Proceedings of the IUFRO OKINAWA 2022

Progress in Small-scale Forestry beyond the Pandemic and Global Climate Change

Okinawa, Japan, October 26-31, 2022

Organized by

IUFRO 3.08.00 Small-scale Forestry
University of the Ryukyus
The Japanese Forest Economic Society
IUFRO 9.06.00 Forest Law and Environmental Legislation

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The Japanese Forest Economic Society
IUFRO 9.06.00 Forest Law and Environmental Legislation

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Forewords

Global warming is among the most critical environmental problems of the 21st century. As the world advocates for a decarbonized society, requirement for forests to fix carbon and mitigate climate change are increasing. Although deforestation continues in some developing countries, developed countries, especially those in Europe, have achieved increases in forest areas and stumpage volumes. Private forests, most of which are small in scale, are crucial for achieving sustainable forest management in these countries, as well as in other countries and areas, including those in the developing world.

Forests have diverse values and functions, including biodiversity conservation, soil protection, landslide prevention, water holding and purification, scenic and recreational values, cultural and spiritual values, and timber and byproduct production. Small-scale forestry, which encompasses community, communal, small private group, indigenous peoples', farm, and family forests, plays an equally important role in realizing such values and functions as public and large-scale private forests.

Many new forest-related laws and regulations have been created to meet international expectations and to improve the self-responsibility of forest administrations. The EU Timber Regulation is a representative example; however, other countries have enacted laws restricting illegal timber trade and promoting the use of wood and woody biomass. In Japan, laws have been enacted in recent years to promote the use of wood in houses and to secure new financial resources for private forest management. Thus, the increasing importance of forest-related legal frameworks is another hallmark of the 21st century.

However, the global society has been severely affected by the COVID-19 pandemic since the beginning of 2020. Restrictions on the free movement of people and goods for nearly three years have taken a heavy toll on the economy. Globally, forestry and forest industries were also greatly affected by a drastic reduction in housing demand, difficulty in importing and exporting wood, layoffs of workers, high log prices, and other factors. Research activities were also stalled at this critical time.

As the situation progressed, the IUFRO 3.08.00 "Small-scale Forestry" Group waited for the pandemic to subside and acted quickly. Subsequently, for the first time in three years, we were able to hold a face-to-face international conference in Okinawa, Japan with the main theme being "Progress in small-scale forestry beyond the pandemic and global climate change." Furthermore, owing to the cooperation of IUFRO 9.06.00 "Forest Law and Environmental Legislation" Group, the conference successfully expanded its range of research topics.

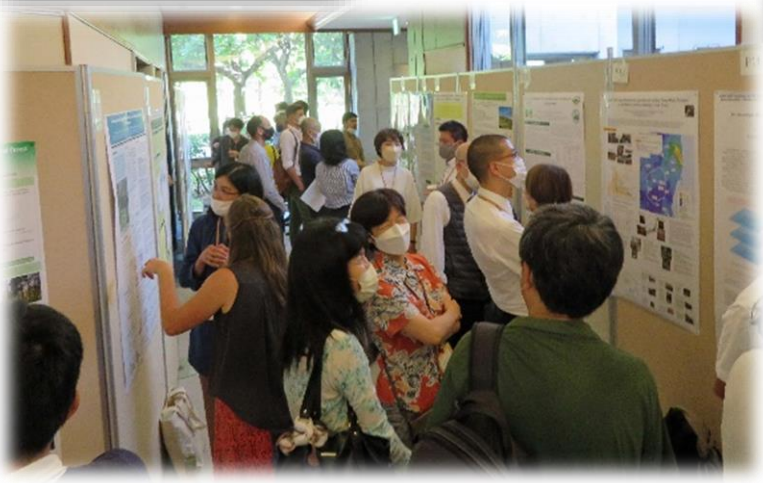
The IUFRO OKINAWA 2022 conference was held between October 26th and 31st, 2022. A total of 80 participants from 20 countries attended the conference, and 36 oral, 17 poster, and two keynote presentations were delivered. The organizing committee was happy that many researchers and students held constructive discussions at the conference.

On behalf of the organizing committee, I sincerely appreciate the University of the Ryukyus and the Japanese Forest Economic Society for co-hosting the IUFRO conference. I thank the sponsors of the National Land Afforestation Promotion Organization, United Graduate School of Agricultural Sciences in Kagoshima University, the University of Ryukyus Foundation, IUFRO-Japan, the Japan Forestry Association (Sanrinkai), the Japan Forest Technology Association, the Forest Management Association of Japan, the National Forestry Extension Association in Japan, the Japan Federation of Wood Industry Associations, the National Federation of Forest Owners' Co-operative Association, and the Okinawa Convention & Visitors Bureau. I also thank the nominal supporters of Okinawa Prefecture, the Japanese Forest Society, the Forestry and Forest Products Research Institute, and the Subtropical Forest and Forestry Research Society.

Based on the contributions of all the participants, sponsors, and staff, IUFRO OKINAWA 2022, the first international conference on forests held in Okinawa, was successful. This book of proceedings attests to the success of this conference. I hope that this achievement will serve as a milestone for the further development of both the IUFRO Small-scale Forestry Group and the IUFRO Forest Law and Environmental Legislation Group.

OTA, Ikuo
Chair, Organizing Committee of the IUFRO OKINAWA 2022


IUFRO OKINAWA 2022




沖縄の木

Poster Presentations 234

Keynote Speech 1

Small-scale forestry and forest policy in Japan

Ryoko Ishizaki*
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Abstract

Japan is one of the world's most forested countries, with 67% of its land area being covered by forests, many of which have small-scale private owners. This paper provides an overview of the natural and social conditions in Japan and discusses the changing status of small-scale forestry.

Owing to its location and climatic, topographical, and geological conditions, Japan is regularly affected by various natural disasters. Recently, outbreaks of localized torrential rain have become more common, and disasters of unprecedented severity are becoming more likely. Meanwhile, the population of Japan is aging and the country's total population has been consistently declining for more than a decade.

In the 1960s, small-scale forestry was recognized as an important factor in Japan's forest policy. However, this was short-lived and the focus of the government's forest policy shifted to fostering larger-scale forestry enterprises that consolidate small forest lands and manage them on their behalf. In contrast to these mainstream forest policy trends, at the grassroots level, there is a growing movement of small-scale forestry practices with diverse objectives.

Keywords: small-scale forestry, forest policy, Japan

1. Japan, the disaster archipelago

Japan is an island state with 67% of the country covered by forests (green areas in Figure 1). The country is highly mountainous, with mountain chains stretching like a backbone across the main islands. Most of the forested areas are in steep, mountainous terrain, while most of the population lives on the few open plains along the coast (red areas in Figure 1). The country has a land area of 378,000 km^2, making it slightly larger than Germany, but is an archipelagic state comprising more than 400 inhabited islands. The islands are located between 120° and 150° E longitude and 20° and 45° N latitude, and extend approximately 3,000 km from east to west and from north to south. In terms of its climate, Japan ranges from subarctic to subtropical, and there are more than 1,000 tree species in its natural forests.

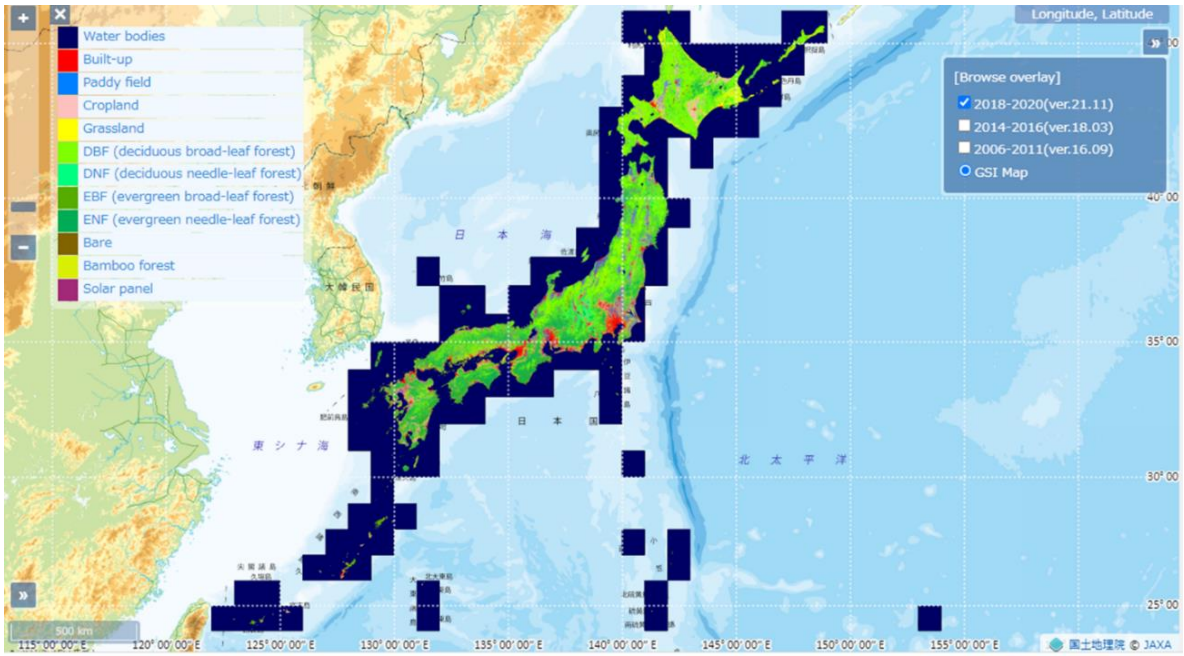


Figure 1: Land use and land cover in Japan
Source: the High-Resolution Land Use and Land Cover map, provided by Japan Aerospace Exploration Agency Earth Observation Research Center (EORC), ALOS/ALOS-2 Science Project and Earth Observation Priority Research: Ecosystem Research Group.

The country is frequently hit by various natural disasters, such as typhoons, torrential rain, earthquakes, and volcanic eruptions. Owing to its geological, topographical, and climatic conditions, Japan is also one of the countries most affected by sediment runoff (Ohmori 1983). Against this background, the Japanese public's primary concern regarding forests has long been the prevention of mountain disasters (Figure 2). Recently, events involving localized torrential rain have been increasing in frequency and disasters of unprecedented magnitude are becoming more likely in some parts of Japan. In this context, there are increasing expectations that proper forest management will reduce the risk of such mountain disasters.

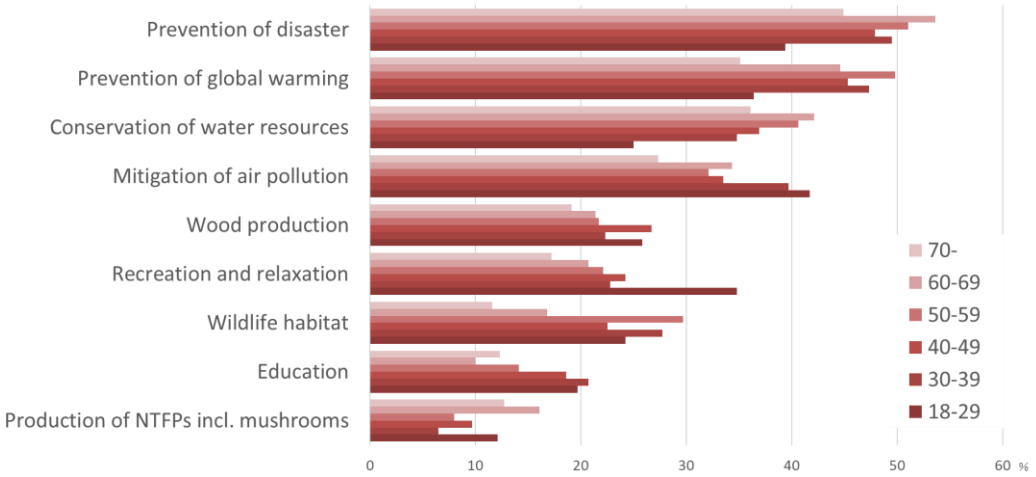
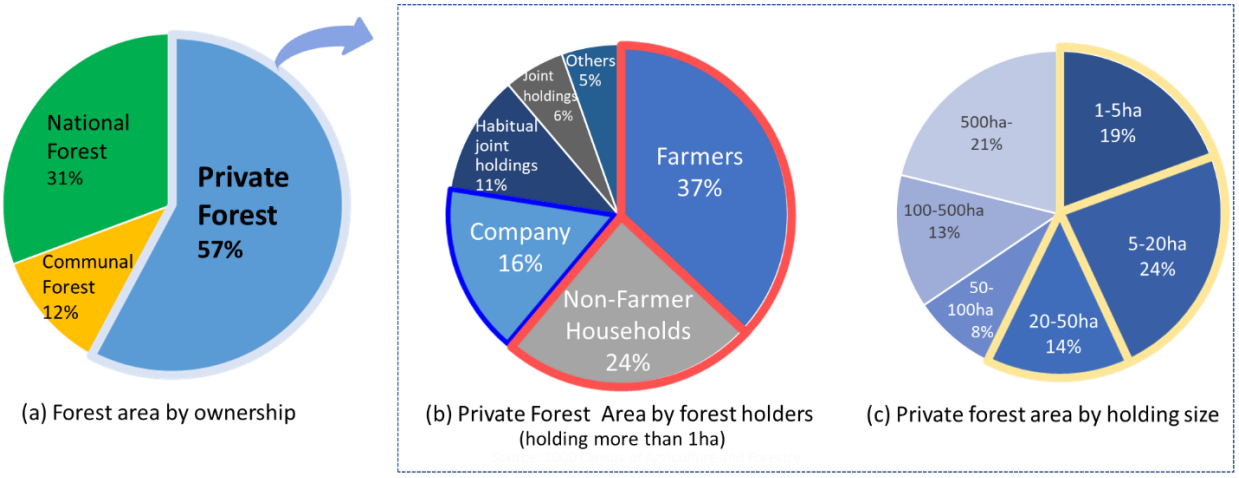


Figure 2: Expected role of forests by age group (multiple answers allowed: up to 3).
Source: Public Opinion Poll on Forests and Life Conducted by the Cabinet Office in 2019.

2. Forests and forestry in Japan

Japan has a forest area of 25 million hectares, of which 31% are national forests, 12% are owned by local governments, and the remaining 57% are privately owned (Figure 3). In terms of the privately owned forest, most of it is owned by families on a small scale. In fact, more than half of the private forest land is owned by smallholders with plots smaller than 50 ha.



(a) Forest area by ownership

(b) Private Forest Area by forest holders (holding more than 1ha)

(c) Private forest area by holding size

Figure 3: Forest owners in Japan

Source: (a) Based on the Forestry Agency "Current status of forest resources (as of March 31, 2017)." (b) and (c) Based on the Ministry of Agriculture, Forestry and Fisheries "2000 World Census of Agriculture and Forestry."

Figure 4 shows the forest area by tree species as of 2017. Plantation forests cover more than 40% of the forest area, with Japanese cedar (*Cryptomeria japonica*) and Japanese cypress (*Chamaecyparis obtusa*) dominating. A total of 45% of the planted forests were planted 46–60 years ago, that is, in the period between the late 1950s and the early 1970s (Figure 5).

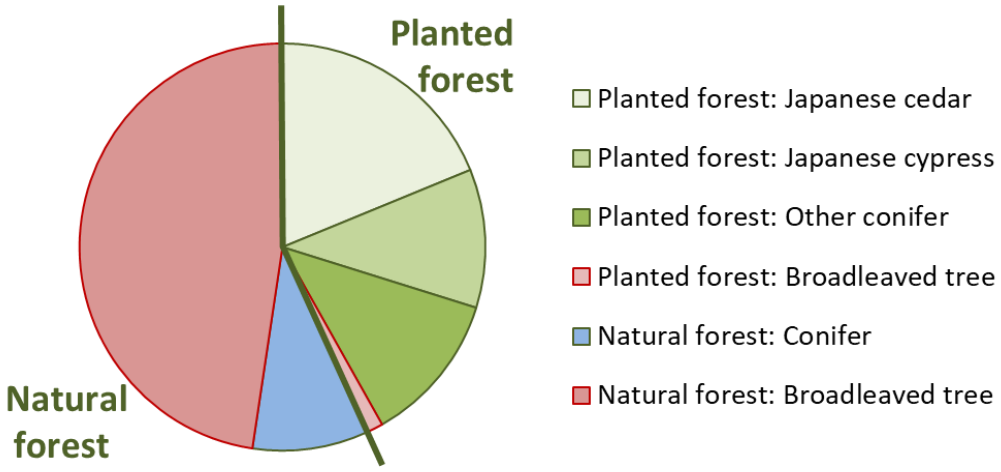


Figure 4: Forest area by tree species

Source: Based on the Forestry Agency "Current status of forest resources (as of March 31, 2017)."

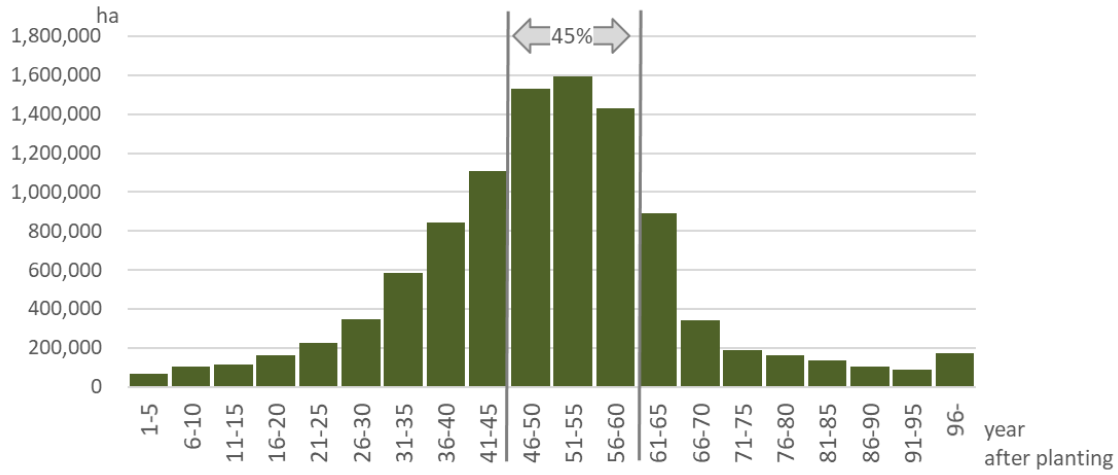


Figure 5: Age class of planted forests
Source: Based on the Forestry Agency "Current status of forest resources (as of March 31, 2017)."

In Japan, over 300,000 ha of forests were planted annually between 1950 and 1970, with the area of natural forests decreasing and that of planted forests increasing. This was just at the time when the source of energy for cooking and heating in ordinary households was changing from wood and coal to oil, and many natural forests being used for fuel were being replaced by plantations for timber production.

3. Small-scale forestry in the spotlight, 1960s

After the Second World War, small-scale forestry began to receive increasing attention in the national government's forest policy. This started with the forestry extension system, which was introduced in 1949 under the direction of the Japanese occupation authorities. In the 1950s, surveys were conducted to determine the actual situation of small forest owners, and in 1960, forest-owning households were included in the agricultural and forestry census for the first time. These surveys revealed that farmers had a great interest in forests and a strong desire to plant trees. Against this background, family farmers were addressed in forest policy in the 1960s as key actors in increasing the productivity of forestry.

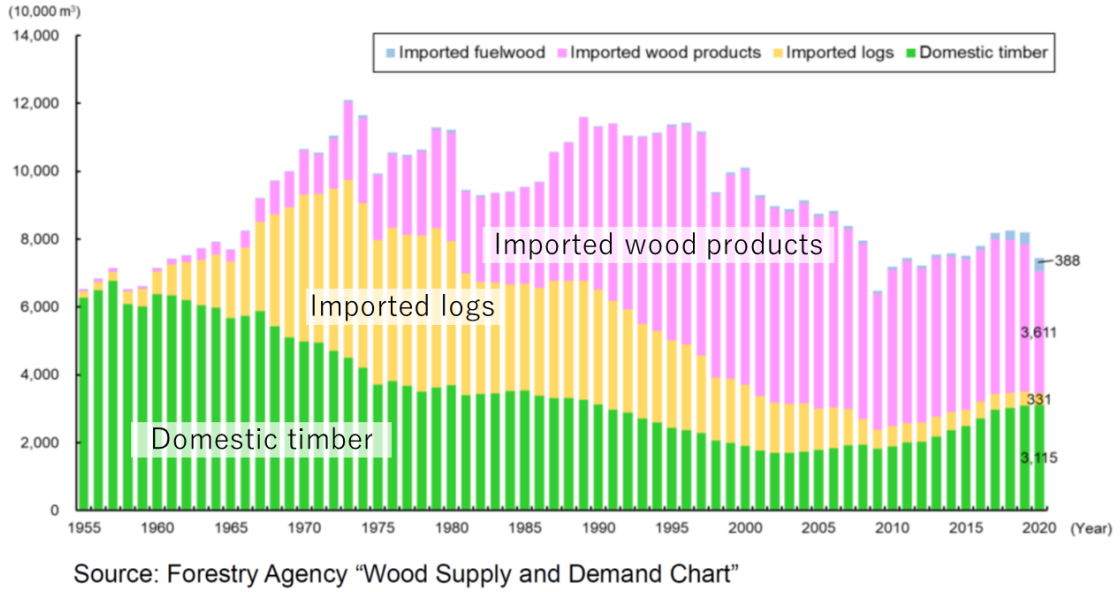
Why were farmers in the spotlight? The reasons pointed out at the time included the fact that farmers were indeed willing to plant trees, the expectation that they would be able to manage their forestry flexibly because they would be their own labor force, and the possibility that such activities would contribute to narrowing the income gap between rural and urban areas, which was growing increasingly wide at the time.

However, these hopes for small-scale forestry were short-lived. Instead, the focus of government forestry policy gradually shifted to supporting the consolidation and substitution of management of small-scale forestry by forestry enterprises (Table 1). This was because the situation around forestry changed dramatically and forest owners gradually lost interest in their forests.

Table 1: Perceptions of small-scale forestry in the reports of consultative councils on basic forest policy

	Title of the report	Submitted by	Perceptions and measures for small-scale forestry
1960	"Basic Problems and Basic Measures of Forestry"	Committee on Basic Problems of Agriculture, Forestry and Fisheries	**Family forestry by farmers is promising** if scaled up (at least 5ha)
1986	"Basic direction of forest policy: toward overcome the forest crisis"	The Forestry Policy Council	There are limits to the efforts of individual forestry households, so **outsourcing work to forestry cooperatives**, etc., is recommended.
1990	"Future direction of forest policy and improvement of national forest management"	The Forestry Policy Council	Strengthening the role of municipalities: ex. introduce a system for **local governments to carry out forestry operations in forests owned by absentee village owners** that are poorly managed, etc.
1997	"Basic direction of forest policy and a radical reform of national forest management"	The Forestry Policy Council	Strengthening the management bases with **motivated forestry households and forestry enterprises**
1999	"Fundamental Issues Related to Forests, Forestry, and the Wood Industry"	Advisory committee on the basic policy for forest, forestry and wood industry	**Decreased interest** in their own forests, **especially among small-scale forest owners** **Consolidation by outsourcing management and operations** to motivated foresters and forestry cooperatives
2000	"New Direction of Forestry Policy"	The Forestry Policy Council	
2010	"Picture of the reformation toward forest and forestry revitalization"	Advisory committee on Forest and Forestry basic policy	**Above a certain size,** larger-scale forest owners or those who have **the motivation and ability to be entrusted with the management of forests** make a forest management plan and conduct operations

Source: Based on Committee on Basic Problems of Agriculture, Forestry and Fisheries (1960) "Basic Problems and Basic Measures of Forestry," Forestry Policy Council (1986) "Basic Direction of Forest Policy: Toward Overcoming the Forest Crisis," Forestry Policy Council (1990) "Future Direction of Forest Policy and Improvement of National Forest Management," Forestry Policy Council (1997) "Basic Direction of Forest Policy and a Radical Reform of National Forest Management," Advisory Committee on the Basic Policy for Forest, Forestry and Wood Industry (1999) "Fundamental Issues Related to Forests, Forestry, and the Wood Industry," The Forestry Policy Council (2000) "New Direction of Forestry Policy," Advisory Committee on Forest and Forestry Basic Policy (2010) "Picture of the Reformation toward Forest and Forestry Revitalization."



Source: Forestry Agency "Wood Supply and Demand Chart"

Figure 6: Wood supply in Japan (1955–2020)

Source: Forestry Agency "Annual Report on Forest and Forestry in Japan (Fiscal Year 2021)" (English Summary), Fig. III-1.

When a spotlight was placed on small-scale forestry in the 1960s, it was at a time when demand for timber in Japan was growing rapidly (Figure 6). Timber prices soared, leading to widespread afforestation, but decades had to pass before these forests could be harvested. During this period, the increasing demand was met by imported timber. Initially, mainly logs were imported, but gradually imports shifted to saw logs.

4. Focus on small-scale forestry by new generations

Currently, more than half of Japan's population lives in the three largest metropolitan areas (Tokyo, Nagoya, and Kansai); while very few people live in forested areas. However, after the Second World War, many people lived in forested areas, but starting in the 1960s, many people, especially the younger generation, moved from the countryside to the cities. Those who stayed in the countryside and worked in agriculture and forestry were mainly born in the late 1920s and early 1930s. This generation is thus now around 90 years old. Meanwhile, the forests that were mainly planted in the 1960s are of felling age.

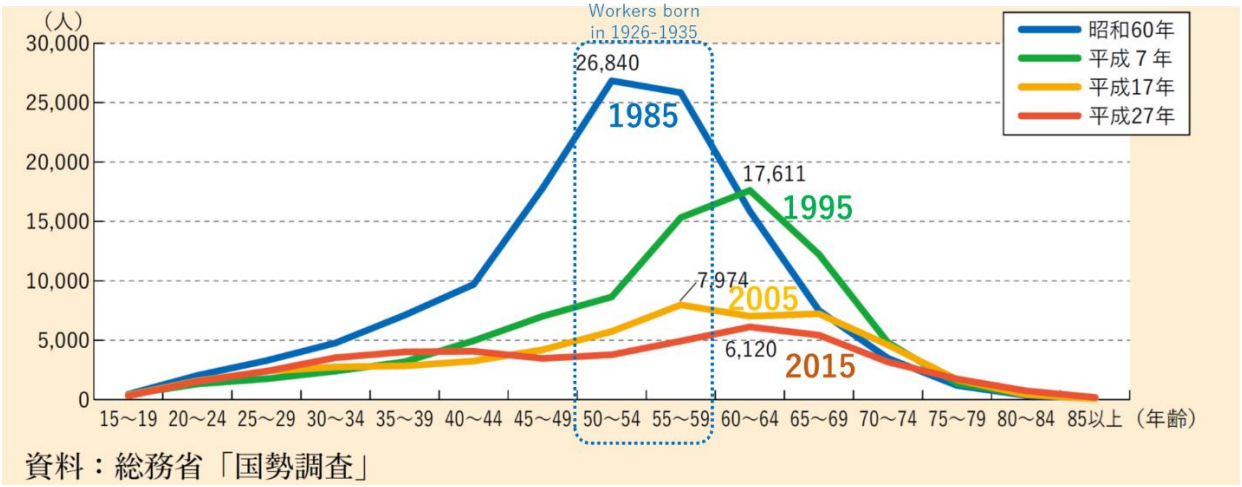


Figure 7: Number of forestry workers by age group (in 1985, 1995, 2005, and 2015)
Source: Forestry Agency "Annual Report on Forest and Forestry in Japan (Fiscal Year 2021)," Fig. II-16.

Recently, interest in small-scale forestry has been growing among some young people. Some of these young people are actually beginning to live in forest areas and enjoy a lifestyle that combines small-scale forestry with other occupations such as agriculture, the outdoor industry, and online retailing. The forestry that they perform is known as "zibatsu-type forestry." The Japanese word "zibatsu" directly translates as "self-cutting." The individuals involved in this forestry are not necessarily forest owners, but they attempt to operate ecologically friendly small-scale forestry. Within this context, there are many possible roles that they can play. In addition to timber production, they are also said to play a role in regenerating local communities and promoting disaster resilience.

5. Is small a problem?

What is small-scale forestry? A relatively clear definition of small-scale forestry is that it is the opposite of large-scale forestry (Harrison and Herbohn 2000; Hyttinen 2004). Small-scale forestry is characterized by diversity, and small-scale forestry operators are driven by a variety of motivations and goals. Hujala et al. (2019) pointed out that, by widening the focus of forestry operations from timber to intangible ecosystem services, small-scale forests have various advantages and potentials, and suggested that policy actors should adopt a new mindset and focus on these aspects. The spread of "zibatsu-style forestry" in Japan probably indicates that these benefits and potentials of small-scale forestry are increasingly becoming recognized by the younger generation in Japan.

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Keynote Speech 2

Insights for anticipatory design of landowner services:

Forest owners' organization in futures action

Teppo Hujala*, Jakob Donner-Amnell*, Osku Haapasaari, Kalle Karttunen*** and Päivi Pelli***

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The design of forest planning, advising, and wood procurement services to family forest owners has predominantly been shaped by altering service needs due to changes in forest owners' backgrounds, such as age, gender, education, and occupation. Parallel to this, responding to global challenges, such as climate change and biodiversity loss, has induced considerations of new and enhanced services to landowners. Recently, however, sudden and drastic changes in societal conditions, namely the Covid-19 pandemic and the war in Ukraine, have shown that the future may bring game changers which alter the service delivery environment. The forest owners' service system is not immune to these kinds of systemic changes, and thus, it makes sense to consider uncertainties in future developments and foster resilience of the socio-ecological service system within small-scale family forestry.

To this end, the Finnish forest owners' network organization, consisting of 56 local and regional forest management associations, a central union, and an in-house service company, is reinforcing the development of future-resilient services to their forest owner members. Here scientists are collaborating with practitioners to i) better survey landowners, their changing ownership objectives, and human-forest relationships, and ii) understand the potential influences of alternative future scenarios on the landowners' service system. This contribution focuses on the latter and illustrates how a workshop based on the three global geopolitical risk scenarios presented in Lloyd's report "Shifting powers: Climate cooperation, chaos or competition?" (2022) helped the practitioners learn how the uncertainties in global geopolitics may via logical implication chains lead to different outcomes in local regulative framework, forest owners' mentalities and service needs, service diversity, and competition in the service market.

As a result of the scenario-based forest owners' service system anticipation, the introduced approach for an anticipatory service design process will continue as a science-practice collaboration involving landowners as contributors

Keywords: anticipation, futures paths, operating environment, preparedness, scenarios, services

A1-01

Legal measures for sustainable forestry and policies to promote wood use in Japan

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Abstract

In recent years, new forest-related legislations have been actively enacted in Japan. Policies pursuing sustainable forest management and increased domestic timber production are being implemented. This study aims to analyze the current forest policy directions and their implications in Japan who is to improve its self-sufficiency rate and to break away from dependence on foreign forest resources.

"Clean Wood Act" was enacted in 2017 to promote the use of legally harvested timber at home and abroad. The act requires timber importers and primary log distributers to submit documents certifying the legality, but it is not enforceable and ineffective so far. Regarding the promotion of timber use, the "Act on Promoting Timber Use in Public Buildings" was enacted in 2010, and it was amended as the "Promotion of Timber Use in Buildings to contribute the realization of Carbon-Free Society" in 2021. In order to increase the demand for timber, wooden construction is being promoted in high-rise and non-residential buildings as well as ordinary houses.

In addition, the "Forest Management Act" came into effect in 2019. This allows municipalities to outsource or take over the management of unmaintained private forests to appropriate contractors, which is expected to promote sound forest management and to facilitate local timber production. In the same year, the "Forest Environment Transfer Tax System" was launched. This is to collect additional 1,000 JPY from all taxpayers and distribute it to municipalities according to the area of privately owned plantation forest, population, and the number of forest workers for the promotion of forestry and adequate forest management.

These policies are the pursuit of scale of economy in forestry and timber industry, and as a result, domestic timber production is on the rise. However, on the other hand, it also has the problem of shrinking small-scale producers and losing diversity of rural society.

Keywords: Act on Promoting Timber Use in Public Buildings, Clean Wood Act, Forest Environment Transfer Tax, Forest Management Act, self-sufficiency rate of timber

1. Introduction

Forest covers two third of the land area of Japan. Although most of the forest were degraded during the long war time in the middle of 20th Century, they recovered with the help of mountain dwellers and forestry experts as well as legal and governmental support. As a result, present domestic forest resources is over 5.2 billion m^3, by far the largest in our history. Within that, 3.3 billion m^3 are plantation forest resources, and Japan's forest have continued to expand both quantitatively and qualitatively after the WWII.

Figure 1 clearly indicates that the Japan's forestry is entering a new phase after the turn of the century. Domestic timber production volume had continued to decline for many decades, while turned to upward trend since 2003. It was 16.1 million m^3 in 2002 but is 23.8 m^3 million in 2019. At the same time, self-sufficiency of timber supply, which also has continued to decline for many decades, turned to upward trend. It was 18.8% in 2002 but is 35.8% in 2020. Almost dying forestry in this country has come back to life.

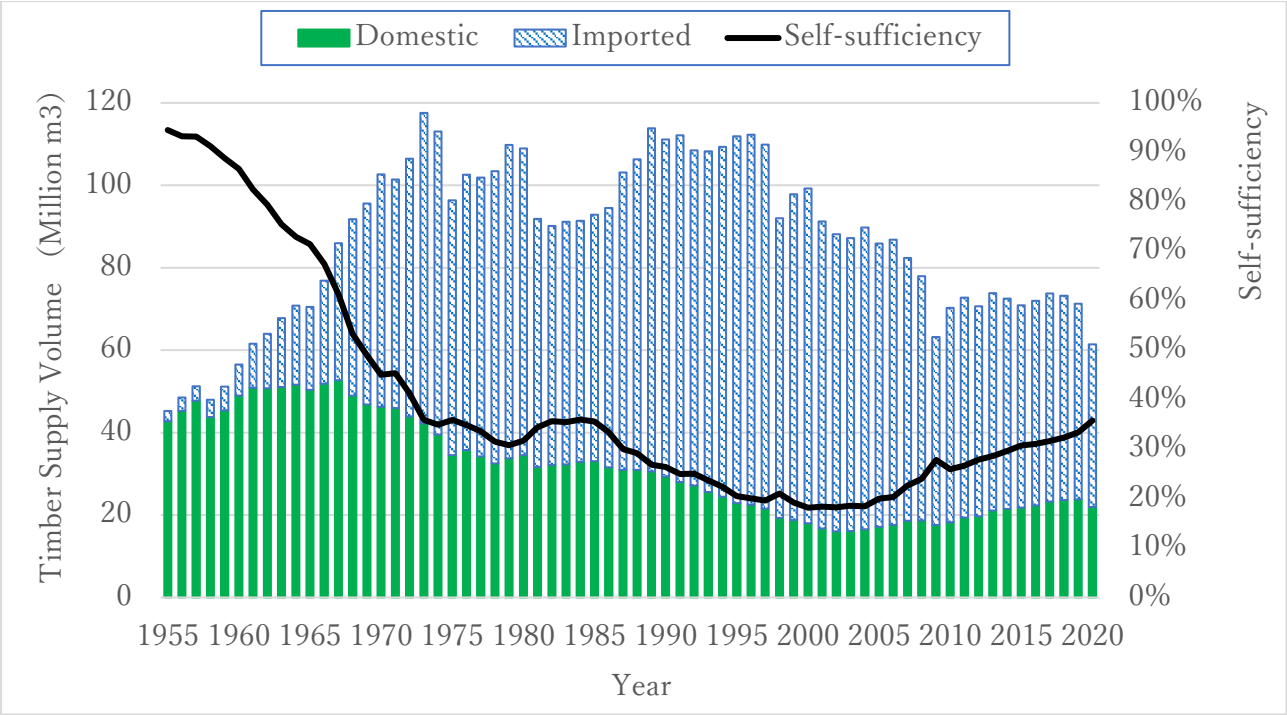

Figure 1: Trend of timber supply in Japan (1955-2020)
Source: Forestry Agency (each year) Timber Demand and Supply Table

Why did these drastic changes happen? There are three possible reasons. The first is climate change. Following the 1997 Kyoto Protocol, the Japanese government committed to a 6% reduction in carbon dioxide emissions. Of this, 3.9% was covered by absorption by forests. Therefore, the government started to develop artificial plantation forests, which had been poorly managed, by spending a considerable amount of tax money. Thanks to that, forest resources have been enriched.

The second is the maturation of plantation forest resources created after the WWII. Majority of our 10 million ha of plantation softwood forest, most of them are either Sugi (*cryptomeria japonica*) or Hinoki (*chamaecyparis obtusa*), had created during 1950s and 1970s, and these trees become the age for harvesting in recent years. This second reason has been strengthened in synergy with the first reason.

The third reason is that it has become difficult to procure timber from overseas, especially tropical timber and Russian timber. As a result, plywood used to be mostly made of tropical timber from Southeast Asia or of larch from Russia, but now the majority is made of domestic conifers. This creates a new demand for domestic larch and Sugi producers.

Log exports to neighboring countries such as Taiwan, South Korea and China, are also increasing. All of these changes are new phenomena that have occurred since the beginning of the 21st century. In response to such situation, the Japanese government has enacted several important forest-related laws to further activate domestic forestry and forest industry.

This paper aims to analyze the current forest policy directions and their implications in Japan by describing several newly created laws related to forestry and evaluating their strengths and weaknesses.

2. Newly created laws relating to forest and forestry in Japan

2.1 Clean Wood Act of 2017

In recent years, European Union and other developed countries are taking measures against global deforestation and illegal logging. Japan also belatedly enacted a new law in 2017 to restrict the use of illegal logged timber both domestically and internationally. This law, “Clean Wood Act”, however is not very effective for its purpose. The law does not necessarily apply to all timber-related businesses,

but only to companies that voluntarily register with the government.

Figure 2 shows the timber related businesses subject to this law. They are classified into two: First type is the primary user of logs or wood chips such as sawmills and plywood factories, and importers of wood. Second type is all other timber related businesses who get materials from the first type directly or indirectly. Those who willing to be registered by this law, they need to follow rules such as attaching documents confirming the legality of the timber they handle. Then they can use the title of Registered Wood Related Business Entity.

However, the document certifying the legality does not necessarily have to be an official certificate, and the penalties for violators are not very severe. In other words, Clean Wood Act in Japan is highly controversial and is not effective in its objective of eliminating illegally harvested timber domestically and internationally. Unfortunately, it must be said that Japan's attitude lags far behind European countries, which have taken a strong stance against illegal logging of tropical timber.

2.2 Act on Promoting Timber Use in Public Buildings of 2010

The Democratic Party of Japan, which took power in 2009, sought to revitalize the primary industry under the slogan of "From concrete to people". As for the forestry, the government launched the "Forest and Forestry Revitalization Plan" aiming for an internationally competitive forest industry. Under such circumstances, a new law was enacted in 2010 to promote the use of wood in public buildings. Not only the national government, but all local governments were ordered to expand the use of wood in construction of public buildings.

This policy persisted after the government returned to the Liberal Democratic Party three years later. As a result, the ratio of wooden construction in public buildings has increased from 8.3% in 2010 to 13.9% in 2020. Focusing on low-rise public buildings, the ratio is even higher, from 17.9% in 2010 to 29.7% in 2020. Thus, this policy has achieved considerable results so far.

Figure 3 shows the trend of housing construction start by structure and ratio of wooden houses. Number of new constructions dropped drastically in 2009 after the global financial crisis, but at the same time the ration of wooden houses has been increasing since then. Partly because the recession has induced large-scale non0wooded construction, it seems that governmental measures to promote construction of wooden buildings including the Act on Promoting Timber Use in Public Buildings are going well.

As a next step, the government tried to promote the use of wood in private buildings as well. Then, the 2010 law had revised as "Promotion of Timber Use in Buildings to contribute the realization of Carbon-Free Society" in 2021. Here, the idea of that promoting the use of wood in construction is an effective means of achieving a carbon-free society is pushed out. Since construction materials are the largest use of domestic timber, this policy will have a significant impact on the promotion of forestry.

Table 1 Ratio of wooden construction in newly built public buildings (2010-2020) Units: %

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ratio of wooden building in new public constructions	8.3	8.4	9.0	8.9	10.4	11.7	11.7	13.4	13.1	13.8	13.9
Ratio of wooden building in low-rise new public constructions	17.9	21.3	21.5	21.0	23.2	26.0	26.4	27.2	26.5	28.5	29.7

Source: Forestry Agency (2022) Forest and Forestry White Paper

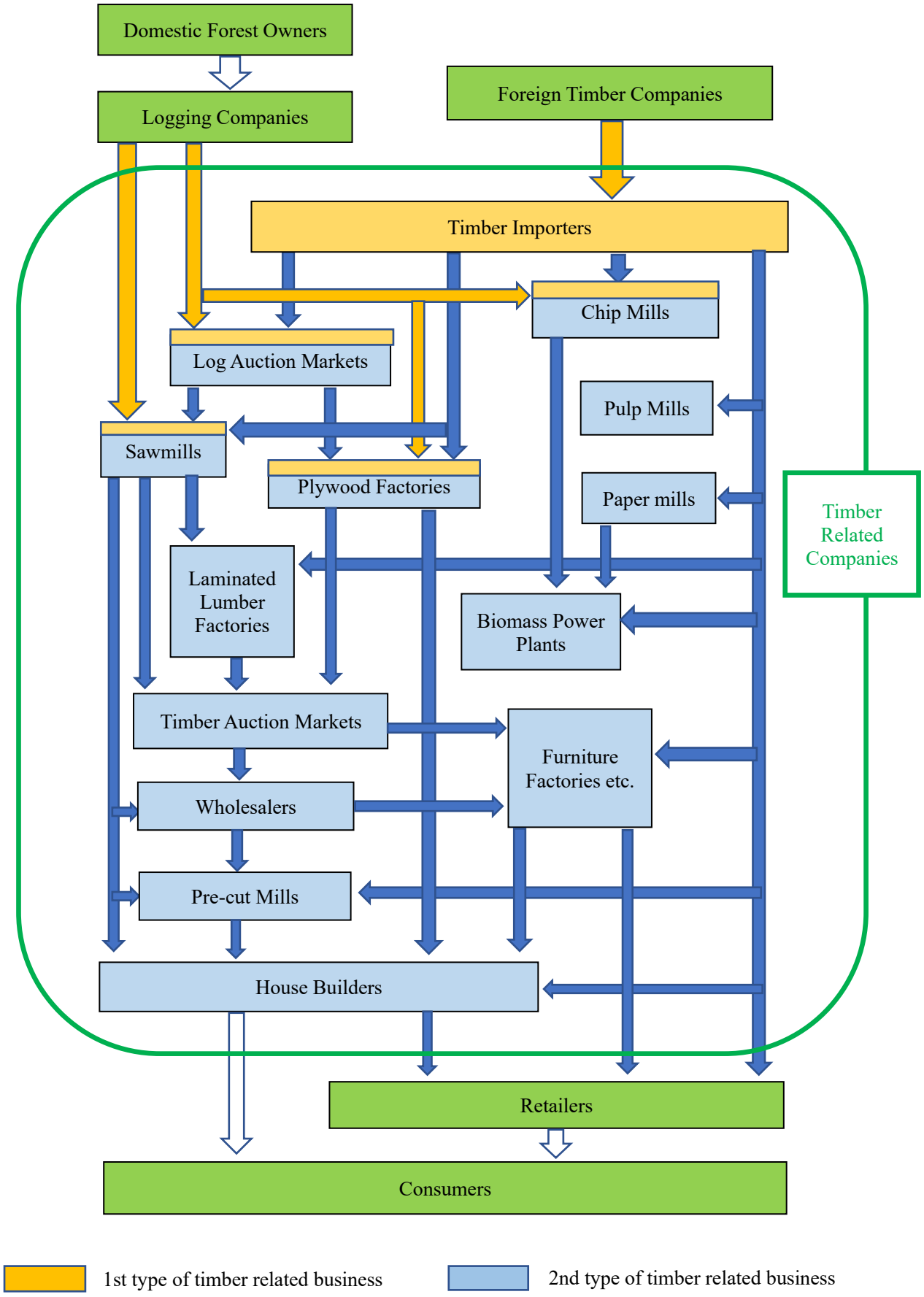

Figure 2 Description of timber related businesses subject to "Clean Wood Act"
Source: Forestry Agency HP (https://www.rinya.maff.go.jp/j/riyou/goho/summary/summary.html)

2.3 Forest Management Act of 2019

One of the biggest problems concerning forestry, especially about small-scale forestry, is lack of interest in forest management by forest owners. There are several reasons: 1) Forestry is not profitable, 2) aging of owners, 3) increase in out-of-village owners, 4) dispersal of land through inheritance, and 5) no heir of the forest owners. As a result, tens of thousands of hectares of forests are abandoned over the country. Forest Management Act in 2019 is aims to remedy such a situation.

Forest Management System was introduced by this legislation where an important concept of Forest Management Right was established. This right is granted to municipalities with an entrustment from the forest owners in order to integrate forestland for efficient management. In addition, the right is given when the owner cannot be found despite conducting a certain public search procedure.

Figure 4 illustrated the concept of Forest Management System. Municipal governments identify unmanaged or undermanaged private forests and contact landowners to offer entrustment contract. Among the forests accumulated in this way, economical forests are subcontracted to active forestry management entities, such as forest owners' cooperatives and local forestry enterprises, to manage them. For low economic value forests, municipal governments itself manage them from an environmental conservation perspective. This system makes it possible to promote timber production while protecting local forests.

Forest Management System would be effective as a countermeasure against undermanaged forests, but the premise for this idea is the purpose of stable large-scale supply of domestic logs through forestland consolidation. As a result, forest management tends to be uniform, and it becomes difficult for small-scale forest owners to manage their forests with their own ideas. Lack of diversity in forest management may not be favorable for the future of local society.

2.4 Law of Forest Environment Tax and Forest Environment Transfer Tax of 2019

The problem of unmanaged and undermanaged forests has certain negative impact on the natural environment. Unhealthy forests are inferior in biodiversity, soil conservation, water holding, and other functions. Law of Forest Environment Tax and Forest Environment Transfer Tax in 2019 was created in the name of addressing this problem.

The system is rather simple. All the taxpayers have to pay 1,000 JPY per year as the Forest Environment Tax. It is collected by municipalities with municipal tax and sent to national government. There are around 62 million taxpayers in Japan, therefore roughly about 60 billion JPY of tax money is going to be collected every year. National government distributes this money to municipalities as the Forest Environment Transfer Tax by the following rules.

Ninety percent of the total tax money is transferred to municipal governments and the rest is to prefectural governments. There are 49 prefectures and 1,724 municipalities in Japan as of October 2022. When transferring to municipalities, 50% of the total amount will be allocated according to the ratio of the area of artificial forests in private forests, 20% according to the ratio of the number of forestry workers, and 30% according to the population ratio. It means that the more the area of artificial forests in private forests in the municipality, the more money they get from the central government, and so on. The criteria for distribution to prefectures are the same. In addition, municipalities with high forest coverage will receive an extra grant as a bonus. Table 2 shows the criteria for distribution of the Forest Environment Transfer Tax.

Regarding to this transferred money, municipal and prefectural governments are allowed to spend for specific purposes related to forest management. In municipalities with small forest areas, it can be used for measures to promote the use of wood products, for forest environmental education, and for others. In general, this legal system has the significance of transferring money for forest management from urban areas with large populations to municipalities with small population and large forest areas.

However, municipalities without specialized forestry section and municipalities with large populations in urban areas are facing the problem of not being able to make full use of this transferred money. While the hardware of tax redistribution is important, it is also necessary to support the

software side of formulating appropriate forest policies for each locality. Above all, it is necessary to increase the number of personnel involved in forestry administration in municipal governments.

Table 2 Criteria for distribution of the Forest Environment Transfer Tax

	Distribution Rate	Basis for calculation	Distribution Rate
Municipalities (1,724)	90%	Area of artificial forests in private forests	50%
		Number of forestry workers	20%
		Population	30%
Prefectures (47)	10%	Same as above	

Source: Source: Forestry Agency HP
(https://www.rinya.maff.go.jp/j/keikaku/kankyouzei/kankyouzei_jouyozei.html)

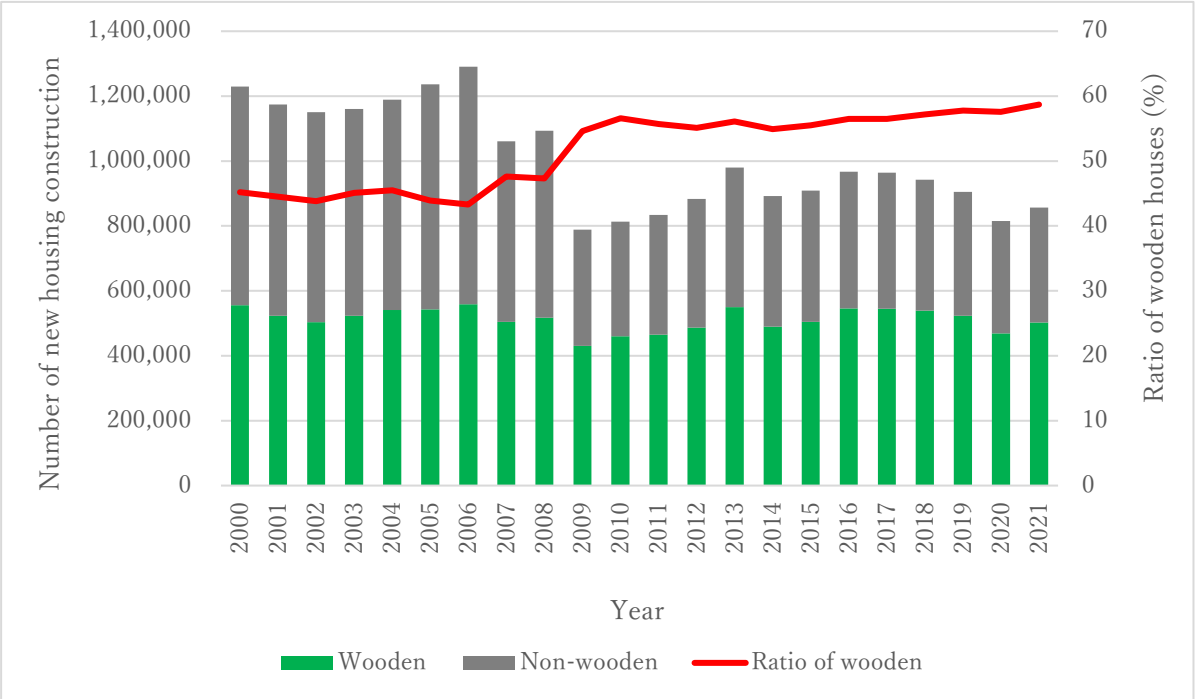

Figure 3 Trend of new housing construction and ratio of wooden houses in Japan (2000-2021)
Source: Ministry of Land, Infrastructure, Transport and Tourism (Each year) Building Start

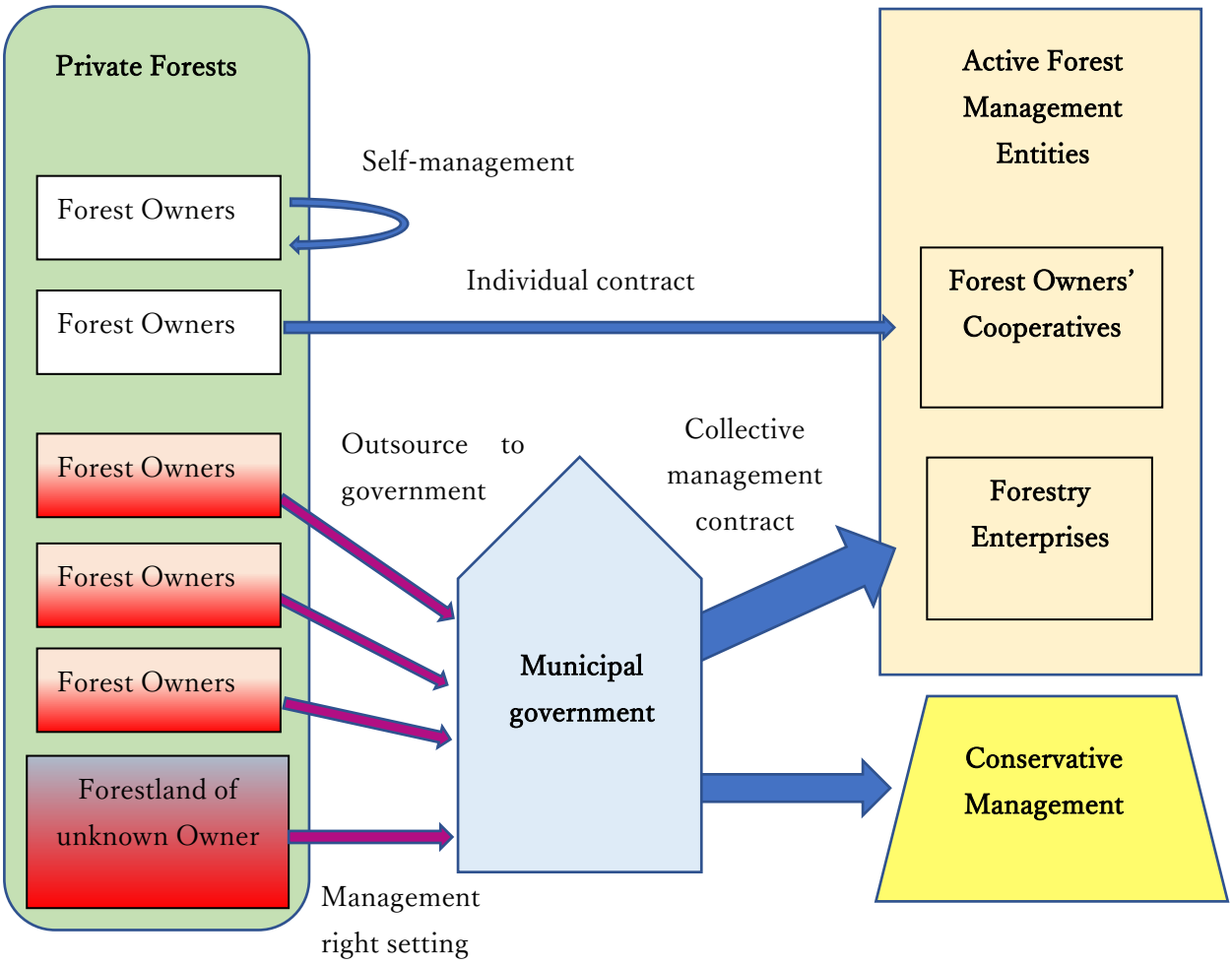

Figure 4 Concept of Forest Management System under the Forest Management Act of 2019
Source: Drawn by the author based on the Forest Management Act of 2019

4. Discussions

What are the aims of the new forestry legislations in recent years？ The author analyzes that there are three goals as follows: 1) Global and local environmental concerns, 2) Increasing domestic timber supply, and 3) Stimulate domestic wood demand.

As a developed country, the Japanese government intended to actively contribute to the problems of global warming and other environmental crises. While promoting the use of carbon-neutral wood as an alternative to fossil fuels, we are trying to take measures to reduce the loss of valuable forest resources such as tropical forests. Problems of such as ecosystem degradation and landslides due to lack of sound management in domestic forests are becoming apparent. Clean Wood Act and others were created with the aim of addressing these environmental concerns.

Artificial softwood plantations created between late 1950s and 1970s have reached maturity. However, the number of abandoned forests and forests with unknown owners is increasing, and timber resources are not being used appropriately. It must be essential to consolidate small-scale dispersed private forests and promote mechanization to improve the efficiency of domestic timber production. Forest Management Act and Forest Environment Tax System were devised to solve this problem.

Since the beginning of the 2000s, sawmills in Japan have been increasing in size with using governmental subsidies. The next challenge should be the destination of the large amount of lumber produced. Therefore, the Japanese government promoted the construction od wooden buildings with the intention of increasing wood demand, as it would also contribute to global warming

countermeasures.

Figure 5 indicates the relation between these three goals and above mentioned five newly created legislations. It can be seen that these new legislations are aimed at one or more of three goals. In this way, the forestry promotion policy of stimulating demand for wood and increasing timber supply is taking root now.

However, from the standpoint of small-scale forestry, which supports Japanese forestry at the bottom, these policies are not very much welcome. It is because the policy focuses only on efficiency and gives preferential treatment to large-scale forestry operations and large-scale sawmills. Small-scale forestry operations and individuals such as agriculture and forestry complex management by self-labor in mountainous areas are becoming difficult. It is essential to improve the legal system to support various forms of forestry and forest industry, including small-scale forestry.

In recent years, damage to agriculture and forestry by wild animals in rural areas has been increasing. Depopulation of mountainous areas is the biggest cause, and to alleviate the concentration of population in urban areas, it is necessary to settle the population in rural areas. Small-scale forestry can contribute to it. In order to realize this, it would be better if there was a more powerful direct income compensation system or similar kinds.

Amendment to the Clean Wood Act will be necessary. Current law cannot keep out illegally harvested timber imports from tropics. Forest certification or strict document screening, such as requiring an official certificate from the government of exporting country, should be made mandatory. In addition, the Japanese government has to make more efforts to spread of forest certification domestically.

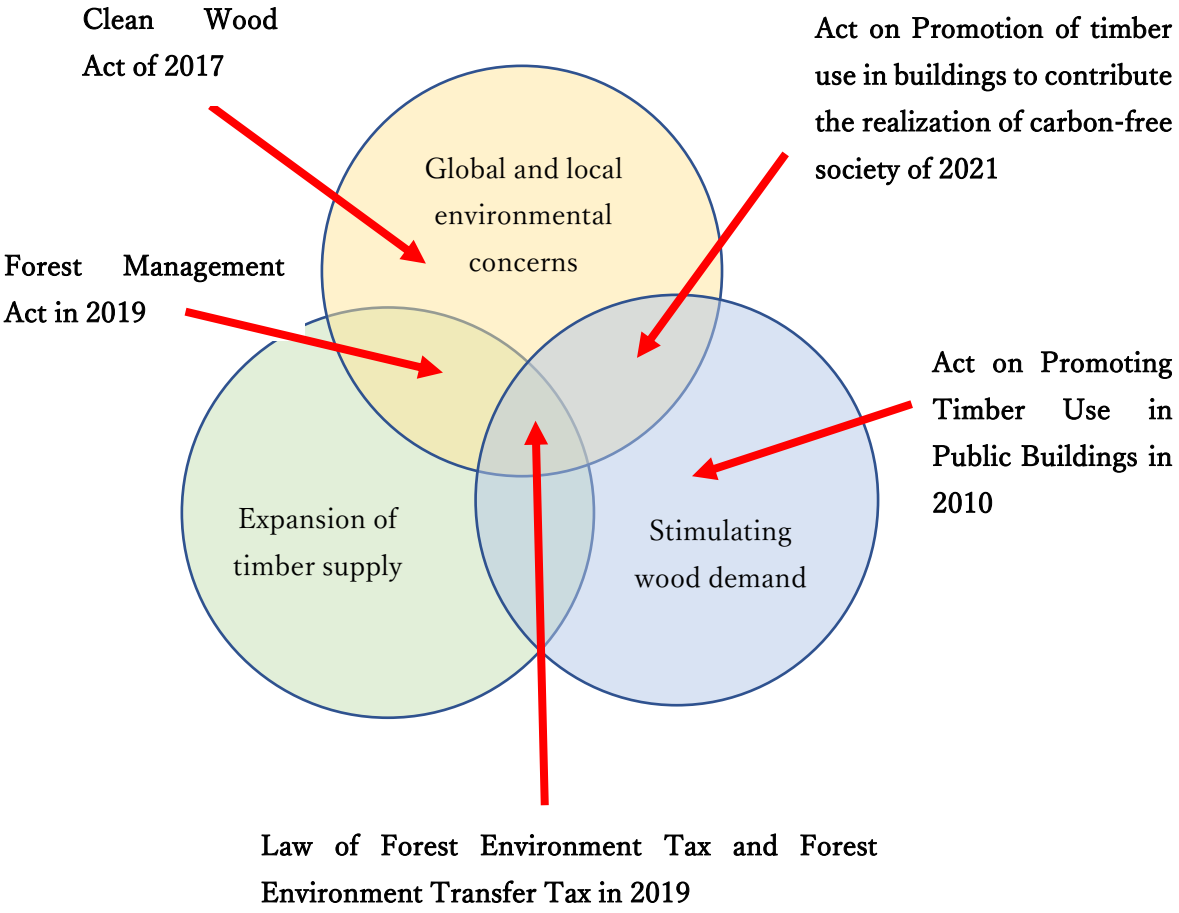

Figure 5 Goals of forest policy and positioning of five new laws

5. Conclusions

Japan's forestry had been stagnant for a long time, but the government has been promoting aggressive forest policy since the turn of the century. There is a tailwind from global warming countermeasures, but this stance of aiming for sustainable forest management with efficient use of forest resources is highly commendable. Newly created forestry related legislations described in this paper are the good indicator of such trend of new direction of forest policy in Japan.

Timber production volume has been increasing for almost 20 years, and self-sufficient rate of timber is as high as 40% today even after experiencing the COVID-19. Who could have predicted a recovery to this level in the last century? Of course, integration of dispatched forestland and newly built large-scale sawmills are driving this growth, small-scale forestry in Japan is still surviving despite many problems.

Some more new laws and systems would be enacted in the near future, but it is necessary for diverse forms of forestry to be respected and supported for the development of local communities and the progress of domestic forestry as a whole.

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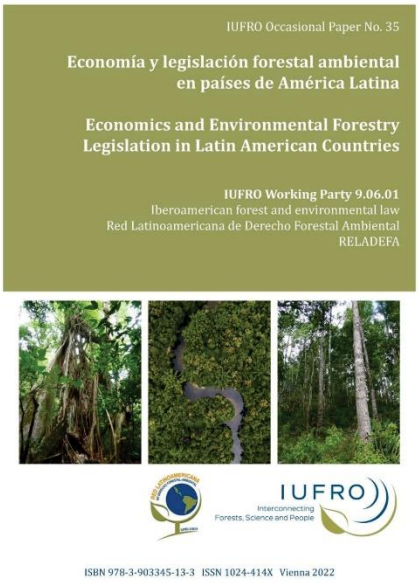

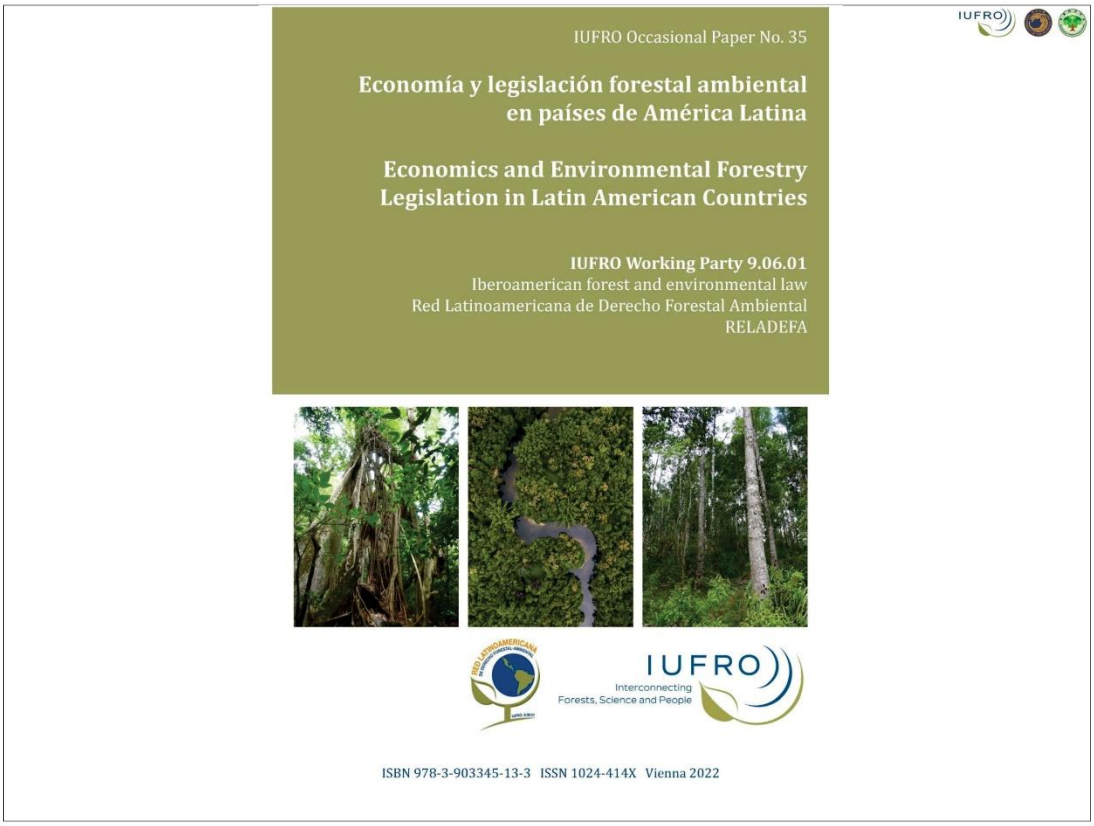

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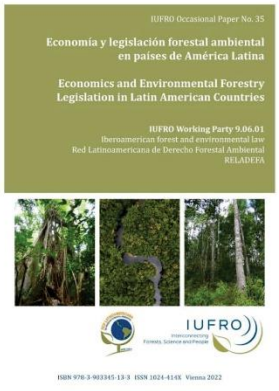

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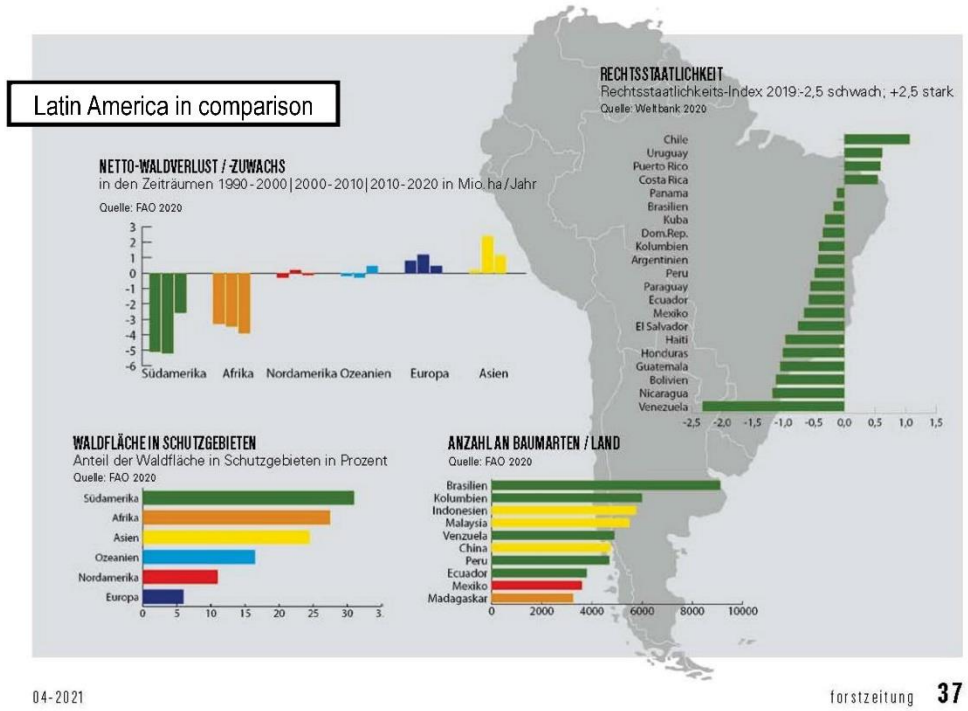
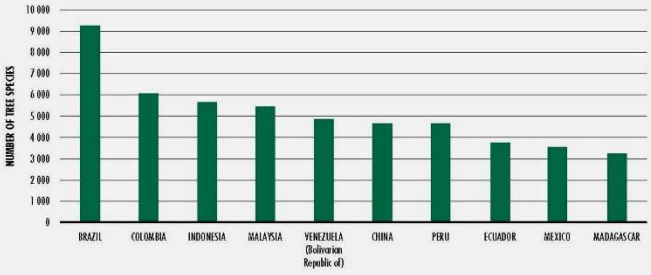


Megadiversity

- **Megadiversity** is a concept established by Conservation International and the United Nations Environment Program's World Conservation Monitoring Center (UNEP-WCMC) to label countries that hold the most extreme biodiversity world wide
- main characteristics of "megadiversity" and "megadiverse countries" include their
  - *geographic location* (in or near tropical regions)
  - *large sizes* (the bigger the country, the higher the chance to host extreme biodiversity - theoretically, at least)
  - *abundance in islands or peninsulas* (appearance of specific species on isolated territories)
  - *great variety of landscapes* (mountainous areas, forests, jungles, islands, seas, lakes, deserts, etc.)
  - *rich evolutionary and cultural history*
- Austria #141/201, Slovak Republic #151/201, Japan #29/201!

Megadiversity in Latin America

- 17 of the world's 201 countries hold over 70% of the earth's biodiversity and are therefore labeled "**megadiverse countries**"
- these include Brazil (#1), Colombia (#3), Mexico (#5), Peru (#7), Ecuador (#9) and Venezuela (#11), i.e. 6 of 11 top megadiverse countries are located in Latin America
- the same countries hold the highest numbers of tree species per country

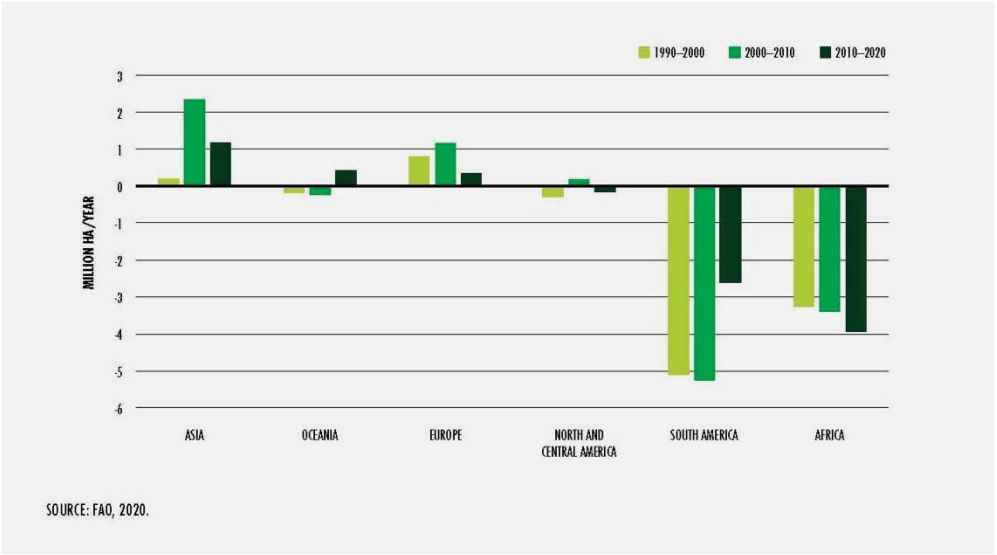


SOURCE: Beech *et al.*, 2017.

Megadiversity in Latin America

- Latin America has established environmental preservation as a constitutional norm, granting the right of all people to a healthy environment (with different denominations in each country), as well as the duty of States and individuals to protect, defend and conserve the environment for present and future generations

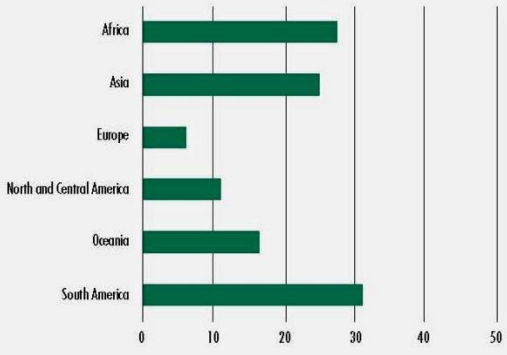
Net Losses of Forest Areas in Latin America



SOURCE: FAO, 2020.

Forest in Protected Areas

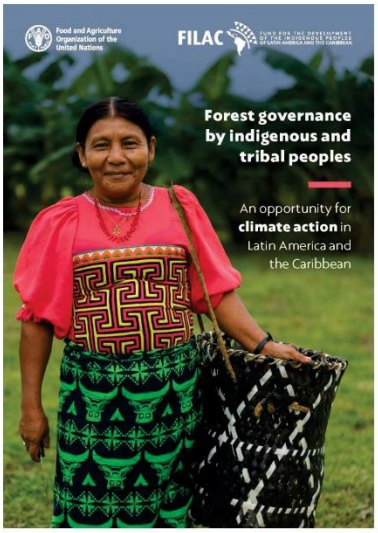
- approx. 726 million ha of forest in legally established protected areas worldwide
- South America has the highest share of forests in protected areas (31 % of forests in legally established protected areas, as of 2020)
- Ecuador 54,5 % of forest in protected areas, transnational integration with Colombia, Costa Rica and Panama



NOTE: Data for Europe include the Russian Federation. If the Russian Federation is excluded, 18 percent of Europe's forest area is in protected areas.
SOURCE: FAO, 2020.

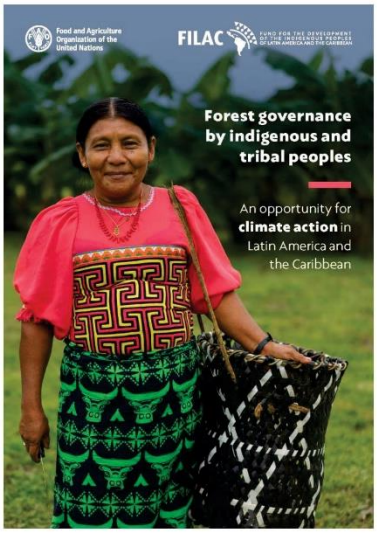
Indigenous People in Latin American Forests

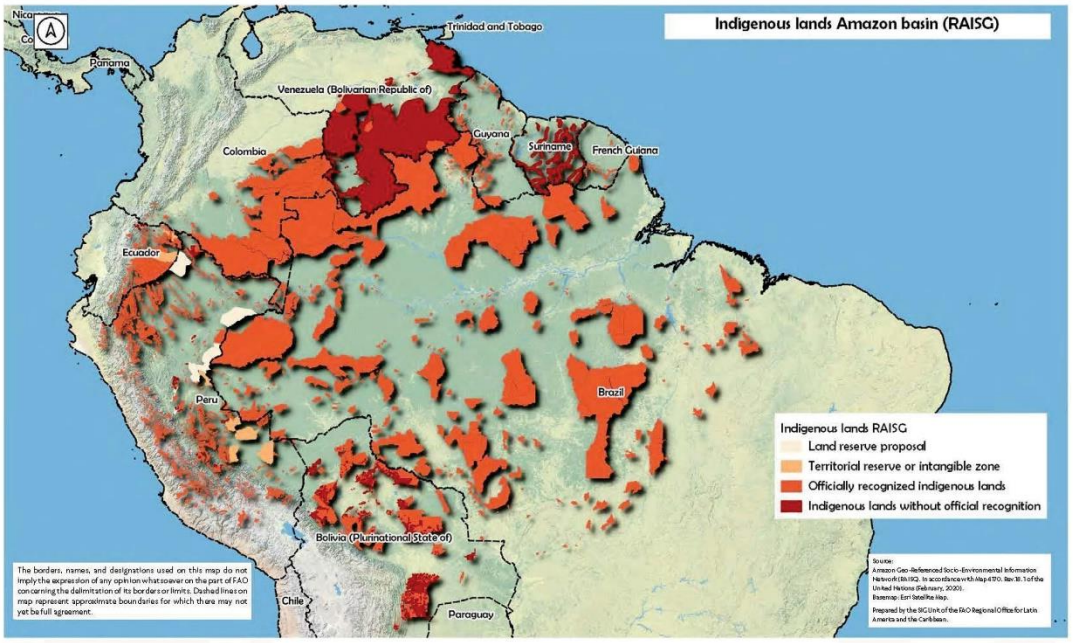
- in most of the reporting countries, there is a large presence of ethnic communities in forest cover areas, with the exception of Uruguay, the Dominican Republic and Cuba
- indigenous peoples physically occupy 404 million hectares in Latin America (that is, one fifth of the total area of the region), almost 60% of that are in the Amazon Basin
- indigenous and tribal peoples are involved in the communal governance of between 320 and 380 million hectares of forests



Indigenous People in Latin American Forests

- 35% of Latin America's forests are in areas occupied by indigenous groups
- more than 80% of the area occupied by indigenous peoples is covered with forests
- 45% of the remaining intact forests (large undegraded forest areas) in the Amazon Basin are in indigenous territories





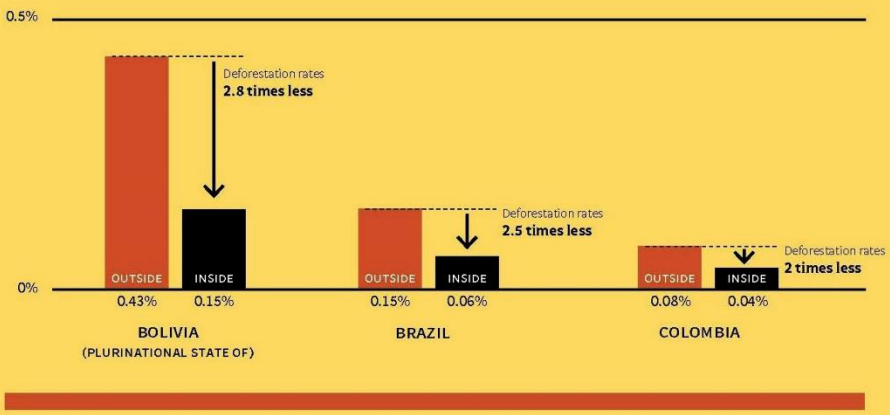
MAP 1. The indigenous territories of the Amazon Basin.

Indigenous People in Latin American Forests

- forests in most indigenous and tribal territories have been much better conserved than other forests in Latin America, less deforestation and less forest degradation; e.g., Peru (2006 – 2011) / Brazil (2001 – 2009): indigenous territories in the Amazon basin reduced deforestation twice as much as protected areas with similar ecological conditions and accessibility
- because of
  - close relations between indigenous peoples and the natural ecosystems they have inhabited for many generations => their productive systems are less harmful to forest ecosystems (use of non-timber forest products, no extensive cattle ranching, etc.)
  - tenure security (i.e., formal recognition by governments of the collective territorial rights of indigenous and tribal peoples; e.g. Art. 386 of the Political Constitution of the Plurinational State of Bolivia) helps to impede encroachment => less forests destroyed by miners, land speculators, ranchers, oil palm/soy bean/coca farmers, etc. (directly or through forest fires caused by such intruders)

Indigenous People in Latin American Forests

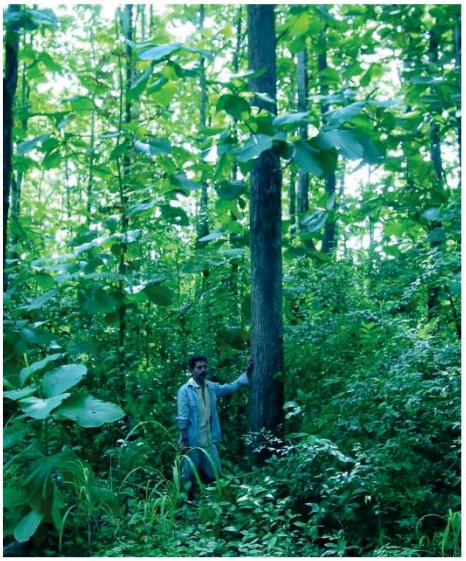
FIGURE 1. Deforestation rates, inside and outside indigenous woodlands where land property has been ensured.



Source: FAO/FILAC 2021

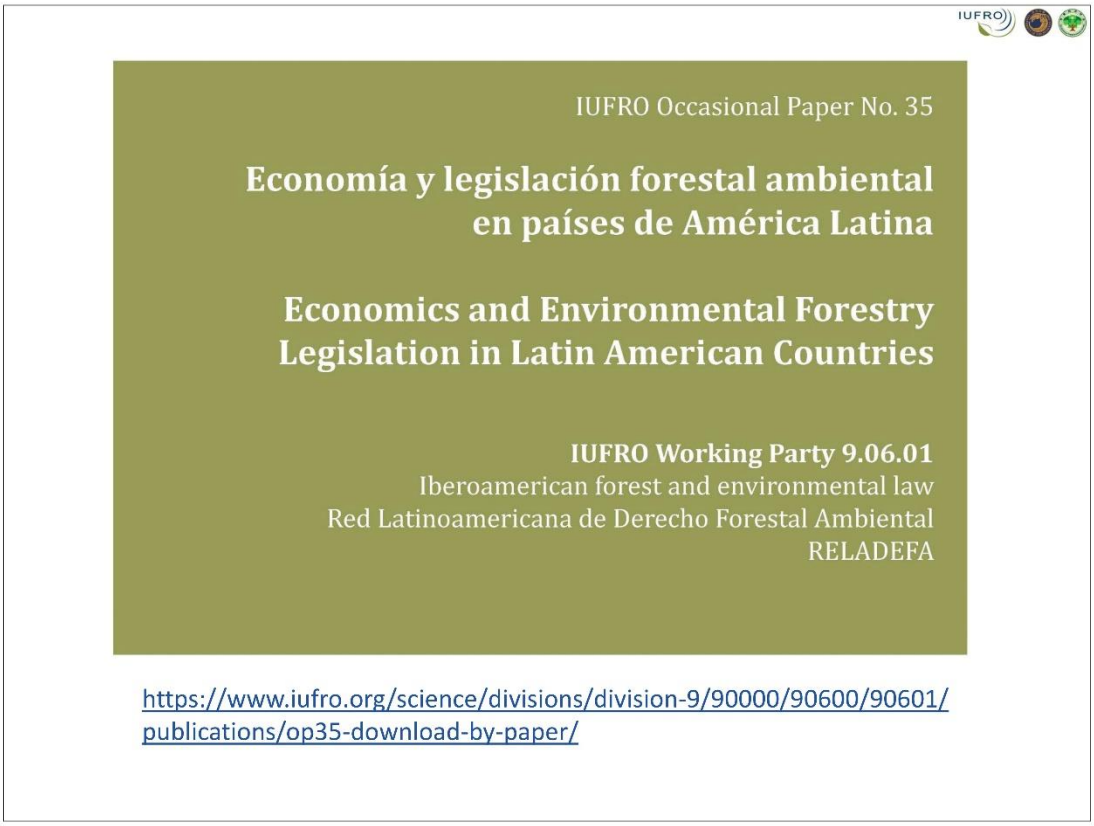
Indigenous People in Latin American Forests

- heavy overlaps of indigenous and tribal territories with protected areas; such areas often have lower deforestation than other protected areas
- government payment for environmental services programs often favor indigenous territories, e.g. in Ecuador (Socio Bosque, 1,57 million ha), Peru, Guatemala, Colombia, Brazil ….



Rights of Nature

- Peru (September 2021): legal action filed in court in Iquitos, demanding that the Marañón river be recognized as having rights and essentially be considered a person (ser vivo = living being)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A1-03

Legal framework for sustainability indicators promoting wood production in the Slovak Forest Certification System

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Abstract

Forest certification as a voluntary tool is largely based on the approved and widely accepted international principles of sustainable forest management. Beside this, national forest certification systems developed on such international principles shall follow the applicable national legislative framework, consider local natural conditions, existing institutional structure as well as incorporate the local sustainability principles and criteria in the forestry related areas. In Slovakia, forest management is carried out on the basis of a stringent national forestry and nature protection legislation that applies to all forest owners regardless of their size or ownership category. In order to allow small non-state forest owners and managers to participate in national forest certification process, it is necessary to consider the differences between the international sustainability requirements and the scope of national legislation and well-established forest management and planning practices, which often reflect the traditional ways of forest management to ensure ecosystem services provided by the forests. Therefore, the main objective of this paper is to assess the selected wood production indicators of the national Slovak Forest Certification System (SFCS), internationally endorsed under the PEFC, against the requirements of the national regulatory instruments. A gap analysis is used to determine which international certification criteria related to wood production are covered by the applicable national legislation and which shall be explicitly added to the national sustainable forest management standard to meet the global sustainability benchmark.

Keywords: sustainability indicators, forestry legislation, group forest certification

1. Introduction

Based on the Forest Act 326/2005 Coll., forests in Slovakia must be professionally managed in accordance with principles of sustainable management. The tool that is being used for this purpose is a forest management program. Forest certification is also a way to achieve sustainable management. Currently, forest management certification is being introduced as a widely used private instrument. Such a voluntary instrument represents a free decision of a business or other entity to comply with above-standard social and environmental requirements. It meets requirements that go beyond regulatory and economic instruments of public policy (FAO, 2014).

In forest management, however, it is important to distinguish between two requirements, namely legality and sustainability. The aim of the legality requirements is to eliminate negative activities in forestry. Currently, the requirements for legality are set out in the Forest Act, the Nature Protection Act and in related decrees and legislative regulations. On the other hand, sustainability requirements are based on the basic definition of SFM (MCPFE, 1993). Within the PEFC certification scheme, this definition is developed through six basic SFM criteria (PEFC ST 1003, 2018) as well as controversial resource requirements (PEFC ST 2002, 2020). The additional requirements for sustainability consider the requirements of public policies for the purchase of timber.

Within the Slovak Republic, the basis of the PEFC recognized national Slovak forest certification system (SFCS) is the certification of the system of quality of forest management as a tool ensuring sustainable forest management. SFCS develops general criteria and principles, which are developed at the level of indicators. Their legislative basis is based primarily on the Forest Act no. 326/2005 Coll. as amended, which refers to the applicable legislative standards containing or regulating the issue. Based on these, it is possible to assess the compliance of management with these

international requirements. Criteria and indicators of sustainable forest management in Slovakia form an integral part of the basic SFCS documents. They are valid throughout the territory of the Slovak Republic. Observance of these criteria and indicators is essential for all participants in the certification process (PEFC SK, 2021a).

To provide an overview on forestry in Slovakia in general, one shall look at the actual Report on the Forest Sector of the Slovak Republic 2021, published by the Ministry of Agriculture and Rural Development of the Slovak Republic (2022).

The main goal of this paper is to define and assess the legal framework for sustainability indicators of the Slovak Forest Certification System, in particular those related to the promotion of wood production within the national SFM certification standard.

1.1 PEFC certification in Slovakia

PEFC, the Programme for the Endorsement of Forest Certification, is a leading global alliance of national forest certification systems promoting sustainable forest management (SFM) through independent third-party certification.

PEFC Slovakia was established in 2002 as a non-profit, independent and professional association of legal entities, currently consisting of 28 member organisations categorised into one of the following categories – forest owners and managers, forest-based industries, and other stakeholders (PEFC SK, 2016). In 2005, the Slovak Forest Certification System (SFCS) was PEFC endorsed for the first time. Since that time, the system has undergone three revisions, the last one carried out during 2019-2021. The national forest certification system comprises, apart from others, requirements for the sustainable forest management and organisation of group certification. SFM standard - TD SFCS 1003:2021 (PEFC SK, 2021a) contains a set of requirements for qualified, independent and objective assessment of the level of forest management. Group certification allows forest owners and managers to become voluntarily certified under one certificate and share the financial obligations arising from forest certification as well as the common responsibility for forest management - TD SFCS 1002 (PEFC SK, 2021b). As of June 30, 2020, there were 1,196,250 ha of forests certified in Slovakia, thus representing over 60% of the total forest area. A detail distribution of certified area according to the groups (certified regions) and forest owner categories as of December 31, 2021 is illustrated in Table 1.

Table 1: Structure of PEFC certified forests in Slovakia

Forest ownership category	Forest area (ha)		Share of certified forests (%)		Number of certificates
	Managed forests	PEFC certified forests	Out of managed forests	Out of ownership category	
Public	1,038,039	1,027,893	99.02	83.81	136
Private	169,076	38,248	22.62	3.12	44
Community	627,675	61,263	9.76	5.00	46
Church	17,332	0	0	0	0
Municipal	170,978	99,004	57.90	8.07	31
Total	2,023,100	1,226,408	60.62	100.000	257

Source: PEFC SK (2022)

1.2 Development of national certification criteria

PEFC international requirements for standard setting (PEFC, 2017) enables each national standardising body to develop standards, which are customised and made suitable for that country and its local situations. In Slovakia, PEFC's requirements for standard development processes are defined by normative document *ND SFCS 002 Development, Review and Revision of SFCS Documentation*

(PEFC SK, 2019a). The standard defines the development process used by the National Governing Body (PEFC Slovakia) as an open and transparent process based on consensus among a broad range of stakeholders composing of several development stages. Periodically performed review process of certification requirements ensures continuous improvement of a certification system and maintains it up to date. As a part of review process all changes in the PEFC International benchmark requirements (gap analysis), national and international legislation as well as permanently collected feedback on SFCS from standard users and other stakeholders have to be taken into consideration in defining the scope of the revision (PEFC SK, 2019b).

The latest revision process took part in 2019-2021 and also included the revision of the SFM standard TD SFCS 1003. Following the PEFC requirements for stakeholder participation (PEFC, 2017), stakeholder categories relevant to the revision process and their key issues were defined (Table 2). Within the stakeholder categories, there were 88 main stakeholders identified, out of which 32 main stakeholders whose participation was crucial for the results of standard setting work, and 41 disadvantaged stakeholders.

Table 2: Categories of stakeholders and their key issues

Category of stakeholders	**Key issues for the category**
forest owners	Improving functionality and maximize the achievement of positive management effects for society while adhering to all the principles of sustainable development
business and industry	Sustainability of the business environment and balance of supply of products from sustainable and controlled forest resources
non-government organisations	Provide activities for the benefit of the public and nature protection
scientific and technological community	Implementation of science and research results in forest management
workers and trade unions	Ensure adequate socio-economic working conditions for employees and protect their rights through collective bargaining
local authorities	Implementation of objectives and procedures of forestry and other public policies in forest management
women	Active participation in society-wide activities related to the management and use of forest resources

Source: PEFC SK (2021c)

All identified stakeholders were directly invited to actively participates in the revision process (PEFC SK, 2021c). PEFC Slovakia received 28 nominations and its Board of Directors accepted all the nominations and appointed a technical committee. The role of the technical committee members was to reach a consensus on the final wording of certification requirements for SFM. For this purpose, during 2020 – 2021 the committee met 3 times (2 times online and 1 time in person) and proposed, discussed and considered a range of comments raised by participating stakeholders. Over 250 comments to SFM standard requirements were submitted by technical committee members; each comment was presented and justified by its author, discussed and considered within the committee and the final wording agreed on. Approved SFM standard was a subject of 60 days public consultation. For any comments received during the public consultation the same procedures for the technical committee as for standard setting applied. The revised SFM standard was a subject of PEFC international assessment and, finally maintained its PEFC recognition in June 2022 for the next period.

2. Material and method

A comparative analysis was used to compare the recently revised selected requirements of the national SFM certification standard "TD SFSC 1003:2001 Sustainable Forest Management – Requirements" with a range of forestry and forestry related legislation. The standard contains a set of requirements for qualified, independent and objective assessment of the level of forest management. Meeting these criteria is an inevitable precondition for the issuance of certificate confirming that the forests are managed in compliance with the principles of sustainable forest management.

The requirements set out in this standard apply to forest owners and managers, as well as to contractors and other operators operating in PEFC-certified areas.

The standard is arranged in the structure of STN ISO 9001: 2015 Quality management system – requirements and each process (specified by its number and title) is described as follow:

a) Full wording: describes the subject of partial processes of quality management system and stages of sustainable forest management, lists the crucial tools and determines indicators ensuring the improvement of practical procedures and methods of sustainable forest management.
b) Objective: defines the expected result to which the fulfilment of the criterion should aim
c) Legislative background: provides references to applicable legislative standards containing or regulating the particular issue.
d) Requirements: Quantitative or qualitative parameters describing the objectively and unambiguously the subject of the requirement and are evaluated in relation to the requirements. They shall apply to each manager participating in the certification. They set out the boundary requirements of management and important phases ensuring the sustainability of forest management or specify the framework procedures and the form of the results of important phases of forest management, in the achievement of which its management is considered sustainable.
e) Method of verification: specifies the source of information used to assess the status of compliance with the criteria indicators.

Out of the complete set of standard indicators, we selected specific, wood production promoting indicators under Criterion 3 (process 8.3) Maintenance and encouragement of productive functions of forest (wood and non-wood), process 8.3.1. Sustainability and continuity of timber harvesting and 8.3.2. Roundwood and compared their content with the valid legislation of the Slovak Republic, which define borderline requirements to ensure sustainable forest management for each participant in regional certification.

The legislative and normative basis of the selected criteria is outlined by the Act 326/2005 on Forests, Act 543/2002 on Nature and Landscape Protection, Act 113/2018 on Placing Timber and Timber Products on the Market, Decree 453/2006 on Forest Management and Forest Protection, Decree 232/2006 on the Marking for Felling, Marking of Harvested Timber and Proofs of Timber Origin and the Slovak technical standards STN 48 0050 Raw wood, STN 48 0055 Qualitative classification of coniferous logs and STN 48 0055 Qualitative classification of deciduous logs.

3. Results

Totally 7 indicators within the defined processes in the SFM standard were assessed and compared with the existing legislative requirement. Some of the indicators include additional requirements defined in the standard revision process by the technical committee members. These requirements exceed legal requirements and contribute to the sustainability aspect of the certification process. The overview of assessed indicators is in Table 3.

Table 3: Assessment of selected wood production promoting indicators

8.3.1. Sustainability and continuity of timber harvesting	
Indicator	*Reference to legal regulation*
8.3.1.1 The total volume of timber harvesting prescribed in FMP for forest unit and forest category shall not be exceeded	The Forest Act, § 23 Principles of felling • Timber volume from felling carried out in a stand with the age over 50 years can be exceeded not more than by 15%, as compared to the felling volume recommended in the FMP. • Total timber volume planned for felling in the FMP for a forest unit and forest category cannot be exceeded. If several forest managers, none of them can exceed total timber volume planned for felling within their particular ownership unit. • Stocking of forest stand shall not be reduced by intentional felling below 7/10 of full stocking, unless otherwise specified.
8.3.1.3 Timber harvesting shall be carried out in accordance with the condition and needs of the stand according to the harvesting principles and based on a written harvesting permit	The Forest Act, § 23 Principles of felling • The felling can be carried out only after marking for felling and on the basis of a written consent of a professional forest manager. • The forest manager is obliged to carry out the felling so as to minimise adverse impacts on soil, water courses, forest stand, adjacent trees, and timber quality. • The forest manager or timber purchaser is obliged, not later than at the hauling place, to mark harvested timber in an approved manner registered by the forestry state administration body. • In the case of protection areas declared by the Nature and Landscape Protection Act, it is prohibited to carry out felling within the areas and during the periods specified by the respective nature protection legal norms.
8.3.2. Roundwood	
Indicator	*Reference to legal regulation*
8.3.2.2 The volume of timber placed on the market shall be equal to the volume of timber harvested	The Act on the Placing of Timber and Timber Products on the Market, § 3 • General conditions of the placing of timber and timber products on the market • Documented information - Operator - Trader - Carrier
8.3.2.3 DDS shall be applied when placing timber on the market. Records of the origin and movement of timber shall be kept	The Act on the Placing of Timber and Timber Products on the Market, § 4 Due diligence system • The operator is obliged to exercise the DDS before timber and products are placed on the market. • In case such operator is also the forest manager within the area of SR, the DDS shall include the evidence according to the Forest Act (e.g. information on timber harvesting and transportation). The Forest Act, § 24 Obligations and rights in skidding, transportation, and storage of timber

	The Decree on the Marking for Felling, Marking of Harvested Timber and Proofs of Timber Origin, § 6 Proofs of Timber Origin and Their Presentation • The forest manager or timber purchaser is obliged to issue proofs of the timber origin and to exercise the DDS for placing timber on the market • All persons who transport, store or process timber as well as all timber purchasers are obliged to prove the origin of transported or stored timber to the prompt of competent authorities by the legally approved evidence and to keep these records for the period of at least 10 years. • The proof of the timber origin shall include information on the timber volume, species, and qualitative class.
Additional certification requirements	
Indicator	*Reference to legal regulation*
8.3.1.2 The annual volume of harvesting during the validity of the FMP shall be in the range between 70% to 130% of the 1/10 of the FMP prescription (does not apply for entities managing areas under 1000 ha)	Legal regulation absents (regulated by the legally non-binding forest management guidelines only).
8.3.1.4 The volume of intentionally harvested timber by species shall correspond (+/- 15% or +/- 10m^3, whichever is more) to the data on volume obtained from trees marking and recorded in the harvesting permit	Legal regulation absents at the level of species (legally regulated at the level of forest stands only).
8.3.2.4 Timber originating from non-forest land, non-certified forests or the purchase of timber shall be separated and placed on the market as non-certified	Legal regulation absents

4. Conclusion

The legal framework for sustainability indicators of the Slovak Forest Certification System, internationally endorsed under the PEFC, is set up by the national regulatory instruments applied in the form of specific forestry and environmental laws. Out of seven particular indicators related to the promotion of wood production that have been analysed, only four are covered by the applicable national legislation. The other two indicators – those dealing with the very specific quantitative requirements on the volume of harvested timber - shall be explicitly added to the respective legislation to meet the global sustainability benchmark as they are present within the legally non-binding guidelines only. Finally, in the case of the indicator on timber originating from non-forest land, legal regulation is completely absent as the respective Slovak forest legislation is applied exclusively to the forest land.

Acknowledgements

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Act 543/2002 on Nature and Landscape Protection

Act 113/2018 on Placing Timber and Timber Products on the Market

Decree 453/2006 on Forest Management and Forest Protection

Decree 232/2006 on the Marking for Felling, Marking of Harvested Timber and Proofs of Timber Origin.

STN 48 0050 Raw wood

STN 48 0055 Qualitative classification of coniferous logs

STN 48 0055 Qualitative classification of deciduous logs.

A1-04

Trends of private forest ownership and the role of forest owners' associations in Norway

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Abstract

This study gives insight into the trends of individual private forest ownership and forest management in Norway. Contrary to Japanese forest management, larger forest areas are actively managed by private owners and forest owners' association (FA) are more active in Norway. The questionnaire survey using Google Form was conducted for members of two of the four FAs in Norway. One of the FAs is Glommen Mjøsen Skog (64 respondents with an average forest area of 453 ha). The members of Glommen Mjøsen Skog own larger properties suitable for forestry. The other is Allskog (41 respondents with an average forest area of 198 ha). Allskog's members are located on the west coast of Norway where forestry is more difficult due to many steep slopes and the smaller properties. Both FAs' members were interested in expanding their properties for the purpose of "expanding forestry management" and "asset formation". In Allskog, 10 of the respondents (24%) purchased 114 ha on average in the past five years. On the other hand, 15 of the respondents in Glommen Mjøsen Skog answered that they expanded their property with 187 ha on average. More than 50% of the respondents in Glommen Mjøsen Skog have successors, while 40% in Allskog. The results indicate that there is a difference in the attractiveness of forest ownership and forestry. Regarding the operation of forest management, 47% and 59% answered "done by respondents themselves or their family members" in Glommen Mjøsen Skog and in Allskog, respectively. Similarly, 19% and 41% answered that harvesting was implemented by "respondents themselves or their family members" in Glommen Mjøsen Skog and in Allskog, respectively. Because members in Allskog own smaller properties, it seems that forest owners have a tendency to carry out all operations by themselves or their family members.

Keywords: Norway, private forest, forest owners' association, forest management entity

1. Introduction

The challenges in Japan are mainly: timber production is not sufficiently expanded since small scale forest owners do not have the motivation for forest management and clear cut without planting seedlings has been increasing gradually. The main reasons of these are: forest owners will not obtain sufficient revenue from their forests because of its smallness, the average age of forest owners is increasing, many forest areas are struggling with depopulation, and lack of successors who want to do forestry. On the one hand, timber production is very active even though majority are small-scale forest owners in some European countries. In these, especially in Norway, 80% of forest ownership is private. And, Forest Owners' Associations (hereafter FA) play an important role in private forest management. These are similar situations in Japan. However, contrary to Japanese forest management, private owners and FAs are more operative in Norway. From these situations, the following hypotheses can be made; reasons for inactive timber production in Japan would not mainly in its smallness of forest scale, but business model of FAs and framework of forest policy. Therefore, better business model of FAs and framework of forest policy improve the forest management and increase timber production in Japan.

This study aims to clarify the trends of individual private forest ownership and the relations between forest owners and FA in Norway, then feedback to Japanese Forestry.

2. Methods

2.1 Comparison between Norway and Japan

Norway is developing renewable resources using the profits obtained from petroleum, which is an exhaustible resource, for not being in trouble when oil is exhausted. In particular, Norway is developing a system that enables aquaculture in the fishery sector and wood production from reforestation in the forestry sector. Japan's main industry is manufacturing, with fisheries accounting for 1.4% of GDP and forestry accounting for 0.04% of GDP.

Table 1: Comparison of general information between Norway and Japan

	Norway	Japan
population	5,337,962	125,800,000
Land area	38,520,000 ha	37,800,000 ha
Forest area	12.2 million ha (38%)	25.1 million ha (66%)
Private forest	80%	57%
Average size of owned forest area	56 ha	6.7 ha
Timber (log) production	5,457,864 m^3	17,620,000 m^3
Timber (log) export	3,559,652 m^3	1,375859 m^3
Timber (log) import	336,633 m^3	2,187,131 m^3

Source: FAO (2022)

2.2 Interviews for two forest owners' associations

Interviews for two FAs were conducted in September 2022. These two FAs manage areas with different geographical conditions.

<Glommen Mjøsen Skog>

One of the FAs is Glommen Mjøsen Skog (Fig. 1). Employees are 130. Forest owners in this area are 20,000, and of which 7,173 (36%) are members of this FA. Average of owned forest is 150ha.

Figure 1: Location of Glommen Mjøsen Skog

The members of Glommen Mjøsen Skog own larger properties suitable for forestry, because of flatness of land. Therefore, timber production is also higher (Fig. 2). Forest owners have choices for selling timber among not only enterprises in Norway but also Swedish enterprises. Therefore, Glommen Mjøsen Skog has to compete with several rivals in terms of timber prices. It makes good condition of timber markets.

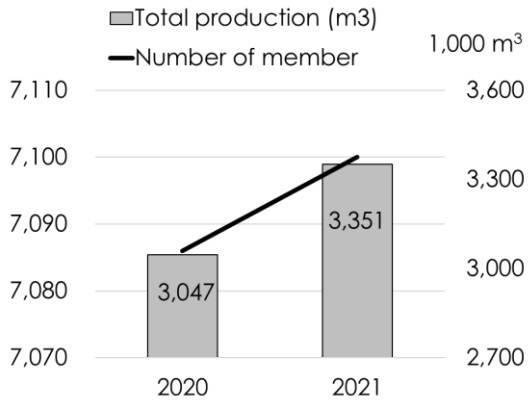

Figure 2: Total timber production and number of members in Glommen Mjøsen Skog
Source: Glommen Mjøsen Skog (2022)

<Allskog>

The other is Allskog (Fig. 3). Employees are 85. Forest owners in this area are 30,000, and of which 7,557 (25%) are members of this FA. Average owned forest is 50ha.

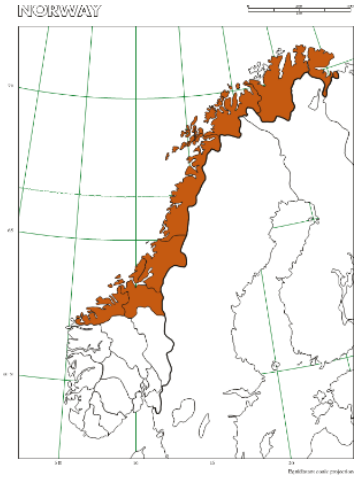

Figure 3: Location of Allskog

Allskog's members are located on the west coast of Norway where forestry is more difficult due to many steep slopes, fjord terrain, lots of rain, and the smaller properties. Produced timber in this area is consumed in this area. Export rate is not high. The number of members in this FA has decreased (Fig. 4).

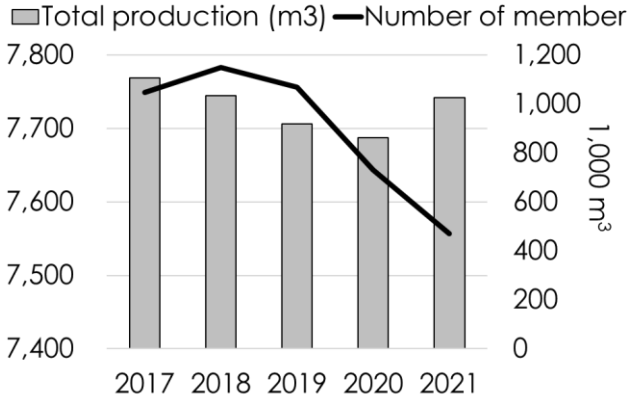

Figure 4: Total timber production and number of members in Allskog
Source: Allskog (2022)

2.3. Questionnaire survey

Questionnaire survey was conducted among members of two FAs using Google Form from November to December 2021. The contents are: forest ownership: including situations of purchase / sale / inheritance, forest management (who implements operation), household characteristics: including situation of successor. Respondents are: 65 members (0.9% of the whole member) in Glommen Mjøsen Skog, and 41 members (0.5%) in Allskog.

2.4. Interviews for forest owners

Interviews for forest owners were conducted in September 2022.

3. Results

3.1 Owned forest

As shown in Table 2 by looking at the owned forest area classifications in the statistics, there is one digit difference between Norway and Japan. In Norwegian statistics, from 3 to 50 ha is not divided, on the one hand, in Japanese statistics, from 100 to over 2000ha is not divided. It can be known the difference in forest property scale from statistics, too.

Table 2: Owned forest area classifications

	Questionnaire survey		Statistics	
	GM (n=65)	All (n=41)	Norway	Japan
Average area	452 ha	198 ha	56 ha	6.7 ha
< 3 ha	1 (2%)	0 (0%)	8,360 (47%)	389,793 (56%)
3-5 ha	0 (0%)	2 (5%)		121,951 (18%)
5-20 ha	5 (8%)	1 (2%)		143,065 (21%)
20-50 ha	6 (9%)	3 (7%)		26,398 (4%)
50-100 ha	13 (20%)	9 (22%)	4,044 (23%)	5,683 (0.8%)
100-200 ha	12 (18%)	13 (32%)	3,046 (17%)	3,157 (0.5%)
200-500 ha	11 (17%)	11 (27%)	1,754 (10%)	
500-1000 ha	8 (12%)	2 (5%)	508 (3%)	
1000-2000 ha	3 (5%)	0 (0%)		
2000 ha <	6 (9%)	0 (0%)	51 (0.3%)	

* GM: Glommen Mjøsen Skog, All: Allskog

Source: Statistics Norway (2022); Forest Agency Japan (2022)

3.2 Trends of forest property purchase

In Allskog, 10 of the respondents (24%) purchased 114 ha on average in the past five years. On the other hand, 15 of the respondents (23%) in Glommen Mjøsen Skog answered that they expanded their property with 187 ha on average. Both FAs' members are interested in expanding their properties for the purpose of "expanding forestry management" and "asset building". Especially in Glommen Mjøsen Skog, a higher willingness to expand management was seen. It is stipulated that, in principle, the purchase and sale of forest land must be conducted between relatives. However, this does not apply if administrative permission can be obtained.

3.3 Succeeded forest and successor

For all 10 members, the area of succeeded forest occupies the majority of their owned forest (Table 3). Its area is more than double the average of purchased area. There are many members who join the associations after inheriting. More than 40% of the respondents in both FAs have successors (Table 4).

Table 3: Number of successor and area of succeeded forest in two associations

	GM	All
Number	5	5
Average area	493ha	284ha

* GM: Glommen Mjøsen Skog, All: Allskog

Table 4: Situation of existence of successor in two associations

	GM	All
have	27 (42%)	21 (51%)
not	8 (12%)	5 (12%)
Do not know	30 (46%)	15 (37%)

* GM: Glommen Mjøsen Skog, All: Allskog

31% of respondents expanded or newly acquired forest through purchase or inheritance. As a general rule, buying and selling is between relatives, and while there are who bought in respondents, but there are no respondents who have sold. So, this situation indicates a gradual trend towards forest accumulation.

Table 5: Owned forest area by age group and purchase / inherit in each association

GM n=65	< 3	3-5	5-20	20-50	50-100	100-200	**200-500**	500-1000	1000-2000	> 2000	
>80	0	0	1	0	0	0	0	0	0	0	1
70-79	0	0	0	1	2 ★	1 ★	0	3 ★	0	0	7
60-69	0	0	0	3	2	4 ★	4☆	1	1	2 ★	17
50-59	1☆	0	1	0	4☆	4	3	1 ★	1 ★	1	16
40-49	0	0	2	2	3	1	3 ★☆	2	1 ★	1	15
<39	0	0	1	0	2 ★	2 ★	1 ★	1 ★	0	2★☆	9
	1	0	5	6	13	12	11	8	3	6	65

All n=41	< 3	3-5	5-20	20-50	50-100	**100-200**	200-500	500-1000	1000-2000	> 2000	
>80	0	0	0	0	0	0	0	0	0	0	0
70-79	0	1	0	0	2	1	1	0	0	0	5
60-69	0	0	0	0	2	2★	2☆	0	0	0	6
50-59	0	0	1	2	3★	4★★	2★☆	1☆	0	0	14
40-49	0	0	0	1☆	2	3★	4	1★	0	0	11
<39	0	1★	0	0	0	3★☆	2★	0	0	0	6
	0	2	1	3	9	13	11	2	0	0	41

★ : purchase ☆ : succeeded

* GM: Glommen Mjøsen Skog, All: Allskog

3.4 Forestry operation (management)

Regarding the operation of forest management, 57% and 83% answered “done by respondents themselves or their family members” in both associations, respectively. Regarding “management by Forest owners’ association”, FA built a digital and online system that forest owners can consign forest operation easily.

Table 6: Main stakeholder who manage forest in two associations

	GM	All
Themselves/ families	30 (57%)	24 (83%)
Forest owners’ association	18 (34%)	4 (14%)
Private enterprises	3 (6%)	1 (3%)
Direct contract	2 (4%)	0 (0%)
total	53 (100%)	29 (100%)

* GM: Glommen Mjøsen Skog, All: Allskog

3.5 Forestry operation (harvest)

71% in Allskog answered harvesting was implemented by “themselves or their family”. 48% in Glommen Mjøsen Skog answered “FA”. Because members in Allskog own smaller properties, it seems that forest owners have a tendency to carry out all operations by themselves or their family members. Larger properties tend to let consign to FA.

Table 7: Situation of timber harvest in two associations

	GM	All
Who harvested in 5 years		
Themselves/ families	12 (26%)	17 (71%)
Forest owners’ association	22 (48%)	7 (29%)
Private enterprises	12 (26%)	0
total	46	24
Reasons for harvesting (multiple answers)		
age or timber size of forest	33	14
necessity of incidental income	18	2
thinning	4	0
rising price of timber	7	4
damaged by insects or storm	5	2
recommendation from FA or private enterprises	4	1
For grazing/agriculture	1	2
Along with forest plan	2	0
forest road or skid road	2	0
subsidies	1	0
for self-consumption	0	6

* GM: Glommen Mjøsen Skog, All: Allskog

3.6 Forestry operation (selling)

Many owners outsource Timber selling to FAs. In this way, the flow is to do as much as forest owners can and then outsource to FAs. This number changes depending on the size of ownership. At that time, the existence of the digital online consignment system was said to be very useful and convenient. Even in the case of harvesting themselves, it is easy to consign only the sale of timber from the online system, and there are many users.

Table 8: Situation of selling timber in two associations

How to sell?	GM	All
Contract with FA	36 (82%)	18 (86%)
Self-selling	7 (16%)	2 (10%)
Standing tree	1 (2%)	1 (5%)
Where to sell?		
FA	45 (88%)	21 (100%)
Logging contractor	4 (8%)	0
Private enterprise	2 (4%)	0

* GM: Glommen Mjøsen Skog, All: Allskog

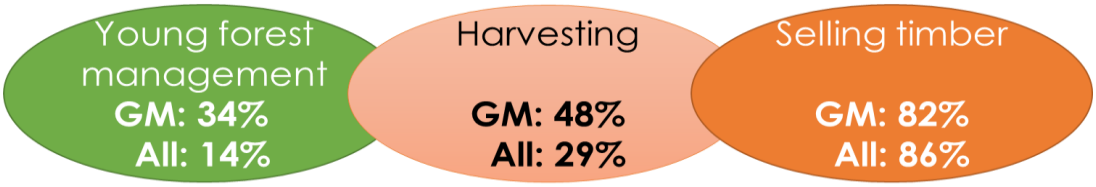

Figure 5: Percentage of consignment with associations in each stage of operation
* GM: Glommen Mjøsen Skog, All: Allskog

3.7 Consultation regarding forest operation

More than 60% of forest owners consult for FAs. Forest owners can feel free to consult with FAs. They consult such "To take measures such promoting sales of firewood (Electricity bill soaring now)" and "To improve impractical rule (forest trust fund[1] can use for forest road but not for skid road)". Like this, only detailed request are there, and no major problems were presented by owners who frequently outsource work to the union.

Table 9: Situation of consultation in two associations

	GM	All
themselves/ families	13 (20%)	9 (22%)
relatives or neighborhood	1 (2%)	3 (7%)
FA	41 (63%)	25 (61%)
private enterprises	4 (6%)	1 (2%)
municipal government officers	5(8%)	3 (7%)
case by case	1 (2%)	0

* GM: Glommen Mjøsen Skog, All: Allskog

3.8 Challenges and services of FAs

The main issue is decrease in FAs membership. The number of people who do not join FAs after inheritance is increasing. Even if they join, there are cases where they join before logging and go out after logging. FAs are trying to improve the service for them, but also have to keep fairness with the existing members, and FAs are caught in a dilemma.

Service of FAs is digital and online operation consignment, and it became possible from FAs' websites. Also, especially Allskog, where membership is declining, implements online consultation meetings and operation workshops. It took advantage of restrictions on going out due to

[1] Forest owners have a duty to set aside 4-40% of the timber value after harvesting (regulated by law) as forest trust fund. The average rate of the fund that set aside in 2021 was 16%. The aims of the fund are: to secure future timber supply from Norwegian forests, and by financing of investments in primary forestry (mainly afforestation). Forest Trust Fund is to be used following main programs: planting, forest road construction, forest management planning, participation in professional extension courses, boundary establishment, management measures to support special environmental values in the forest, and etc. In general, interest earned from the fund is divided between: County Governor about 18%, The municipal Forest Service, The local Forest Owners Association 30%, Norwegian Agriculture Agency 20%, A small amount is used for administration of the fund.

COVID19, and in particular, many consultations were received from elderly owners. Except these services, one-hour free consultation with a lawyer and electricity bill discount are there. GM also faces the constant challenge of maintaining and securing union membership.

4. Discussions

Regarding ownership, the area owned has expanded compared to before (=restricted segmentation). This is due to policies that lead to buying and selling in principle between relatives. Not only due to this, but this policy has enough impact.

Regarding forest operation, consignment is smooth because forest owners can easily consult with FAs. In addition, it became possible to consign operations digitally and online, making it easier to outsource. This is largely due to the accumulation of data from forest resource surveys that have been conducted continuously since 1919.

Regarding inheritance/successor: In the case of becoming FAs member along with the inheritance, even if they do not have knowledge of forestry, operations can be outsourced digitally and online, so there is no need to do the work themself, so the inheritance will go smoothly.

5. Conclusions

There is a clear difference in the scale of ownership between Norway and Japan, where there are many private owners and the role of forest owners' associations is big. However, the establishment of comprehensive forest resource surveys, the establishment of operational management and outsourcing system using ICT and digital online, and the importance of the role of FAs, have made Norwegian forestry active. It can be said that this is consistent with the direction of the measures that Japan is currently launching and promoting. This reduces the burden after inheritance and leads to clear inheritance.

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A1-05

Rediscover of the importance of log auction market in Japan:
A case study in western Hyogo Area

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** Faculty of Agriculture, University of the Ryukyus

Abstract
Log auction market had been played an important role for forestry in Japan until the turn of the Century. It worked reasonably well for decades, but log auction market has gradually become unnecessary as consolidated harvest operations and large-scale sawmills expanded. As a result, the number of log auction market has decreased significantly in recent years. Under such circumstances, however, the Yamazaki Log Auction Market (YLAM) in western Hyogo Prefecture has greatly increased its handling volume after 2000. This study aims to clarify the present status of the forestry in the area and to analyze the reasons of the uprising trend of the YLAM.

The YLAM was established in 1962. Soon it became a center of timber distribution in the area, but the handling volume has gradually decreased with the downward trend of Japanese forestry after 1980s. However, the handling volume turned to increase from 60,000m^3 in 2009 to 100,000m^3 in 2015. The authors found four reasons: 1) active investment for the auction yard and introduction of efficient machinery, 2) cooperation based on trust from small-scale logging enterprises in the surroundings, 3) increase in new logging enterprises in the area, and 4) business expansion of correction and sales of wood materials for biomass power generation plant.

It is difficult for small-scale forest owners and enterprises to keep up with lager sawmills and mass production. The YLAM gained trust of various stakeholders and increased customers by accepting even small number of logs of all standards. Small-scale forestry in developed countries will need such diversity.

Keywords: Large-scale sawmills, logging enterprise, small-scale forest owners, Yamazaki log auction market

1. Introduction
Log auction market had been played an important role for forestry in Japan until the turn of the Century. Historically, small-scale forest owners had long suffered from a situation where they had no choice but to sell their trees cheaply to sawmills because of a weak sales power. However, in 1960s, forest owners' cooperatives or group of local forestry entities established log auction markets to sell their logs at fair price locally. This challenge was successful and log auction market expanded nationwide. Figure 1 indicates the flow of domestic wood for housing in Japan. This is a system that delivers necessary timber products to the consumers who need it through a number of intermediaries, such as log auction market, sawmill, wholesalers, and pre-cut factories.

This complex system worked reasonably well for decades, but the auction market has gradually become unnecessary because of increasing direct deals of logs due to the expansion of consolidated harvest operations and large-scale sawmills with governmental policy directions. Intermediaries including many of log auction markets had to be shut down in recent decades. As a result, it is getting more and more difficult for small house builders to get wood materials they need from diverse retailers as used to be.

In such circumstances, however, the Yamazaki Log Auction Market (YLAM) in western Hyogo Prefecture has greatly increased its handling volume. This study aims to analyze the reasons of such good performance of YLAM by literature research and interviews with related parties and organizations.

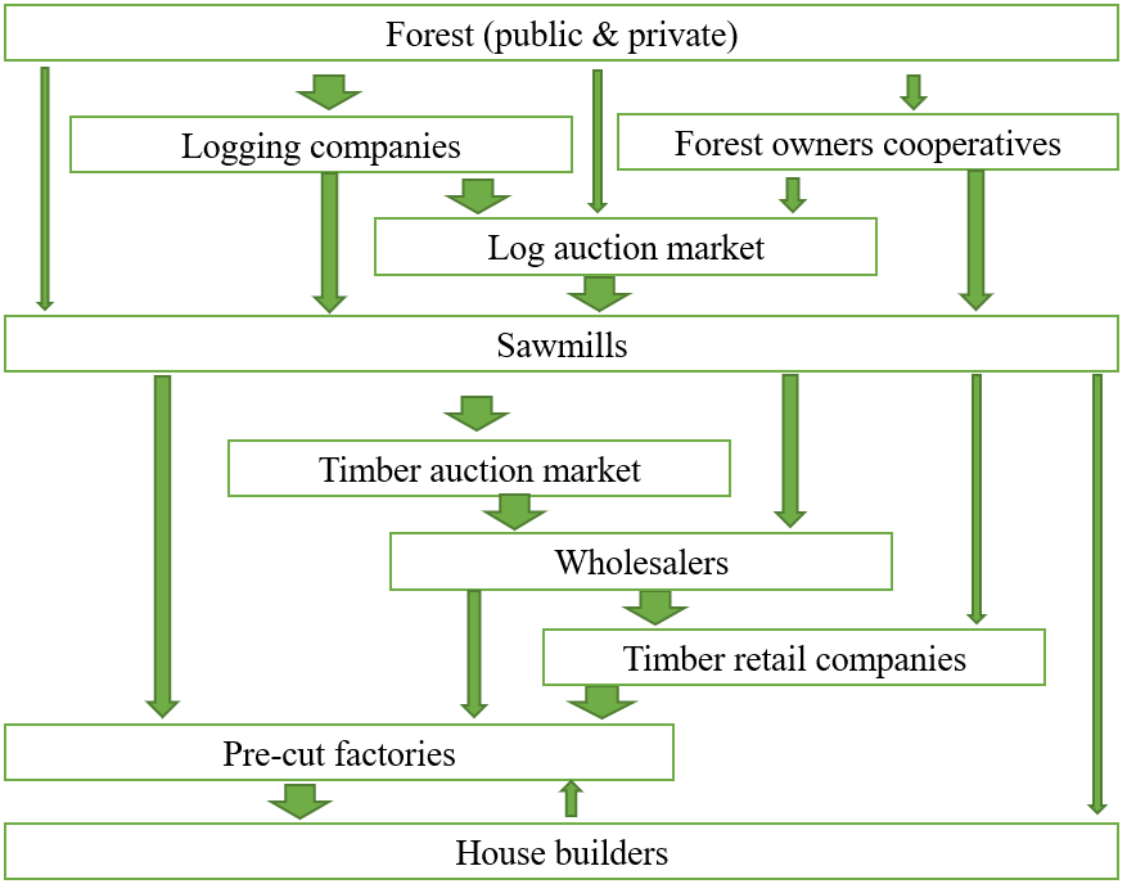

Figure 1. Flow of domestic timber for housing

2. Methods

Research methods are interviews and literature survey. Interviews are conducted to the YLAM, logging enterprises, national forest branch office, and local governments. We also analyzed the forestry statistics of Hyogo Prefecture and Shiso City.

3. Results

3.1 Forestry and forest industry in Hyogo Prefecture

Hyogo prefecture is located in the Kansai region of Honshu. Hyogo has an overall area of 8,400 km^2 with a population of about 5.4 million in 2022. Land use in Hyogo Prefecture is as follows: Forest (67%), agricultural land (10%), residential land (7%), and others (17%). Hyogo Prefecture extends from the Japan Sea in the north to the Seto Inland Sea in the south, and further down to the Pacific Ocean through Awaji Island. It consists of various regions, from large cities to rural villages and remote islands. It is said to be "A Japan in Miniature" because of its diverse climate and topography.

Figure 2 shows the trend of wood production in Hyogo Prefecture from 1970 to 2020. In 1970, wood production was over 500,000m^3, but in 2009, it decreased to 160,000m^3. In recent years, they have produced around 250,000m^3.

Figure 3 shows the trend of wood supply source for Hyogo Prefecture from 1980 to 2018. In 1980, majority of wood supply source were satisfied by imported lumber, but it continued to decrease after that. A large-scale sawmill that handled wood from foreign countries had closed in 2014, and domestic wood becomes the mainstream of wood source in recent years.

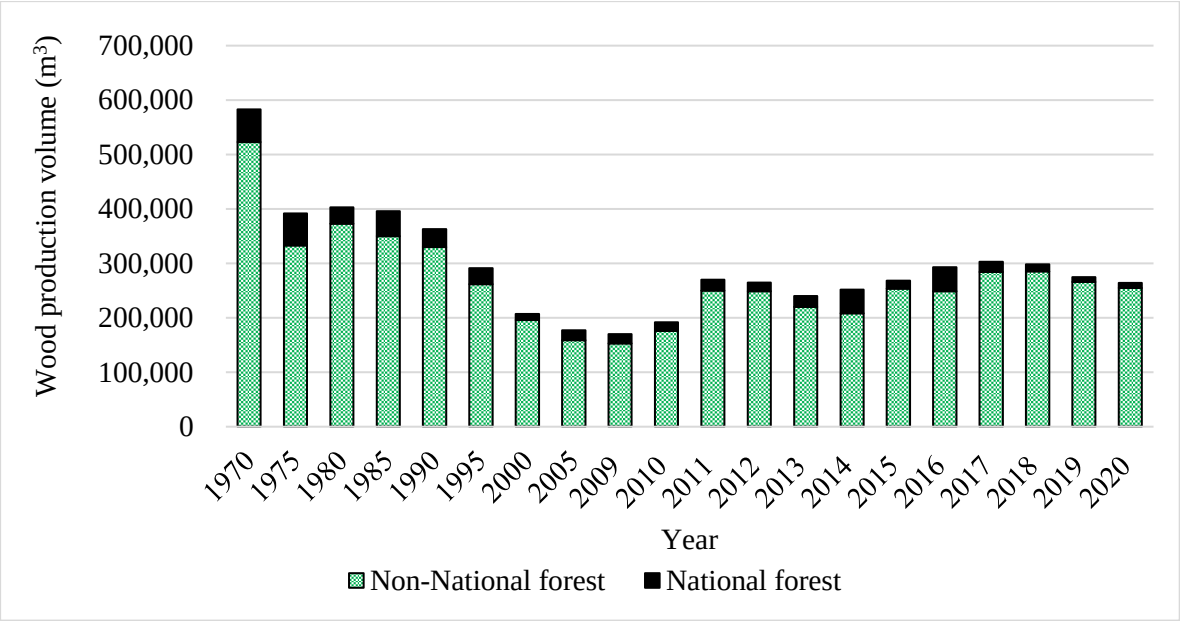

Figure 2. Trend of wood production volume in Hyogo Prefecture (1970-2020)
Source: Department of Agricultural Administration and Environment, Hyogo Prefecture (2022)

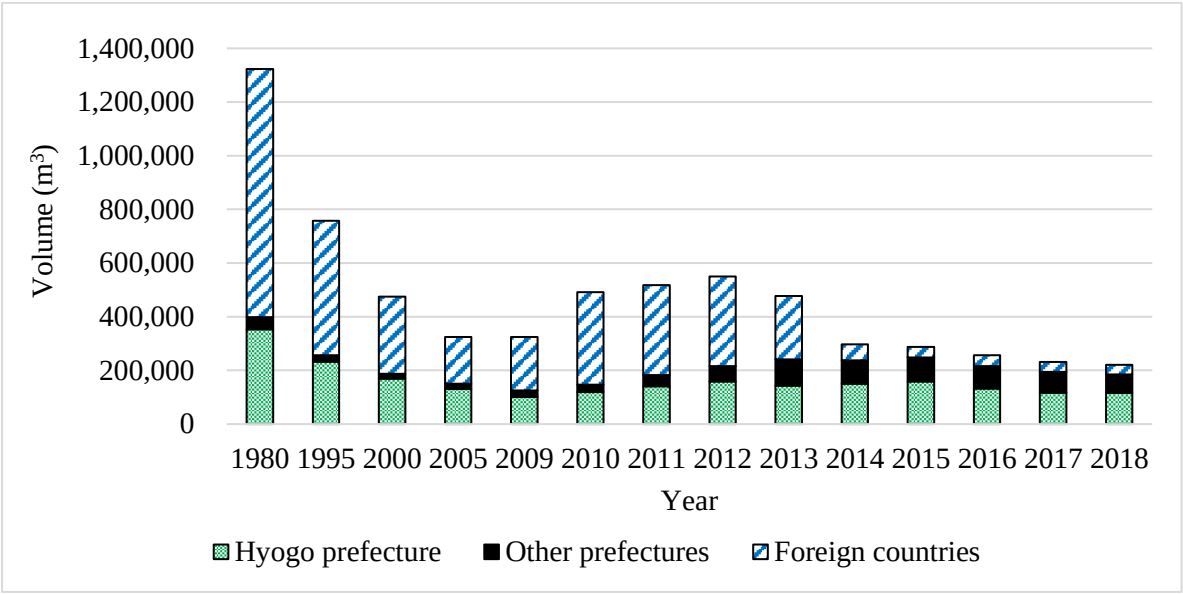

Figure3. Trend of wood supply source for Hyogo Prefecture (1980-2018)
Source: Department of Agricultural Administration and Environment, Hyogo Prefecture (2022), Hyogo Prefecture (2018)

3.2 Western Hyogo area

Western Hyogo area, called West Harima, is famous as a traditional forestry area. It is a leading area of wood production in Hyogo prefecture. The YLAM is in this area, of which the amount of handling volume is the largest in Hyogo Prefecture. The largest scale sawmill in the prefecture, Cooperative Hyogo Wood Center, is also located in this area.

In 1886, A branch office of the Forestry Agency established. It began to manage 24 thousand ha of national forest and 5.6 thousand ha of municipal forests. This area became famous in high quality cedar production. Around 1925, the director of the branch office named it "Shiso-Cedar". There were forest railway and more than 80 sawmills in the city.

Figure 4 shows the trend of wood production volume in Shiso City from 2008 to 2020. Wood production volume in Shiso city occupied more than a quarter of the total of the prefecture.

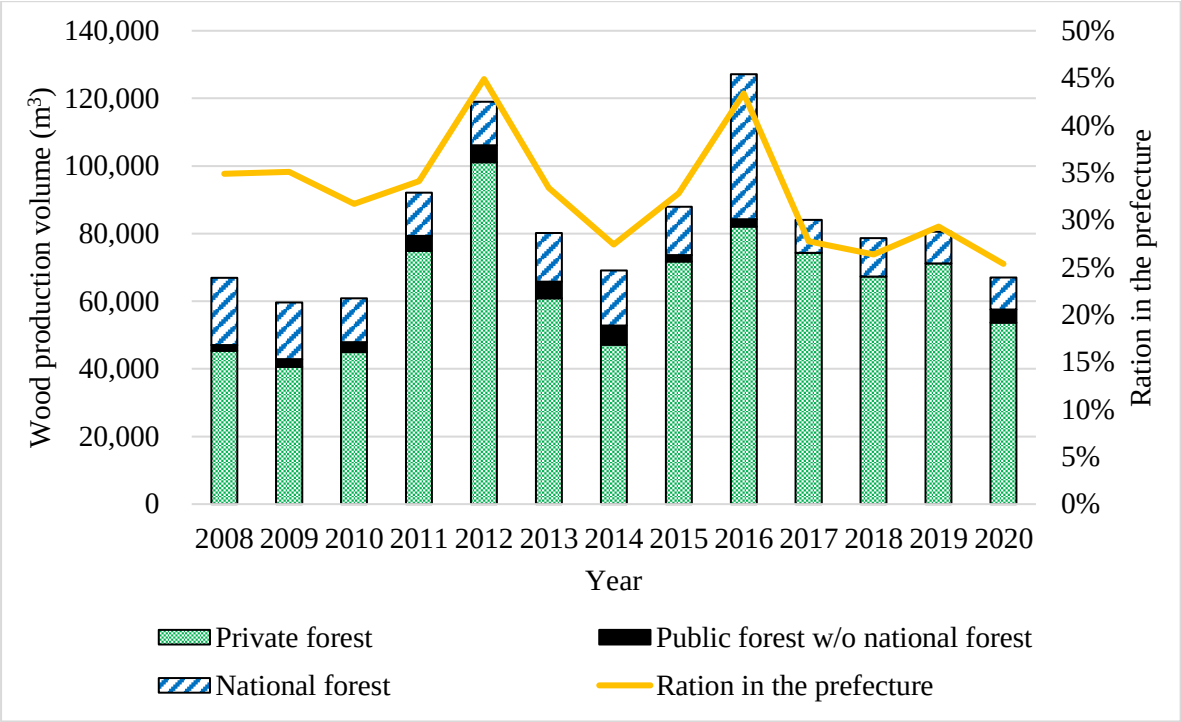

Figure 4. Trend of wood production volume in Shiso City (2008-2020)
Source：Department of Agricultural Administration and Environment, Hyogo Prefecture (2022)

3.3 Yamazaki Log Auction Market

The YLAM was established in 1962 in the south of Shiso City. It is located about 2 km from the Yamazaki IC on the expressway. It has 18 employees in 2018 and the area of the market is 27,350 m^2, of which 19,400 m^2 is the lumber yard in which log auction is held. YLAM possesses one log sorter, seven grapples and 11 forklifts. Log auctions are held 33 times per year, it means basically 3 times a month. Since the establishment of the YLAM, great majority of the logs from western Hyogo area has been auctioned and sold here, but the handling volume has gradually decreased with the downward trend of Japanese forestry.

Since 2006, Hyogo Prefecture has been promoting the participation of private companies as a base for a "new processing and distribution system for lumber produced in the prefecture" and has begun to develop facilities for large-scale sawmills. Through this public-private partnership project, the Cooperative Hyogo Wood Center, a new large-scale sawmill, was established in 2010 just 6 km north of the YLAM. The establishment of the Cooperative Hyogo Wood Center was funded by the national and local governments. The national government paid 50% and Shiso City 50% of the 990 million yen for land preparation, in addition, 50% of the 2 billion yen for facility development was borne by the national government, 10% by the prefecture, and 40% by the entity (Department of agricultural administration and environment, Hyogo Prefecture (2014)). More than a half of the logging enterprises in the area joined as the members of the cooperative system. Reducing costs by integrating everything from raw wood accumulation to lumber processing is the first objective of this project. Construction of a competitive supply system for wood products in the prefecture is another objective. This center is characterized by mass production with a small sort of items, and remnants are processed into chips. The target of handling volume was 126,500m^3 per year at the beginning of the factory.

The YLAM predicted a certain amount of decrease in handling volume because of the opening of the Cooperative Hyogo Wood Center. However, contrary to initial expectations, handling volume

increased from 60,000m^3 in 2009 to 100,000m^3 in 2015 (Figure 5). Most of the logs, i.e. about 70-80% of the total handling volume, are locally corrected.

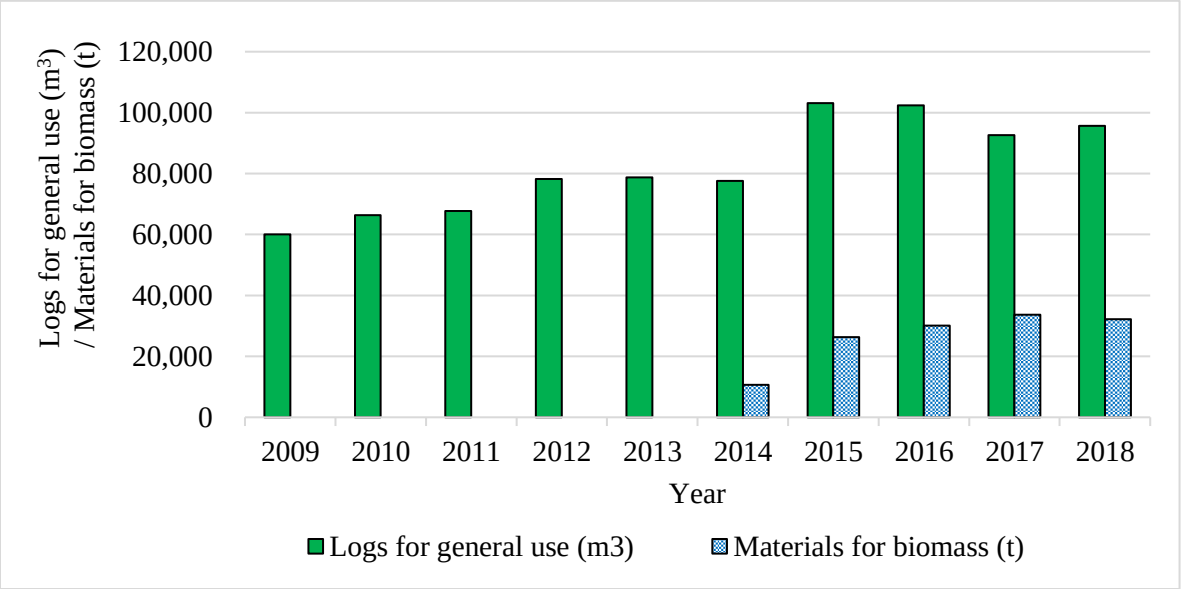

Figure 5. Trend of log handling volume at YLAM (2009-2018)
Source: Data provided by YLAM

4. Discussions

Why has log handling volume of the YLAM increased despite the opening of a large-scale sawmill nearby? The authors found four reasons.

First reason is active investment for the auction yard and introduction of efficient machinery. The auction yard was expanded in 2014 and the handling capacity increased significantly. Total project cost was 420 million yen, of which about 200 million yen was subsidized by national government. With the expansion of the auction yard surface, a log sorting machine with 26 pockets was newly introduced. The YLAM is able to accept more logs at any time because of this investment.

Second reason is cooperation of small logging enterprises and local forest owners' cooperatives. Most of logging enterprises in the area produce less than 10,000m^3 of timber per year. Therefore, it is difficult to ship large lots to the large-scale sawmill, and they tend to ship to the YLAM instead. Selling price of logs are more transparent and rather higher at the YLAM than direct deal with the Cooperative Hyogo Wood Center. In addition, the YLAM has a spirit of giving back to local mountain owners through the development of forestry, and this way of thinking is also trusted by many logging enterprises.

Third reason is the increase in local timber due to the successive entry of new logging enterprises in the area. As a result of promoting new entrants into forestry industry through policies of Shiso City and the national government, the number of logging enterprises nearly doubled from 12 in 2007 to 21 in 2017 (Figure 6), and the distribution volume of wood in the area has increased. New logging enterprises tend to ship to the YLAM because they can ship to small number of logs. It is difficult for small-scale forest owners and new enterprises to keep up with lager sawmills and mass production. The YLAM also contributed to new entrants and settlement of logging enterprises by accepting even small number of logs of all sizes and grades.

Fourth reason is business expansion of the YLAM. They began to correct and sell wood fiber for biomass power generation plant. Since 2012, many biomass power plants have been built under the governmental policy in Japan, and purchase of timber for biomass fuel has started at a fixed price. The YLAM also started correcting biomass grade wood materials in 2014, and it leaded to the increase in wood production with the rise in the price of timber for biomass use.

Other factors include an increase in the number of forestry businesses that ship products to nearby markets due to a decline in the price level of high-grade log, and the increase in local timber due to improvements in work efficiency resulting from the development of road networks and the introduction of high-performance forestry machinery.

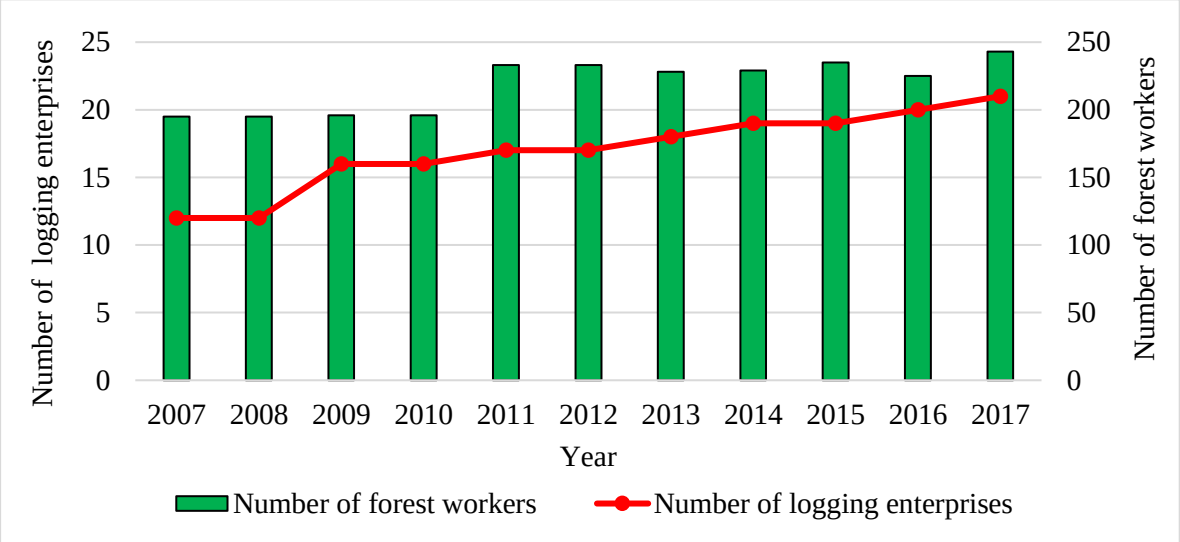

Figure 6. Changes in the number of forestry workers and logging enterprises in Shiso City (2007-2017)
Source: Shiso City (2018)

5. Conclusions

There are many small-scale forest owners and logging enterprises in Japan. The auction market has become more and more unnecessary because of expansion of consolidated harvest operations and increasing number of large-scale sawmills with governmental policy directions. However, it is difficult for small-scale forest owners and logging enterprises to keep up with lager sawmills and mass production. The YLAM gained trust of various stakeholders and increased customers by accepting even small number of logs of all sizes and grades. As a result, forestry in this area is becoming popular with new logging enterprises. The development of small-scale forestry in developed countries will need not only large-scale sawmills but also diversity of business forms, including log auction market as this example.

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B1-01

Small Private Forestland Owners in the US South: Addressing 21st Century Challenges

Jacek Siry

Small Scale Forestry International Conference 2022
Okinawa, Japan
October 26-31, 2022

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Overview

Background

What is small?

Concerns

Outlook

Conclusions

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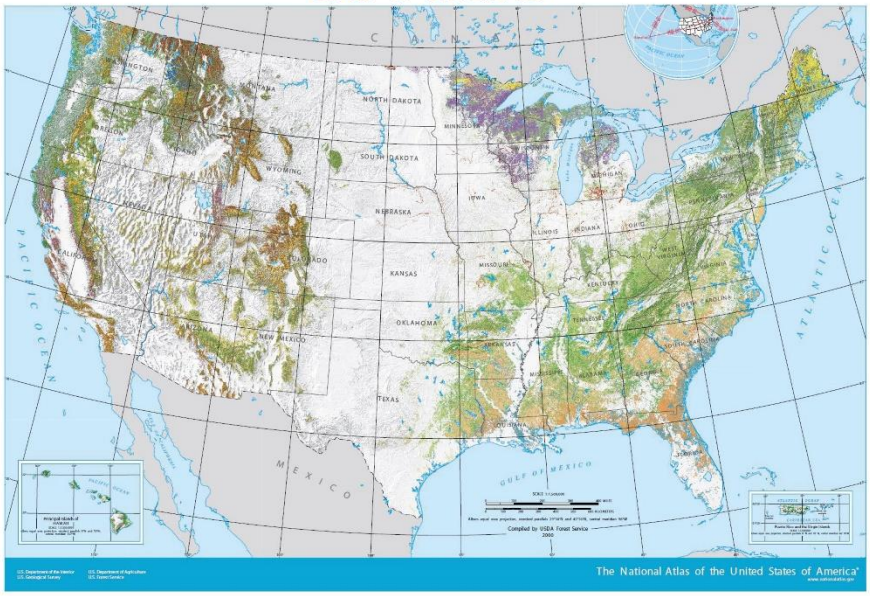
US Forests



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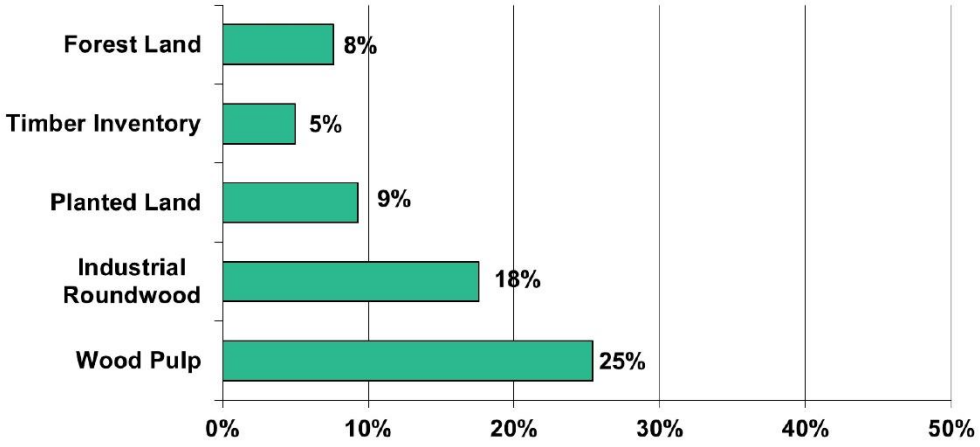
US in World Context



Source: FAO Global Forest Assessment, FAO Yearbook, USDA Forest Service, TimberMart-South

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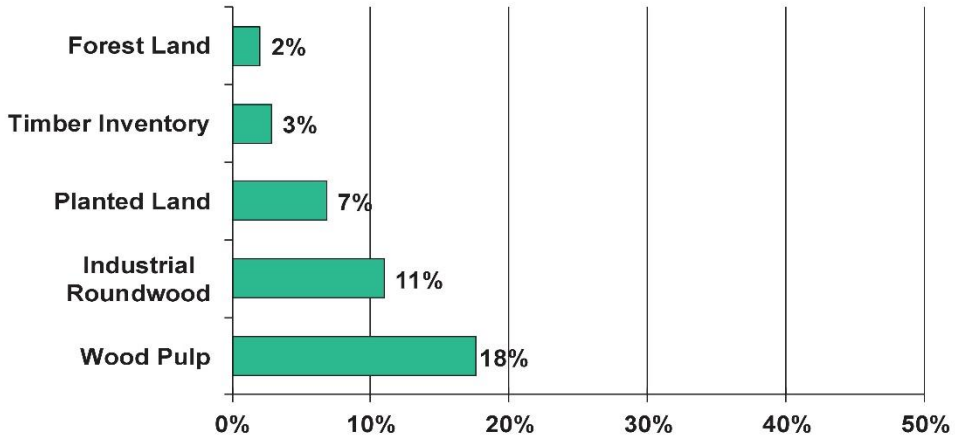
US South in World Context



Source:
FAO Global Forest Assessment,
FAO Yearbook,
USDA Forest Service,
TimberMart-South

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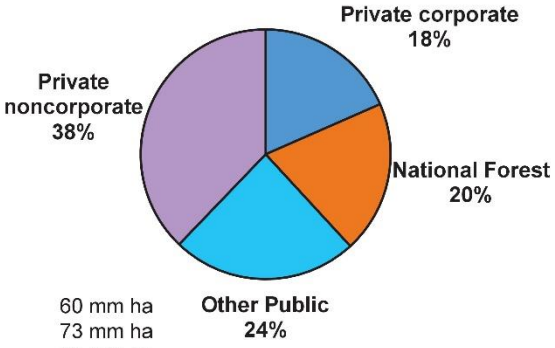
US Forest Ownership

Private forests account for 92% of wood production



National Forest	60 mm ha
Other Public	73 mm ha
Private corporate	56 mm ha
Private noncorporate	115 mm ha
Total	304 mm ha

Source: Smith et al. 2009

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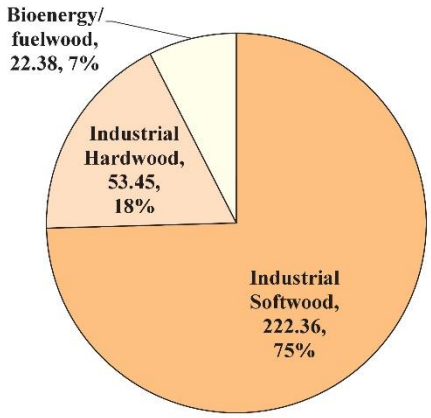
7

Where Does the Wood Go?
Total Roundwood Use for US South



Total 298.19 million green tons

Source: USFS Timber Product Output Reports, TimberMart-South

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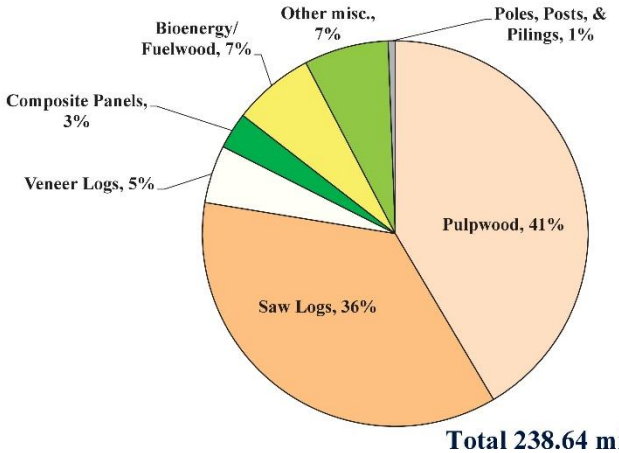
8

Where Does the Wood Go?
Softwood Use in US South



Total 238.64 million green ton

Source: USFS Timber Product Output Reports, TimberMart-South

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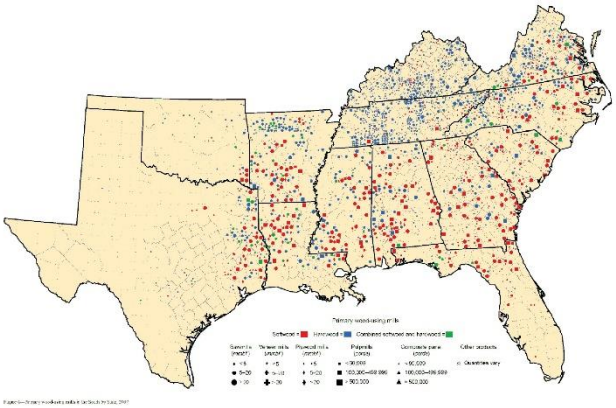
US South Timber Industry

Primary Wood-using Mills



Source: U.S. Forest Service, TimberMart-South

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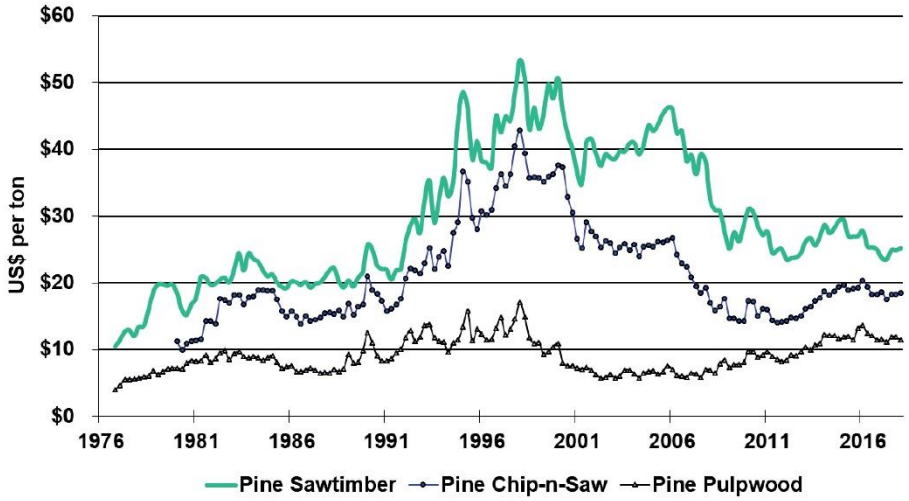
Georgia Average Quarterly Prices



Source: TimberMart-South

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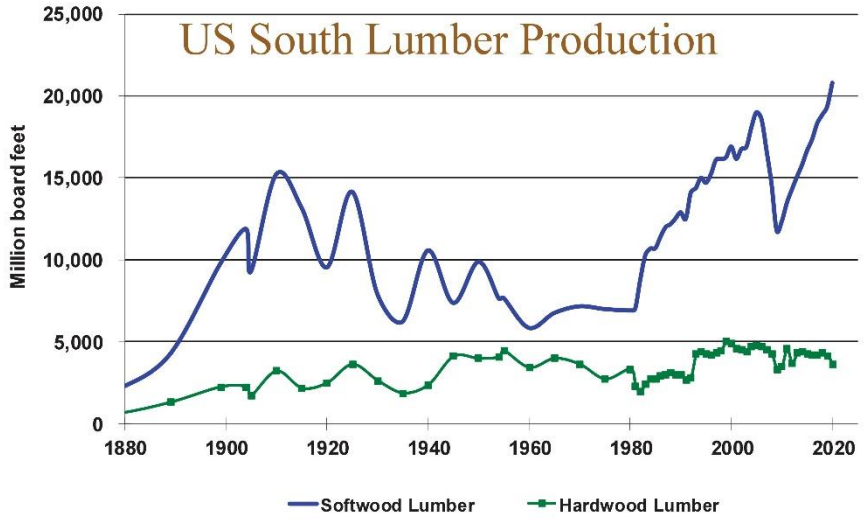

Source: U.S. Forest Service, U.S. Census, and Random Lengths Yardstick, TimberMart-South

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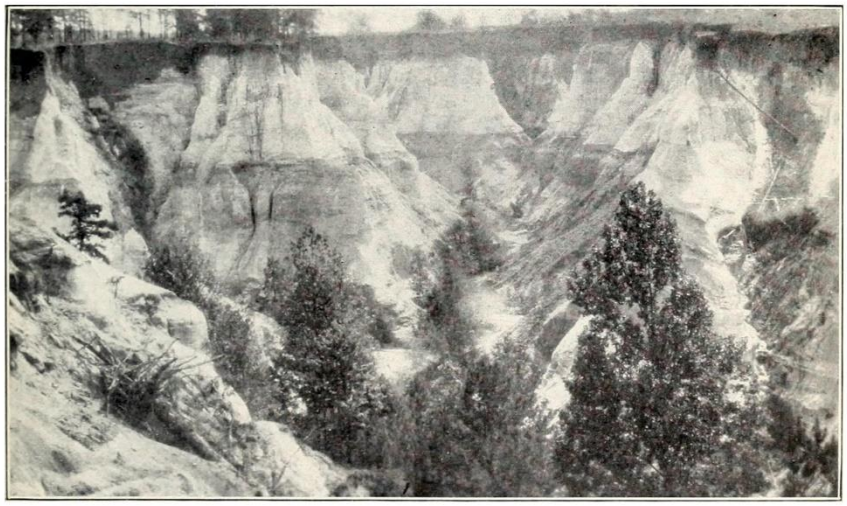
The Past



Source: USDA, Davis, www.flickr.com

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The Past

Forest History Society, Austin Carey Photograph Collection https://foresthistory.org/envira/austin-cary-forestry/

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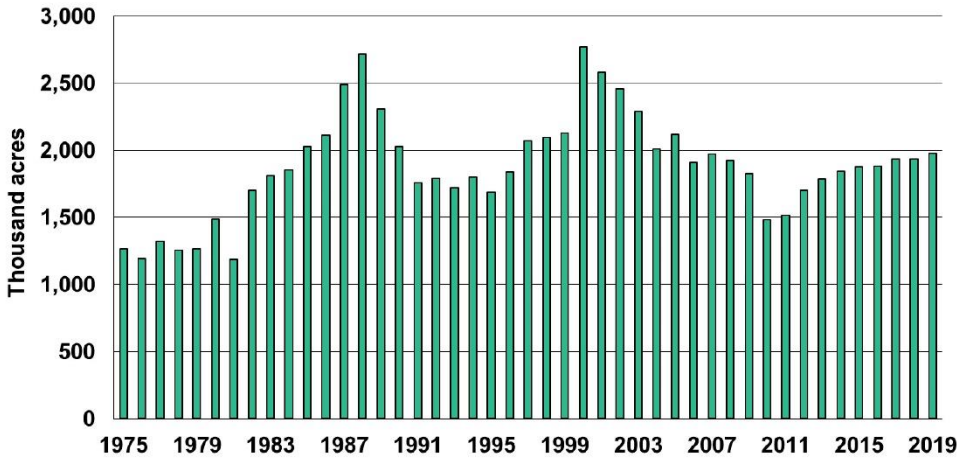
Southern Reforestation Trends



Source: U.S. Forest Service, TimberMart-South

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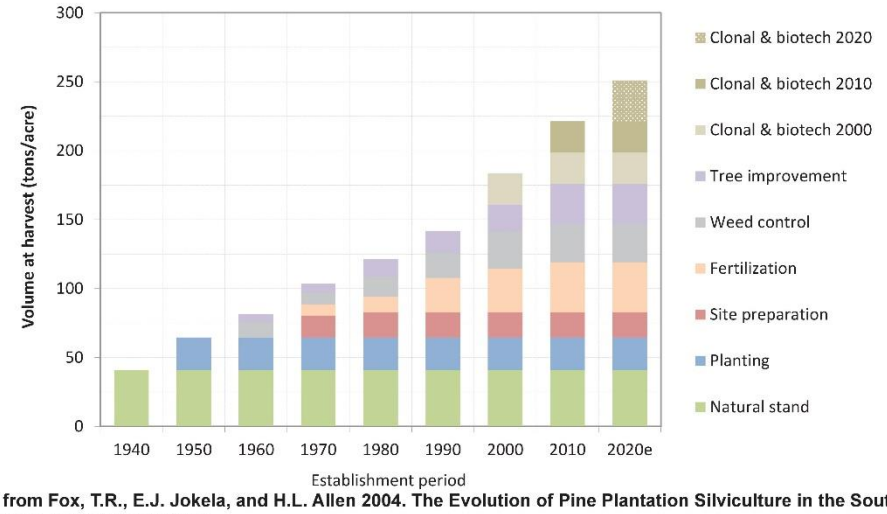
Pine Yield History – Drivers of Productivity



Adapted from Fox, T.R., E.J. Jokela, and H.L. Allen 2004. The Evolution of Pine Plantation Silviculture in the Southern United States, Rafael De La Torre

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What is Small?

- 20 to 100 acres
- 8 to 40 hectares
- Very diverse group of forest owners
- Timber harvest often not the top objective but timber is often harvested
- Strong private property rights

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Southern Forest Policy Issues

- Concerned with what affects private, working forests
- Clean Water Act
  - Wetlands and Best Management Practices (BMPs)
- Endangered Species Act
  - Taking & critical habitat

- Compared to other regions, very moderate regulation of forest management

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Forest Taxation

- State and local taxes
  - Annual property tax on forestland
  - Conservation use valuation assessment programs

- Federal taxes
  - Federal timber tax as capital gains tax

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Nontimber Forest Products & Environmental Services

- Focus on private and toll goods
- Outputs that generate income
  - Hunting leases
  - Pine straw
  - Other
    - Sand, gravel, minerals
    - Cell towers
    - Solar farms, windmills, etc.
  - Government incentive programs

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Forest Carbon Sequestration

- Major organizations (examples)
  - CAR (Climate Action Reserve)
  - ACR (American Carbon Registry)
  - NCX (Natural Capital Exchange)
- Challenges & opportunities
  - Prices
  - Rules
  - Uniformity
- Forest bioenergy

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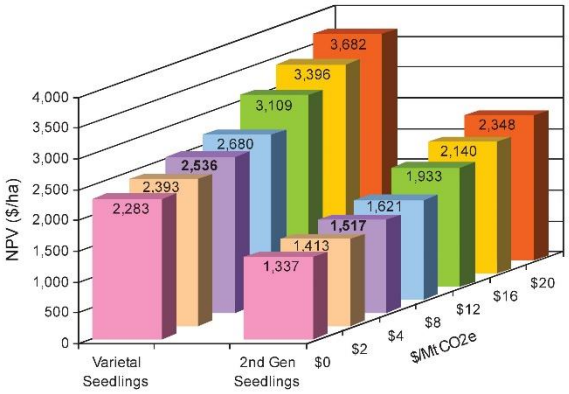
Forest NPV Gains for Range of CO_2e prices

Discount rate = 6%



Source: Rafael De La Torre

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Impact, ESG, Sustainable Investments

- Potentially an attractive proposition
  - Positive environmental impacts
  - Positive economic impacts
- To capitalize will need, among others,
  - Forestry information systems
  - Environmental impact analysis
  - Economic impact analysis
- Need to develop appropriate investment vehicles

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Forest Certification

- Most large forestland owners SFI certified
- Smaller forestland owners typically not, but may engage in ATFS, group certification is also being developed
- Issues
  - Rules
  - Costs (direct & indirect)
  - Benefits (higher prices, market access?)
- Often required as part of other programs
  - Forest carbon trading, green energy, green buildings

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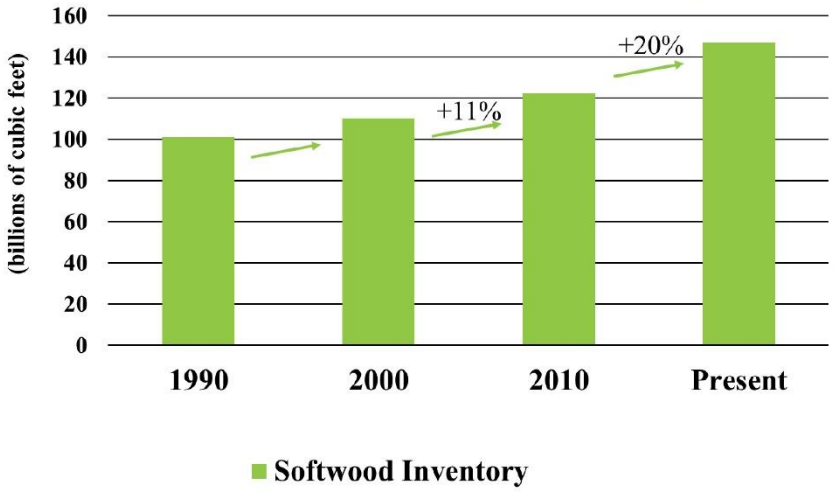
US South Softwood Inventory



Source: U.S. Forest Service FIA, TimberMart-South

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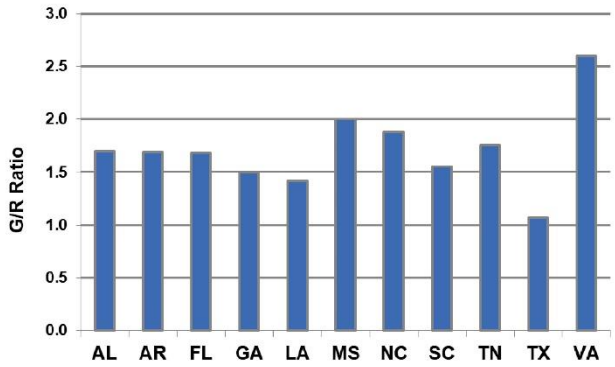
Growth / Removal Ratio of Growing Stock Trees on Timberland



Source: U.S. Forest Service FIA FIDO, TimberMart-South

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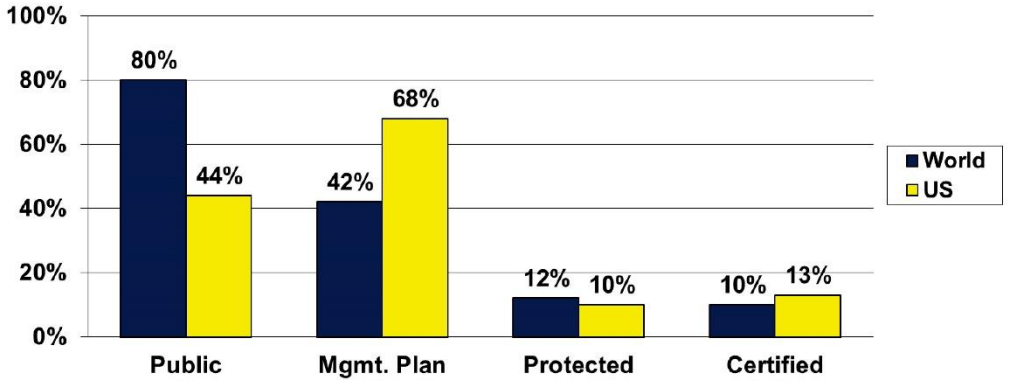
US in World Context



Source: FAO Global Forest Assessment

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Threats?

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Conclusions

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B1-02

Digitalization of private forest holdings:
Experiences from Slovenia

Andrej Ficko*, Maruša Čotar* and Helena Smrekar*
* University of Ljubljana, Biotechnical faculty

European economies and societies strive to be more sustainable, resilient and better prepared for the challenges and opportunities of the green and digital transitions. This paper presents results and experiences with the project DIGIGOZD which provides forest owners and forest managers in Slovenia with digital tools helping them to obtain information on forest stands, simulate stand development and optimize forest management. With the help of private forest owners partners in the project we improved and tested a mobile app for stand inventory, develop a model for projecting stand development and develop a decision support system which should help forest owners to optimally manage their forest under environmental and economic changes. Experiences in dissemination obtained in this project could form a basis for further digitalization of agricultural and forest holdings.
Keywords: Forest planning, digitalization, IT, digital tools, EU recovery plan

B1-04

Economic incentives for the conservation of forests at Parana State - Brazil

Paulo de Tarso de Lara Pires*, Vitor Afonso Hoeflish* and Edson Luis Peters**
* Professor at Federal University of Paraná,
** Justice Prosecutor

The present study deals with the deforestation process of natural forests in the State of Parana, Brazil, the evolution of the agrarian cover, and the social and economic situation of the Araucarian Forests statewide. The instruments of command and control have been insufficient for the protection of forests. It is perceived that a higher efficiency can be achieved by aggregating new legal and policy instruments, such as the creation of new natural protected areas, tax incentives, and special lines of credit. This research is developed in this direction, searching for the creation of a forest management program, that has glimpsed the conservation and recovery of the Araucaria forest remains in the State, without extremely burdening the influence region, or refraining the economic growth of the traditional agricultural sector and small farmers. The controlled use of the lumber and non-lumber resources in the Conservation Units of Sustainable Use makes possible the self-management of natural areas, the control of wooden endowments in the region, therefore, decreasing the pressure over the local forest remains. The creation of a new category of Conservation Unit, the Private Reserve of Sustainable Development, gives to the farmers the alternative to attain profits, at the same time, provides the increase of protected areas in the Biome. Another alternative is the creation of economics mechanisms for the incentive of the environmental conservation. The taxes chosen in this study were the Real State Taxes and the Industrial Taxes. The analysis of the data indicated that both initiatives would be viable by stimulating conservation, by making possible an alternative income to the farmers, by generating regional jobs, and by not burdening the State Treasury. The best way for preservation of Araucaria's forests is based in policies that look for the harmonization between a balanced environment and a fair society.

Keywords: Forest; Economic Incentives; Natural Forest; Forest Law

B1-05

Management issue of the small scale forestry management entities after introduction the high-performance forestry machinery in the wake of a disaster

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In Japan, forestry machines called high performance forestry machinery are widespread and the ratio of log production by work systems that utilize high-performance forestry machinery accounts for 70% of the total log production. However, high performance forestry machinery is generally expensive, and after purchasing the machinery, it is necessary to produce a certain amount of logs to pay the machine cost. The introduction of machines changes the quality of management and is a risk, especially for small scale forestry management entities. 90% of high performance forestry machinery is owned by companies or forestry owners' cooperatives.

On the other hand, there are cases where forestry management entities introduce the high performance forestry machinery in the wake of a disaster. In the landslide disaster caused by the torrential rain that occurred in the northern Kyushu region in 2017 (Northern Kyushu Torrential Rainfall), there was a forestry management entity that introduced a new machine by using the subsidy of the restoration support project. The background of the machine introduction is that machines would be useful for recovery in the event of a disaster, and that subsidies reduced the cost of introducing machines. It is thought that the introduction of machines has significantly changed the management method of small scale forestry management entities, but it has not been clarified what kind of impact it actually had.

In this study, we investigated the changes in management before and after the introduction of machinery for small scale forestry management entities that were damaged by Northern Kyushu Torrential Rainfall and introduced forestry machinery, and clarified the impact of the introduction of machinery on the management. In addition, we considered the role of forestry machinery in disaster countermeasures and how the government can provide support.

Keywords: torrential rain, high performance forestry machinery, driftwood disaster, machine investment, machine cost

C1-01

Comparative behavioral study among Austrian and Japanese forest owners

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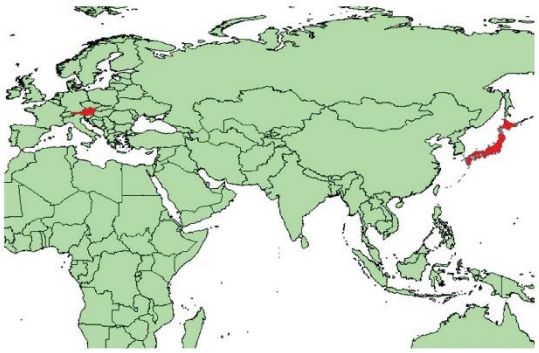
1.1 Current forestry status
1) Locations & basic stats



	AT	JP
Average temperature(℃)	10.9	15.4
Average precipitation (mm)	703	1,529
Land area (million ha)	8.4	37.8
Forest area (million ha)	**4.0**	**25.1**
Population (million)	9.0	126.0
Per capita GNI ($1,000)	51	41

Note : Temparatures and precipitations are the values for Vienna and Tokyo respectively.
Source : Statistik Austria, Branchenbericht 19/20, Mokuzai Jyukyu Houkokusyo, Nihon Kokusei-zue20/21

- Japan is warmer and has a lot more rain.
- Japan has notably more forest area.
  - Planted forest is 10 million ha.
- Both are the developed countries.

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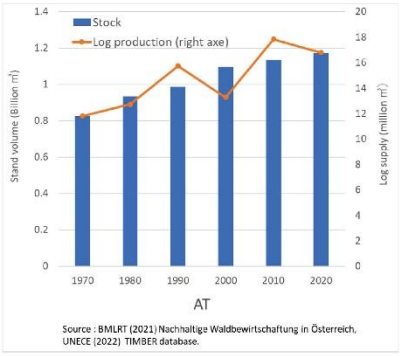
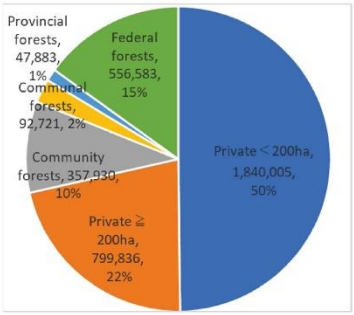
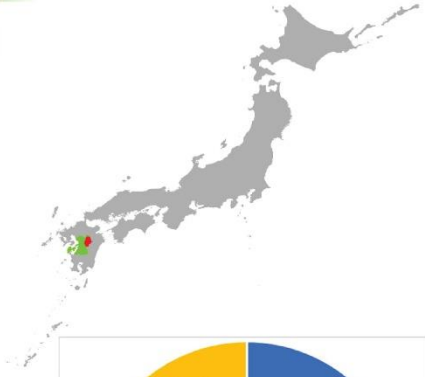
2) Overview of forestry
① Austria

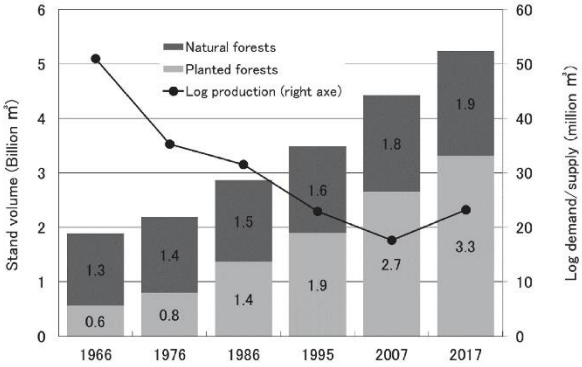


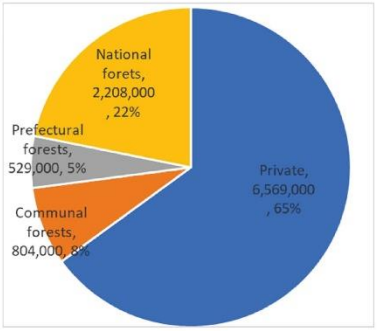


- Log production has increased along with the increase in stock.
- Small-scale private forest owners are in the majority.

② Japan







- Stand volume is rapidly increasing, however, log production began to increase gradually.
- Small-scale private forest owners are in the majority.

3) Conditions for forestry

	Productive forest (million ha)	Ratio of forest with a slope over 30°	Average stock (m^3/ha)	Density of forest road (m/ha)	Log for industries (million m^3)
Austria	3.3	**22**	345	**45**	11
Japan	10.1	**43**	324	**14**	20

- Conditions for forestry seem to be better in Austria.
- Although Japan's productive forest area is three times larger than Austria, the amount of industrial log production has only doubled.

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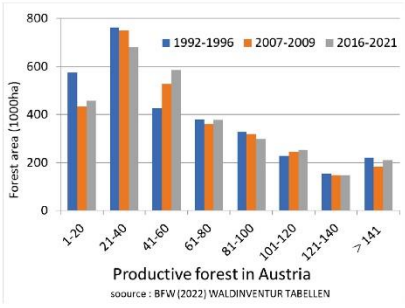
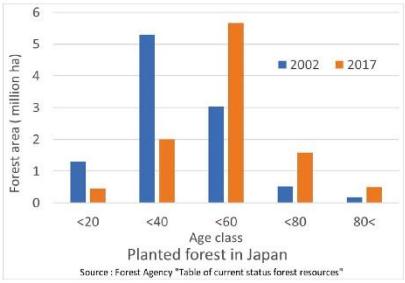
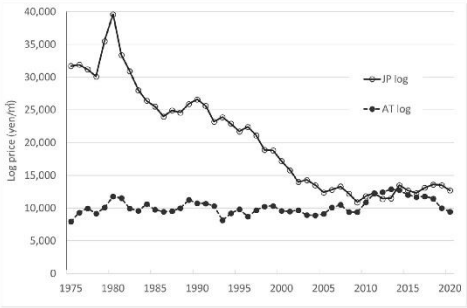
4) Age distribution and log price





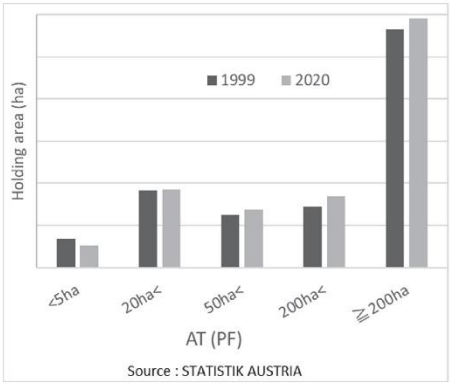


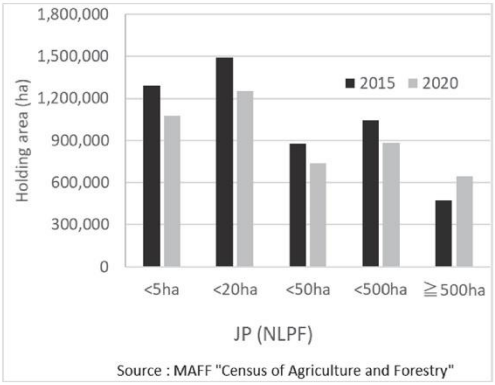
- Stabilized forest age and log price in Austria
- Uneven forest age and decreasing log price in Japan

→ Non-legal entity forest owners (NLPF) lose their motivation for forestry.

→ The most of planted forests has not been planted after clear cutting.

5) Behavior of NLPF





- NLPF in Austria are increasing their forest area whereas NLPF in Japan are reducing their forest area by 117,000 ha/yr, mostly caused by unknown owners.
- Motivation for forestry seems to be quite different between two countries!

1.2 Previous related studies

87% of respondents was elder than 60 yr. and 76% obtained no income in 3 years.

The low motivation of forest owners is due to the small size of their holdings.

- Japan
  - Sato Noriko et al. (2006) Attitudes of Small-scale Forest Owners to their Properties in an Ageing Society: Findings of Survey in Yamaguchi Prefecture, Japan. 5(1): 97-110, 2006
  - Research group on future forest management (2010) New The Japan Forestry Association, 251pp.
- Europe
  - **Hogl, K. et al. (2005) What is new about new Forest owners? A typology of private Forest ownership in Austria. Small Scale For. Econ. Manag. Policy, 4(3): 325–342.**
  - **Weiss, G., A. et al. (2006): Bewirtschaftungs stleistungen für neue Waldbesitzertypen. Gemeinsamer Ergebnisbericht von BOKU Wiener Neustadt an das BMLFUW.**
  - **Weiss, G. et al. (2015) Forest Land Owne nge in Austria. In: COST Action FP1201 FACESMAP Country Report. European te Central-East and South-East European Regional Office, Vienna.**
  - Nina M. Mostegla et al. (private forest owners. F
  - Kalle Kärhä et al. (2020) Operations in Finland: A
- North America
  - David N. Bengston et al. the United States: An A Survey. Small-scale Fore
  - Y. Zhang et al. (2009) Th Forest Ownership Patter

1) **farmer forest owners 20%**
2) **part-time farmers 20%**
3) small-towners with rural background 12%
4) forest owners previously employed in agriculture 16%
5) farm leavers 10%
6) urban forest owners 9%
7) owners without connection to agriculture 13%

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1.3 Research question

- Which factors caused these differences in the forestry situation?
- We focused on the following three factors:
  1. Property size (and how it affects forest profitability)
  2. Age and forestry skills of forest owners
  3. Role of the FOCs on forestry

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2. Data

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2.1 Research fields
(1) Austria

- Styria
  - Active forestry: 3.8million m^3 (2nd place)
  - Production forest: 0.84 million ha; relatively steep terrain.
- Styrian forest owners cooperative (WV)
  - FOC for small/medium-scale forest owners
  - Number of members : 15,670/total forest owners 31,648
  - Members' forests : 323,000 ha
- Collecting data
  - Field survey : November of 2019, September of 2022
  - A web-based questionnaire survey was conducted among all WV members from December of 2021 to January of 2022.
  - Responses: 1480; Number of registered e-mail addresses 8700 : response rate 17%

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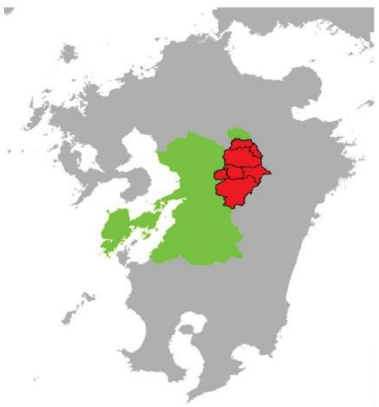
(2) Japan

- Kumamoto prefecture
  - Active forestry: 1million m^3 (6th place).
  - Forest: 0.28 million ha; steep terrain
- Aso Forest Owners Cooperative (Aso)
  - Forest in the region 68,000ha
  - Number of members: 5,751
  - Members' forests: 51,000 ha
- Collecting data
  - Field survey: November of 2020
  - A questionnaire survey was conducted among sampled AFOC members from December of 2020 to January of 2021.
  - Responses: 335; Delivery: 1,155; response rate 29%



2.2 Contents of questionnaire survey

- Information about the forest
  - Total area and number of dispersed places
  - If and why the forest was purchased or inherited over the past 5 years.
  - If and why the forest was sold or donated over the past 5 years
- Harvest and tending activities
  - Harvest area in 2019 and How, Where to sell, Why
  - Why were trees not sold?
  - Forest management activity in 2019 and Who did
- Ordinary forest management
  - Frequency of inspection
  - Boundary clarification
  - Who is responsible for management?
- Characteristics of household
  - Age & gender of forest owners
  - Main and secondary income
- Forest management successor
  - If a successor does not exist, what is the plan for future forest management?
  - If a successor exists, can they operate the forest themselves?

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3. Results

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3.1 Property size
1) forest area

- Average forest size of respondents
  - WV: 28.3 ha SD 91.7 ha
  - Aso: 16.1 ha SD 42.8 ha
  - WV is 1.8 times larger; this is significantly different.
- Average dispersed forest area
  - WV: 16.5 ha SD 82.2 ha
  - Aso: 3.88 ha SD 14.4 ha
  - ***WV is 4.2 times larger***; this is significantly different (P<0.001)

2) Results of the interviews from WV members

➢We confirmed that legal restrictions for buying or selling forests are still active.

- Buyers of agricultural and forest land must be farmer or person who can do farming and forestry.
  [Real estate transaction laws in each state].
- Forest parcels may not be divided into parcels too small.
  [the Austrian Forest Act].
- Traditional farm holdings should not be divided
  ["special inheritance rules"].

Source: Weiss, G. et al. (2015) Forest Land Ownership Change in Austria.

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3) Increase/decrease of property: WV

- Increase within 5 years
  - 25% of respondents (5% : 2,196 ha/41,877 ha)
  - Purchase area: 66%
- Decrease within 5 years
  - 9% of respondents (3.1% : 1,300 ha/41,877 ha)
  - Sell 169 ha : 13%

➢Forest purchase is active.

3) Increase/decrease of property: Aso

- Increase within 5 years
  - 14% of respondents (12% : 522 ha/4,210 ha)
  - Purchase 106 ha, **20%**
- Decrease within 5 years
  - 8% of respondents (1.4% : 57 ha/4,210 ha)
  - Sell 28 ha : 49%

➢Forest purchases in Aso were less active than in WV.

4) Contribution of forestry income

WV

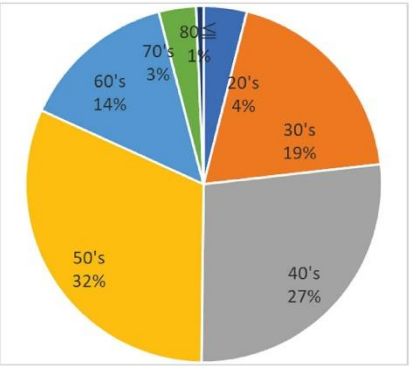
	Income source	
	Main	Secondary
Agricalture	31%	19%
Forestry	**8%**	**41%**
Private busines	7%	4%
Salary	41%	6%
pension	10%	2%
rent	1%	5%
others	1%	3%

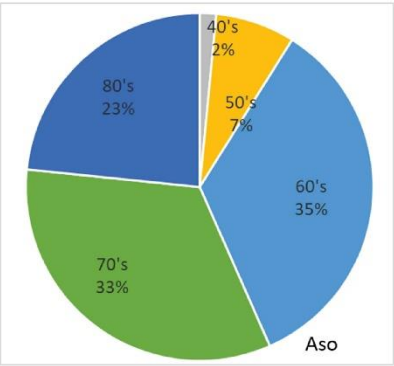
Aso

	Income source	
	Main	Secondary
Agricalture	24%	22%
Forestry	3%	11%
Private busines	8%	5%
Salary	23%	13%
pension	**39%**	**41%**
rent	2%	5%
others	0.3%	2%

- ➢Forestry is an important source of income for WV members.
- ➢Pensions are an important source for Aso members but not for WV. Forestry income is not so important in Aso.

3.2 Age and forestry skills of forest owners
1) Age distribution of forest owners





- WV: 82% were younger than 60.
- Aso: Less than 10% were younger than 60.
- ➢Age distribution between the two regions was significantly deferent.

2) Successor

- WV
  - "I have": 84% "he/she can harvest": 67%
- Aso
  - "I have": 44% "he/she can harvest" : 21%

➢The existing of successor is very high in WV and most of those successor have logging skills.

3) Results of the interviews from WV members

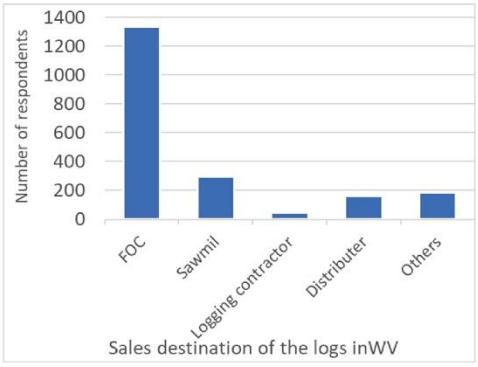
Owner	Present area (ha)		Age	Sex	Harvesting by family	About inheritance				extend forest
	Forest	Farm				Year	Area (ha)	From whom	Trigger	
A	90	30	33	M	yes	2018	90	father	pension	yes
B	42	-	41	M	yes	2014	4.5	mother	pension	yes
C	5	10	20's	F	yes	2018	10	mother	divorce	no
D	99	35	56	F	yes	-	99	husband	pension	yes
E	14	10 (6)	34	M	yes	2016	14	mother	death	yes
F	30	15	30's	M	yes	2021	30	father	age	yes
G	37	37	40's	F	yes	2019	30	father	pension	yes
H	36 (34)	46	25	M	yes	2019	36	grand father	death	yes
I	120	17	40's	M	yes	2012	70	father	age	yes
J	35	23	29	F	yes	2021	35	father	pension	yes
K	8	5	22	F	yes	2020	8	mother	age	yes
L	7.75	7.75	30	M	yes	2020	13	father	age	yes

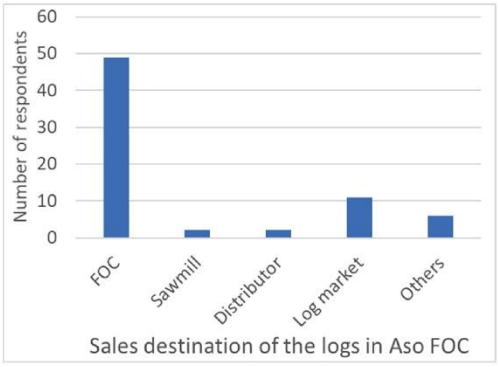
Note: "age" means that his/her parents or grand parents became too old to continue forestry. "-" means no data.
"(6)" means that he/she rents 6 ha.

➢Most of the interviewees were strongly motivated to expand their forest when they could buy an adjacent forests at a reasonable price.

➢Pension was a key trigger for inheriting forest.

3.3 Role of the FOCs on forestry
1) Log marketing

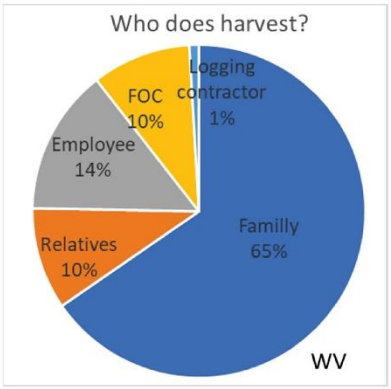


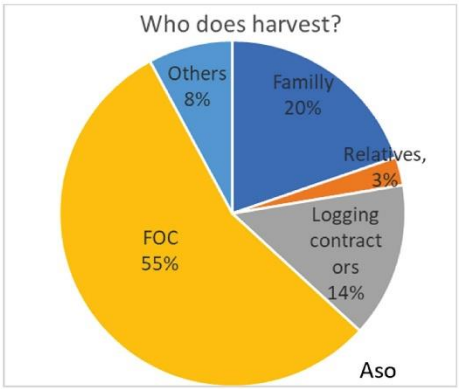


- Respondents received a joint-marketing service in both areas.
- Aso sold logs through two log auction markets.

➢ Increased distribution cost : piling, secondary transport

2) Harvesting forests





- Most of WV members could harvest trees by themselves.
  - Income = log price – transport cost
- Most of Aso members did not harvest by themselves.
  - Income = log price – harvesting cost – distribution cost

➢ One reason why forestry did not contribute to household income in Aso is that harvest and distribution costs are high.

4. Conclusion

- Property size, especially dispersed forest size, was larger in WV.
  - Legal restrictions are effective. No restrictions in Japan.
- WV members obtain a certain amount of income from forestry.
  - They harvest trees by themselves.
  - Larger forest size
  - low-cost distribution
- WV members are younger than Aso due to the pension system.
  - Inheritance of forest property within farming or part-time farming forest owners was realized in WV members.
- To sustain and encourage NLPF, the following measures are required in Japan:
  - The inheritance or transference of forests to young and motivated persons.
  - The encouragement of forest owners who can harvest their own forests.

➢ This work was supported by JSPS KAKENHI Grant Number 19KK0027.

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C1-02

Forest management in small-scale private forests

Factors explaining the willingness to engage in forestry – a German case study

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Abstract

In Germany, the implementation of competing societal demands on the forest ecosystem affects 24 % small-scale private forests (SSPFs). In this inhomogeneous group of small-scale private forest owners (SSPFOs), different living conditions and goals prevail, which is affecting the management of the forest ownership. In the past, research has focused on activating forest owners to mobilize wood, but without considering forest management activities (FMAs) besides timber utilization. While a large number of regional studies in Germany now provide insight into the parameters influencing various forest management activities, no results exist to date for the entire federal territory. To this purpose, a population representative telephone questionnaire study was used to interview German SSPFOs based on a heuristic structural model. A regression-analytic evaluation approach was applied to determine the influencing parameters for the willingness to engage in eight different forest management activities (FMA_{wteS}). The results show that the willingness to engage in FMAs increases, which can be related to regulation and maintenance ecosystem services. Furthermore, the FMA_{wte} are strongly determined by the respective FMA in the past. Moreover, regulation and maintenance - related FMA_{wteS} are strongly determined by the SSPFOs' perception of values and norms. Communication structures, such as a contact to public foresters have a strong positive impact on FMA_{wteS}. Based on these results, concrete forest policy conclusions can be drawn for addressing SSPFOs in order to balance the interests of actors in SSPFs.

Keywords: Small-scale private forest owners, forest management activities, willingness to engage, logistic regression analysis

1. Introduction

Forests are important for the provision of a number of ecosystem services that influence life on earth and, in particular, human well-being (Mauser, 2021; Reid et al., 2005). In Germany, as in other European countries, society is making increasing and sometimes competing demands for the provision of forest-related ecosystem services, leading to conflicts of interest among themselves and with forest owners (Eckerberg and Sandström, 2013; Nousiainen and Mola-Yudego, 2022; UNU, 2003).

In terms of area, 48 % of the 11.4 million hectares of forest in Germany are owned by private forest owners. Of the 1.8 million private forest owners, around 95.5 % have an ownership size of < 20 hectares and are referred to as small-scale private forest owners (SSPFOs) in the context of this study (BMEL, 2014; Neitzel, 2018). These 1.74 million SSPFOs are also of great importance for the provision of forest-related ecosystem services, as they account for 24 % of Germany's forest area.

A number of studies show that SSPFOs across Europe cannot be addressed as a homogeneous group but differ and continuously evolve in terms of their living conditions, motives and actions (Feil et al., 2018; Ficko et al., 2017; Hirsch and Schmithüsen, 2010; Wiersum et al., 2005; Živojinović et al., 2015). In addition to traditional timber utilization, more non-commodity-based services such as the provision of nature and climate conservation services are now being supported by SSPFOs (Nybakk et al., 2009; Nybakk and Hansen, 2008; Umaerus et al., 2013).

Recognizing the increasing and diverse demands on forests by society, as well as changing objectives of forest owners, forest policy is developing systems that promote and value not only timber harvesting activities, but also other ecosystem services provided by the forest, such as carbon sequestration, recreation or water purification (BMEL, 2021a; EC, 2021; UN, 2021). For these

objectives, the current scientific knowledge on the motivation of implementing FMAs is still insufficient (Pröbstl-Haider et al., 2017). While many regional studies in Germany provide insights in FMAs (Bittner and Härdter, 2003; Hartebrodt and Bitz, 2007; Joa and Schraml, 2020; Schreiber and Hastreiter, 2011; Tiebel et al., 2021), no information is yet available on SSPFOs' willingness to engage (WTE) regarding FMAs and their influencing factors at the level of the entire federal territory, unlike for example in Scandinavia (Eriksson and Fries, 2020; Juutinen et al., 2021, 2020; Koskela and Karppinen, 2021).
In this regard, the study focuses on the following research question:

- Which variables influence the willingness of German small-scale private forest owners to engage in timber utilization, regulation-, maintenance- and cultural-related activities?

To promote the provision of ecosystem services by SSPFOs to serve societal demand, this study aims to fill this research gap with regard to knowledge of SSPFOs' willingness to engage in forest management activities (FMA_{wteS}).

2. Conceptual Framework

Decision-making is the process of choosing between at least two options and leads to a decision for (choice of) the favorable case. This process is under the control of the person making the decision as well as environmental factors (Betsch et al., 2011). FMA_{wteS} of SSPFOs are as well influenced by a number of variables, which will be considered in the context of this study using the Model for Explaining Human Decision-Making according to Pregernig (1999). Pregernig (1999) states that human decision-making is the result of a multistage selection process (Appendix A).

The model is a further development of Langenheder (1975), which has been successfully applied in agricultural sociological studies (Lettmann, 1995; Rau, 1989; Wentingmann, 1988). Pregernig (1999) further developed Langenheder's (1975) model and applied it in a forestry context, where it is used in studies by, for example, Ruschko (2002) and Hogl et al. (2005). Human decision-making is influenced by several determinants that are interrelated in complex ways. For this reason, it should be noted that the theoretical model used here is not intended to provide a deterministic portrait of reality, but rather to heuristically structure an existing problem into broader categories and to find practical clues that allow us to better understand and explain human decision-making in a more general context (Ruschko, 2002).

3. Material and methods

3.1. Survey

The dataset used in the analysis is based on a computer-assisted telephone interview (CATI) of a person-weighted population representative random telephone sample of 1,202 private forest owners conducted in 2017 by a survey institute (Feil et al., 2018; Neitzel and Wachenfeld-Schell, 2018). Private forest owners here are owners or co-owners (e. g., community of heirs) of a forest area with a corresponding land register entry in Germany. A detailed explanation of the survey can be found in Feil et al. (2018) and Neitzel and Wachenfeld-Schell (2018), with the former also including the complete questionnaire. Since this study focuses only on forest owners with ownership sizes < 20 ha, 1,009 SSPFOs were filtered from the dataset for further analysis.

3.2. Data selection and variable description

The variables to be analyzed in this study were selected based on the groups of variables in the conceptual framework presented. This study includes eight questions on different FMAwtes of SSPFOs, which are displayed in Table 1. The answers to these WTEs are in the focus of the statistical analysis as dependent variables. These are assumed to include various explanatory variables, which are shown in Appendix B.

Table 1: Dependent variables examined in this study and corresponding ecosystem services based on CICES V5.1

Variable	Definition	Ecosystem Service
$CONVERSION_{wte}$	Willingness to convert coniferous forest to deciduous forest in the next 10 years to make the forest more pristine (no/yes)	Regulation and maintenance
$ALIEN_{wte}$	Willingness to plant alien tree species in the next 10 years to make the forest more diverse (no/yes)	Provisioning
$MAINTENANCE_{wte}$	Willingness to cut down single trees (maintain felling) in the next 10 years to allow other trees to grow (no/yes)	Provisioning
$LOGGING_{wte}$	Willingness to log wood for firewood use or furniture production in the next 10 years (no/yes)	Provisioning
$TRACKCLEAR_{wte}$	Willingness to clear forest tracks in the next 10 years to make them available to forest visitors (no/yes)	Cultural
$HABITATTREE_{wte}$	Willingness to not use habitat trees in the next 10 years to permanently preserve them for animals and plants (no/yes)	Regulation and maintenance
$ZEROLOG_{wte}$	Willingness to refrain from logging in the next 10 years to preserve the forest for plants and animals only (no/yes)	Regulation and maintenance
$KEEPOFF_{wte}$	Willingness to keep off the forest in certain areas in the next 10 years to preserve them for plants and animals only (no/yes)	Regulation and maintenance

The different FMAwtes were assigned to different ecosystem services to which they predominantly correspond. The assignment was oriented to the three major sections of CICES V5.1 (Haines-Young and Potschin-Young, 2018), based on the main objectives behind the questions. In this way, the FMAwtes can be interpreted and discussed in a broader context, even if not all ES can be covered by the studied FMAwtes.

The authors are aware that this is an ideal-typical assignment of individual FMAwteS to individual ecosystem services. In terms of a multifunctional forestry in Germany, however, different ecosystem services can be pursued together with individual FMAwteS.

3.3. Statistical analysis

To answer the research question, this study uses nominal logistic regression to analyze the quantitative data set. The reason for this is that the selected dependent variables are dichotomous and can take a value of 1 or 0. Logistic regression is based on a cumulative logistic probability function and estimates the probability of a given action given a set of categorical characteristics (Pindyck, 1981). The dependent variables described in 3.2 are in focus of the analysis. Based on full regression models with 22 influencing variables, backward variable selection was performed using the Akaike Information Criterium (AIC). In addition to the regression coefficients, the Odd Ratios (OR) were determined, which allow a statement to be made about the size of the effect strength of the respective variables (Chen et al., 2010).

4. Results

The results of the eight regression models are described here in brief and can be found in their entirety in Stockmann et al. (2022). Primarily, variables are mentioned which have at least a weak effect (OR > 1.5-2) on the FMAwteS. In general, the Feedback loop shows to be a significantly strong positive explanatory variable in all models. The Intervening variables make large explanatory contributions, with MILIEU, having a significant effect in half of the models. In the group of Selection instances, especially direct social interaction (OPERATOR) shows a strong significant influence in almost all models, while indirect communication plays a minor role. In the Objective environment, in addition to the variables OWNERS and SUPPORT, economic variables (PRIMARY, SIZE, FRAGMENTATION) in particular have a significant influence in just very few models. The variables RESIDENCE and MATURITY have the strongest influence from this group.

Examination of descriptive results further suggests that at least half of SSPFOs are willing to participate in various FMAs. Only the willingness to plant alien tree species ($ALIEN_{wte}$) was affirmed by only 29.5 % of the respondents. The highest WTE was shown for single tree thinning ($MAINTENANCE_{wte}$), with 88.7 % agreeing. There is also a high WTE for logging wood with 75.4 %

($LOGGING_{wte}$), for not using habitat trees with 77.3 % ($HABITATTREE_{wte}$) and converting forests with 70.7 % ($CONVERSION_{wte}$).

A comparison of the FMA_{wteS} with the Feedback loop also show that the willingness for all FMAs was stated to be higher in the future. This increasing tendency is particularly pronounced for the $HABITATTREE_{wte}$ (+33.1 %), $CONVERSION_{wte}$ (+27.6 %) and $KEEPOFF_{wte}$ (+27.6 %).

Furthermore, it can be seen that 25 % of the SSPFOs belong to the Established milieu and almost 80 % of the SSPFOs take care of their forest by themselves. 85 % of SSPFOs live in more rural areas with a mean distance of 46 km (median: 2.5 km) to their forest ownership and own the forest with 1-2 co-owners of their ownership community. Noticeably, only 29 % of SSPFOs are members of an FOA and only 12.8 % have taken public subsidies in the past.

5. Discussion

The aim of this study was to identify the factors influencing the willingness to engage in forest management activities of SSPFOs. For this purpose, data was used from a population-representative questionnaire study (Feil et al., 2018). Variables were selected based on the Model for Explaining Human Decision-Making according to Pregernig (1999). It was assumed that these variables represent potential determinants for the WTE in a regression-analytical evaluation approach.

It was found that the FMA_{wteS} are primarily determined by the Feedback loop. Thus, an SSPFO that has performed a FMA in the past 10 years is very likely to perform that activity again in the next 10 years. This highlights the importance of "initial activation" of SSPFOs to FMAs (Aguilar et al., 2017). In addition, the decreasing transaction costs due to the repetition of an action (Göbel, 2021) might have an influence as well. The SSPFOs no longer must obtain information about potential service providers as well as costs in advance, which are necessary before an action can take place.

Furthermore, half of the FMA_{wteS} (CONVERSION, MAINTENANCE, ZEROLOG, KEEPOFF) are determined mainly by the social milieu to which the SSPFO belongs. These results suggest that especially actions which, with the exception of MAINTENANCE, are predominantly associated with regulation and maintenance-oriented services, are increasingly conditioned by the basic orientation (value and norm relationship) as well as the social position of the SSPFOs.

Another decisive factor for the WTE of the SSPFOs is the influence of the external forester, who influences the WTE of forest owners and is an important contact person (Chhetri et al., 2018; Karppinen and Berghäll, 2015; Koskela and Karppinen, 2021; Kumer and Slavič, 2016). Social networks can be classified as relevant for forest owner engagement (Eriksson and Fries, 2020; Stoettner and Ní Dhubháin, 2019). In this regard, informal interaction and knowledge sharing can encourage SSPFOs to develop and put shared knowledge into practice and promote the development of a trusting relationship (Gootee et al., 2010; Joa and Schraml, 2020; Schraml, 2003; Stoettner and Ní Dhubháin, 2019).

In particular, WTEs that can be attributed to regulation and maintenance services seem to gain in popularity, as can be seen from the strong increases in willingness to HABITATTREE, CONVERSION and KEEPOFF. These results potentially highlight an opening perception of SSPFOs to see their forest not only as a supplier of wood products, but beyond that as a scenery to implement climate and conservation goals. This shift from traditional uses to non-commodity-based services has been also noted in other studies (Nybakk et al., 2009; Nybakk and Hansen, 2008; Umaerus et al., 2013). However, as the role of regulation and maintenance services receive increasing social attention, it cannot be dismissed that a social desirability has an influence on SSPFOs' respective WTEs.

Finally, for the membership in an FOA it can be demonstrated that it has a positive effect mainly on the use and sale of timber or related actions (ALIEN, LOGGING, TRACKCLEAR) (Curman et al., 2016; Põllumäe et al., 2014). Though, the role of FOAs affects only a small portion of SSPFOs. The influence of public subsidies in the past has less impact on FMA_{wteS}, which is confirmed by Mostegl et al. (2017) and Church and Ravenscroft (2008). It is likely that the individual transaction costs for one-time subsidization are too high due to bureaucracy and administrative requirements (Sarvašová et al., 2019).

6. Conclusion

This study shows the increasing willingness of SSPFOs to provide regulation and maintenance -related services, which are important for example in the context of the European Forest Strategy and the national orientation of forest policy at the "natural development" of forests (BMEL, 2021a; EU, 2021). The willingness for provisioning-oriented services shows lower increases, but these are also at a similarly high level, which corresponds to the decided goal of the Charter for Wood (BMEL, 2021b).

However, it should be mentioned in advance that the results are only valid under the conditions prevailing at the time of data collection. For example, extreme weather events in 2017 in parts of Germany may have led to an increasing awareness of climate change, which is not reflected in the data set.

To ensure the provision of these different ecosystem services, the most important factors influencing the SSPFOs' FMA_{wteS} must be considered: the positive experiences with the FMAs in the past ("initial activation") of forest owners, the milieu affiliation and the person who takes care of the forest ownership. If initial activation of forest owners is accomplished, SSPFOs will likely continue to provide the respective ecosystem service in the future. Here, the influence of extension foresters plays a central role by providing advice and support for FMA related to all ecosystem services. Furthermore, regulation and maintenance -related services are strongly dependent on milieu affiliation.

Provisioning-oriented services, on the other hand, are more dependent on factors of the objective environment and, not least, on membership in a FOA. However, since timber utilization for personal use is the largest utilization factor in SSPFs (about 68 % of SSPFOs), the role of local foresters and FOAs is essential to ensure that actions intended by SSPFOs can be realized.

The key role of the consulting and or managing person, which is clear from the results, could become the subject of subsequent research to help determine appropriate organizational arrangements for the SSPFOs and to better reach SSPFOs. The associated development of social networks is an important but under-studied aspect that is relevant to forest owners (Andersson and Lidestav, 2016; Nybakk et al., 2009).

Finally, it should be mentioned that the results are only valid under the conditions prevailing at the time of data collection. For example, extreme weather events in 2017 may have led to increasing awareness of climate change in parts of Germany, which is not reflected in the dataset. Furthermore, it is possible that the position of public foresters could be weakened in the future by the change from indirect to direct subsidization of forest owners by FOAs in some states (ML, 2022).

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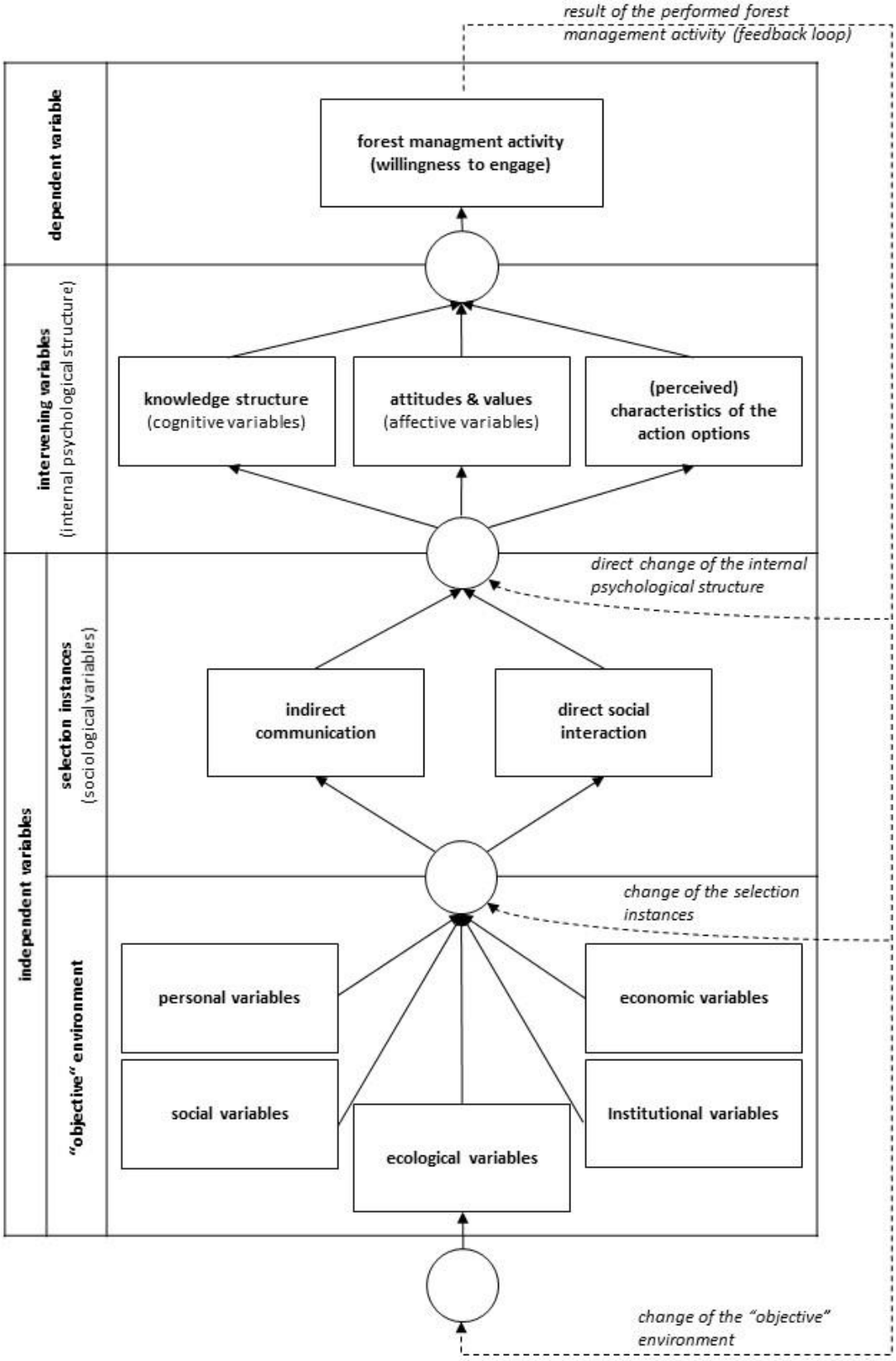
Appendix A. Model for Explaining Human Decision-Making (Pregernig (1999); acc. to Langenheder (1975))



Appendix B. Description of the explanatory variables in the analysis

Variablename	**Variable group (and -subgroup) based on Pregernig (1999)**	**Definition**	**Scale**	**Question number in Feil et al. (2018)**
$CONVERSION_{fbl}$	Feedback loop (forest management activity)	Convert coniferous forest to deciduous forest in the past 10 years to make the forest more pristine (no/yes)	nominal	10.1_1
$ALIEN_{fbl}$	Feedback loop (forest management activity)	Plant alien tree species in the past 10 years to make the forest more diverse (no/yes)	nominal	10.1_2
$MAINTENANCE_{fbl}$	Feedback loop (forest management activity)	Cut down single trees (maintain felling) in the past 10 years to allow other trees to grow (no/yes)	nominal	10.1_3
$LOGGING_{fbl}$	Feedback loop (forest management activity)	Log wood for firewood use or furniture production in the past 10 years (no/yes)	nominal	10.1_6
$TRACKCLEAR_{fbl}$	Feedback loop (forest management activity)	Clear forest tracks in the past 10 years to make them available to forest visitors (no/yes)	nominal	10.1_8
$HABITATTREE_{fbl}$	Feedback loop (forest management activity)	Not use habitat trees in the past 10 years to permanently preserve them for animals and plants (no/yes)	nominal	101_7
$ZEROLOG_{fbl}$	Feedback loop (forest management activity)	Refrain from logging in the past 10 years to preserve the forest for plants and animals only (no/yes)	nominal	10.1_4
$KEEPOFF_{fbl}$	Feedback loop (forest management activity)	Keep off the forest in certain areas in the past 10 years to preserve them for plants and animals only (no/yes)	nominal	10.1_5
MILIEU	Intervening variables (knowledge structure, attitudes & values, (perceived) characteristics of the action options)	Classification of SSPFO according to the Social-Milieus (Sinus-Milieus ®) 1: Established 2: Liberal-Intellectual 3: Performers 4: Expeditive 5: Adaptive-Pragmatic 6: Social-ecological 7: Modern Mainstream 8: Traditional 9: Precarious 10: Hedonists	nominal	15
FUNCTION	Intervening variables (attitudes & values)	Attitude to the forest function of the forest ownership by the respondent (public vs. private) > 0: private < public function < 0: private > public function	interval	11.2_1, 11.2_2, 11.2_3
RELEVANCE	Intervening variables (attitudes & values)	Attitude to the economic relevance of forest ownership by the respondent (economic relevant vs. economic irrelevant) > 0: high economic relevance < 0: no economic relevance	interval	13.10_1, 13.10_2, 13.10_4
OUTSOURCE	Intervening variables ((perceived) characteristics of the action options)	Willingness to hand over the forest responsibility in all aspects of forest management to professional foresters (no/yes)	nominal	12.6
INDIRECT_QUAL	Selection instances (indirect communication)	Number of media channels consulted on the topic of forests in the past year	ratio	9.2

INDIRECT_QUANT	Selection instances (indirect communication)	Frequency of retrieving information specifically on forest topics in the past year	ratio	9.3
DIRECT_QUAL	Selection instances (direct communication)	Number of contact persons consulted for decision-making regarding the forest ownership	ratio	9.5
OPERATOR	Selection instances (direct communication)	Main operator in the forest ownership 1: SSPFO or family (internal) 2: private foresters / forest service providers, other forest owners, associations, forest management community, FOA-direction (external private) 3: public foresters (external public) 4: nobody	nominal	9.6
GENDER	Objective environment (personal variables)	Gender of respondent 0: female 1: male	nominal	16.1
AGE	Objective environment (personal variables)	Age of SSPFO	ratio	16.2
OWNERS	Objective environment (social variables)	Number of members of the forest ownership community	ratio	8.12
RESIDENCE	Objective environment (personal variables)	Urban vs. rural residence of the SSPFO 0: rural 1: urban	nominal	-
PRIMARY	Objective environment (economic variables)	(Past) employment in the primary sector	nominal	16.6
SIZE	Objective environment (economic variables)	Size of forest ownership	ratio	8.8
FRAGMENTATION	Objective environment (economic variables)	Number of forest fragments of forest ownership	ratio	8.7
DISTANCE	Objective environment (economic variables)	Distance between forest ownership and residence in km	ratio	14.4
ROAD	Objective environment (economic variables)	Presence of roads that allow timber harvesting and removal (no/yes)	nominal	13.4
COMPOSITION	Objective environment (ecological variables)	Predominant forest type in forest ownership 0: mixed 1: deciduous 2: coniferous	nominal	13.1
MATURITY	Objective environment (ecological variables)	Age class distribution in forest ownership 0: mixed 1: young 2: middle 3: old	nominal	13.2
FOA	Objective environment (institutional variables)	Membership in a forest owner association (no/yes)	nominal	8.13
SUPPORT	Objective environment (institutional variables)	Use of public subsidization for activities in forest ownership in the last 10 years (no/yes)	nominal	13.8

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C1-03

How young generations are oriented towards small-scale forestry in Japan?

-Results of a questionnaire to the mailing list of the non-profitable organization for the promotion of self-logging forestry (*ZIBATSU*)-

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*** Non profitable organization for promotion of self-logging type (*Zibatsugata*) forestry

Abstract

In Japan, small-scale forestry, known as 'self-logging (*Zibatsu*)', has attracted the attention of young people in recent years. In 2014 the Association for the Promotion of Self-logging type Forestry (*Zibatsu-gata*) was established as a non-profit organization (NPO). The NPO promotes small-scale forestry by providing training in chainsaw thinning and disaster-resistant spur roads, as well as management advice. However, it is unclear which demographic groups participate in the NPO's activities and what their expectations are of the small-scale forestry. Therefore, a questionnaire by google forms was conducted with 1,040 registered the direct mailing list of the NPOs to examine the attributes of the members and their expectations on *Zibatsu* forestry. The number of valid responses was 184 (17.7%). More than half of the respondents were under 50 years of age. Respondents could be divided into three categories: those who planned to engage in self-logging forestry (Candidates: 57%), those already working in self-logging forestry (Practitioners: 30%) and those who were supporters of the NPO activities (Supporters: 13%). The prospective workers were seeking to acquire skills in self-logging forestry and were particularly interested in learning spur roads for disaster resilient forestry. In particular, a high percentage of the candidates did not own forest land, indicating the importance of matching aging forest owners with candidates. It was also clear that few of the practitioners and candidates planned to make a living solely from income from *Zibatsu*, and many planned to combine it with other self-employment businesses.

Keywords: self-logging forestry, combined business, disaster resilient forestry, spur road, Japan

1. Introduction

About Fifty-five percent of Japan's forests are privately owned, and the many planted forests created in the 1950s and 1970s are reaching the stage of utilization. Small private forest ownership structures and aging forest owners are considered challenges for the Japanese forestry industry. However, small-scale forestry, known as self-employed and self-logging by using small vehicle, has been attracting attention among the younger generations in recent years. A non-profit organization for promotion of self-logging called the *Zibatsu* type (*Zibatsugata*) forestry[(1)] was established in 2014, and the *Zibatsu*gata forestry has become a social movement. Some case studies have revealed what kind of people are paying attention to *Zibatsu* type and for what purpose[(2)].

A typical *Zibatsu*-type operation is introduced by Photo 1. He was 40 years old and owns about 10 ha of forest. But this site was owned by an elder neighbor who lived in the same community as him. He was working with the owner to thin cedar trees by creating a narrow spur road to reduce sediment runoff. The revenue was generated by removing building timber (6m) that is longer than the length of logs produced by ordinary forestry machinery.

Photo1. An operation site of *Zibatsu type* forestry
Source: Provided by Mr. Sei Miyazaki

In the past, forest owners who removed timber from their own forests using family labor were called "*Zibatsu* forestry household." However, in the recent *Zibatsu-type* forestry movement, young people who are not necessarily forest owners are now involved in small-scale self-employed forestry, either by renting forest land or by being commissioned to do so. Kohrogi (2014)[3] pointed out that self-logging forestry in Japan had its first wave in the 1970s and 1980s, its second wave in the 1990s, and is now in its third wave. However, the actual situation has not been clarified.

2. Methods

The NPO promoting *Zibatsu type* forestry (hereafter described as *Zibatsu*) was established in 2014. It currently has 67 regular members (including 3 organizations). An email magazine is registered to 1,891 people. The NPO main activities are, firstly, organizing of training for logging and creation of forest spur road, and sending lecturers to the region. Secondly, it provides advice to 54 local governments that want to promote *Zibatsu*. The depopulated local governments that want to increase the settlement of young people are now promoting *Zibatsu*. The third is information sharing and dissemination. Every Thursday, various information related to self-logging forestry is disseminated as *Zibatsu* News by YouTube. The number of subscribers to its you tube program has increased to 6,450 in December, 2022.

We commissioned the NPO to send an email to 1,041 people who were registered on the mailing magazine as of November 2019, asking them to cooperate with a google form questionnaire by email. Period of implementation was one month until December 2019. The valid respondents were 183 (17.7%)

3. Results of the questionnaire

3.1 Basic information on the respondents

By age, 6% of the respondents were 29 years old or younger, 18% were between 30-39, 27% were between 40-49, 29% were between 50-59, 16% were between 60-69, and 5% were 70 years old or older. More than half of respondents were under 50 years of age. In terms of gender, 90.2% of the respondents were male. Looking at the respondents' area of residence, 60% of respondents live in Japan's three largest metropolitan areas.

The composition of the main income of the 183 respondents showed that the most common type of income was being employed outside agriculture and forestry (34%). This was followed by employed in the forestry industry (forestry cooperatives and private forestry companies) (14%) and self-employed business outside the agriculture and forestry (11%). including web design, carpentry, and café management. Other respondents were civil servants, students, and jobless.

Respondents can be divided into three main groups. The largest group of respondents were those planning or considering employment in *Zibatsu* accounting for 57% of respondents. They can be called “Candidates”. Next were respondents who had already started and were working in *Zibatsu*, accounting for 29%. It is “Practitioners”. Finally, 13% of respondents were not planning to work in *Zibatsu*, but they endorsed and supported the NPO's activities. We classified them “Supporters”.

Fig.1 shows the proportions of the three groups by age. The younger the age group, the higher the proportion of “Candidates”, with 80% of those aged 29 and under, with the main feature being the high proportion of those in their 20s and 30s who want to work. The proportion of those in their 50s “Candidates” is also higher than that of those in their 40s. It may be that some people want to start *Zibatsu* after retirement. The proportion of “Practitioner” exceeds 30% in the 40s and 60+ age groups. The proportion of supporter increases with age.

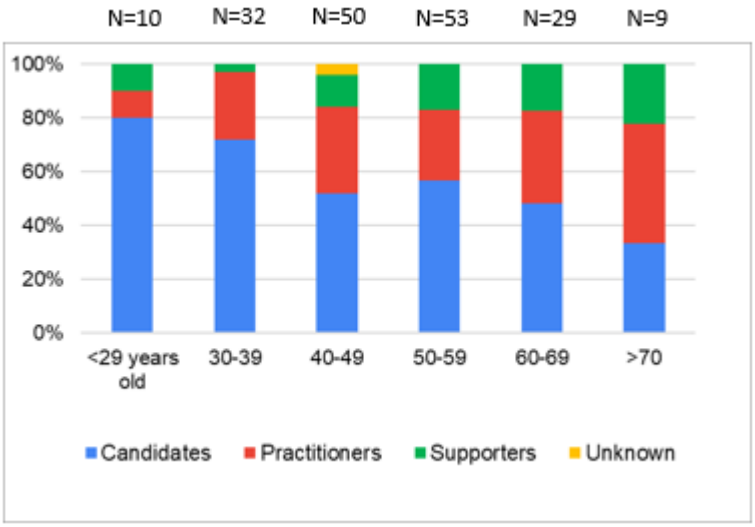

Figure 1: Respondent Composition of engagement with self-logging forestry by age group.
Source: Questionnaire survey by google form

3.2 Actual conditions of the *Zibatsu* Practitioners

Next are the results of the survey on the actual status of the 54 respondents who practice *Zibatsu*. In terms of their operation forests (multiple answers), more than 60% of the practitioners are original forest owners. However, the remaining 40% have secured land for their operations by renting, commissioning, or purchasing forests; 15% work in rented private forests; 15% work in forests owned by the local government or community; 13% work in contracted private forests for thinning. The area of forest land secured, about 80% is less than 30 ha.

In terms of *Zibatsu* practitioners' work style, the 40% respondents worked alone, followed by 32% in groups with peers, and 23% with family members. On the other hand, when looking at the percentage of total income from *Zibatsu*, only 8% said 100%, while most said less than 50%. There were also 21% who did not answer this question.

3.3 Actual conditions of the *Zibatsu* Candidates

Next are the results of the survey on the actual situation of the 104 people who plan to start *Zibatsu*, of which a high percentage were young people. Looking at their schedule, 41% answered they could start without migrating and 12% had a migration plan. 19% said they were currently looking for forests or a place to settle, and 28% said they only wanted to and had no concrete plans. When those candidates were asked about the area of forests already secured, 33 respondents answered. Of these, 45% had less than 5 ha, and including those with less than 30 ha, nearly 90% were even smaller than current practitioners.

3.4 Future work plan of the Practitioner and the Candidates

We asked the practitioners and the candidates about their future *Zibatsu* goal by a single-choice (Fig. 2). The most common response (58%) was “want to position *Zibatsu* as a side business and earn a certain amount of timber income. In the free text box, many respondents wrote “want to run a combined business with other self-employed businesses.” 18% of respondents wanted to run a full-time forestry business. On the other hand, 14% wanted to obtain firewood for their own consumption rather than for sale and to develop their forests first.

In terms of their target of their expected *Zibatsu* income. 60% of the respondents indicated less than 3 million yen (approximately USD 20,000, calculated 1$=150yen). Another 22% were unable to answer the question. It can be indicated that many of them do not see themselves living solely on income from *Zibatsu*. When asked to write freely about the challenges to realizing the target, many respondents mentioned 'improving logging and timber production techniques', 'learning to build disaster resilient spur roads to establish eco-friendly forestry' and 'administrative support to secure forests'.

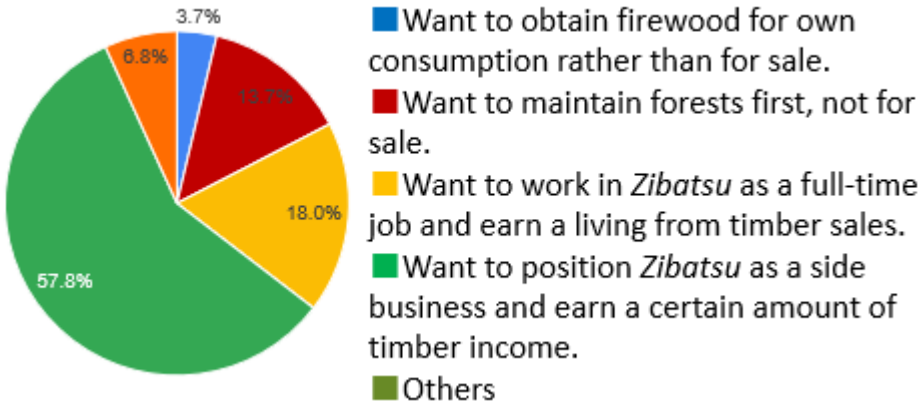

Figure 2: Respondents’ goal for Zibatsu, self-logging forestry
Source: Questionnaire survey by google form

4. Discussions and conclusions

The questionnaire results showed that interest in small-scale forestry is spreading among the younger generations in Japan. It was found that many young people, not only forest owners, are interested in *Zibatsu* and that there is a certain percentage of young people who are taking concrete action. They planned to move from the city to the rural area, with the combined management of self-employment with forestry as a side business.

This survey was conducted based on the registered mailing list (1,040 people) as of October 2019, but the most recent data shows that the number of people on the list has expanded to 1,891, and it might be expected that these movements are accelerating under the COV-19 pandemic.

Whether the above new entry into small-scale forestry is a trend only in Japan or whether it can be generalized to other countries needs to be discussed in the future. While there are many forest owners involved in their own forests, the contractual relationship between young people who are not owners and forest owners must be an important issue for discussion of private forest ownership. We would like to conduct further research on how young people can participate in small-scale forestry in Japan.

Acknowledgements

This work was supported by JSPS KAKENHI Grant Number JP15H04562. We are grateful for the cooperation of the NPO to promote *Zibatsugata* forestry.

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C1-04

Landowners' willingness to enter contracts for improving the state of the environment and increase carbon sequestration

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* Natural Resources Institute Finland

The Co-European project CONSOLE aims to improve the supply of environmental and climate goods for agriculture and forestry through the development of voluntary contracts. In this part of the study, we compare the Finnish farmers and forest owners' views on different types of voluntary contracts.
The study assessed four different types of contracts: (1) results-based contract, 2) landowner cooperation agreement, (3) value chain agreement and 4) land lease agreement with environmental conditions at the general level. In addition, a results-based agreement to increase the carbon sequestration was assessed in more detail.

The research focused on the following questions: What kind of farmers and forest owners are willing to enter contracts to deliver agri-environmental public goods? What are differences or similarities in farmers' and forest owners' views on different types of contracts? Are landowners willing to join a voluntary results-based carbon compensation scheme, and does the willingness to join the scheme differ among the forest owners and farmers?

The survey data that consisted of 386 forest owners and 409 farmers was collected in spring 2021 via an electronic survey questionnaire. The properties and factors affecting the desirability of different types of contracts were analysed with exploratory analyses. The second part of the study used the Choice Experiment (CE) method for the analysis of compensation requests in a results-based carbon scheme. According to the preliminary results, the farmers were more interested in the voluntary contracts than the forest owners. For the both landowner groups, the characteristics of the results-based contracts were the most desirable contract features.

The effectiveness of voluntary agreements is based on the willingness of farmers to enter contracts. Based on the results, various contract models can be designed to promote environmental and climate actions so that they fit the needs and experience of landowners.

Keywords: voluntary agreement, environmental and climate action, compensation claim

C1-05

Forest Research

Encouraging tree planting for Carbon and Water Benefits: a UK perspective

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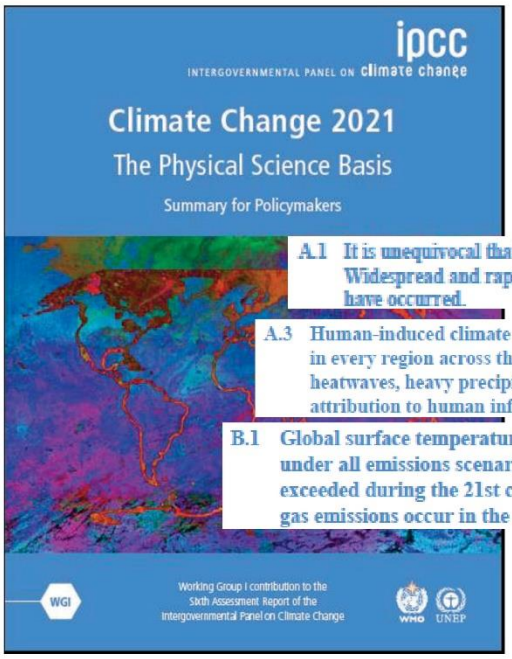
Forest Research
Alice Holt Lodge
Farnham
Surrey
England

Shortened version (Full presentation available at: (3) (PDF) Encouraging tree planting for Carbon and Water Benefits: a UK perspective [researchgate.net])

Forest Research

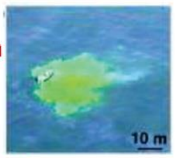
Climate Change mitigation as policy priority



Forest Research

Avoiding 'dangerous' climate change

?° **Risk of large changes in ocean circulation and the release of methane clathrates.**



3° **Risk of significant loss of Amazon rainforest.**
Globally few ecosystems can adapt, consequent reductions in food supply and consequent further damage to the climate system.

2° **Melting of Greenland ice sheet may become irreversible.**

1° **Some marine ecosystems suffer irreversible change. Ocean acidification is already a risk.**

Source: Vicky Pope, Met Office Hadley Centre © Crown copyright 2007

Forest Research

UK forest cover

Table 1.2 Woodland area in the United Kingdom

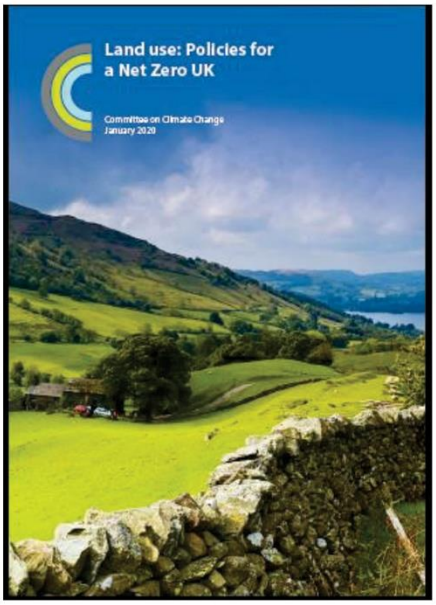
percent of land area[1]

Year	England	Wales	Scotland	Northern Ireland	UK
1086[2]	~15	..	..	..	..
c1350[2]	~10	..	~4	..	..
17thC[2,3]	~8	..	~4	~1.5	..
1905[3]	5.2	4.2	4.5	1.1	4.7
1924	5.1	5.0	5.6	1.0	5.0
1947[3]	5.8	6.2	6.6	1.7	5.9
1965	6.8	9.7	8.4	3.1	7.4
1980	7.3	11.6	11.8	4.9	9.0
1995-99	8.4	13.8	16.4	6.0	11.3
1998[4]	9.5	14.4	16.7	6.0	12.0
2021[5,6]	10.1	15.0	19.0	8.6	13.3

Source: Forestry Commission, Forestry England, Scottish Forestry, Forestry and Land Scotland, Welsh Government, Natural Resources Wales, Forest Service, National Forest Inventory.

Forest Research

UK Climate Change mitigation & forests



https://www.theccc.org.uk/publication/land-use-policies-for-a-net-zero-uk/

To reach UK commitment to carbon Net Zero by 2050, the Committee on Climate Change recommends:

- **planting ~30,000 ha (90 – 120 million trees) of woodland each year**
  - delivering annual carbon sequestration of 14 MtCO2e in forests by 2050 plus additional 14 MtCO2e from harvested wood products
  - Increasing UK forest cover from 13% to ≥17% by 2050

Forest Research

Water Quality Protection

- Well structured soils increase rainfall infiltration & water storage, reducing rapid runoff;
- Tight cycling of nutrients, yielding good water quality;
- Semi-permanent land cover, protecting soils & water from disturbance;

Forest Research

Effectiveness: Water Quality

Pollutant inputs are much lower to woodland compared to agriculture

	Permanent Grassland	Rough Pasture	Wheat	Barley	Maize	Oil Seed Rape	Woodland
Nitrogen Input (kg/ha/yr)	94-135	10	131-167	120-132	46-62	155-189	20
Nitrate-N Export (kg/ha/yr)	0.86-10.58	0.02-0.05	1.54-19.72	1.54-19.72	1.52-19.72	3.29-17.4	0.02-0.1
Phosphate Input (kg/ha/yr)	6-16	0	13-35	18-41	27-43	15-37	0
Phosphate Export (kg/ha/yr)	0.012-0.169	0.008	0.038-0.458	0.038-0.458	0.038-0.458	0.15-1.834	0.008

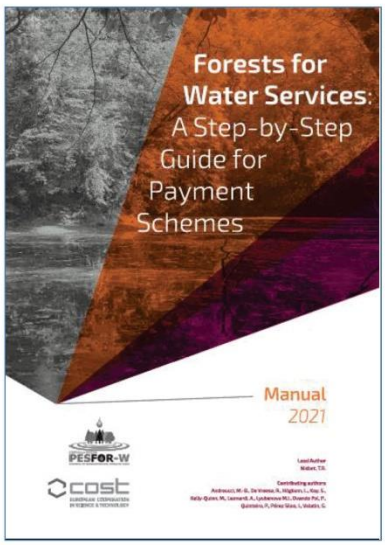
Table 1
Nutrient loads and modelled export coefficients for different crops vs woodland in Great Britain. Nutrient loads taken from the British Survey of Fertiliser Practice for 2000-2011 (BSFP, 2013) and export coefficients based on the same data modelled for the UK National Ecosystem Assessment Follow-on Report (Bateman et al., 2014).

Forest Research

Effectiveness: Buffers

Woodland buffers are effective for removing pollutants draining adjacent land; buffer width is a key factor:

Buffer width	5 m	10 m	20 m
Nitrate-N	20%	30%	40%
Phosphate-P	10%	20%	30%
Suspended Sediment	80%	90+%	90+%

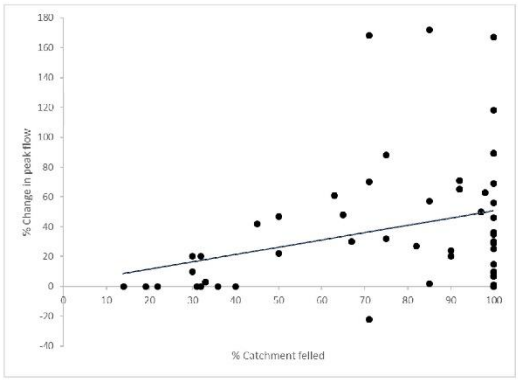


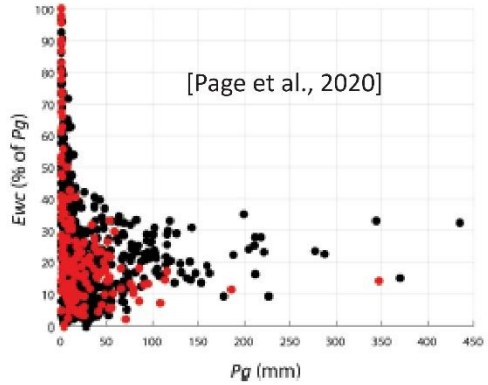
Forest Research

Effectiveness: Flood Reduction

Observed data show woodland creation can reduce flood peaks by 5% to 65%, while the effects of clear-felling range from -22% to +172%

[From Guillemette et al., 2005]





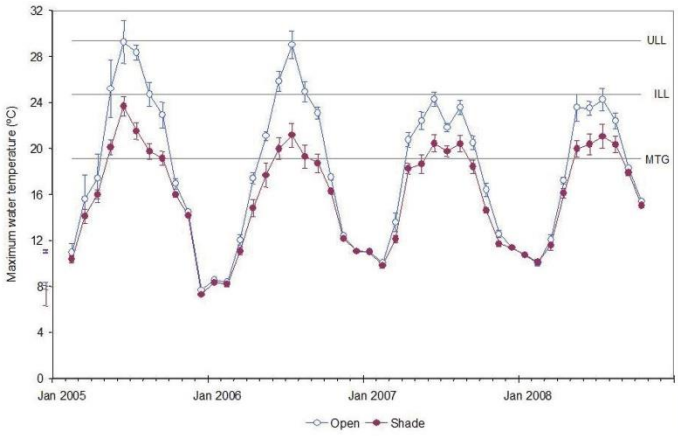
[Page et al., 2020]

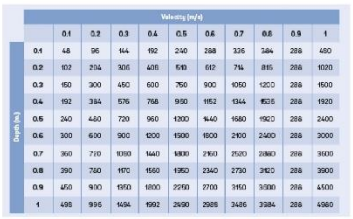
Modelling predicts forest planting can reduce flood peaks by -3 to +54%

[Ngai et al., 2017]

Forest Research

Effectiveness: Cooling



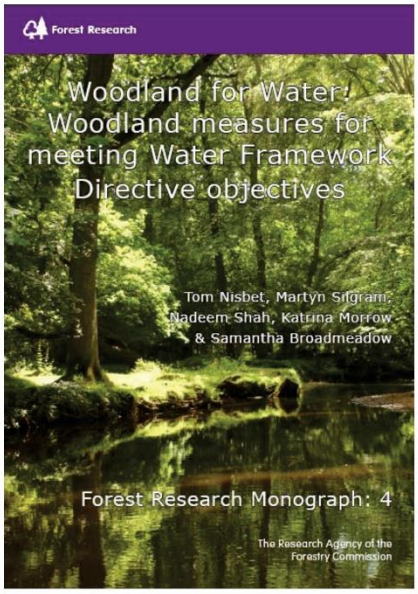


Daily peaks in water temp typically 5˚C cooler in shaded reaches (Broadmeadow et al., 2010); shaded channels typically 1.5 ˚C lower on average than open (KRC)

[Johnson and Wilby, 2015]

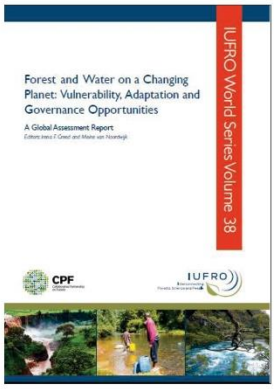
Forest Research

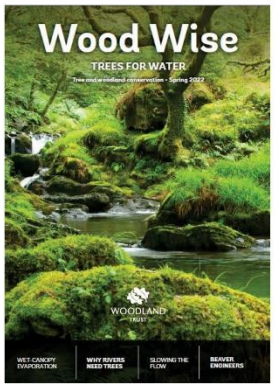
Woodland Water Benefits



https://www.gov.uk/government/publications/woodland-for-water

"There is strong evidence to support forest planting in appropriate locations to achieve water management and water quality objectives"

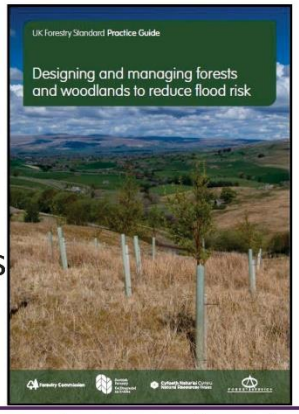




Forest Research

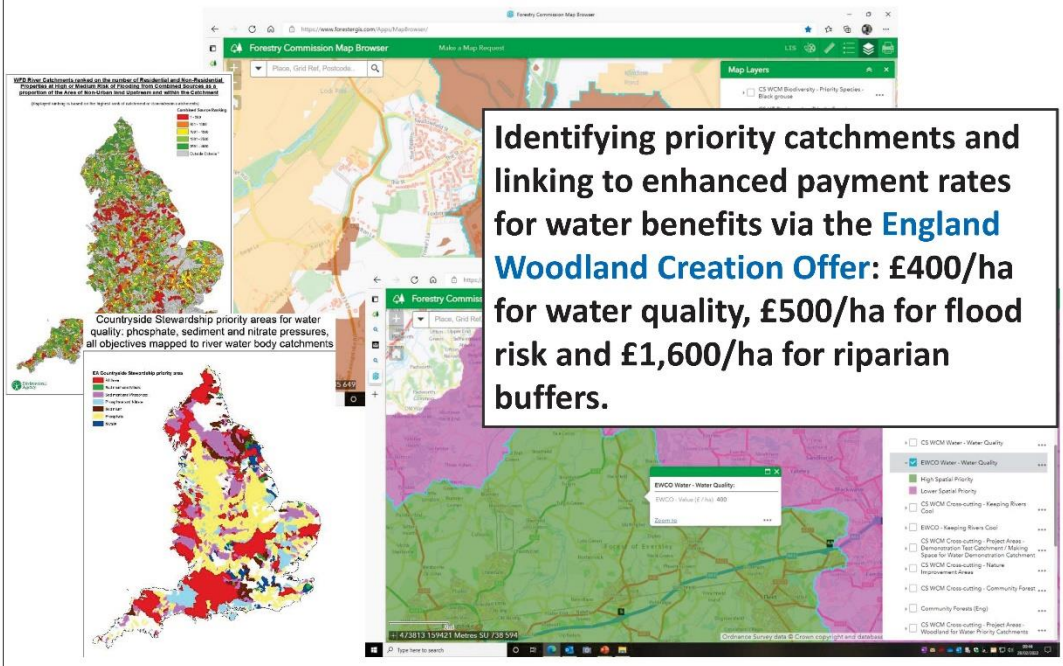
Importance of Water Services

- Water environment & ecological status remains severely impacted by diffuse pollution: woodland can reduce sediment delivery, nutrient inputs (N & P), pesticide runoff & faecal indicator organism (FIO) load;
- Freshwater environment under increasing thermal stress: woodland can provide cooling;
- Flood risk appears to be increasing: woodland can reduce flood peaks;
- Woodland creation a secure & sustainable measure to tackle pressures
  - Effectiveness depends on:
    - location, scale, design & management



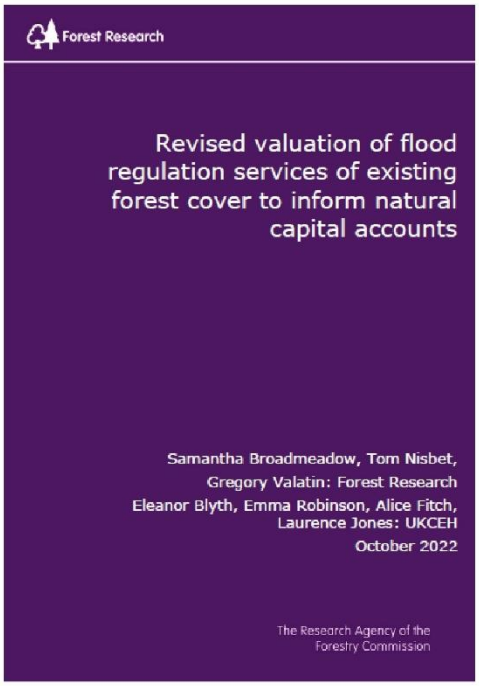
Forest Research

National Spatial Prioritisation



Forest Research

Valuing Flood Regulation Services



Natural capital value (over 100 years) of flood regulation service provided by existing GB woodlands & trees within Flood Risk Catchments (central estimates):
£25.1 billion (£7,974/ha) compared to bare soil;
£12.5 billion (£3,970/ha) compared to managed grass.

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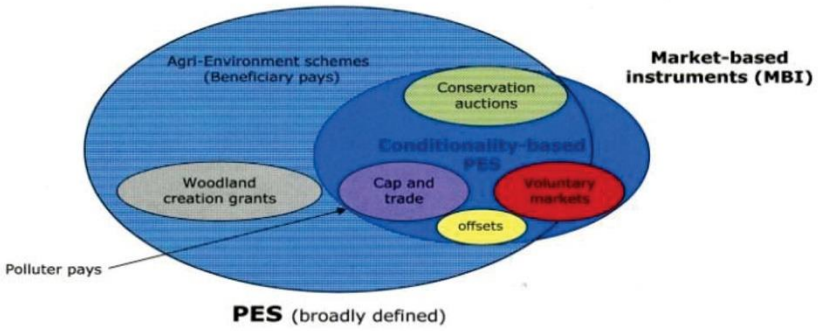
PES: providing incentives

Payments for Ecosystem Services (PES):



"a transfer of resources between social actors, creating incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources" (Muradian *et al.*, 2010).

Forest Research

market aims to double tree cover

https://www.bristolavoncatchmentmarket.uk/about

Bristol Avon Catchment Market

Home | About us | For landholders | For businesses | Market overview | FAQs | Contact

Latest news

A ground-breaking collaboration

The Bristol Avon Catchment Market is being delivered through a collaboration between Avon Wildlife Trust, Wiltshire Wildlife Trust and EnTrade.

The Avon and the Wiltshire Wildlife Trusts and EnTrade are working together to create a market that delivers local, high-impact and verified projects to restore nature and deliver a range of environmental services such as increased biodiversity, carbon reduction and natural flood management.

The Avon Wildlife Trust and Wiltshire Wildlife Trust will work with landholders so that environmental credits from projects are of the highest integrity, delivering nature recovery where it is most needed. EnTrade will ensure that the market generates fair prices for buyers and sellers through a user-friendly trading platform.

"The Bristol Avon Catchment Market is a genuine step change for the delivery of nature-based solutions at a landscape scale."

Amy Coulthard
Director for Nature's Recovery
Avon Wildlife Trust

The Bristol Avon Catchment Market is an online marketplace where:

- farmers make offers to sell environmental projects such as new wetlands, woodlands and grasslands; and
- businesses make bids to purchase credits for the environmental services delivered by these projects.

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Nature for Climate Fund

https://www.gov.uk/government/news/government-publishes-uks-third-climate-change-risk-assessment

GOV.UK Topics

Home > Environment > Climate change and energy > Climate change adaptation

News story

Government publishes UK's Third Climate Change Risk Assessment

Work that has been undertaken by the UK government and the devolved administrations to adapt to climate include:

- Increasing the total spend from the Nature for Climate Fund on peat restoration, woodland creation and management to more than £750m by 2025.

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Forest Research

Increasing Private Sector investment

https://questions-statements.parliament.uk/written-questions/detail/2022-02-07/119512

UK Parliament

Written questions, answers and statements

UK Parliament > Business > Written questions, answers and statements > Find written questions and answers

Water Companies: Finance

Question for Department for Environment, Food and Rural Affairs

UIN 119512, tabled on 7 February 2022

Question

Dr Matthew Offord
Conservative
Hendon

To ask the Secretary of State for Environment, Food and Rural Affairs, if he will take steps to identify potential funding opportunities for water companies to maximise co-funding and green finance opportunities in order to operate in partnerships across catchments.

Answer

17 February 2022

Water companies, as private companies, are best placed to identify co-funding and green finance opportunities to operate in catchment partnerships. However, we have set ourselves a target to raise at least £500 million a year in private finance for nature's recovery in England by 2027, and more than £1 billion by 2030. Nature and catchment-based solutions in the water sector are expected to make a significant contribution to this target.

We have therefore been working with industry leaders from business, finance, land management and environment sectors to understand how to scale up private finance into ecosystem service markets, including through the Financing UK Nature Recovery Coalition. This includes taking action to ensure that any investment is robust and credible, as well as delivering additionality. We will be setting out more on our plans on financing nature later this year, including through the upcoming Nature Recovery Green Paper and the update to the government's Green Finance Strategy.

Defra is already working to encourage water companies to maximise co-funding and green finance opportunities, such as through the review of the Water Industry National Environmental Programme. The review, jointly led by Defra, the Environment Agency and Ofwat, aims to further enable water companies to work with interested organisations in a catchment to jointly design and fund schemes to improve the water environment. This includes boosting investment in nature-based solutions wherever possible. Defra also encourages the use of market-based mechanisms, such as nutrient trading, and has fully supported the piloting of these approaches.

Answered by

Department for Environment, Food and Rural Affairs

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Forest Research — UK Woodland Carbon Code

The Woodland Carbon Code (WCC) is the quality assurance standard for woodland creation projects in the UK, and generates independently verified carbon units. Backed by the Government, the forest industry and carbon market experts, the Code is unique in providing woodland carbon units right here in the UK. The Woodland Carbon Code is internationally recognised for high standards of sustainable forest management and carbon management and is endorsed by ICROA, the global umbrella body for carbon reduction and offset providers in the voluntary market.

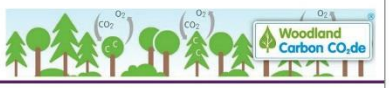
ICROA International Carbon Reduction & Offset Alliance

Supported by robust science from Forest Research, independent validation and verification and a transparent registry where you can track ownership, transfer and use of credits, it allows you to:

- **Reduce your net emissions:** The UK Government's Environmental Reporting Guidelines shows how you can use verified Woodland Carbon Units to compensate for your company's gross UK-based emissions.
- **Claim Carbon Neutrality:** PAS 2060:2014 shows how verified Woodland Carbon Units can be used in claims of carbon neutrality of an activity, product, service, building, project or event in the UK.
- **Buy in advance and help with your pathway to Net Zero by 2050:** Purchase units in advance of sequestration helping to plan your pathway to net zero over the years to come.

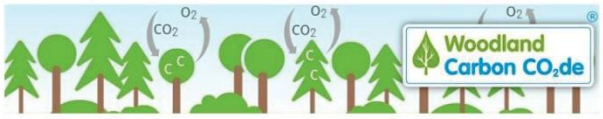
Note: Companies can compensate for their UK-based emissions using carbon units from WCC projects, but not for their emissions overseas or emissions from international aviation or shipping.

https://woodlandcarboncode.org.uk/



Forest Research — Woodland Carbon Code: attracting investment

Standard & Guidance | Buy Carbon | Landowners – Apply | Carbon Tools | UK Land Carbon Registry | Case Studies



Green Investment Bank

The UK Green Investment Bank Plc have bought carbon units from three projects, the latest Pairmoss 2, a flood mitigation scheme in West Lothian.

Find out more

premierpapergroup

Premier Paper, the UK's leading independent paper merchant, since 2011 offers customers the chance to compensate over

BILFINGER GVA

Bilfinger GVA, the UK's leading real estate advisory business, is buying carbon from a project in Cumbria to compensate over time for its office energy usage.

Waitrose

Waitrose, a quality food retailer, has bought carbon from Wercop, to help compensate for the tailpipe emissions of their home delivery fleet.

Find out more

Why did you decide to buy from Woodland Carbon Code projects?

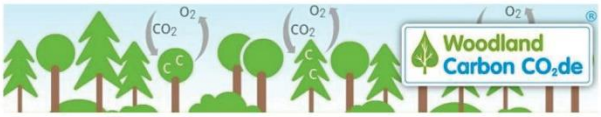
You can't go wrong with trees! They create beautiful environments for wildlife, fostering biodiversity, as well as opportunities for recreation and environmental benefits through flood control and of course through absorbing CO_2.

https://woodlandcarboncode.org.uk/buy-carbon/what-other-companies-say/waitrose

Forest Research

UK Woodland Carbon Code

Standard & Guidance | Buy Carbon | Landowners – Apply | Carbon Tools | UK Land Carbon Registry | Case Studies



https://woodlandcarboncode.org.uk/uk-land-carbon-registry/wcc-statistics#carbon

Projected Carbon Sequestration of Woodland Carbon Code projects – Interim statistics as of 30 June 2022

Projected Sequestration (Million tCO2e)	England	Wales	Scotland	Northern Ireland	UK
Under Development	2.4	0.5	8.5	0.3	**11.7**
Validated only	*0.7*	*0.2*	*4.7*	*<0.01*	***5.6***
Verified at year 5	*0.4*	*0.07*	*1.5*	*<0.01*	**2.0**
Total Validated	1.1	0.2	6.2	0.01	**7.6**
All Projects	**3.5**	**0.8**	**14.8**	**0.3**	**19.3**

Note: These figures include both the carbon units which can be sold and those which are allocated to the WCC buffer.

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UK woodland carbon market developments


Forest Research

UK Timber Market Statement 2021

October 2021
Forest Research

2.4 Carbon markets

Interest in carbon markets has increased markedly over the last 12 months, among landowners, intermediaries and users of carbon credits alike. In the last year, the Woodland Carbon Code and the Peatland Code have created a joint register of carbon projects – the UK Land Carbon Registry, and there are proposals for new carbon standards including Farm Soil Carbon, Hedgerows, rewilding, lowland Peatland, Saltmarshes and Kelp Forests. In England, the government's Woodland Carbon Guarantee, giving landowners the option to sell their verified Woodland Carbon Units to government at a guaranteed price, has recently held the fourth auction. The first three auctions offered carbon contracts to over 75 projects planning to create over 2,300ha of woodland in England. Average prices for verified Woodland Carbon Units ranged from £17-£24 per tonne of carbon dioxide equivalent (tCO_2e).

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Potential for a Woodlands Water Code?

RESEARCH

Towards a Woodland Water Code?

Encouraging tree planting for water quality benefits

Gregory Valatin and **Tom Nisbet** of Forest Research provide insights into collaborations in the PESFOR-W project

Diffuse pollution from agriculture is a major environmental problem. It is a significant pressure for over 40% of Europe's river and coastal water bodies, responsible for degrading water quality, damaging freshwater life and reducing recreational and cultural amenity values. This represents a major cost to society. For example, South West Water estimate that 17% of their customers' bills is for water treatment to remove diffuse pollutants for the provision of clean drinking water.

While efforts continue by farmers and researchers to find ways of reducing diffuse pollutant losses through changes to farming practices, it is increasingly recognised that other 'measures' will be required to achieve water targets and protect the water environment. This includes utilising the ability of trees to intercept and reduce the flow of pollutants from adjacent agriculture. Strategically placed woodlands can be very effective at controlling diffuse pollution, as well as delivering other water services.

The benefits of tree planting for protecting water quality and reducing flood risk have informed woodland creation grants in England since 2012, with additional payments or points awarded in priority areas. However, planting rates remain limited, which in a large part is thought to be due to insufficient incentives for landowners to plant trees on higher valued agricultural land, where pollutant losses are often greatest. Better quantification of the value of woodland creation for removing diffuse pollutants would strengthen the economic case for supporting tree planting for water benefits through grants, or other Payments for Ecosystem Services (PES) schemes.

> The benefits of tree planting for protecting water quality and reducing flood risk have informed woodland creation grants in England since 2012

The effectiveness and cost-effectiveness of woodland planting to reduce diffuse pollution is the subject of a new international research network (PESFOR-W) created in autumn 2016 and supported by the European Cooperation in Science and Technology (EU COST) programme. PESFOR-W aims to improve Europe's capacity to use woodland for water PES and help tackle diffuse water pollution by pooling knowledge and experience from across many countries. It will develop standard approaches and tools to quantify the cost-effectiveness of woodland planting for reducing the five main diffuse pollutants - sediment, nitrate, phosphate, pesticides and Faecal Indicator Organisms, as well as consider potential trade-offs for water quantity.

PESFOR-W currently draws on expertise from 38 countries and spans a range of disciplines, including forestry, agriculture, water and environmental economics. It includes participants not just from research institutes, but also from those engaged in existing woodland for water PES schemes, and aims to involve a wide spectrum including landowners, industry and regulators. A key task is to gather evidence from case studies across Europe. The aim is to incorporate this information into a publically available web-based, spatial repository, and to draw lessons from existing schemes to provide guidance for future PES implementation.

As the diagram above illustrates, broadly defined, PES schemes can be considered to encompass a range of different types of mechanisms. These include publicly funded schemes such as woodland creation grants, agri-environmental schemes such as the EU Rural Development Programme and use of

Continued on page 37

http://www.confor.org.uk/news/ftn-magazine/ftn-back-issues/

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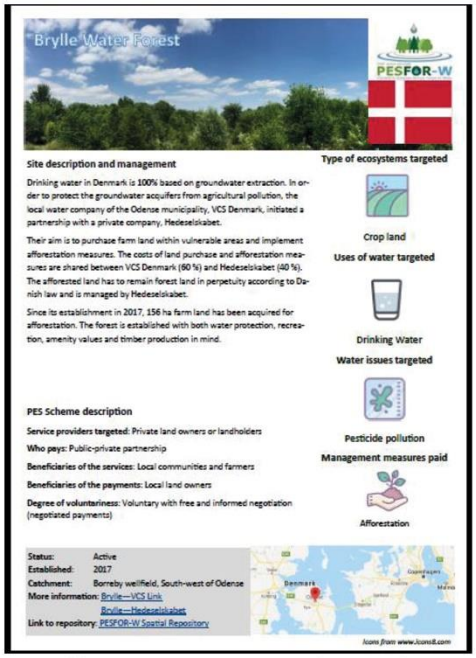
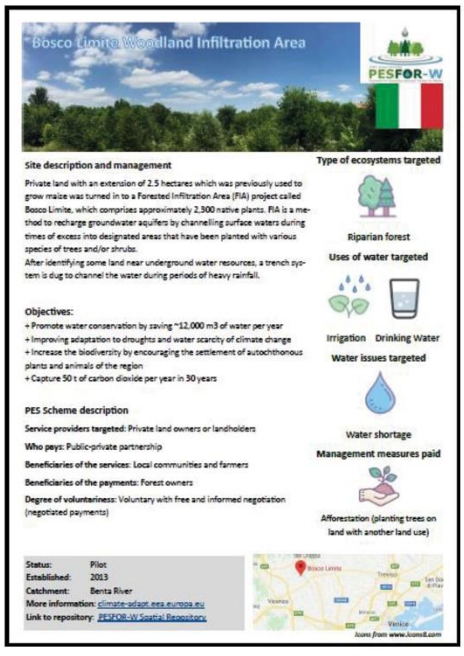
Woodlands for Water case studies





https://www.forestresearch.gov.uk/research/payments-for-ecosystem-services-forest-for-water/case-studies/

Forest Research

Woodlands for water PES: CEA

Ecosystem Services 53 (2022) 101373

Contents lists available at ScienceDirect

Ecosystem Services

journal homepage: www.elsevier.com/locate/ecoser

Approaches to cost-effectiveness of payments for tree planting and forest management for water quality services

G. Valatin [a,*], P. Ovando [b,r], J. Abildtrup [c], C. Accastello [d], M.B. Andreucci [e], A. Chikalanov [f], A. El Mokaddem [g], S. Garcia [c], M. Gonzalez-Sanchis [h], F. Gordillo [i], B. Kayacan [j], D. Little [k], M. Lyubenova [l], T. Nisbet [a], A. Paletto [m], C. Petucco [n], M. Termansen [o], K. Vasylyshyn [p], S. E. Vedel [o], R. Yousefpour [q,s]

COST Action CA15206 PESFOR-W Payments for Ecosystem Services Forests for Water

Forest Research

UK Woodland Water Code

https://www.gov.uk/government/publications/nature-for-people-climate-and-wildlife/nature-for-people-climate-and-wildlife

GOV.UK | Topics | Government activity

Home > Environment > Climate change and energy > Nature for people, climate and wildlife

Department for Environment Food & Rural Affairs

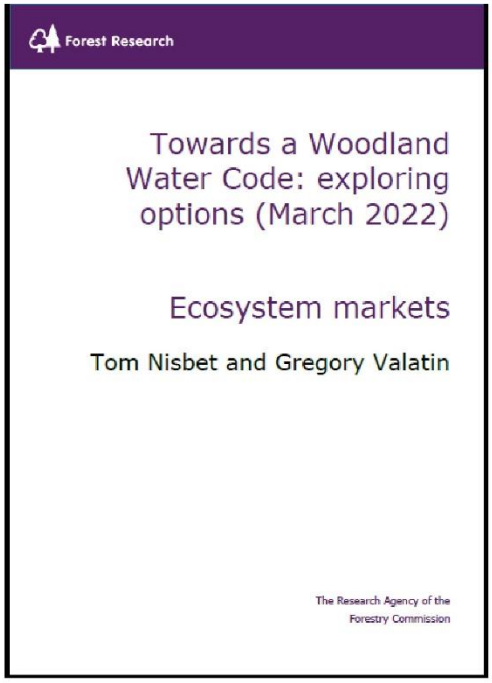
Policy paper

Nature for people, climate and wildlife

Published 18 May 2021

we will develop a Woodland Water Code which will act as a crediting mechanism for water quality to encourage private investment in riparian planting.

Forest Research — Woodland Water Code options


Forest Research

Towards a Woodland Water Code: exploring options (March 2022)

Ecosystem markets

Tom Nisbet and Gregory Valatin

The Research Agency of the Forestry Commission

Table of Contents

Forest Research — Woodland Water Code (scope)

Water-related benefits of woodlands

- **Protecting Water Quality**
  - nutrients (N & P)
  - sediment
  - pesticides
  - faecal bacteria (FIO)
- **Reducing Flood flows**
- **Cooling Water Temperatures**

1) Benefits of woodlands **vs existing agricultural use**
   - Baseline as existing farming practice averaged over a crop rotation **with presumption of good farming practice**;

2) Benefits of creating **woodland buffers**
   - Water quality
   - Water temperature cooling

Forest Research

Woodland Water Code

Geographical focus:

- **areas where water pressures impact most on the environment & society**
  - i) land draining to **water bodies or protected areas** (e.g. drinking water catchments) that are failing to achieve good ecological status or drinking water standards due to **diffuse pollution**;
  - ii) downstream communities or assets at **risk from flooding**;

  - iii) watercourses supporting **priority species** (e.g. Atlantic salmon) that are **declining due to thermal stress**

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Forest Research

Woodland Water Code

Steps (scoping paper recommendations included):

1. Explore potential **development of WWC as an Add-on within the UK WCC**. If not feasible, establish a new Secretariat.
2. Start with **water quality** and focus initially on nutrient reduction (N & P).
3. Constrain the Code initially to a **target area**.
4. explore use of **Farmscoper to quantify baseline conditions & impacts** of land use change across range of farm types & activities. Consider adjustments to better represent woodland-water interactions.
5. Evaluate ability of Farmscoper **to reflect performance of riparian woodland buffers** & refine modelling to accommodate different buffer designs & management.
6. Convert woodland nutrient reduction benefits into a **system of water**/nutrient **credits** & work with stakeholders to integrate woodland credits within existing schemes.
7. Design **methods & rules** for application & engagement, including length of baseline period, controlling leakage & ensuring additionality. Develop web pages & guidance.
8. Beta-**test application of the Code** & collect data to demonstrate successful implementation & performance.
9. **Engage with potential investors**, market test implementation, identify gaps or weaknesses & refine. Utilise/tailor WCC infrastructure to support implementation of WWC & **plan for launch**.

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Concluding remarks

UK forest policy priorities

- **Carbon** & Water as woodland creation drivers
- Climate change mitigation a requirement to ensure long-term provision of all other forest ES
- Importance of government funding & regulation
  - levering in private sector investment
  - **Rapid development of UK incentive schemes**

Rapid upscaling needed to meet UK policy targets

- **Carbon Net Zero + water quality improvement + flood risk attenuation + habitat conservation +…**

Q. How can investment opportunities be aggregated to the scale needed by large-scale investors while also accounting for community preferences?

Forest Research

Acknowledgements

Thanks to DEFRA for supporting work to develop a Woodland Water Code under Nature for Climate Fund R&D, to the Forestry Commission, Scottish Forestry & the Welsh Government for funding work scoping of the development of a Woodland Water Code and leading the PESFOR-W COST Action, to PESFOR-W colleagues for their work & the COST Association for funding the Action (CA15206) 2016-2021

COST Action CA15206 PESFOR-W Payments for Ecosystem Services Forests for Water

cost EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

Funded by the Horizon 2020 Framework Programme of the European Union

A2-01

Mountainous community forestry in BC and the threat of fires, floods, indigenous landscape management, Covid and market prices

Paul Mitchell-Banks*/**

* Adjunct Professor, UBC Department of Land and Water, Human Environment Lead,
** SLR Consulting (Canada) Ltd.

The past three years have been challenging for community forestry in British Columbia, with a dramatic change in weather (reflecting climate change) leading to catastrophic fires followed by floods. During this period, there have been Covid challenges on forestry management and labour activities, as well as market prices that have been significantly more volatile.

This paper will examine the performance of four mountainous community forests located around British Columbia:

1) Mission Municipal Forest. 10,900 ha (12% municipal government owned, 88% provincially owned) under managed under a Tree Farm License, located in the lower Fraser Valley, close to the City of Vancouver

2) North Cowichan Community Forest. 5,000 ha municipally owned. Located on Vancouver Island, and the largest municipality in the Cowichan Valley Regional District (CVRD).

3) Revelstoke Community Forest. 120,000 ha. Located in the central British Columbia in Interior Wet Belt, operated under a Tree Farm License. Previously heavily logged with operability challenges of long hauling distances and steep mountainside harvesting.

4) City of Creston. Volume based Community Forest Agreement License, 25-year term, 25,000 cubic metres annual harvest.

These mountainous community forests provide a comparison of area versus volume-based management, different ownership, and tenure systems – examples of the scale and scope that community forestry can take in British Columbia. All incorporate community input into forestry and landscape management decisions that ensure that management industrial forestry priorities include water management, landscape aesthetic values, fish, wildlife, and recreation, and other values and place an increased priority on timber supporting value-added industries.

Climatically induced weather changes that led to first fires and then floods in the province, coupled with the challenges of the covid pandemic and labour challenges have led to the past three years being particularly challenging. This paper will review the recent past and compare performance to pre-fire/flood and pre-Covid times.

Keywords: Community, Mountainous, Covid, Fire, Indigenous

A2-02

Governance: a process – not a bag of conditions: How communicative/dialogue-based planning-theory may improve sustainable forest management when forestry issues are fragmented, both related to ownership and outcomes?

A descriptive presentation of a study comparing SFM to methods used in Scandinavian societal planning (SFM = Sustainable Forest Management; FM = Forest Management; PES = Payment for Ecosystem Services)

Johan Barstad* and Rhys Evans*

* University College for Green Development

Studies show stakeholder/citizen participation is needed for bearable, equitable and viable outcomes. Forests can no longer be treated only as wood and biomass producers. Ecosystem services, in particular cultural – or rather societal – are now equally relevant/important.

This poses challenges and increases the need for improving the understanding of management as a process, rather than acts of management alone. Societal and policy development studies help provide enlightenment to the relational/inter-personal dimension. Studies, both theoretical and on interventions connected to community, public health, and even land-use planning issues, point to focusing more on the process and on relational dimensions such as cooperation among the participants.

SFM studies often use 'Governance'. Still governance is hardly ever defined, only rudimentarily clarified, often as "the ways/tools of governing", focusing on the involved stakeholders and their basis for action. Emerging understanding of governance in policy/societal studies trend more towards interconnection between involved actors, openness, transparency, and degree of and reason for involvement.

Traditional FM internalizes a classic understanding of power, where the ability to act depends on the single stakeholder's power to act, often ignoring possibilities arising from cooperation (partnerships, triple/quad helix models).

A focus based upon action and actor characteristics, obscures the important social relations which constitute the governance of these forest lands, and consequently studies fail to explain why/why not approaches become successful. We need to move from traditional, instrumental (positivistic) approaches towards the communicative, focusing on dialogue, relationships and broader intentions/interrelations within policies in general.

I am currently in a process studying how forestry and environmental science approach governance and comparing this approach to how governance currently is understood, presented and analyzed particularly in Scandinavian policy literature/studies.

Will use theories from Jurgen Habermas, Patsy Healy, Star and Griesemeyer, Rhodes, and Torfing, connected to study of the (non)emergence of PES in European countries

Keywords: Governance; Sustainable Forest Management; Payment for Ecosystem Services; Communicative Planning

A2-03

Urban reforestation involving diverse actors:

The case of Takaragaike, Kyoto

Norie Tamura*, Hein Mallee, Hideyuki Niwa*** and Mahito Kamada******

* Graduate school of Project Design
** Kyoto Prefectural University
*** Kyoto University of Advanced Science
**** Tokushima University

Keywords: transdisciplinary co-management, urban forest, landscape, Satoyama

This study discusses the process of forest landscape restoration activities in Takaragaike Park in Kyoto City, Japan, which is the arena for numerous collaborations of a range of different types of actors.
Takaragaike Park used to be an agricultural village on the northern edge of Kyoto, the longtime historical capital of Japan. It consists of a number of hills that jut out from the otherwise flat adjacent land. Historical maps show the hills surrounded by paddy fields up to the 1950s, but the hill slopes were too steep for cultivation. Instead, in pre-modern times, the forest on the hills was intensively exploited to provide the materials necessary for the livelihoods of the farming communities, such as fire wood and leaf litter for agricultural fertilizer. Like in many rural areas in Japan, continuous human use gave rise to a secondary forest landscape, nowadays referred to as *satoyama*, a zone of multiple uses complementary to the agricultural lowland and the higher mountainous forest. This kind of intensively used multifunctional landscape mosaic was highly diverse and tend to have rich biodiversity. It was maintained by ecosystem management practices that were rooted in local environmental knowledge and community cultural practices. In the case of Takaragaike, an additional cultural feature is that the southern slopes are the location of one of Kyoto's five famous large-scale bonfires on the occasion of the traditional Obon Festival in mid-summer. The local community still lights two sets of beacons in the shape of Japanese characters meaning "[Buddha's] Wondrous Law" to celebrate the sending off of the spirits of the deceased ancestors who are believed to visit at that time.

Modern urban development, however, engulfed the areas around Takaragaike and the livelihoods of the communities moved away from agriculture and agroforestry. On 1966 the Kyoto International Conference Center (famous as the venue where the Kyoto Protocol was signed) was opened in the area and in 1997 a main subway line was extended to Takaragaike, greatly improving the accessibility of the area. Most of the flat land has now become residential area, in many ways accentuating the presence of the Takaragaike hills as a green space. With the decline of agriculture in the region, the intense use of the forest has also disappeared and the forest has become neglected while ecological succession has progressed. It now is best characterized as an urban forest park. It is at the center of a quite complicated institutional landscape. The land ownership includes state (the Conference Center, City Park), private, and communal (local commons including the beacons) regimes. It is also subject to multiple regulatory frameworks relating to urbanization coordination, natural landscape conservation, scenic areas, historical districts, and disaster preparedness. A range of actors and stakeholders are involved in one way or other and loosely collaborating, including park staff, park users, the local community (both the historical farmers and recently arrived residents), the City Government and researchers. They engage in multiple projects for maintaining and improving the park, among others building deer fences, eliminating invasive tree species, cutting overgrown trees and building slope stabilization structures, and collective forest management planning.

In 2008, the park management was renewed and a playpark using the forest area was established. A coordinator was appointed and environmental education initiatives began. Parents became involved in creating a safe environment for their children's play (for example, works to prevent slopes from collapsing) and a network with park users began to take shape. This period became a turning point as some of the problems that plague forests nationwide hit Takaragaike, intensifying the deterioration of the forest. This included deadly tree pests such as oak wilt and pine wilt as well as extensive damage caused by the increasing numbers of deer. The dead trees were in danger of falling on park visitors and the drastic consumption of undergrowth by deer increased the potential for landslides. These problems heightened the motivation for active forest restoration and from 2013 a series of learning activities was launched, including seminars for the public about the ecosystem, field studies by a local university, and field seminars by an academic association. Also in 2013, the park users set up an NPO. The organizers began working on comprehensive restoration with local residents' groups and conservation ecologists. Through their efforts, in 2015 the Restoration and Conservation Council was established. Bringing together the park users and their NPO, the local community, researchers, the Conference Center, and the City Government, this Council discussed current issues affecting Takaragaike and future visions. It provides a platform for communication about and coordination of the activities of the various actors. With the improved coordination and drive, more active interventions, such as enclosures against deer damage, removal of alien invasive tree species, and cutting down overgrown trees in danger of collapse, carried out jointly by citizens and researchers were launched from 2016. With the depopulation of the countryside, the expansion of urban areas and the decline of *satoyama* as a "buffer zone," deer are now common appearances in peri-urban areas and increasingly even in cities. Their browsing interferes with forest dynamics and changes the composition of habitats. In Takaragaike, where the size of the park makes it impossible to fence the area in its entirety, net enclosures are used to protect small patches of newly planted trees. In a collaboration with the local community, the researchers and other actors secured funding from the City and built a more durable metal fence around the area with the festival beacons.

As indicated, a variety of actors are involved in the conservation and improvement of the Takaragaike forest. These are some of the key ones with their primary stakes or interests in the forest:

- The Kyoto City Urban Greening Association, an organization affiliated with the City Government, entrusted with the management of parks. They are keen on organizing playpark activities in order to highlight the attractiveness of the park and employ an environmental activist-expert to coordinate such activities. She works to conserve the *satoyama* in order to foster a closer relationship of people with the forest.
- The Takara Association, a local NGO that emerged from the activities of the playpark participants. Their primary orientation is to enjoy *satoyama* activities.
- The Forest Kindergarten, for which the forest is an excellent place for children's activities.
- The Rissho Association, the residents' organization of the local community at the southern foot of the hill. They are concerned about the forest growing into wilderness and are afraid there may be landslides due to erosion. They complain the landscape view is no longer beautiful and want to regain the landscape of the remote past.
- The Kyoto National Conference Center, Kyoto's premier congress venue which is located one the northern edge of the park. They are also concerned with the management of the landscape which forms the appealing backdrop to the facility.
- The Faculty of Agriculture of a local university which has been using the forest as a field research site. They are collaborating with the planning and management activities in response to a request.
- The Kyoto City Government has several departments that are responsible for various aspects of the park, with equally various goals, but most frequently the department in charge of park management engages with the activities. Initially, they felt such involvement was cumbersome, but recently they

have begun to consider the Takaragaike transdisciplinary network as a potential vehicle for some of the management work.

It is clear that these stakeholders are not necessarily all working toward a single goal but with the establishment of the Restoration and Conservation Council already mentioned the have a mechanism for consultation and coordination. It is here that the framing of the Takaragaike forest as an "urban *satoyama*" plays an important role. Rather than underpinning a nostalgic drive to restore the agricultural forest of old, the *satoyama* discourse helps the diverse actors are to collectively build an umbrella vision and bundle their activities. The management of the Council is conducted as a transdisciplinary practice where citizens and researchers collaborate and partnerships are secured with government and other public stakeholders. The transdisciplinary process can be usefully conceptualized as a process of social learning emerging out of the collaborative engagement of diverse actors. The researchers – including two of the authors of this paper -- play a number of roles in this process. They facilitate the social learning process, provide the ecological knowledge, mobilize academic resources and provide legitimacy and leverage to civil society actors. Coordination can be difficult due to differing stakes among the actors, but the effective use of a motivational discourse and the transdisciplinary relationships successfully coordinate interests and create a space for diverse actors to be involved.

A2-04

Profitability and management system of abandoned broad-leaved forests:

A case study in Kochi University Forest

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Abstract

Following the "fuel innovation" in Japan in the 1950s, many hardwood forests, or "satoyama forests", were abandoned and left unmanaged, although they continued to provide firewood and charcoal as well as valuable timber species for houses and furniture. Many now overmature broadleaved forests, especially those dominated by oak trees, have become infested with oak disease insects. Appropriate thinning is needed to prevent such diseases and to improve landscape aesthetics. As large-scale harvesting systems are not suitable for the normally low-profit operations of broadleaved forests, small-scale harvesting systems are a potential solution. A series of small-scale harvesting trials were carried out in the Kochi University Forest from 2019 to 2021, using a 3t class excavator-based grapple machine and a winch-mounted mini-forwarder, combined with motor-manual felling and a narrow spur road network. The study site is a former coppice broadleaved forest dominated by *Quercus acuta* in volume and *Camellia japonica* in number. The cost balance of the operations was estimated to be acceptable for self-employed private companies, while the balance would be detrimental for full-time logging companies. Regarding the use of the harvested wood, almost half of the volume should be used for biomass fuel, a third of the volume could be used for timber, and the remainder would be used for firewood production. Large-sized harvested logs, i.e. those of the secondary classification, were sawn into boards of 6 cm thickness and then stored in the university garage for natural drying. A proposal for the management of such abandoned broadleaved forests is given on the basis of these experiments.

Keywords: broadleaved trees, harvesting, small-scale operation system, forest road network, forest management

1. Introduction

More than half of Japan's forests are deciduous (Forestry Agency 2022). Traditionally, they were intensively managed as 'satoyama' forests for firewood and charcoal production. They also provided valuable sawn timber for houses and furniture. However, after the so-called "fuel innovation", i.e. change of energy source from firewood and charcoal to fossil fuel, in the 1950s, forestry in Japan shifted to coniferous plantations (Suzuki et al. 2016b; Birundu et al. 2017). Much of this broadleaved forest was then abandoned and left unused, resulting in an unhealthy condition. Some of the over-mature broadleaved forests, especially those with dominant oaks, have been attacked by oak disease insects in recent decades (KRC 2014, 2018, 2019; Kominami 2019). Appropriate thinning is needed to prevent such diseases and to improve landscape aesthetics. There are only a few reports on the experimental harvesting of such mature, large-sized broadleaved trees by mechanized operations in Japan (Nakazawa et al. 2019, 2020). On the other hand, mechanized harvesting has been applied to coppice forests in European countries (Spinelli et al. 2017; Tolosana et al. 2018; Buckley 2020).

Since large-sized harvesting systems are not suitable for normally low-profit operations in broadleaved forests, small-sized harvesting systems could be a possible solution (Suzuki and Yoshimura 2019a, 2019b). We conducted a series of small-sized harvesting operations trials for large

broad-leaved trees with single-tree selection thinning in the Kochi University Forest in 2019–2021. The operations in 2019–2020 used a 3t class excavator-based grapple loader and a winch-mounted mini-forwarder combined with motor-manual felling and a narrow spur road network. Mini-forwarders are widely used by small-scale forest owners in Japan because of their low price and versatile mobility with a mounted winch, even though their travel speed is relatively slow (Taniyama 2004; Nakahata et al. 2014; Suzuki et al. 2015; Birundu et al. 2016). Narrow spur road networks can be constructed even on steep slopes, i.e. slope angles greater than 30 degrees, without increasing slope failure potential, as long as appropriate route selection and slope reinforcement with small diameter logs takes place (Kanzaki et al. 1990; Suzuki et al. 2010, 2015; Sakai 2017). The results of the test harvesting operations are summarized and analyzed here, comparing three different harvesting methods. In the 2021 operation, a simple cable system was used with the mini-forwarder-mounted winch in combination with both the grapple-equipped 3t class excavator and a 3t capacity forwarder. These methods cover most situations associated with harvesting operations on dense spur road networks. The performance in terms of productivity, costs and estimated profit on harvested logs, is also evaluated.

2. Methods

2.1 Study site

A 30 m x 30 m area of experimental harvesting was established in November 2019 in a deciduous forest, an approximately 70-year-old former coppice forest with dominant species *Quercus acuta* in volume and *Camellia japonica* in number, within the 5th compartment of the Kochi University Forest (Figure 1). The first series of harvesting operations was conducted from December 2019 to April 2020. A second 30 m x 30 m area was established north of the first area in September 2021 for a series of harvesting operations conducted in November 2021. The Kochi University Forest is located in the center of Kochi Prefecture (33°42′17.0" N, 133°36′23.7" E, 660–1,045 m asl), adjacent to the Reihoku area to the south, which is well-known as a steep, mountainous area (Suzuki et al. 2019; Nagai et al. 2020). No silvicultural management was carried out in the sub-compartments of the deciduous forest for approximately 70 years after it was acquired by the university from a private owner. This is because of the shift towards conifer species for commercial forestry and consequent abandonment of most broadleaved forests. The slope around the harvested areas was 20–30 degrees.

All standing trees with a diameter at breast height (DBH) greater than 5 cm were identified by serial number, species and coordinates. Tree crowns, measured as a clump in cases where several individual trees had sprouted, were projected onto the plot map for the trees larger than 10 cm of DBH using 2 m survey poles to an accuracy of 10 cm. Tree heights were measured using Vertex III (HAGLÖF SWEDEN AB) for those greater than 20 cm DBH and estimated for the others from 14% of the samples and linear regression analysis. The standing volume of the plot was then estimated using the stem volume table for western Japan (FAPD 1970).

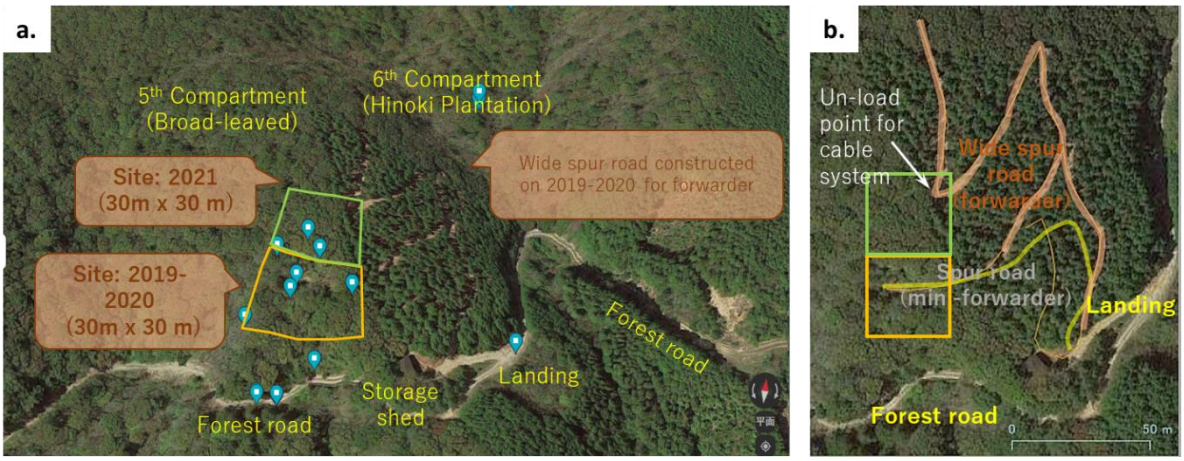

Figure 1: Study area. **a**. Overview. **b**. Roads in the study area.
Source: **a**. Google Inc. (2021) Google Map. Online, (https://goo.gl/maps/ciXJYftZKpkJhMLfA). Accessed 12 October 2021. **b**. UAV photo, courtesy of Dr. Naoyuki Hashimoto.

2.2 Harvesting operations

Nine sets of large *Quercus acuta* trees or clumps were selected as target trees for the first series of harvesting operations in the 2019–2020 fiscal year. Three sets each were harvested using three different methods: direct grappling at the roadside (RS), uphill winching (UH), and downhill wincing (DH) (Figure 2).

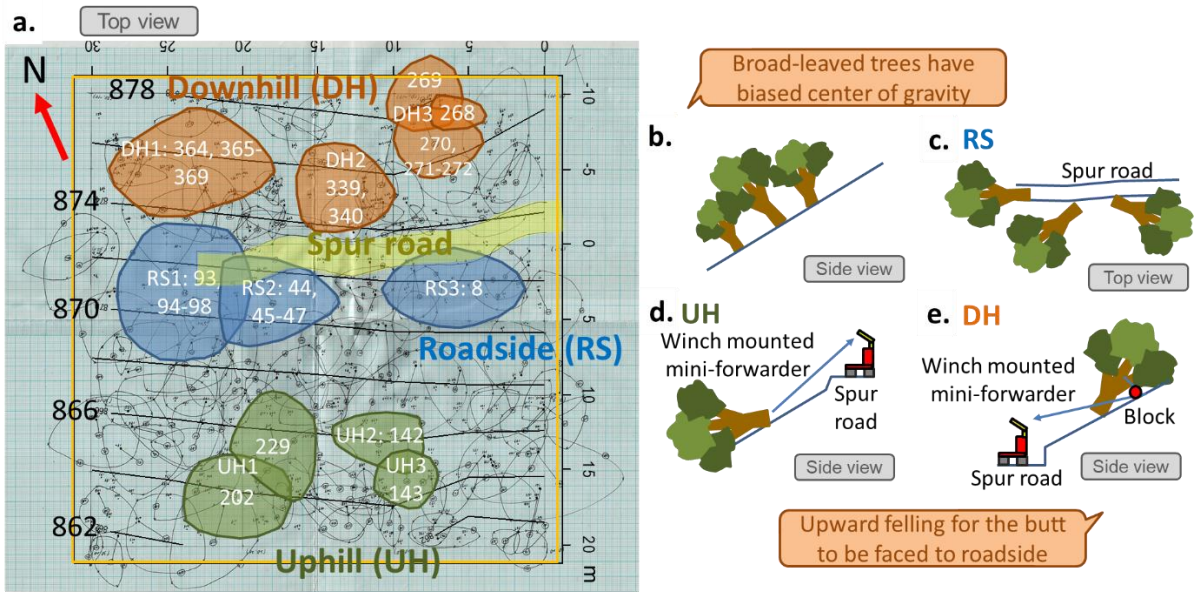

Figure 2: **a**) Crown projection map of the area harvested by direct grappling and winching, 2019–2020. White numbers are the identification numbers of individual trees. **b**) Side view of standing trees. **c**), **d**), **e**) Harvesting methods used.

Felling and processing were performed motor-manually in all methods. A 3t class excavator-based grapple loader (CAT 303C-CR; Suzuki et al. 2019) was used for direct grappling in the RS and DH methods. The machine also assisted with roadside felling (RS) and loading of processed logs (RS and DH) (Figure 2). In the UH and DH methods, a winch-mounted mini-forwarder (CANICOM BY1003) with a 1 tonne loading capacity winched the felled trees and the processed logs up or down hill. In the UH method, upward winching of the felled trees was assisted by a chainsaw winch (Yoshimura et al. 2019) accompanied by a felling cone (Yamamoto 1987). The mini-forwarder transported the logs from the plot down to the landing next to a forest road on a spur road over a

distance of 160 m (Figure 3). The spur road was constructed during plot establishment in November 2019. Harvesting by the RS method was carried out in December 2019, by the UH method in March 2020 and by the DH method in April 2020.

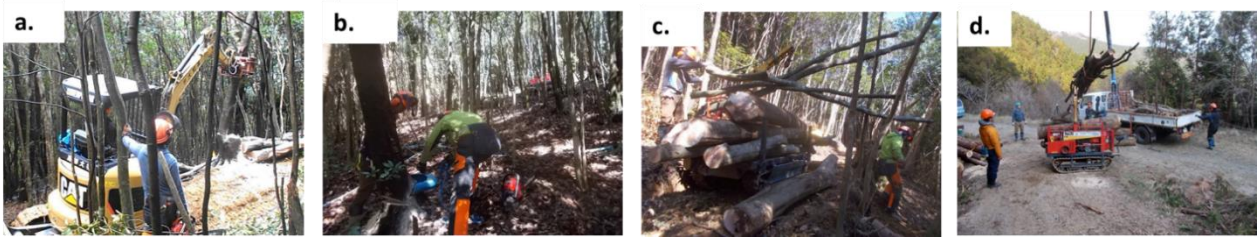

Figure 3: The 2019–2020 harvesting operations. Grapple equipped 3t class CAT303CR excavator (**a**.), winch-mounted BY1003 mini-forwarder (**b**.), loading (**c**.), and unloading at the landing (**d**.).

In the FY 2021 harvest area, three groups of large *Quercus acuta* trees or clumps were selected as the target trees for the harvesting. To increase the productivity of the felling the surrounding small trees were first clearcut (Figure 4). The first two harvested clumps were felled using a hand-winch and the last harvested clump was felled using a small cable system, the details of which are explained below.

Figure 4: Felling of the FY 2021 harvest. Preparatory cutting of surrounding small trees (**a.**), felling with the butt facing the upper slope (**b.**), felling of the first two clumps assisted by hand-winch (**c.**), and felling of the last clump assisted by cable system (**d.**).

A 24 m span small cable system was rigged to attach the head spar and a winch of the mini-forwarder, and placed at the top center of the 2021 harvesting area (Figures 5 and 7). The tail spar was placed at the lower center of the area. The tail spar side end of the 10 mm diameter wire rope skyline was attached to the base of a standing tree in the 2019–2020 harvest area. To adjust the rope tension the head spar end of the skyline was attached to the excavator or forwarder (IWAFUJI U3), located on the spur road. A main line of 8 mm diameter wire rope skidded and hauled the harvested logs over a movable block of the carriage, allowing twice the direct pulling capacity of the winch (Figure 5; Birundu et al. 2016; Aoki et al. 2017; Yabe et al. 2019; Yoshizumi et al. 2020). All logs harvested in the 2021 area were extracted using the small cable system. The site landing was located on the cut slope shoulder of the spur road (Figure 5, c.). The grapple-equipped excavator loaded the logs onto the mini-forwarder (one trip) or forwarder (three trips), which then transported the logs over a distance of 200 m down to the landing at the forest road (Figure 6).

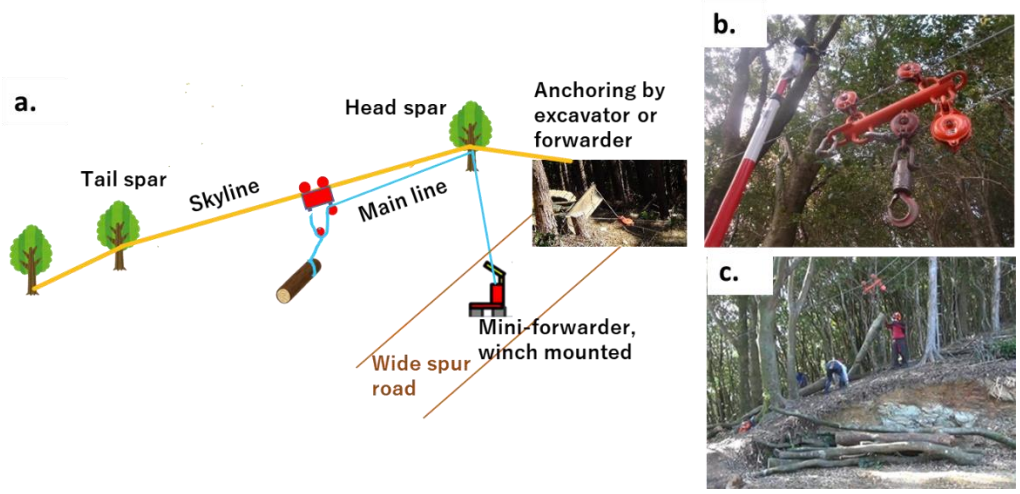

Figure 5: Rigging of the small cable system. **a.** Layout, tail spar located at the 2019–2020 site; **b.** Carriage and main line, double-boosted arrangement (Yoshimura and Suzuki 2018; Yabe et al. 2019); **c.** Unloading point located on the side of the spur road.

Figure 6: Loading and transport. Loading with a grapple (**a**.), once with a mini-forwarder (**b**.), and three times with a forwarder (**c**.) for logs of 3.72 m^3 to the landing.

One to three technical officers from the total of four officers of the Kochi University Forest carried out all the operations. The operations were videotaped for later analysis. All of the officers, except one who joined the operation in April 2020, had more than ten years' experience in forest operations. The more recently recruited officer was still in his training period when he participated in the trial harvesting operation. Prior to joining the Kochi University Forest he had worked at the Kochi University Farm for over ten years.

In the analysis of video recordings, five work elements were identified: felling, processing, logging, transport (loading and hauling) and rigging (the latter only for the cable system harvesting method). The number of hours worked by each worker was calculated for each of these five activities. The volume of logs processed was measured for each set of trees or clumps (i.e. groups of trees) at the spur terminal or at the landing. As three sets of trees or clumps were combined during the transport work element, operational efficiency was analyzed in terms of working hours per volume of logs harvested across the different work elements.

Productivity data were calculated as harvested timber volume per productive machine hour (PMH; Miyata 1980, Heinimann 2021) according to the four methods and the five work elements, using the time study data. The hourly labor cost was assumed to be the average for cases studied in Kochi Prefecture (Setiawan et al. 2013, Suzuki et al. 2015). The purchase prices of the machinery were obtained through a questionnaire combined with the calculation method described in NFEAJ (2001). The resulting cost in JPY (Japanese Yen) per harvested log volume was obtained by dividing the hourly cost by the corresponding productivity. Costs were evaluated either as machine costs only

or as the sum of machine and labor costs. This is because machine costs only would be appropriate for self-employed small-scale forest owners or private companies (Suzuki et al. 2009, 2013, 2015; Birundu et al. 2016).

2.3 Profitability

The profitability of the trial harvest was assessed by comparing the harvesting costs incurred and the projected selling price of the harvested logs. There is currently no market for hardwood logs in and around Kochi Prefecture. Until recently, most of the harvested hardwood logs in Kochi prefecture were sold to woody biomass power plants (Suzuki et al. 2016a, 2017; Suzuki and Nagai 2018; Fukuda et al. 2019), even though they were previously traded as valuable species for lumber, furniture, special wooden tools, etc. However, it has been reported that once-closed hardwood markets have recently reopened, especially in northeastern Japan (Taguchi 2020; Forestry Agency 2021; Suzuki 2021). Tsubuku (2008, 2017) listed various uses of hardwood species and practical market prices, commenting that hardwood logs with a length of 2 m or more and a small end diameter of 25 cm or more would meet the demand of the valuable hardwood timber market. In addition, the demand for firewood for woody biomass boilers in Kochi Prefecture (Suzuki et al. 2014) and the surrounding areas is increasing. Logs with a small end diameter of 10–15 cm are assumed to be suitable for firewood production. Profit will be maximized if the forest owner or company produces their own firewood. Profitability has been assessed by the assumed selling price of harvested logs, corresponding to the small end diameter and length classes.

3. Results and Discussions

3.1 Stock of the study plot

In the 2019–2020 harvest area, there were 403 trees (4,467 trees/ha) with a total volume of 20.466 m^3 (227.5 m^3/ha) (Figure 2). The dominant species were *Camellia japonica* (156 trees) followed by *Quercus acuta* (105 trees) in number and *Quercus acuta* (12.683 m^3) followed by *Abies firma* (2.291 m^3) in volume. Note that *Abies firma* is a coniferous species. It was the only coniferous species in the area, with 7 individual trees present.

As for the area harvested in FY 2021, there were 336 trees (3,733 trees/ha) with a total volume of 20.259 m^3 (225.1 m^3/ha) (Figure 7). The dominant species were *Camellia japonica* (130 trees) followed by *Quercus acuta* (108 trees) in number and *Quercus acuta* (7.131 m^3) followed by *Camellia japonica* (6.807 m^3) in volume. Here another coniferous species, *Chamaecyparis obtusa*, was present with 33 trees in number and 2.674 m^3 in volume. It was the third most dominant tree in both number and volume because the eastern edge of the area contained an adjacent conifer plantation sub-compartment (Figure 7).

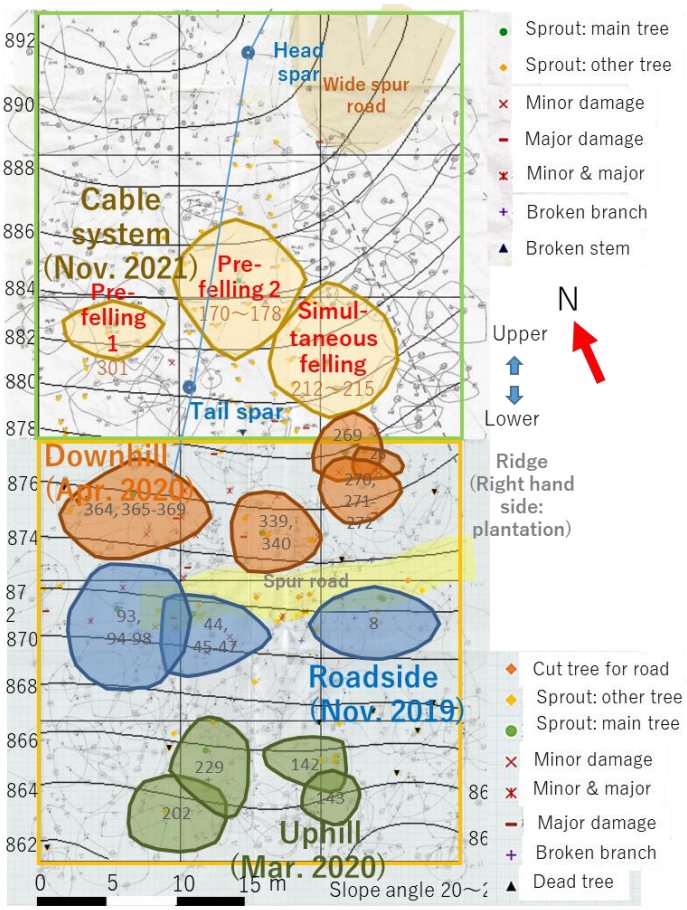

Figure 7: Areas harvested in FY 2021 (top) and FY 2019–2020 (bottom).
Note: Background images are crown projection maps of the areas. Thick edged colored circles are harvested clumps. Symbols indicate observed damage on remaining trees checked after the FY 2021 harvest, which will be reported in detail elsewhere.

3.2 Harvesting operations

Harvesting operations in the FY 2019–2020 season using the three methods lasted for two to three days for each method. The average logging distances from the stumps to the spur road were 2 m, 14 m, and 6 m for the RS, UH, and DH methods respectively (Figure 2). Although the logging distances were less than 10 m, which is almost the same as the average height of the harvested trees, i.e. 9.6 m, the DH logging operation was not straightforward. Broadleaved tree crowns extend in a spread fashion, not vertically as in conifers, resulting in the center of gravity being skewed downwards (Figure 2). Therefore, in the DH method, the harvested trees were first felled upwards using a block and the winch mounted on the mini-forwarder (Figure 2). They were then extracted by winching and direct grappling. The target trees were selected from those with a DBH of 25 cm or greater, except for the two trees harvested by the UH method (142 and 143, Figure 2) which had DBHs of 21.7 cm and 23.6 cm, respectively. Individual tree sizes ranged from 8–32 cm in DBH and 6–15 m in height.

The difference in productivity between the three harvesting methods was compared as an indicator of the total labor required to produce a unit of harvested volume (person-hour/m^3). Two-way ANOVA was used for the analysis, with the dependent variable being labor and the factors being the three harvesting methods, i.e. RS, UH, and DH, and three work elements, i.e. felling, processing, and logging. Both factors were significant ($p < 0.05$). Although the interaction was not significant ($p > 0.05$), there seems to be a tendency that the felling labor in the RS method is less than the felling labor in the UH and DH methods (Figure 8). The reason for this could be the larger area for felling in the RS method than in the other methods. The labor hours for processing and logging did not differ significantly between the three methods.

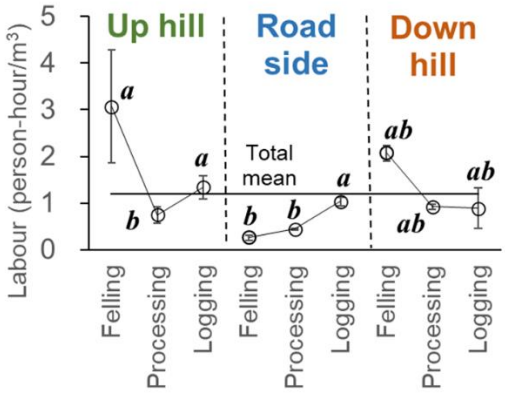

Figure 8: Hours of elemental labor classified by logging method, excluding transport.
Note: Error bars indicate standard error (n = 3). Letters indicate levels of significant difference (Tukey-test, $p < 0.05$).

One of the three workers in the DH method had little experience of harvesting operations, being the individual who joined the Forestry Department in April 2020 as described above. It is also possible that the technical officers of the university forests had lower performance in harvesting operations than commercial harvesting crews. For example, the felling procedure in the DH method, i.e. felling uphill instead of down, might have been inappropriate. The felling procedure in the UH method might also be more efficient if, for example, winch-assisted felling with a block or some other more suitable method was used.

The total volumes of stems and logs harvested in the FY 2019–2000 operation were 5.460 m^3 and 7.862 m^3 respectively. For the FY 2021 operation the volumes were 3.802 m^3 and 3.816 m^3 respectively. The reason why the log volume was larger than the stem volume was that the latter was estimated using a stem volume table and many thick branches were included.

Figure 9 shows productivity, including the FY 2021 operation, expressed as harvested volume per productive machine hour (PMH) for each work element and in total. The total productivity, P_0 (m^3/person-hour or m^3/person-day) was calculated using formula (1) (NFEAJ 2001):

$$P_0 = 1 / \Sigma (1 / P_i), \quad (1)$$

where P_i is the productivity of a work element i (m^3/productive machine hours, PMH), and i is the number of work elements considered. In Japan, the productive machine hours per day is normally set at 6 hours, while the scheduled machine hours per day is set at 8 hours (Setiawan et al. 2013, Suzuki et al. 2015).

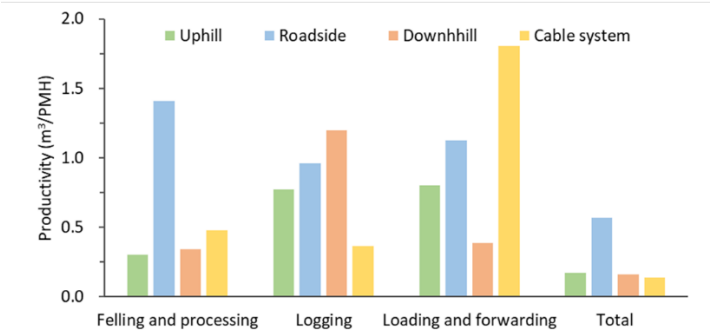

Figure 9: Productivity.
Note: Uphill (UH), Roadside (RS), Downhill (DH) were operated in FY 2019–2020, and Cable System (CS) in FY 2021.

In the FY 2019–2020 operations, RS had the highest overall productivity due to the highest productivity in both felling/processing and loading/forwarding work elements. In felling and processing, the productivity of CS (cable system) was the second highest, reflecting the effects of previous felling operations. The highest productivity in loading and forwarding in CS was due to the use of the forwarder, which had a larger loading capacity and faster travel speed than the mini-forwarder. The total productivity of 0.57 m^3/PMH of RS, 0.14–0.17 m^3/PMH of CS, DH, and UH is equivalent to 3.42 m^3 per day and 0.84–1.02 m^3 per day respectively, assuming that the productive hours per day is six hours (Setiawan et al. 2013; Suzuki et al. 2015). Taniyama (2004) summarized the productivity of harvesting operations by a combination of a mini-forwarder and an excavator-based grapple loader of a similar size to the present study as 8.1–13.5 m^3/crew-day (2.7 m^3/person-day for 3–5 persons/crew) for thinning conifer plantations, which is almost two and a half to four times that of the RS method in the present study.

After harvesting, new openings were created in the canopy within the plot (Figure 10). KRC (2014) suggested that post-harvest coppice regeneration can be considered 'successful' if more than 10 shoots longer than 50 cm grow from a harvested stump in the following year. Although there were no "successful" stumps in the 2019–2020 harvest area when checked in December 2020, almost all harvested *Quercus acta* stumps had approximately 10 shoots shorter than 50 cm in length, indicating the rootstock had survived. Further surveys will be conducted two years after the harvest, including the harvest area of FY 2021.

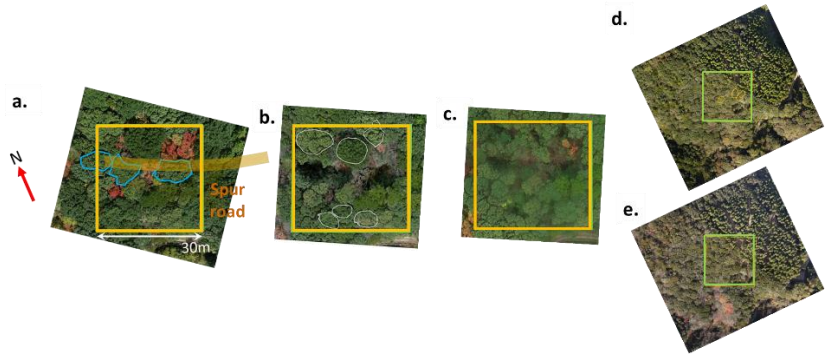

Figure 10: FY 2019–2020 harvest area, before (**a**.) and after (**b**. and **c**.) harvest, and FY 2021 harvest area, before (**d**.) and after (**e**.) harvest.

3.3 Profitability

The hourly costs of labor, i.e. operators/workers and the machines, were obtained as listed in Table 1. Data sources were interviews and literature references. Figure 11 shows the resulting costs, which are obtained by dividing the hourly cost of each work element by its productivity.

Table 1. Hourly cost of machines and labor

Item	JPY/hour	Source
Chainsaw (Zenoah G3701EZ)	346	Setiawan et al. (2013)
Mini-forwarder (SUPER Yamabiko BY1003)	1,557	Interview, NFEAJ (2001)
Grapple equipped excavator (CAT303C-CR)	1,691	Interview, NFEAJ (2001)
Forwarder (Iwafuji U3)	4,544	Setiawan et al. (2013)
Labor	2,725	Setiawan et al. (2013), Suzuki et al. (2015)

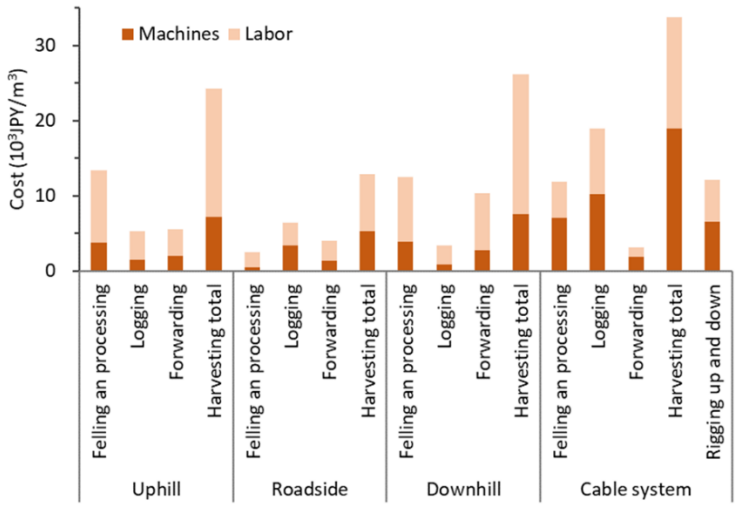

Figure 11: Resulting costs.

The cost of felling and processing operations exceeded 10,000 JPY/m^3 for the three UH, DH, and CS methods. This suggests that although the spreading crowns of the mature broadleaved trees affected felling performance, it was not so much of an issue for motor-manual processing because the processing performance was almost the same for all methods, including RS. The total cost of the CS method was more than 30,000 JPY/m^3 in (33,800 JPY/m^3 for total harvesting plus 12,000 JPY/m^3 for rigging up and down), while it was almost the same for the UH and DH methods, i.e. 24,200 and 26,100 JPY/m^3, respectively. The total cost of the RS method was the lowest, i.e. 12,900 JPY/m^3, which is almost equal to the average saw log price of planted coniferous species in Japan (Forestry Agency 2021, 2022). If these four methods are applied equally to an area comparable to that of the study area, the average total cost will be 27,300 JPY/m^3, of which 41% is machine costs, i.e. 11,300 JPY/m^3.

Figure 12 shows the size distribution of the total number and volume of logs harvested for both the 2019–2020 and 2021 operations. The total number of logs was 224 and the total volume was 11.582 m^3.

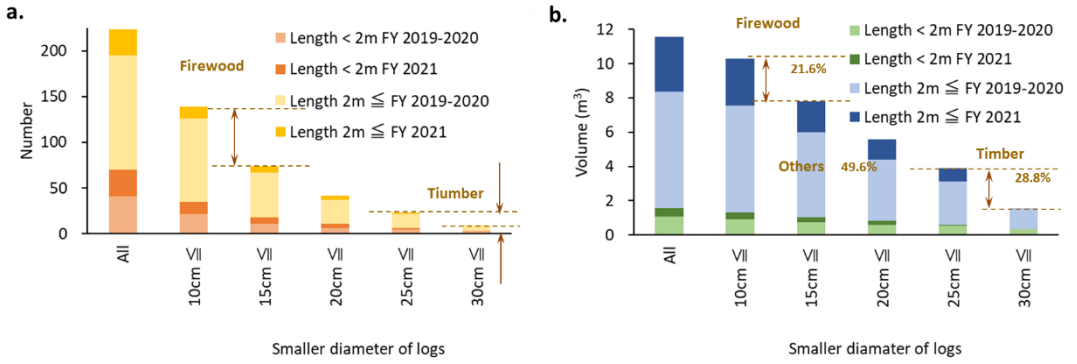

Figure 12: Size distribution of logs harvested in FY 2019–2021, **a**. Frequency, **b**. Volume.
Notes: For FY 2021, long logs were supposed to be cut at 305 cm from the butt end, as longer logs were harvested using the cable system. Total volume 11.582 m^3. Firewood: small end diameter 10-15 cm. Timber: more than 2 m in length and small end diameter greater than 25 cm.

The result of the profitability assessment is summarized in Table 2. Logs with a small end diameter greater than 25 cm and length greater than 2 m should be sold as timber (Tsubuku 2008, 2017). Among the remaining logs, those with a small end diameter between 10 and 15 cm are suitable

for firewood production (Suzuki et al. 2014). The remainder can be sold as biomass fuel. Price information for timber (Tsubuku 2008, 2017; Woodshop Sekiguchi. 2022), firewood including self-processing costs (Suzuki et al. 2014), and biomass fuel (Suzuki et al. 2015; Suzuki and Nagai 2018), the average income (1,000 JPY/m^3) was estimated for three pricing scenarios: minimum (Case 1), maximum (Case 2), and medium (Case 3). The proportions of harvested wood product classifications were obtained from Figure 12.

Table 2. Assessment of profitability

Proportion			Property		Case 1: Minimum			Case 2: Maximum			Case 3: Medium		
Classification	Num.	Vol.	Small end diameter	Length	Unit price (1K JPY/m3)	Price (1K JPY/m^3)	Note	Unit price (1K JPY/m3)	Price (1K JPY/m^3)	Note	Unit price (1K JPY/m^3)	Price (1K JPY/m^3)	Note
Firewood	29.0%	21.6 %	10cm ≦, < 15cm		6.0	1.3	Material	20.0	4.3	Self-production, higher price (Suzuki et al. 2008)	13.0	2.8	Self-production, medium price (Suzuki et al. 2008)
Lumbar	7.6%	28.8 %	25cm ≦	2 m ≦	10.0	2.9	≒ Softwood	67.1	19.3	Self-sawing, higher price	33.5	9.6	Self-sawing, medium price
Others	63.4%	49.6 %			4.0	2.0	Biomass	5.0	2.5	Pulp	4.5	2.2	Biomass and pulp
					Sum	6.2		Sum	26.1		Sum	14.7	

In case 1 (6,200 JPY/m^3), only the harvesting method RS treated as self-employed (machine costs only) would be profitable. For the medium and maximum prices (cases 2 and 3), the harvesting costs averaged over the four methods exceed the revenues, although the machine costs alone do not. In practical scenarios, the selective harvesting of large broadleaved trees should be accompanied by the ad hoc construction of spur roads to make the RS method applicable to wider sections in the target harvesting area (Suzuki and Yoshimura 2019a, b).

4. Conclusions

Although the harvesting operations in the Kochi University Forest were experimental and there were many operational points to improve, the results provide some insights into the future management of abandoned hardwood forests in Japan. As the use of small machines is practically unavoidable, high productivity cannot be expected. To avoid continued lack of active forest management, efforts must be made to increase the price of harvested logs, for example an advertising campaign promoting the use of timber in furniture.

A trial case for the self-production of hardwood boards was carried out at the Kochi University Forest. From 3.89 m^3 of logs of suitable size, clean logs of 1.66 m^3 were selected for board production (Figure 13). The logs were transported on demand to a nearby sawmill for board processing. The sawing fee was approximately 30,000 JPY (275 JPY/min.). Boards of 1.06 solid m^3 were sawn out (utilization rate: 1.06/1.66 = 0.64). After being processed to a thickness of 6 cm, the boards were transported back to the university garage. After three to five years of natural drying, the boards will be sold for commercial use.

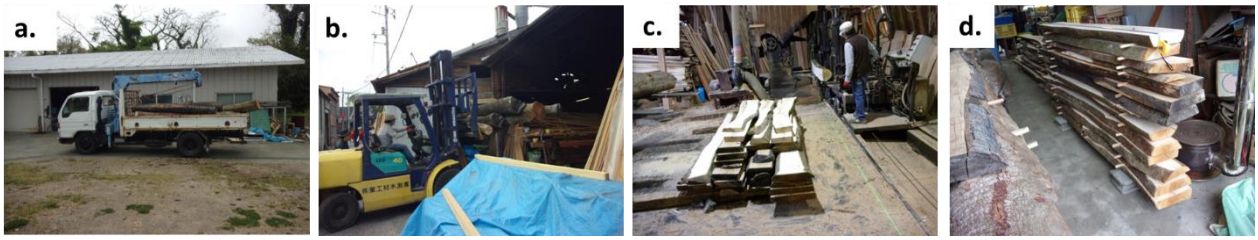

Figure 13: Own wood processing for added value.
Note: **a**. Large harvested oak logs collected from the University Forest stock yard, **b**. Logs transported to the sawmill for board processing, **c**. Logs cut to 6 cm thickness, **d**. Processed logs returned to the University garage to be shipped after a few years of natural drying.

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A2-05

Rules and techniques to ensure labor-saving replanting in small-scale forestry after clearcutting in Japan: do they improve carbon sequestration?

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Abstract

This study describes Japanese regulations relevant to replanting after clearcutting and investigates super sparse planting as an example of a labor-saving and low-cost planting method. The potential of super sparse planting to improve forest carbon sequestration is discussed by examining data from the Japanese National Forest Inventory (NFI), assuming sugi-dominant plots with a low top-story crown cover ratio as potential stands established by super sparse planting. There are some sugi-dominant plots with a top-story cover ratio of approximately 40–50%, and they have a higher stand volume than other forest types. If super sparse planting achieves such a cover ratio within decades, it may have the potential to improve carbon sequestration after clearcutting of plantations, compared to that of natural regeneration. There is little research on super sparse planting and it is currently not publicly accepted in Japan, therefore, further investigation is required.

Keywords: Clearcutting, replanting, carbon sequestration, legislation, sugi (*Cryptomeria japonica*)

1. Introduction

Approximately 60% of Japanese forests are small-scale and privately owned. Most timber in Japan is produced from planted softwood, such as sugi (*Cryptomeria japonica*), hinoki (*Chamaecyparis obtusa*), and larch (*Larix kaempferi*), and in most cases, clearcutting is legally allowed. The current replantation choices after clearcutting are standard middle- or high-density planting or natural regeneration. However, many forestlands are not replanted after clearcutting because replantation is not mandatory in general, and "conservation forests" where replanting is mandatory, are not common in small-scale private forests. Currently, the estimated replanting ratio after the main harvest is approximately one-third nationwide (Forestry Agency, 2021).

One reason for such a low replanting ratio is the costly and labor-consuming standard of high- or middle-density replanting. Natural regeneration is often expected to be a low-cost alternative; however, the carbon sequestration performance of natural forests is generally low. In many cases, natural regeneration is selected by passive motivation to avoid replanting, without the prospect of sound regeneration. If replanting is neglected, the degradation of ecological services, such as carbon sequestration, becomes a concern. Super sparse planting may facilitate low-cost management and improve carbon sequestration.

This study describes Japanese regulations relevant to replanting after clearcutting and super sparse planting as an example of a labor-saving and low-cost planting method and discusses the potential of super sparse planting to improve forest carbon sequestration by examining data from the Japanese National Forest Inventory (NFI). In this study, super sparse planting was defined as low-density planting of ca. 50–500 trees/ha, which may create an open canopy of planted species over several decades.

2. Methods

The relevant Japanese regulations and circumstances were described by reviewing previous studies, public statements, and documents.

Japanese NFI, started in 1999 and formally named as the “forest resource monitoring survey” until 2009 and the “forest ecosystem diversity basic survey” since 2010, is a quinquennial plot survey

by systematic sampling covering the entire forested area of Japan (Yoshida, 2008; Forestry Agency, 2013; Egusa *et al*., 2020). In each 0.1 ha monitoring plot located on a 4 km grid point, various social and ecological plot attributes are examined and recorded, such as forest ownership type, forest type, stand age, main tree species, stem volume, and the cover ratio of each crown story. The top-story crown-cover ratios of sugi plantation plots are generally high; however, some plantations have not been successfully managed and have lower ratios of top-story crown cover.

In this study, sugi-dominant plots with low top-story crown-cover ratios were assumed to be potential stands established by super sparse planting. The most recent NFI stand volume open data from the third period (2009–2013) survey were examined.

3. Results

3.1 Japanese regulations relevant to replanting and super sparse planting

Planting density is generally around 3000 trees/ha in traditional Japanese labor-consuming plantation management; however, low-cost management by sparse (low-density) planting has become preferable for improved profitability (Ota *et al*., 2013). Some current guidelines for prefectures where forestry is actively conducted allow planting density to be decreased to 1000 trees/ha, and a guideline explaining how to conduct sparse planting has been published by the government (Forestry Agency, 2022). According to these guidelines, public subsidies are available for planting. However, these recent prescriptions, which still aim for sufficient timber production despite rougher management, have not resulted in high replanting ratios.

In the majority of "conservation forest" cases, clearcutting is possible, however, replanting is mandatory. In conservation forests, specifications of operations, such as minimum planting density and planting species, are publicly declared (Japan Forest Foundation, 2022). The minimum planting density in each stand was calculated according to the expected growth rate of stem volume for each planting species, and the calculated density was approximately 2000 trees/ha or more.

Based on this information, super sparse planting is not publicly regulated and is currently recommended. In addition, because high planting density is deemed necessary to obtain sufficient high-quality timber, only a few cases of super sparse planting have been reported in Japan. In research, two sugi plots in Miyazaki Prefecture, where sugi trees were planted in 1974 in a radial manner, contained a super sparse section with 376 trees/ha, and most of the individual trees were still growing well (Fukuchi *et al*., 2011). There have been other reported cases, such as 500 trees/ha planting of Dahurian larch (*Larix gmelinii* var. *japonica*) (Yamada *et al*., 2009) and 226 trees/ha of spruce (*Picea jezoensis* var. *jesoensis*) (Matsui *et al*., 2006) in Hokkaido; however, both stands were young.

In addition, planting often requires expensive spatial defense against deer browsing in Japan. In contrast, super sparse planting might require only single-tree defense, such as tree shelters, meaning that the total cost per unit area might be lower.

Another relevant issue is that public management in unprofitable private forests has become increasingly important. In 2019, a new tax, the “Forest Environment Transfer Tax, ” and a public commission system were launched. Private forest owners who want to abandon the management of their forests can entrust their forests to local governments. Entrusted forests suitable for forestry will be re-trusted to active private forest managers, and those unsuitable for forestry can be publicly managed by local governments (Forestry Agency, 2022). However, cases of the latter pattern are still limited, partly because there is no choice for low-cost replantation of unprofitable stands. Minimal public management is a potential choice in such cases.

3.2 NFI sugi-dominant plots with low top-story cover ratio

There were 2925 sugi-dominant plots in the NFI data. Even though young and old-aged sugi-dominant plots are limited, there are sufficient numbers of sugi plots aged between 25 and 74 years old, and most of them have high top-story cover ratios, of ≥ 70% (Table 1). However, sugi plots with low top-story cover ratios such as ≤ 50% do exist.

Table 1: Sugi-dominant plot numbers and ratio with each stand age and cover ratio class of top story

Stand age	Plot number ratio of each top-story cover ratio (%)											No. of plots	(%)
	0	10	20	30	40	50	60	70	80	90	100		
0										100		1	0.0
10	49	10	5	3	2	2	5	7	7	7	3	59	2.0
20	9	4	6	3	5	6	12	18	18	11	8	108	3.7
30	2	1	3	2	4	5	8	18	28	20	8	335	11.5
40	1	1	1	2	3	6	11	21	20	24	11	666	22.8
50	2	1	1	1	3	3	8	19	28	23	12	822	28.1
60	2	1	0	2	1	5	8	20	26	25	10	493	16.9
70	2	1	2	1	3	6	7	16	26	25	11	174	5.9
80	1	1	1	1	4	5	10	22	25	23	8	101	3.5
90				3	2	3	21	16	27	17	11	63	2.2
100								13	31	38	19	16	0.5
>100	4		4	4	12	4	16	20	16	12	8	25	0.9
No data	2	3	3	6	5	3	8	13	24	29	3	62	2.1
Total	3	1	2	2	3	5	9	19	25	23	10	2,925	100.0

Underline means categories which consist of less than five plots.
Stand age and cover ratio are rounded to the nearest 10.

3.3 Stand volume of sugi-dominant plots with ≤ 50% top-story cover ratio

The stand volumes of sugi-dominant plots with top-story cover ratios ≤ 50% were less than those of sugi-dominant plots with higher top-story cover ratios (Table 2). This suggests that intensive middle- or high-density planting can achieve better stem growth than super sparse planting. However, the volume of plots with a 50% top-story cover ratio were more than half that of plots with a higher top-story cover ratio.

Table 2: Average stand volume of sugi-dominant stands with each stand age and top-story cover ratio class.

Stand age	Top-story cover ratio (%)										
	0	10	20	30	40	50	60	70	80	90	100
0										261	
10	71	92	95	80	76	50	181	554	336	680	440
20	107	80	138	93	235	186	267	390	365	368	377
30	120	129	160	176	247	297	350	418	464	444	406
40	174	114	184	237	408	407	480	580	558	541	515
50	66	278	328	243	330	429	502	590	620	653	621
60	35	84	565	330	345	475	506	573	638	685	660
70	128	58	422	909	297	541	457	545	575	652	668
80	3	199	107	593	446	569	459	670	646	652	547
90				222	295	549	455	625	704	737	673
100								1,002	738	681	755
Total	88	144	225	261	333	415	458	562	583	605	576

Stand age and cover ratio are rounded to the nearest 10.

3.4 Comparison of stand volumes of sugi stands and other forest types among plots with top-story cover ratio ≤ 50%

Using middle-aged plots between 25 and 74 years, for which the top-story cover ratio was ≤ 50%, the relationship between stand volumes and attributes including latitude, elevation, stand age, and top-story cover ratio was analyzed by generalized linear model (GLM) for each forest type (Table 3).

In most forest types, the top-story cover ratios were positively correlated with stand volume. Assuming the same average latitude and elevation, sugi plots with top-story cover ratio of approximately 40–50% have higher stand volumes than other forest types, including hardwood forests,

which are generally naturally regenerated forests (Figure 1).

Table 3: GLM coefficients of estimating stand volume per ha.

Forest type	y-intercept	Latitude N	Elevation	Stand age	Top-story cover ratio	Chi-square test
Softwood (mainly planted)						
Sugi	564.59***	-15.23***	-0.106*	2.76**	6.45***	***
Japanese red pine	-202.09	3.05	0.158***	3.36***	2.95***	***
Hinoki	724.05	-21.25	-0.069	3.61**	3.03***	***
Larch	545.67	-10.75	-0.047	1.42	1.88	***
Hardwood (mainly natural forest)						
Deciduous oak	115.68	-3.65	0.013	1.45**	3.10***	***
Other deciduous broadleaf	181.13***	-3.81***	0.007	0.48	2.22***	***
Evergreen oak	99.93	0.23	0.012	0.41	2.38***	***
Mixed broadleaf	251.64*	-6.15	0.094**	0.06	2.63***	***
Others	175.48	-4.67	0.105*	1.41	1.77*	***

*: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$

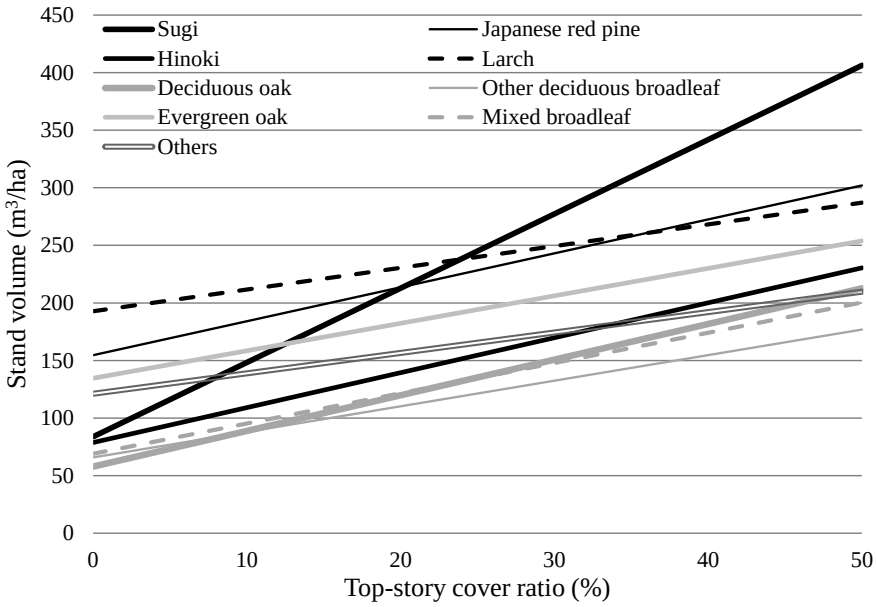

Figure 1: Illustration of GLM result: relationship between stand volume and top-story cover ratio.

4. Discussions

Sugi-dominant plots with top-story cover ratio of approximately 40–50% have higher stand volumes than other forest types in the Japanese NFI data. If super sparse planting achieves such a cover ratio within decades, this result suggests that super sparse planting has the potential to improve total stem growth after clearcutting of plantations, compared to that of natural regeneration.

However, we ought to consider that the specific weight of the sugi stem is smaller than that of most broadleaf species, meaning that carbon sequestration of the sugi forest can be relatively less than its stand volume growth.

5. Conclusions

Currently, super sparse planting is not publicly accepted, and knowledge about its techniques and application is limited. However, NFI data analysis indicated the potential that super sparse planting of sugi may achieve better carbon sequestration than natural regeneration. Further investigation is required to successfully conduct super sparse planting and to foster public consensus to accept super sparse planting in public forestry regulations.

Acknowledgements

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A2-06

A conceptual study for innovation in Japanese forestry

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Although 66% of land area is covered by forests, the share of forestry in the national economy is only 0.04% in Japan. Japanese forestry suffers from small and dispersed ownership structure, low wood prices, low management motivation among forest owners, and low productivity. Under such circumstances, it is important to understand the factors which promote/inhibit innovations, and to understand the ideal policies which support innovation activity. In recent decades, research on innovation in the forest sector has been conducted by European and North American researchers. For example, Weiss et al. (2020) systematically reviewed 230 papers encompassing 40 years of research on innovation. Japan has a long history of plantation forestry and forest policy and economics study, and Japan and Japanese researchers have also made notable contributions to innovation research in general, such as the development of the concept “national innovation system” by Freeman et al. (1987). Furthermore, the work by Nonaka and Takeuchi (1995) is the most frequently cited reference in innovation study written by non-western researchers (Fagerberg et al. 2011). However, no paper on innovation in Japanese forest sector was listed in the comprehensive international review by Weiss et al (2020). This is because there is only limited research on innovation in Japanese forest sector using common theories. This study aims to illustrate the factors which promote and inhibit innovations in Japanese forestry by conceptual discussions with reference to innovation research in general, research on innovation in the forest sector in Europe and North America, and forestry economic studies in Japan. Small and dispersed ownership, top-down centralized policy scheme, geographical factors, rapid market structure changes, and luck of incentive for non-forest enterprises to participate in forestry have impeded innovation. A recent increase in interest toward carbon sequestration can be an opportunity to promote innovation through cross-sectoral collaboration.

Keywords: innovation systems, forest sector, forest policy

A2-07

Utilization of grass and wood in common-use imperial land and incorporation to conservation forest in Yamanashi Prefecture in the early 20th century

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In Japan, the first Forest Law was promulgated in 1897, which initiated the system of conservation forests to mainly conserve water sources and prevent landslides. One well known reason for this was the severe damage caused by floods, which were frequent in many areas at the time. Although rapid modernization was changing not only the legal system but also society and the economy, rural residents still needed grassy and shrubby mountains for agriculture and daily life. In Yamanashi Prefecture, the research area of this paper, many iriai commons were once designated as the imperial estate in 1889. They were returned to the prefecture in 1911, and commoners were allowed to use and manage this imperial estate. In the mid-Meiji period before the return, this estate was called common-use imperial land (CIL) where gathering was permitted partially in the place of former iriai commons. The main material of this paper is a report published by Yamanashi Prefecture in 1903. The report revealed the cost of flood damage, the area of water sources, the forest conditions of the CILs, the income of the Bureau of Imperial Estate (BIE), regulations on conservation and supervision, and the quantity and area of mountain resources used. Even though use by residents in the CIL was restricted by the BIE, residents, in fact, used their mountain in the same manner as before. For the residents, the 36-hamlet CIL, which was in a state of disrepair, was contrasted with the Ashikura CIL, which was in relatively good condition, and showed that improvements could be made through innovations by the residents, such as coppiced forests called karitate-rin. At the same time, it was suggested that it would be more reasonable to purchase alternative fertilizers, given the labor required to do so, than to collect grass, which would cause devastation.

Keywords: mountain resources, commons, conservation forests, the Forest Act, Yamanashi prefecture

A2-08

Traditional knowledge and practices for the sustainable management of sokshing (leaf litter forest) and its challenges under the contemporary forest policies in Bhutan

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Customary forests are extremely important in sustaining a large section of the population in low- and middle-income nations. The management of these forest resources are governed by customary laws and traditional knowledge. However, forestry laws often categorize customarily managed forest as state property and denies the ownership of the forest users. This research will examine the traditional knowledge and practices in managing sokshing (leaflitter forest) sustainably in Bhutan and clarifies the institution and roles of the customary tenure system in striking a balance between local community livelihood and conservation. Data were obtained through focus group discussions, key informant and household interviews. Hereditarily owned forest, sokshing, has been managed by the local people over a century for leaflitter collection to produce farm manure despite the numerous changes in the forest and land use policies at government level. Apart from reducing the sokshing owners' traditional ownership to just usufruct rights, which was further legally eliminated with the passage of the land legislation in 2007, sokshing has never had institutional or legal backing. Nevertheless, sokshing is respected by the local community, and has played important role in maintaining forest cover around the village. Local people have a deeply embedded understanding of the relationship of agriculture and sokshing as a traditional believes and practices. Such a customary system provides a foundation for a participatory forest management strategy, which is more likely to be effective than establishing a new institution with new user groups. Thus, customary tenure system and variance in forest or land policies must be reconsidered and recognized for the sustainable use of sokshing.

Keywords: Traditional knowledge, customary forest, sustainable management, Tenure

A2-09

Present situations of production forestry cooperatives, a form of communal (*iriai*) forest management, in Japan:

Insights from Kyushu region

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Traditional communal (*iriai*) forests in Japan are a well-known example of successful common property resource management. Contemporary situations of *iriai* forests are diverse due to legal, market, and social changes since the 1960s. This presentation examines the present situations of production forestry cooperatives (*seisan shinrin kumiai*: hereafter PFC), which rarely appear in English literature. PFCs are cooperatives established for managing *iriai* forests after extinguishing *iriai* rights, generally replacing broadleaved forests with coniferous forests for more intensive forestry production. To examine the situations of and challenges faced by PFCs will help us understand how external legal, market, and social environments affect common property resource management. The PFC case can also effectively highlight pitfalls into which Japanese forestry policy has fallen. Data collected from surveys in Fukuoka and Saga Prefectures in Kyushu Island was used. Topics surveyed included PFCs' basic information, recent management activities, and financial conditions. In most cases, basic forest management operations had been conducted. However, PFCs were likely to suffer from the burden of taxation in conditions where little timber revenue is expected. At the same time, several PFCs had a large amount of non-forestry incomes or assets, e.g., rental fees of forestland. With some exemption, it was rare that advanced forestry initiatives were in place. Several PFCs had been dissolved due to the burden of taxation and decreasing number of members who can substantively work. The dissolved PFCs had become authorized neighborhood associations (*ninka chien dantai*); with this status, major taxes were exempted. Policy recommendations include to make legal settings about PFCs more compatible with contemporary realities and to seek multi-level governance in places where production-oriented forestry, the original purpose of PFCs, is no longer expected to produce fruitful outcomes.

Keywords: common property resources, institution, market, rural society

A2-10

A study on the influence of legal improvement on afforestation projects in the Yaeyama Archipelago during the 1950s and 1960s

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The islands of the Ryukyu Archipelago, to which the Yaeyama Archipelago belongs, were under U.S. administration from 1945 to 1972. It is known that the enactment of the Ryukyu Forest Act and relevant measures under the U.S. administration had a great impact on afforestation activities. As for the Yaeyama Archipelago, analysis on the afforestation projects has been limited to the government-owned forests of Iriomote Island. Therefore, we focused on non-government-owned forests, which account for one third of the forest land area in the Yaeyama Archipelago from the 1950s to the 1960s using administrative documents including unpublished ones, in terms of the impact of changes in industrial structure and legislation on the afforestation activities in detail.

In the Yaeyama Archipelago, major changes in the industrial structure occurred around 1960 with the "fuel revolution", the "sugarcane boom" and the "pulp boom". In the Yaeyama archipelago as a whole, it is clarified that the tree species used for afforestation changed drastically from Casuarina equisetifolia to Pinus luchuensis as a result of the change in industrial structure.

On the other hand, focusing on individual islands, it is suggested that, economically, the use of wood on the islands, especially the production of pulpwood logs, may have determined the species of trees planted. It also became clear that the Ryukyu government encouraged the planting of Pinus luchuensis in the Yaeyama Archipelago officially aiming at enhancing future supply of softwoods pulpwood. This policy, simultaneously increased the current harvesting of hardwoods for pulpwood, which is implied to coincide with the interests of the pulp industry at the time as a background.

Keywords: Civilian-owned forests, Afforestation subsidies, Pulp industries, Forestry law (Ryukyu government)

A2-11

Management and conservation of old-growth homestead windbreaks on the Ryukyu Archipelago, Japan

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Hundreds of years ago, local people on the Ryukyu Islands planted windbreaks surrounding their homestead to protect the houses from tide water blowing from the sea, strong typhoons in summer, and monsoonal winds in winter. *Garcinia subelliptica* (fukugi in Japanese) is dominant among other useful tree species in this windbreak landscape. However, these windbreaks vanished quickly on some islands after the Second World War. Many trees were burnt at the war fires, and then removed to extend village road at the past rural development projects. The recent resort construction boom in Okinawa also results in the cutting of huge windbreaks. This study reported the inventory of the old-growth windbreak trees and their geographical distribution on the Ryukyu Archipelago, and discussed the problems, and challenges relevant to tree maintenance and conservation. It was found that the challenges the conservation and maintenance of old-growth trees within the homestead include natural and human factors. Exposure to typhoons and monsoon winds are among the most important natural factors that contribute to tree damage. However, human factors are also important for tree cutting or conservation. Residents' awareness of tree conservation determines whether the trees were preserved or cut down. Fortunately, some recent initiatives taken by the local government, NPOs, and the enterprise was also presented to explore to the possible conservation scheme of homestead windbreaks.

Keywords: forest conservation, human-forest relationship, old-growth tree, sustainable management

B2-01

October 27th, 2022

Condition of Participation and Role of Women in Community-based Forest Management : A Case of Van (Forest) Panchayats in Indian Himalaya

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(& Lecturer, **University of Tsukuba;** Research Fellow, **University of Tokyo**)
Satoshi TACHIBANA (Prof., Faculty of Life and Environmental Sciences, University of Tsukuba)
Randeep RAKWAL (Prof., Faculty of Health and Sport Sciences, University of Tsukuba)

Background

CBFM: Community-based forest management

- In the 1990s, the forestry sector was gradually **decentralized to create greater efficiency, accountability, and cost cutting** (Agrawal and Ribot, 1999)
- the government began to acknowledge **a certain right and authority of local communities to the management** of state forests.

The importance of people's involvement in forest management
➡ community-based forest management (CBFM)
(Chopra et al., 1990; Palit, 1993; Poffenberger and McGean, 1996; Sarin, 1996)

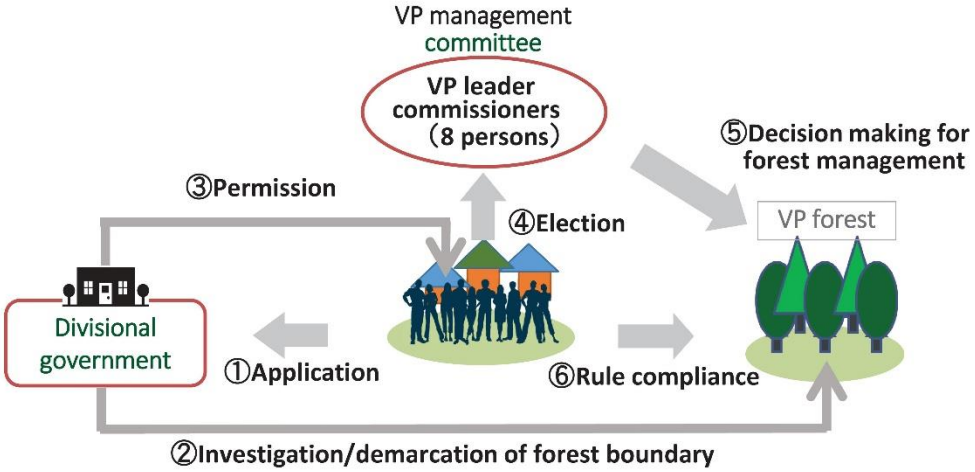
To enhance a **sense of ownership** and **responsibility for the resources among local people** (Meinzen-Dick and Knox 2001)
Benefit from forest management for the local people

1

Background

Case Study : Van Panchayat (VP) in India

- When and how VP forest appear?
- How do VP leader (*Sarpanch*) and commissioners elected?
- How is decision making, observation and compliance?



2

Background

VP : Van (Forest) Panchayat

VPs are **grass root organizations** having potential for **enlisting peoples' participation.**
(Saxena,1995)

VP represents one of the largest and most diverse experiments in **common property management** developed in **collaboration with the State.**
(Arnold and Stewart, 1991)

VPs were created in **response to a people's movement for the utilization of forest resources** at the beginning of the 20th century.
(Ballabh et al., 1988; Guha, 1983; Saxena, 1987; Singh et al., 1991)

Van Panchayat (VP) : Community based forest management (CBFM)
self-governed institution of forestry in Uttarakhand state, India

3

Background

Literature Review of VAN PANCHAYAT

- VPs have emerged out of **persistent conflicts between people and the government** regarding its **control over forest resources** (Guha, 1983; Singh and Ballabh, 1991)
- VPs demonstrated good examples of **decentralized resource management** that **benefited local communities** (Agrawal, 2005)
- **Deforestation and ecological degradation** in central Himalaya (Somanathan, 1991)
- **Loss of autonomy** and **intensified conflicts** within and among the MCs of the VPs (Ballabh et al., 2002)
- **Quantitative and qualitative decline** of the once dense and well-managed forests in the central Himalayas (Balooni et al., 2007)

Academic Significance

- Focus on people's participation and propose factors of sustained forest management.

4

Background

Discussions on Participation

In participatory forest management and participatory development, higher levels of participation, **"participation in decision-making," are important and desirable** (Leeuwis 2000, Inoue 2003).

Review of participatory development

In participatory forest management, it is possible to obtain the benefits necessary to stabilize and improve livelihoods from participatory forest management without necessarily participating in decision-making.
In addition, while opportunities for decision-making should be given equally to community members, if residents choose not to participate in decision-making, this should be respected, and the situation cannot be considered unfair even if some residents do not participate (Yamauchi 2014).

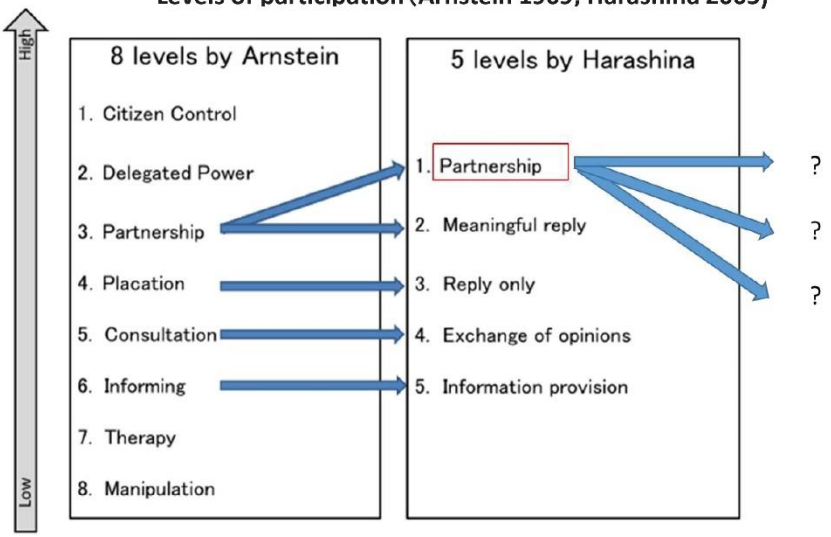
Participation is not just "participation in decision making"

5

Background

Types and Definitions of Participation

Types of participation (Inoue 2001; 2003)
Levels of participation（Arnstein 1969; Harashina 2005)



Higher participation is lack of description and analysis of "actions by citizens (local people)"

6

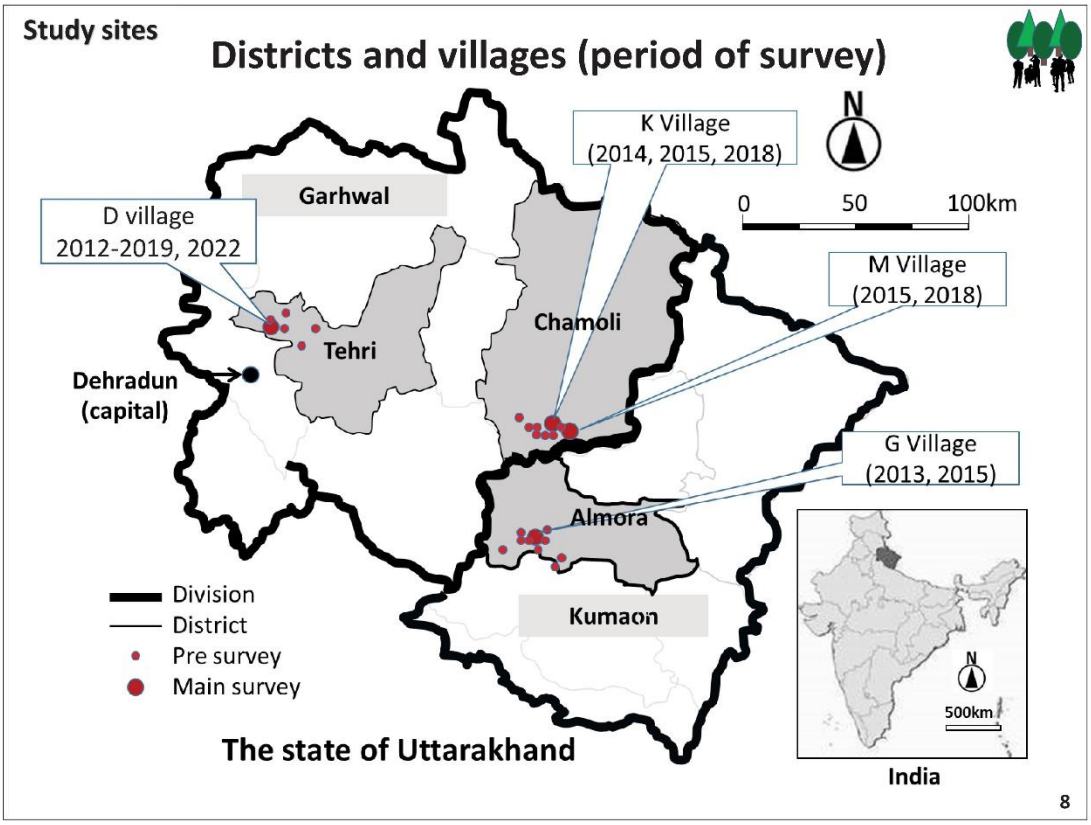
Objective

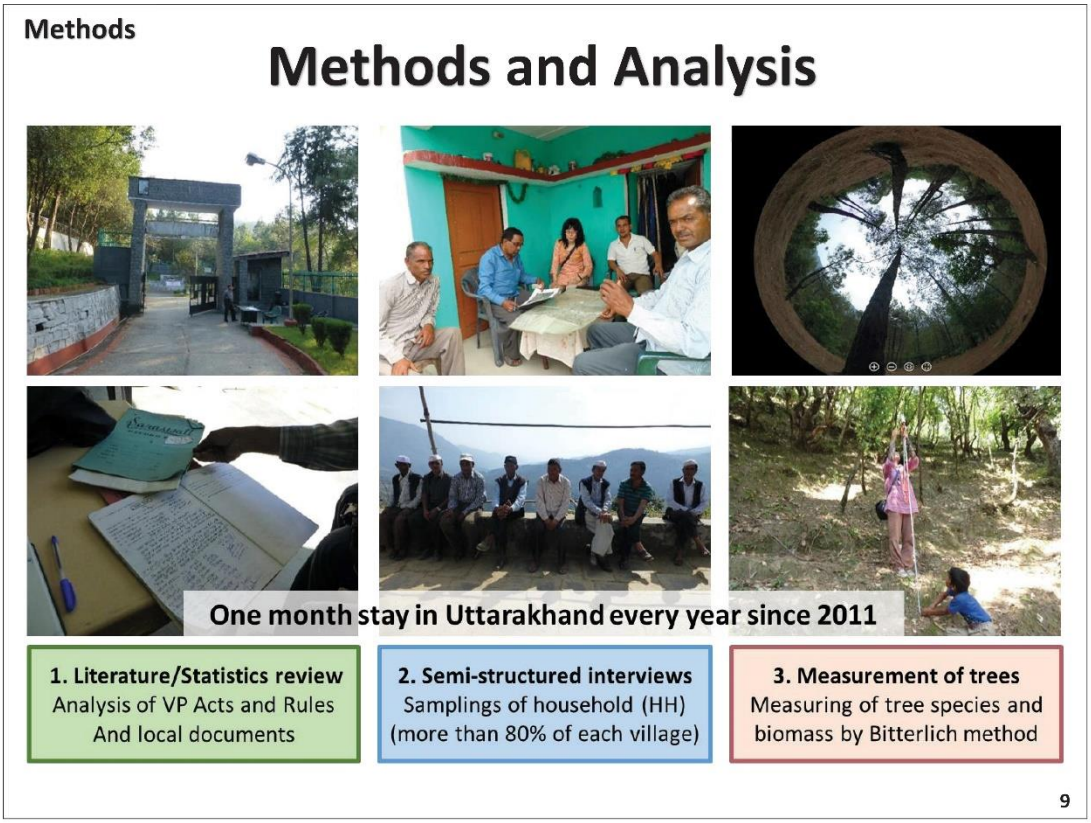
OBJECTIVEs of STUDY

How successfully are local institutions achieving sustained forest management in India?

1. Investigate the reality of the **people's forest management and utilization**
2. Does **women's participation** lead to sustained forest management?

7


Study sites
Districts and villages (period of survey)
K Village
(2014, 2015, 2018)
N
0
50
100km
Garhwal
D village
2012-2019, 2022
M Village
(2015, 2018)
Chamoli
Tehri
Dehradun
(capital)
G Village
(2013, 2015)
Almora
Division
District
Pre survey
Main survey
Kumaon
500km
The state of Uttarakhand
India
8


Methods
Methods and Analysis
One month stay in Uttarakhand every year since 2011
1. Literature/Statistics review
Analysis of VP Acts and Rules
And local documents
2. Semi-structured interviews
Samplings of household (HH)
(more than 80% of each village)
3. Measurement of trees
Measuring of tree species and
biomass by Bitterlich method
9

Results

Village information of VP

No.	VP	District	Altitude (m)	Sample no. of Households	Total House -holds	Human Population		
						Total	Male	Female
1.	D village	Tehri	1650	41	51	348	181	167
2.	G village	Almora	1850	14	22 (7: migrated)	158	46	72
3.	K Village	Chamori	1818	31	32	129	62	67
4.	M village	Chamori	1890	26	35	147	NA	NA

Comparison of VP forest land

S. No.	VP	Year of establishment	VP Forest land (ha)	VP forest/HH (ha)	Broad forest type
1	D village	1993	20	0.39	Only **oak** dominated
2	G village	1937	87	3.95	**Oak** dominated
3	K village	1972	56	1.75	**Oak** and **pine** mixed
4	M village	1953	45	1.29	**Oak, pine, planted** mixed

In D village, Around 0.4 ha per HH is adequate to local communities according to the **oak (*Quercus spp.*) dominated forest**

Banji Oak dominated forest in D village (Field survey,2015)

10

Results

Comparison of Village Rules of VP

VP	D village	G village	K village	M village
Logging	Prohibit	Prohibit	Prohibit	Prohibit
Lopping	Accept	Prohibit	Prohibit	Accept
Grazing animals	Accept	Accept	Accept	Accept
Grass cutting	Accept	Accept	Accept	Accept
Collection of dry and fallen branches, twigs and leaves	Accept	Accept	Accept by season and place	Accept
Forest guard (*Chokidar*)	No	No	Yes	Yes
Supporting from organization	No	Yes from NGO	Yes from CAMPA)*	Yes from JFM)** and CAMPA)*

* Compensatory Afforestation Management and Planning Authority; ** Joint Forest Management

D village : Original Rule is less than the other villages
K village : More rules and *Chowkidar* than the other villages
K, G and M village: Supported by government/NGO

Chowkidar in K village (Field survey, 2015)

11

Decision-making on the management of forest panchayats

Meeting by VP members (village residents)
(one person from each household participated)

Meeting held by the MC in K village (2014)

12

Results

People's participation in forest management

参加についての質問項目	回答	D村 (n=42)	G村 (n=14)	K村 (n=31)	M村 (n=26)	合計 (n=113)
1. Name of VP leader パンチャーヤト長の名前	Known 認知している	38	10	31	25	104
	Not known 認知していない	4	4	0	0	8
	NA 無回答	0	0	0	1	1
2. Participation of VP meeting 会合への参加	Yes 参加している	32	10	31	25	98
	No 参加していない	10	4	0	0	14
	NA 無回答	0	0	0	1	1
3. Meeting days / year 会合への参加日数	Actual 開催日数(年間)	4	4	12	12	-
	Average 村ごとの平均	1.3	2.3	10.1	12.0	-
4. Attitude at meeting 会合での態度 (各世帯から代表が1名)	Be present その場にいる	15	4	2	1	22
	Ask opinion 意見を尋ねる	2	0	4	4	10
	Express opinions, taking initiatives 意見を表明する	7	3	7	13	30
	Have voice, influenced decisions 声を出して決定に影響を与える	4	4	8	6	22
	Ask to undertake specific tasks 特別な役割のために質問をする	1	3	10	1	15
	NA 無回答	13	0	0	1	14
5. Micro-plan 森林管理プランの認知	Not know 認知していない	28	3	26	19	76
	Know 認知している	14	11	5	6	36
	NA 無回答	0	0	0	1	1
6. Participate in micro-plan 森林管理プラン作成への参加	No 参加したことがない	30	3	31	21	85
	Yes 参加したことがある	14	11	3	4	32
	NA 無回答	0	0	0	1	1
7. Merit/Benefit of MC activity 森林管理委員会への参加のメリット	No 利益はない	39	8	29	20	96
	Yes 利益がある	3	6	2	5	16
	NA 無回答	0	0	0	1	1

13

Results

Participation level

high

low

- Participation to making micro-plan (30 out of 113, in 4 villages): **27%**
- Recognition of Micro-plan (36 out 113, in 4 villages): **32%**
- Participation to forest activities (27:plantation, out of 42 in D village): **64%**
- Attitude at meeting (Answers other than "Be present", 4 out of 113 in 4 villages): **68%**
- Participation of VP meeting (98 out of 113, in 4 villages): **87%**
- Recognition VP leader (104 out of 113, in 4 villages): **92%**

➢The higher the level of participation, the lower the percentage of people participating.

Woman feeding livestock (2014)

14

Results

Form of participation at the meeting and situation in each village

Participation form	D village	G village	K village	M village	Total
Be present	15	4	2	1	22
Ask opinion	2	0	4	4	10
Express opinions, taking initiatives	7	3	7	13	30
Have voice, influenced decisions	4	4	8	6	22
Ask to undertake specific tasks	1	3	10	1	15
NA	13	0	0	1	14
Total	42	14	31	26	113

➢ **In village D, 36% (15 residents) were just there**
➢ **In village K, 32% (10 residents) ask questions because of their special role, and more than half of the residents have an influence on decision making, with 26% (8) of the residents influencing decisions with their voice.**

15

Results

Indicators of people's participation (by ratio)

VP Factor	D village	G village	K village	M village
Importance of meetings	0.92	0.71	1.00	0.96
Attendance of meetings	0.76	0.71	1.00	0.96
Ability to influence decisions (Strength based on a 5-point Likert scaler: 0<r<1)	0.42	0.62	0.72	0.62
Participation ratio in the number of meetings	0.33	0.58	0.84	0.96-1.00
Merit/Benefit of Participation in management Committee	0.07	0.43	0.06	0.19

D village: Low level of participation

✓**NO voice and impact in the group's decisions**

✓**People are NOT attending meeting every month**

16

Results

Use of VP forest land in village D

Panchayat Forest at village D	
VP established year	1993
Area of panchayat forest	21ha (0.4ha/HH: household)
Rule of panchayat forest ➢No rules other than felling of standing trees	Prohibition: cutting of standing trees Permitted: grazing, cutting grasses ollection of fallen branches, bush cutting
Main tree species in VP forest land	Mainly, *Quercus leucotrichophora* Some patched of *Pinus roxburghii*

Oak tree at village D
(*Quercus leucotrichophora*)

Panchayat forest at village D

VP forest at D village covered by oak trees (2014)

17

Results

People's perception (1)

Women in D village (Field survey 2018)

The effect of forest deprived benefit change after VP (n=41)

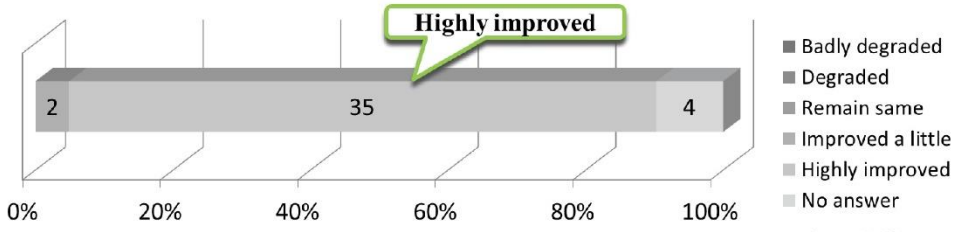
Source: based on structured interview for householders (2012)

88 % respondents are satisfied with the condition and management of VP.

18

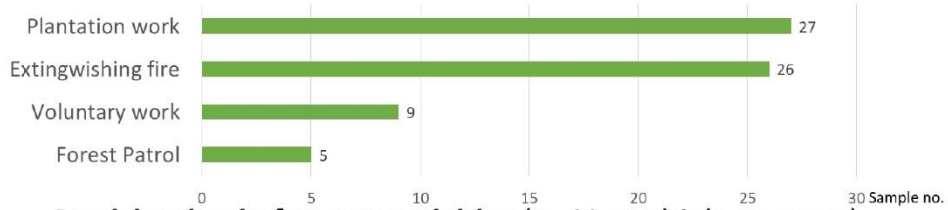
Results

People's perception (2) and participation



Impact on current VP condition after the VP was formed (n=41)

Source: based on structured interview for householders (2012)



Participation in forestry activities (n=41, multiple answers)

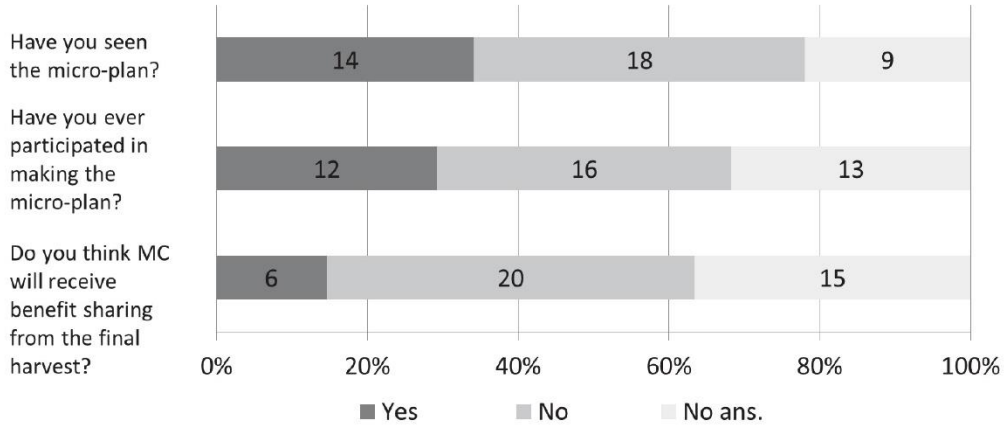
Source: based on structured interview for householders (2012)

- 95% of the households positively, since the VP was established.
- 66% of households participated in activities related to forest management

19

Results

People's participation



Recognition of micro-plan made by MC (Management Committee) (n=41)

Source: based on structured interview for householders (2012)

49% of respondents assume few forest benefit for MC,

Most villagers had no questions regarding of **Existence of micro-plan (every 5 years)** and reality of **fixed MC members.**

⇒ **GRANT (100,000 RUPEE/YEAR) FOR PLANTATION FROM FOREST DEPARTMENT**

20

Results

Participation in forest management committees (MC) - with women's use of forests

【Women who are MC members】3 (SC: 1, OC: 2)

➢MC members are not elected, but decided by discussion at meetings.

➢The reason why they are elected is not known due to discussion among men.

➢I am glad that I am a member, because I can meet many people from many villages and my educational level will be improved.

➢I do not receive any financial compensation as a member of the committee.

【Women who are not MC members] 25 (SC: 9, OC: 16)

➢More than half of the women said they were not interested in meetings at all.

➢(Women who were MC in the past) want to be reappointed as MC member.

➢I am interested in being a MC member, because I do not have LPG and totally dependent on firewood.

➢I have no time for house work, farming, firewood collection, etc. and have no intention to become a member.

➢My husband participates in meetings, so there is no need for her to be a member.

➢I am too old (in her 70s) to be a MC member.

【MC】Members are recommended by the VP head, not of their own volition.

【Non-MC】More than half of the women are not interested in being members. Women who use the forest are interested in being MC.

Source: based on semi-structured interview with the 28 women (2013) and participant observation.

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Results

Overview of women's daily lives :

gathering firewood and fodder in the forest, farming, caring for livestock, preparing meals, cleaning, etc.

Women doing farm work (2014)

time	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3
Spring/ Sumner/ Autumn	wake-up cow-ranch breakfast		collection from forest agricultural work							lunch/ rest		agricultural work					cow ranch	dinner and the preparation		sleep				
Mon soon	wake-up cow-ranch breakfast			collection from forest				cow-ranch lunch				re st	agricultural work				Cow-ranch	dinner and the preparation		sleep				
Win ter	sleep			wake-up cow-ranch Breakfast		collection from forest				lunch/ rest		agri cult ural wor k	cow-ranch		dinner and the preparation rest entertainment					sleep				

Source: based on MDO (2002) and participant observation.

Engaged in work except for sleeping hours

→ Factors considered to be barriers to women's participation (1)

22

Results

Interview and participant observation

- with the first VP chief at village D (Mr. R) -

1993-2013 Mr. R is the head of the forest panchayat (4 terms of 20 years) , meetings 3-4 times in a year
2013-2018 2ns head of the VP, No meetings
2018-2023 3rd head of VP, recommendation by Mr. R.,

【Details about the MC】

- The year 2013 is the year of election of forest management committee members in the forest panchayat, and the new VP head is Self recommendation.
- The ratio of men and women in the forest management committee is 50/50.
- The previous head (2013-2018) did not understand the job well.
- New forest panchayat head (2018-) recommended a man of the same caste who lives in the neighborhood.
- MCs have women who can serve on the committee so that women make up half (4) of the committee. Requests were made to households.

➢ **Involvement in the forest management committee of village D even after the retirement of the panchayat chief**

➢ **4 female members appointed but members not elected**

→ Factors considered to be barriers to women's participation (2)

Source: based on interview with the first VP chief and participant observation (2012–2022)

23

Discussions

Participation in microplan (management plan) creation

➢Subsidy from the Forestry Department (Village D)

➢involvement of government organization (Village K)

Participation in decision-making

➢MC households are high caste with high use of firewood, low participation of women as MC members. The number of residents elected as MC members is limited. (Village D)

➢All SC households are MC member. The previous head of the VP was a woman (Village G)

Participation in forest activity

➢Participation in forest management activities is higher than participation in decision-making related to forest management (Village D).

➢All households participate in monthly meetings organized by MC, and female forest guard is employed (Village K).

【Others】Involvement of NGO/Government

➢Existence of non-MC members who are negative toward MC members

→ Involvement of NGO supporting MC (Village G)

➢The existence of a VP head and his activities are known by all households

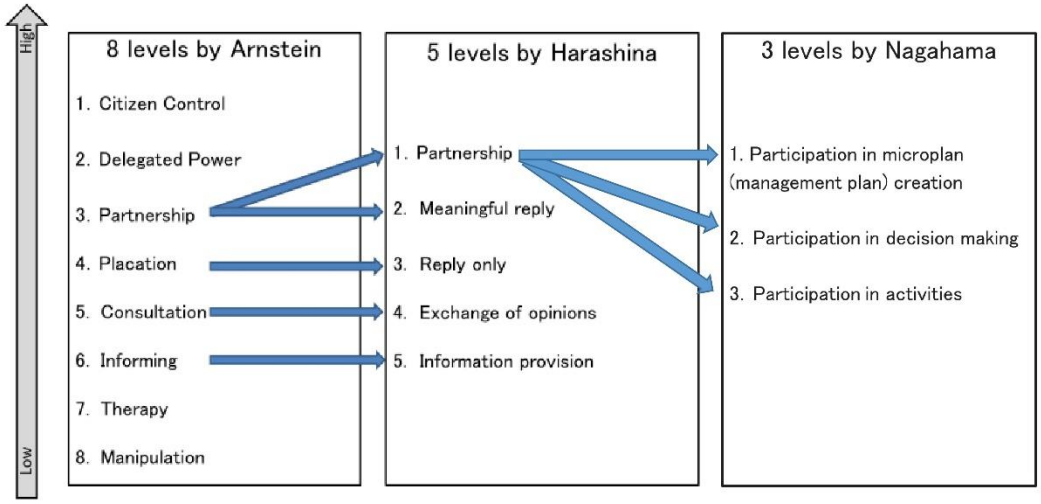
→ Involvement of a government organization that has operated JFM in the past (Village M)

24

Discussions

Levels of participation

There are three stages of "participation in activities" , "participation in decision making" and "participation in microplan (management plan) creation" in management by citizens.



Proposal for "New Three Stages of Participation" in Forest Management

25

Discussions

People's Participation in forest management

【From the case of village D】

➢The first VP chief showed strong leadership
➢ Organized forest panchayat in 1993, thereby changing the forest from civil/soyam forest (open access) to panchayat forest (common land).
➢ Clear rules "only felling of standing trees is prohibited
➢ High level of satisfaction with VP by local people
➢ Panchayat forest land is mainly covered by oak forest
➢The residents are willing to participate in activities related to forest management, and their participation in decision making related to forest management is not high.
➢ Forest MC members have not changed significantly (characteristics of MC: SC caste households and low female participation, firewood users, and income)
➢ Forest users are mainly women; a limited number of women hold MC positions
➢ Women's participation in decision making is not progressing

VP: Women participate in forest management activities (afforestation, forest patrols), but are not involved in decision-making bodies or in the preparation of microplans
The model for sustainable resource management practice

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Discussions

Women's Participation

➢ Only a **few women** were involved in decision-making.
➢ The fact that most of the households were satisfied with their current forest use can be explained by the limited number of households and women who **actively participate** in forest management.
➢ In particular, **MC members are often elected from upper caste** households（Nose2013）. In addition, it can be considered that there is an actual situation where women's participation in decision-making is lowered due to their social and customary lack of high status.
➢ There is a perception that there is **no "advantage to participation",** which is based on the experience of being underrepresented, as pointed out by B. Agrawal（2009), and low educational background.
➢ The structure of gender-based oppression and exclusion of women can be examined from the perspective of **ecofeminism**, in which the principles of ecology are combined with feminism which holds that women and nature have a special connection (Miea & Shiva 2014).
➢ The **"Van Panchayat Rules" since 2001** have included a provision for half the number of women MC members. The question of how this will be adhered to in each VP and the composition of MC member membership will continue to be an issue, not only currently, but also in light of the changes that will occur in the next round of elections.
➢ Furthermore, **meaningful devolution** requires nurturing democratic, self-governing CBFM institutions with clear communal property rights and empowerment of forest-dependent women/men to make real choices for enhancing sustainable livelihoods in accordance with their own priorities(Sarin 2003). If supported by an empowering regulatory landscape, VPs may be the institution best poised to effectively safeguard biodiversity and human well-being (Steven 2022).

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Conclusions

Conclusions

1. Proposed "three stages of public participation in forest management"

➢The three stages of community participation in forest management are: participation in activities, participation in decision-making, and participation in the preparation of management plans. The main participatory activities for VP members are forest-related activities such as tree planting and forest patrolling.

2. Promoting Women's Participation in Decision-Making

➢The majority of VP forest users were women, but the number of female members in the MC was limited, and the women involved in decision making were fixed and did not voluntarily choose their positions.

➢it clearly implied a limited participation of women in the decision-making process, i.e., no or negligible involvement in the management plan by the main VP forest users.

➢participation in CBFM activities was easy for the villagers (surveyed in the four villages/VPs); however, what was the most difficult was the participation leading to decision making in the MC and the VP as a whole.

➢In order to increase the active participation of women in the MC, it is necessary to increase the number of items in forest policies such as the "Van Panchayat Rules" that encourage women's participation in decision-making and maintain a mechanism to ensure compliance with these rules.

3. Policy Recommendations

➢it would be desirable to make rules to ensure that each VP complies with the system, included in the "Van Panchayat Rules" from the Uttarakhand state, which requires half the number of women members of MC, and to elect new members to MC every 5 years.

➢regard to the provision of half of all VP leaders being women in the state, if this system is adhered to, the percentage of women leaders in each VP will be increased. This is critical, as many of the VP forest users are women.

➢it is imperative for the state Forest Department to actively appeal and promote the case of women's increased participation in decision-making and their contribution to sustained forest management and village revitalization through the appointment of women MCs and VP leaders.

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Further Analysis

"To encapsulate (portray) sustained forest management in a time frame / time span"

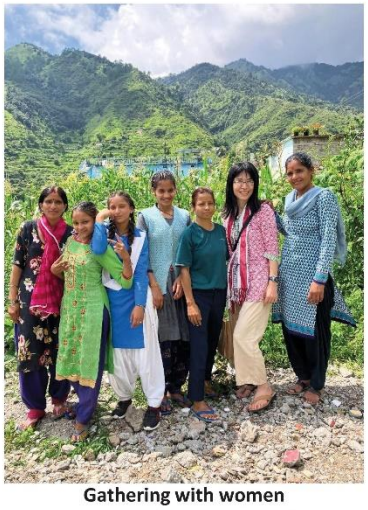
【Case of D village】

How forest use and management has **changed**?

2012 August Survey
(41 households)

↓

2022 August Survey
(22 households)



Gathering with women after the interview (2022)

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Additional Discussion
Journals / Forests / Volume 13 / Issue 10 / 10.3390/f13101667
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Article
Critical Aspects of People's Participation in Community-Based Forest Management from the Case of Van Panchayat in Indian Himalaya
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Abstract
The importance of community-based forest management (hereafter, CBFM) is drawing attention to forest policies in finding solutions for deforestation and importantly to also understand the basis of people's involvement. Focusing on the latter, the study presented here targets a regional CBFM (Van (forest) Panchayat; hereafter, VP) at the village level in Uttarakhand, India and looks into characteristics and critical aspect of people's participation. Participatory observations were conducted in four selected villages, followed by structured interviews with 113 of a total of 131 households and semi-structured interviews with additional 28 female villagers. Some specific findings were (a) the VP members were mostly involved in forest-related activities, e.g., plantation, forest patrols, (b) a greater use of firewood by the management committee (hereafter, MC) where most members were from the higher-caste, and (c) most of the VP forest users were women; however, few women members were involved in decision-making, as they were mostly fixed members and they had not voluntarily chosen their positions. In the above context, it implied a limited participation of women in the decision-making process, i.e., no or little involvement in the management plan by the main VP forest users. Results concluded three stages of local peoples' participation in forest management: "participation in activities"
30


Access to the Journal
Aspects of People's Participation in Community-Based Forest Management from the Case of Van Panchayat in Indian Himalaya
Kazuyo Nagahama, Satoshi Tachibana & Randeep Rakwal
https://www.mdpi.com/1999-4907/13/10/1667
Thank you very much for your kind participation.
We look forward to meeting you
at next IUFRO conference!
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B2-02

The **Livelihood Resilience** of **Traditional Agroforestry:** a Study of **Customary Community** in West Java

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[3]Research Center for Ecology and Ethnobiology, National Research and Innovation Agency Indonesia (BRIN)

1. Introduction

Traditional Agroforestry

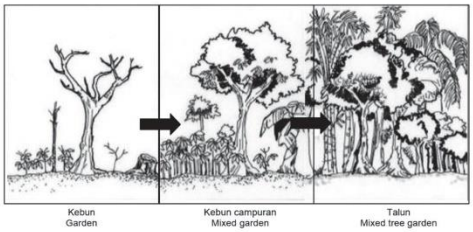
- Forests are one of the **naturals that** provide multiple resources and also food security. Besides natural forests, we know also various **man-made forests**.
- Agroforestry (AF), the new name for an old practice. More than 20 pattern across Indonesia (MoEF 2015)
- **"Traditional** (or indigenous) AF are those systems that **have been developed by farmers** in response to perceived needs and existing opportunities, **without** the involvement of formal research and extension services" (Foresta 2000)
- Characteristics of traditional AF in Developing Countries: **Small land tenure**, **low literacy rates**, **lack of forest maintenance** (Ahmad et al. 2022)

3

Traditional Agroforestry

- Diverse crops in AF → meet Resilience need
- Based on **local knowledge/wisdom** with various **local names**, countless **crops**, but the **same pattern**.
- West Java = commonly called **Talun – Kebun** (Soemarwoto 1984)
- Transformation of Kebun (garden)→ Kebun Campuran (mixed garden) → Talun (mixed tree garden) (de Foresta et al 2000)

Source: de Foresta et al 2000



4

Policy Regarding Customary Community

Customary law community (or CC) :
"community groups, **traditionally settled** *at* **geographical areas**, ties to **ancestral origins**, strong relationships with the **environment, have a value system** that determines economic, political, social and legal institutions. " (Article 1 :11, MoEF Regulation 17 of 2020), (Article 1 : 30, Act 32 of 2009)

In Indonesia, after Suharto Regime fell The **Existence of CC** got bigger and more massive attention. It also is called as "**Adat Revivalism**" (Henley & Davidson 2012)

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Policy Regarding Customary Community

Agrarian Law 1870 → *domeinverklaring/domain statement*
- eroded the existence of indigenous peoples (Asmin, 2016).
- **only recognized the land with certificates**

Forestry Act 41/99,
- **expressly negates customary right**, "the forests out of owned land automatically located within state forest areas" (Myers et al. 2017)

First Entitlement of CFs

1870 — **1999** — **2016**

Pre-Colony

Traditional Land System
- Kingdom
- Sultanates
- **Local tribes**

1945

Basic Agrarian Law (BAL) (Act no.5 of 1960)
- **acknowledged the existence** of indigenous and tribal peoples (Soemardjan 1962)

2013

Constitutional Court Determination (CCD) no. 35/2012
- new hope for rights of CC (Subarudi 2014)

6

Livelihood Resilience

- Resilience: The **capacity of a system** to **absorb disturbance** and **still retain** its **basic function** and structure (Walker and Salt 2006)
- Aim: 1) **prevent** moving undesired, 2) **renew & reorganize** after disturbance.
- **Context**: of what, to what, for whom
- **Robust** = high resilience – low sensitivity, **Vulnerable** = low resilience – high sensitivity

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Livelihood Resilience

- Livelihood Resilience

  The capacity of all people across generations to **sustain and improve** their **livelihood opportunities** and well-being despite environmental, economic, social, and political disturbances. (Tanner 2006)
- Coping strategies

  Specific responses or activities used to adjust to changing conditions, both short and long-term, and do not only happen during **periods of stress** but are often intensified in **such events** (Adger, 2003; Mosberg and Eriksen, 2015)

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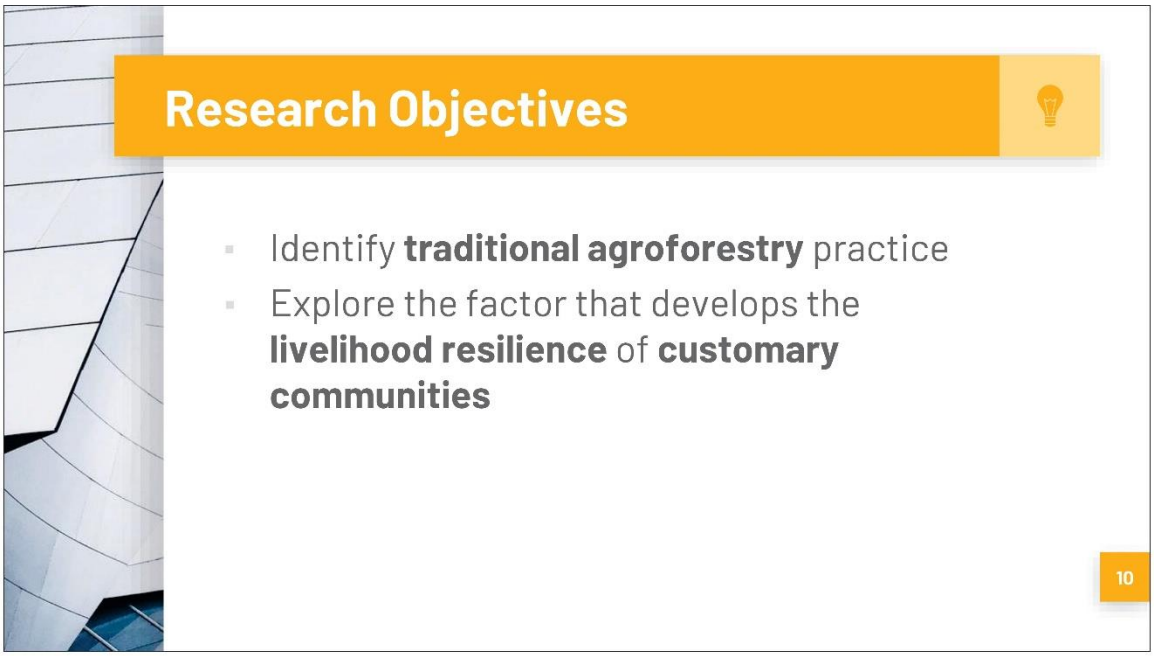
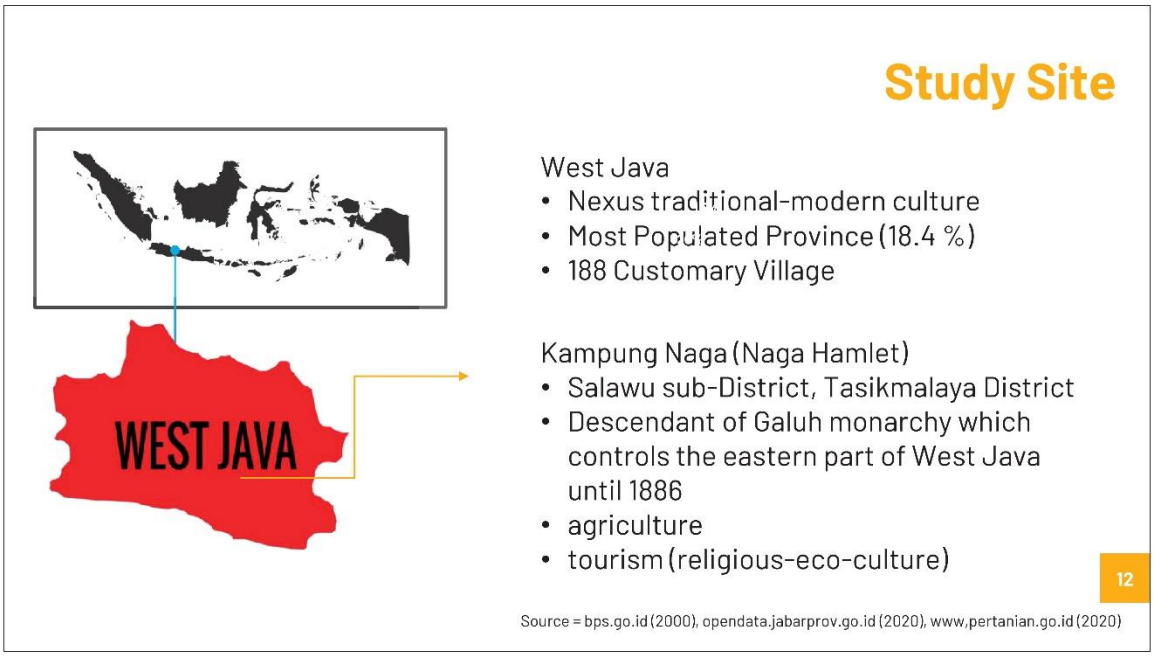
Previous Studies
In the Philippines, customary laws pertaining to land rights, adoption of upland cultivation practices following soil and water conservation principles, stand management, and biodiversity protection (Camacho et al, 2016).
Traditional agroforestry the resilience of rural farmers through more efficient water utilization, and diversifying products in Bangladesh (Islam et al, 2021)
Lecegui (2022) explored the multidimensional issues that influence and are influenced by livelihood strategies and their adaptive capacity at the farm household level.
Bekele (2022) study the resilience of Ethiopian agropastoral households in the presence of large-scale land investments
9


Research Objectives
Identify traditional agroforestry practice
Explore the factor that develops the livelihood resilience of customary communities
10


2. Methodology


Study Site
WEST JAVA
West Java
• Nexus traditional-modern culture
• Most Populated Province (18.4 %)
• 188 Customary Village
Kampung Naga (Naga Hamlet)
• Salawu sub-District, Tasikmalaya District
• Descendant of Galuh monarchy which controls the eastern part of West Java until 1886
• agriculture
• tourism (religious-eco-culture)
12
Source = bps.go.id (2000), opendata.jabarprov.go.id (2020), www.pertanian.go.id (2020)

Study Site Characteristics

Only 114 (2019) → 112 homes (2022)

No Electricity

No vehicle inside

No Toilet at the house

147 stair

Leuit Ageng/granary

Hutan Larangan (taboo forest)

Common public Bathroom/Sento

Methods

when	what	how	who
• March 2019 • August 2022	• Livelihood • Agroforestry Pattern • Crops • Marketing Chain	• Semi-structured Interview • Questionnaire • Livelihood Analysis	• Customary Figure • Customary Youth • Household (12 of 112)

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Questions

Financial Capital
Profession, Saving, Remittance
Livestock, Farmland, Farm Equipment

Human Capital
Prodctive Labor Force (18-55). Education
Health Level, Health Problem which effects to finance Productive

Social Capital
Close family, political influence
Group/club participation, neighborhood relationship

Physical Capital
Road Condition, Supporting Facilities
Access to irrigation, Harvesting equipment.

Natural Capital
Arable farmland, Plant diversity
Livestock. Soil Erotion Potency

Reference: Quandt 2018

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3. Results

Philosophy	Means
Gunung – Kaiyan	mountain with wood
Gawir – Awian	cliffs with bamboo
Pasir – Talunan	hills for talun (mixed cropping)
Legok – Balongan	basin for fishponds
Datar – Sawahan	plain for rice fields
Cinyusu–Rumateun	water source should be treated
Situ – Uruseun	lake must be treated
Sagara – Piaraeun	the sea must be maintained

Agroforestry in Naga

- System: Kebun talun (mixed cropping). No home garden.
- Utilization: Anytime /subsistent
- Communal: Hutan Larangan (taboo forest)
- Dominant: Mixed (vegetable, wood tree, empon empon (herbs)
- Tree: Commercial and own needs
- Livestock: Goat, poultry

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Agroforestry Challenges

Land Productivity

High-Density → Low Productivity

Labor

Urbanization/change of working style → shortage of labor

Harvesting & Marketing System

Harvest by needs → Depend on Middleman

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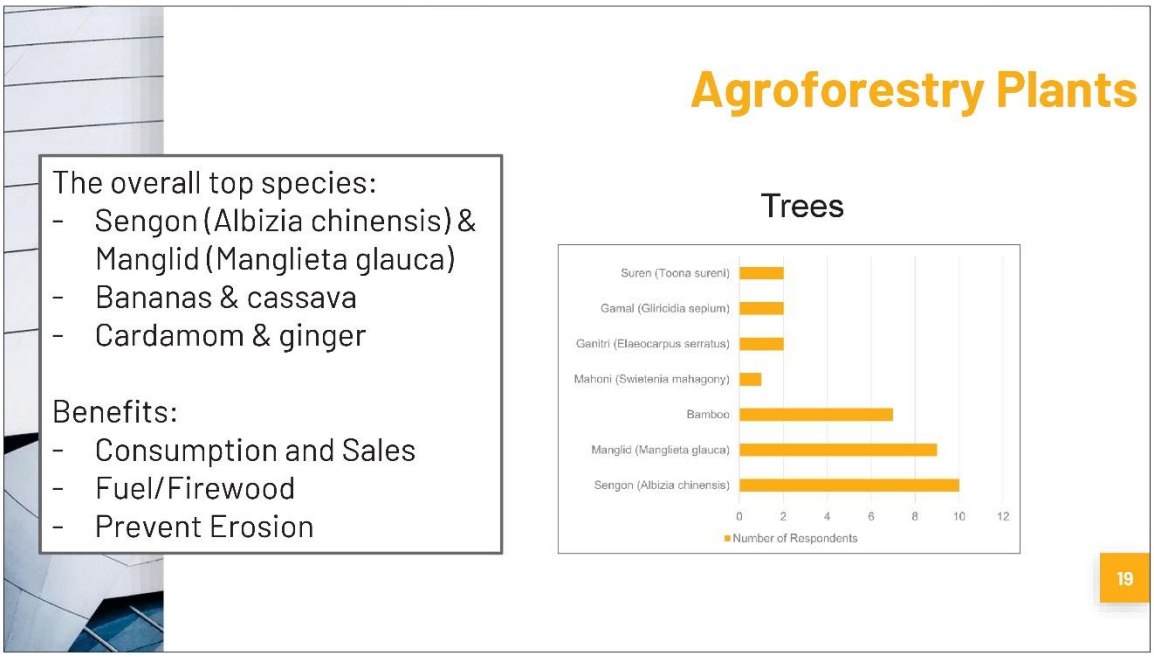
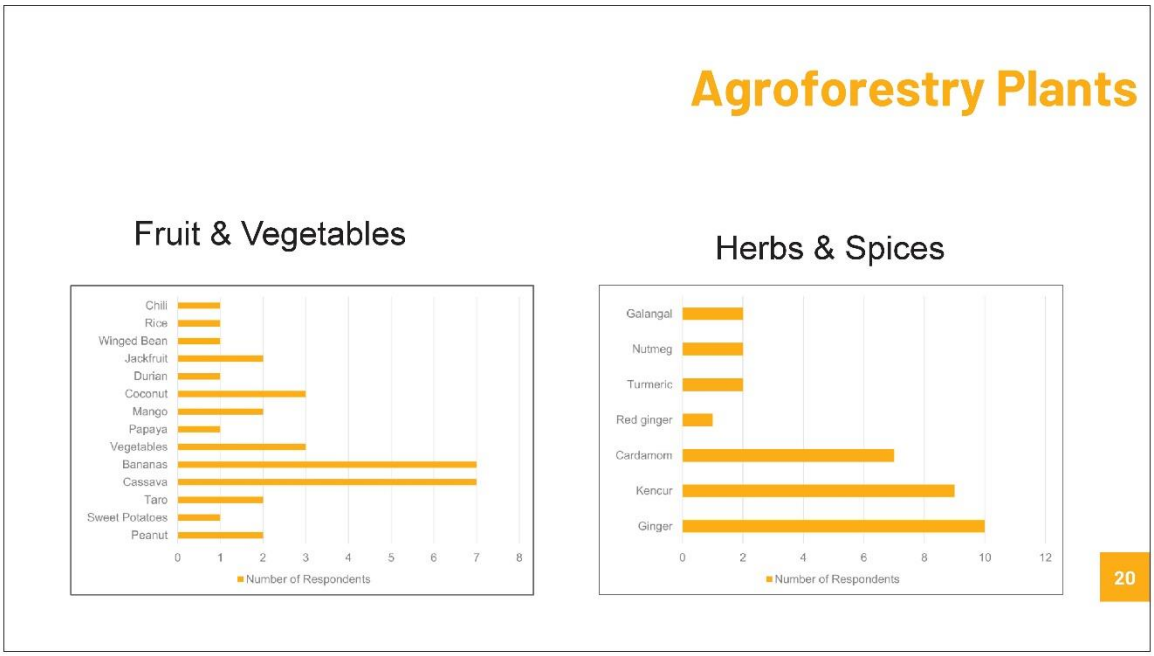
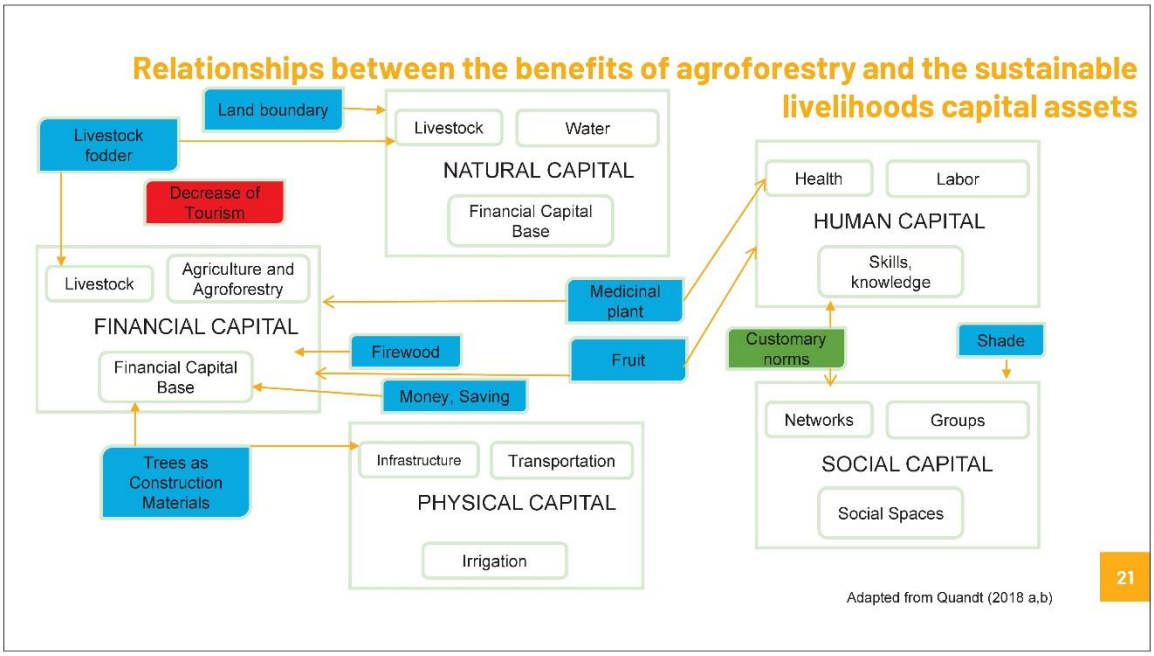
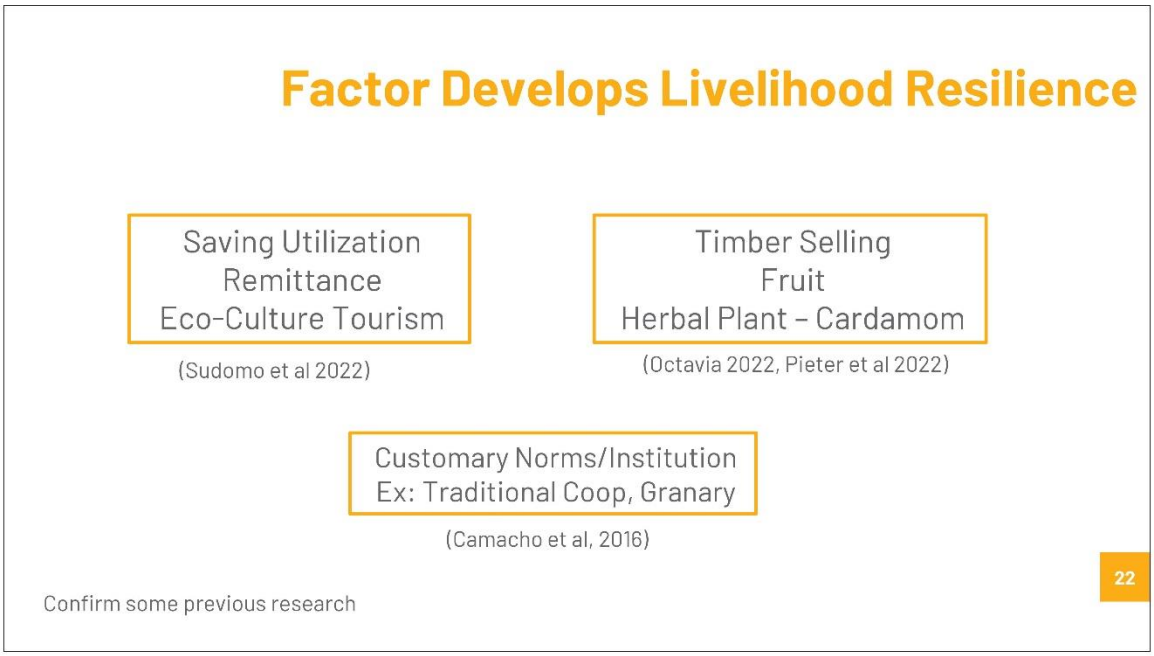

Agroforestry Plants
The overall top species:
- Sengon (Albizia chinensis) & Manglid (Manglieta glauca)
- Bananas & cassava
- Cardamom & ginger
Benefits:
- Consumption and Sales
- Fuel/Firewood
- Prevent Erosion
Trees
Suren (Toona sureni)
Gamal (Gliricidia sepium)
Ganitri (Elaeocarpus serratus)
Mahoni (Swietenia mahagony)
Bamboo
Manglid (Manglieta glauca)
Sengon (Albizia chinensis)
0 2 4 6 8 10 12
Number of Respondents
19

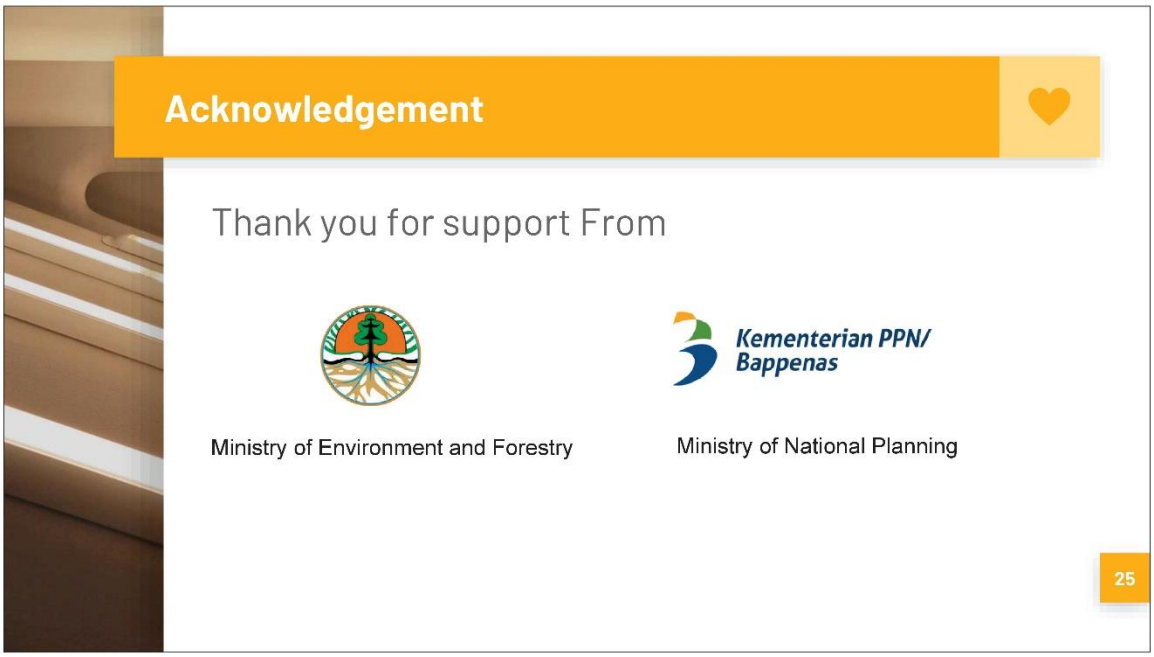

Agroforestry Plants
Fruit & Vegetables
Chili
Rice
Winged Bean
Jackfruit
Durian
Coconut
Mango
Papaya
Vegetables
Bananas
Cassava
Taro
Sweet Potatoes
Peanut
0 1 2 3 4 5 6 7 8
Number of Respondents
Herbs & Spices
Galangal
Nutmeg
Turmeric
Red ginger
Cardamom
Kencur
Ginger
0 2 4 6 8 10 12
Number of Respondents
20


Relationships between the benefits of agroforestry and the sustainable livelihoods capital assets
Land boundary
Livestock fodder
Decrease of Tourism
Livestock
Water
NATURAL CAPITAL
Financial Capital Base
Health
Labor
HUMAN CAPITAL
Skills, knowledge
Livestock
Agriculture and Agroforestry
FINANCIAL CAPITAL
Financial Capital Base
Medicinal plant
Firewood
Fruit
Money, Saving
Customary norms
Shade
Networks
Groups
SOCIAL CAPITAL
Social Spaces
Trees as Construction Materials
Infrastructure
Transportation
PHYSICAL CAPITAL
Irrigation
Adapted from Quandt (2018 a,b)
21


Factor Develops Livelihood Resilience
Saving Utilization
Remittance
Eco-Culture Tourism
(Sudomo et al 2022)
Timber Selling
Fruit
Herbal Plant – Cardamom
(Octavia 2022, Pieter et al 2022)
Customary Norms/Institution
Ex: Traditional Coop, Granary
(Camacho et al, 2016)
Confirm some previous research
22


4. Concluding Remarks


Key Findings from Research and Research Challenge in Future
1. Traditional Agroforestry practices provides direct support for contributing income to customary communities in Naga Hamlet
2. Several factor develops the livelihood resilience of customary communities : direct income of non agroforestry, income of agroforestry, customary norms
Further research is needed to get a full picture of quantitative value contribution of the traditional system to livelihood resilience
24


Acknowledgement
Thank you for support From
Ministry of Environment and Forestry
Kementerian PPN/ Bappenas
Ministry of National Planning
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B2-03

From conflict to recognition of customary forest in North Sumatra, Indonesia:

Exploring nexus among local people, local government and a pulp and paper company

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* Graduate school of Bioagricultural Sciences, Nagoya University, Japan

** Vocational School, Universitas Gadjah Mada, Indonesia

In Indonesia, there are customary forest (*hutan adat*) that has been customarily managed and used by local people for generation. While the customary forest was previously positioned as state forest according to the national forest law, the Constitutional Court of Indonesia in 2013 ruled that customary forest should not be included in state forest, and it was stipulated with a regulation issued by the Ministry of Environment and Forestry in 2015. The purpose of this study is to clarify how the local people in North Sumatra manage and use the customary forest, how the conflict provoked regarding land issues, and how the rights of the customary forest were treated by the government. In North Sumatra, the local people planted benzoin trees for the purpose of collecting sap, and the trees have been customarily managed and used for generations. However, in 1992, the customary forest of 269,000 ha was placed under the control of a pulp and paper company, and which felled benzoin trees and instead, planted eucalyptus trees, resulting in the loss of part of the customary forest. Due to the influence of eucalyptus plantation, the amount of sap collected has decreased. Consequently, the peoples opposed the actions of the pulp and paper company, protested over the ownership of the customary forests, and conflict provoked between the local people and the pulp and paper company. With the issuance of the Minister of the Environment's decree to exclude the village's customary forests with 5172ha from the concession in 2017, the procedure for accrediting the customary forest by the local government and the central government has been recently carried out.

Keywords: benzoin tree, customary forest, adat, conflict, Indonesia

B2-04

Review of historical extension forestry practices in Papua New Guinea

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Abstract

In 1991, Papua New Guinea's governmental forest management transitioned from a decentralized provincial management system to a centralized management system that was primarily focused on export-oriented industrial-scale timber harvests. Forest management is now in the process of transitioning to a focus on the sustainable management of secondary forests and reforestation. There is also a growing recognition in the government on the importance of sustainable small-scale forestry operations as livelihood opportunities for rural communities. Before the 1991 transition to a centralized forest management system, an extension forestry system that incorporated small-scale economic development activities was widespread throughout all of Papua New Guinea's provinces. During the last thirty years the knowledge on the functions of these extension forestry systems has been reduced to a few remaining foresters that can recall the activities that were implemented, and a small number of library-held paper-copy reports that have never been digitized. Unfortunately, most of these paper-copy reports have been lost or destroyed by unfortunate events such as theft and structure fires. To preserve this knowledge, we undertook an historical review of these past extension forestry systems. Our objective was to provide a summary of these systems that could be used as a guide by forest managers and policy makers for improving small-scale forest-based economic development. We utilized a mixed-methods approach for this historical review that involved identifying and interviewing people with first-hand knowledge of past extension forestry activities, and by reviewing the remaining paper-copy extension forestry reports. This paper is a summary of that historical review. The findings in this summary are applicable for improving small-scale forest-based economic development in Papua New Guinea and other tropical countries with similar sociocultural systems.

1 Introduction

Recent research in Papua New Guinea regrading small-holder forestry has identified numerous management challenges. These challenges included low financial returns being received by smallholders for timber harvests on their land, low financial viability of portable sawmill operations, lack of smallholder forest management planning, and limited timber market knowledge held by smallholders and portable sawmill operators (Scudder et al. 2019a and Scudder et al. 2019b). A repeated recommendation from this research was that extension forestry be increased to improve financial returns to rural forest resource landowners. During our research, we were made aware that extension forestry used to be widespread in PNG and had been successful in mitigating many of the current challenges that our research has identified regarding small-scale/community forestry. There is also a growing recognition in the government on the importance of sustainable small-scale forestry operations as livelihood opportunities for rural communities. Before the 1991 transition to a centralized forest management system, an extension forestry system that incorporated small-scale economic development activities was widespread throughout all of Papua New Guinea's provinces. During the last thirty years the knowledge on the functions of these extension forestry systems has been reduced to a few remaining foresters that can recall the activities that were implemented, and a small number of library-held paper-copy reports that have never been digitized. Unfortunately, most of these paper-copy reports have been lost or destroyed by unfortunate events such as theft and structure fires. Hence, we thought it imperative to research the historical extension forestry practices

and summarize them in a report to be shared as a potential model for improving small-scale forestry in PNG. In the following sections, we discuss our research methods, followed by historical extension forestry organization structure, extension forestry management goals and activities, the discussion, and the conclusion

2 Methods

We utilized a mixed-methods approach to researching historical extension forestry in PNG. This included a literature review and informal interviews with key informants. A literature review was conducted of old PNG forestry reports that described extension forestry activities. Unfortunately, most of these documents in PNG have been lost or destroyed by unfortunate events, such as theft and building fires.

Informal interviews were conducted with previously employed extension forestry workers, or people with first-hand experience in historical extension forestry. An interview protocol was designed to identify past extension forestry activities. All interviews were conducted by the authors, with handwritten notes taken. A total of 65 interviews were conducted. The purpose of the interviews was to ascertain specific features of past extension forestry; management structure, goals and activities, and management outputs.

3 Historical extension forestry organizational structure

While forest management by Australia in the Territory of Papua and New Guinea (TPNG) did exist prior to WWII, extension practices were limited to agricultural activities. Agricultural extension was developed by the British in the 1920s, to be used in their colonies to improve agricultural efficiency, labour efficiency, and land utilisation capabilities (Adams 1982). In 1946, the Australian Department of Agriculture Stock and Fisheries (DASF) started bringing agricultural officers to TPNG. These agricultural officers were referred to as; Didiman (Godbold 2010).

Research by Godbold (2010), provides an in-depth description of activities conducted by Didiman. The initial goal of DASF was to develop permanent mixed farming systems throughout TPNG. Agricultural xtension was set up to be a social system that used technical information provided by the Didiman. The Didiman were expected to be familiar with indigenous farming, able to do demonstrations, locate farm supplies, get seed and fertilizer supplies, aid with processing, and give general guidance to indigenous communities. Didiman also patrolled extensively throughout the country, which required them to live in remote stations and in rural communities. Patrols were the primary approach used by Didiman to communicate with farmers. During visits to communities on patrol, Didiman would tell people to attend trainings, visit demonstration sites, and distribute plant seed. Patrols were also a way to collect census data and other information about the district. This was all put into reports and sent back to the central office in POM. By 1969 – 1969, the DASF had 177 agricultural extension centres and 16 extension stations throughout TPNG. While Didman were technically agricultural extension officers, trees were also incorporated into their activities, which included coffee, cocoa, coconut, rubber, pyrethrum, and palm oil trees. The roles and activities developed and implemented by the Didman from 1946 to 1975 had a large influence on how future extension foresters in Papua New Guinea would implement their activities.

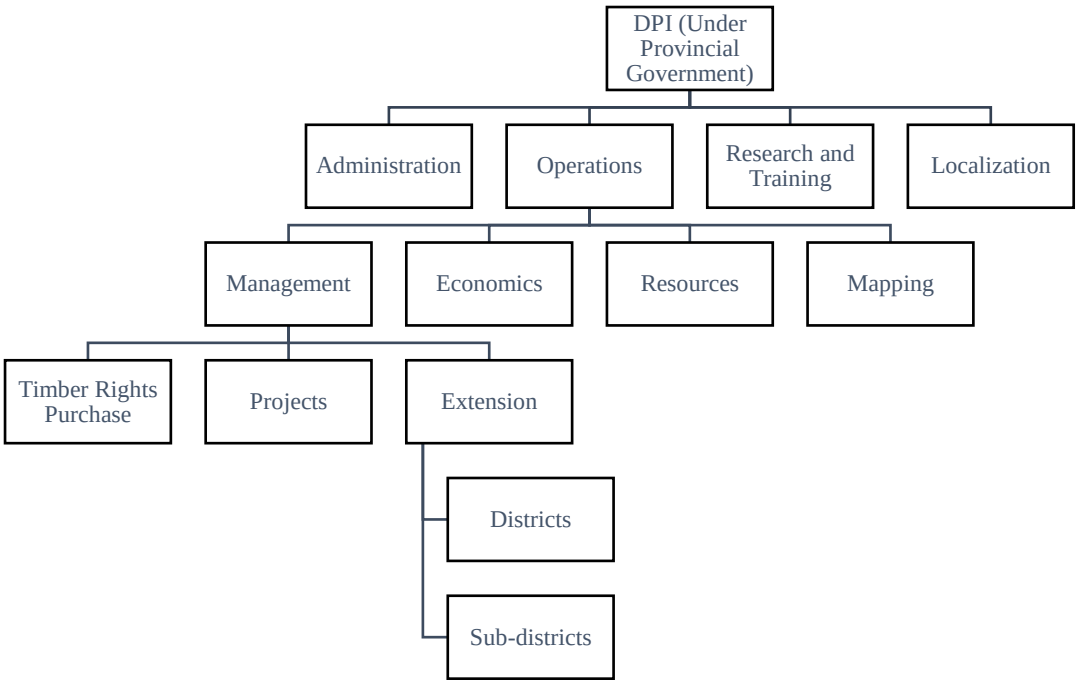
In 1975, Papua New Guinea became an independent country and the DASF and the Forestry Department were amalgamated under the Division of Primary Industries (DPI). During this time period, the DPI management structure was decentralized, by being organized under the control of the Provincial Governments (see Figure 1). In the forestry department, the management focus was mainly on forest projects and forestry extension activities.

Interviews with key informants indicated that extension forestry offices typically existed within each district, of each province of PNG. These offices housed forestry staff, agricultural staff, fisheries staff, and business development staff. These various government staff branches worked closely with the local government councils. The local government councils provided them with land for their offices/buildings and local employees for the upkeep of these buildings. The typical number

of forestry staff at each office was generally three forest officers, two assistant foresters, and one secretary. Key informants assumed that it was likely the same for the other staff branches that shared the office. There was one vehicle for each office that was shared by all the staff housed there. Grouped within these offices were extension nurseries, vocational centres, and road maintenance vehicles.

It was estimated that by 1972 there were more than 40 extension nurseries in PNG (DOF 1973). These extension nurseries produced 300,000 to 500,000 tree seedlings for planting each year (DOF 1973). Interviews with key informants indicated that the species most commonly supplied for woodlots were *Tectona grandis*, *Theobroma cacao*, *Coffea arabica*, and shade trees such as *Casuarina equisetifolia*. Around all this infrastructure, cottage industries such as wood-working and agricultural processing developed that served the surrounding communities. Shipping for the sale of agricultural crops was done using boats owned by the Lutheran Church. These boats acted as ferries for people and goods transport to the ports. Livestock were also a component of agriculture, along with cocoa and coffee. All the government divisions in each office worked together since they are all interrelated.

Figure 1: Structure of forestry division under the Department of Primary Industries



Source: Derived from (DOF 1997 and Gunga 2019)

4 Extension forestry management goals and activities

The goal of the extension forestry in PNG was to develop forest extension programs in the region. The specific objectives were; 1) to conduct reforestation awareness, 2) to promote nature conservation, 3) to promote woodlot farming, and 4) the coordination of the extension programme. Several of the activities related to these management goals overlap.

Several activities were conducted to develop awareness. The first activities were meetings held with community-based organizations (CBOs), non-governmental organizations (NGOs), church groups, and youth groups. Meetings were also held with local communities and village groups. Awareness activities were also conducted at schools and other public venues.

Nature conservation was promoted through multiple activities. The first activity was like the activities above; promoting awareness through meetings with targeted groups. The second and third

activities were the production of tree seedlings for distribution and encouraging landowners to plant the trees in targeted areas. Tree plantings were followed up with surveys of the reforestation activities.

Woodlot farming was promoted through a series of steps. The first step was identifying and registering individuals and groups that were interested in participating in woodlot development. The second step was the production of seedlings for distribution. The third step was for extension forestry personnel to assist with mapping out the boundaries of the woodlots. The final step was the provision of advice related to tree planting and woodlot maintenance.

The activities associated with coordinating the extension programme are primarily internal management and monitoring activities. The initial focus was on designing the procedures for specific activities for the extension forestry goals discussed above. This was followed up with monitoring of the various extension programs and writing up quarterly reports discussing the completed activities. A review of the extension programs was conducted on a periodic basis to ensure that the programs aligned with their provincial forestry management plans.

Interviews with key informants revealed that extension forestry activities were primarily focused on establishing woodlots. Wood establishment involved five reforestation activities. These were; 1) awareness on the importance of forests and livelihood, 2) establishing nurseries and seedlings distribution, 3) knowledge and technical skills transfer, 4) providing support to facilitate interest in reforestation projects, and 5) building and maintaining rapport with local landowners and forest-based stakeholders. Additional extension activities were also identified during interviews with key informants were trainings related to portable sawmill operations and the harvest and trade of non-timber forest products (NTFPs). NTFPs identified in the interviews were *Santalum album*, *Aquilaria malaccensis*, and *Calamus rotang*.

5 Extension materials

5.1 The Liklik Buk

In 1975, approximately 100 church related rural development workers came to an agreement that a printed handbook catalogue regarding rural development practices should be produced and shared throughout PNG. The impetus for this decision was that rural development workers often struggled to locate simple step-by-step guides for activities related to rural development. In 1975, most rural development workers and the population as a whole did not have access to libraries, telephone, mail services, and professional development consultants. It was determined that a widely available printed catalogue, whose materials could be continually be updated, would be beneficial for improving development activities and progress in PNG. The sections of the book include guides for; growing agricultural and tree crops; raising livestock; processing crop and livestock products; village industry arts and crafts; building and road construction; energy production; water resource use/development; and healthcare. The book was not designed to be read from cover to cover, but rather to be used as a reference how-to-guide for implementing rural development activities.

The first edition of the Liklik Buk was printed in 1976. In the first two months, 5,000 copies had sold out. The Liklik Buk is currently published by the Appropriate Technology Community Development Institute (ATCDI), a branch of the PNG University of Technology (ATCDI 2020). The ATCDI was established in 1978 to provide community service development to improve living standards in rural communities. The ATCDI is active in multiple other programs; small industry entrepreneurship; small-scale energy development; rural water supply; and food technology (ATCDI 2020). A sister branch of the ATCDI at the PNG University of Technology is the South Pacific Institute for Sustainable Agriculture & Rural Development (SPISARD). The SPISARD was established in 2003 to provide sustainable agriculture technology transfer and extension services to rural communities (SPISARD 2020).

6 Discussion and Conclusion

From our review of historical extension practices, we were able to identify several framework items that contributed the success of extension forestry practices. The first item was the decentralized

organization system. This system allowed for field units to be able to initiate projects that were in the interest of district development communities, local government councils, and village communities. Explicit consent from the central policy and planning committee was not needed if the projects followed the overall intent/goals of the central policy and planning committee.

The second framework item we identified was the synergy between the different organizations at these extension offices; forestry, agriculture, fisheries, and business development. Since these organizations shared offices, vehicles, and equipment, they were able to develop plans and activities for communities that complimented each other. Related this was item three, in which the staff of these organizations lived within or nearby these communities rather than using a 'fly in–flyout' approach. By living within/nearby to these communities, they were able to establish trust with the people in the communities and better able to understand their interest and needs regarding extension practices.
Item four was the development of local nurseries for both agricultural crops and tree crops. Having local nurseries allowed communities to gain access to training in nursery activities and best practices for crop planting. In addition, this gave them access to the best available seed source for agricultural and tree species crops.

The final item we identified was the development of cottage industries for domestic development. Regarding tree species crops, this was related to the provision and training for milling and value-add processing of timber. Regarding agricultural crops, this was related to processing of raw agricultural crops to produce value-add food products. Both categories allowed for small holder farmers and/or local communities to receive larger financial returns than could have been achieved with sales from the raw materials.

In conclusion, we found that the framework that best supported extension forestry prior to the transition to a centralized forest management system, was one where the extension officers were able to maintain a long-term local presence within the various rural communities. The local presence and synergy approach with agriculture/fisheries/business-development, provided an interdisciplinary system that was likely able to provide cost sharing opportunities and the development of more diverse livelihood strategies for communities. Despite the benefits provided by this framework, it is likely that funding would be the greatest challenge as it is probably that tax revenues generated from these activities would be less than the cost for implementation. Mitigating the funding challenges would likely require extension services to be introduced in areas where larger industrial-scale forest management operations are occurring so that operational costs could be shared.

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B2-05

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Western Impact on Small-scale Private Forestry Policy in Japan

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Similarities and Diversities of Forest Policy across Countries

Similarities come from:
✓Common issues: ex. Protected forests
✓**Policy transfer** : ex. Forestry extension system & concept of foresters in Japan
✓.....

Even if one institution is adopted from another country, it may develop into different forms.

Diversities come from:
✓Differences in natural environment, and socioeconomic conditions
✓Difference in available resources
✓Differences in government policy direction
✓.....

Forest Policy for Small-scale Forestry

- **Small-scale forestry** is characterized by **diversity** of motivations and goals and **lack of scientific knowledge.** (Harrison and Herbohn 2000; Hyttinen 2004)

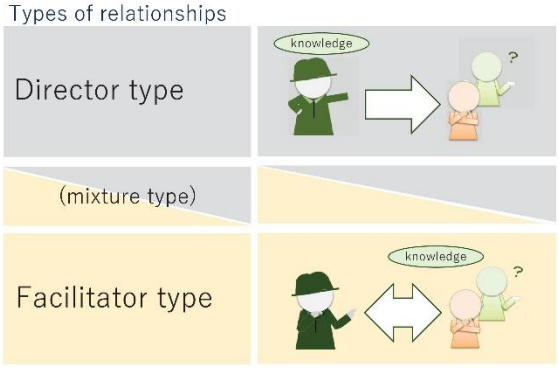
▶**Small-scale forestry policy** requires **building relationships** with a diverse policy targets and clients.

(1) Location of Knowledge
- ✓ Who generates knowledge?
- ✓ Who decides what knowledge or information to share?

(2) Direction of Communication
- ✓ One-way or interactive communication?

"increasingly forest knowledge systems move from top-down to inclusive, bottom up and horizontal communication"
(Lawrence et al. 2020)

Types of relationships



Adoption of Western Models in Japan (the case of Meiji period: 1868-1912)

D. Eleanor Westney (1987) *Imitation and Innovation. The Transfer of Western Organizational Patterns to Meiji Japan*, Cambridge: Harvard University Press.

✓**Remarkable features of Meiji Japan:** voluntary (p.12, 18, 23)

✓**Focusing on adoption & adaptation:** the successful imitation of foreign organizational patterns requires innovation (p.6)

- ➢ All organizations must draw on the surrounding environment for resources and must respond to the external demand for their products or services. (p.6)

✓**Roles of Western Models:** inspiration and legitimation (p.219)

- ➢ Inspiration is providing the ideas for innovations in organizational patterns: it centers on the question, "How have other organizations solved this problem?"
- ➢ Legitimation involves generating a convincing precedent for innovations: it centers on the question, "Who else (that we respect) solved the problem this way?"

Research questions

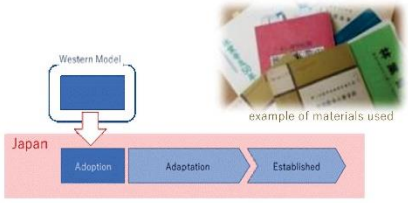
To understand the characteristics of forest policy for small-scale forestry in Japan from the perspective of the dynamic policy shaping process...

- Scale and content of the impact :
  How and to what extent are Japanese policies linked to those of Western countries?
- Self-motivation:
  Were there any self-motivated parts on the Japanese side?
  If so, what did it mean?
- Innovation:
  Were there any innovations done that would make imitation a success?

Method

[Adoption]
- ✓Why was it adopted by Japan?
- ✓What was adopted in Japan?

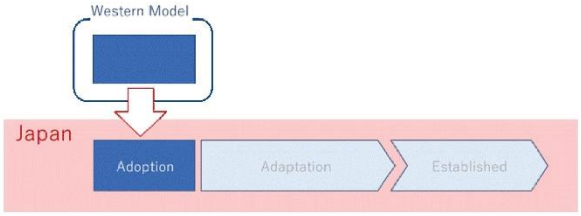
[Adaptation]
- ✓What was changed in Japan?
- ✓Why did it change in Japan?



Results

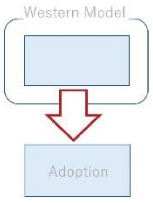
(1) U.S. Forestry Extension System

Adoption



Why was it adopted by Japan?

1949-1950



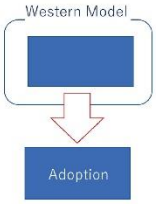
Forced: Introduced at the direction of the US occupation of Japan

From records of the Forestry Agency:
*"Although there were some points that were difficult to understand, they were **unavoidable**."*
(林野庁編1971, 32)

- Main interests: rural democratization
- Recognition of the problem in Japan
  - Large gap between
    - ✓ many **excellent research results**
    - ✓ **Knowledge of the people in general**
- Considered necessary
  - ✓ Establishment of a **consistent research** and **extension system**

What was adopted in Japan?

1949-1950

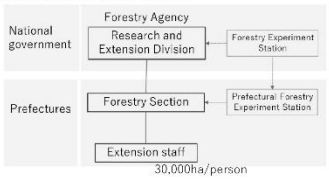


Adopted Policies

- ✓ Strong promotion of experimental research on forestry
- ✓ Rapid diffusion of its results
- ✓ Balancing Planting and Logging

&

Organization and staff



*Organization **incorporating universities** and other educational and research institutions **not adopted**

➢ What was new to Japanese Officers

Adopted "Forestry Extension": **Bottom-up education**
→completely new way of thinking

◆ Examples of guidance from US forester

- ✓ **Service** to owners instead of guidance
- ✓ **Demonstrations** instead of lectures

Was the adoption completely forced?: Did the Japanese side adopt it reluctantly?

1949-1950

Answer: No.

Forced, but **willing to work on it.**

US officer

Trusted & appreciated

Comments of Japanese foresters:
*"His **passion** for his work blew away the differences in nationality and gave us a **warm blood connection**.." (原1959)*

Mutual trust

Japanese practitioners

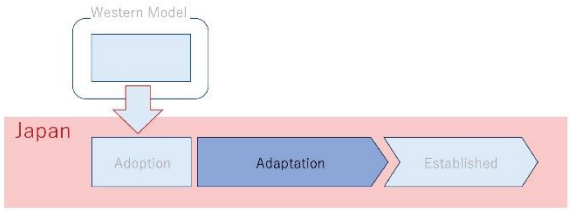
Greatly motivated

Comments of Japanese foresters:
*"Roughly one-third of them were **repatriates** from the outer regions formerly controlled by Japan" (全林協編1975, 115) and "they have **a lot of experience** in forestry ," but "could **dive into this new** type of job with new sensations" (原1959)*

(1) U.S. Forestry Extension System

Adaptation

Phase 1



What was changed in Japan?

1951-1955

Phase 1 **Purification** to farmer-oriented extension

Critical review by Japanese extension officers

Adopted Policies

- ✓ Strong promotion of experimental research on forestry
- ✓ Rapid diffusion of its results
- ✓ Balancing planting and logging

Ideal status

Voluntary learning by farmers
rather than transfer of superior technology

Prioritization of farmers' private interests
rather than priority of the public interest

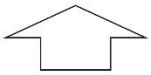
➢ Main measures:

- ✓ Fostering voluntary research groups of farmers
- ✓ Training of extension staff

Why was it changed in Japan?

1951-1955
Phase 1 **Purification** to farmer-oriented extension

Critical review by Japanese extension officers
✓ **Self-motivated process** by Japanese foresters

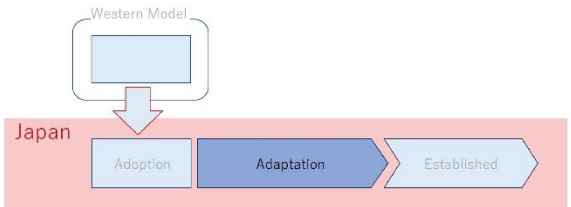


➢ Why was it possible?
- ✓ External factor: end of occupation
- ✓ Internal factor: well-motivated Japanese foresters

Difference to the next phase
- ✓ Relatively independent decision-making regarding extension projects.

(1) U.S. Forestry Extension System

Adaptation
Phase 2



What was changed in Japan?

1956-
Phase 2

Integrated into the government's policy implementation
Increased other tasks ...

- Integrated Policy
  - ✓ Forestry planning
  - ✓ Implementation of government-subsidized projects
    (ex. forest conversion: from forests for fuel to forests for industrial wood)
    - ◆ Accelerating due to increased emphasis of government policy on public investment

Comments of extension foresters:
*"**Extension staff should promote implementation of government policies, not talk to farmers**"*
That's what it has come to. (座談会1959)

...and reduced contact with farmers

Further push
✓ Especially in the 2000s-: Personnel reduction in local governments

Why was it changed in Japan?

1956-
Phase 2

Integrated into the government's policy implementation
Increased other tasks and reduced contact with farmers

Government's demand outside of forest policy

- Trigger: Budget assessment by the Ministry of Finance
  - Realization of national requirements
  - Efficiency of public policy
  - Implementation of policies with clear effects

Other factors that exacerbate the situation

Change in forestry
✓ Long-term trend: Declining interest in forests among forest owners

Personnel customs
✓ Frequent personnel transfer customs

Did motivated extension staff totally disappear?

1956-
Phase 2

Answer: No.

- ✓ Although conditions and environments have changed and the major trend has been away from farmers, **some foresters continue to provide** extension services by engaging directly with local people.

Has voluntary learning by the farmers been lost?

1956-
Phase 2

Answer: No.

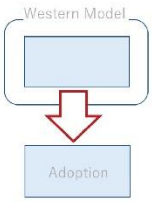
- ✓ **Some groups are still active** in the voluntary learning groups established in Phase 1.
- ✓ **New types of voluntary learning** are also being developed.

(2) Concept of European Foresters

Adoption

Why was it adopted by Japan?

2009



Voluntary: Introduced by the newly governing party at that time

- Main interests: Revitalizing Japan's forestry industry by following the model of European forestry
- Recognition of the problem in Japan

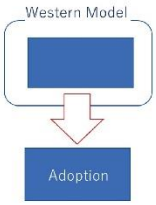
  Foresters in Europe
  - playing a key role in vitalizing small-scale forestry

  Extension staff in Japan
  - Insufficient quantitatively and qualitatively
    - Too busy and not enough time
    - Frequent personnel changes
- Considered necessary
  - ✓ Training and deployment of Foresters in Japan like in Europe

(梶山2004, 2005)

What was adopted in Japan?

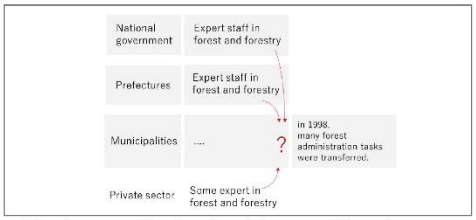
2010-



Qualification: "Japan-style forester"

- ✓ It can be obtained by passing an exam, either by extension staff, other public officials or by private professionals.
- ✓ Expected role: Support for Municipal Administration

***No authority was adopted.**
* The workload of extension staff cannot be reduced, and personnel transfer practices cannot be changed.



***No clear organizational position was adopted.**
No systematic and direct connection with the forest owners.

- What can not be changed?

Intergovernmental allocation of authority

- ✓ **Municipalities, which generally do not employ foresters, have the authority to supervise general private forest** operations.
  - It was transferred in 1998 as part of the decentralization process.

Personnel customs in local governments

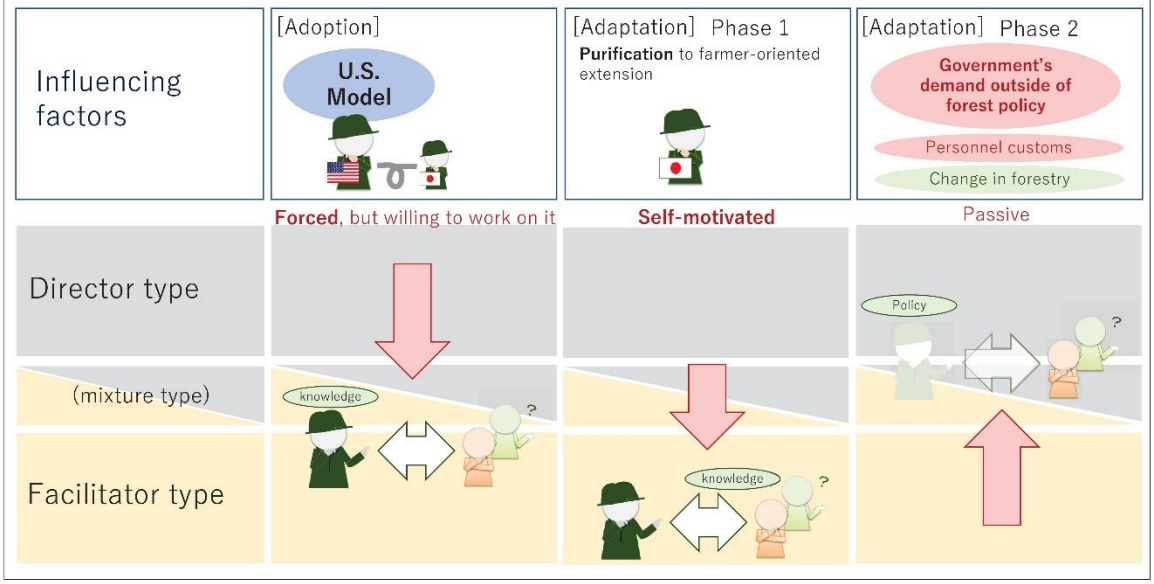
- ✓ **Staffing and personnel customs** of local governments, such as municipalities, cannot be changed as national forest policy.

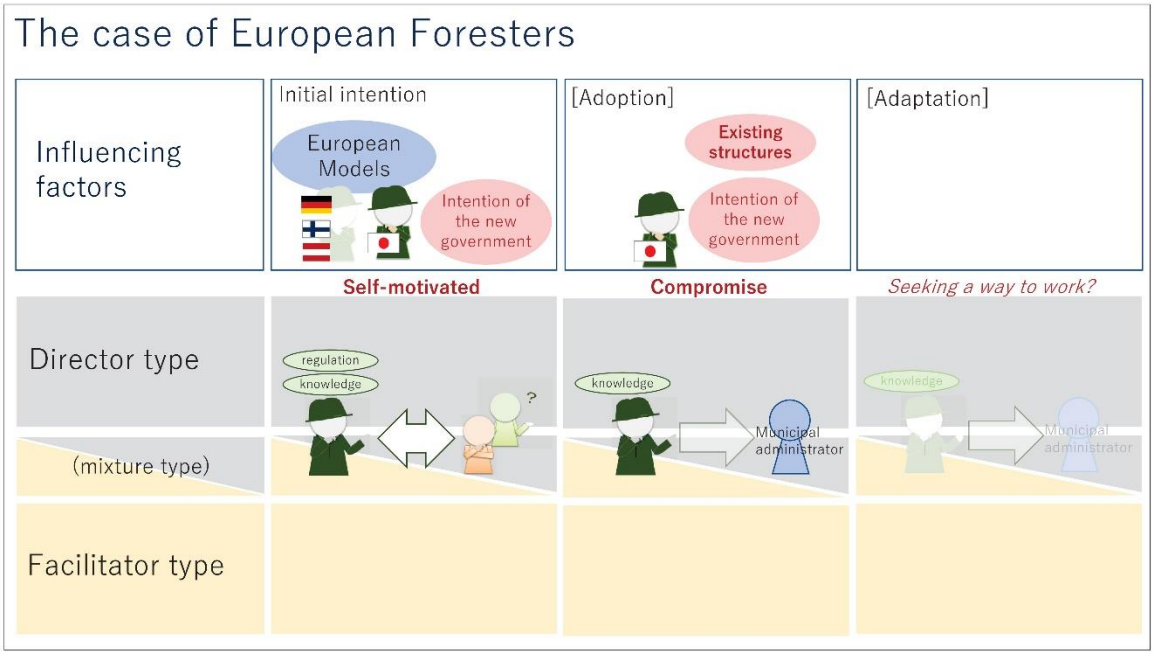
(2) Concept of European Foresters

Adaptation ?

No clear system has been adopted that can be adapted.

The case of U.S. Forestry Extension System




The case of European Foresters
Influencing factors
Initial intention
European Models
Intention of the new government
[Adoption]
Existing structures
Intention of the new government
[Adaptation]
Self-motivated
Compromise
Seeking a way to work?
Director type
(mixture type)
Facilitator type
regulation
knowledge
?
knowledge
Municipal administrator
knowledge
Municipal administrator


Conclusion

Scale and content of the impact: Differences between the cases

- Understanding of the original model

U.S. Forestry Extension System	European Foresters
✓ **Direct** introduction	✓ **Indirect** introduction

- Scale of Adoption

U.S. Forestry Extension System	European Foresters
✓ **Whole system** implementation with reorganization and staffing	✓ **Limited** to what can be integrated **within existing systems**

- Scale of Impact

U.S. Forestry Extension System	European Foresters
✓ **Large**, at least still exists	✓ **Very limited**, not functioning well

Scale and content of the impact: Common Features of the two cases

✓ **Inspiration** provided by the Western Models

- In both cases, the Western models provided inspiration to some extent.
- Especially, **the ideas on communication style with farmers** provided by the adoption of the US extension system were perceived as something completely new for Japanese at that time and **became a strong driver of subsequent voluntary innovations.**

✓ **Legitimation** provided by the Western Models

- In both cases, the Western models provided **significant legitimation**.
- Because of this legitimation, **the importance of human resource development, which is not easily recognized in Japan, was highlighted as a major issue.**

Self-motivation & innovation

- ✓ **The Purification to farmer-oriented extension (Phase 1)** is considered **an innovation by self-motivated Japanese foresters** to reshape the system more in line with the reality of rural Japan.
- ✓ **The adoption** of the US model itself **was basically forced**, but innovation occurred voluntarily.
- ✓ This was possible because the Japanese forestry officers were **motivated by their work** and **had room for voluntary initiatives.**

Implications of this study

Room for voluntary initiatives by foresters and **their motivation and perception of their work** seem to be **important for locally-oriented innovation** in a system based on an external model.

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B2-06

Western impact on small-scale forestry policy in China

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This study attempts to identify the characteristics of small-scale forestry policy in China, focusing on the impact originated from Western countries. In mainland China, small-scale forestry had historically undergone diverse developments, reflecting regional, ecological, and social characteristics. Western knowledge, systems, and concepts introduced in the latter half of the 19th century have affected such regional forestry management. First, political and social changes caused by the expansion of Western powers into China at that point led to China opening up and increasing exchanges with the outside. Second, China needed to rebuild forestry management as it faced serious deforestation and forest deterioration because of human activities throughout history. Increase in natural disasters and shortage of timber resources were recognized as the main problems caused by historical management of forests, including small-scale forestry by farmers and landowners at that time. Therefore, China focused on modern forestry management knowledge, systems, and concepts, introduced mainly from Germany, the United States, and Japan through forestry experts with study experience in these countries. After the establishment of the People's Republic of China in 1949, China's forestry management systems were strongly influenced by those of the Soviet Union, which led the socialist countries. Moreover, since 1949, under the top-down political system, large-scale afforestation by mobilizing local people and strict forest protection by allocating rangers has been emphasized. Thus, China's small-scale forestry policy has developed in a way that it has adopted various Western impacts and undergone its own changes.

Keywords: China, Western impact, modern forestry management, forestry experts

B2-07

Land associations in Slovakia – viable example of small-scale forestry from economic and legal point of view?

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Abstract

Land associations belong to the important legal type of the Slovak forest enterprises – they manage almost 30 % of forest land. Still, their legal and economic regime is somehow specific in comparison with the other legal types of forest enterprises. Nowadays, there are more than 2 700 land associations in Slovakia with the extremely distinct size of forest properties The forest management activities of land associations are thus affected by a number of factors – the most important ones are specific property rights in land associations, economic interests and preferences of forest landowners, legal restrictions, social and environmental interests and preferences of the society. The objective of the paper is to analyse the principles and conditions of sustainable and effective management of forests under specific economic and legal conditions of land associations. The paper presents the most important economic, environmental and societal issues that determine management of the land associations under the Slovak conditions. Finally, it shall enumerate the list of general recommendations for optimal provision of forest ecosystem services in common forests.

Keywords: forest ownership, common forests, land association, ecosystem services, Slovakia

1. Introduction

Common forests have been present as a typical case of land property rights in the area of Slovakia (ŠTEFANOVIČ 2006) since ever. Nowadays, these forests are managed within the legal form of so-called land associations here. Land associations represent very special and important, however rather complicated legal form of forest enterprises in Slovakia, managing almost 31 % of all forests in Slovakia. They run under the specific legal and economic regime and, while being a part of traditional way of living in rural areas, they are significant also for urban population, especially due to the provision of the recreational benefits within the whole range of ecosystem services (CIESIELSKI, STERENCZAK 2018).

There are many problems connected to the forest management in the case of land associations, still, it is possible to solve them. Thus, the main objective of this paper is to discuss the most important and impending problems economic, environmental and societal issues that determine management of the land associations under the Slovak conditions.

2. Historical context of land associations formation

Forest common property in the area of Slovakia, at that time belonging to the Austrian-Hungarian Empire, originates from the 18th century when Austrian empress Maria Theresia in 1767 had issued special decree on the land ownership of Hungarian noblemen and their serfs (LUBY 2002, ŠULEK 2007). According to this decree, the Hungarian serfs were able to manage certain area of agricultural and forest land – they held such land; however the legal owners of the land were only their noblemen. What the serfs had to do for exchange was to fulfil certain duties, such as to provide the noblemen with labour force, perquisites or directly money.

In 1848, as a result of the bourgeois revolution in the Austrian-Hungarian Empire, the serfdom was abolished, and former serfs were compensated for previous duties provided for their noblemen – they got certain portion of pastures and forest land to their hereditary possession. The only special issue was that these serfs were no single owners of the land – the single legal owner was the group of

families living in neighbourhood. Each family disposed of specific ideal share of this common property according to the amount of duties its members were previously obliged to fulfil for the noblemen.

In 1850s, the communities of farmers were allowed to buy smaller portions of land in order to consolidate area of land they owned. Later in the 19th century, the shareholders of common property might be not only the local farmers, but also other inhabitants living in the village, including craftsmen or protestant parishes. Finally, in 1898, the act specifying legal status of common property was issued in the Hungarian part of the monarchy – the common property was defined as a form of indivisible property owned by the group of local inhabitants and their heirs in a form of ideal portions (so-called land association, in Slovak "urbar association").

The institution of common property as a special type of ownership of pastures and forest land, formed as it was described, has survived in the area of Slovakia up till now. The legal act from 1898 has been valid in Slovakia till 1995, when new Act on Land Associations was introduced. However, in the 20th century, the forest ownership structure including common property of forest resources has been significantly changed (ŠULEK – LICHÝ 2015).

The significant change in forest common property occurred in 1949 when all forest holdings in common ownership (together with the municipal forest holdings) were legally expropriated without any compensation. In fact, the land associations administering forest common property were allowed to manage their forest land ("to use" their forest land) till 1958 when all property rights together with the management rights were simply handed over to the state forest enterprises and "urbar associations" were effectively cancelled. (at the end of 1980s, more than 99 % of forest land in Slovakia was in the state ownership). In 1991, the process of restitution of original property rights has started and nowadays, forest common property is the most important type of ownership in the Slovak non-state forestry sector.

In 1995, the first piece of legislation regulating the historical type of common property was enacted in Slovakia – it was the Act 181/1995 Coll. on Land Associations. This act comprised provisions on the creation of land associations, their legal status, management and dissolution as well as provisions on the rights and duties of the individual members of land associations.

According to this Act, the term "land association" meant association of owners of shares of common property of pasture and forest land – the members of such associations were all co-owners of common property. Their rights and duties were administered according to the respective provisions of the Civil Code. Such land association were entitled to manage common property of pasture and forest land according to the respective legal provisions (e.g. Forest Act).

The shared co-ownership of the common property was indivisible – the rules of dividing of individual shares of common property had to safeguard the proper management of forest land. The rights and duties of individual shareholders resulted from the size of their shares on the common property. The members of the land associations (the individual shareholders) were able to transfer their shares together with the respective rights and duties only under specific provisions established in the Act on Land Associations.

At that time, there were two different types of land associations – the first one was the land association without legal personality, the second one was the land association with legal personality. The land association without legal personality were based on the free association of physical persons who were the owners of shares of common property – such land association was created by the registration of the list of at least two thirds of the common property shareholders. Then, the shareholders had to notify the competent county forest office that administered the register of land associations and to elect their authorized representative. In this case, there were not any special provisions on organisation and administration of such land associations, and they performed their activities according to the general provisions of the Civil Code.

The land associations with legal personality were based on the contractual association of physical persons who were the owners of shares of common property – such land association was created by the registration of the agreement on creation of the land association with legal personality.

Such land association was also listed in the register of land associations administered by the competent county forest office. Land associations with legal personality were typical corporations with special management bodies established in accordance with the provisions of the Act on Land Associations – the central management body of such land association was the plenary assembly of all shareholders, the main executive body was the executive committee lead by the elected chairman as a legal representative of the land association, and the supervisory board was the central control body of the land associations consisting of the land association shareholders.

The land association could be dissoluted only in specific cases that were listed in the Act on Land Associations (one of them was transformation of the land associations into the business corporation, another one was the case when there was only one shareholder of land association left, yet another one was the dissolution based on the decision of the plenary assembly of land association).

3. Present state of the Slovak land associations

In May 2013, the innovative Act No. 97/2013 Coll. on Land Associations was enacted in order to meet new challenges brought by the actual state of management of common forests as well as to reflect the comments and suggestions of the land associations themselves. Thus, according to this Act, two types of land associations, both being legal persons, shall be distinguished (land associations without legal personality do not exist anymore):

- simple land associations consisting of one common property (original historical formations) – their ratio legis lies in adjustment of specific property rights based on historical co-ownership of forest lands and pastures and
- simple land associations consisting of different types of properties (new types of so-called jointly managed property) – their ratio legis lies in fulfilment of public interest and individual economic interests of owners related to rational management of land properties.

As a result of this, the new Act introduced transformation of original land associations on one hand, and the possibility of establishment of completely new land associations, on the other.

As it was already mentioned, in 2020, the Slovak land associations managed 30,9 % of forest land in Slovakia, whereas in 2005, it was only 23,8 % of forest land – it means that the share of forest land managed by the land associations increased by almost a third.

Considering the real property rights, the situation is completely different – while in 2005, 24,9 % of the area of forest land was owned by land associations, in 2020 it was only 16,7 %, a decrease to two thirds of the original area. This situation is related to the evidence of the so-called unidentified and presumed owners, whose shares in land associations are handled by the Slovak Land Fund (it also manages shares of common property owned by the state).

Regarding the number of land associations, a total of 2 761 land associations are currently registered in Slovakia, of which most are located in the Prešovský region (727 land associations), the Banskobystrický region (520 land associations) and the Žilinský region (476 land associations). On the contrary, the fewest of them are located in Bratislavský region (49 land communities) and Trnavský Region (111 land communities), which clearly corresponds to the level of forest cover within the individual regions of Slovakia.

In relation to the area of individual land associations, it can be stated that the smallest registered land association has an area of only 37 ha, while the largest one has an area of up to 7 085 ha. In total, almost 32 % of all land associations fall into the size category of 100 – 199 ha, and another more than 17 % of all land associations dispose of an area of less than 100 ha. Based on these figures, it is obvious that almost half of all land associations are smaller than 200 ha, while only less than 5 % of the total number of all land associations dispose of an area of more than 1 000 ha. The average area of one land association is 333 ha, the median value of the area of a land association is 204 ha.

4. Economic, environmental and social problems of the Slovak land associations

Considering the economic results of management of land associations, based on the publicly available data, it can be concluded that there are no differences between common forests and other type of forest ownership, neither when production characteristics nor the economic results are taken into consideration (of course, taking into account all specific management aspects in the case of state forests, such as the administration of forests of un-identified owners with a ban on logging and public benefit activities, exclusion from the provision of compensation for the restriction of management on forest land as a result of prohibitions and restrictive nature protection conditions or limited possibilities of financial support from public sources).

On the other hand, there are enormous differences in the economic results of management between individual land associations – especially land associations with a small area, or land associations in mountainous areas suffer from problems of effective management (GLÜCK 2002). There are two options for solving this particular economic problem – one is the special support of small-sized forests from public sources, the other is the possibility of merging of land associations as the current legislation allows it without any problems, today.

A special economic problem of land associations (although not only in this case, even if the problem is most prominent here) is the question of income diversification of forest enterprises (see also MCKEAN 2000, CHEIKBOSSIAN 2003). While in the case of state forests, 89,57 % of revenues come from wood sales, in community forests it is up to 95,26 % of revenues (in the case of other non-state forests, wood sales represent 94,75 % of total revenues).

The cost side of land associations management is currently largely affected by outsourcing, i.e. by the realisation of silvicultural and harvesting activities through forest contractors (PALUŠ ET AL. 2010). The high level of outsourcing is a result of the pressure to reduce costs (WILLIAMSON 2002), a factor that comes directly from the internal environment of the land associations, from the individual co-owners who are oriented mainly towards the cost-effectiveness of the management of the land associations.

Moreover, the land associations suffer from a problem to ensure performance especially of harvesting activities on their own, due to the technical and technological obsolescence of the machinery – this is a consequence of undersized investment activity, caused, among other things, by the relatively high interest burden in the case of the use of credit financial resources. In this case, there is also a risk of subsequent potential revenue reduction, e.g. due to the sale of wood on the stump. On the other hand, silvicultural activities are, at least partially, carried out by the shareholders or co-owners themselves – such fact shall be perceived rather positively.

A large number of land associations (and often relatively large ones) manage their forests in the protected areas where problems resulting from conflicting relations between forest management and nature protection are very prominent. Economic problems are often directly related to the impact of climate change that is reflected in the large-scale disturbances. It is also interesting to note that only less than 12 % of the total area of land associations is certified under the PEFC certification scheme, while in the case of state forests it is 100 %, in the case of municipal forests it is 71 % and even in the case of individually owned private forests it is 26 % their total area.

When analysing the economic issues of forest management, there is also a growing pressure to provide the recreational function of forests (SCHMITHÜSEN 2007, DOEG ET AL. 2016). In this context, in addition to seriously increased costs and only potentially increased revenues, one must take into account the personal and substantive scope of the use of forests by the general public and, moreover, the increased need to solve problems arising from fault liability of forest owners in order to provide recreation and other cultural forest ecosystem services.

5. Conclusion

The current economic problems of the management of common forests in Slovakia are also closely related to the level of legal regulation of land associations. It should be emphasized that the legal regulation itself does not cause significant problems – on the contrary, the application practice becomes problematic. This fact is further reflected in problems with the management of land associations that may result in problematic economic starting points for management of forests by the land associations in Slovakia. However, if there is a general interest to maintain and function land associations optimally and especially effectively in terms of usefulness and efficiency, the problems of land associations shall not be ignored. What more, it is necessary to help land associations to manage their forests in a better way from the economic, legal, environmental as well as social point of view.

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Act No. 97/2013 Coll. on Land Associations

B2-08

State and development of forests in protected areas of Slovakia according to environmentally appropriate indicators

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Abstract

The paper deals with the analysis of the state and development of forests in protected areas and their evaluation through environmentally acceptable indicators. It compares the state of forest stands according to the levels of protection in two time levels of 2007 and 2022. Based on the obtained results, the current state and development of the majority of examined indicators can be considered to be positive. It mainly concerns trends in the development of tree species composition, spatial structure, the naturalness of forest stands, but also stocking, wood and carbon stocks in forest stands. On the other hand, the representation of forested protected areas in the Slovak Republic (64.2% of the forest area) is very high even from an international point of view. Moreover, further expansion of the non-intervention management in national parks to 75% of their area by 2030 is being prepared, especially in mountainous rural areas, with possible negative impacts on employment and income of the local population. The forest naturalness in the national parks does not correspond to this expansion either. This will cause subsequent damage to the related stands by harmful agents, as well as economic losses, since the share of the forestry sector in the gross domestic product of the Slovak Republic is 2.6%, which is the fourth highest share in Europe.

Keywords: protected areas, levels of protection, indicators of forest state and development.

1. Introduction

The aim of the contribution was to analyze the state and development of the structure of forest stands in protected areas (PA) and outside the PA, through a set of environmentally acceptable indicators and their mutual comparison according to levels of protection based on data on the state of forests in two time levels, namely in 2007 and after 15 years, in 2022.

2. Material and method

The basic data sources were the summary information on the state of forests (SISF), the 1st and 2nd cycle of the National Forest Inventory and Monitoring of the Slovak Republic (NFIM 1 and NFIM 2 SR) carried out in 2005-2006 and 2015-2016, the report on the State of European Forests 2020 (SoEF 2020) and the information system of the State nature conservancy (SNC) of the Slovak Republic. SISF are elaborated annually within the forestry information system (FIS) managed by the National Forest Center (NFC). From this source comes the data on the area of forests, the representation of vegetation levels, the tree species and age composition of the forests, the spatial structure and the growing stock of wood in the forests in the PAs and their division according to the levels of protection (LPs). From the NFIM SR, data on carbon stocks and naturalness of the forests in the PAs were obtained according to LPs. From SoEF 2020, data on the shares of forests in PAs of European states according to MCPFE (Ministerial Conferences on Protection of Forests in Europe) classes were taken, and from the information system of SNC SR, GIS layers with PAs boundaries were taken, through which we determined the areas of forest stands according to individual LPs, as well as other necessary forest stands characteristics.

The necessary summary information for all 5 LPs was obtained from two SISF databases, one from the historical database with summary information for the year 2007 (i.e. data from the Forest management plans (FMPs) valid from 1998 – 2007) and the current database (2022) containing data FMPs valid from 2012 – 2021. Using this procedure, we obtained parallel data from two time levels of 2007 and 2022, which allowed us to compare and evaluate the state and development of the forest structure in the PAs after 15 years, using mainly methods of analysis, synthesis and comparison. The outputs were elaborated in the standard FIS format, from which the required analytical tabular and graphic reports were processed in MS Excel program.

3. Results

3.1 Characteristics of PAs in Slovakia

In Slovakia, two systems of PAs (national and European) are applied and there are also other internationally protected territories:

- The national system of PAs, which includes (national) nature reserves (N)NR, (national) natural monuments (N)NM, i.e. small-scale protected areas (SPAs) and national parks (NP) and protected landscape areas (PLAs), i.e. large-scale protected areas (LPAs). The national system of PAs is declared according to Act no. 543/2002 Coll. on nature and landscape protection, as amended.
- The European system includes two types of PAs declared according to the respective directives of the European Union (EU). It consists of Sites of Community Imprtance (SCIs) and Special Protection Areas (SPAs) so called protected bird areas (PBAs).
- Other internationally protected areas are declared on the basis of other international obligations of the Slovak Republic in the field of nature protection. These are mainly UNESCO biosphere reserves – MaB, Ramsar sites and UNESCO natural heritage sites.

The Nature and Landscape Protection Act specifies prohibited activities and restrictions specifically for the 2nd to 5th LPs. In the first LP, as a rule, the provisions of general protection of nature and landscape are applied. As the level of protection increases, the range of prohibitions and restrictions expands. Forest management is completely excluded in the 5th LP.

In 2021, the total area of the PAs was 1.25 million ha, i.e. 64.2% of the total area of forest stands in Slovakia. The most forest stands are represented in the 1st basic LP (40%), then in the 2nd LP (29%), which is mainly represented by PLAs. It is followed by PBAs (15%), which according to the Nature and Landscape Protection Act are included in the 1st LP, but in their parts restrictions corresponding to the 2nd to 5th LPs are applied, which are defined in the programs for the care of respective PAs as long as have already been developed and approved. The fourth most represented is the 3rd LP (11%), in which NPs prevail. In the 5th LP (4%) are the most strictly protected PAs, especially the SPAs, in which the no-intervention regime is applied. PAs with 4th LP have a representation of 1%. These include mainly (N)NR and (N)NM and their protection zones as well as PLAs and NPs protection zones. SCIs are mostly declared in the 2nd LP. However, their protection is not directly dependent on LPs. If they overlap with the PAs of the national system, the conditions of protection determined by the legal regulation of the PAs declaration, which was issued later, apply.

The current area of 1st LP is almost 700 thousand ha (Figure 1). Since 2007, it has decreased by almost 130 thousand ha (Figure 2), mainly in favor of PBAs (110 thousand ha).

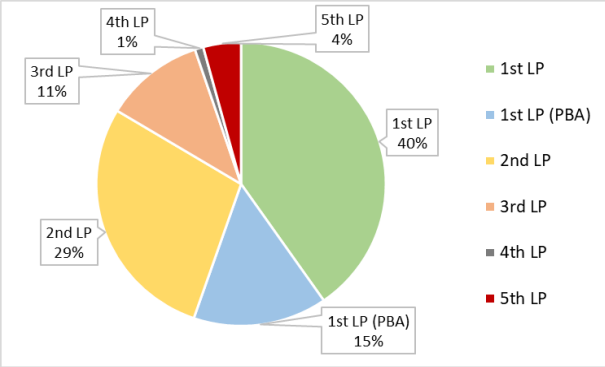

Figure 1: Share of levels of protection (LPs)

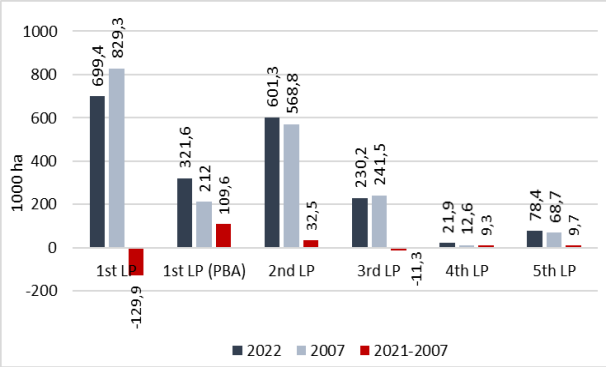

Figure 2: Change of LPs area since 2007

3.2 Comparison of the representation of forests in Pas of European countries

According to the data of the report on the State of Europe´s Forests (FORST EUROPE 2020) In Slovakia there were Pas (without PBAs) on 44% of the area of forest stands. Slovakia was in 4th place among European countries. According to the share of non-intervention areas, the SR was third with a share of 3.5%. However, in 2021, this share increased to 4% with the declaration of the UNESCO site "Carpathian beech forests" on the list of world cultural and natural heritage. Based on the objectives of the Environmental Policy Strategy of the SR until 2030, the area of non-intervention areas in NPs should be increased to 75% of their area, which will increase the total area of forest non-intervention areas in the SR to 8.8%.

3.3 Selection of environmentally acceptable indicators of the structure of forest stands

In order to maintain and strengthen the ecological and production potential of forests in the conditions of climate change, it is necessary to put into practice an alternative of a more resistant type of forests with a rich tree species, age and spatial structure. This rule is important both in protected forests (to strengthen their self-regulating capacity) and in forests outside PAs (to increase their stability and resistance to harmful agents).

For this reason, we examined the state of forest stands in individual LPs according to internationally recognized "ecological" indicators, also used in the framework of the FAO Global Forest Resources Assessment (GFRA), the FOREST EUROPE report on the State of Europe´s Forests (SoEF), as well as the Montreal Process (MP). We mainly used the following indicators: representation and number of tree species in forest stands, forest type (coniferous, deciduous, mixed), horizontal and vertical structure (stocking, number of layers), naturalness, as well as the wood and carbon stock in the biomass of forest stands per 1 ha.

3.4 Comparison of the state and development of forest stands according to LPs in 2007 and 2022

We present the comparison for three LPs (5th, 3rd and 1st), in which the most significant differences are in the restrictive conditions of nature protection, as well as in the management of the respective forest stands.

In all examined LPs, the representation of less stable coniferous forests has decreased since 2007 in favor of more stable deciduous and mixed forests (Figure 3). Equally positive was the decrease in the area representation of monoculture forest stands with a low number of trees. This finding was also significantly confirmed in the forest stands of the 1st LP outside the protected area (Figure 4).

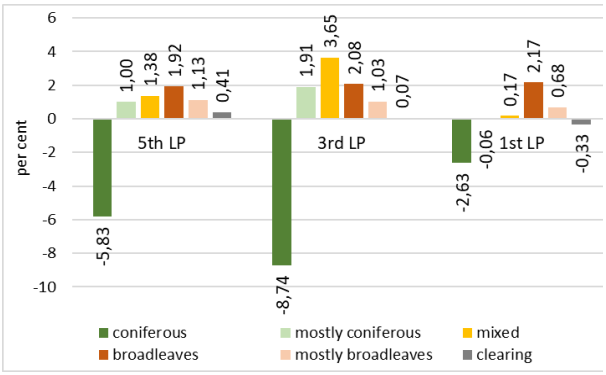

Figure 3: Changes in representation of forest types since 2007 by LPs (%)

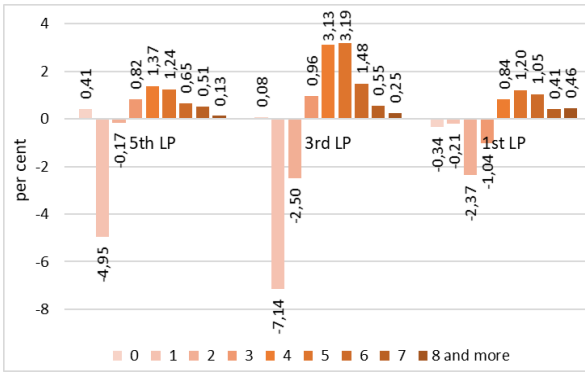

Figure 4: Changes in number of tree species in forest stands since 2007 by LPs (%)

Equally positive is the trend of decreasing the share of single-layer, less stable forest stands of the same age. The representation of these forest stands decreased the most in the 5th LP by 10.1%, then in the 3rd LP by 4.4% and finally in the 1st LP by 2.8% (Figure 5). The relative density of forest stands (socking) increased the most in the 1st LP by 7.8%, then in the 3rd LP by 5.8% and finally in the 5th LP by 2.7% (Figure 6).

Figure 5: Change of area share of forest stands by number of storeys and LPs since 2007

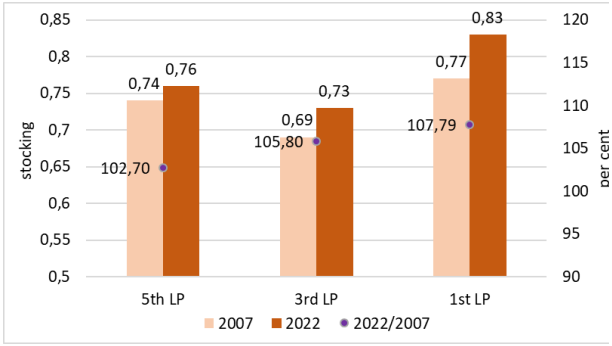

Figure 6: Relative stand density (stocking) by LPs and its change since 2007

The development of the indicators presented so far indicates a gradual approach towards more resistant forest types with a richer tree species, age and spatial structure.

Also, the growing stock of wood per 1 ha has increased since 2007 in all examined LPs, by more than 7% in the 1st and 5th LPs. Currently, the highest volume of growing stock under bark is 247 m^3 in the 1st LP (Figure 7). There is also a very high volume of dead wood in the forests of Slovakia (45 m3/ha). The given volume includes all components of dead wood: standing, lying, stumps and thin wood less than 10 cm thick (Figure 8). Based on the comparison of NFIM 1 and NFIM 2 data, the volume of dead wood increased even more (especially in the 4th and 5th LPs) and is the highest among all European countries (SoEF 2020).

Increasing the volume of wood in forest stands has a positive effect on the volume of carbon stored in forest ecosystems. Forests contribute significantly to the reduction of greenhouse gas emissions, especially carbon dioxide, into the atmosphere through their ability to sequester carbon. According to NFIM 2 data, the amount of carbon stored in the trees of all examined LPs is very similar, ranging from 93.5 to 96.3 tons per 1 ha. The amount of carbon in dead wood decreases proportionally with decreasing LP. The same applies to the amount of carbon stored in litter and humus.

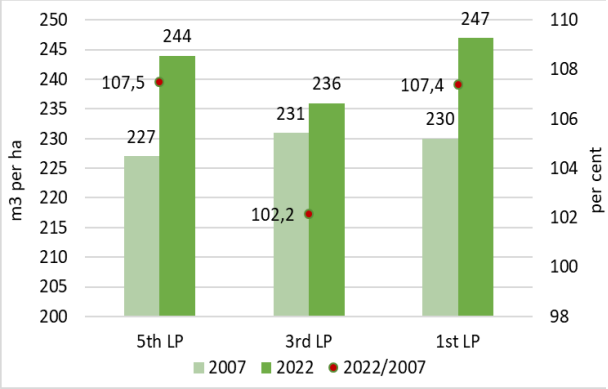

Figure 7: Growing stock per ha by LPs and its change since 2007

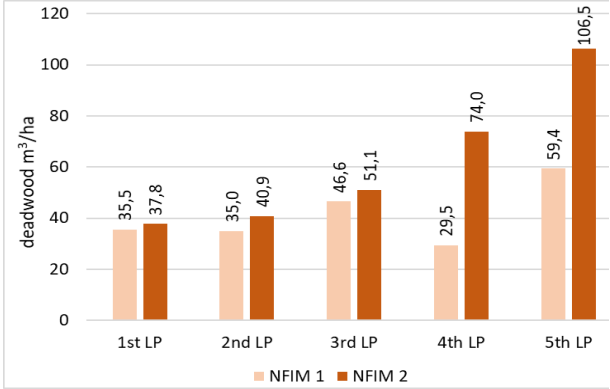

Figure 8: Change of deadwood stock by LPs between two cycles of NFIM

4. Discussion and conclusion

According to the presented data, the current state and development of the majority of evaluated ecological indicators in the three examined LPs, which cover 52% of the area of forest stands in Slovakia, can be evaluated very positively. Even in the 1st LP, which mainly includes commercial forests, positive trends were found in the tree species composition, spatial structure and naturalness of the forest stands. On the other hand, even in forest stands with strict protection (in the 5th and 3rd LPs) an improvement in such indicators as stocking, timber and carbon stock was observed.

However, as we found out, the representation of forest protected areas in Slovakia (64.2% of the forest area) is very high, even from an international point of view. We are of the opinion that the basic principle of sustainable forest management, which is the balanced provision of all three types of forest services: ecological, social and economic, is failing. Despite this, further tightening of protection is being prepared, in particular the extension of the non-intervention regime in NPs to 75% of their area by 2030. This will be implemented mainly in mountainous rural areas, where the use of forest resources has always been important in terms of employment and income of the local population. Figure 9 shows the representation of individual LPs in altitudinal vegetation zones, from which the highest representation of the most severe LPs (3rd to 5th) in mountain forests of the 6th to 8th vegetation zones is evident. In the lowlands and uplands of the 1st-5th vegetation zones, the 1st and 2nd LPs prevail.

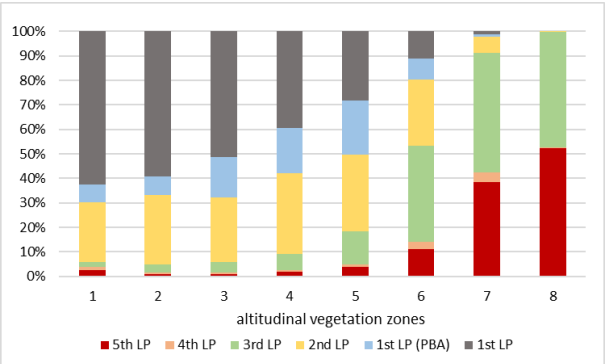

Figure 9: Shares of LPs in altitudinal vegetation zones

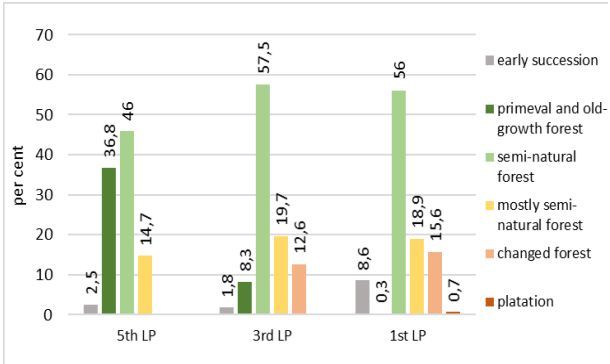

Figure 10: Representation of naturalness classes in LPs

The planned extension of the non-intervention 5th LP is not justified by the state of the forest stands in the NPs, which are mainly formed by partially changed natural forest stands with little

differentiated age and spatial structure, without the preserved ability of self-regulation. The structure of the forest naturalness of forest stands in the national parks is very similar to the structure in the 1st LP with a predominant representation of commercial forests (Figure 10). A non-intervention regime in partially changed forest stands in the NPs will cause them to be damaged by abiotic harmful agents (mainly wind) and subsequently by biotic agents (especially bark beetles).

The aforementioned restrictions in the interest of nature protection will also have negative economic impacts. The share of the forestry sector in the gross domestic product of the Slovak economy is 2.6%, which is well above the average of European regions. Compared to European countries, the above-mentioned share of Slovakia is the 4th highest after Latvia, Estonia and Finland (FOREST EUROPE 2020). The existing nature protection system is very unclear from the point of view of forestry. Three systems of PAs (national, European NATURA 2000 and other international) overlap on large areas (on 778 thousand ha, or 62% of all PAs). As a result, different requirements and restrictions resulting from the national Nature and Landscape Protection Act, European directives, but also other international protected areas overlap in the same forest stands. These requirements are often contradictory, redundant and unnecessarily complicate the systematic management and care of forests in overlapping protected areeas.

Acknowledgment

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B2-09

Liability for stumps rolling down from windthrow areas in Austria

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Abstract

In recent years, natural disasters such as thunderstorms have severely impacted forests by throwing huge areas. From both economic as well as a liability perspective, small-scale forest owners are especially affected by that,. This paper shows which liabilities may arise under Austrian law for forest owners from such windthrow areas, with special focus on tree stumps rolling downhill and damaging underlying structures or people while discussing how forest owners may successfully mitigate such liability risks.

Keywords: Liability for windthrows, Austrian liability rules, Austria, liability mitigation, natural disasters, small scale forestry

Introduction

Low-pressure complexes that reach wind speeds exceeding hurricane force in their frontal zone have been a determining aspect of forest management in the Austrian Federal Province of Carinthia as well as in large parts of Europe. In Carinthia, extensive experience with large-scale windthrow was already gained after the storm “Paula” in January 2008, when 1.75 million solid cubic metres of wood were damaged.

Figure 1: Windthrow area of the storm low “Vaia” in the Wangenitzental
Source: *P. Herbst*

In 2018, the storm "Vaia" caused windthrows affecting a total forest area of about 4300 ha in the Austrian Federal Provinces of Carinthia and East Tyrol. Remarkably, 59 % of the damaged areas are located in terrain with a slope steeper than 30 degrees[2].
Terrain with such steepness also corresponds to the slope inclination that is assumed to be critical for the rolling and falling of root plates set up by windthrow. Such conditions are found on slopes steeper than 25 to 30 degrees, depending mainly on the soil conditions and exposure.
Accordingly, storm "Vaia" alone has created a latent source of danger in the Austrian Federal Provinces of Carinthia and East Tyrol on a forest area of at least 2500 ha due which may materialize if root plates roll or fall out of the forest. Another major liability factor are root plates remaining in forests after processing windthrows since they may damage underlying properties or persons if they are severed from the ground and roll or fall downwards.

Figure 2: Windthrow area above a road
Source: M. Granitzer

The above-mentioned circumstances may create substantial liabilities for both forest and road owners, especially affecting small-scale forest owners who own around 70 % of the affected areas in Austria. There have already been several court cases against forest owners, after remaining roots holding stumps of toppled trees rotted and the released tree stumps rolled downhill, damaging infrastructure below. Such cases pose severe threats to the economic viability, especially of small-scale forest owners.

[2] Storm "Vaia" 2018 Carinthia and East Tyrol; WLV, Federal Ministry of Sustainability and Tourism (2019).

Results

Liability under Austrian law

General

Austrian law provides for several legal bases regarding liability for rolling and falling root plates, most importantly the liability for structures according to Section 1319 Austrian Civil Code, the liability of road holders according to Section 1319a Austrian Civil Code, the liability according to the "Ingerenzprinzip" as well as the specific forest liability of Section 176 Austrian Forest Act.

Irrespective of the specific features of the above-mentioned liabilities, general civil law liability principles according to Section 1295 ff Austrian Civil Code apply. Accordingly, a person is liable if damage has occurred, the action of the damaging party was causal for it, and the damaging party acted unlawfully and culpably (fault-based liability)[3].

Fault-based liability requires the fault of the damaging party which is defined as the personal reproachability of the unlawful conduct of damaging party. A further distinction regarding the degree of fault is made between slight and gross negligence as well as intent.

Negligence is generally deemed to have occurred if the person who caused the damage acted in an objectively negligent manner and can also be subjectively blamed for this negligence[4].

Slight negligence occurs when a damaging party commits a breach of duty of care that could also happen to a careful comparable person. For example, the Austrian Supreme Court qualified a forest owner's behavior who stretched a silver-grey metal chain across a road which caused a mountain biker to fall and seriously injure himself as slight negligence. The court ruled that the metal chain was recognizable from 25 m given average attention, and the forest road owner could not be accused of gross negligence despite the lack of further protection which in turn lead to the forest owner not being liable[5].

Gross negligence exists if there is an extraordinary and conspicuous neglect of a duty of care and the occurrence of the damage can be assumed to be almost probable.[6] The Austrian Supreme Court qualified as gross negligence the stretching of a not clearly visible pasture barrier tape over an estate road open for mountain biking at a height of three quarters of a meter without protection or marking (e.g. by warning signs or tapes or cloths hanging down from the barrier tape), because this created a source of danger that was difficult to recognize and which, moreover, a mountain biker on an estate road open for mountain biking should in no way expect[7].

Finally, intent exists if the damaging party inflicts the damage with knowledge and will, i.e., intentionally[8].

Liability in forests

According to Section 33 Austrian Forest Act, forest within the meaning of the Forest Act may be entered by anyone for recreational purposes, although there are several restrictions on this general right of entry (for example, for forestry facilities, camping, driving, horseback riding and so on).

To compensate for the restriction of ownership experienced by forest owners due to the right of entry granted to the public in 1975, Section 176 Para 1 and Para 2 Austrian Forest Act contain a fundamental exemption from liability as follows: From a liability perspective, people enter forest on their own risk, i.e., with the forest owner principally not being liable. Forest owners and their people as well as other persons involved in forest management are not obliged to avert the risk of damage that could arise off public roads and paths due to the condition of the forest. In principle, they are also not obliged to change the condition of the forest ground and its vegetation in such a way that such dangers are averted

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[3] *Kodek* in *Kletečka/Schauer*, ABGB-ON[1.03] § 1293 ff.
[4] *Reischauer* in *Rummel*, ABGB[3] § 1294 ABGB Recital 21.
[5] Austrian Supreme Court 28.11.2012, 4 Ob 200/12h.
[6] Austrian Rule of Law RS0030644.
[7] Austrian Supreme Court 28.2.2012, 4 Ob 211/11z.
[8] *Reischauer* in *Rummel*, ABGB[3] § 1294 ABGB Recital 22.

or prevented. However, there are very important exceptions to this general exemption from liability of forest owners, which are outlined below.

Liability in the event of force majeure

The general principle in liability law is that the damaged party is not entitled to damages for damage caused by chance ("casum sentit dominus")[9]. These random events also include so-called "force majeure". This is when an extraordinary external event occurs that does not occur with a certain regularity or is not to be expected and cannot be averted or made harmless in its consequences even by exercising the utmost reasonable care[10]. In general, however, any other event that cannot be averted despite all conceivable expertise and caution is also to be classified as force majeure. Force majeure includes, for example, strong storms (and their effects on forests), floods, mudslides, avalanches and rockfalls.

Unless there are contractual or legal obligations, forest owners are not liable for cases of force majeure. Such legal obligations are, for example, the forestry law provisions of Section 27 - 31 Austrian Forest Act on banishment, which serve to protect third parties against natural events by obliging forest owners to use their forest in a certain way[11].

However, this does not apply if forest owners created such hazardous situations themselves or if the risk has been significantly increased by their actions.[12] This refers to cases in which forest owners act arbitrarily, for example, by slipping logs while logging[13] or by particularly dangerous forest use chosen by the forest owner which increases rockfall hazards[14]. Even if, for example, red rot occurs through the fault of forest owners or their people which cause the damaging event, liability can arise for the forest owner despite the existence of an elementary event.[15] Accordingly, it is essential that forest owners adhere to state of the art procedures when processing windthrows to exclude such liability.

State of the art

Processing of windthrown trees involves an extremely high safety risk which is why accident prevention is important. To mitigate risk, forest owners are expected to conduct processing following state of the art procedures which are clearly defined in numerous guidelines and brochures[16]. In connection with rolling and falling root plates after windthrow processing, the following must be particularly observed by persons processing windthrows: In order to avoid endangering oneself as well as others by tipping or rolling root plates when cutting, root plates are to be set up with the first leaf, thrown trees are to be equalised with the root plate if necessary and root plates that cannot be folded back are to be secured by leaving longer sections of stem[17].

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9 *Schacherreiter* in *Kletečka/Schauer*, ABGB-ON1.07 § 1311 Recital 1.
10 Austrian Rule of Law RS0029808.
11 Austrian Supreme Court 13.11.1968, 7 Ob 215/68.
12 *Karner* in *Kanonier/Rudolf-Miklau*, Regionale Risiko Governance: Recht, Politik und Praxis S. 284 p. 284.
13 Austrian Supreme Court 26.1.1999, 5 Ob 3/99y.
14 Austrian Supreme Court 20.3.1997, 2 Ob 13/97v.
15 Austrian Higher Administrative Court 14.09.1956, 0059/54.
16 *Hader/Mühlegger/Sperrer*, Merkblatt zur Windwurfaufarbeitung (2008); https://www.fasttraunkirchen.at/images/pdf/Sturmholzaufarbeitung.pdf, visited on 6.8.2021; *Pfeiffer/Spiess/Gruber*, Schadholzaufarbeitung SVB/LKNÖ St. Pölten (2012).
17 *Hader et al,* Merkblatt zur Windwurfaufarbeitung (2008).

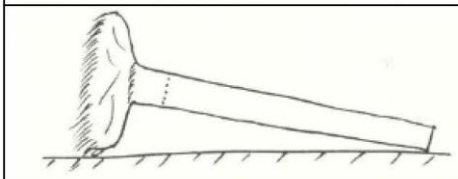
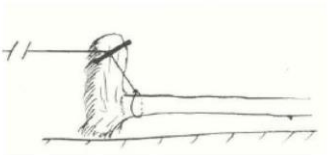
Gefahrenminimierung durch folgende Sicherheitsmaßnahmen	
	• Langen Stock belassen
	• Erdbloch vorerst nicht abtrennen • Wurzelteller mit Seilwinde aufstellen und Erdbloch anschließend wie Stumpen fällen
	• Sichern mit Stahlseil über beigelegtes Querholz am Wurzelteller

Figure 3: Safety measures for hazard minimization
Source: *Hader et al*, Merkblatt zur Windwurfaufarbeitung

Before cutting, upright or overhanging root plates should be secured; after cutting, they must be folded back where possible. If the root plate cannot be folded back and a longer stem section must therefore be left, the rule of thumb is that the length of the remaining stem section in the ground left as a securing piece must be at least equal to the height of the root plate[18]. In steep terrain or with less grippy soil surfaces (raw humus layers, scree, rock sections exposed by windthrow), the stem sections should be left correspondingly longer.

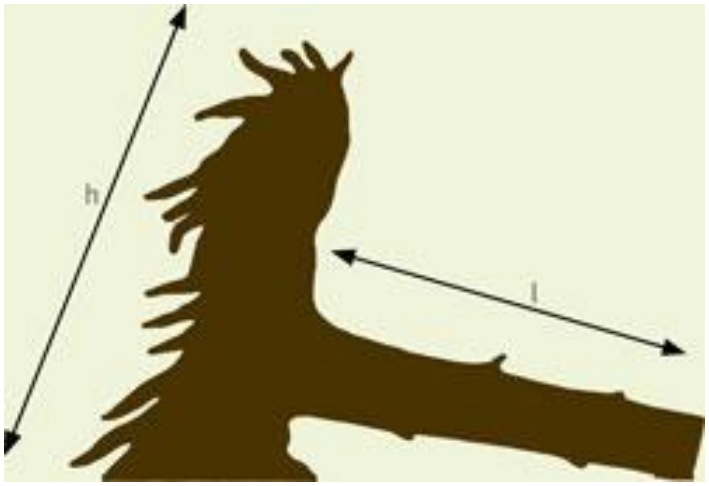


Figure 4: The length of the securing piece (l) corresponds at least to the height of the root plate (h)
Source: DGUV Information 214-046 - Safe forest work (2014)

As a rule, therefore, potentially usable log pieces must be left as a safeguard[19]. Since, in addition to the loss of usable wood mass, this inevitably involves parts of stem section in the ground, both the forest owner and the logging or cableway contractor are often tempted to increase the proceeds in the windthrow area by leaving sections of stump too short. In this way, however, forest owners significantly increase the risk through their actions, which can result in liability for such forest owners.

[18] DGUV Information 214-046 - Sichere Waldarbeiten (2014).
[19] *Pfeiffer et al,* Schadholzaufarbeitung (2012).

Figure 5: Log pieces should be left as a safeguard
Source: M. Granitzer

Liability for the condition of the forest off public roads and paths

Away from public roads and paths, forest owners are not liable for dangers that could arise from the condition of the forest. Current case law generally extends this to all damage caused by the condition of the forest even outside a forest if away from public roads and paths[20]. Forest owners are also explicitly not obliged to change the condition of the forest floor and its vegetation in such a way that hazards are averted or reduced (Section 176 Para 2 Austrian Forest Act).

Forest owners are, however, liable for personal injury and property damage arising from certain sources of danger that can no longer be attributed to the natural state of the forest[21], such as snares, barbed wire remains, pitfall traps etc. Liability only exists in the case of gross negligence. However, this exemption does not cover rolling and falling root plates after windthrows since those are not hazards attributable to the natural state of the forest.

Liability for forest management

Forest owners are liable for damage caused in connection with work carried out during forest management (Section 176 Para 3 Austrian Forest Act). This liability includes personal injury and damage to property. Materially, all those damages are covered that occur during work during forest management, whereby this is to be understood comprehensively[22]. This usually involves activities such as felling trees or operating a winch, but could also include, for example, the erection of a forestry workers' shelter. Naturally, rolling and falling root plates during or after windthrow processing are also to be included. Liability exists in cases of gross negligence and intent. On properly restricted forest areas liability exists only in case of intent (Section 33 Para 2 Austrian Forest Act and Section 34 Austrian Forest Act).

[20] Austrian Supreme Court 30.10.2018, 9 Ob 7/18x.
[21] Austrian Supreme Court 21.12.2011, 7 Ob 171/11i.
[22] Austrian Rule of Law RS0132911.

Liability for forest roads and other paths in the forest

Preliminary remarks

Forest owners, forest path keepers and keepers of other paths in the forest are liable for damage caused by a defective condition of a forest path or other path in the forest (Section 176 Para 4 Austrian Forest Act and Section 1319a Austrian Civil Code). This includes both personal injury and damage to property. These principles apply equally to the assessment of the question of which measures the forest owner must take to avert dangers from the "adjacent forest"[23].

It is important to mention that only forest path owners are always liable according to Section 1319a Austrian Civil Code[24]. Keepers of other paths in the forest, on the other hand, are only liable if the path is "marked", i.e., if the forest owner has dedicated the path for use by the public by marking it accordingly or has tolerated such marking by third parties.

The term "owner of a forest path" (hereinafter also referred to as "owner of any other path in the forest") is defined according to the general term for owners of roads pursuant to Section 1319a Austrian Civil Code. Accordingly, the owner of a path is the person who bears the costs for the construction and maintenance of the path and has the power of disposal to take the corresponding measures[25]. The actual ownership of the path is not important.[26]

Liability only exists in the case of intended use by the damaged party, or if it was not recognizable to the damaged party that the use was not intended (Section 1319a Austrian Civil Code). Furthermore, the forest path owner must act with gross negligence or intent.

Liability area

It should be noted that liability for the safety of the path is to be assumed in the broadest sense and that the duty of the path owner to ensure path safety is not limited to the mere traffic area, but also concerns sources of danger in the spatial surroundings within the scope of what is reasonable[27]. The path owner may thus be obliged to provide possible and reasonable avalanche protection. Likewise, in order to avoid rockfall, the annual inspection of the terrain above the path for loose or friable rock may be required[28].

In addition, the landowner is in principle not liable for damage that occurs because of natural forces without any human intervention or omission[29]. Thus, if the forest owner has had to carry out the state of the art clearing required by forestry law on a windthrown area (leaving upright or overhanging root plates), the owner of the windthrown forest is not liable for this with regard to the path below, but rather the keeper of such path.

Defectiveness

Liability is assumed for the defective condition of a forest path. Whether the condition of a path is **defective** depends on what is **appropriate** and **reasonable for** its construction and maintenance according to the **type of path,** especially its dedication (Section 1319a Para. 2 Austrian Civil Code). The defectiveness can therefore not be defined in a generally valid way but rather depends on the concrete individual case. For example, a motorway requires a different condition than a hiking trail. [30]

The defectiveness of a reclaimed windthrow area is first determined by the extent to which the reclaiming was carried out according to the state of the art. If there are omissions here, it must be

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[23] *Jäger,* Forstrecht (2003) § 176 Recital 11.
[24] Austrian Supreme Court 5.11.1980, 6 Ob 626/80.
[25] Austrian Supreme Court 21.9.1978, 6 Ob 694/78.
[26] *Weixelbraun-Mohr* in *Kletečka/Schauer*, ABGB-ON[1.06] § 1319a Recital 4.
[27] *Bydlinski*, Verkehrssicherungspflichten des Wegehalters im Bergland ZVR Heft 10/1998.
[28] *Karner,* Schutz vor Naturgefahren und Haftung. ZVR 2011/60.
[29] *Fink*, Zur Haftung des Grundeigentümerers für Naturereignisse ZVR 1985/129.
[30] *Reischauer* in *Rummel*, ABGB[3] § 1319a ABGB Recital 6.

examined whether the avoidance of this defectiveness would have been **appropriate** and **reasonable** due to the local conditions. The three key elements determining defectiveness are (i) path type, (ii) adequacy and (iii) reasonableness.

Path type

The type of path is to be taken as an indication of the extent to which the path owner -has control -and safety obligations[31]. The more exposed the geographical location of a path, the more attention must be paid to the fact that certain residual risks are not completely avoidable. Due to the special conditions in high mountains, it is almost impossible to always keep a path in a completely safe condition. According to case law, every path user must be aware of this[32]. The surroundings of a path can also create danger zones. In the area of a steep slope, mudslides and falling rocks can occur, and in the case of windthrow areas, also rolling root plates. Even such possible hazards cannot always be completely prevented by a path owner.

Adequacy

Appropriateness is to be judged according to whether the path of a certain type is properly constructed and maintained. Thus, it is also a question here of the windthrow area having been prepared in accordance with the state of the art.

Reasonableness

In determining what is reasonable, what can be expected of the holder according to general and equitable principles must be considered[33]. Reasonableness means that the assessment must take the best possible account of the specific circumstances of the person concerned (including his or her financial and earning situation). The individual measures to be taken by a path owner depend on what is appropriate for its maintenance according to the type of path, especially its dedication, its geographical location in nature and the resulting extent of its reasonably expected use (traffic need), and what is reasonable according to objective standards[34]. The extent of the duty of care can therefore not be determined in general terms but can only be examined in individual cases[35].

The greater the interest of the forest path owner in the forest path, the greater the maintenance obligations. Therefore, a comprehensive weighing of interests must be carried out, in which, in addition to the reasonableness for the owner, the value of the threatened goods and the dangerousness of the situation must be considered[36]. The person who allows traffic over their property purely out of courtesy can only be reasonably expected to take measures to maintain the path to a very limited extent; as a rule, he will only be subject to duties to warn or cordon off in the event of danger. Therefore, the interest of the owner of the windthrow area in the forest path threatened by rolling root plates must be considered.

According to established case law, the standard of care to be applied also depends on the economic capacity of the respective path owner. Whether a certain duty of path safety is economically reasonable is based on the average (also) financial capacity of similar owners of forest paths – and paths in general of the same or similar type as the forest path. Smaller communities as path owners can be expected to do less than larger ones, but in general the public sector, i.e., also communities, is burdened with more responsibility towards the public than private individuals[37]. In other words, the economic possibilities that the owner's community usually has are decisive for the extent of the safety obligations[38].

Accordingly, for clearing and protection of a windthrow area, liability depends on whether the forest

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31 Austrian Supreme Court 19.10.1989, 7 Ob 632/89p.
32 Austrian Rule of Law RS0023748.
33 Austrian Rule of Law RS0030180.
34 Austrian Supreme Court 17.12.2008, 2 Ob 115/08p.
35 Austrian Rule of Law RS0030202.
36 *Jäger*, Forstrecht (2003) § 176 Recital 11.
37 Austrian Supreme Court 31.8.2016, 2 Ob235/15w.
38 *Bydlinski*, Verkehrssicherungspflichten des Weghalter im Bergland p. 17.

owner on the one hand and the path owner on the other hand can be expected to remove the concrete danger spot at all.

Forest edge liability

Preliminary remarks

"Forest edge liability" refers to liability that may arise from hazards emanating from the forest affecting structures or people outside of such forest. This includes, for example, trees falling from the edge of the forest onto people or buildings, but also rockfall onto a main road caused by mangled trees. On the one hand, there are specifically regulated cases here, such as liability on public roads and paths and liability on forest roads and other paths, but on the other hand there is also general liability for any damage. The path safety obligations of forest owners also play an important role.

„Ingerenzprinzip"

General

The „Ingerenzprinzip" is a legal principle that states that anyone who creates or allows to exist a source of danger must take the necessary precautions to avert the dangers arising from it[39]. However, no excessive requirements may be made for these precautions, especially in those cases in which everyone can protect themselves because the danger is easily recognisable[40]. The general exemption from liability under Section 176 Para 2 Austrian Forest Act does not preclude liability according to the „Ingerenzprinzip" [41]. For public roads and paths, the legal situation has already been comprehensively discussed by case law. According to this, Austrian law burdens the owner of an "adjacent forest" with the duty of care in the case of recognizably dangerous forest conditions along public roads and paths[42]. This duty of care also exists for the benefit of road users of a public road adjacent to the forest, such as motorways and federal roads.

Adjacent forest

The term "adjacent forest" is indeterminate and therefore to be interpreted according to the purpose of the law. Accordingly, case law restricts the term to the immediate area of danger, as only acts or omissions for which a certain occurred outcome is typical should render liable[43]. In other words, forest owners are not liable for atypical, downright improbable damage sequences.

Whether an immediate danger area exists always depends on the concrete individual case. The local conditions play an important role, such as the slope, the density of the tree population, the size of the trees, the subsoil (presence of boulders or larger stones) and other comparable factors. Case law has, for example, judged a tree standing on the edge of a plateau to be a source of danger for a federal road below[44]. The decisive point is that the limitation of liability to gross negligence also applies to the forest next to it[45].

Overall, this means that liability according to the "Ingerenzprinzip" for public roads and paths only exists in case of gross negligence on the part of the adjacent forest owner. Furthermore, the forest must be in the immediate danger zone of the public road or path, which is determined according to the specific individual case.

For damage caused off public roads and paths by an adjacent forest, different principles have been set by case law and doctrine. In certain cases, the "Ingerenzprinzip" is also to be used as a basis for liability for these damages.[46]

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39 Austrian Rule of Law RS0089131.
40 Austrian Supreme Court 14.11.2000, 4 Ob 280/00f.
41 Austrian Rule of Law RS0127655.
42 Austrian Supreme Court 29.8.1995, 1 Ob 625/94 = SZ 68/145.
43 Austrian Supreme Court 26.4.2001, 6 Ob 21/01h.
44 Austrian Supreme Court 26.4.2001, 6 Ob 21/01h.
45 Austrian Supreme Court 26.4.2001, 6 Ob 21/01h.
46 Austrian Supreme Court 30.10.2018, 9 Ob 7/18x.

In principle, however, liability according to the "Ingerenzprinzip" only exists if the hazard causing damage is not a natural forest hazard. On the one hand, this concerns cases in which a source of danger was created that is not related to the forest and its management (for example, an overgrown barbed wire that was not removed by the forest owner)[47]. On the other hand, this also includes cases where an existing hazard in nature is noticeably increased by a dangerous type of use by the forest owner[48]. The latter, in turn, applies if root plates in windthrow areas are cut too short.

Apart from these constellations, the duties of care and responsibility of forest owners are interpreted very restrictively by case law. Part of the doctrine affirms a liability of forest owners also outside the principles outlined above, and by means of a graduated system of duties of care[49]. Case law denies such liability unless the land adjacent to a forest is used in an exceptional manner. In other words, if the area on which the damage occurs due to a source of danger from the forest is used as usual, the forest owner is not liable.

Road safety obligations

In general, the obligations of forest owners to ensure safety play a decisive role. If these are not complied with, there is a case of gross negligence or omission, which in principle gives rise to liability according to the "Ingerenzprinzip" – and possibly also according to other provisions. In connection with root plates rolling or falling during windthrow processing or afterwards, this means that at least insufficient compliance with the state of the art leads to liability consequences.

In summary, it can be said firstly that the more valuable the endangered legal asset is, the greater the extent of the duty to ensure safety is required. Secondly, the more dangerous a situation is, the greater the scope of the duties. Thirdly, the sooner the forest owner can be reasonably expected to take safety measures, the sooner it can be assumed that they must be taken[50].

Recognizability of the danger

In addition, the recognizability of the danger and the appearance of non-existing danger play a special role. The scope and extent of the duty to ensure safety on the road therefore also depend on the extent to which the road users themselves can recognize and counteract existing dangers. The more difficult it is for a road user to recognize a source of danger, the more the duty to safeguard owes corresponding measures to avert danger[51]. Since the possibility of self-protection also plays a role in the existence and scope of the duty of care, the duty of care may, on the other hand, be reduced or not apply at all if the hazard is easily recognizable to everyone.

A source of danger must therefore be secured the sooner it can be assumed that the persons affected by the danger know how to protect themselves from harm. As root plates can also roll over greater distances after windthrow processing, it cannot necessarily be assumed that they are recognizable to users of a road running further below the windthrow area.

Economic reasonableness of hazard elimination

Whether it is reasonable for a forest owner to remove or secure a source of danger is determined by an objective standard. In this context, economic capacity is also an important factor, although this cannot be used as a justification per se. Thus, any duty to safeguard cannot be dismissed across the board with the reference to economic unreasonableness.

If it is unreasonable to remove or secure the specific source of danger, forest owners are still obliged to warn or mark the danger zone. Jurisprudence also places relatively high demands on the duty to warn. For example, the Supreme Court affirmed this in the case of the owner of a large number of water bodies with over 1000 retention basins, since there was a danger to life. A duty to warn is therefore generally reasonable.

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47 Austrian Supreme Court 21.12.2011, 7 Ob 171/11i.

48 Austrian Supreme Court 20.3.1997, 2 Ob 13/97v.

49 *Jandl/Wagner*, Umweltrelevante Haftungsfragen p. 78.

50 *Karner* in *Kanonier/Rudolf-Miklau*, Regionale Risiko Governance: Recht, Politik und Praxis p. 299 et seq.

51 *Loacker,* Vertragliche Verkehrssicherungspflichten oder: Alles ist möglich? VWT 2005 II 2, p. 34.

As a matter of principle, the above-mentioned standards of liability of path owners are to be observed for the duties of road safety (Section 176 Austrian Forest Act and Section 1319a Austrian Civil Code)[52]. If security obligations arise from laws, regulations, or official orders (e.g., conditions in a permit notice[53]), these must naturally be observed as a matter of priority. If forest owners do not comply with these, they are liable in any case.

Protection forests and banning

Protection forests as defined by the Austrian Forest Act

The treatment and use of site or object protection forests is clearly regulated in the Austrian Forest Act. Owners of a protection forest must treat it according to the local conditions in such a way that its preservation is guaranteed as stable as possible, corresponding to the location, with a strong inner structure and timely renewal (Section 22 Para 1 Austrian Forest Act,).

The owner of a site protection forest, which is not an object protection forest in the sense of Section 21 Para 2 Austrian Forest Act, is obliged under Section 22 Para 3 Austrian Forest Act to carry out measures according to the mentioned paras 1 and 4 only insofar as the costs of these measures can be covered from the proceeds of felling in this site protection forest. Section 22 Para 3a Austrian Forest Act obliges the owner of a site protection forest to carry out measures according to paras 1 and 4 only to the extent that the costs of these measures are covered by public funds or payments by beneficiaries.

In addition, the owners of site forests as well as object protection forests are obliged to reforest, as well as to take forest protection measures according to Section 40 to 45 Austrian Forest Act:

- Section Sections 40 to 42 regulate forest fire fighting.
- Section Section 43 regulates the obligation to report a threatening proliferation of forest pests.
- Section Article 44 stipulates that, firstly, the forest owner shall prevent dangerous damage to the forest by forest pests in a suitable and reasonable manner and shall effectively control forest pests that are already multiplying in a dangerous manner. Secondly, if other forests are also threatened by the pest danger, the authority may have to prescribe measures to be carried out jointly or simultaneously by the forest owners of the endangered area by means of a notice or decree.
- Finally, Section 45 prohibits acts or omissions that promote the dangerous proliferation of forest pests; this also applies in cases where there is no immediate threat of mass proliferation. Wood that has already been felled and is infested with forest pests to a dangerous extent or may serve as a breeding ground for them shall be treated wherever it is found in good time to prevent the spread of forest pests. This obligation is incumbent on the forest owner or the respective holder of the timber.

The processing of windthrows is carried out in particular based on the provisions of Section 22 Para 1, 44 ff Austrian Forest Act ("[...] for reasons of forest protection and forest management"). This means that in a site protection forest (which is not at the same time an object protection forest) the forest owner is only obliged to carry out the forestry measures prescribed by law for such forests to the extent that the costs of these measures can be covered from the proceeds of felling in this site protection forest, whereas in an object protection forest the costs of these measures must be covered by public funds or payments by beneficiaries. Regarding the forest protection issue, which is usually used to justify the order for the processing of damaged timber, the Austrian Forest Act clearly states that the prescribed measures must also be reasonable for the forest owner.

Forest banishment

Self-help?

In case of natural hazards such as avalanches or rockfalls, there are, neither claims for damages nor claims under neighboring law. However, if existing legal obligations to avert damage are neglected, such claims may arise. This concerns, for example, the provisions of Sections 27 ff Austrian Forest

[52] *Jäger*, Forstrecht (2003) § 176 Recital 11.
[53] *Karner* in KBB, ABGB[5] § 1311 Recital 4.

Act on banishment[54].

In the opinion of Koziol and Karner[55] , the owner of a property from which a natural hazard emanates must, however, tolerate that the threatened neighbor takes protective measures on the property from which a natural hazard such as rockfall emanates, at least at his own expense. Wagner and Jandl[56] disagree, stating that in the case of pure natural hazards, there is no right to require the landowner of the endangering property to tolerate any safety or removal measures on his property. Necessary damage prevention or removal measures can therefore only be carried out in agreement with the property owner concerned. In connection with hazards emanating from forests, this problem can be countered by banishment as an instrument of hazard prevention provided for in the Austrian Forest Act.[57] This also fulfils the legal obligation to avert damage.

Banishment

Forests that serve the direct defense against dangers arising from the condition of the forest or its management are to be banned by order pursuant to Section 27 Para 1 Austrian Forest Act. The prerequisite for this is that the purpose of the ban (i.e., the economic or other public interest to be protected) proves to be more important than the disadvantages associated with the restriction of forest management because of the ban.

Section 27 Para 2 Austrian Forest Act provides for the following banishment purposes:

a) protection against avalanches, rockfall, rockslides, snow slides, landslides, floods, wind or similar hazards, e.g., rolling rootstocks in the course of or after windthrow work, or

e) securing the usability of traffic facilities, or in general

g) protection against hazards resulting from the condition of the forest or its management, e.g., after extensive windthrow. This provision is thus also aimed at hazards of technically unsound management, but not at hazards arising in connection with the implementation of individual management measures (e.g., logs passing through while felling or stones rolling down)[58].

Forests can be brought into such a condition by banishment – and the measures and omissions connected therewith – that no dangers contrary to one of the banishment purposes of Section 27 Para 2 Austrian Forest Act emanate from such forest[59].

Compensation

The costs of the measures prescribed by the authority can be passed on by the forest owner to the beneficiary (e.g., the path owner) according to Section 28 Para 4 Austrian Forest Act. In this context, case law also refers to the duty of the path owner to ensure road safety, who is obliged to observe the condition of the adjacent forest and to take the necessary precautions[60].

The characteristic of being a protection forest does not generally prevent banishment from being imposed[61]. In this context, Section 31 Para 2 Austrian Forest Act therefore ensures that the beneficiaries cannot be called upon to finance measures which the forest owner is already obliged to implement or tolerate according to the regulations concerning the management of the protection forest or other regulations. However, according to Section 22 Para 3 and Section 44 Austrian Forest Act, the question of the economic reasonableness of the prescribed measures must always be considered.

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54 Austrian Supreme Court 13.11.1968, 7 Ob 215/68.

55 *Karner* in *Kanonier/Rudolf-Miklau*, Regionale Risiko Governance: Recht, Politik und Praxis p. 283.

56 *Wagner/Jandl*, Nachbarrechtliche Einstandspflicht bei Hangrutschung infolge risikoerhöhenden Verhaltens.

57 Austrian Supreme Court 26.4.2001, 6 Ob 21/01h.

58 Austrian Higher Administrative Court 19.10.1992, 89/10/0183.

59 Austrian Higher Administrative Court 27.03.1995, 94/10/0106.

60 Austrian Supreme Court 26.04.2001, 6 Ob 21/01h.

61 Austrian Higher Administrative Court 18.10.1993, 90/10/0053.

Conclusions

Windthrow events are generally to be classified as “force majeure” which leads to forest owners principally not being liable for damages arising out of windthrow areas. However, if stem sections are left too short, the forest owner significantly increases the risk of damage through their actions which may result in liability for forest owners despite force majeure. Accordingly, if the processing of the windthrow area does not correspond to the state of the art, this leads to liability consequences.

The state of the art is to leave a longer stem section if the erected root plate cannot be folded back, (Rule of thumb: The length of the stem section left in the ground as a securing piece must correspond to at least to the height of the root plate, in steep terrain or with less grippy ground surfaces respectively more).

Forest owners are generally liable for damage caused by root plates rolling or falling in connection with windthrow processing. Liability however exists only in cases of gross negligence and intent, on properly closed areas liability exists only in cases of intent. There is no liability if the windrow has been processed according to the state of the art.

Road or path holders’ duty to ensure road safety (also forest roads) also concerns sources of danger in the spatial surroundings of the road, insofar as this is reasonable. Road holders are therefore liable for damage caused by rolling or falling root plates from windthrow areas onto roads below, if this is due to the fact that a forest owner carried out the processing of a windthrow area compliant with the state of the art and had to leave upright or overhanging root plates. The principles of path holder liability apply to security measures for “adjacent forests” as well. In summary, forest owners may thus be liable for defective conditions of paths or a windthrow area itself.

Processed windthrow areas are principally defective if they were not processed according to the state of the art. If state of the art was not followed, forest owners may still not be liable if it would not have been appropriate and reasonable to avoid such defectiveness due to local conditions. In mountainous areas, certain residual risks cannot be completely avoided, i.e., it is not possible to mitigate all risks.

Reasonableness is determined by what can be expected of the holder according to general and reasonable principles. It also depends on whether the forest owner can be expected to clear and protect a windthrow area at all, considering their economic capacity.

Liability according to the “Ingerenzprinzip” arises in case of at least gross negligence, i.e., if the state of the art was not observed when processing windthrow areas and falling root plates cause damage.

Road safety obligations can be reduced or completely omitted if hazards are easily recognizable for the public. This is not necessarily the case with rootstocks, which after windthrow can also roll over longer distances onto an underlying road.

Owners of windthrow areas should request banishment of said area for the period of danger as this fulfils the legal obligation to avert damage on therefore excludes the forest owners’ liability. Forest owners may pass such costs onto the beneficiary, e.g., the holder of an underlying road.

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B2-10

Challenges and possibilities of mountain trail maintenance by local residents:

A case study of Mt. Norikura Mountain in Central Japan

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There are many trails in national parks in Japan, which are not well administered, and whose trails are maintained by private sectors. Due to the recent outbreak of a new type of coronavirus infection, maintenance has become inadequate. Therefore, new types of maintenance and management methods should be considered.

This study focuses on the possibility of maintenance of mountain trails in national parks by volunteer local resident. In order to examine the issues of trail maintenance by local residents and the roles of the government and local communities, we participated in the volunteer trail maintenance project by local residents on Mt. Norikura and conducted interviews to local residents.

The results of the observation and survey revealed that maintenance by local residents has the potential to be a new leader in trail maintenance. On the other hand, they were skeptical about trail maintenance and its economic benefits to the region, and showed little motivation for maintenance. It was also revealed that the local residents tend to be more dependent on government, and thus are more susceptible to be greatly influenced by policies.

Therefore, a core person is needed to continue the project. It is also necessary to involve people outside the communities to ensure continuous maintenance.

Keywords: national park, collaborative management, trail

B2-11

Current status and issues of consensus building on ecotourism:

A case study of eco-tour guides in Amami Oshima Island

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In considering the promotion of ecotourism, it is important to unify the concept of ecotourism in the region and to build a framework for cooperation between local residents and implementing agencies. In this study, we examined the efforts and issues of eco-tour guides on Amami Oshima Island as a case study of this concept, unification, and the establishment of a framework. Interviews conducted in December 2021 and May 2022.

This study concluded that the people of Amami learned the lesson of negative impacts of tourism that appeared in Yakushima Island. As a result, they established the "Ecotourism Promotion Council" as a forum to exchange of opinions, among users of forests and marine areas in addition to local governments and guide businesses. Tourist guide formulates the rules and regulation based on the consensus of stakeholders and execute it smoothly. Hence, the voluntary rules for local use were established. In addition, a certified guide system was established to ensure the quality of the guides and to disseminate the voluntary rules. However, some local residents and tourists were found not following the voluntary rules. It was observed that there was lack of proper dissemination of this rules and the certified guide system among the tourists. In addition to consensus-building among stakeholders, wider dissemination of information should be needed.

Keywords: Ecotourism, Amami Oshima Island

P 01

Annual available amount of forest biomass resources from profitable sub-compartments in the Kanuma area of Tochigi Prefecture, Japan

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This study estimated the annual available amount of forest biomass resources from profitable sub-compartments in the Kanuma Area of Tochigi Prefecture, Japan, by considering the regeneration expenses incurred by the sustainability of forest management and by discounting the future revenues and costs to the present net values. In addition to the economic balances, this study estimated the GHG emissions including CO2, CH4, and N2O. The study site has 33,059 ha and 41,062 sub-compartments. Thus, the average area of sub-compartment is only 0.81 ha. Under the Feed-in-Tariff program, the economic balances of both, direct combustion and small-scale gasification facilities would be positive. For log prices of 10,000 JPY/m3 and forest biomass resources prices of 3,000 JPY/tDM, the annual available amount of forest biomass resources with subsidies and regeneration costs was estimated at 12,044 tDM/year. Since subsidies play important roles on economic balances of regeneration and thinning operations in Japan, the annual available amount of forest biomass resources without subsidies was reduced to 2,710 tDM/year. In relation to log price increments, the annual available amounts of forest biomass resources were increased. The GHG emission of the direct combustion plants having a capacity of 5 MW was of 68 gCO2eq/kWh. On the other hand, the GHG emission of a small-scale gasification power plants having a capacity of 2.4 MW was 52 gCO2eq/kWh. Additional analyses on aggregated operations during merging sub-compartments in the watershed will be presented on the poster to improve profitability and reduce GHG emissions.

Keywords: Aggregated operation, economic balance, forest biomass resource, GHG emission, supply potential

P 02

Tree selection method to convert from plantation to mixed conifer-broadleaf forest:

A case study in Kagamiganaru National Forest, Tottori Prefecture

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In recent years, the increase in unsuccessful conifer plantation has been regarded as an issue, and it is recommended to induce a conifer-broadleaved mixed forest in order to exert the multi-functionality of the forest. The case site was Kagamiganaru National Forest, which was a Cryptomeria japonica plantation planted after the WW II. It was planned to cut 27% of C. japonica in an area of 11.92ha to lead to a conifer-broadleaved mixed forest. The invading broadleaved trees were mainly Fagus crenata, which is a climax species, and many Betura grossa, Acanthopanax sciadophylloides and Acer rufinerve were also invaded. The floor plant was mainly Sasa, and it was densely grown in the gap. There were two problems to induce a conifer-broadleaved mixed forest; (1) The logging rate will exceed 27% just by logging around the broad-leaved trees; (2) The overgrowth of Sasa will suppress the invasion of broad-leaved trees, if it was induced to conifer-broadleaved mixed forest by existing methods such as group selection cutting and belt selection cutting. Therefore, a tree selection method was tried based on new criteria. First, broad-leaved trees, which are climax species such as F. crenata and B. grossa, were selected as preferentially preserved trees, and then the C. japonica that suppressed the broad-leaved trees were selected as felled trees. In order to carry out tree selection efficiently, a UAV was taken during the leaf-spreading period of F. crenata, which spreads earlier than other broad-leaved trees, and a vegetation map was created. Broad-leaved trees such as F. crenata were selected based on the vegetation map, and then C. japonica, which is a logging tree, were selected. Future monitoring is important as logging has not yet been completed.

Keywords: Tree selection, Conifer-broadleaf forest, National forest

P 03

Climate-growth response of *Cryptomeria japonica* cultivars in Kyushu, Japan

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Cryptomeria japonica, commonly called Japanese cedar or "Sugi", is an evergreen conifer endemic to Japan and an important forestry species accounting for 44% of the country's total plantation area. In this study, we sampled ring cores from mature trees of *C.japonica* growing in experimental forests in Tano (TN), Shiiba (SB), Kasuya (KS), and Takakuma (TK). A total of 192 ring cores were collected representing the following cultivar: Kumootoshi, Yaichi (early-growth); Obiaka, Yabukuguri (intermediate-growth); and Measa and Ayasugi (late-growth). Ring width measurements were visually counted and verified using a sliding microscope and a digital mini-processor with data inputting software. Cross-dating using COFECHA were performed to build site-based and cultivar-based chronologies. Each ring series was detrended and standardized using ARSTAN to remove non-climatic factors or any age-related variation in ring width. To understand the long-term climate-growth characteristics and infer cultivar-specific growth responses, we checked the correlation of tree ring data with climatic variables such as monthly mean temperature and monthly mean precipitation. Based on results, main three findings are: (1) Sensitivity and response of ring width to temperature and precipitation varies among cultivars and within same-growth type cultivars; (2) Climate sensitivity was highest in TN and early-growth type cultivars showed high sensitivity to temperature at TN and TK; (3) In the site where highest climate sensitivity is observed (TN), precipitation of the previous year's growing season–particularly in the months of February, May and August–tends to negatively affect ring width, while June temperature of the previous growing season and February temperature of the current growing season positively affect ring width. This suggests that climate-growth responses tend to vary more at sites with high temperature/precipitation and that response variation among cultivars suggest variable acclimation potential to future climate.

Keywords: ring chronology, climate-growth response, climate sensitivity, monthly mean temperature, monthly mean precipitation

P 04

An assessment of forest carbon capture and carbon storage:

A methodological considerations for company based perspective

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** Green Carbon OÜ

With the current study the assessment of forest carbon storage and forest carbon capture potential from the company perspective is followed and analyzed as part of the carbon offsetting potential analysis of Estonian University of Life Sciences. The land managed by the Estonian University of Life Sciences is over 11 thousand (11 013) hectares, that include more than 5,7 thousand (5710) forested land. Area covered by wetlands is 4,2 thousand (4238) hectares. The rest of the land comprises agricultural land, grasslands, water bodies, housing and infrastructure land (20,5 hectares).

Forest carbon storage assessment is based on the forest inventory data. Only the above ground stores is under the consideration, storage in tree stems and branches. The carbon capture is based on stem and branch growth functions, wood density and carbon content functions from earlier studies. The forest carbon capture potential is calculated based on stand growth models and is calculated for all the tree cohorts taller than 6 meters.

The overall annual carbon capture potential in forest lands in Estonian University of Life Sciences is 1 390 tons (e.g. 5 095 tons in C02 equivalent). The highest annual carbon capture potential is in the stands in age range 21-30 years (583 kg/ha) and the lowest in age range of 91-100 years.

The analysis and methodology development is a joint cooperation with Green Carbon OÜ and Estonian University of Life Sciences for developing an carbon offsetting methodology applicable in carbon offsetting in different projects or in case of various sized ownerships.

Keywords: carbon offsetting projects, forest stand carbon sequestration

P 05

Ecotourism in Okinawa - Comparing travelers' expectations and perceptions among three different time points

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Abstract
Okinawa has been attracting tourists from both within and outside the country with its rich natural resources, beautiful scenery, and unique culture. The recent recognition of the Yambaru region, the northern part of Okinawa Island, by UNESCO as a World Natural Heritage site would further attract both domestic and international visitors and make ecotourism a potential source of economic growth. However, it is not uncommon for the region to experience degradation of natural environment due to excessive pressure from increasing visitors. In order to achieve a better balance between recreational demands and conservation of natural resources, besides evaluating the impacts of recreational uses on natural environment, it is important to explore expectations and perceptions of ecotour participants toward ecotourism activities and experiences. In this study, to explore the differences in ecotour participants' expectations and perceptions between pre- and post UNESCO registration, we conduct an interview survey with ecotour participants and compare the results obtained from this survey with the previous two studies (2001 and 2016) conducted in the Yambaru region, where ecotourism is practiced by small-scale forest managers. Our comparative study indicates that the participants of ecotours in this region were satisfied with and attracted by ecotour experiences in forested areas and often became repeat customers of this "green" ecotourism even though marine tourism has been more popular in Okinawa. Our study also clarifies the areas in which tours could be improved.
Keywords: Ecotourism, Okinawa, Yambaru region, World Natural Heritage

1. Introduction
Okinawa has been attracting tourists from both within and outside the country with its rich natural resources and beautiful scenery. The Okinawa Prefectural Office has perceived ecotourism as an effective tool for balancing conservation with sustainable development. The recent recognition of Yambaru region, northern part of Okinawa Island, by UNESCO as a World Natural Heritage site would further attract both domestic and international visitors and make ecotourism a potential source of economic growth. However, it is not uncommon for the region to experience degradation of natural environment due to excessive pressure from increasing visitors. In order to achieve a better balance between recreation demands and conservation of natural resources, besides evaluating the impacts of recreational uses on natural environment, it is important to explore expectations and perceptions of ecotour participants toward ecotourism activities and experiences. Especially, examining the needs and preferences of ecotour participants and updating them constantly would allow us to reflect participants' changing expectations towards ecotourism management. We explore the differences in ecotour participants' expectations and perceptions between pre- and post UNESCO registration by conducting an interview survey with ecotour participants and comparing the results obtained from this survey with the previous studies conducted in the Yambaru region, where ecotour programs are operated by small-scale forest managers.

2. Methods

Our study site is the northern part of Okinawa Island (Figure 1) where a wide range of ecotour programs and outdoor recreation activities are provided. We first extensively searched for relevant previous studies based on multiple databases.

We then further reviewed carefully two previous studies by Takushi (2001) and Ikeda (2016) conducted in the Yambaru region to examine ecotour participants' expectations and perceptions before UNESCO registration. In order to identify ecotour participants' expectations and perceptions of after UNESCO registration, we designed a questionnaire based on the study by Ikeda (2016). The questionnaire was mainly made up of two components including items related to (i) demographic characteristics of the respondents (gender, age, employment status, income, education level, current residential address) and, (ii) expectations and perceptions toward ecotour programs. In this study, we also added questions about the awareness of this site being registered as a World Natural Heritage Site and its impact as well as the impact of the COVID-19 pandemic on the respondents' decision to visit Yambaru. We conducted a face to face questionnaire survey at "Yambaru discovery forest" located in Aha, Kunigami, from August 17, 2022 to August 24, 2022. Each face-to-face questionnaire took about 10 to 20 minutes to complete. The visitors of the site were selected randomly. In all, 81 visitors answered the questionnaire on site. The respondents were made aware that the information collected would be strictly confidential and anonymous, and used for the purpose of this research only.

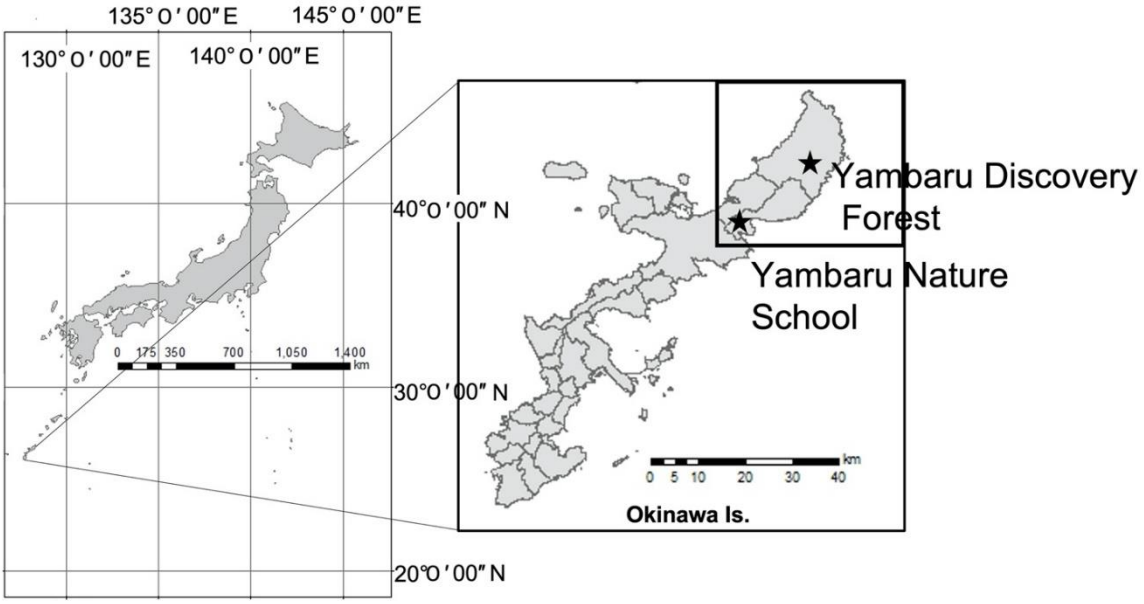

Figure 1 Study site

3. Results

3.1 Comparison of the basic attributes of datasets from three studies

Tour programs provided varied among sites as well as over time. Also, questions in the questionnaires were different among studies. Threfore, the comparison among three studies had to be taken with caution and can only be taken as an approximate indication of general trend.

Table 1 summarizes the basic attribute of datasets from three studies compared here. While Takushi study (2001) was conducted in Gesashi, Higashi village, Ikeda study (2016) and this study were conducted in Aha, Kunigami village. The main survey targets of Takushi study (2001) were participants of "Yambaru Nature School", while those of Ikeda study (2016) and this study were visitors of "Yambaru Discovery forest". Survey days ranges from 8 to 11 days, and the dates are all from August to September. The participants' mean number of visits to Okinawa ranges from 1.4 to

5.03. The most common visitor type of Ikeda study (2016) and this study (2022) was families with children, and the participants' mean number of nights stayed at "Yambaru discovery forest" was around two to three nights.

Table 1: Basic attribute of datasets from three studies

	Takushi study (2001)	Ikeda sutdy (2016)	This study (2022)
Site	Gesashi, Higashi village	Aha, Kunigami village	Aha, Kunigami village
Survey target	Participants of Yambaru Nature School	Visitors of Yambaru discovery forest	Visitors of Yambaru discover forest
Survey days	11 days (Sep. 10 - Sep.20)	10 days (Aug.13 - Aug.21, Sep.21)	8 days (Aug.17 - Aug.24)
# of responses collected	79	122	81*
Gender (Female)	51%	55%	53%
Age	10`s (23%), 20`s (63%), 30`s(13%), 40`s(1%)	10`s (1%), 20`s(3%), 30`s(29%), 40`s (56%), 50 or older (11%)	10`s(30%), 20`s(5%), 30`s(16%), 40`s(31%), 50`s (15%), 60`s (3%)
Out-of-prefecture Participants	96%**	56%	64%
Mean number of visits to Okinawa (SD)	1.4	3.14	5.03 (4.34)
Mean number of visits to Yambaru (SD)	N/A	2.32	3.47(4.06)
Mean number of visits to Yambaru discovery forest (SD)	N/A	1.35	1.36 (0.9)
Revisit rate	N/A	N/A	20%
Mean number of nights at Yambaru discovery forest (SD)	N/A	3.02 Max: 10	2.27 (1.44) Max: 6
Visitor type	N/A	Family with children (82%)	Family with children (67%)

* We are still in the process of collecting data, and will incorporate more data into our analysis in the future

** A group of college students (39 students) from another prefecture were included in Takushi's study (2001)

3.2 Comparison of popular programs and tour satisfaction among three studies

We classified various programs provided in three studies (two sites and three different time periods) into two categories[†], namely "waterfront tour program" (which includes "canoeing & kayaking experience", "river treking", "mangrove walking") and "forest tour program" (which includes "nigh trekking", "walking with local guides", "bird watching") . (As shown in Photo 1, "Nigh trekking" is a popular program that allows participants to encounter a wide variety of wildlife species). Then, we evaluated the number of participants for each type of program. As shown in Table 2, the proportion of people participating in "forest tour program" has increased, while that of people participating in "waterfront tour program" has decreased. Numbers in parentheses indicate the number of participants.

We also compared tour satisfaction and satisfaction with tour guides among three studies. While we and Ikeda (2016) used a 5 - point rating scale, where the ends of the scale are 1 and 5 representing "very dissatisfied" and "very satisfied" respectively (additional option: don't know), Takushi (2001) used a 7 - point scale. Therefore, we reclassified Takushi (2001)'s scales into a 5 - point scale. Table 3 shows that mean scores for both tour satisfaction and satisfaction with tour guides are greater than 4 (out of 5) for all three studies.

[†] There were programs which could not be classified into either of the two programs in Takushi (2001) & Ikeda (2014). Therefore, the proportions for each row do not add up to 1.0 for these two studies.

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Photo 1. Various wildlife species can be found during night trekking in Yambaru forest.

Table 2: Percentage of programs in each category out of all participating programs.

	Takushi study 2001	Ikeda study 2016	This study 2022	Chi-square (p-value)
Waterfront tour	65% (57)	44% (56)	40% (38)	14.284 (0.0008)
Forest tour	21% (18)	40% (50)	60% (59)	30.694 (2.163e-07)

Table 3: Mean scores of tour satisfaction and satisfaction with tour guides.

	Takushi study 2001	Ikeda study 2016	This study 2022	Testing the difference in mean scores between 2001 & 2022††
Tour satisfaction	4.56	4.76	4.48	p-value: 0.355
Satisfaction with tour guides	4.41	4.59	4.35	p-value: 0.403

††Since only mean scores were available from Ikeda (2016), tests such as homoscedasticity could not be performed. Therefore, here, the difference between the mean score in 2009 and in 2022 was tested for reference. In the homoscedasticity test (F-test), the p-value was above the significance level, so the null hypothesis "two population variances are equal" could not be rejected.

3.3 Comparison of Ikeda study 2016 and this study 2022

We examined the current residential addresses of the tour program participants and compared them with Ikeda (2016). 77% (2016) and 71% (2022) of all respondents were participants from outside the prefecture. Therefore, the majority of ecotour program participants were and still are from outside the prefecture.

We also examined the main purpose of visiting "Yambaru discovery forest" by classifying the 14 purposes stated in the questionnaires into three categories, namely, "sightseeing exclusively", "learning exclusively", and "both sightseeing & learning". As shown in Table 4, although only a few respondents visited "Yambaru discovery forest" exclusively for "learning", "learning" has been a part of the purpose of visiting "Yambaru discovery forest" for the majority of respondents in Ikeda's study (2016). However, in our study, the proportion of respondents who stated "both sightseeing & learning" as the purpose of visiting has decreased compared with that of Ikeda's study (2016) from 60% to 46%.

We finally examined the areas where tours could be improved, which were pointed out by respondents. Table 5 shows that "price of the tour" and "lack of tours for children" were listed among the top three areas in which tours could be improved in both studies.

Table 4: Percentage of each purpose.

	sightseeing exclusively	learning exclusively	both
Ikeda study 2016	38%	2%	60%
This study 2022	54%	0%	46%
Chi-square	2.742	0.416	3.812
(p-value)	(0.098)	(0.519)	(0.051)

Table 5: Top 3 areas which could be improved

	1st	2nd	3rd
Ikeda study 2016	Price of the tour	Lack of tours for children	Explanations about flora & fauna were not detailed
This study 2022	Lack of tour information	Lack of tours for children	Price of the tour

3.4 Impacts of UNESCO registration on tourists' behavior

In order to evaluate the impacts of UNESCO registration on tourists' behavior, we include the following four questions regarding UNESCO registration in our questionnaire.

Q1: Are you aware that the northern part of Okinawa Island and Iriomote Island, along with Amami Oshima and Tokunoshima, have been registered as World Natural Heritage Sites?

Q2: Is your decision to visit “Yambaru” region affected by the recent UNESCO registration ?

Q3: Is your decision to visit “Yambaru discovery forest” affected by the recent UNESCO registration ?

Q4: Will the recent UNESCO registration improve the natural environment of this region?

Although 83% of respondents answered ‘yes’ to Q1, 30% of respondents agreed with Q2. Furthermore, only 4% of respondents agreed with Q3. 80 % of respondents either strongly agreed or agreed with Q4.

3.5 Impacts of COVID-19 pandemic on tourists' behavior

In order to evaluate the impacts of the COVID-19 pandemic on tourists' behavior, we include the following two questions regarding the pandemic in our questionnaire.

Q1: Did you want to travel more than ever during quarantine?

Q2: Did you want to get in touch with nature more than ever during quarantine?

68% and 69% of respondents agree with Q1 and Q2 respectively.

4. Conclusions and Discussions

Our study indicates that although ecotour programs are operated by small-scale forest managers, they have successfully managed to maintain the quality of tours and tour guides. Considering the demand, although “waterfront tours” have been popular tour programs, “forest tours” have become more popular in recent years. Also, our study indicates that there are a certain group of participants who were not totally satisfied with the price of the tour and the lack of kids-friendly tour programs.

Our study shows that, although 83% of respondents are aware of the recent UNESCO registration of the region, it affects only a fractional portion of the respondents’decision to visit “Yambaru discovery forest”. It is somewhat surprising to see that registration by UNESCO was not the main reason for visiting the Yanbaru region for the majority of respondents, given various studies

linking UNESCO registration and the increase in the number of tourists (Kvasnová & Marciš 2022).

On the other hand, our study shows that the majority of respondents want to travel and get in touch with nature more during quarantine regarding the COVID-19 pandemic. Travel restrictions associated with the COVID-19 pandemic may be affecting the purpose of travelers coming to Yambaru region and overshadowing the impact of UNESCO registration on the decision to visit "Yambaru discovery forest". Furthermore, although "learning" was at least a part of the purpose of visiting "Yambaru discovery forest" for the majority of respondents in the previous study, our study indicates that current participants put value more on sightseeing during their visits to "Yambaru discovery forest". This difference in the purpose of visiting the site might also stem from various restrictions regarding the COVID-19 pandemic.

Our sample size is relatively small. Future studies with inclusion of more samples would be necessary for validating the results from our case study and therefore provide useful information for ecotour management.

Acknowledgements

The authors would like to express their gratitude to anonymous reviewer for their useful comments and precious time spent on our article.

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P 06

Quantitative evaluation of forest succession after oak wilt outbreak in a secondary forest (satoyama)

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In Japan, secondary forests (satoyama) have been maintained through 10- to 30-yr coppice rotation for use as firewood and charcoal. Management was abandoned after the fuel revolution and large trees of fast-growing species such as *Q. serrata* and *Q. crispula* have become dominant. In recent years, however, damage from oak wilt caused by *Platypus quercivorus* has become a wide-spread problem. Various cases of vegetation succession after oak wilt have been reported. The objective of this study was to predict vegetation succession after oak wilt in an abandoned satoyama forest in Kobe, Japan, which has been unmanaged for ca. 60 years. We established 27 study plots in a 64 ha area and investigated forest community structure and species composition. Four forest communities were identified using cluster analysis of the study plots. Then, the vegetation similarity between the four communities was analysed using the Chao index and their relationships were visualised using the non-metric multidimensional scaling (nMDS).

In secondary forests, *Pinus densiflora* - *Rhododendron macrosepalum* and *Q. serrata* - *Quercus variabilis* communities were found and some showed plagiosere due to invasion by *Cryptomeria japonica* from neighboring plantation forest. Of the four forest communities, those dominated by *Ilex pedunculosa* and *Q. serrata* were structurally similar and are likely to experience significant changes in vegetation after oak wilt. With regard to species composition, *P. densiflora*- and *I. pedunculosa*-dominated communities were similar, showing increasing dominance by evergreen shrubs. On the other hand, *Q. serrata*-dominated forests had a high density of *Clethra barbinervis* and *I. pedunculosa*, suggesting that mixed evergreen and deciduous forests will be established in the future if affected by oak wilt. Our results indicate that forest community analysis using nMDS can be used to predict future vegetation dynamics and guide forest management in abandoned satoyama.

Keywords: Satoyama, succession, oak wilt, plagiosere, community analysis

P 07

Changing forest management practices impacts on the community forest user's livelihood in Nepal

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Protection-oriented Community based Forest Management in Nepal had shifted to Scientific Forest Management (SciFM) in 2014; however, revoked in 2021 facing severe criticism due to rampant corruption cases and deforestation; a new shift to Sustainable Forest Management being processed. This study was carried out to see the how CF users perceived SciFM in terms of economic, social, and environmental aspects and its discontinuation in their livelihoods. 290 household surveys, key informant interviews, and group discussions were conducted. Increased forest revenue from selling harvested timbers has indirectly benefited the forest users by enhancing their livelihoods through different income generation options and community development initiatives, although overharvesting of the trees had a severe effect on the forest environment. Due to the lack of technical knowledge among forest users, the engagement of forest technicians increased in forest management activities, having indirect impact on forest users' decision making. All of the users disagreed with the decision to discontinue the SciFM practices; 80% of CF users supported the SciFM due to its economic benefits, 17% agreed on both economic and social benefits, and 3% valued it for all three merits, including resource conservation. Financial upliftment was indeed a major driving force behind the implementation of SciFM. Majority of the users were unknown about the new sustainable forest management and scared of the investment for implementing it. The study suggested that the path ahead could be reforms in protection-oriented CF through advanced silviculture practices easily understood by CF users for the betterment of forest-dependent users' livelihood, including ecological and social values.

Keywords: Community Forest, Forest management, Scientific Forest management, forest users, livelihood, Nepal.

P 08

Increasing wooden construction in Okinawa:
Its factors and obstacles

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Abstract
Since the era of the Ryukyu Kingdom, houses were made of wood in Okinawa. That is because wooden houses surrounded by windbreaks were suitable for high temperature and humidity. However, 100,000 houses disappeared by WWII and US occupation government promoted Reinforced Concrete (RC) houses during their 27years of occupation. As a result, the ratio of wooden houses became less than 10% in Okinawa, while over 80% in other parts of Japan. Under such circumstances, however, construction of wooden houses has been increasing rapidly in recent years. This study aims to analyze the factors of this booming of wooden houses, and to discuss potential obstacles and future perspectives based on the survey conducted in 2018 and 2021.

Two factors for the increase of wooden houses have been identified: Low construction cost and improvement of technology. Wooden houses can be constructed reasonably cheaper than RC houses. Besides, construction period is short. These advantages are especially preferred by young people. Although, typhoons and termites have been the biggest natural enemies of wooden houses, the evolution of structural design and anti-termite treatment has dramatically improved the safety and durability of wooden houses in subtropical areas. We also found non-housing construction of wood is increasing in Okinawa.

On the other hand, there are some obstacles for further increase. The first is the shortage of carpenters in wooden construction. Many house builders in Okinawa only built RC houses, so they lacked the skills to build wooden houses. The second is that construction timber cannot be produced on the islands. Stable supply of materials, especially timber from Kyushu, is critically important. Moreover, it has been difficult to procure wood and other building materials during the last two years due to COVID-19. If these problems can be solved, there will be more wooden structures in Okinawa in the future.

Keywords: COVID-19, house builders, non-housing construction, wooden houses

1. Introduction
Forestland area in Japan is 25 million ha or 67% of the country's land, and 41% of them are artificial plantations. Majority of such artificial forests are over 50 years and ready to be harvested. Domestic timber is mainly used for housing construction. Figure 1 shows the number of buildings by structure. Wooden construction is popular in low-rise buildings, especially individual houses with the height of less than 3 floors.

Okinawa is in sub-tropics and surrounded by ocean. It is hot and humid throughout the year. This characteristic is mostly the same as the summer in the other part of Japan. Therefore, wooden houses are preferred because they are not airtight and cooler in hot season.

In Ryukyu Kingdom, almost all buildings were wooden including Shuri Castle. Unfortunately, as many as 100,000 buildings has been destroyed during World War II and most of the people lost their houses. After the war, US Occupation Government promoted to construct Reinforced Concrete (RC) buildings, because they believed RC was suitable for the climate of Okinawa. As a result, almost

all new construction including individual houses became RC, and the ratio of wooden houses dropped to less than 10% in the late 20th Century.

However, construction of wooden housesis increasing in recent years and the ratio of wooden houses within the new housing construction reached as high as 30% in 2021 (See Figure 2). This study aims to analyze the factors of this booming of wooden construction, and to discuss potential obstacles and future perspectives based on the survey conducted in 2018 and 2021.

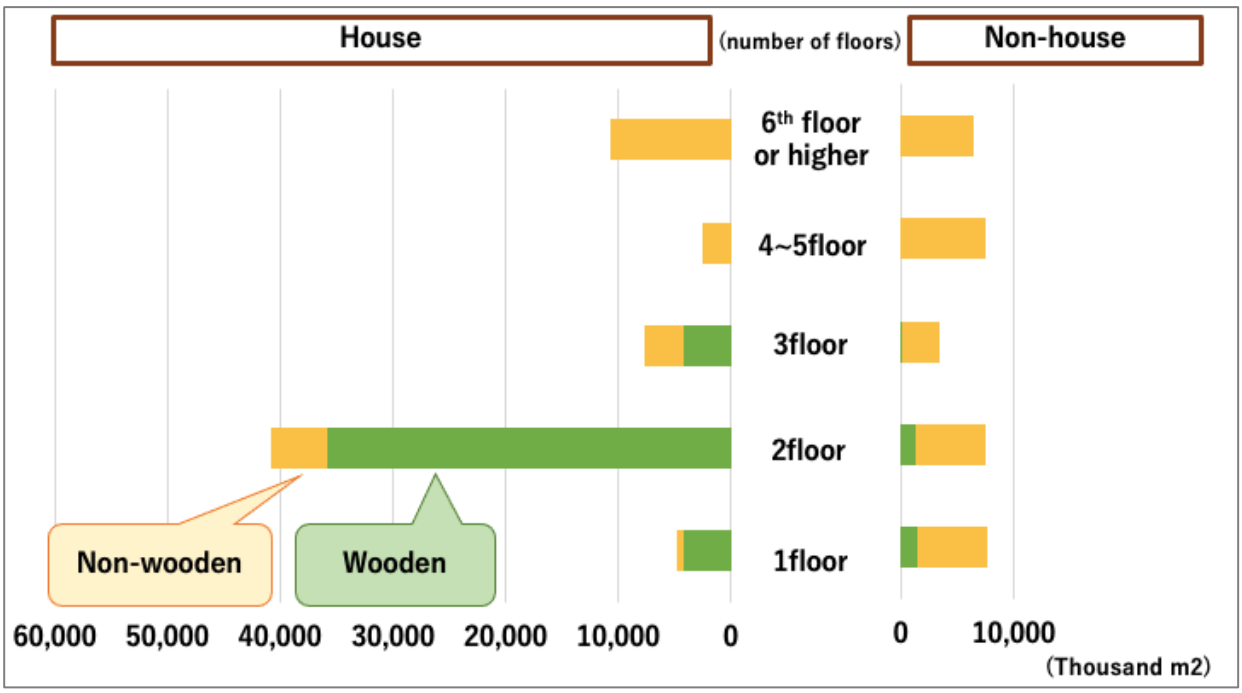

Figure 1. Floor space of buildings initiated by floor level and construction type in Japan (2019)
Source: Forestry Agency (2021) Annual Report on Forest and Forestry in Japan, Chapter III, Wood Product Demand and Use of Wood , p151-213

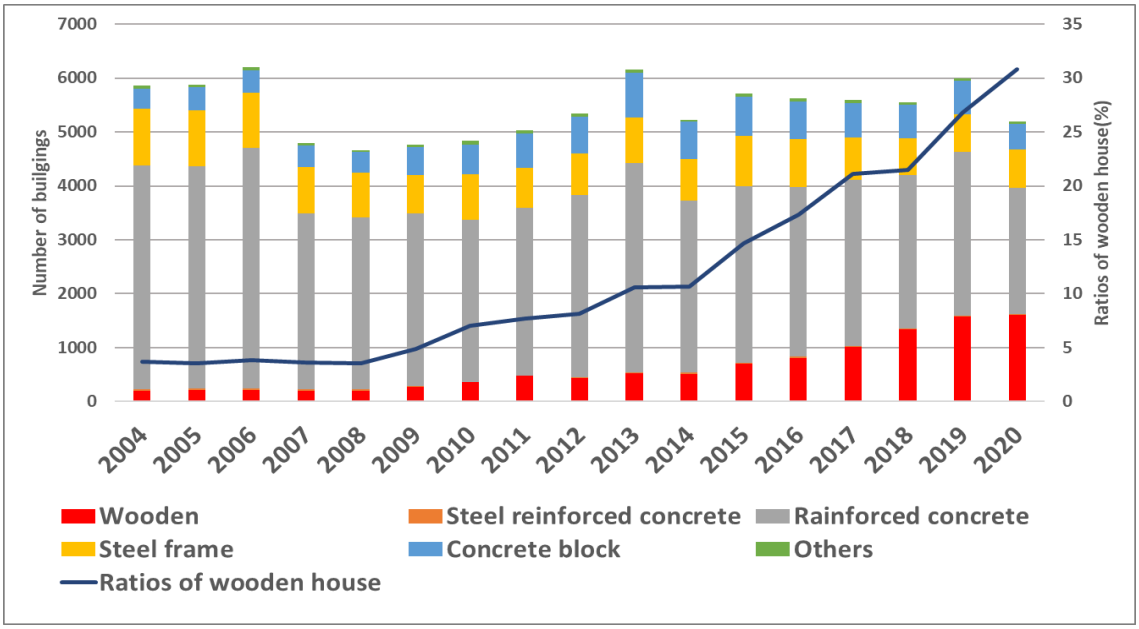

Figure2. Numbers of building and ratios in Okinawa
Source: "Ministry of Land, Infrastructure, Transport and Tourism",2021,e-sTat, https://www.e-stat.go.jp/statsearch/files?page=1&layout=datalist&toukei=00600120&tstat=000001016965&cycle=1&tclass1val=0; last accessed January 31, 2023.

2. Methods

We examined and analyzed the architectural plan documents submitted to the local municipal offices during 2012~2019. The plan documents show details (such as type of structures, number of floors, and total floor space of the building etc.) of buildings that builders a going to build. Then, we extracted the date of wooden structure buildings from the plan documents. There were about 170,000 wooden structures built during 2012~2019.

Based on the plan documents and the previous studies, we conducted interview surveys with 50 companies who has built wooden structures in Okinawa.

3. Results

3.1 Current status and issues of wooden housing

We found two reasons for the increase in wooden construction in Okinawa: 1) Low construction cost, and 2) technological improvement of wooden construction. Wooden houses can be constructed reasonably cheaper than RC houses. In addition, the construction period has shortened due to the expansion of pre-cut technology.

Typhoon and termites are still the biggest natural enemies of wooden houses in Okinawa, evolution of structural design and anti-termite treatment of wood have dramatically improved the safety and durability of wooden houses. This resulted in many of local construction companies that used to build only RC houses to take on the challenge to build wooden houses.

The most commonly used construction method by these companies is the post and beam construction method. This is a traditional Japanese construction method that supports the load with posts and beams (See Figure3). It is the most popular construction method in Japan, and about 80% of wooden houses are built using this method, except Okinawa.

We also discovered obstacles in promoting wooden building in Okinawa. The first is the shortage of carpenters in wooden construction. Many house builders in Okinawa only have experiences to build RC houses, so they lacked the skills to build wooden houses. The second is that construction timber cannot be produced on the islands. Stable supply of materials, especially timber from Kyushu, is critically important.

Figure 3. Japanese traditional wooden house

3.2 Non-housing construction of wooden buildings

Non-housing wooden construction is also on the rise in Okinawa. While only 20 buildings were constructed in 2012, it increased to more than 100 in 2019. Northern part of Okinawa Island, Ishigaki Island, and Miyako Island have a relatively large number of non-house wooden buildings (See Figure4).

Large number of non-housing wooden buildings are lodging facilities such as low-rise hotels and cottages. Because Okinawa is one of the most touristic areas in the country, many new lodging facilities are constructed every year.

Wooden buildings are becoming popular because they are cheaper and comfortable than RC buildings. The scale of these wooden buildings is relatively small, ranging from one to two stories and less than 499 m^2

They are also being built for a variety of other uses. For example, some are used in combination with housing, nursery schools, and restaurants etc. (See Figures5, 6, and 7).

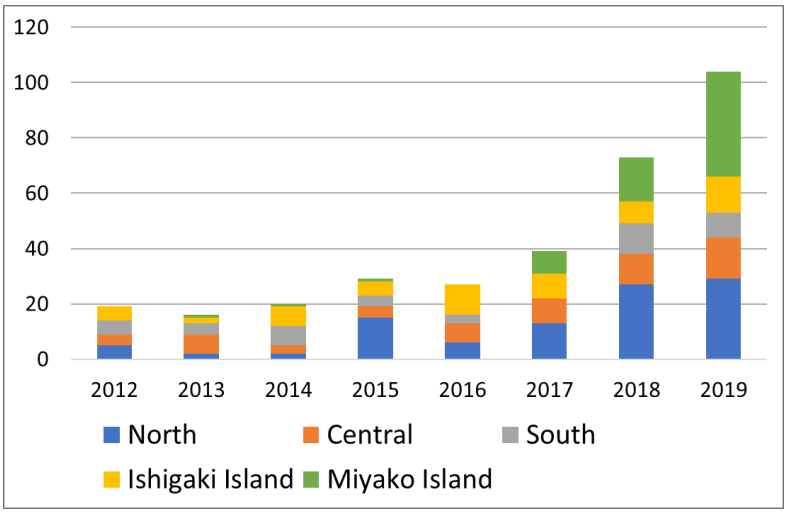

Figure4. Number of buildings by area

Source: Kishimoto, S. (2021) Trends of non-housing wooden construction in Okinawa Prefecture, B.A thesis, University of the Ryukyus (in Japanese, the title was translated by the authors), p17

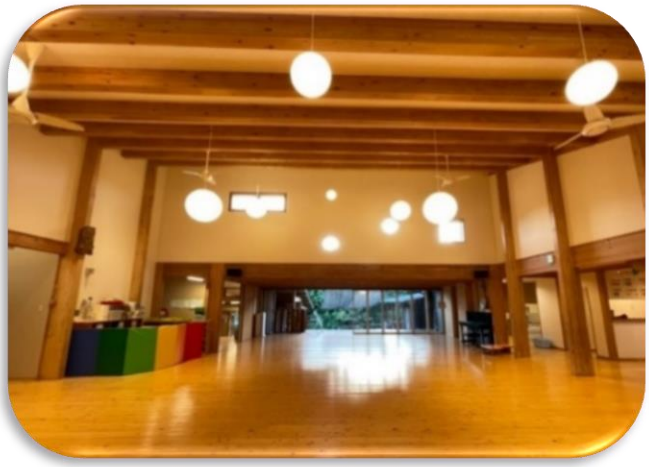

Figure5. Wooden nursery school

Figure6. Wooden cottage

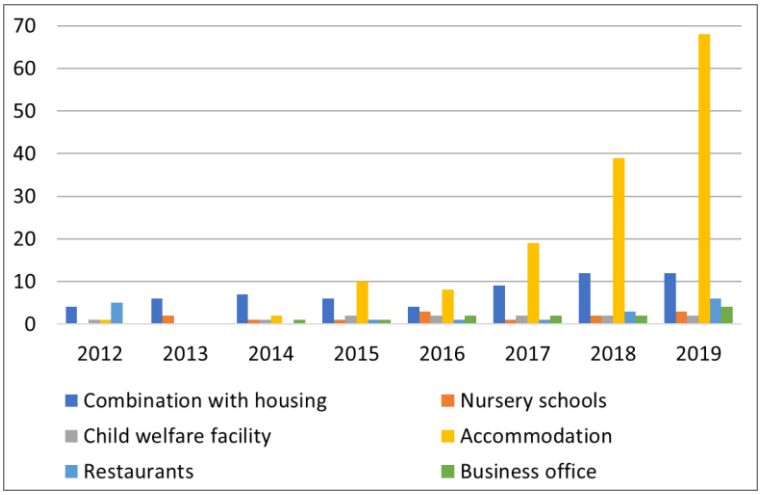

Figure7. Number of buildings by use
Source: Kishimoto, S. (2021) Trends of non-housing wooden construction in Okinawa Prefecture, B.A thesis, University of the Ryukyus (in Japanese, the title was translated by the authors),

3.3 The effect of COVID-19

With the spread of the COVID-19, the housing industry suffered from a shortage of home appliances. This is due to lockdowns around the world and the inability to produce them.

But the biggest negative effect of COVID-19 was the sudden rise in timber price which happened in the early 2021.This is called “wood shock”. The beginning of the ”wood shock” is said to have started with a large increase in the number of new housing starts due to the economic measures against the new coronavirus in the United States. On the other hand, there was a decline in lumber production capacity due to a decline in the productivity of sawmills due to the with COVID-19 and large-scale forest fires. As these events occurred simultaneously, the amount of lumber exported from the United States to Japan decreased and lumber prices rose sharply. Other factors include a shortage of container ships and lockdowns in various countries.

However, it had little impact to the uprising trend of wooden houses in Okinawa because RC construction also faced the price increase of various raw materials which increase building cost. As shown in Figure 3, the ratio of wooden houses are increasing during the COVID-19 period so far.

4. Discussions and Conclusions

Most houses in Okinawa used to be RC buildings after WWII but recently the number of wooden houses has been increasing and reaches 30% of the total new construction.

The percentage of wooden construction in public buildings in Okinawa (0.6%) is lower than the national average in Japan (13.8%). Therefore, it is necessary to promote the use of wood construction in public buildings in Okinawa. State-of- the-art wooden constructions technologies and skills have been developed and applied to medium scale buildings and medium-high-rise buildings in Japan(e.g. there is 11th floor wooden building in Kanagawa). We hope that the number of these types of buildings will increase in Okinawa in the future.

The issues for keeping up with the recent increasing demand for wooden structures buildings are to improve wood building techniques and skills suitable for Okinawa, to train carpenters with those techniques and skills, and to expand distribution channels for construction materials

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P 09

Quantitative and qualitative survey for wood utilization from abandoned satoyama secondary forests in Japan

Ren Taniuchi*, Wakana A. Azuma*, Takahiko Yosioka*, Keiko Kuroda* and Yoshiaki Hayakawa**

* Graduate School of Agricultural Science, Kobe University

** Andeco Co., Ltd.

Satoyama secondary forests have long history of short rotation of coppice management, but most of them are now abandoned in the 1960s for socioeconomic reasons of increased fossil fuel use. One of the reasons for the lack of sustainable forest management is the undiscovered profit potential of wood use. To distribute timber from abandoned satoyama secondary forests, we proposed and demonstrated the use of near field communication (NFC) tags to manage individual trees before harvesting. We attached NFC tags to individual trees for potential use as timber and associated them with data on tree species, diameter, straight trunk length, and photographs to store information for understanding the abundance and size distribution of each species as well as effective tree shape for timber use. In a deciduous broad-leaved forest dominated by Quercus crispula in Hokkaido, 14 tree species and 51% of all individuals were tagged in a 10m x 30m plot. In a deciduous broad-leaved forest dominated by Q.crispula in Nagano prefecture, a total of 13 tree species and 15% of all individuals were tagged in two plots of 30m x 25m and 10m x 15m. In deciduous broad-leaved forest dominated by Quercus serrata in Shiga Prefecture, a total of 10 tree species and 62% of all individuals were tagged in two 10m x 10m plots. In a forest dominated by Q. serrata and evergreen broadleaf shrubs in Hyogo Prefecture, a total of 15 tree species and 25% of all individuals were tagged in three 10m x 10m plots. To aggregate tagging information of the neighborhood would promote the use of a certain amount of wood by multiple tree species. Derivation of NFC tags on logs after harvesting is expected to connect forests, lumber manufacturers, fabricators, and users.

Keywords: near field communication tag, over-aged coppice, digitalization, hardwood, small-scale restoration

P 10

Current status and a proposal for succession of shifting cultivation in mountainous area in Japan:

A case study at Shiramine district, Ishikawa Prefecture

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* Graduate School of Bio-agricultural Science, Nagoya University, Japan

Shifting cultivation has contributed to food production especially in developing countries. Sustainably practiced shifting cultivation in the forest was once the major source of food for mountainous regions of Japan. However, it has disappeared around the mid of 20th century due to economic development. Of all this, the local residents of Shiramine district, Ishikawa prefecture, has nonetheless been successful in continuing shifting cultivation.

This research aims to expose the current status and issues and further proposes the solution towards succession of shifting cultivation. Interviews and participant observation were conducted on August to September 2021 and June to August 2022.

The study found that only one household was engaged in shifting cultivation and the local museum in the village held participation events regularly (twice in a year). We also observed that they were attracting a lot of attention from outside the region and visitors come from all over Japan. However, we found three reasons behind the risk of its extinction; decreasing of suitable land in the mountain, manpower and lacking of successors to continue it. For the succession of shifting cultivation, we propose the following measures: (1) building the succession skills among the community members and outsiders. (2) active understanding and support from the government including the development of framework to facilitate shifting cultivation.

Keywords: Shifting cultivation, Shiramine district, Ishikawa prefecture

P 11

IUFRO 2022 Conference of 3.08 with 9.06
Future Directions of Small-scale and Community-based Forestry

How can comparative forest sector approach be implemented?

By YAMAMOTO, Nobuyuki
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As is well known, comparative approach is an orthodox method in sociology, which was initiated by Max Weber or Émile Durkheim. It is also often applied in forest research. Although, the extent of its viability is not so clear.

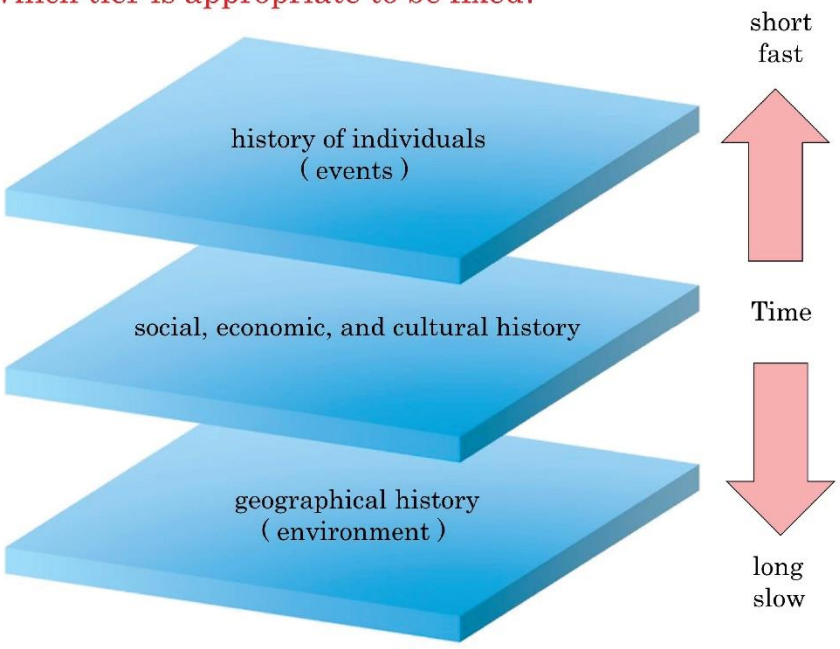
For example, the difference in complicated forest management systems is an important topic. The forest owners' organization in Finland is called Metsänhoitoyhdisty (MHY) and Metsä Forest and in Japan, Shinrin-kumiai. This means there is not only a difference in name, but also an inherent difference based on indigenous society. This point is critical when considering regulations and subsidies by government.

Nevertheless, is it possible to compare two countries with indigenous societies, histories and natural environments? Because the forest sector is highly dependent on the indigenous conditions of each country. This is even more so if it is a multi-country comparison. It seems difficult for us to avoid its arbitrariness. The simple answers to these questions would be on a case-by-case. Then what is case-by-case?

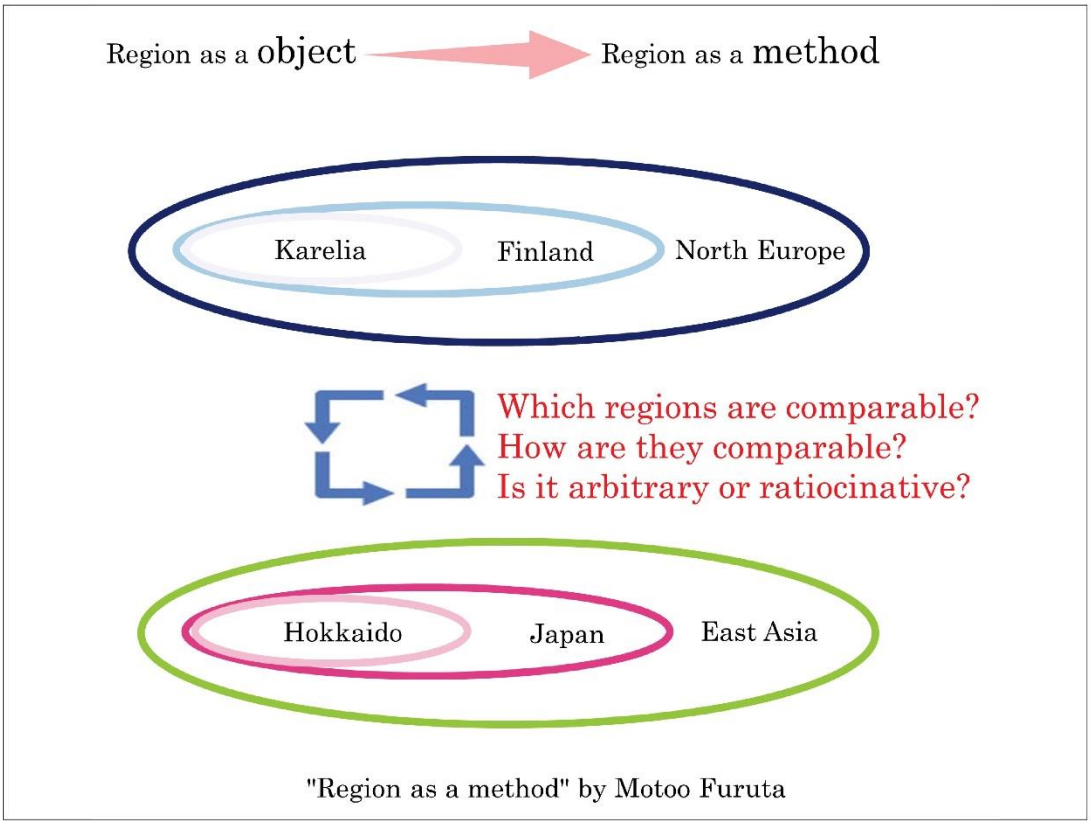
Problems abound. What is the appropriate geographical scale? Which is better, country, province, watershed? "Region as a method" advocated by Motoo Furuta, a historian of modern and contemporary Vietnam, may be a workable solution (Furuta 1998). What is the appropriate time scale? Physical or historical time? Short or long term? We may benefit from recalling the three-tier structure of history (geographical, social and human) proposed by Fernand Braudel (Braudel 1966). In any case, the solution derived by comparative research does not seem so clear-cut. Often, the solution will be something vague, uncertain and confused. But on the other hand, it may also be a treasure trove of fruitful hints.

How can comparative forest sector approach be implemented? What can it reveal? This is my first step towards considering comparative approach.

Which tier is comparable?
Which tier is appropriate to be fixed?



The three-tier structure of history by Fernand Braudel

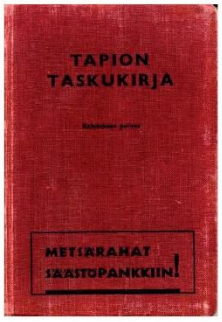


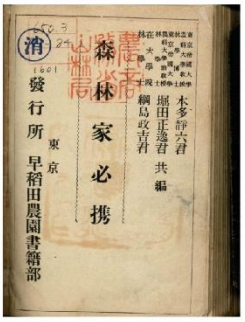
Focusing the contemporaneity of forest sector modernization must be important.

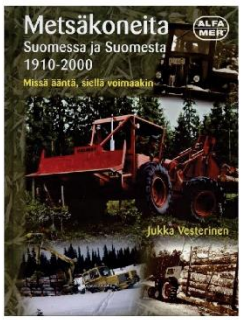
The contemporaneity of forest sector modernization in Finland and Japan (1)

Finland	Japan
1851 State forestry Administration	1867 Meiji Restoration
1858 Forestry college	1879 National forest service
1886 Forest act : no deforestation, police administration	1882 Tokyo forestry school
	1897 Forest act : no deforestation, police administration
	1899 National forest land act
	1907 Forest act : Forest owners' association
1917 Independence	
1917 Forest act: no deforestation, state forester administration	
1922 Settlement act (Lex Kallio) / Forest taxation act	
1924 Regulation of forest holding market	1926 Act supporting forest cooperate facilities
1928 Forest improvement act	1929 Act supporting silviculture
1928 Private forest act: no deforestation, semi-private forester administration	1929 Natural regeneration management (Dauerwaldgedanke)
1935 Roundwood scaling act	1933 Oligopoly of Oji paper
1938 National park	1940 Timber control measures act (-1950)
1943 Reforestation of degraded forests	
1939-1945 WW II	
	1951 Forest act : forest planning system, forest owners' cooperative
	1956 Japan forest development corporation act
1951 Forest management associations act	1957 National park act
	1958 Productive capacity reinforcement plan of the national forest
	1960 Liberalization of timber imports
1961 Fresh water act	1961 Timber production increase plan of the national forest
1964 Minimum wage regulation for loggers	1964 Forestry basic act
1967 Amendments in private forest and forest improvement acts	1966 Common forest land modernization act
	1972 Nature conservation act
1992 Earth Summit	
1993 Forest taxation / Amendment in private forestry supervision	
1994 State forest administration renewal as a business enterprise	
1995 Member state of the European Union	
1996 Nature conservation act	1996 Act on the security of forestry work force
1998 Liberalization of forest holding market	1998 Act on reform of national forest management
1999 National Forest Programme 2010	2001 Forest and forestry basic act
	2006 New wood production project
2005 Act on state forest enterprise (Metsähallitus)	2008 Act on advancement of implementation of forest thinning
2008 National Forest Programme 2015 / METSO	2009 Forest and forestry revitalization plan
2009 Development project of the forestry promotion organisations	2013 General accounting transfer of national forest management accounts

The contemporaneity of forest sector modernization in Finland and Japan (2)







P 12

Changes in the use of hardwood logs after the nuclear power plant accident in the medium and low radiation dose zones

Miho Iwano Yamamoto*, Chihiro Sakanoue, Yuka Hideshima* and Uichi Hayashi***

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** Regional Forest Office

Since the nuclear power plant accident in 2011, forests in Fukushima Prefecture, the southern Tohoku region, and the northern Kanto region have been contaminated by radioactive materials, and the production and use of hardwoods in these areas have been severely damaged and have had to be transformed. This report focuses on logs for shiitake mushroom production and fuelwoods, and clarifies the structural changes in their production, distribution, and utilization. 1)The production of shiitake mushrooms using hardwood logs (konara oak (*Quercus serrata)*) has plummeted by 90%, and 90% of the producers have withdrawn from the market. The majority of logs used in production come from now western Japan, and even after 10 years, the recovery of logs from their own prefecture has been extremely limited. Producers are involved in the complicated documentation and production process for compensation, and are seeking proper styles based on the supply of saw tooth oak (*Quercus acutissima*) from western Japan while waiting for the radioactive materials in the forests to decay. Trees in forests that are no longer cared for are growing larger and larger, and shiitake mushroom producers are getting older and older. 2)Hardwood firewood for pizza ovens and stoves is requested to be less than 40 Bq/kg as the regulation value of radioactive materials calculated backward from the ash after burning. Although most of the hardwood lumber from southern Tohoku and northern Kanto, including Fukushima Prefecture, exceeded the regulation values, local differences in response have arisen as a result of the gradual decay of radioactive materials over the 11 years since the accident. In addition to expensive firewood distribution that meets the needs of traditional firewood users for firewood that has been tested for radioactive materials, inexpensive firewood distribution has arisen to meet the needs of new firewood users. 3)In general, the nuclear accident has accelerated the trend decline in the use of hardwoods in the medium- and low-dose zones, while causing fragmentation within the region due to differences in response.

Keywords: Non Timber Forest Products, shiitake mushroom logs, firewood, broadleaf trees, Fukushima nuclear power plant accident

P 13

Utilization of by-products derived from industrial wood processing

Martin Moravčík*, Ján Parobek, Miroslav Kovalčík** and Hubert Paluš****

* National Forest Centre

** Technical University in Zvolen

The world's top forums for combating climate change support the production of timber and timber products produced in a sustainable and environmentally friendly way. Through the storage of carbon in forests, its sequestration in harvested wood products (HWP) and the replacement of non-renewable raw materials, the global warming can be considerably mitigated. In order to extend the storage period for carbon in HWP, several measures have been taken in the new Slovak National Forest Programme. Financial support is also proposed for the preferential use of by-products (chips, sawdust, shavings, cuttings, etc.) that are derived from the mechanical processing of wood, primarily for the production of wood based panels and pulp products. This should contribute to creating higher added value, increasing employment, but especially to changing the current (non-ecological) practice of the prevailing use of wood by-products for energy production. The measures are aimed at promoting the cascade processing and utilization of wood with the order of preference: mechanical processing - chemical processing - end-of-life product recycling - energy utilization; thus extending the life cycle of wood and consequently the carbon sequestration in HWP. To examine the current state of utilisation of wood by-products in small-scale sawmills, we conducted a questionnaire survey for the three main product groups: 1) sawmill products, 2) veneers and plywood and 3) chipboard. The empirical survey was evaluated by means of the expert data analyses. The data was collected from almost one hundred small wood processing plants and subsequently generalised for the conditions of the Slovakia. The findings will serve as a basis for optimizing the current use of wood by-products in accordance with the approaches of circular bioeconomy and cascading use of wood, for the improvement of monitoring of wood material flows and provision of better data for domestic and foreign statistical databases.

Keywords: wood by-products, harvested wood products, climate change mitigation, cascade utilization of wood, mechanical wood processing, energy utilization of wood

P 14

Grassland management by communities and government:

A case of prescribed fire in Kitakyushu Quasi-National Park

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The research site is Hiraodai, Japan, which is one of the places with annual burning control of grassland vegetation. The purpose of this study is to investigate the transition of the significance of prescribed fire and the system of collaboration system of local communities together with the local government, which supports the contemporary controlled burn. The research method consists of interviews with local residents, the administration, and related local companies, as well as a literature review. The results showed that in the past, Hiraodai had been managed as common lands by local people of Higashitani village (Kokura Minami Ward, Kitakyushu City, Fukuoka Prefecture) from the 16th and 19th centuries. The lands had been used for gathering herbs for cattle and horse feed, compost, and thatched roofing material. This kind of management system with communities as common lands is called ‘iriai’ in Japanese. We also found the common lands currently are used for different purposes. They have conducted safety burning to prevent wildfires, maintain the landscape, and prevent pest damage. Before the grass burning event, a local committee organized by community members sets up a firebreak zone for safety burning control. In 1977, a fatal accident because of fire extension happened, which caused the suspension of prescribed fire in a wide range of Hiraodai. At that time, local people realized that burning control was essential to protect the grassland, and they decided to organize the committee and resumed controlled fire in 1993. The case of Hiraodai give some implications for the current conducted custom of controlled burning; importance of the local communities’ collaborative system to protect the vegetation and culture of the grassland, and maintenance of the native knowledge and seeking of supportive outside actors to organize the event in the situation of declining birthrate and aging population in rural villages.

Keywords: controlled fire, iriai

P 15

Image and actual conditions of forestry workers in sustainable forest management

Cases of Miyagi Prefecture, Tohoku region

Yuko Takisawa*and Sachio Ito**

* Project Assistant Professor in Iwate University

** Associate professor in Iwate University

Abstract

Securing forestry workers is an important issue in sustainable forest management and forestry. What is important for this is the assurance of forestry workers' skills and occupational safety. Many European countries have already adopted the European Chainsaw Certificate (ECC) as a guarantee of skills and occupational safety in chainsaws, and in some countries ECC has been incorporated into forest certification systems such as FSC. In Japan as well, consideration has begun to add forestry to the skill test system of the Ministry of Health, Labor and Welfare, and efforts to improve the status of forestry workers will be further strengthened. However, there are few studies or case reports linking sustainable forest management with forestry workers' skills and occupational safety in Japan. Therefore, in this study, we focus on Japanese forest owners who use forest certification such as FSC and SGEC as examples of sustainable forest management. The aim of this study is to capture the image of forestry workers required by the forest owner and the actual situation of forestry workers actually working there. In particular, we will focus on how workers' skills and occupational safety are guaranteed. The target forest owners are Minamisanriku Town located in Miyagi Prefecture in the Tohoku region. It's example of historically sustainable forest management efforts that emphasized forest management in the region even before the acquisition of FSC.

Keywords: Sustainable forest management, FSC, Forestry worker, Forestry labor, Skill

1. Introduction

Securing forestry workers is an important issue in sustainable forest management and forestry. What is important for this is the assurance of forestry workers' skills and occupational safety. Many European countries have already adopted the European Chainsaw Certificate (ECC) as a guarantee of skills and occupational safety in chainsaws, and in some countries ECC has been incorporated into forest certification systems such as FSC. However, there are few studies or case reports linking sustainable forest management with forestry workers' skills and occupational safety in Japan. Therefore, in this study, we focus on Japanese forest owners who use forest certification such as FSC as examples of sustainable forest management. The aim of this study is to capture the image and actual Conditions occupational safety of forestry workers required by the forest owner.

2. Methods

First, know the current status of FSC and understand when workers and occupational safety changes were made. Second, we will focus on how workers' skills and occupational safety are guaranteed with FSC. The target forest owners are Minamisanriku Town located in Miyagi Prefecture in the Tohoku region. It's a historically sustainable forest management efforts that emphasized forest management in the region even before the acquisition of FSC.

3. Results

3.1 Current status of certified forest by FSC and “The FSC National Forest Stewardship Standard” of Japan

There are 35 cases of FM certification of FSC and the number of area is approx. 420,000 ha in Japan. And there are 1,747 cases of CoC certification in Japan. In 2012, revisions were made to the principles and criteria for FSC forest management certification. In response, the final version of the International Standard Indicators (IGI) came into force in 2015. Based on the IGI, each country decided to formulate its own domestic regulations. In other words, it became an opportunity to seek international standards not only at the "principles" and "criteria" level, but also at the "indicator" level. In Japan as well, “The FSC National Forest Stewardship Standard of Japan” based on the IGI were approved and published in 2018.

3.2 How the certification was obtained In Minamisanriku Town and the council role

In Minamisanriku Town, there were talks about obtaining FSC certification even before the earthquake. However, due to the costs associated with obtaining and maintaining certification, this was not achieved. Triggered by the Great East Japan Earthquake in 2011, the town and its residents turned their attention to sustainable community development. In the midst of this, those involved in the forestry industry have started to work on sustainable forest management again. Initially, four parties were working to obtain certification. Minamisanriku Town also joined the group, and the Minamisanriku Town Forest Management Council was established in 2015. Acquired FSC-FM certification in 2015 as a group certification. The council is working on sustainable forest management in accordance with the forest management plan it created. In 2016, a local producers association joined. Current Minamisanriku Forest Management Council organization chart is as shown in Figure1. The current certified forest area is 2,481 ha.

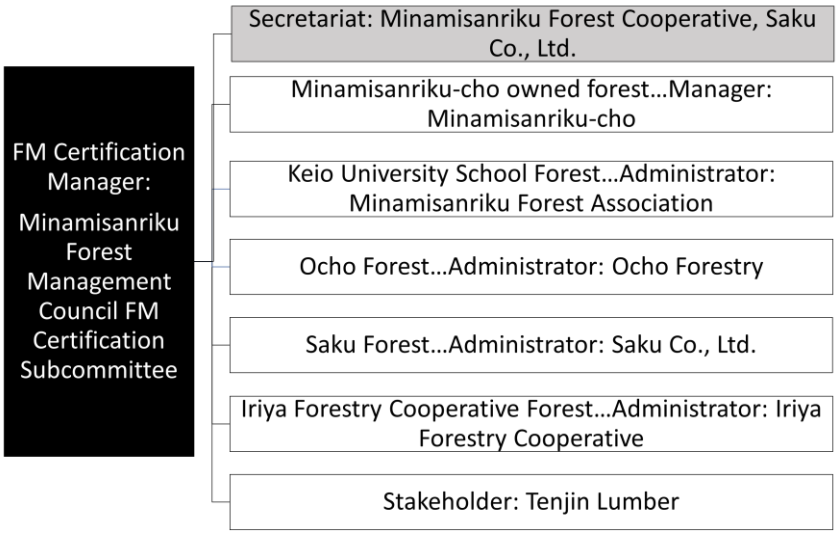

Figure 1: Minamisanriku Forest Management Council organization chart
Source: Forest management plan of Minamisanriku Forest Management Council FM Subcommittee ver.2021 revision

Minamisanriku Forest Management Council Forest Management Plan is Figure2. It consists of 10 items. In particular, monitoring items and labor and safety management items are important. The Council conducts internal audits based on the evaluation indicators specified in the "Monitoring Guidelines". The evaluation indicators are (1) “number of occupational accidents” (2) “material production volume” (3) “certified forest area”. Monitoring is recorded, shared and discussed in reports

every year. The internal audit has been in this form since 2019. The impetus for the council to introduce indicators (1) to (3) was the preparation of the FSC domestic standards in 2018.

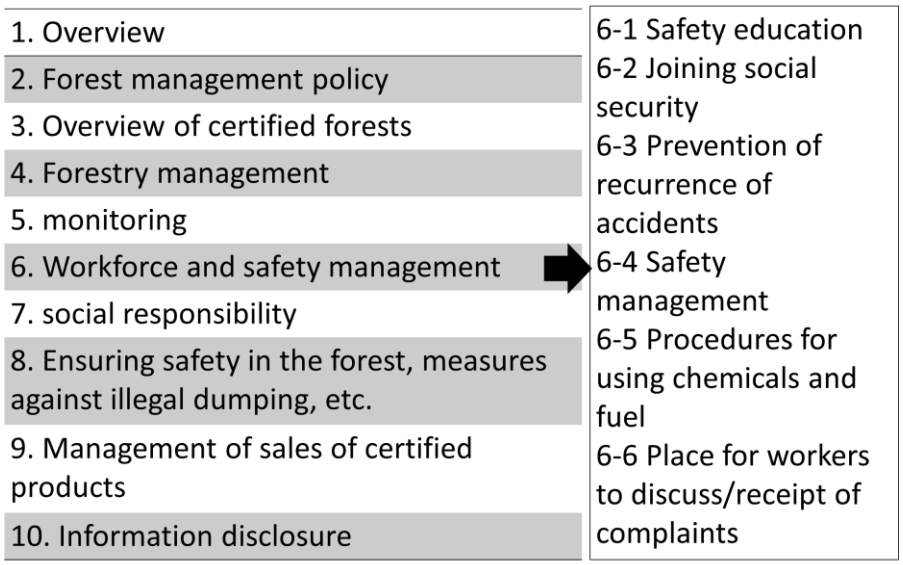

Figure 2: Minamisanriku Forest Management Council Forest Management Plan(Revised 2021)
Source: Forest management plan of Minamisanriku Forest Management Council FM Subcommittee ver.2021 revision

4. Discussions

(1) Regarding the number of occupational accidents, there were two effects: occupational safety records and regular meetings. One is the council will hold an internal audit and an education and training competition once a year. Internal audit has become a forum for sharing and improving monitoring reports. The education and training competition is a place to give lectures to workers. The education and training competition reflects the content discussed in the internal audit, and new safety prevention activities (hazard prediction and near-miss incidents) are constantly being updated. In addition to these meetings, regular meetings are held about 10 times a year. The other is that until then, training for workers and safety prevention activities had been conducted only by the work groups of each forestry company and union, but by holding meetings and regular meetings, information was shared across organizations. Also, a habit of looking back on information was born. In fact, the number of near-miss incidents has decreased among council members. Not only that, but the Council has also started to hold seminars and lectures on other fields of forest management and forestry. It is open as a place for people involved in the forestry industry outside the council to use it as a place to collect and update information.

5. Conclusions

An initiative was born in the council to set specific evaluation indicators every year and report the degree of achievement through internal audits. As information was accumulated over time, it was effective in improving the working environment and safety.

Acknowledgements

I would like to express my gratitude to the following persons. Ms Mishiba and Mr Shiomi from FSC Japan, who informed us about the changes in FSC regulations, Mr Sato from Sakyu Co., Ltd., who willingly gave us information about the Minamisanriku Forest Management Council, and Ph.D. Ito, who discussed our research themes.

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Forest management plan of Minamisanriku Forest Management Council FM Subcommittee ver. 2021 revision. Revised June 30, 2021

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P 16

Impacts of COVID-19 on Kelantan's small-scale wood-based industry players

Noor Jemali*/, Syafinie Majid*, Marinah Muhammad*,**
NurNajwa Dina Abong* and Juliana Yahya*****
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** Tropical Rainforest Research Centre (TRACE)
*** Kelantan Forestry Department

The wood-based industry (WBI) put forth the entrepreneurs of big companies to small-medium enterprises (SMEs) business which is run by indigenous or Malaysian Bumiputera. The WBI in Kelantan state contributes a significant commitment to economic earnings. Statistics show that SMEs constitute almost 95% of the total establishments in the furniture industry. In Kelantan, the traditional arts and crafts from wood are one of tangible heritage and their uniqueness is well acknowledged. However, the Covid-19 pandemic eventually had adjusted and left several implications on this sector. Surveys and interviews were carried out to investigate the current status of the WBI and the implications of Covid-19 to 136 licensed wood factories that are distributed throughout ten main districts in Kelantan. 45% of them run the sawmill factories. The remaining are in veneer, panel products as well as furniture and furniture components industry. The wood-based industry in Kelantan offered vast job opportunities and increase Malaysia's export. Among the issues and uncertainty discussed were employment, taxes, losses as well as government policy and responsibility. The opportunities such as initiatives to help the SMEs was also discussed in this paper.

Keywords: Wood-based industry, Covid-19, MCO implication, small-scale, Kelantan

P 17

Assessing potential educational tourism spots at Bedal Island in Delta Tumpat, Kelantan

Aqilah Abdul Rahim*, Noor Janatun Naim Jemali*/, Syafinie Majid*, Marinah Muhammad*, Manju Shobashini Nadaraju*, Nur Najwa Dina Abong***, Suryani Mohd Nordin*** and Melati Yusof*****

* Faculty of Earth Science, Universiti Malaysia Kelantan Jeli Campus

**Tropical Rainforest Research Centre

***Kelantan Forestry Department

Mangrove forests in Malaysia cover the shoreline of Peninsular Malaysia, Sabah, and Sarawak at about 630 thousand hectares. Delta Kelantan which is located in the district of Tumpat is one of the largest mangrove areas on the east coast of Malaysia with 13,000 ha in area. This area comprises 17 islands and Bedal Island (BI) is one of them. BI holds a diversity of mangrove flora and fauna species. Over two decades, the Kelantan Forestry Department, in partnership with the Peninsular Malaysia Forestry Department and other private agencies has conducted various mangrove conservation initiatives to safeguard the coastline and maintain the mangrove forest ecosystem. With this unique and rich mangrove environment ecosystem as well as desirable settings, the BI is potentially turned into an educational tourism site to boost tourist destinations in Kelantan. Therefore, this paper aims to assess the local perception towards the development of BI for the edutorism area using surveys and interview approaches. A total of 246 responses from various demographic backgrounds were gathered. Results found that the majority of the respondents agreed and have a positive perception of Bedal Island being the first edutourism spot in Kelantan based on mangrove forest ecosystem services provided by the area.

Keywords: mangrove, perception study, Tumpat, edutourism, small island, conservation

Information

1. Conference Program

Day	Time	Program	Venue
Oct. 26, Wed	9:00 - 10:00	Registration	Lobby
	10:00 - 12:40	Opening Session	B1
	14:00 - 17:30	Oral Sessions	B2, B3-4, B6-7
	17:30 - 20:30	Welcome BBQ	Tropical Beach
Oct. 27, Thu	9:00 - 12:30	Oral Sessions	B2, B6-7
	12:30 - 14:30	Poster Sessions	Lobby in front of B2
	14:30 - 17:30	Oral Sessions	B2, B6-7
Oct. 28, Fri	9:00 - 17:30	In-Conference Tour	
	18:30 - 21:30	Farewell Party	Paikaji, Naha City
Oct. 29, Sat	13:00 - 17:30	Public Symposium	B1
Oct. 30, Sun - 31, Mon	All day	Post-Conference Excursion	

2. Venue

Okinawa Convention Center, Conference Building B
4-3-1 Mashiki, Ginowan City Okinawa 901-2224, Japan

3. Public Symposium

Considering the future of the forest management of Yambaru, a World Natural Heritage designated in 2021 : From historical and international perspectives

Date: Saturday, October 29
Place: Okinawa Convention Center, Conference Building B　Room B1

Timetable:

13:00　Opening remarks: Shoji Inoue (Vice President, University of the Ryukyus)

〔Part I〕Symposium Lecture

13:10　Yuei Nakama (Professor emeritus, University of the Ryukyus)
"Forest history of Okinawa**:** Considering the significance of Saion's philosophy of mountain forest management"

13:50　Atsushi Takashima (University of the Ryukyus)
"Current status of forest management approach in Yambaru, Okinawa Island"

14:30　Rastislav Sulek (Technical University in Zvolen, Slovakia) and Peter Herbst (Forestry expert & lawyer, Villach, Austria)
"The forest use, protection, and recreation interface: from a European perspective"
(1) General concept of forest management in protected areas (Sulek)
(2) Forest multifunctionality in Austria – balancing recreation, protection, and use (Herbst)

15:20　Break

〔Part II〕Panel Discussion

15:40 Panel Discussion
Panelists: Four of the Speakers, Yuei Nakama, Atsushi Takashima, Rastislav Sulek, and Peter Herbst
Yuki Ando (Ministry of the Environment, Amami-Okinawa Natural Environment Office)
Takamasa Nakazato (Okinawa Prefecture, Forest Management Division)
Hiromi Kamigaichi (Endemic Garden H, Co. Ltd.)
Coordinator: Ikuo Ota (University of the Ryukyus)

17:10 Closing Remarks: Hiroo Kondo (Chief, Okinawa Prefecture, Forest Management Division)
17:20 The end of the symposium

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IUFRO 3.08.00 Small-scale Forestry

University of the Ryukyus

The Japanese Forest Economic Society

IUFRO 9.06.00 Forest Law and Environmental Legislation

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Forest Management Association of Japan

National Forestry Extension Association in Japan

Japan Federation of Wood Industry Associations

National Federation of Forest Owners' Co-operative Associations

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