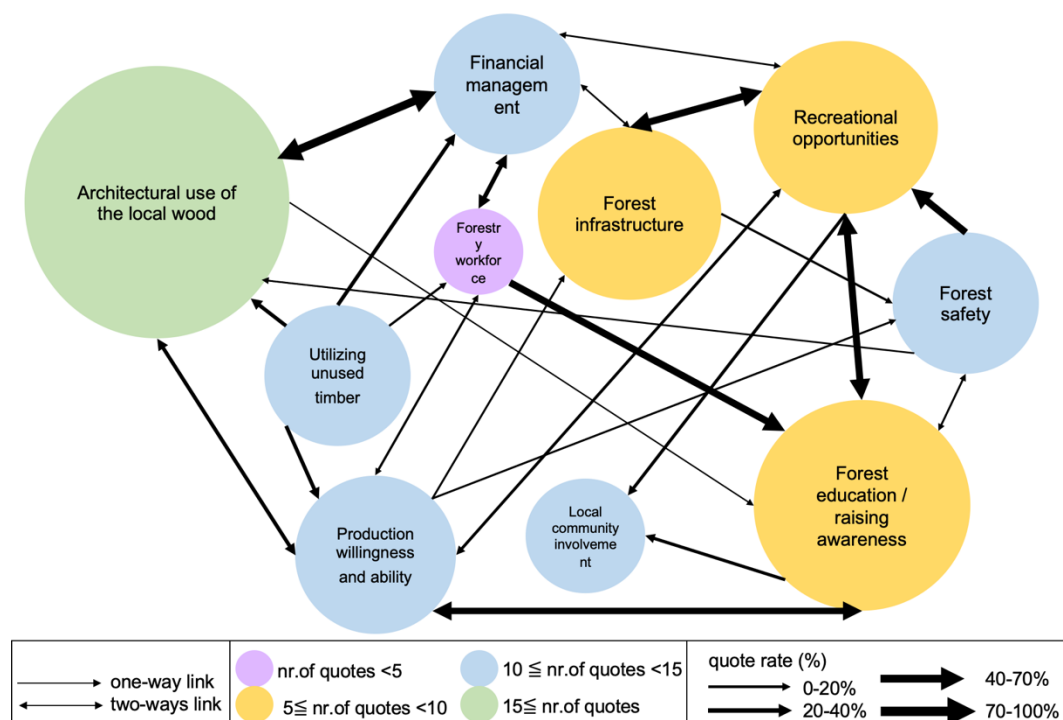


Fig. 3. Interrelations Between Critical Issues

Likewise, the observed link between “Recreational opportunities” and “Forest education / raising awareness” is interpreted as in-forest experiences (such as tasting plants, cutting wood, etc.) being effective ways of raising awareness of the locals about forests.

3- Hypothetical interpretations

The results of the data analysis are evaluated through a workshop at the stage of “⑧ Evaluating the priority degree of the critical issues” in the research flow shown in Fig. 2. Later, the results are summarized at “⑨ Hypothetical summary of regional problems” below. The feedback provided by the participants at the workshop that was conducted simultaneously with the fieldwork was used as the backbone of the interpretation.

⑧ Evaluating the priority degree of the critical issues

After the key issues were summarized under the above ten themes, an exercise to scrutinize them was conducted at the workshop "Re-reading the Relationship between People and Forests" held in February 2022. During the workshop, the relationship between people and forests was discussed from various perspectives. In addition, participants visited local forests and engaged in dialogue with individuals and companies involved in wood processing, forest education, and recreation in the Tokachi region (the Rereading Fieldwork: Forest in Winter, explained in Chapter 3). The opinions and experiences shared there led to a deeper and more relative understanding of each theme and its context by the participants. While all themes were very important, some were given relative priority because of the study's goal of revitalizing the relationship between local people and the forest.

The comparison was realized by ranking each theme over the other from 0 to 2 as shown in Table 2.

TABLE 2
THE PRIORITY RANKING MATRIX OF THE TEN THEMES

2 Pts. : Left criteria is more important than top criteria 1 Pts. : Left criteria and top criteria are equal 0 Pts. : Left criteria are less important than top criteria	Financial management	Recreational opportunity	Forest education / raising awareness	Architectural use of the local wood	Forest infrastructure	Forest safety	Production willingness + ability	Forestry workforce	Local community involvement	Utilizing unused timber	Absolute weight	Normalized Weight	Priority Rank
Financial management		1	0	2	0	0	1	1	0	1	6	7%	6
Recreational opportunities	1		1	2	0	0	2	2	1	2	11	12%	5
Forest education / raising awareness	2	1		2	0	2	2	2	1	2	14	16%	3
Architectural use of the local wood	0	0	0		0	0	1	2	0	1	4	4%	7
Forest infrastructure	2	2	2	2		1	2	2	1	2	16	18%	1
Forest safety	2	2	0	2	1		2	2	2	2	15	17%	2
Production willingness + ability	1	0	0	1	0	0		1	0	1	4	4%	7
Forestry workforce	1	0	0	0	0	0	1		0	1	3	3%	8
Local community involvement	2	1	1	2	1	0	2	2		2	13	14%	4
Utilizing unused timber	1	0	0	1	0	0	1	1	0		4	4%	7

As a result of the comparative evaluation, the workshop participants agreed that "Forest infrastructure" prioritizes the others. During the discussions, it was often mentioned that sufficient infrastructure, such as the adequate amount and network of forest roads, access points, toilets, and break areas, are essential urgent necessities to give visitors an easy and safe experience. Also, the forest infrastructure is agreed to contribute to the realization of forest education through opportunities and hands-on experiences in natural forests.

Following the infrastructure, "Forest safety" was evaluated as the next theme to be adequately provided in place-specific proposals to revitalize the people-forest relationship. And next, the third priority was given to the theme of "Forest education / raising awareness." The remaining themes were given priorities, as shown in Table 2.

⑨ Hypothetical summary of regional problems

In "Layer 1: Rereading", various local facts were examined not only based on literature reviews but also based on interviews with locals, talking to the town management and analyzing the findings in a workshop with experts cross disciplines using the above-explained steps of the research flow (see Fig. 2). This process has allowed us to discuss the identified critical issues with a broader perspective as aimed.

According to the initial observations, "Forest infrastructure" showed a higher priority on the other factors required for revitalizing the people-forest relationship.

Additionally, the interrelation pattern analysis between the critical issues also backed the fact that "Forest infrastructure" is strongly linked with the realization of "Recreational opportunities" in forests. On the other side, organizing "Recreational opportunities" in a forest seemed to be strongly correlated with "Forest education/raising awareness" provided to the locals.

In the direction of the above-mentioned findings, our hypothetical interpretation is summarized as:

"for an effective interaction between locals and the forests, providing physical infrastructure with adequate safety measures are inevitable and essential for continuous efforts on forest education/raising awareness be performed to trigger their stepping into the forests."

Furthermore, the interrelationship pattern illustrated in Fig.3 provides a visual representation of how critical aspects of the study are connected, demonstrating the necessity of using a multidisciplinary approach to suggest architectural design and its user story as proposed for the "Layer 3: Architectural Intervention" in this study.

Conclusively, the introduced ten themes of critical issues, their interrelation pattern, and their degree of importance to the community are not limited to this study. Future

“rereading” efforts are required continuously to provide not only a broad perspective to the subject but also to respond to the dynamic changes of the place. In parallel, the findings shall form a hypothetical benchmark for future revitalization proposals.

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Chapter 3: Rereading Part 2: Fieldwork Notes

The literature review and interviews which are examined in Chapter 2, and the re-reading workshop that took them as its starting point in light of local specific issues, have confirmed an abstract direction. In the rereading fieldwork conducted in parallel with the workshop, specific issues were touched upon by entering local forests in the deep snow with local officials, and physical experiments were conducted. Some of the issues were more general, but they were not omitted because they were concerns that arose in the course of the series of fieldwork.

Rereading Fieldwork Note on Forest in Winter 20220218-0220

This fieldwork note was compiled by memu earth lab based on conversation transcripts in the post fieldwork review (online) to those who participated in the Rereading Fieldwork "Forest in Winter" on February 18, 19, and 20, 2022.

*Photographs shown are a mixture of those taken by the participants.

Fieldwork Participants

Osaka Nursery Co., Ltd. M. Matsumura, S. Kiyose

<https://osakaringyo.com/>

Shrine and temple design and construction, Okagesama Corporation. M. Sugawara

<https://okage-sama.com/>

Minotake Forest Works (Ikeda Town Regional Development Cooperation Team).

C. Kawase, N. Fuke, G. Tonsho

<https://minotakeforestworks.com/>

The University of Tokyo, Fuji Iyashinomori Woodland Study Center, Laboratory of Forest and Human Society Relationship. H. Saito (Director of the Center), J. Saito (staff at the Center)

<https://www.uf.a.u-tokyo.ac.jp/fuji/>

The University of Tokyo, Field data Research Center, Laboratory of Forest and Human Society Relationship. A. Fujiwara

<https://www.uf.a.u-tokyo.ac.jp/fdrc/>

The University of Tokyo, memu earth lab. Y. Morishita (organizer)

<https://memuearthlab.jp/>

Fieldwork

[Rereading Fieldwork 20220218-0219 Rereading Forest](#) (Google Map)



Fieldwork 1: Forest at Omori (Ikeda town, Omori region)

- Management scale: 34.96_ha
- Town (municipality) entrusted with the management of privately owned forest
- Forest left unattended for 50 years (the area that was clear-cut 50 years ago and subsequently turned into secondary broadleaf forest, mixed with larch forest area)
- Long season multiple thinning (self-thinning) forestry

Fieldwork 2: Forest at Kimonto (Taiki town, Seika region)

- Management scale: 150 ha
- Private forests
- Wetland consists of 5 main areas: 50-year-old forest (mixed forest with *Abies sachalinensis* plantation and dominated by *Quercus crispula*), 80-year-old forest (mainly hardwoods), wetland forest, larch forest that was clear-cut several years ago and reforested.
- A mixture of small-scale clear-cutting and long-season multiple thinning according to vegetation suitability.

Fieldwork 3: Wood splitting and experimenting the small-scale sawmill equipment (Obihiro city)

- Understanding the evolution of woodworking tools and the current state of carpentry (from obsidian to power tools)
- Experimenting with splitting wood by hand (with a wooden wedge and mallet)
- Experimenting sawing with small-scale equipment (using an engine-powered band saw)

Fieldwork 4: Riparian forests of Memu (Memu district, Taiki town)

- Size: 200 ha, 10 km in circumference
- Prefecture-owned forest, private forest
- Consists of a wetland forest, and riparian forest

Fieldwork Notes

Infrastructure for “people to forest, forest to people”

Recently, the distance between people and forests and their respective spaces is becoming more and more distant, or perhaps it has always been so¹. The existence of this distance has come to be considered a challenge in recent years. Even in Hokkaido, where forests account for over 70% of its land area, such a feeling is noticeable, and it is by no means a trend that can be found only in urban areas. Especially among children, forests are becoming a distant presence. This further increases the number of people unfamiliar with forests, and the distance between people and forests is widening.

When considering entering a forest on foot, people who are familiar with the space and conditions of a forest can enter without "infrastructure" (basic structure, mechanism, or foundation), but for those who are unfamiliar with the forest, a supporting infrastructure that assists, and holds their hand in entering the forest is considered necessary. This category includes mental infrastructure as well as a physical one.

When a human enters a forest, he/she is expected to engage in acts such as "touch, dip, eat, grasp, swallow, get in, go" into the forest. When a human leaves a forest, he/she is expected to "disengage, climb, ascend, descend, digest, leave, return." Through these actions, people confront the forest, and the infrastructure described above means to value and support these actions, activities, and relationships, as illustrated in Fig. 4.

¹ It is generally believed that in the past (before the industrialization of subsistence farming), people used forests as a source of livelihood by entering them and taking what they needed out of them in their daily lives. The forests and mountains where the forest resources were overexploited, the area became bald and the balance of proper use of resources has been shaken along with the size of the population. Later, such activities were carried out by professional workers and people who did not enter (or leave) the forests became less accustomed to them, or so it is thought.

When we consider entering the forest to make a living, the primary purpose is to bring out "human things" (trees used as lumber, wild plants, mushrooms, sap, bushes, animals, etc.) from the forest. The existence of infrastructure to leave the forest is what makes livelihood possible. Therefore, in considering the relationship between people and forests, it is important to consider not only how people enter the forest but also how people exit and how "human things" are obtained from the forest. Moreover, the flow of this entry and exit (see Fig. 5) is an important fact too to understand the relationship comprehensively.

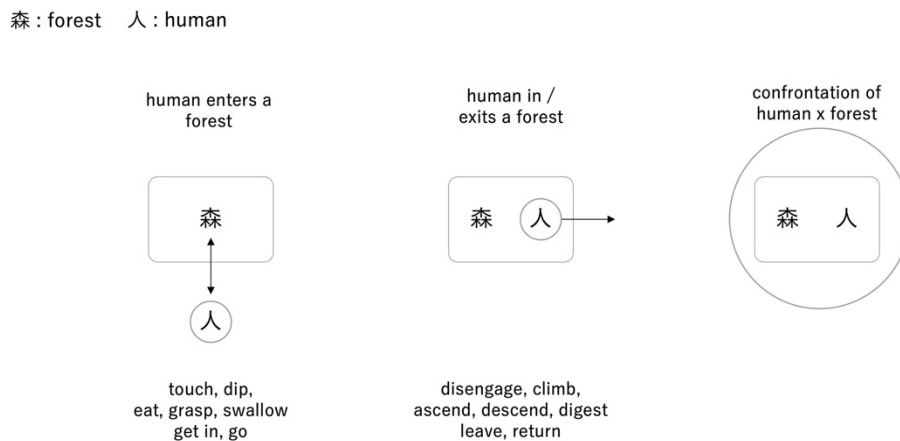


Fig. 4: What is the act of people entering the forest, the act of people leaving the forest, and the confrontation between people and the forest? (A transcription of a sketch by Mr. Sugawara)

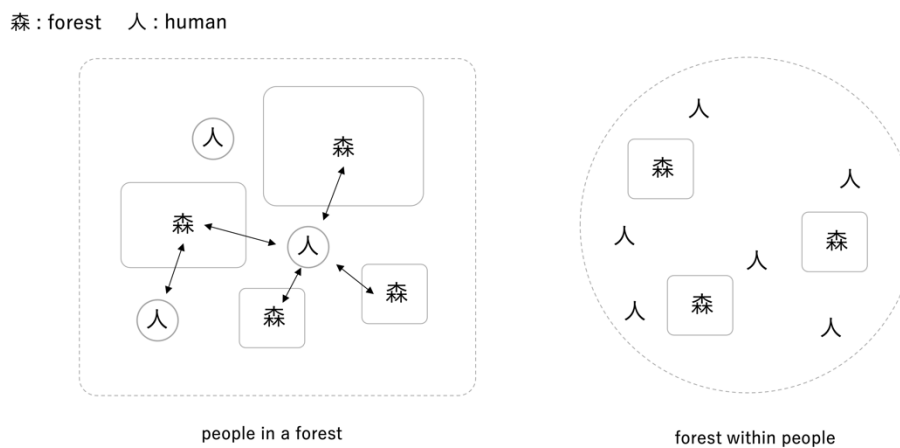


Figure 5: When a human enters a forest, the human is in the forest. When "human things" are taken out of the forest and brought where the community is, then the forest is inside the people (based on a sketch by Mr. Sugawara).

When we think of infrastructure in human settlements, such as cities, we often think of energy, water, sewage, information networks, and roads, which are a bit heavier and exist on networks laid out by physical properties such as concrete, asphalt, metal, resin, and electronic signals.

Then, for further consideration, more points were raised below:

“What kind of infrastructure is needed for people and forests to interact, for people to enter forests and for “human things” to be taken out of forests?”
“What kind of forests are there that we are dealing with?”

The idea of controlling human behavior and actions

For example, we need to recognize that even a single method of attaching a path into the forest is a profound problem. The current situation is that there are places that encourage people to enter the forest, but there are also places that do not want people to enter. In some cases, such as in national parks in the U.S., easy-to-walk trails are provided from the perspective of controlling human behavior in the forest. Although wooden paths such as decks are difficult to maintain, people often walk on the decks and do not set foot in the forest. In some cases, they plan places where people do not enter by creating "honey spots" where people concentrate, such as laying ropeways and other facilities that are often dared to be considered excessive. The direction of universal design through the development of boardwalks so that wheelchairs and strollers can enter the forest paths is also a part of the infrastructure development. On the other hand, it is natural that people in wheelchairs also want to touch and step on the soil. Setting a division by laying an infrastructure between and "demanding" that people stay on it cannot generate a satisfying relationship between people and forests

Ease of entry, management of entry and exit, and creation of mutual understanding

Some forests that have been slightly improved, or forests that have been improved for forestry purposes are easier to enter due to the presence of paths and other accessibility features. In some cases, accessibility has been extended in a way that was not intended. For example, in Tokachi, even on private land, there are times when strangers rush in to gather wild vegetables in the spring. The phenomenon of overused forests, which is far from being called depopulation, is also occurring. The term "right of access to the forest" may sound formal, but at the same time, it is necessary to consider accident and risk control within private lands. While there are ways to control access by hardware, such as setting up gates, it is also possible to create communication (relationship-making) methods using ICT, and manage through mutual understanding. In any case, it is important to create a relationship between people and the forest so that they are aware of entering and leaving the forest.

Divide the way of entry according to the characteristics of the forest.

Thinking that any forest could be easily entered by people unfamiliar with it may not be true. Often forests are difficult for people to enter, such as forests that have an intense muddy surface due to geological conditions or forests that are difficult even for professionals to enter in the first place. Due to the fact, forests could be grouped into forests dedicated to industrial use and/or for recreational or other uses and forests that are neither for industrial nor recreational purposes. From the perspective of ownership and management, it is often thought that forests should be opened widely to examine how

certainly involved forests are used. However, by no means should all forests be considered as forests that anyone can enter, but rather, after assessing the characteristics of the forest, it is important to determine the relationship with individual forests (or sub-groups in the domain or specialty). However, it is important to determine the characteristics of the forest and then separate the relationship with individual forests (or sub-groups, professionally speaking).

Considering the forests of Tokachi from a forestry perspective: it is assumed that there is a way of attaching roads that is unique to the Tokachi forests

When working in the forests of Tokachi, it is thought that there is a way of making roads that is different from the forestry way of making roads in the forests of Honshu. Although it is not an established methodology, it is a good opportunity to think about a unique way to attach roads to the mountains in Tokachi in the future. In addition, many of the paths that predecessors drew have been neglected, and it may be a good idea to reuse them over time to meet current needs.

Who are the parties involved in re-reading the relationship between people and forests?

The need to re-read the relationship between people and forests is not limited to those involved in the forestry industry but involves the parties engaged in building residential spaces for the next generation, who will be responsible for or influence the future of forests. It is a significant issue for those who may be responsible for the next generation of local communities (here, the trend was to call them "0→20 Prospective Locals") to grow up with sufficient awareness of natural forests. There are initiatives for elementary and junior high school children to learn about local industries. It is thought that the relationship between people and the forest will change in the future if the forest is more accessible without barriers.

The forest as a human being

Considering "human things" (trees to be turned into timber, wild plants, and mushrooms, sap, bushes, animals, etc.) taken out of forests, for example, if the existence of forests is considered as a place where "trees as materials" are located anyone can make similar (value) judgments. A similar value would occur for different forests from the market value of timber rather than looking at other properties. As a result, they are recognized as similar forests. In addition, the forests do not have a sense of human presence. On the other hand, in "forests as people" or "forests where people are seen," the same forest is seen based on human relationships and mutual understanding with others. It is assumed that the difference between a systematically managed forest and a gentry forest managed by foresters will be in the way they interact with local people, who also consider the forest their resource.

Walking in the Winter Forest

Entering the Winter Forest

In the "Field Study Group" at the University of Tokyo Hokkaido Experiment Forest (Furano), about 20 research members conduct a "walk" through the forest once a year after it snows in winter to determine the direction of management. Since it is difficult to see the whole picture in summer and fall, the survey is conducted in winter, when the space is easier to grasp. In the past, snowmobiles were used to enter the forest and conduct the survey on skis, but recently snowshoes have been used.

Tokachi Forest in Winter

The winter forests of Tokachi make it easy for people to enter the forests as snow covers the entire area. The depth of snow creates permissive forest conditions. Ticks, horseflies, gnats, mosquitoes, wasps, and other stinging insects are absent, and stinging plants and other thorny species are buried in the snow, reducing the factors that cause them to sting or bite. Particularly in deciduous forests, visibility is ensured, so the forest could be watched at a distance, and risks can be recognized in advance, such as potential fallen trees and the condition of the ivy.

In the winter forest, brown bears (Ussuri brown bears) hibernate, although there have been an increasing number of suspicious cases in recent years. In addition, on sunny days, their body temperature is warmer than the outside temperature due to the amount of solar radiation.

In other words, snow could be considered an infrastructure that allows people to enter the forest during the winter. The word "infrastructure" conjures up images of structures built by people, such as concrete or asphalt roads, open roads with trees cut down, pest control to keep insects away, vermin control, etc. However, if we think of it as something that builds a relationship between "people and their entering the forest," we can see that the Tokachi forest already has an infrastructure in place in winter. However, if we think of it as something that builds the relationship between "people entering the forest," we can say that "forests that are easy to enter" already exist in the winter forests of Tokachi.



Photo 1: Snowshoeing on the border between riparian forest and farmland

Human Augmentation (expansion of human capabilities)

Compared to metal or wooden snowshoes of the past, plastic snowshoes are somewhat easier to handle, and their light weight improves portability and mobility in the forest. Especially for children, their light weight makes it easier for them to work in the snow, and even if they fall with great force, they are less likely to be injured. New relationships between forests, snow, and people in the sphere of activity, such as new winter sports, can be considered.

The history of the forest as read from the "accessible forests" of Tokachi

When looking at the individual mountains in front of us, we can see more clearly how accessible they are, how far away they are from people, and how close they are to us if we look at them against the background of the long history of the Hidaka Mountains and the Tokachi Plain, such as a topographical map. For example, in the above fieldwork map, the Hidaka Mountains and the Tokachi Plain are in stark contrast.

In contrast, the forests in the plains, which are closer to human settlements, have a brighter sky and flatter terrain. Although they are sometimes difficult to walk through, they are more

human-friendly than those in the mountains and are relatively easy to access. It is a relatively easy forest to enter and close to people.



Photo 2: Forest in Omori with bright sky

Looking at the forest soil formation in the "easy-to-enter forests" near human settlements that we visited during our fieldwork, we observed that the "history of the forest" was shallow. The topsoil was thin, and the layer of black soil formed by the accumulation of organic matter was not very apparent. The soil was formed by the accumulated fallen leaves from above and the weathering of the soil below. However, we could catch a glimpse of the history of human intervention not only in the plains but also in the mountains during the pioneering activities.



Photo 3: Cross-section of the stratum revealed by the construction of a work road in the Omori Forest

The area of the forest located upstream of the Kimonto Swamp (Kimonto Forest) has the earliest history of cultivation in Tokachi (a record of cultivation by Benzo Yoda dates from 1884), and is considered to be an area with a longer time axis of the relationship between people and forests in modern times than any other area in Tokachi. In this sense, deciphering the history of the forest itself, such as tree species, tree vigor, soil formation, and traces of forest roads, will also lead to cracking the history of human activities.

For example, if we assume that the harvesting period for larch is about 50 years (since the period of expanded afforestation), then due to this fact there isn't much discussion about forests before the 1970s. Suppose there is a history of shortcutting for human subsistence. In that case, it is possible to imagine that there were mountains in Hokkaido that were repeatedly clear-cut on a small scale in a satoyama-like manner to support people's livelihood.



Photo 4: Land suitable for planting larch after clear-cutting

It is important to understand the history of the relationship between people and forests through the history of forest resources, and to consider how to manage and interact with forests in light of the land and human activities there.

It is also considered important to have zoning of the relationship between people and forests, such as forests suitable for clear-cutting, forests suitable for long thinning of broadleaf trees, and forests that people can enter and those that they cannot. It is important to form a diversity of forests from the perspective of the wider region. However, it is difficult for practitioners to determine how to connect this to daily practice. Since various perspectives and ideas come into the mountains, it is important to have both the clear-cutting and selective logging perspectives, as well as hints for the state of the industry that can be seen through the practice of both afforestation and silviculture.

For example, if a forest that has been heavily clearcut in the past were to try selective logging in the future, this would be a new event for the forest. This fact could be considered a new trial for the forest to see how the forest will evolve in the future. Currently, for example, the composition of tree species in the Omori forest is simple in a sense, and can be understood as evidence of the return of growth after clear-cutting. But if clear-cutting is not carried out in the future, the forest may become more complex. If clearcutting is done again, the same simple composition as now is expected to return.

A little-known of “Forest Soil”

It is said that clear-cutting and afforestation on a 50-year basis are better than clear-cutting on an industrial and economic merit basis. In fact, there are many things that are not understood, and the best answer is not known even from the standpoint of scholars. However, there is an opinion from the field that the soil is getting worse and not growing well where 2~3 generations of artificial forests have been planted simultaneously. This is a story of a long span of time, so it is difficult to prove scientifically. This is the case for cedar plantations in Honshu, but it is necessary to verify the extent to which this is the case because larch is an ectomycorrhizal species and tends to grow even in areas with weak soils. Rather, we are aiming for a rotation of about 30 years, but we have not yet examined whether this is sustainable. A fast rotation also means an increase in the number of times the land is harvested, so it will be necessary to consider this from the perspective of soil fertility.



Photo 5: Soil of a simultaneous plantation of red Ezo spruce at the end of April (for reference)

In the Green Transformation (GX) agenda, there is little discussion of the balance between the soil fertility and the time required for the forests to grow. Even in the Green Transformation (GX) agenda, there is not a sufficient amount of discussion on how to examine forest soils and how to cultivate sustainable forests.

During the period of rapid economic growth, forestry companies have actively researched "forest fertilization," following agricultural examples. But the results have been less than satisfactory. In contrast, forests are basically self-fertilized by fallen leaves, and the soil is created based on a self-contained cycle system. The use of wood in forests can be thought of as an act of taking material outside the boundary, and accelerating this cycle is thought to have an effect on self-fertilization. However, there is still much to be elucidated regarding the specific effects, such as the different types of fallen leaves and the way they fall depending on the tree species, and how they affect each other.

The scale of forest management

Forest management is carried out not on an individual tree basis, but on a sub-group basis. Although the sub-groups are not homogeneous, they are understood as a cohesive area that can be understood by the human side. This quantification builds a homogeneous understanding of forests while interacting with individual pinpoint trees. Administrative and technical experts in forestry management perform tasks collectively in small groups and examine individual trees. Especially in forests that have been reset by human hands, which is the case for the majority of forests, it is necessary to manage forests with a certain "separation". As a comparison, continuing to confront individual trees without "dividing" them into small groups can be viewed as an idealistic approach when tackling ancient forests.

In livestock and dairy farming, pigs are kept for less than one to two years, beef cattle for about two years, and dairy cows for about seven years. From the viewpoint of a visitor, we are confronted with individual animals, but on the side of the farmer, we have to come to terms with life as a herd.

In the case of farmland, the cycle is based on a time axis that can be controlled by humans, such as a one-year cycle. In some cases, such as the management of trees to form the soil for rice paddies or to collect fruit trees, the management is not all-inclusive, as there are cases where the management transcends generations.

In the case of horses, if we look at horses in a different framework from the "industrial interaction," such as horse cultivation, horse transport, and horse racing, their life span is around 25 years, which is closer to the human generational cycle. Some animals, such as dogs, live out their lives to the end of their life cycle, which in the case of dogs is about 15 years, and some animals exist in a "relationship" with humans as an affectionate, and sympathetic existence.

In this way, management is based on the assumption that a certain degree of homogeneity can be achieved for subjects that are placed in a shorter cycle than humans.

In forests, the time scale is often longer than a human generation, and in many cases, not everything can be controlled. Therefore, it is necessary to understand that the forest in front of us is only a kind of state in transition and not an event that always occurs as determined by a mechanism.

Which bent tree do you recommend in this forest?

Seeing the forest as timber: taking trees out of the forest

In a broadleaf forest (Omori Forest) that had been neglected for 50 years as a secondary forest after clear-cutting, the question was asked, "Which bent tree do you recommend in this forest?".

There are many trees that can grow straight, but is there any possibility to consider bent trees as timber? Clear-cutting is the orthodox industry trend, and within that, there is no mention of bent trees. Even in the long-season multiple thinning approaches and in the near-natural forestation approach, there has not been much progress toward selecting bent trees.

With the market price competition for straight trees, is it possible to consider the potential of bent trees, and is there an option to leave these trees to grow in the selective thinning process?

If long-season, multi-thinning forestry is the direction in which the forestry industry is expected to grow, focusing too much on niche or minority needs could be seen as otherworldly. On the other hand, shouldn't there also be a direction to consider what kind of timber the forest can produce without undue effort, without relying on the existing way timber should be made. Today, producers are able to transmit push-type information, so it is possible to have a flow of timber with a fixed customer at the time of harvesting (a system that is actually in operation in Germany and other countries to optimize logistics).

Taking an example of a house of 30 tsubo (1 tsubo+3.306 sqm) that is a scale that can be handled by the master to manage about 10 people on-site, when non-standard lumber is used that indicates unexpected adjustments to occur due to the use of non-standard products and their implications. When it comes to a public building of 100 tsubo, there is a greater possibility of confusion in the production team, optimism about the special qualities of the materials, and difficulty in finding smooth progress on site.

Of course, if such use of timber were to become common, it would be a different case, but from a project management perspective, it would be difficult to suddenly make large-scale use of such timber.

As an experiment to examine the potential of existing trees, in a forest where there are many thin logs (15~20 cm), only a few of them can be used as building structural timbers (30 cm~). However, alternatively, their use as interior timbers can be considered. For example, an experiment of taking baseboards from small logs that can be cut into 6' x 1800' pieces could be given a try.

There is also a description of the use of curved wood to increase strength in Ainu chise (chise is "dwelling" in Ainu language). It is said that the Ainu used different types of wood for different types of building materials according to their different attributes and physical properties. Shouldn't there is a design process in which architectural space and furniture are considered from the tree side, such as alder, Japanese ash, Japanese poplar, etc.? If

the use-value of curved wood is recognized again in terms of physical properties, it may or may not be sold in the present time, but there is a possibility that curved wood will be considered useful in the future with this kind of forestry process. The way the gap or space is taken up changes the way light enters the tree, and there is a possibility of considering lumber that does not just grow straight.

There is great potential for rereading the traditional knowledge of tree attributes and physical properties and their utilization that has been cultivated in the past and considering how to deal with trees and their cultivation plans in line with our current lifestyles and ways of living.

In the winter tramping in the Hokkaido Experiment Forest of the University of Tokyo and "field study meetings," people gather and conduct subjective examinations. During that, they often use words rather than numerical values to express themselves, after having constructed their respective objectivity through preliminary surveys and other divisions of labor. Even with regard to fields that are difficult to quantify, such as traditional knowledge, it is necessary to consider how to decipher them according to the local site with numerically objective back data such as physical property data.

Splitting wood

Until the introduction of the large saw in the Muromachi period (1333-1573), lumber was generally sawn by "splitting the wood" with a wedge and a mallet. When splitting a log, the log is split along the pith of the tree, as well as along the growth and twists of the branches. In other words, the complex surface appears only after splitting. From the Muromachi period onward, lumber was extracted from the log in accordance with the straight lines and planes drawn by the design process. The use of wood by "sawing" became commonplace, as the exact surface was extracted, that is, a straight surface that was not affected by the core (pith) or knots of the wood was transferred to the lumber. This is still basically the case today with square timber. At the same time, techniques are developed to deal with the distortions and twists that would occur later.



Photo 6: Changes in Woodworking Tools

Sugawara-san, a temple carpenter, has done wood splitting many times, and was told "good" by the workshop participants. However, he mentioned that he wasn't sure what part exactly was "good" technically. This time, he prepared raw wood for splitting three types of wood.

Japanese Larch	: Moisture content @ core 26.8%, @ end 23.6
Yezo spruce	: Moisture content @ core 27.5%, @ end 39.1
Japanese ash/Manchurian ash:	Moisture content @ core 56.5%, @ end 30.4

* Wood moisture content was measured by a simple digital electrical resistance moisture meter (CAMTL751C).

<https://vimeo.com/715614283/810d362a1a>

Video 1: Splitting Ezo spruce

As can be expected from the twisting nature of larch, the fibers were intricately entangled, and the splits did not go straight, making the act of splitting difficult. Ezo spruce split more easily than larch, but was more difficult to split due to twisting, especially in the branches, and intersections with the grain along the pith. Yachidamo (Japanese ash) was the easiest to split with the least amount of effort, and its cross-section appeared straighter and flatter than the others.



Photo 7: Larch that does not crack easily, but rather splits



Photo 8: Yezo spruce



Photo 9: Split pith and cross section of Japanese ash



Photo 10: Split pith of Japanese ash

Although we are usually confronted with wood that already exists in our perception as a material, splitting wood is a useful opportunity for us to learn about the true nature of something that was alive. It is an opportunity to learn to face life.

We would like to continue to examine whether there is potential for trees in riparian forests, which are currently not being utilized due to their softness and lack of strength. As a hypothetical example, if the trees are ready to be split in their raw state, as was the case with the Japanese ash, it would be possible to think of the riparian forest as an extension of the living space as a place to supply timber. In the valley lands scattered throughout Tokachi, there are willow trees, Japanese Poplar, and other trees that are underutilized or have been historically abandoned.

In the future, we plan to experiment with the possibility of making simple architectural pavilions and furniture out of split logs, which can promote the development of material technology.

Milling the woods

In this section, the relationship between small mills² (band saws) and local forests was examined.

In the past, there used to be three or four mills in Yamanakako Village, where the University of Tokyo Experiment Forest is located, that produced lumber using band saws by "pay sawing" (bringing in lumber and ordering it in this size). However, larger and more advanced lumber mills were built near ports and other locations far from the forest. In time, the local small and medium-sized mills were closed. Thus, finding areas with forests but no mills is more common. Although the trees are right in sight, the lack of sawmilling technology makes it impossible to process them within the region, and the distance to the closest milling facility from the forest has become greater.

In addition, it is challenging to sell logs to the general lumber users in the region but easier to sell boards to meet their demands.

Different factors, such as usability for a forester, a condition that people can handle, and capital investment, affect the distance between the forest and its users.

² Wood-Mizer LLC : <https://woodmizer.jp/t15wide>

reference : Handcrafting Zen Chairs in Japan

<https://www.woodmizer-europe.com/Blog/Articles/handcrafting-zen-chairs-in-japan>



Photo 11: Sawmilling Yezo spruce

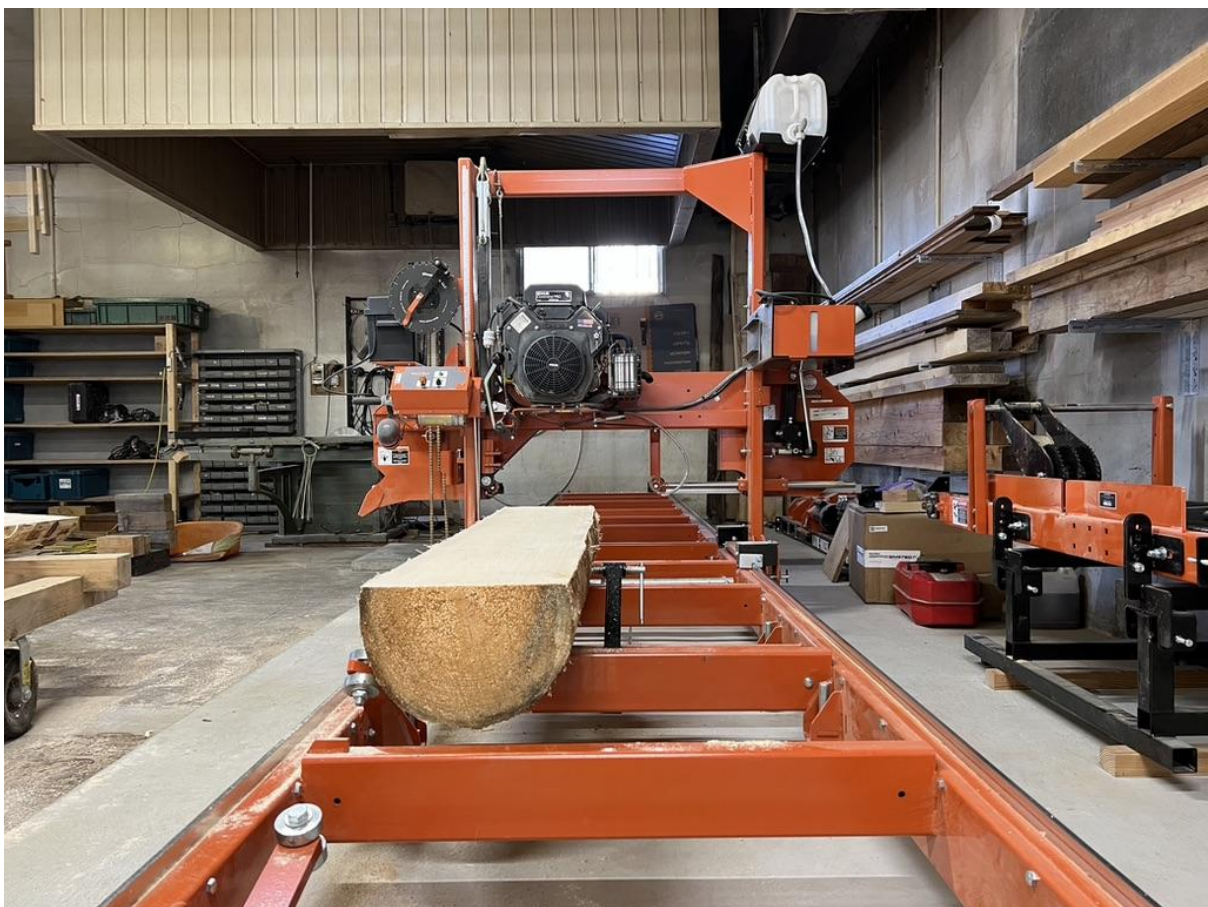


Photo 12: Cross-section of a milled Yezo spruce

In this case, as a (miyadaiku: shrine carpenter) carpenter whose projects are often delivered as design-build, he considered the possibility of having a small sawmill in his workshop that is relatively close to forests. Could a small-scale capital investment such as a small sawmill become an infrastructure that brings out the potential of timber in the forest in the region, and lead to a rereading of the conventional framework of the profession? The possibility of carpenters milling lumber (which is not conventionally the case), thereby creating a new market for lumber that is more in line with needs, should be examined in the future. The future of the value cycle (Value Chain) could be reconsidered from a practical perspective of production with small sawmills.

The basic technological trends remain the same in machining techniques (both human-powered and machine-powered) as well as computer-controlled CNC and milling. The latest wood processing technology has reached the point where wood is broken down to the molecular level and used as the next-generation plastic material, and the individuality of wood is no longer relevant.



Photo: Cross-sectional comparison of split and ground Ezo spruce, and re-reading the meaning of the tools used (in this case, a hatchet).

On the other hand, by re-reading the possibilities of utilizing wood and taking advantage of its individuality and characteristics, our future work shall examine the options of trees that have so far been difficult to find in the marketplace and the possibilities of value that is not homogeneous and not reproducible.

This shift is also a major turning point in terms of design philosophy. The information on the material to be used and the design information no longer need to be linked. Moreover, most design activities (i.e., the current thinking on artifacts) are based on transferring the designed line or solid form to the wood and its realization through processing. In the future, we will be comparing designing from the pith section of a tree versus splitting the wood and cutting straight lines out of trees with intention.

Disturbance cultivation

Wetlands and riparian forests are often such spaces that remain untouched in Tokachi, even though they are located near villages and towns. The reason is that wetlands and riparian forests are often challenging for people to process and utilize for various reasons.

Although people today do not make much use of these spaces, we are curious to know what kind of use these spaces had from the viewpoint of people in the past. In summer, the riparian forests are infested by ticks, horseflies, gnats, mosquitoes, wasps, and thorny grasses such as stinging nettles spread out around their feet, making it possible to encounter brown bears. In winter, however, snow and cold create an infrastructure that makes the area accessible. Riparian forests and wetlands may have been considered a source of sustenance and resources. In obtaining lumber, it is easy to cut down trees in winter when they are lighter and carry them out by sliding them on the snow on the flat land. This space can be thought of as a space where lumber can be procured without the need for animals to carry it out.



Photo 14: Riparian forest along the Memu River

Japanese ash, which grows in this environment, was used by the Ainu people as a building material for their dwellings (chise) and daily use.

Riparian forests are also considered to be highly valuable from the standpoint of food supply, as they support vegetation such as onigurumi (oriental walnut), mountain grapes, and salmon runs. In the Tohoku region, riparian forests are considered a good mushroom source. The occasional heavy floods that knock down trees and disturb the forests provide the sites for mushrooms to grow.

It can be said that the disturbance of forests produces mushrooms and wild vegetables, and people have depended on the disturbance. Udon and zentai, which are blue-green algae, grow on disturbed land, and cod sprouts are dependent on human harvesting. It is possible that people in the past thought of creating such a condition, or "disturbed cultivation," as a way of dealing with the forest.

When forests are fixed and undisturbed, in contrast, the forest food supply becomes unstable. For example, when an erosion control dam prevents mountains from sliding, from the perspective of those who depend on wild vegetables, it can be said that udo (plant related to ginseng, used in medicine and cooking: *Aralia cordata*) will no longer be available.

Chapter 4: Results of "Layers 1: Re-reading" and future works

The recession that Japanese forestry has been facing for decades resulted in forestry and forest management turning into an unprofitable business for the investors and forest owners. In forest communities, some families do not even remember the exact location of their forest anymore. Among the local people, the socio-economic motivation for maintaining forests and utilizing its resources has been decreasing for decades. As a result, many mountain villages (called as “yamamura shuraku” in Japanese, that means “small forest communities and economic zones”) in Japan have been facing depopulation, having insufficient resources to maintain their forests while the younger generations have less involvement with forests compared to previous generations. Given this situation, raising awareness of forests, especially among the younger generation, has become an important issue. There have been many wood and forest educational and promotion activities organized and funded by government parties. Yet, there is a need for a long-term sustainable system involving public and individual parties with diverse knowledge about building robust forest-people relationships.

Our research with the aim of building people-forest relationships for the next generations focuses on creating research-based interactive opportunities in such communities. As explained in Chapter 1, the research suggests a three layered-process. In the following days, the research will focus on “Layer 2: Interactive research” to conduct interactive research-based events. Simultaneously, at Layer 3: Architectural Intervention, the interactive research will be supported by a mobile pavilion, the “Traveling Forest” to be developed through a collaborative research-design-build process. The Traveling Forest project is an architectural intervention that will help perform varied educational and experimental events in forests. Hypothetically, the architectural interventions as this research's output will increase the frequency and quality of forest experiences. Accordingly, we hypothesize that increased interactions between the community and forests will promote well-being, a sense of belonging, greater care, and effective actions to conserve and utilize forest resources going forward.

The initial rereadings of the place have been performed, and observations are gathered in the previous chapters of this report. Chapter 1 introduced the research objective and its roadmap, and Chapter 2 explained the methodology while focusing on identifying and analyzing the local critical issues about the research question. Chapter 3 presented the observed characteristics of the place from a multidisciplinary expert perspective and shed light on its potential resources to explore in future works.

As a result of the surveys, we could focus on our responses to answer the research questions. Particularly, the significance of targeting young children (under 12) to enhance their forest and wood awareness was observed during the surveys. Additionally, engaging teenagers in educational and experiential activities prepare them to care for and protect forests and improve their well-being as they become adults.

Keeping our target population in mind, our work proposes building architectural interventions to increase their interaction with forests (the above-explained Traveling Forest project). To do so, initially, our next step, entry to the Layer 2: Interactive Research, is to develop a list of events focusing on “forest education/raising awareness” (ex: lectures, experiences, etc.). During the events, we will observe participants' needs from physical and social perspectives. Later, the

feedback from the interactive research events will be used to outline the requirements for the architecture design.

In parallel, the development of the architectural intervention (entry to the Layer 3: Architectural Intervention) will be conducted by a multidisciplinary “project team”. The project team will include the “design team,” which will be selected through a public call to collaborate with the project coordinators, academic advisors, and local partners. As explained in Chapter 1, the design team will stay at Memu and have multiple opportunities in six months to reread the place and its resources to develop a design for the architectural intervention, which could be installed in different forests and used for varied activities. To meet this functional requirement, our work proposes a mobile pavilion, as we call a “Traveling Forest,” to be the main concept of the architectural project. Assembly and reverse engineering of the structure will bring an additional challenge to design parameters to provide its mobility. Moreover, material resourcing and production methods are other technical challenges added to the design to be explored and encouraged to be locally solved by the design team with the support of the other project team members (see Fig.6).

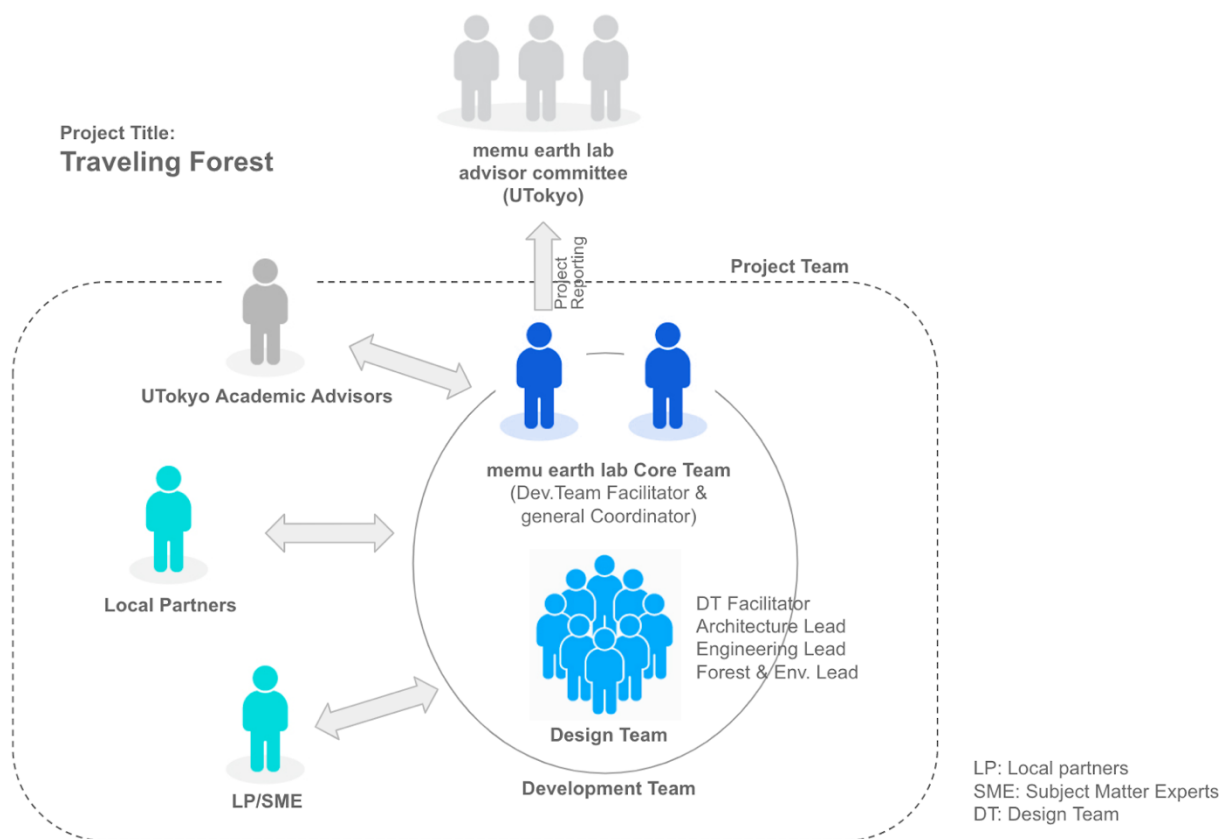


Fig.6 Organizational scheme of the Traveling Forest project

Technical design features mentioned above will conceptually challenge current methods of building a mobile pavilion. Meanwhile, these challenges, involving the community in the development process, will provide a possibility to establish a people-forest relationship into a community relationship.

Furthermore, the collected data on the local facts and its analysis in Chapter 2 and fieldwork notes in Chapter 3 have introduced additional technical and social features required to be addressed during the research by the design team. Below is a resume of suggested potential future works and subjects to be explored by the development team in the future, supporting the research objective:

- **The level of intervention:** Finding the right balance between creating an environment that makes it easy for people to enter and explore forests, and controlling the natural environment, is essential. Interaction with nature, artificial installments, and the overall experience shall be designed in harmony with nature. For example, walk-paths are installations allowing a safe and accessible exploration of forests for humans. However, on the contrary, they would interfere with the natural experience if it is over-controlled. A well-balanced level of intervention is a critical design parameter that should reflect in the design (related critical issues theme: Forest Infrastructure and Forest Safety (Importance Rank Nr.1 and Nr. 2)).
- **Alternative forms of people-forest interaction:** The people-forest interaction shall not be thought limited to stepping into the forest but bringing the forest into the human environment could be considered too. Different physical forms of interaction could be conceptualized (related critical issues theme: Recreational opportunities).
- **Seasonality:** Dynamism in forests born by seasonal changes should be considered a design parameter of adaptability. For example, in winter, snow on the ground has the potential to act as a nature-provided infrastructure. Such natural phenomena could turn into an advantage with a season-corresponding design.
- **Traditional knowledge:** The traditional use of varied local forest resources can provide a wide range of practical information. For example, making Chise (Ainu dwelling) and Kucha (a hunter hut) could teach us a locally suited sustainable approach of processing the forest resources. In addition, rereading the history of the forest could tell us about the story of the relationship in the past.
- **Utilizing undervalued forest resources:** Researching and experimenting with alternative ways of adding value on unused (or underutilized) forest resources is an encouraging design challenge. It may be possible to explore sustainable life-cycle solutions to local resource challenges by processing abundant and easily accessible materials such as curved wood, soft trees found in Riparian forests, small logs, etc. (related critical issues theme: Utilizing unused timber).

The introduced critical issues, their ranking of importance regarding the research objective, the design parameters born from the fieldwork discussions, and the available traditional knowledge are significant resources of information to shape the design requirements for our future work. Hypothetically, the proposed Traveling Forest project will serve as an effective medium to unify the forests and the local people at interactive research-based opportunities. Particularly, interacting with local children along the project will improve their awareness about forests and their resources and give them a chance to plant a seed in their future relationship with forests. We hope that this research and its results will contribute to not only revitalizing the forest-human relationship but also promoting the healthy growth of children into nature-conscious adults.